WBN2Public Resource

From: Boyd, Desiree L [dlboyd@tva.gov]
Sent: Thursday, August 23, 2012 2:21 PM
To: Epperson, Dan; Wilson, George; Poole, Justin
Cc: Arent, Gordon; Hamill, Carol L; Boyd, Desiree L
Subject: TVA letter to NRC_08-23-12_Part 70 Extension Request
Attachments: 08-23-12_Part 70 Extension Request_Final.pdf

Please see attached TVA letter that was sent to the NRC today.

Thank You,

~*~*~*~*~*~*~*~*~*~*~*~

Désireé L. Boyd

WBN Unit 2 Licensing

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423-365-8764

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August 23, 2012

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Director, Office of Nuclear Material Safety and Safeguards
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 2 | 10 CFR § 70.33
NRC Docket No. 50-391

Subject: WATTS BAR NUCLEAR PLANT (WBN) – UNIT 2 – REQUEST FOR RENEWAL OF SPECIAL NUCLEAR MATERIAL (SNM) LICENSE NO. SNM-2014

The U.S. Nuclear Regulatory Commission (NRC) issued Material License SNM-2014 to TVA on June 14, 2011 (Reference 1). The license was issued to provide for the receipt of the new fuel necessary for the first cycle of operation at WBN Unit 2 prior to the issuance of a 10 CFR Part 50 Operating License. The Part 70 license currently has an expiration date of June 30, 2013. TVA respectfully requests that NRC renew the SNM with an expiration date of September 30, 2016. The additional time requested will allow TVA to complete the engineering, construction, and testing necessary to obtain an operating license for WBN Unit 2. TVA is currently in possession of the fuel authorized by license SNM-2014. The fuel is stored and maintained in accordance with the requirements of the license. The TVA Board of Directors authorized the continuation of construction activities and completion of WBN Unit 2 on April 26, 2012, based on the schedule and resource requirements of the estimate to complete the project. Reference 2 provided a request for an extension of the WBN Unit 2 Construction Permit (CPPR-92) until September 30, 2016. Appropriate contingencies were incorporated into the requested CP extension with respect to both the time and resources required. The requested license extension date was chosen to match that requested for the construction permit extension.

TVA reviewed the WBN Unit 2 10 CFR Part 70 Safety Analysis Report (SAR) and has incorporated updated information. Enclosure 1 provides an overview of the review undertaken as a part of this license renewal request. It also outlines the basic assumptions and approach used to evaluate the impact of the use of new information. Enclosure 2 provides a discussion of and a basis for each of the changes to the SAR. This evaluation concluded that the changes do not result in a substantive change in the previous conclusions with respect to safety. Enclosure 3 provides a mark-up of the Part 70 SAR, and Enclosure 4 provides a copy of the SAR with the changes incorporated.

In view of the above, TVA submits that pursuant to the requirements of 10 CFR § 70.33 and 10 CFR § 70.34, good cause exists for the renewal of the WBN Unit 2 Special Material License SNM-2014 and that the renewal is for a reasonable period of time. There are no new commitments contained in this letter. If you have any questions, please contact Gordon Arent at (423) 365-2004.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 23rd day of August, 2012.

Respectfully,

Raymond A. Hruby, Jr.
General Manager, Technical Services
Watts Bar Unit 2

References:
1. NRC letter dated June 14, 2011, "Issuance of Special Nuclear Materials License No. SNM-2014 for Watts Bar Nuclear Plant, Unit 2"
2. TVA letter to NRC dated May 17, 2012, "Watts Bar Nuclear Plant (WBN) – Unit 2 – Request for Extension of Construction Permit CPPR-92"
3. TVA letter to NRC dated November 12, 2009, "Application for a Special Nuclear Material License for Watts Bar Nuclear Plant Unit 2 in Accordance with 10 CFR 70, 'Domestic Licensing of Special Nuclear Material'"
4. TVA letter to NRC dated July 30, 2010, "Response to Request for Additional Information Regarding the Safety Evaluation Report for 10 CFR 70 License Application for Watts Bar Nuclear Plant, Unit 2"
5. TVA letter to NRC dated September 17, 2010, "Watts Bar Nuclear Plant (WBN) Unit 2 – Response to NRC Question Regarding WBN Unit 2 Emergency Plan (TAC No. ME0853)"
6. TVA letter to NRC dated January 25, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 - Submittal Concerning Procedures for Unit 2 Special Nuclear Material"
7. TVA letter to NRC dated April 29, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 - New Fuel Receipt - Response to Request for Additional Information"

Enclosures:

1. Watts Bar Nuclear Plant Unit 2 – Request for Renewal of Special Nuclear Material License No. SNM-2014
2. Discussion and Evaluation of Changes to the WBN Unit 2 Part 70 SAR
3. Watts Bar Nuclear Plant Unit 2 – Revised Part 70 Safety Analysis Report – Markup
4. Watts Bar Nuclear Plant Unit 2 – Revised Part 70 Safety Analysis Report – Changes Incorporated
5. TVA Annual Report Form 10-K-2011
6. TVA Organizational Topical Report TVA-NPOD89-A

cc (Enclosures):

U. S. Nuclear Regulatory Commission
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Atlanta, Georgia 30303-1257

NRC Resident Inspector Unit 2
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Enclosure 1

WATTS BAR NUCLEAR PLANT (WBN) – UNIT 2 – REQUEST FOR RENEWAL OF SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-2014

By letter dated November 12, 2009 (Reference 3), TVA requested a Special Nuclear Material (SNM) license for WBN Unit 2 to allow receipt, inspection, and storage of 193 fuel assemblies containing U_{235} with an enrichment of up to 5% for the initial core loading upon receipt of an operating license for the plant. Enclosure 1 of Reference 3 provided the WBN Unit 2, 10 CFR Part 70 Safety Analysis Report (SAR). SNM License SNM-2014 was issued by the NRC June 14, 2011, with an expiration date of June 30, 2013. TVA is currently in possession of the SNM authorized by license SNM-2014. The SNM is stored and maintained in accordance with the requirements of the license. On April 26, 2012, the TVA Board of Directors approved an extension of the project schedule with a likely fuel load date of June 2015. The approval also included project schedule margin to account for a variety of uncertainties that could extend the fuel load date into 2016. TVA submitted a request to extend the WBN U2 Construction Permit (CP) to September 30, 2016, on May 12, 2012 (Reference 2). TVA requests that license SNM-2014 be renewed with an expiration date of September 30, 2016, to be consistent with the CP extension.

10 CFR § 70.33 provides the requirements for renewing an existing SNM license. In developing this renewal request, TVA reviewed Reference 3 and the enclosed Part 70 SAR, SNM License SNM-2014 (Reference 1), the NRC Safety Evaluation Report for Special Nuclear Material License Application Watts Bar Nuclear Plant, Unit 2 Spring City, Tennessee, dated June 2011 (also provided in Reference 1), and the other related correspondence identified in References 4, 5, 6, and 7 to determine whether information updates were required. The majority of the information in the SAR was incorporated by reference and had been previously submitted to and approved by the NRC. This information included but was not limited to the FSAR; NUREG 0498 and Supplement 1, “Final Environmental Impact Statement for Watts Bar Nuclear Plant”; TVA’s Final Supplemental Environmental Impact Statement for the Completion and Operation of Watts Bar Nuclear Plant Unit 2; the Radiological Emergency Plan; and the Physical Security Plan and Safeguards Contingency Plan.

The review concluded that Chapters 1, 2, 3, 4, and 11 of the Part 70 SAR needed to be updated to reflect all changes that have occurred since the SNM license application was submitted.

The review concluded that the following WBN U2 Part 70 SAR chapters required no changes or updates:

- Chapter 5 – Nuclear Criticality Safety
- Chapter 6 – Chemical Process Safety
- Chapter 7 – Fire Protection
- Chapter 8 – Emergency Management
- Chapter 9 – Environmental Protection
- Chapter 10 – Decommissioning

Enclosure 3 and Enclosure 4 of Reference 3, respectively, provided the SNM Control summary and the Physical Security Plan/Contingency Plan Summary. These have not changed.

Enclosure 1

The following major documents were used or provided as part of the request for SNM License SNM-2014. The original and current revision level of the documents and whether they are being resubmitted as part of this extension request is provided in the table below:

Original Document	Current Version	Resubmitted
Form 10K-2008	Form 10K-2011	Enclosure 5
TVA Organizational Topical Report TVA-NPOD89-A Revision 18	Revision 19	Enclosure 6
Physical Security Plan, Training and Qualification Plan, Safeguards Contingency Plan and Independent Spent Fuel Storage Installation Security Program, Revision 11	Same – Revision 11	No
WBN FSAR Amendment 94	Amendment 108	Submitted by TVA Letter to NRC dated March 5, 2012
Radiological Emergency Plan		No – Maintained in accordance with 10 CFR § 50.54 (q)

In the initial application and this extension request, TVA was not required to provide an Integrated Safety Analysis (ISA) Summary as described in 10 CFR Part 70 Subpart H as the requirements do not apply to storage licenses and no fuel fabrication was authorized. As such, the applicable sections of Part 70 do not specify a formal change process for the WBN Unit 2 Part 70 SAR such as that described in 10 CFR § 70.72.

The new fuel storage area, spent fuel pool, and fuel handling equipment are shared by both Unit 1 and Unit 2 and are under the control of Unit 1 in accordance with the Unit 1 10 CFR Part 50 Operating License. The requirements for the plant staff responsible for both new and spent fuel, fuel handling, plant operations, emergency planning, and security are controlled in accordance with the provisions of the Unit 1 Operating License as well as SNM License SNM-2014. Changes to either the hardware or the organizations are controlled by the change control provisions of 10 CFR § 50.59 or the applicable sections of 10 CFR § 50.54, including when formal NRC approval is required prior to the implementation of a change and notification requirements when changes are made that do not require prior NRC approval.

Enclosure 2 provides a discussion of the changes made in each SAR Section. An evaluation of the changes is included in these discussions.

Enclosure 3 provides a marked up version of the WBN Unit 2 Part 70 SAR showing both inserts and deletions, and Enclosure 4 provides a clean version of the SAR with the changes incorporated.

Enclosure 1

In accordance with the requirements of 10 CFR § 70.33, "Renewal of licenses" TVA submits Enclosures 1 through 6 which contain the required license application information including necessary updates.

In view of the above, TVA submits that pursuant to the requirements of 10 CFR § 70.33, good cause exists for the renewal of the WBN Unit 2 SNM License SNM-2014 and that the extension is for a reasonable period of time.

Enclosure 2

Discussion and Evaluation of Changes to the WBN Unit 2 Part 70 SAR

As noted in Enclosure 1, an integrated safety analysis as defined in 10 CFR § 70.62 is not required for the WBN Unit 2 SNM license. The evaluations performed below are to facilitate the license extension request as opposed to providing required information and evaluations. The criteria provided in 10 CFR § 70.72 also invoke the performance requirements of 10 CFR § 70.61. With respect to the SNM present at the WBN site, the risk of a nuclear criticality accident has been limited by assuring that, under normal and credible abnormal conditions, all nuclear processes are subcritical. The applicable nuclear processes are receipt, inspection, movement, and storage of unirradiated fuel assemblies. In the absence of a criticality event, there are no dose effects from the Unit 2 fuel assemblies that would remotely approach, much less exceed the dose criteria of 10 CFR § 70.61. A fuel handling accident in which one of the Unit 2 fuel assemblies is dropped on an irradiated Unit 1 fuel assembly in the spend fuel pool is the only design basis event with dose consequences associated with the SNM license. This event, described in Chapter 3, is evaluated against the criteria of 10 CFR § 50.67 and 10 CFR Part 100. A description of each of the changes is provided below. An evaluation of each of the changes using the 10 CFR § 70.72 criteria is provided below.

Chapter 1 – General Information

1.2.1 Corporate Identity

The composition of the TVA Board of Directors is discussed and the 2009 submittal has changed.

The Form 10-K-2011 (Enclosure 5) shows the Chairman as Dennis C. Bottorff and no vacancies although three members including the chairman terms expired not later than the end of the 2011 Congressional session. The current Chairman is William B. Samson, and there are three vacancies.

Tom Kilgore continues as the Chief Executive Officer (CEO), and Preston D. Swafford continues to serve as an Executive Vice President and the Chief Nuclear Officer (CNO). The Chief Operating Officer (COO), William B. McCollum, Jr., has retired and the COO position has been eliminated. The current members of the Board of Directors and TVA's Executive Officers are provided on TVA's external web site www.tva.gov. Form 10-K-2011 (Enclosure 5) is the most recent version of the TVA annual report and names the Board members and Executive Officers in place at the time of the report's publication. The web site provides more current information. All of the Board members and TVA's Executive Officers are citizens of the United States of America.

These changes are administrative in nature, are consistent with the requirements of the TVA Act, and do not affect the criteria discussed in 10 CFR § 70.72

1.2.2 Financial Qualifications

Change the reference from the 2008 to the 2011 annual report, and a copy of the 2011 report is provided in Enclosure 5. This change is administrative in nature and does not affect the criteria discussed in 10 CFR § 70.72.

Enclosure 2

Discussion and Evaluation of Changes to the WBN Unit 2 Part 70 SAR

1.2.4 Authorized Uses

This section was written when Unit 2 was applying for an SNM license. It has been revised to request an extension to SNM License SNM-2014. This change does not affect the criteria discussed in 10 CFR § 70.72.

1.3.1 Site Geometry

The section states that WBN is on a 1770 acre reservation with the Watts Bar Dam and Hydroelectric Plant, the Watts Bar Steam Plant, the TVA Central Maintenance Facility, and the Watts Bar Resort. The Watts Bar Steam Plant has been dismantled, with the exception of the electrical switchyard. The steam plant is also discussed in Section 1.3.2, Demographics. This section states that the plant is not currently operating but could be reactivated in the future. This is no longer the case. The section has been revised to delete the discussions of the steam plant.

The turbine missile analysis provided in Chapter 3 of the Unit 2 FSAR and the Unit 1 UFSAR included the effects of a missile from the Watts Bar Steam Plant. Because the steam plant has been dismantled, the strike probability for a steam plant turbine missile is zero. The analyses provided in the UFSAR and FSAR are not being revised at this time as they remain valid and conservative as the strike probability from a steam plant missile continues to be included in the probability calculation. As such, no changes to the nuclear plant are being made as a result of this change. A new type of accident has not been created; no new processes, technologies, or control systems are being used as a result of this change; and dismantling the steam plant did not result in altering any item relied upon for safety. TVA concluded that this is an acceptable change.

1.3.2 Demographics

As noted above the Watts Bar Steam Plant has been dismantled. The section has been revised to delete the discussions related to the steam plant.

1.3.3 Meteorology

The tornado information provided at the top of page 1-11 has been deleted as it duplicated the same information provided on pages 1-12 and 1-13. There were minor updates to the snowfall totals provided in this section. The deletion of duplicative tornado information is editorial and does not affect the criteria discussed in 10 CFR § 70.72. Snowfall in the Tennessee Valley is generally low and does not represent a condition that controls plant design. The updated snowfall information does not change that. No plant design features or changes to analyses were required as a result of these minor changes. The evaluation concludes that a new type of accident has not been created, no new processes, technologies, or control systems are being used as a result of this change, and the change did not result in altering any item relied upon for safety. TVA concluded that this is an acceptable change.

1.3.4 Hydrology

Technical information in this section remains current with the exception of the discussion regarding probable maximum flood (PMF) level provided in the second paragraph and the probable minimum flow past the site discussed in the fourth paragraph. In addition, there are two editorial changes to referenced FSAR tables as a result of renumbering of these tables in the FSAR.

The second paragraph previously stated that "Determination of the maximum flood level included consideration of postulated dam failures from seismic and hydrologic causes. The maximum flood Elevation 734.9 ft would result from an occurrence of the probable maximum storm. Allowances for concurrent wind waves could raise lake levels to Elevation 736.2 with run up on the 4:1 slopes approaching the plant reaching about Elevation 736.9."

TVA has revised the hydrologic analysis of the WBN site resulting in an increase in the PMF. As a result of this revision, the second and third sentences of the second paragraph are revised to state: "Wind wave run up on the 4:1 slopes approaching the Diesel Generator Building reaches elevation 741.6 ft, on the critical wall of the Intake Pumping Station reaches elevation 741.7 ft, and on the walls of the Auxiliary, Control and Shield Buildings reaches elevation 741.0 ft."

The fourth paragraph states that "The probable required minimum flow past the site is estimated to be 2,000 cubic feet per second (cfs), which is more than adequate for plant water requirements." As a result of the update to the hydrologic analysis, the fourth paragraph is revised to state: "The probable minimum flow past the site is estimated to be 3,200 cubic feet per second (cfs), which is more than adequate for plant water requirements." This change has no impact on fuel storage.

The reference to FSAR Table 2.4-4 is revised to FSAR Table 2.4-1 in the third paragraph, and to FSAR Table 2.4-10 is revised to FSAR Table 2.4-15 in the fifth paragraph. These are editorial changes as a result of renumbering WBN Unit 2 FSAR tables.

The technical changes to PMF and probable minimum flow past the site are all supported by the updated hydrologic analysis, which includes but is not limited to use of more recent flood history information for calibration of the runoff and stream course model, changes to the inputs used for determining probable maximum precipitation (PMP) and resulting PMF and design basis flood (DBF) elevations at the plant site including changes to the runoff and stream course model, changes to the determination of seismically induced dam failure flood impacts at the plant site, changes to the analysis for determining that adequate water is available for operation of WBN Unit 1, and updates to flooding protection requirements.

WBN is designed in accordance with the Regulatory Position 2 of Regulatory Guide (RG) 1.59, Revision 2, August 1977, which specifies that at least those structures, systems, and components necessary for cold shutdown and maintenance thereof are designed with hardened protective features to remain functional while withstanding the entire range of flood conditions up to and including the worst site-related flood probable (e.g., PMF, seismically induced flood, hurricane, surge, seiche, heavy local precipitation) with coincident wind-generated wave action as discussed in Regulatory Position 1 of the RG. The updated hydrologic analysis conforms to the guidance of RG 1.59.

The structures housing systems, structures, and components (SSCs) that are important to fuel storage include the Auxiliary Building, the Intake Pumping Station (IPS), and the Diesel Generator Building.

The Auxiliary Building is designed to flood, with the postulated flood level inside the building consisting of PMF plus 0.5 ft surge, or elevation 739.7 ft. Specific to fuel storage, the updated hydrologic analysis has no adverse impact. The top of the spent fuel pool and new fuel storage area are above the PMF including the effects of surge, located at elevation 757.0 ft. Thus, there is no possibility of flood water entering either the vault or the spent fuel pool. The spent fuel pooling cooling water pumps are located above the PMF including the effects of surge, and are not impacted. Therefore, there is no impact on equipment located inside the Auxiliary Building important to fuel storage.

The IPS houses Essential Raw Water Cooling (ERCW) equipment. As a result of the revised hydrologic analysis, ERCW equipment required for flood mode operation located on elevation 722.0 ft of the IPS could be impacted by the PMF. For the IPS, surge is accounted for by considering the sum of the wind wave and runup on the critical face of the IPS combined with the PMF stillwater elevation, which conservatively results in an internal flood elevation of 741.7 ft for the IPS. However, temporary compensatory measures are in place to ensure adequate flood protection if a PMF event were to occur by preventing flood waters from passing from the IPS elevation 741.0 ft which is exposed to the PMF, down stairwells and doors W001 and W002 at elevation 741.0 ft, to elevation 722.0 ft. Permanent plant modifications are planned to ensure flood protection of the ERCW equipment important to fuel storage. Therefore, there is no impact on equipment located inside the IPS important to fuel storage.

The updated hydrologic analysis increases the DBF on the 4:1 slopes approaching the Diesel Generator Building to elevation 741.6 ft, which is 0.4 ft below the Diesel Generator Building operating floor elevation of 742.0 ft. Therefore, there is no impact on equipment located inside the Diesel Generator Building important to fuel storage.

Chapter 2 – Organization and Administration

2.1.1 Corporate Functions, Responsibilities and Authorities

Section 2.1.1 of the WBN Unit 2 Part 70 SAR was taken directly from Organizational Topical Report TVA-NPOD89-A, “TVA Nuclear Power Group Organization Description.” The Topical Report has been revised since the Part 70 SAR was submitted, and Section 2.1.1 has been revised accordingly. A copy of the current revision of Organization Topical Report is provided in Enclosure 6. Discussions of the Office of Inspector General and Concerns Resolution were removed from the topical report in the most recent revision as they are agency level functions. The discussions of these functions have been retained in Section 2.1.1 but are noted to be independent of the Organizational Topical Report.

The following represent recent organizational changes that have occurred but have not been incorporated into the Topical Report as of the date of this license extension request. The Chief Operating Officer position has been eliminated. The Nuclear Generation Development and Construction organization has been changed to Nuclear

Construction. The Generation Development functions have moved to another organization within TVA. The Senior Vice President, Nuclear Construction, is responsible for the construction of additional nuclear generation assets. The CNO and the Senior Vice President, Nuclear Construction, directly report to the CEO instead of to the Chief Operating Officer. Section 2.1.1 has been revised accordingly.

The responsibility for and the control of SNM within the on-site organizations has not changed. These changes do not change the management reporting relationships or oversight of SNM associated with SNM-2014.

2.3.1.4 Preventative Maintenance

The maintenance program at WBN conforms to current industry practice and the Maintenance Rule (10 CFR § 50.65). The program uses predictive, periodic, and planned maintenance to maintain equipment. Consistent with this regulatory guidance and industry practice, the significance of components to safety, plant operation, and conformance with regulatory requirements has been evaluated and graded. It has been determined that it is acceptable for certain non-critical components to be allowed to run to failure. Because the program allows "run to failure;" the sentence reading "PM is performed before equipment failure" has been deleted. The same change has been made in Chapter 11 of the Part 70 SAR. This change does not impact either the Safety Conditions or the Safeguards Conditions of the Unit 2 SNM license, and it does not affect any other statements provided in the Part 70 SAR. The evaluation of this program change concludes that a new type of accident has not been created; no new processes, technologies, or control systems are being used as a result of this change. The change did not result in altering any item relied upon for safety with respect to new or spent fuel storage. TVA concluded that this is an acceptable change.

Chapter 3 – Integrated Safety Analysis and Summary

Consequences of a Fuel Handling Accident (FHA)

A discussion of the offsite dose consequences of a FHA was provided in the SAR. The discussion was taken from Chapter 15.5.6 of the WBN Unit 2 FSAR. A recent amendment to the Unit 2 FSAR included an updated FHA analysis. For new, unirradiated fuel, a FHA in the containment during initial core loading will not have offsite radiological consequences. The event of concern would be damage to an irradiated fuel assembly in the spent fuel pool caused by mishandling a new Unit 2 fuel assembly. The FHA analysis for Unit 2 outside of containment has been reanalyzed using the alternate source term methodology of RG 1.183. The following discussion is taken from the updated FSAR Section 15.5.6.2.

> The analysis of a postulated fuel handling accident in the Auxiliary Building refueling Area is based on Regulatory Guide 1.183. i.e., Alternate Source Terms (AST).The bases for evaluation are:
>
> *(1)* In the Regulatory Guide 1.183 analysis, the accident occurs 100 hours after plant shutdown. Radioactive decay of the fission product inventory during the interval between shutdown and placement of the first spent fuel assembly into the spent fuel pit is taken into account.

(2) In the Regulatory Guide 1.183 analysis, damage was assumed for all rods in one assembly.

(3) The assembly damaged is the highest powered assembly in the core region to be discharged. The values for individual fission product inventories in the damaged assembly are calculated assuming full-power operation at the end of core life immediately preceding shutdown. Nuclear core characteristics used in the analysis are given in Table 15.5-21. A radial peaking factor of 1.65 is used.

(4) The Regulatory Guide 1.183 analysis assumes all of the gap activity in the damaged rods is released to the spent fuel pool and consists of 8% I-131, 10% Kr-85, and 5% of other noble gases and other halogens.

(5) Noble gases released to the Auxiliary Building spent fuel pool are released through the Auxiliary Building vent to the environment.

(6) In the Regulatory Guide 1.183 analysis, the iodine gap inventory is composed of inorganic species (99.85%) and organic species (0.15%).

(7) In the Regulatory Guide 1.183 analysis, the overall inorganic and organic iodine spent fuel pool decontamination factor is 200.

(8) In the Regulatory Guide 1.183 analysis, all iodine escaping from the Auxiliary Building spent fuel pool is exhausted unfiltered through the Auxiliary Building vent.

(9) No credit is taken for the ABGTS or Containment Purge System Filters in the analysis.

(10) No credit is taken for natural decay either due to holdup in the Auxiliary Building or after the activity has been released to the atmosphere.

(11) The short-term (i.e., 0-2 hour) atmospheric dilution factors at the exclusion area boundary and low population zone given in Table 15A-2 are used. The thyroid dose utilizes ICRP-30 [25] iodine dose conversion factors. Doses are based on the dose models presented in Appendix 15A.

Fuel Handling Accident Results

The radiation dose results of the Regulatory Guide 1.183 fuel handling accident (FHA) are given in Table 15.5-23. Alternate source term (AST) described in RG 1.183 was selectively used to evaluate the FHA due to an event in the spent fuel pool located in the Auxiliary Building or in the containment when the equipment hatch or both doors in a personnel air lock are open. As part of this selective implementation of AST, the following assumptions are used in the analysis:

- The total effective dose equivalent (TEDE) acceptance criterion of 10 CFR § 50.67(b)(2) replaces the previous whole body and thyroid dose guidelines of 10 CFR § 100.11.
- The gap activity is revised to be consistent with that required by RG 1.183.
- The decontamination factors were changed to be consistent with those required by RG 1.183.
- No Auxiliary Building isolation is assumed.
- No filtration of the release from the Containment or the spent fuel pool to the environment by the Containment Purge filters or the ABGTS is assumed.

The evaluation for the FHA at the spent fuel pool is a bounding analysis for a dropped assembly in containment when the containment is open. The release point for the containment purge system is the Unit 2 shield building stack. The X/Qs are lower for this release point than for the normal auxiliary building exhaust. In addition, any release from the shield building stack would go through the purge system HEPA and Charcoal filter assemblies prior to release. Currently, when the purge lines isolate on high radiation, the auxiliary building also isolates and ABGTS is actuated. The release point for ABGTS is the shield building stacks and the releases are filtered through HEPA and Charcoal assemblies. Thus AST analysis for the FHA in the Auxiliary Building that considers no filtration is conservative and acceptable as the basis for the containment open evaluation.

The thyroid, gamma, and beta doses for FHAs in the Auxiliary and the open containment are given in Table 15.5-23 for the exclusion area boundary and low population zone. These doses are less than 25% of the 10 CFR 100.11 limits of 300 rem to the thyroid, and 25 rem gamma to the whole body and less than the 10 CFR § 50.67 limit of 25 rem TEDE. These doses are calculated using the computer code FENCDOSE [16].

The whole body, beta, and thyroid doses to control room personnel from the radiation sources discussed above are presented in Table 15.5-23. The doses are calculated by the COROD computer code [17]. Parameters for the control room analysis are found in Table 15.5-14. The dose to whole body is below the 10 CFR § 50 Appendix A, GDC 19 limit of 5 rem for control room personnel, and the thyroid dose is below the limit of 30 rem and the 10 CFR § 50.67 limit of 5 rem TEDE.

1. Does the proposed change create new types of accident sequences that, unless mitigated or prevented, would exceed the performance requirement of 70.61 and that have not previously been described in the integrated safety analysis summary?

Response: No.
An FHA is an accident that is currently part of the plant's design basis. That is not being changed. The change is to the method for determining the dose consequences assuming the accident has occurred. The equipment affected by the change are not accident initiators but are relied upon after an accident has been initiated to help mitigate the consequences of the FHA. Application of the AST does not involve any physical changes to the plant design. As a result, the proposed changes do not affect any of the parameters or conditions that could contribute to the initiation of any accidents. Since design basis accident initiators are not being altered by adoption of the AST analysis of the FHA, the probability of an accident previously evaluated is not affected. The dose consequences of a FHA have been re-evaluated utilizing the AST methodology recognized by 10 CFR § 50.67 and the guidance contained within Regulatory Guide 1.183. Based upon the results of this analysis, TVA has demonstrated that, with the requested changes, the dose consequences of the FHA are within the appropriate acceptance criteria of 10 CFR § 50.67(b)(2) and Table 6 of RG 1.183. The AST involves quantities, isotopic composition, chemical and physical characteristics, and release timing of radioactive material for use as inputs to the dose analysis of the FHA. Selective implementation of the AST does not create any conditions that could significantly increase the consequences of any of the events being evaluated.

Therefore, the change does not create a new accident.

2. Does the proposed change use new processes, technologies, or control systems for which the licensee has no prior experience?

Response: No.
The analysis changes do not use new processes, technologies or control system, since no physical changes are being made to the plant. This change does not impact any plant systems that are potential accident initiators. The AST methodology involves quantities, isotopic composition, chemical and physical characteristics, and release timing of radioactive material for use as inputs to the dose analysis of the FHA.

3. *Does the proposed amendment involve a significant reduction in a margin of safety?*

Response: No.
TVA has modified the methodology for responding to a FHA. Selective implementation of the AST methodology is relevant only to the calculated dose consequences for the FHA. The radiological analysis of the FHA does not credit containment isolation, operation of the Auxiliary Building Gas Treatment System, or operation of the Reactor Building Purge Air Cleanup Units. The results of the revised dose consequences analysis demonstrate that the regulatory acceptance criteria regarding onsite and offsite doses are met for the FHA. In addition, the selective implementation of the AST methodology does not affect the transient behavior of non-radiological parameters (e.g., RCS pressure, Containment pressure) that are pertinent to a margin of safety. Therefore, the proposed change does not involve a significant reduction in the margin of safety.

Based on the above, TVA concludes that the change in analytical methodology is consistent with NRC guidance and dose limits of 10 CFR § 50.67.

The NRC review of the Regulatory Guide 1.183 FHA for WBN Unit 2 was documented in NUREG-0847, Supplement 25, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Unit 2. The review states that "The staff concludes that the doses estimated by TVA for the WBN Unit 2 FHA will meet the requirements of 10 CFR § 50.67 and the guidelines of RG 1.183 and are, therefore, acceptable."

A license amendment request for WBN Unit 1 providing the same analysis was submitted to the NRC for review and approval on June 13, 2012.

Chapter 4 – Radiation Protection

There is one change to this chapter. The Containment Vent Isolation (CVI) signal will be modified to accommodate and improve two unit operation as currently described in Section 4.6.2, Ventilation.

The CVI will be modified so that if both containments are open to the Auxiliary Building, a CVI in one unit will initiate a CVI on the other unit to assure Auxiliary Building Secondary Containment Enclosure (ABSCE) integrity. A CVI signal isolates the normal Auxiliary Building ventilation system so that any releases would be through a release path that includes HEPA filters and charcoal adsorbers. As noted in the discussion of the FHA provided in Chapter 3, isolation of the normal Auxiliary Building ventilation system and establishment of the ABSCE is not assumed to occur in the new accident analysis.

This change improves the CVI response and would reduce radioactive releases in the event of FHA. However, no credit for this change was included in the offsite and control room dose analysis provided in the WBN Unit 2 Part 70 SAR or in the WBN Unit 2 Part 50 FSAR. This change does not create a new type of accident. The change does not use new processes, technologies or control system for which the licensee has no prior experience. The change uses existing control systems to perform an additional isolation function that is the same type of action as the system currently performs. The addition of this feature would potentially reduce the main control room and offsite dose consequences of a FHA assuming both WBN units were in an outage. However, no credit for this isolation feature is taken in the FHA dose analysis.

Chapter 11 – Management Measures

Section 11.2 Maintenance

The description of the Preventative Maintenance program in this section has been revised in the same manner as was done in Chapter 2.

Enclosure 3

Watts Bar Nuclear Plant Unit 2 – Revised Part 70 SAR – Markup

Chapter 1 Table of Contents

1 GENERAL INFORMATION

This section of the application contains a general description of the Watts Bar Nuclear (WBN) Plant Site and the types of activities that will be performed when receiving, possessing, inspecting, and storing special nuclear materials in the form of 193 fully assembled fuel assemblies for the initial core of the WBN Unit 2 reactor.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed using the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 1 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 1.1 Facility and Process Description				
Facility Location, Site Layout, and Surrounding Characteristics	70.22(a)(7) & 70.65(b)(1)	1.1.4.3(2)	2.1.1 Site Location and Description	1.2: General Plant Description
Facilities Description	70.22(a)(7) & 70.65(b)(2)	1.1.4.3(2)	2.1.1 Site Location and Description	1.2.2: Facility Description
Process Descriptions	70.22(a)(7) & 70.65(b)(3)	1.1.4.3(3)	9.1.1 – Criticality Safety of Fresh and Spent Fuel Storage and	9.1.1: New Fuel Storage 9.1.2: Spent Fuel Storage 9.1.4: Fuel Handling System

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 1 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
			Handling 9.1.2 – New and Spent Fuel Storage	
Raw materials, by-products, wastes, and finished products		1.1.4.3(4)	None	None
Section 1.2 Institutional Information				
Corporate identity	70.22(a)(1)	1.2.4.3(1)		See Section 1.2.1
Financial information	70.22(a) note	1.2.4.3(2)		See Section 1.2.2
Type, quantity, and form of licensed material	70.22(a)(4)	1.2.4.3(3)		See Section 1.2.3
Requested licenses and authorized uses	70.22(a)(2) & 70.22(a)(3)	1.2.4.3(4)		See Section 1.2.4
Special exemptions or special authorizations	70.17	1.2.4.3(5)		See Section 1.2.5
Security of classified information	10 CFR Part 95	1.2.4.3(6)		See Section 1.2.6
Section 1.3 Site Description				
Site Geography	70.65(b)(1)	1.3.3(1)	2.1.1 Site Location and Description	2.1: Geography And Demography
Demographics	70.65(b)(1)	1.3.3(2)	2.1.3	2.1 Geography

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 1 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
			Population Distribution 2.2.1-2.2.2 Identification of Potential Hazards in Site Vicinity	And Demography 2.2: Nearby Industrial Transportation, And Military Facilities
Meteorology	70.65(b)(1)	1.3.3(3)	2.3.1 Regional Climatology/ Local Meteorology	2.3: Meteorology
Hydrology	70.65(b)(1)	1.3.3(4)	2.4.1 Hydrologic Description	2.4: Hydrologic Engineering
Geology	70.65(b)(1)	1.3.3(5)	2.5.1 Basic Geologic an Seismic Information	2.5 Geology, Seismology, and Geotechnical Engineering Summary of Foundation Conditions

1.1 FACILITY AND PROCESS DESCRIPTION

1.1.1 Facility Location, Site Layout, and Surrounding Characteristics

The Watts Bar Nuclear Plant (WBN) Site is located on a site of approximately 1770 acres in Rhea County, Tennessee on the west bank of the Tennessee River at river mile 528. The site is just south of the Watts Bar Dam, approximately 50 miles northeast of Chattanooga, and 31 miles north-northeast of the Sequoyah Nuclear Plant site. WBN Unit 1 was licensed on February 7, 1996, Docket No. 50-390 NFP-90 and operates at 3459 MWt. WBN Unit 2 is presently under construction as authorized by Construction Permit CPPR 92, Docket NO. 50-391 issued by the Atomic Energy Commission on January 23, 1973. On July 7, 2008, the NRC issued an Order extending the construction completion date of Watts Bar Unit 2 to March 31, 2013.

1.1.2 Facilities Description

The major structures are two Reactor Buildings, a Turbine Building, an Auxiliary Building, a Control Building, a Service and Office Building, Diesel Generator Buildings, an Intake Pumping Station, and two natural draft cooling towers. The arrangement of these structures is shown in Final Safety Analysis (FSAR) Figures 2.1-1 through 2.1-5. Plant arrangement plans and cross sections are presented in FSAR Figures 1.2-1 through 1.2-15.

The fuel storage and handling area is located in the Auxiliary Building of WBN. All handling and storage will be within this defined area. The fuel will be inspected in the fuel-handling area and stored in the new fuel storage vault and the spent-fuel storage pit. Detailed elevation and plan views of the Auxiliary Building showing the fuel-handling areas are shown on Figures 1.2-3, 1.2-4, and 1.2-8 of the WBN FSAR, subsection 1.2.3.

New fuel is stored in racks (WBN FSAR Figure 9.1-1). Each rack is composed of individual vertical cells which can be fastened together in any number to form a module that can be firmly bolted to anchors in the floor of the new fuel storage pit. The new fuel storage racks are designed to include storage for 1/3 core for each unit at a center to center spacing of 21 inches. Space between storage positions is blocked to prevent insertion of fuel. The center-to-center distance between new fuel assemblies is sufficient to assure $k_{eff} < 0.98$ when the new fuel storage area is dry or fogged (optimally moderated). For the fully flooded condition assuming cold, clean, unborated water, the value of k_{eff} is less than or equal to 0.95. Under these conditions, a criticality accident during refueling and storage is not considered credible.

All surfaces that come into contact with the fuel assemblies are made of annealed austenitic stainless steel, whereas the supporting structure may be painted carbon steel.

The racks are designed to withstand nominal operating loads as well as SSE and OBE seismic loads in accordance with Regulatory Guides 1.29 and 1.13.

Floor areas of the Auxiliary Building elevation 757 are designated critical lift zones. Lifting of heavy loads in this area is controlled by site procedures.

The new fuel storage racks are located in the new fuel pit area which has a cover that protects the racks from dropped objects. The new fuel storage vault is a reinforced concrete structure. A three inch drain is provided in the new fuel storage vault. This vault is a part of the Auxiliary Building, which is a Seismic Category I Structure. The new fuel storage vault opens on to the elevation 757 floor, but is normally covered by a series of hatches which are designed to withstand the effects of an OBE or SSE. These hatches are removed as necessary during handling of the new fuel. Administrative controls are utilized when a section of the protective cover is removed for handling of the new fuel assemblies.

The spent fuel storage pool is a reinforced concrete structure with a stainless steel liner for leak tightness. This storage pool is a part of the Seismic Category I Auxiliary Building, and is shared between units one and two. Both the liner and pool walls are designed to withstand the effects of an OBE and SSE. The location of the spent fuel storage pool is shown on WBN FSAR Figures 1.2-3 and 1.2-8. The spent fuel storage pool opens onto the elevation 757 floor, and is protected by a guard rail which surrounds the pool. The depth of the pool is sufficient to allow some 26 feet of water shielding (nominally) above the spent fuel. This water depth ensures that the doses on the operating floor from stored spent fuel are negligibly small. The spent fuel storage racks consist of stainless steel structures with cells or receptacles for nuclear fuel assemblies as they are used in a reactor. Twenty-four of these flux trap racks provide 1386 storage positions in eighteen 7 x 8 cell array modules and six 7 x 9 cell array modules. Each rack is supported by four pedestals (one rack has five pedestals) sitting on two-inch thick stainless steel bearing pads which spread the load on the pool floor imposed by the dead load of the fuel assemblies, the maximum uplift force from the spent-fuel bridge hoist, thermal loads, and loads from SSE and OBE.

The spent fuel racks are designed in accordance with the following listed criteria:

(1) The spent fuel storage racks were designed for storage of 1386 fuel assemblies. The design meets all the structural and seismic requirements of Category I equipment as defined by the NRC Position Paper dated April 14, 1978, on spent fuel storage and handling applications and the references listed in Table 9.1-3.
(2) Burnup credit and fuel assembly placement controls are used to ensure the fuel array in the spent fuel racks is maintained subcritical assuming the array is fully flooded with non-borated water, the fuel is new with a maximum anticipated enrichment of 5.0 weight percent U-235, and the geometric array is the worst possible considering mechanical tolerances and abnormal conditions.
(3) The spent fuel storage facility is designed to prevent severe natural phenomena, including missiles generated from high winds, from causing damage to the spent fuel. The spent fuel storage facility, including the spent fuel racks, is Seismic Category I.
(4) The spent fuel storage racks are designed to withstand handling and normal operating loads and the maximum uplift forces generated by the fuel handling equipment.
(5) A loss of pool cooling accident is not considered a credible accident because the pool cooling system is Seismic Category I and single failure proof.
(6) The spent fuel storage racks are designed to withstand the impact of a dropped spent fuel assembly from the maximum lift height of the spent fuel pit bridge hoist.
(7) The spent fuel storage facilities provide the capability for limiting the potential offsite exposures, in the event of significant release of radioactivity from the stored fuel, to well less than 10 CFR 100 guidelines.

Design of these storage racks is in accordance with Regulatory Guide 1.13 and ensures a safe condition under normal and postulated accident conditions. The distance between spent fuel assemblies is maintained to ensure a $k_{eff} < 0.95$ even if unborated water is used to fill the spent fuel storage pool.

The spent fuel racks are designed as free standing and are qualified as seismic Category I structures. The seismic design considered fully loaded racks in water at less than boiling temperature undergoing a safe shutdown earthquake (SSE). Composite, dynamic simulations which modeled all racks in the pool were utilized to determine limiting loads and displacements for each rack in the pool, to establish limiting relative motion between racks, and to evaluate the potential for and the consequences of inter-rack and rack-wall phenomena in the entire assemblage of racks. The racks were also checked for operating basis earthquake (OBE) loads and found to be satisfactory. The racks can withstand the drop of a fuel assembly from its maximum supported height and the drop of tools used in the pool. The racks are also capable of withstanding accidental drops of the gates which cover the slots between the spent fuel pool and the transfer canal and cask loading pit from a height of eight feet above the top of the racks. Electrical and mechanical stops prevent the movement of heavy objects over the spent fuel pool including the shipping casks. The movement of the casks is restricted to areas away from the pool. The wall which separates the fuel storage area from the cask loading area has been designed to restrict damage to the cask loading area if a cask were dropped even in a tipped position in the cask loading area.

1.1.3 Process Descriptions

All fuel handling will be performed with cranes and hoists located in the auxiliary building which is common to both WBN Units 1 and 2. These will include the Auxiliary Building crane, the 6-ton overhead crane in the cask loading area, the spent-fuel pit bridge hoist, and the new fuel elevator. The new fuel assemblies and their inserts are handled with handling fixtures designed specifically for this purpose and with a special sling suspended from the Auxiliary Building cranes or bridge hoist. All handling devices have provisions to avoid dropping or jamming of fuel assemblies during fuel movement. The Auxiliary Building crane, the spent-fuel pit bridge hoist, and the associated handling devices are capable of supporting maximum loads under SSE conditions. The equipment is inspected and tested for safe operation before use in fuel handling activities.

When the fuel arrives onsite, the shipping containers will be unloaded and placed on the refuel floor. The shipping containers will be opened, and the fuel will be removed one at a time and inspected in the fuel handling area. After inspection, the fuel will be placed in either the new fuel storage vault or the spent fuel storage pool.

1.1.4 Raw Materials, By-Products, Wastes, and Finished Goods

There are no reflectors or moderators with special characteristics associated with this license application. There are no raw materials associated with this license application.

1.2 INSTITUTIONAL INFORMATION

1.2.1 Corporate Identity

TVA is a wholly owned corporate agency and instrumentality of the United States of America established pursuant to the Tennessee Valley Authority Act of 1933, as amended ("TVA Act").

~~As an agency of the United States Government, TVA is neither owned, controlled, nor dominated by an alien, a foreign corporation, or a foreign government. A copy of TVA's latest annual report (2008 Form 10-K) filed with United States Securities and Exchange Commission which provides a current description of TVA is attached. See, in particular, pages 7 and 8 which describe TVA's service area. The address of TVA's principal executive offices is 400 W. Summit Hill Drive, Knoxville, Tennessee.~~

As an agency of the United States Government, TVA is not owned, controlled, nor dominated by an alien, a foreign corporation, nor a foreign government. TVA's latest annual report (2011 Form 10-K) filed with United States Securities and Exchange Commission provides a current description of TVA including TVA's

service area. The address of TVA's principal executive offices is 400 W. Summit Hill Drive, Knoxville, Tennessee.

TVA is administered by a board of nine part-time members appointed by the President of the United States with the advice and consent of the Senate. The Chairman of the TVA Board is selected by the members of the TVA Board. Under the terms of the TVA Act, in order to be eligible to be appointed as a member of the Board of Directors, an individual must be a citizen of the United States.

~~A list and description of the members of the TVA Board of Directors appears on pages 155 and 156 of the attached 2008 Form 10-K.~~

~~The only significant changes regarding the list of Board members are that Robert M. Duncan currently serves as the Chairman and Donald R. DePriest no longer serves as a member of the Board. There are currently three vacant positions on the TVA Board. A list and description of TVA's Executive Officers appears on pages 156-158 of the attached 2008 Form 10-K. The only significant change insofar as the organization and governance of TVA's nuclear program is concerned is that the current Chief Nuclear Officer and Executive Vice President is Preston D. Swafford~~.

The current TVA Board members are William B. Sansom, Chairman; Marilyn A. Brown; William Graves; Barbara S. Haskew; Richard Howorth; and Neil McBride. There are three vacancies.

Tom Kilgore is President and Chief Executive Officer and Preston D. Swafford is Executive Vice President and Chief Nuclear Officer. The most current list of TVA Board Members and Executive Officers is available at www.tva.com/abouttva/leadership.htm. All of TVA's Executive Officers are citizens of the United States.

The applicant is not acting as agent or representative of another person in filing this application.

The Watts Bar Nuclear Plant (WBN) Site is located on a site of approximately 1770 acres in Rhea County, Tennessee on the west bank of the Tennessee River at river mile 528. The site is just south of the Watts Bar Dam, approximately 50 miles northeast of Chattanooga, and 31 miles north-northeast of the Sequoyah Nuclear Plant site. The site address is P O Box 2000, Spring City, Tennessee.

For Unit 2 construction completion, Bechtel Power Corporation provides the engineering, procurement, and construction services with TVA oversight. Bechtel uses major specialty subcontractors such as Siemens and Westinghouse. Westinghouse will supply the initial fuel loading for WBN Unit 2.

WBN is owned by the United States and operated by TVA.

1.2.2 Financial Qualifications

Information to demonstrate TVA's financial qualification is contained in the annual reports filed with the Securities and Exchange Commission. TVA's ~~2008~~ **2011** annual report is attached.

1.2.3 Type, Quantity and Form of Licensed Material

The maximum quantity of SNM for WBN Unit 2 including the initial core of 193 fuel assemblies and allowance for extra material onsite will be 2600 kg of U-235. A more detailed description of the fuel assemblies to be stored is set forth in section 4.2 of the WBN FSAR.

The average core enrichment is approximately 2.70 wt. percent U-235. A nominal enrichment is the design enrichment plus or minus a manufacturing tolerance. The maximum enrichment under this license will be 5 wt. percent U-235. Each fuel assembly will contain approximately 462 kilograms (kg) of uranium.

This information is summarized as follows.

Special Nuclear Material	Form	Maximum Amount
Uranium enriched in isotope U-235 up to 5% by weight and uranium daughters	Physical: Solid Chemical: UO_2	91,800 kg

1.2.4 Authorized Uses

TVA hereby ~~applies for a SNM license~~ **requests an extension of SNM License SNM-2014** to provide for receipt, possession, inspections, and storage of 193 fully assembled fuel assemblies for the initial core of the WBN Unit 2 reactor. This license is requested until ~~June 30, 2013~~, **September 30, 2016** or until the receipt of an operating license for WBN Unit 2.

1.2.5 Special Exemptions or Special Authorizations

None.

1.2.6 Security of Classified Information

This license application does not contain any classified National Security Information, Restricted Data, or Formerly Restricted Data (FRD) nor does it result in a change in access to such information. In addition, it is not expected that activities conducted in accordance with the proposed license will involve classified National Security Information, Restricted Data or Formerly Restricted Data (FRD).

1.3 SITE DESCRIPTION

1.3.1 Site Geography

The Watts Bar Nuclear Plant is located on a tract of approximately 1770 acres in Rhea County on the west bank of the Tennessee River at river mile 528. The site is approximately 1-1/4 miles south of the Watts Bar Dam and approximately 31 miles north-northeast of the Sequoyah Nuclear Plant. The site (about 700 feet MSL) is near the center of a northeast-southwest aligned valley, 10 to 15 miles wide, flanked to the west by Walden Ridge (900 to 1,800 feet MSL and to the east by a series of ridges reaching elevations of 800 to 1,000 feet MSL. FSAR Figure 2.1-3 consists of a map of the topographic features (as modified by the plant) of the site area for 10 miles in all directions from the plant. Profiles of maximum elevation versus distance from the center of the plant are shown in FSAR Figures 2.3-14 through 2.3-29 for the sixteen compass point sectors (keyed to true north) to a radial distance of 10 miles.

The 1770 acre reservation is owned by the United States and is in the custody of TVA. Also located within the reservation are the Watts Bar Dam and Hydro-Electric Plant, ~~the Watts Bar Steam Plant~~ the TVA Central Maintenance Facility, and the Watts Bar Resort Area.

The resort area buildings and improvements have been sold to private individuals and the associated land mass leased to the Watts Bar Village Corporation, Inc. Due to this sale and leasing arrangement no services are provided to the resort area from the Watts Bar Nuclear Plant.

The location of each reactor is given below:

LONGITUDE AND LATITUDE (degrees/minutes/seconds)

UNIT 1 35°36' 10.430" N	84°47' 24.267" W
UNIT 2 35°36' 10.813" N	84°47' 21.398" W

UNIVERSAL TRANSVERSE MERCATOR (Meters)

Northing	Easting
UNIT 1 N3, 941,954.27	E 700,189.94
UNIT 2 N3, 941,967.71	E 700,261.86

FSAR Figure 2.1-2 shows the Watts Bar site location with respect to prominent geophysical and political features of the area. This map is used to correlate with the population distribution out to 50 miles. The population density within 10 miles is keyed to FSAR Figure 2.1-3.This map shows greater detail of the site area. FSAR Figures 2.1-4a and 2.1-4b are maps of the Watts Bar Site Area. The Watts Bar reservation boundary and the exclusion area boundary are boldly outlined. Details of the site and the plant structures may be found on FSAR Figure 2.1-5.

~~The only significant nearby industrial facility is the Watts Bar Steam Plant~~. **There are no significant industrial facilities near WBN.** The nearest land transportation route is State Route 68, about one mile north of the Site. The Tennessee River is navigable past the site. A main line of the CNO&TP (Norfolk Southern Corporation) is located approximately 7 miles west of the site. A TVA railroad spur track connects with this main line and serves the ~~Watts Bar Steam Plant and~~ Watts Bar Nuclear Plant. The spur has fallen into disuse and would need to be repaired prior to use. No ~~other~~ significant industrial land use, military facilities, or transportation routes are in the vicinity of the nuclear plant.

1.3.2 Demographics

Historical and projected population information is contained in this section. Both resident and transient populations are included. For 2000, population was based on data from the U.S. Census Bureau, Census of Population, 2000, including block group, block, and census track data. Projections were based on county projections by Woods& Poole. Sub-county population estimates were prepared using a constant share of the 1990 county total. County Census maps and 1:250,000 topographic maps were used to desegregate sub-county population data into the annular segments.

Considerations included municipal limits, topography, road system, land ownership (e.g., National Forest), and land use (e.g., strip mines). Transient population consists of two components - recreation visitation and school enrollments. Peak hour visitation to recreation facilities is based on the maximum capacity of the facility plus some overflow. School enrollments for 2008 are from the Tennessee Department of Education Report Card 2008 (http://www.state.tn.us/education/). Projected enrollments are based on projected population growth in the respective counties.

About 18,900 people lived within 10 miles of the Watts Bar site in 2000, with more than 75% of them between five and 10 miles from the site. Two small towns, Spring City and Decatur, which in 2007 had populations of 2,002 and 1,456 respectively, are located between five and 10 miles from the site. Decatur is south and south-west of the site, while Spring City is northwest and north-northwest. Most of the remainder of the area is sparsely populated, especially within five miles of the site. The pattern is expected to continue. FSAR Tables 2.1-2 through 2.1-8b show the estimated and projected population distribution within ten miles of the site for 2000, 2010, 2020, 2030, 2040, 2050, and 2060. FSAR Figure 2.1-3 shows the area within ten miles of the site overlaid by circles and sixteen compass sectors.

The area between 10 and 50 miles from the site lies mostly in the lower and middle portions of east Tennessee, with small areas in southwestern North Carolina and in northern Georgia. The population of this area is projected to increase by about 62%, or 660,000 persons, between 2000 and 2060. About 71% of this total increase is expected to be in the area between 30 and 50 miles from the site. The largest urban concentration between 10 and 50 miles is the city of Chattanooga, located to the southwest and south-southwest. This city had a population in 2007 of 169,884; about 80% of this population is located between 40 and 50 miles from the site, while the rest is located beyond 50 miles. The city of Knoxville is located to the east-northeast of the site and is slightly larger than Chattanooga. However, only a small share, less than 10 percent, of its population of 183,546, is located between 40 and 50 miles of the site with the remainder beyond 50 miles. There are three smaller urban concentrations in this area with population greater than 20,000. The city of Oak Ridge, which had a 2007 population of 27,514, is located about 40 miles to the northeast. The twin cities of Alcoa and Maryville, which had a combined population in 2007 of about 35,300, are located between 45 to 50 miles to the east-northeast. Cleveland, with a 2007 population of 39,200, is located about 30 miles to the south. Most of the population growth is expected to occur around these and the larger population centers.

There are, in addition, a number of smaller communities dispersed throughout the area, surrounded by low-density rural areas. FSAR Tables 2.1-8 through 2.1-14 contain the 2000, 2010, 2020, 2030, 2040, 2050, and 2060 population distribution at various distances and directions from the site out to 50 miles. FSAR Figure 2.1-2 shows the area within 50 miles of the site overlaid by the circles and 16 compass sectors.

Maps showing the area are found on FSAR Figures 2.1-2 and 2.1-3. The only significant nearby industrial facility is the Watts Bar Steam Plant. The nearest land transportation route is State Route 68, about one mile north of the Site. The Tennessee River is navigable past the site. A main line of the CNO&TP (Norfolk Southern Corporation) is located approximately 7 miles west of the site. A TVA railroad spur track connects with this main line and serves the ~~Watts Bar Steam Plant and~~ Watts Bar Nuclear Plant. The spur has fallen into disuse and would need to be repaired prior to use. No other significant industrial land use, military facilities, or transportation routes are in the vicinity of the nuclear plant.

~~The Watts Bar Steam Plant is a coal-fired electric generating facility with a total capacity of 240,000 kW which during normal operation has about 100 employees. The plant is not currently operating, but could be reactivated in the future.~~

The Watts Bar Nuclear Plant site is located on a 9-foot navigable channel on Chickamauga Reservoir. Its intake structure is located approximately two miles downstream of Watts Bar Lock and Dam. Watts Bar lock is located on the left bank of the Tennessee River with dimensions of 60' wide x 360' long. Towboat sizes vary from 1500 to 1800 horsepower for this section of the Tennessee River (Chattanooga to Knoxville). The most common type barge using the water way is the 35'x 195' jumbo barge with 1,500 ton capacity. There were also numerous liquid cargo (tank) barges of varying size with capacity to 3,000 tons.

1.3.3 Meteorology

Short-term site-specific meteorological data from the TVA meteorological facility at the Watts Bar Nuclear Plant site are the basis for dispersion meteorology analysis. Data representative of the site or indicative of site conditions for temperature, precipitation, snowfall, humidity, fog, or wind were also obtained from climatological records for Chattanooga, Dayton, Knoxville, Oak Ridge, and Watts Bar Dam, all in Tennessee. Short-term records for the Sequoyah Nuclear Plant site were used.

These data source locations are shown relative to the plant site in FSAR Figure 2.3-3.
~~(1) 300 mph = Rotational Speed~~
~~(2) 60 mph = Translational Speed~~
~~(3) 360 mph = Maximum Wind Speed~~
~~(4) 3 psi = Pressure Drop~~
~~(5) 1psi/sec = Rate of Pressure Drop (3 psi/3 sec is assumed)~~
~~(1) 290 mph = Rotational Speed~~
~~(2) 70 mph = Translational Speed~~
~~(3) 360 mph = Maximum Wind Speed~~
~~(4) 3 psi = Pressure Drop~~
~~(5) 2 psi/sec = Rate of Pressure Drop (3 psi/1.5 sec is assumed)~~

Temperature data for Dayton and for Chattanooga are presented in FSAR Tables 2.3-2 and 2.3-3, respectively. The Chattanooga and Dayton data are provided as reasonably representative and recent (1971-2000) temperature information. Mean temperatures have ranged from the low 40s in the winter to the upper 70’s in the summer at both locations. Mean maxima ranged from about 50°F in mid winter to about 90°F in midsummer. The mean minima ranged from about 24°F for both locations to about 74°F for Dayton and 75°F for Chattanooga. The extreme maxima recorded for the respective data periods were 107°F at Decatur and 106°F at Chattanooga, while the extreme minima recorded were -15°F and -10°F, respectively.

Precipitation data for Watts Bar Dam are presented in FSAR Table 2.3-4. Rain or snow has fallen on an average of 110 days per year, and the annual average precipitation for 1941 through 1970 was nearly 53 inches. The maximum monthly rainfall has ranged from about seven inches to nearly 15 inches. The minimum monthly amount for September 1939 through September 1989 was zero. The maximum in 24 hours was 5.3 inches on January 6-7, 1946. Mean monthly data reveal the wettest period as late fall through early spring, with March normally the wettest month of the year. The data show a secondary peak of rainfall in July. Thunderstorm activity is most predominant in the spring and summer seasons, and the maximum frequency of thunderstorm days (FSAR Table 2.3-1) is normally in July.

Appreciable snowfall is relatively infrequent in the area. Snowfall data are summarized in FSAR Table 2.3-5 for Dayton and in FSAR Table 2.3-6 for Chattanooga and Knoxville. The Dayton, Chattanooga and Knoxville records provide current information and offer a complete picture of the pattern of snowfall in the Tennessee River Valley from Chattanooga to Knoxville. Mean annual snowfall has ranged from ~~4.3~~ **4.4** inches at Chattanooga to about 10 inches at Knoxville. Dayton, about halfway between those locations, averaged about 4 inches annually for an earlier period of record. Generally, significant snowfalls are limited to November through March. For the data periods presented in the tables, respective 24-hour maximum snowfalls have been ~~18.5~~ **20.0**, 8, and ~~11.1~~ **18.2** inches at Chattanooga, Dayton, and Knoxville. Severe ice storms of freezing rain (or glaze) are infrequent, as discussed in the regional climatology section. Atmospheric water vapor content is generally rather high in the site area, as was indicated in the discussion of the regional climatology.

Long-term relative humidity and absolute humidity data for Chattanooga are presented in FSAR Tables 2.3-7 through 2.3-9. Short-term humidity data based on measurements at the onsite meteorological facility are summarized in FSAR Tables 2.3-10 and 2.3-11 for comparison with the data in FSAR Tables 2.3-8 and 2.3-9. A typical diurnal variation is apparent in FSAR Table 2.3-7. Relative humidity and absolute humidity are normally greatest in the summer. Fog data for Chattanooga, Knoxville, and Oak Ridge, Tennessee, and from Hardwick are presented in FSAR Table 2.3-12. These data indicate that heavy fog at the Watts Bar site likely occurs on about 35 days per year with the fall normally the foggiest season. Sources of data on fogs with visibilities significantly less than 1/4 mile and on durations of fogs which can be considered representative of the site have not been identified.

Wind direction patterns are strongly influenced by the northeast-southwest orientation of the major topographic features, as evidenced in the onsite data, Sequoyah Nuclear Plant data, and the records for Knoxville and Oak Ridge. The Watts Bar wind direction and wind speed data are summarized in FSAR Tables 2.3-13 and 2.3-14 (annual at 10 and 46 meters); FSAR Tables 2.3-15 and 2.3-16 (directional persistence at 10 and 46 meters); and FSAR Tables 2.3-17 through 2.3-40 (monthly at 10 and 46 meters). The annual wind roses for each level are shown in FSAR Figures 2.3-4 and 2.3-5. The most frequent wind direction at 10 meters has been from south-southwest (about 16%). The next highest frequencies (about 8%) are from the north-northeast and northwest wind. The data in FSAR Table 2.3-41 and the data in FSAR Table 2.3-13 show a predominance of wind from the north-northwest and northwest, respectively, for wind speeds less than about 3.5 mph. More discussion of this very light wind speed pattern is contained in FSAR Section 2.3.3.3. It is very significant that the frequencies of calms differ so markedly between the two sets of onsite data. It appears that the higher frequency of calm conditions is primarily a consequence of the location of the temporary meteorological facility in a "sink." The maximum wind direction persistence period at 10 meters is shown in FSAR Table 2.3-15 as 44 hours from the south-southwest direction.

The monthly summaries show some minor variation in the wind direction patterns, but the upvalley-downvalley primary and secondary frequency maxima generally are fully evident.

In the FSAR summary tables for 46 meters, the upvalley-downvalley wind direction pattern is very clear and dominant. The two highest frequencies are 19% from the south-southwest wind direction and 11% from the north-northeast wind direction. The maximum wind direction persistence (FSAR Table 2.3-16) during the 17-year period was 48 hours from the south-southwest.

The site is located in Region I for Design Basis Tornado considerations. The design conditions assumed for the Watts Bar Nuclear Plant reactor shield building (and other safety-related structures) are the following:

(1) 300 mph = Rotational Speed
(2) 60 mph = Translational Speed
(3) 360 mph = Maximum Wind Speed
(4) 3 psi = Pressure Drop
(5) 1psi/sec = Rate of Pressure Drop (3 psi/3 sec is assumed)

For the additional Diesel Generator Building and structures initiated after July 1979, the design basis tornado parameters are as follows:
(1) 290 mph = Rotational Speed
(2) 70 mph = Translational Speed
(3) 360 mph = Maximum Wind Speed
(4) 3 psi = Pressure Drop
(5) 2 psi/sec = Rate of Pressure Drop (3 psi/1.5 sec is assumed)

These and tornado-driven missile criteria are discussed in FSAR Sections 3.3 and 3.5. The fastest mile of wind at 30 feet above ground is about 95 mph for a 100-year return period in the site area. The vertical distribution of horizontal wind speeds at 50, 100, and 150 feet above ground is 102, 113, and 120 mph on the basis of the speed at 30 feet and a power law exponent of 1/7. A gust factor of 1.3 is often used at the 30-foot level, but this would be conservative for higher levels. The wind load for the Shield Building is based on 95 mph for that level, as discussed in FSAR Section 3.3. Estimates of the probable maximum precipitation (PMP) and the design considerations for the PMP are discussed in FSAR Section 2.4.

1.3.4 Hydrology

Watts Bar Nuclear Plant is located on the right bank of the Chickamauga Lake at Tennessee River Mile (TRM) 528 with plant grade at elevation 728 MSL. The plant has been designed to have the capability for safe shutdown in floods up to the computed maximum water level, in accordance with regulatory position 2 of Regulatory Guide 1.59, Revision 2, August 1977.

Determination of the maximum flood level included consideration of postulated dam failures from seismic and hydrologic causes. The maximum flood Elevation ~~734.9~~ **739.2 ft** would result from an occurrence of the probable maximum storm. ~~Allowances for concurrent wind waves could raise lake levels to Elevation 736.2 with run up on the 4:1 slopes approaching the plant reaching about Elevation 736.9.~~

The wave run-up elevations on the 4:1 slopes on the critical wall of the Intake Pumping Station would be 741.4, on the Diesel Generator Building would be 741.6, and elevation 741.0 on the Auxiliary Building, Control Building and Shield Building.

The nearest surface water user located downstream from Watts Bar Nuclear Plant is Dayton, Tennessee, at TRM 503.8, 24.2 miles downstream. All surface water supplies withdrawn from the 58.9 mile reach of the mainstream of the Tennessee River between Watts Bar Dam (TRM 529.9) and Chickamauga Dam (TRM 471.0) are listed in FSAR Table 2.4-4.

The ~~probable~~ required minimum flow past the site is ~~estimated to be 2000~~ **3200** cubic feet per second (cfs), which is more than adequate for plant water requirements.

Ground water sources within a two-mile radius of the site are listed in FSAR Table 2.4-10 and their locations are shown on FSAR Figure 2.4-102. Of the 89 wells listed, only 58 are equipped with pumps. Two of the thirteen spring sources listed are equipped with pumps. Seventy-nine residences are supplied by ground water, with one well supplying five houses. Assuming three persons per residence and a per capita use rate of 75 gallons per day (gpd), total ground-water use is less than 10,000 gpd.

Drawdown data are available only for the Watts Bar Reservation wells, as listed in the previous section. Water-level fluctuations have been observed monthly in six observation wells since January 1973. Data collection for wells 7, 8, & 9 began in December 1981. The locations of these wells are shown on FSAR Figure 2.4-104. Data for the period January 1973 through December 1975 is shown on FSAR Figure 2.4-103.

As elsewhere in the region, water levels normally reach maximum elevations in February or March and are at minimum elevations in late summer and early fall. Depth to the water table is generally less than 20 feet throughout the plant site.

FSAR Figure 2.4-105 is a water-table contour map of the area within a two-mile radius of the plant site, based on 48 water-level measurements made in January 1972. The water table conforms fairly closely to surface topography, so that directions of ground-water movement are generally the same as those of surface-water movement. The water-table gradient between plant site and Chickamauga Lake at maximum water-table elevation and minimum river stage is about 44 feet in 3200 feet, or 0.014.

Water occurs in the Conasauga Shale in very small openings along fractures and bedding planes. Examination of records of 5500 feet of foundation exploration drilling showed only one cavity, 0.6-foot thick, penetrated.

Water occurs in the terrace deposit material in pore spaces between particles. The deposit is composed mostly of poorly-sorted clay- to gravel-sized particles and is poorly water bearing, although an approximately six-foot-thick permeable gravel zone is locally present at the base of the terrace deposit. The foundation excavation required only intermittent dewatering after initial drainage. The excavation was taken below the base of the terrace deposit into fresh shale. No weathered shale was found to be present; the contact between the terrace deposit and fresh shale is sharp.

The average depth to the water table in the plant area, based on data collected during August through December 1970, is 17 feet; the average overburden thickness is 40 feet; the saturated overburden thickness is therefore, 24 feet. No weathered zones or cavities were penetrated in the Conasauga Shale below a depth of 85 feet, so that the average saturated thickness of bedrock is assumed to be less than 50 feet.

The plant site is hydraulically isolated by Yellow Creek and Chickamauga Lake to the west, south, and east; it is hydraulically isolated to the north by the relatively impermeable Rome Formation underlying the site. Therefore, it is believed that any off-site groundwater withdrawals could not result in altered groundwater movement at the site.

No attempt was made to measure hydraulic properties of overburden or of bedrock at this site because of the very limited occurrence of ground water and the heterogeneity and anisotropy of the materials underlying the site.

1.3.5 Geology

The Watts Bar Nuclear Plant site is located in Rhea County, Tennessee, on the right side of the Tennessee River at river mile 528, about two miles south of Watts Bar Dam (FSAR Figure 2.5-9). Physiographically, the site is located in the Tennessee section of the Valley and Ridge Province of the Appalachian Highlands (FSAR Figure 2.5-1). This section is the southernmost of the three sections comprising the Valley and Ridge Province and extends from the Tennessee River-New River divide southwestward into central Alabama. It is bounded on the west by the Appalachian Plateaus Province and on the east by the Blue Ridge Province.

The site is located along the northeast-southwest trending portion of the Tennessee River drainage basin. At the site area the elevation of the flood plain is approximately 700 feet and to the west of the plant location is a series of knobs reaching elevation 900 feet. The plant lies on an alluvial terrace of approximate elevation 735 feet (FSAR Figures 2.5-9 and 2.5-10).

The site is located in the folded and faulted Southern Appalachian Structural Province and in the Southern Appalachian Tectonic Subdivision. A Modified Mercalli Intensity (MM) VIII earthquake is assumed to occur at the site with accelerations of 0.18 G's horizontal and 0.12 G's vertical for SSE requirements.

Regional and sub-regional fault maps are provided as FSAR Figures 2.5-7 and 2.5-8 and cover radii of 200 and 100 miles, respectively.

The plant site is situated in a bend of the Tennessee River that has been covered by alluvial terrace deposits (FSAR Figures 2.5-9 and 2.5-10). Beneath these deposits lies the Middle Cambrian Conasauga Formation, an inter-bedded shale and limestone upon which the Category I structures are founded. The regional strike of this formation is approximately N35°- 40°E (Figure 2.5-110) and beds for the most part dip to the southeast. However, because of relatively complex folding at the site, the attitudes of the bedding range from horizontal to vertical. Photographs, sections, and maps of the excavations of the plant showing rock quality and structural complexity are included in the Watts Bar FSAR as Figures 2.5-110 through 2.5-122.

Chapter 2 Table of Contents

2 ORGANIZATION AND ADMINISTRATION

This section of the application contains a description of the management systems and administrative procedures at TVA and the Watts Bar Nuclear Plant (WBN) in place to assure that corporate management is involved with, informed about, and dedicated to the safe design, and operation of the nuclear plant and that sufficient technical resources have or are being provided to adequately accomplish these objectives. WBN is an existing Site that has management systems and procedures already established to support the receipt, handling, inspection and storage of fuel. WBN Unit 1 personnel shall be responsible for receipt, handling, inspection, and storage of the new fuel for WBN Unit 2.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed using the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 2 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 2.1 Organizational Structure				
Functional description of specific organization groups responsible for operating and managing the design changes to the facility	70.22(a)(6)	2.4.3(1) & 2.4.3(7)	13.1.1 - Management and Technical Support Organization	13.1 Organization Structure of Applicant TVA-NPOD89-A Rev. 18
Section 2.2 Key Management Positions				
Qualifications, responsibilities, and authorities for key management personnel	70.22(a)(6)	2.4.3 (2) 2.4.3(3) & 2.4.3(4)	13.1.2, 13.1.3 - Operating Organization	13.1.3: Qualification Requirements for Nuclear Facility Personnel

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 2 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 2.3 Administration				
Effective implementation of HS&E functions using written procedures	70.22(a)(8)	2.4.3(5)	13.5.1 - Administrative Procedures	13.5: Site Instructions
Reporting of unsafe conditions or activities	70.62(a)	2.4.3(6)	17.2 – QA During the Operations Phase 17.3 – Quality Assurance Program Description	17.2: Quality Assurance for Station Operation
Commitment to establish formal management measures to ensure availability of IROFS	70.62(d)	2.4.3(8)	13.5.1 - Administrative Procedures	13.5: Site Instructions
Written agreements with offsite emergency resources	70.22(i)	2.4.3(9)	13.3 - Emergency Planning	13.3: Emergency Planning

2.1 Organizational Structure

The TVA and the WBN organizational structures are briefly described in the following sections. The summaries are based on **TVA Standard Program and Process Procedures**, FSAR Chapter 13.1, Organizational Structure of Applicant, the Nuclear Quality Assurance Plan, TVA-NQA-PLN89-A and the Organization Topical Report TVA-NPOD89-A, TVA Nuclear Power Group Organization Description.

Lines of authority, responsibility, and communication shall be defined and established throughout highest management levels, intermediate levels, and all operating organization positions. These relationships shall be documented and updated, as appropriate, in organization charts, functional descriptions of departmental responsibilities and relationships, and job descriptions for key personnel positions, or in equivalent forms of documentation. These requirements are documented in the Nuclear Power Organization Topical Report (TVA-NPOD89-A).

2.2.1. Corporate Functions, Responsibilities and Authorities

TVA is an agency of the federal government whose major policies, programs, and organization are determined by a part-time, nine member Board of Directors (BOD) structure pursuant to the TVA Governance Restructuring provisions of the Consolidated Appropriations Act, 2005. The BOD members are appointed by the President of the United States and confirmed by the Senate for five-year terms. The BOD selects a Chief Executive Officer (CEO) who also serves as President to manage TVA's day-to-day business. The BOD shapes the long-term business strategies, recommends major program initiatives, and guides TVA's day-to-day operations.

~~The Chief Operating Officer (COO) is responsible for pulling together all the operational elements of TVA with a clear focus on the operational excellence of the organization. This organization is faced with the challenges of meeting environmental pressures, growing power demand, and stakeholder expectations.~~

The CEO is responsible for managing all aspects of TVA, including power production, transmission, power trading, resource management programs, and economic development, as well as TVA's corporate functions. The CEO heads TVA's Executive Committee and chairs its Business Council.

The Office of Inspector General (OIG) supports TVA in addressing its challenges and meeting its goals through the conduct of a comprehensive Audit and Inspection Programs designed to focus on areas of high risk and strategic importance. In addition, OIG responds to allegations of fraud, waste, and abuse affecting TVA. The OIG is a statutory requirement as delineated by the Inspector General Act of 1978 as amended. ~~The OIG works along side, yet independent of TVA.~~

The Office of General Counsel (OGC) provides legal services to TVA in all aspects of operations, including offering guidance and advice to the BOD on the legal ramifications of TVA activities and operations and representing them in litigation.

~~The Chief Administrative Officer (CAO) is responsible providing corporate support functions for all of TVA through TVA's Human Resources, Information Systems, Procurement, TVA Police, and Facilities Management.~~

TVA encourages and is committed to the voluntary expression of concerns and differing views. Employees, contractors, and others who support TVA functions are encouraged to express concerns and differing views, cooperate, and participate in the investigation of concerns and in the development of concern resolution without fear of reprisal, thus furthering the employees' fulfillment of duties, productive efforts, observance of standards and a safety conscious work environment. This commitment has been elevated to be agency wide. Concerns Resolution staff members are located at all major TVA facilities.

The Executive Vice President and Chief Nuclear Officer (CNO) is responsible for the overall safety, efficiency, and economy of TVA's Nuclear Power Program and the overall Nuclear Power Group (NPG) organization.

The Senior Vice President (VP) Nuclear Generation Construction is accountable for the construction of additional nuclear generation assets and technologies to meet demands for safe, clean, reliable and low cost power.

~~The Senior Vice President (VP) Nuclear Generation Development and Construction is accountable for the development and construction of additional nuclear generation assets and technologies to meet demands for safe, clean, reliable and low cost power.~~

The Corporate Organization leadership and reporting relationships are shown in Figure ~~1-1~~ **1-0** of the Organizational Topical Report TVA-NPOD89-A.

2.1.2 Operating Organization

The Vice President WBN is responsible and accountable for activities at the site, including Unit operations, modifications, maintenance, support, training, and engineering services. To accomplish these activities, the following departments report to the Vice President WBN:

- Plant Management
- Engineering
- Training
- Project Management
- Safety and Licensing
- ~~Site Human Resources~~
- ~~Site Quality Assurance~~
- ~~Site Concerns Resolution~~

The Plant Manager reports to the Vice President WBN and is responsible for overall plant safe operation and shall have control over the onsite resources necessary for safe operation and maintenance of the plant. He directs the activities of the following departments:

- Operations
- Maintenance
- Radiological Protection
- Chemistry/Environmental
- Work Control
- ~~Safety~~

The organization structure, position responsibilities and authorities are contained in the Organizational Topical Report TVA-NPOD89-A. Figure ~~1-12~~ **2-1** of the Organizational Topical Report represents the Watts Bar Nuclear Plant operating organization.

2.2 Key Management Positions

This section describes the functional positions responsible for managing the operation of the WBN. The responsibilities, authorities, and lines of communication for each key management position are provided in this section. Responsible managers have the authority to delegate tasks to other individuals; however, the responsible manager retains the ultimate responsibility and accountability for implementing the applicable requirements.

2.2.1 Operating Organization

The functions and responsibilities of key personnel are described in the following paragraphs. Additional detailed responsibilities are provided in Organizational Topical Report TVA-NPOD89-A and corporate and site procedures.

2.2.1.1 Executive Vice President and Chief Nuclear Officer (CNO)

The Executive Vice President and CNO is the senior nuclear manager with direct authority and responsibility for the management, control, and supervision of TVA's Nuclear Power Group (NPG) and for the execution of nuclear programs, policies, and decisions that the Board of Directors approves or adopts. The **Executive** Vice President and CNO has corporate responsibility for overall plant nuclear safety and shall take measures needed to ensure acceptable performance of the staff in operating, maintaining, and providing technical support in the plant so that continued nuclear safety is assured.

2.2.1.2 Senior Vice President Nuclear Operations

This position reports directly to the Executive Vice President and CNO. Responsibilities of this position include oversight of the licensed NPG nuclear plants. The Senior Vice President Nuclear Operations direct reports are the three site Vice Presidents.

2.2.1.3 Vice President Watts Bar Nuclear Plant (WBN)

This position is responsible and accountable for activities at the site, including unit operations, modifications, maintenance, support, training, and engineering services. ~~This includes determining the nature and extent of onsite and offsite support services required to support site operations and activities in accordance with TVA NPG's policy and procedures. This also includes quality of work activities.~~

2.2.1.4 Director Site Engineering

This position is responsible for integrated management and execution of site projects to provide overall management of the Engineering Design, Systems Engineering, Engineering Support, Technical Support, and Components Test and Inspection functions at the site.

2.2.1.5 Director Site Training

This position directs the planning, development, implementation, and evaluation of ~~federally-regulated and nationally-accredited~~ Training Programs to ensure sufficient qualified personnel to operate, maintain, and modify the nuclear power plant. ~~The nuclear industry's training organization, the National Academy for Nuclear Training, is managed by INPO, the industry's self-governance organization.~~

2.2.1.6 Director Project Management

This position is responsible for **cost engineering functions including estimating, forecasting, trending**/scope control, data analysis, and reporting.

2.2.1.7 Director Safety and Licensing

This position is responsible for the Site Performance Improvement, Emergency Planning, and Site Licensing functions.

~~This position is responsible for the Safety and Licensing functions at the site. This position reports to the Vice President WBN, but is provided governance and oversight direction from the Vice President Nuclear Licensing.~~

~~**2.2.1.7.1 Manager Site Licensing and Industry Affairs**~~

~~This position provides licensing services associated with the site operating license. This position serves as the primary interface with the NRC Region II for site-related matters. This manager is responsible for developing the vision and strategy for the site in the areas of the NRC, INPO, NEI, and other industry interfaces.~~

2.2.1.7.~~2~~1 Manager Site Emergency Preparedness

This position is responsible for directing the technical professionals of the Site Emergency Preparedness (EP) organization which provides technical direction and support the site staffs in managing the development, maintenance, and implementation of the site-specific portions of the Radiological Emergency Plan (REP), site Emergency Plan implementing procedures, site response organization, facilities, and communications programs to meet NRC Federal regulations for maintaining an operating license and to provide protective measures to ensure the health and safety of TVA employees and the general public in the event of an accident at a NPG facility. **This position reports to the site Director of Safety and Licensing.**

~~2.2.1.7.3 Manager Management Services~~

~~This position is accountable for planning, managing and directing all Document Control, Records Management, and Administrative Services at the site.~~

~~2.2.1.7.4~~ 2.2.1.8 Manager Site Nuclear Security

This position is responsible for the management and direction of the Site Nuclear Security Program to ensure security at the nuclear plant sites and compliance with TVA and NRC requirements. **This position reports to the Senior Manager Security Operations (Corporate).**

T~~his position reports to the Manager Security Operations (Corporate) and has a reporting relationship (dotted line) to the Director Safety and Licensing.~~

~~2.2.1.8 Manager Site Human Resources~~

~~This position serves as an advisor for Human Resource Program delivery to the nuclear site. In conjunction with line management, this position administers Human Resource policies and practices and consults with line management to develop workforce plans, staffing and recruiting plans, and succession plans. This position also provides consultation in areas such as performance management, compensation and labor relations. This position reports to the Human Resources Service Manager (Corporate) and has a reporting relationship (dotted line) to the Vice President WBN.~~

2.2.1.9 Manager Site Quality Assurance

This position provides oversight of quality activities associated with the operation of Watts Bar. Responsibilities are described in detail in TVA's Nuclear Quality Assurance Plan (TVA-NQA-PLN89-A). This position reports to the General Manager, Quality

Assurance (Corporate) and has a reporting relationship ~~(dotted line)~~ to the Site Vice President.

~~2.2.1.10 Specialist Site Concerns Resolution~~

~~This position is responsible for implementing and managing the Site Concerns Resolution Program to receive, evaluate, and initiate actions for resolution of employee concerns regarding NPG activities. Responsibilities also include nurturing an environment free of intimidation, harassment, or discrimination. This position reports directly to the Manager, Site Licensing Oversight (Corporate), which provides the program is sufficiently independent and freed to ensure that employee concerns are properly addressed.~~

2.2.1.~~11~~ 10 Plant Manager

This position is responsible for ensuring that plant operations and support activities are conducted in accordance with applicable requirements. The Plant Manager shall be responsible for overall plant safe operation and shall have control over the onsite resources necessary for safe operation and maintenance of the plant.

2.2.1.~~11~~10.1 Manager Maintenance

This position is responsible for planning, directing, and managing the plant's Maintenance Program to ensure that equipment and systems are maintained in accordance with operability and reliability engineering practices and requirements.

2.2.1.~~11~~10.2 Manager Radiological Protection

This position guides programs and activities at the plant ensuring that all operations, maintenance, modifications and engineering activities are conducted in a radiologically safe manner and protect plant systems and equipment.

2.2.1.~~11~~10.3 Manager Chemistry/Environmental

The position guides programs and activities at the plant ensuring that all operations, maintenance, modifications, and engineering activities that potentially impact plant chemistry/environmental are conducted in a manner consistent with applicable requirements.

2.2.1.~~11~~10.4 Manager Work Control

This position provides overall responsibility for planning, coordination, scheduling and monitoring of all on line and outage work. Responsible for establishing work priorities and coordinating shift turnover; managing the plant scheduling processes; and ensuring efficient and effective management of the work control function that is the basis of the site schedule.

2.2.1.~~11~~10.5 Manager Operations

This position has responsibility for planning, organizing, and setting policy, and support activities (e.g., fire protection surveillances). These activities include operational strategies for generation, water and waste usage, approval authority for system enhancements, and prioritization of maintenance activities.

2.2.1.~~11~~10.5.1 Superintendent Operations

This position is responsible for all plant operations. The superintendent, through the Shift Manager, manages the day-to-day operation of the facility, refueling operations, start-up, operational testing, water and waste processing, and plant operations.

2.2.1.~~11~~10.5.2 Superintendent Operations Support

This position is responsible for budget preparation, training oversight, performance monitoring, and assists the Manager, Operations, in overall program direction for operations. The Supervisor, Fire Operations, with the overall responsibility for the Fire Protection Program, reports to the Superintendent, Operations Support.

~~2.2.1.12 Safety Consultant~~

~~This position delivers a tactical and consolidated safety and health program for the site. Delivers progressive programs and initiatives including safety program design and implementation, emergency response and security planning, and other programs designed to promote a skilled and safe workplace.~~

2.2.2 Shift Crew Composition

The shift crew for one unit operating normally consists of the Shift Manager, Unit Supervisor, Nuclear Unit Operators, and Assistant Unit Operators. Additional licensed and non-licensed personnel are required for two-unit operation. Additional operators are assigned as required by the Technical Specifications to meet the requirements of 10 CFR 50.54(m)(2). Plant management and technical support personnel will be present or on call at all times.

2.2.3 Safety Review Committee

The WBN has a Plant Onsite Review Committee (PORC) that functions to advise the Plant Manager in matters related to nuclear safety. This advisory function is performed by the PORC acting in a formal meeting periodically and as situations demand. The PORC Chairman and members are appointed in writing by the Plant Manager. PORC members meet the experience requirements of ANSI N18.1-1971 and ANSI/ANS 3.1-1981 as endorsed by Regulatory Guide 1.8, Revision 2, April 1987, "Qualification and Training of Personnel for Nuclear Power Plants,".

Technical reviewers and PORC are qualified, organized, and conduct business as described in the Nuclear Quality Assurance Plan, TVA-NQA-PLN89A.

The PORC is used to conduct, as a minimum, reviews of the following. The PORC may delegate the performance of reviews, but shall maintain cognizance over and responsibility for them (e.g., subcommittees).

- New procedures or changes to existing procedures recommended by Regulatory Guide 1.33, Revision 2, Appendix A, February 1978 that require an evaluation in accordance with 10 CFR 50.59.
- The emergency operating procedures which implement NUREG-0737 and NUREG-0737, Supplement 1, as stated in Generic Letter 82-33.
- Physical Security Plan.
- Radiological Emergency Plan.

- Offsite Dose Calculation Manual (ODCM).
- Process Control Program (radwaste packaging and shipping).
- Additional PORC reviews specifically required by site-specific technical specifications or the plant's licensing basis.
- Proposed changes to Technical Specifications; Technical Requirements Manual; their Bases; and amendments to the Operating License.
- Selected 50.59 evaluations and 72.48 evaluations.

2.2.4 Personnel Qualification Requirements

NPG personnel at the WBN meet the qualification and training requirements of NRC Regulatory Guide 1.8 (ANSI N18.1-1971 and ANSI/ANS 3.1-1981) with the alternatives as outlined in the Nuclear Quality Assurance Plan, TVA-NQA-PLN89-A.

2.3 Administration

This section provides the requirements for fuel and fuel related components (FRCs). Fuel supply, fuel design, plant operations, refueling outages, dry cask storage, and other related activities are controlled and managed to comply with applicable Technical Specification and regulatory requirements, licensing commitments, licensing and design bases, or additional commitments made due to industry practices. Further detailed discussions of management measures are contained in Chapter 11 of this application.

2.3.1 Configuration Management

Configuration management is a critical element of the engineering standard programs as well as essentially all other functional areas involved with operating, maintaining and modifying a nuclear plant. It encompasses and is implemented through various plant organizations' procedures that are established to ensure the objectives below are achieved. The detailed aspects of configuration management are integrated into many of the engineering processes and procedures to ensure that (1) plant structures, systems, components, and computer software conform to approved design requirements, and (2) the plant's physical and functional characteristics are accurately reflected in plant documents, plant simulator, and other data systems.

Configuration management philosophies are incorporated into processes for (1) operating and maintaining the plant systems and components, (2) evaluation of hardware and components to meet the plant design basis, (3) generation of design output and changes to plant configuration, (4) installation and testing of plant systems and components, and (5) revision, updating, storage, and retrieval of documents which document the configuration of the plant.

The controls established in these processes ensure that design bases are maintained, design output is consistent with the defined bases, the as-built plant configuration meet design output requirements, and the as-built documents accurately reflect the plant's configuration.

2.3.1.1 Fuel Related Aspects

Plants are operated with a strategic objective of zero fuel defects. Fuel supply, fuel design, plant operations, refueling outages, and other related activities are controlled and managed to comply with applicable Technical Specification and regulatory requirements, licensing commitments, licensing and design bases, or additional commitments made due to industry practices.

Fuel is stored only in approved locations. Approved locations are those licensed by the NRC. These are the reactor cores, the fuel storage racks and shipping containers. Requirements, restrictions, limitations, and controls for these locations are given in site Technical Specifications for cores and racks and in Certificates of Compliance for containers. To preclude the possibility of accidental criticality when fuel is outside of these locations, limited quantities of fuel are allowed out of approved storage locations.

The maximum quantity of fuel assemblies allowed out of approved storage locations per approved plant procedures are as follows:

- One un-irradiated fuel assembly shall be allowed within the fuel-handling area. The fuel handling area includes all areas of the refueling floor where un-irradiated fuel assemblies are handled outside of metal shipping containers. The fuel-handling area also includes the new fuel storage vault and the truck bay where metal shipping containers are unloaded.
- One fuel assembly shall be allowed within the spent fuel storage pool boundary (excluding the inspection, reconstitution, or cleaning locations with appropriate evaluation for each configuration that must be performed prior to implementation). The spent fuel storage pool boundary includes the cask loading area, fuel transfer canal (excluding the transfer cart), and spent fuel pool.
- Three fuel assemblies shall be allowed within the refueling canal. The refueling canal includes the fuel transfer tube boundary (including the transfer cart) and the rod cluster control changing fixture. This allows for two fuel assemblies to be in the rod cluster control changing fixture while the third fuel assembly is being transferred through the fuel transfer tube, is in the upender, or is in transit to or from the reactor cavity.
- One fuel assembly shall be allowed within the reactor cavity.
- Loose fuel rods or pellets must be evaluated for criticality before removal from a fuel assembly or storage at the site.

2.3.1.2 Maintenance

The maintenance and modification (M/M) program assures that equipment, systems, and structures (1) are maintained and modified in accordance with applicable requirements, (2) supports safe, reliable, and efficient operation of the nuclear power plants, and (3) are maintained at a quality level required for them to perform their intended functions as specified in the original design, material specifications, and inspection requirements. In the context of this program, the modification process refers only to the physical implementation of design changes.

2.3.1.3 Corrective Maintenance (CM)

Corrective maintenance is the classification of any work on systems, structures, or components (SSCs) where the SSC has failed or is significantly degraded to the point that failure is imminent (within its operating cycle/preventive maintenance interval) and no longer conforms to or is incapable of performing the SSC’s design function.

2.3.1.4 Preventive Maintenance (PM)

PM consists of predictive, periodic, and planned maintenance actions taken to maintain equipment within design operating conditions and extend its life.
~~PM is performed before equipment failure. This work is controlled by the work order~~

~~(WO) process.~~
The program requires that site PM activities be performed on critical components and be re-evaluated, revised, or updated periodically based on industry experience, plant equipment history, or trend analysis.

2.3.1.5 Long-Term Maintenance Plan (Rolling Schedule)

The long-term maintenance plan is a product of the preventive and surveillance process, and specifies the frequency for implementation of maintenance and surveillance activities necessary for the reliability of components in each system. The rolling schedule includes the preliminary defense-in-depth assessment, which documents the allowable combinations of system and Functional Equipment Groups (FEGs) that may be simultaneously worked on line or during shutdown conditions. FEGs are common sets of boundaries encompassing equipment that has been evaluated for acceptable out-of-service combinations. They are used to schedule planned maintenance and establish equipment clearances.

2.3.2 Training and Qualification

It is the policy of TVA NPG to develop and implement performance-based training programs which promote and support the safe, reliable, and efficient operation of TVA's nuclear power plants. This demands that the personnel who operate, maintain, and support those plants be fully qualified to perform their duties. Effective training is an essential element of achieving and maintaining such qualifications. Effective training thus requires definition of the skills, knowledge, and competencies necessary to perform required duties; establishment and implementation of learning opportunities which develop those desired skills, knowledge, and competencies; and, documentation of attainment of such skills, knowledge, and competencies

The training and qualification program at TVA and WBN for personnel in operating and support organizations has been developed to ensure the safe and efficient operation of nuclear power plants. The program also addresses the qualifications of personnel who occupy positions to which TVA is committed through its licensing documents. This commitment is to ensure that the minimum qualifications, which are contained in national standards, for positions in operating and support organizations are appropriate for the safe and efficient operation of TVA's nuclear power plants.

TVA will meet the requirements of Regulatory Guide 1.8, Revision 2 (4/87) for all new personnel qualifying on positions identified in regulatory position C.1 after January 1, 1990. Personnel qualified on these positions prior to this date will still meet the requirements of Regulatory Guide 1.8, Revision 1-R (5/77). As specified in regulatory position C.2, all other positions will meet the requirements of ANSI/ANS N18.1-1971.

The objective of the training programs is to provide qualified personnel to operate and maintain the facility in compliance with its license, technical specifications, and appropriate governmental regulations.

Training programs are kept up-to-date by the responsible training manager to reflect plant modifications, changes in procedures, and lessons learned from in-house and industry operating experience. Training materials are updated and approved prior to use.

Continuing training is established by responsible managers to ensure that individuals performing safety-related functions remain cognizant of changes to the facility, procedures, governmental regulations, and quality assurance requirements as well as industry operating experience, Licensee Event Reports (LERs), historical INPO SOERs and other past significant facility experience, and personnel errors as applicable for their area of responsibility.

2.3.3 Procedures

The hierarchy of NPG procedures is defined in the NPG Procedure and Document Control Program. Descriptions of the major types of procedures are given below to assist in the determination of where a particular procedure fits in this hierarchy. Procedures for receipt, handling, inspection and storage of fuel are contained in the following procedure categories.

2.3.3.1 Standard Programs and Processes (SPPs)

These procedures describe administrative controls for processes that cross organizational boundaries, and based on their content, must be available, understood, and followed by all personnel. For example, clearance administration and fitness for duty procedures are SPPs since all employees need to be aware of these processes and their requirements. The following functional areas are provided from TVA's Administration of Standards Programs and Processes (TVA-SPPs). This list provides a sample of the types of procedures developed to support TVA Nuclear Power Group functions associated with nuclear plant operations:

2.3.3.2 Standard Department Procedures (SDPs)

SDPs describe administrative controls for processes that normally do not cross organizational boundaries and are generally contained within one organization. SDPs, like SPPs, are applicable to all NPG sites and locations unless reduced or limited applicability is specified in the procedure.

2.3.3.3 Site Instructions

Site Instructions are used to specify implementing instructions in the operation and maintenance of the plant. These instructions are normally technical in nature and are not administrative procedures. Examples of Site Instructions are Surveillance Instructions, Maintenance Instructions, Physical Security Instructions, Radiological Control Instructions, and Operating instructions. Site instructions are typically site-specific, but in some cases they may be common procedures used at all sites. If common procedures are used, licensing and Technical Specification requirements must be met for all sites.

2.3.4 Incident Investigation

The corrective action process is the primary tool used to document problems, analyze why problems exist, correct problems, and to document and close our gaps to excellence. As station leaders, all members of the WBN staff understand the importance of effectively using this process. Every opportunity is to be taken to ensure we and others are documenting issues. Strong and timely actions to correct and improve our equipment, performance and processes are expected from all organizations.

The WBN Unit 1 Technical Specifications (TSs) require that a system, structure, or component (SSC) be operable given the plant condition (operational mode); thus there should be a reasonable expectation that the SSC in question is operable while an operability determination is being made, or an appropriate TS action requirement should be entered.

Operations and/or Site Licensing shall take action when Problem Evaluation Reports are determined reportable and document the reportability determination.

2.3.5 Audits and Assessments

2.3.5.1 Audits

Measures are established to implement a comprehensive audit program which consists of internal audits, including NPG and other TVA organizations, which support the nuclear program and contractor/supplier audits to determine and assess the adequacy and effectiveness of the QA program.

2.3.5.2 Assessments

Quality Assurance Assessments are performed as a type of verification to ensure that observed quality-related activities are performed in accordance with requirements and desired results are achieved.

A detailed description of the program elements related to Audits and Assessments is contained in Chapter 11 of this application.

2.3.6 Quality Assurance Department

The Quality Assurance department is responsible for developing and administering the Nuclear Quality Assurance Plan (NQAP) and the Nuclear Assurance organization procedures required to ensure that TVA activities provide the required degree of safety and reliability.

Providing oversight of TVA activities by auditing, inspecting, assessing and observing the conduct of activities at Corporate and nuclear plant sites to ensure that they provide the required high degree of safety and reliability and are carried out consistent with applicable laws, regulations, regulatory commitments, licenses, and other requirements. The depth and scope of oversight is dependent on the item's or subject's importance to safety and performance history.

The TVA NQAP addresses and complies with the 18 criteria provided in 10 CFR 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants.” In addition, changes to the TVA NQAP are performed in accordance with 10 CFR 50.54, “Conditions of licenses,” paragraph (a).

2.3.7 Operating Organization

At WBN, the fundamental approach to operating the plant safely requires a site operational focus. Operational Focus consists of three elements: Operational Safety, Operational Decision Making and Organizational Alignment around the roles and responsibilities of the organization in meeting the needs of Operations and minimizing operational challenges.

A licensed Unit Operator is designated as the “Operator at the Controls” or OATC whose primary focus is the monitoring of the critical parameters necessary to support safe reactor operation (typically power, level, pressure and other critical parameters as determined by Operations or Shift Management

2.3.8 Employee Concerns

The Concerns Resolution Program (CRP) is established to ensure (1) that all employees supporting NPG are free to express safety issues, concerns, or differing views to NPG or TVA management without fear of reprisal and (2) all such concerns and issues are investigated and resolved in a timely manner.

NPG places special emphasis on resolving concerns which are important to the safe and reliable operation of its nuclear plants. The normal process for resolving concerns and differing views is through the responsible line management. Employees are encouraged to use the chain of command so that corrective actions can be handled promptly at the working level. Use of the Corrective Action Program (CAP) is the preferred avenue to identify, evaluate, and resolve issues related to the safe operation of NPG plants. In addition to the CAP, the following additional avenues are available:

- NPG Concerns Resolution Staff (CRS)
- **Nuclear Construction Concerns Resolution Staff**
- **TVA Ombudsmen**
- Office of the Inspector General (OIG)
- Nuclear Regulatory Commission (NRC), and
- Other governmental agencies with jurisdiction

2.3.9 Records Management

The QA program requires that for activities affecting quality, measures shall be established to ensure that documents prescribing the activity, including changes, are approved for release by authorized personnel, reviewed for adequacy, and made available to personnel performing the prescribed activity prior to commencing work.

2.3.10 Written Agreements with Offsite Emergency Resources

Interfaces between TVA, State, and local governmental agencies, and emergency response organizations are defined in the TVA REP and in the emergency plans of the affected State and local governments.

The State Radiological Emergency Plans, as well as the plans for those portions of states within the 50-mile ingestion pathway, are referenced in the TVA REP, Appendix E. These plans provide for the coordinated response of the State and affected local governments as well as the States and local governments within the 50-mile ingestion pathway.

Agreements have been established for services of outside organizations during an emergency. Agreement letters for offsite law enforcement support are maintained by the site Nuclear Security Services and are updated annually. The following provides the types of agreements established:

- Agreements maintained with ambulance services for 24-hour availability of EMT-staffed ambulances for the transport of irradiated/contaminated patients:

- Agreements maintained with medical centers to provide 24-hour availability of medical treatment for patients who may have been exposed to or contaminated with radioactive material:
- Agreements maintained with fire departments with 24-hour assistance capabilities:
- DOE Radiation Emergency Assistance Center/Training Site (REAC/TS), Oak Ridge, Tennessee - 24-hour availability of backup assistance to TVA for medical/radiological emergencies which exceed in-house and commercially available capabilities.

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3 INTEGRATED SAFETY ANALYSIS (ISA) AND ISA SUMMARY

Based on TVA's review of the regulations and discussions with the NMSS staff during a public meeting on October 22, 2009, the regulations requiring an Integrated Safety Analysis are not applicable to licensing the use of special nuclear material in a nuclear power plant. The regulations in 10 CFR 70.61 through 10 CFR 70.76 apply, in addition to other applicable Commission regulations, to each applicant or licensee that is or plans to be authorized to possess greater than a critical mass of special nuclear material, and engaged in enriched uranium processing, fabrication of uranium fuel or fuel assemblies, uranium enrichment, enriched uranium hexafluoride conversion, plutonium processing, fabrication of mixed-oxide fuel or fuel assemblies, scrap recovery of special nuclear material, or any other activity that the Commission determines could significantly affect public health and safety.

Section 50.34 of 10 CFR Part 50 specifies the technical information required to be contained in an application for an Operating License (OL). 10 CFR 50.34 (b) requires that an application for an OL include a final safety analysis report (FSAR) that includes information that describes the facility, presents the design bases and the limits of its operation, and presents a safety analysis of the structures, systems, and components and of the facility as a whole. Since the areas where fuel handling is conducted are shared between Watts Bar Nuclear Plant Unit 1 and Unit 2, the fuel handling accident analyses currently contained in Chapter 15 of the WBN Updated Final Safety Analysis Report (FSAR) are applicable to this application. Criticality analyses associated with fuel handling and storage are described in WBN FSAR Section 4.3.2.7.

The following refueling accident cases were evaluated by TVA: (1) two cases for drop of a fuel assembly with its handling tool, which impacts the baseplate (deep drop scenario) and (2) one case for drop of a fuel assembly with its handling tool, which impacts the top of a rack (shallow drop scenario). An analysis of the drop of the spent fuel pool gate was performed. Fuel handling accident dose consequence analysis was performed assuming rods in a fuel assembly were damaged. In addition, criticality analyses were performed for fuel storage in the new fuel vault and the spent fuel pool. These analyses are considered to bound potential accidents associated with the receipt, inspection, handling, and storage of the new fuel for WBN Unit 2.

The FSAR states that the fuel handling system devices and equipment have provisions to avoid dropping or jamming fuel assemblies while conducting refueling operations. The combined weight of a fuel assembly plus handling tool is approximately 2100 lbs. Controls on crane movement are such that the top of an active fuel assembly can only be raised to within approximately 10 feet of the top of normal water level. Despite the handling system provisions and the controls imposed on the crane, a conservative accident evaluation of the fuel racks should include the effect of a fuel assembly falling. Drop accidents focusing on the integrity of the rack structure due to such drops are considered for the bounding rack cases. The consequences of dropping a fuel assembly as it is being moved over stored fuel are discussed below. Based on the highest lift of a fuel assembly, the maximum distance from the bottom of a fuel assembly, traveling over fuel racks, to the top of the rack is 36 inches.

Dropped Fuel Assembly - Accident I

A fuel assembly plus its handling tool (2100 lbs.) is dropped from 36 inches above the top of an empty storage location away from a rack support pedestal and impacts the base of the rack module. Local failure of the baseplate or bottom casting is acceptable; however, the rack design should ensure that gross structural failure of the rack does not occur and that the subcriticality of the adjacent stored fuel assemblies is not violated. Calculated results show that there will be no change in spacing between cells. The load transmitted to the pool liner through the support pedestal by such an accident is well below the loads caused by the seismic event results provided in FSAR Chapter 6. Local failure of the rack bottom casting occurs during a "straight deep drop" accident away from the pedestal locations. The rack design allows local failure in that the amount of casting material present at the base of each cell is insufficient to support the postulated impact load. A finite element analysis using DYNA 2-D3 shows that the local failure of the bottom casting grid structure absorbs only 12 percent of the total impact energy. The pool liner is impacted following failure of the bottom casting. Local damage of the liner and its supporting concrete structure in the leak chase area was investigated using the LS-DYNA3D computer code to address the nonlinear elasto-plastic problem. The results show that there is no rupture of the liner.

Dropped Fuel Assembly - Accident II
Pedestal parameters were used to address the case of the "straight deep drop" accident over a pedestal. The resulting impact transmits a load of 191,000 lbs. to the slab through the pedestal. The magnitude of this impact is less than the peak pedestal load, 300,000 lbs., obtained from the seismic analysis for the racks. Furthermore, the impact load is less than the calculated peak pedestal load from the single rack analyses under OBE conditions (198,000 lbs.). In that analysis, the pedestals were shown to satisfy the allowable stress limits for Level A conditions. This accident, therefore, is not limiting. The bearing pressure on the pool slab, 2,432 psi, is below the allowable concrete pressure, 2,890 psi.

Dropped Fuel Assembly - Accident III
For the "straight shallow drop" of a fuel assembly and its handling tool on the top of the rack modules, a very conservative energy balance calculation was used together with the more conservative physical parameter values from the rack. Permanent deformation of the rack is acceptable, but such deformation is required to be limited to the top region such that the rack cross-sectional geometry at the level of the top of the active fuel region (and below) is not altered. Analysis results demonstrate that permanent damage to any fuel storage cell is limited to a maximum depth of 3.06 inches below the top of the rack. This is less than the distance from the top of the rack to the beginning of the active fuel region (approximately 20 inches). Therefore, there will be no effect on the subcriticality of fuel stored in adjacent cells as a result of this accident.

Dropped Gate
The drop of the 3820 lb. spent fuel pool gate from eight feet above the top of the racks was also evaluated. It was determined that permanent damage to a fuel storage cell is limited to a maximum depth of 5.325 inches below the top of the rack. Again, there will be no effect on the subcriticality of fuel stored in adjacent cells as a result of this accident.

The analysis results of Dropped Fuel Assembly - Accident I show that the load transmitted to the liner through the rack structure is properly distributed through the bearing pads located near the fuel handling area; therefore, the liner would not be ruptured by the impact as a result of the fuel assembly drop through the rack structure. The analysis results of Dropped Fuel Assembly - Accident III and the dropped gate show that damage will be restricted such that there is no effect on the subcriticality of fuel stored in adjacent cells. The NRC staff reviewed TVA's analysis results in its submittal of October 23, 1996 and concurred with the findings. This is acceptable based on the TVA's structural integrity conclusions supported by the parametric studies.

Consequences of a Fuel Handling Accident (FHA)

The analysis of a postulated fuel handling accident is based on Regulatory Guide 1.25, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors ," and NUREG/CR-5009, "Assessment of the Use of Extended Burnup Fuel in Light Water Power Reactors."

The parameters used for this analysis are listed in FSAR Table 15.5-20.

The bases for the Regulatory Guide 1.25 evaluations are:

1. In the Regulatory Guide 1.25 analysis the accident occurs 100 hours after plant shutdown. Radioactive decay of the fission product inventory during the interval between shutdown and placement of the first spent fuel assembly into the spent fuel pit is taken into account.

2. In the Regulatory Guide 1.25 analysis damage was assumed for all rods in one assembly.

3. The assembly damaged is the highest powered assembly in the core region to be discharged. The values for individual fission product inventories in the damaged assembly are calculated assuming full-power operation at the end of core life immediately preceding shutdown. Nuclear core characteristics used in the analysis are given in FSAR Table 15.5-21. In the Regulatory Guide 1.25 analysis, a radial peaking factor of 1.65 is used.

4. For the Regulatory Guide 1.25 analysis all of the gap activity in the damaged rods is released to the spent fuel pool and consists of 10% of the total noble gases and radioactive iodine inventory in the rods at the time of the accident with the following gap percentage exceptions which are based on NUREG/CR 5009 as appropriate: 14% of the Kr-85, 5% of the Xe-133, 2% of the Xe-135, and 12% of the I-131.

5. Noble gases released to the spent fuel pool are released through the Shield Building vent to the environment.

6. In the Regulatory Guide 1.25 analysis, the iodine gap inventory is composed of inorganic species (99.75%) and organic species (0.25%).

7. In the Regulatory Guide 1.25 analysis, the spent fuel pool decontamination factors for the inorganic and organic iodine are 133 and 1, respectively.

8. All iodine escaping from the pool is exhausted to the environment through charcoal filters.

9. A filter efficiency of 99% is used for elemental and organic iodine for the Auxiliary Building Gas Treatment System (ABGTS) filters and 90% for inorganic iodine and 30% for organic iodine for the purge air exhaust filters.

10. No credit is taken for natural decay either due to holdup in the Auxiliary Building or after the activity has been released to the atmosphere.

11. The short-term (i.e., 0-2 hour) atmospheric dilution factors at the exclusion area boundary and low population zone given in FSAR Table 15A-2 are used. The thyroid dose utilizes ICRP-30, "Limits for Intakes of Radionuclides by Workers," iodine dose conversion factors. Doses are based on the dose models presented in FSAR Appendix 15A.

12. Two Tritium-Producing Burnable Absorber Rods in the assembly are assumed to break and release the entire contents of tritium. All of the tritium is conservatively assumed to evaporate into the air.

The thyroid, gamma, and beta doses for FHAs in the Auxiliary and Reactor Buildings are given in FSAR Table 15.5-23 for the exclusion area boundary and low population zone. These doses are less than 25% of the 10 CFR 100.11 limits of 300 rem to the thyroid, and 25 rem gamma to the whole body. These doses are calculated by using Revision 4 of the computer code FENCDOSE.

The ventilation function of the reactor building purge ventilating system (RBPVS) is not a safety-related function. However, the filtration units and associated exhaust ductwork do provide a safety-related filtration path following a fuel-handling accident prior to automatic closure of the associated isolation valves. The RBPVS contains air cleanup units with prefilters, HEPA filters, and 2-inch-thick charcoal adsorbers. This system is similar to the auxiliary building gas treatment system except that the latter is equipped with 4-inch-thick charcoal adsorbers. Anytime fuel handling operations are being carried on inside the primary containment, either the containment is isolated or the reactor building purge filtration system is operational. The assumptions listed above are, therefore, applicable to a fuel handling accident inside primary containment except that the assigned filter efficiency is 90% for inorganic iodine and 30% for organic iodine since no relative humidity control is provided.

The radiation dose results of the Regulatory Guide 1.25 fuel handling accident (FHA) analysis are provided in FSAR Table 15.5-23. For a FHA inside containment, no allowance has been made for possible holdup or mixing in the primary containment or isolation of the primary containment as a result of a high radiation signal from monitors in the ventilation system for the case where containment penetrations are closed to the Auxiliary Building. However, the containment purge filters are credited. For a FHA inside containment when containment penetrations and/or the annulus are open to the Auxiliary Building Secondary Containment Enclosure (ABSCE) spaces, the containment is isolated by a high radiation signal from monitors in the ventilation system and no credit is assumed for the containment purge filters. The result of a FHA inside primary containment is well below the limits of 10 CFR 100.

The whole body, beta and thyroid doses to control room personnel from the radiation sources discussed above are presented in FSAR Table 15.5-23. The doses are calculated by the COROD computer code. The gamma and beta doses are based on a one time burn of a Tritium Production Core fuel element whereas the thyroid dose is based on a three times burned element. This selection of sources produces higher doses. Parameters for the control room analysis are found in FSAR Table 15.5-14. The dose to whole body is below the 10 CFR 50, Appendix A, GDC 19 limit of 5 rem for control room personnel, and the thyroid dose is below the limit of 30 rem.

~~Dose equations in TID-14844, “"Calculation of Distance Factors for Power and Test Reactors," were used to determine the dose. Dose conversion factors in ICRP-30 were used to determine thyroid doses in place of those found in TID-14844.~~

REPLACE WITH THE FOLLOWING:

A discussion of the offsite dose consequences of a FHA was provided in the SAR. The discussion was taken from Chapter 15.5.6 of the WBN Unit 2 FSAR. In a recent amendment of the Unit 2 FSAR, an updated FHA analysis was provided. For new, unirradiated fuel, a fuel handling accident in the containment during initial core loading will not have offsite radiological consequences. The event of concern would be damage to an irradiated fuel assembly in the spent fuel pool due to damage caused by a new Unit 2 assembly. The FHA analysis for Unit 2 outside of containment has been reanalyzed using the alternate source term methodology of Regulatory Guide 1.183. The following discussion is taken from the updated FSAR Section 15.5.6.2.

> The analysis of a postulated fuel handling accident in the Auxiliary Building refueling Area is based on Regulatory Guide 1.183. i.e., Alternate Source Terms (AST).The bases for evaluation are:

(1) In the Regulatory Guide 1.183 analysis, the accident occurs 100 hours after plant shutdown. Radioactive decay of the fission product inventory during the interval between shutdown and placement of the first spent fuel assembly into the spent fuel pit is taken into account.

(2) In the Regulatory Guide 1.183 analysis, damage was assumed for all rods in one assembly.

(3) The assembly damaged is the highest powered assembly in the core region to be discharged. The values for individual fission product inventories in the damaged assembly are calculated assuming full-power operation at the end of core life immediately preceding shutdown. Nuclear core characteristics used in the analysis are given in Table 15.5-21. A radial peaking factor of 1.65 is used.

(4) The Regulatory Guide 1.183 analysis assumes all of the gap activity in the damaged rods is released to the spent fuel pool and consists of 8% I-131, 10% Kr-85, and 5% of other noble gases and other halogens.

(5) Noble gases released to the Auxiliary Building spent fuel pool are released through the Auxiliary Building vent to the environment.

(6) In the Regulatory Guide 1.183 analysis, the iodine gap inventory is composed of inorganic species (99.85%) and organic species (0.15%).

(7) In the Regulatory Guide 1.183 analysis, the overall inorganic and organic iodine spent fuel pool decontamination factor is 200.

(8) In the Regulatory Guide 1.183 analysis, all iodine escaping from the Auxiliary Building spent fuel pool is exhausted unfiltered through the Auxiliary Building vent.

(9) No credit is taken for the ABGTS or Containment Purge System Filters in the analysis.

(10) No credit is taken for natural decay either due to holdup in the Auxiliary Building or after the activity has been released to the atmosphere.

(11) The short-term (i.e., 0-2 hour) atmospheric dilution factors at the exclusion area boundary and low population zone given in Table 15A-2 are used. The thyroid dose utilizes ICRP-30 [25] iodine dose conversion factors. Doses are based on the dose models presented in Appendix 15A.

Fuel Handling Accident Results

The radiation dose results of the Regulatory Guide 1.183 fuel handling accident (FHA) are given in Table 15.5-23. Alternate source term (AST) described in RG 1.183 was selectively used to evaluate the FHA due to an event in the spent fuel pool located in the Auxiliary Building or in the containment when the equipment hatch or both doors in a personnel air lock are open. As part of this selective implementation of AST, the following assumptions are used in the analysis:

- The total effective dose equivalent (TEDE) acceptance criterion of 10 CFR 50.67(b)(2) replaces the previous whole body and thyroid dose guidelines of 10 CFR 100.11.
- The gap activity is revised to be consistent with that required by RG 1.183.
- The decontamination factors were changed to be consistent with those required by RG. 1.183.
- No Auxiliary Building isolation is assumed.
- No filtration of the release from the Containment or the spent fuel pool to the environment by the Containment Purge filters or the ABGTS is assumed.

The evaluation for the FHA at the spent fuel pool is a bounding analysis for a dropped assembly in containment when the containment is open. The release point for the containment purge system is the Unit 2 shield building stack. The X/Qs are lower for this release point than for the normal auxiliary building exhaust. In addition, any release from the shield building stack would go through the purge system HEPA and Charcoal filter assemblies prior to release. Currently, when the purge lines isolate on high radiation, the auxiliary building also isolates and ABGTS is actuated. The release point for ABGTS is the shield building stacks and the releases are filtered through HEPA and Charcoal assemblies. Thus AST analysis for the FHA in the Auxiliary Building that considers no filtration is conservative and acceptable as the basis for the containment open evaluation.

The thyroid, gamma, and beta doses for FHAs in the Auxiliary and the open containment are given in Table 15.5-23 for the exclusion area boundary and low population zone. These doses are less than 25% of the 10 CFR 100.11 limits of 300 rem to the thyroid, and 25 rem gamma to the whole body and less than the 10 CFR 50.67 limit of 25 rem TEDE. These doses are calculated using the computer code FENCDOSE [16].

The whole body, beta, and thyroid doses to control room personnel from the radiation sources discussed above are presented in Table 15.5-23. The doses are calculated by the COROD computer code [17]. Parameters for the control room analysis are found in Table 15.5-14. The dose to whole body is below the 10 CFR 50 Appendix A, GDC 19 limit of 5 rem for control room personnel, and the thyroid dose is below the limit of 30 rem and the 10CFR 50.67 limit of 5 rem TEDE.

The NRC review of the Regulatory Guide 1.183 FHA for WBN Unit 2 was documented in NUREG-0847, Supplement 25, “Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Unit 2. The review states that “The staff concludes that the doses estimated by TVA for the WBN Unit 2 FHA will meet the requirements of 10 CFR50.67 and the guidelines of RG 1.183 and are, therefore, acceptable.”

Criticality Accidents

See Chapter 5 of this license application for a discussion of the criticality analyses performed for the new fuel storage vault and spent fuel storage pool.

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4 RADIATION PROTECTION

This section of the application describes the radiation protection program at the Watts Bar Nuclear (WBN) Plant.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed based on the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 4 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 4.1 Commitment to Radiation Protection Program Implementation	10 CFR 20.1101, Subpart B	4.4.1.3	12.5 Operational Radiation Protection Program	12.5 Radiological Control (RADCON) Program
Section 4.2 Commitment to an ALARA Program	10 CFR 20.1101	4.4.2.3	12.1 Assuring that Occupational Radiation Exposure Are ALARA	12.1 Assuring that Occupational Radiation Exposure Are ALARA
Section 4.3 Organization and Personnel Qualifications	10 CFR 70.22	4.4.3.3	13.1.2, 13.1.3 Operating Organization	13.1.3 Qualification Requirements for Nuclear Facility Personnel
Section 4.4 Commitment to Written Procedures	10 CFR 70.22(8)	4.4.4.3	13.5.1 Administrative Procedures	13.5 Site Instructions

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 4 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 4.5 Training Commitments	10 CFR 19.12 & 10 CFR 20.2110	4.4.5.3	13.2.2 Non-Licensed Plant Staff Training	13.2.1 Accredited Training Programs
Section 4.6 Ventilation and Respiratory Protection Programs Commitments	10 CFR 20, Subpart H	4.4.6.3	12.3 & 12.4 Radiation Protection Design Features, 12.5 Operational Radiation Protection Program	12.3.3 Ventilation, 12.5.2 Equipment, Instrumentation, and Facilities
Section 4.7 Radiation Surveys and Monitoring Programs Commitments	10 CFR 20, Subpart F, C, L, M	4.4.7.3	12.3 & 12.4 Radiation Protection Design Features, 12.5 Operational Radiation Protection Program	12.3.3 Ventilation, 12.5.2 Equipment, Instrumentation, and Facilities
Section 4.8 Additional Program Commitments	10 CFR 20, Subpart L, M, 10 CFR 50.72 & 10 CFR 50.73	4.4.8.3	N/A	See Section 4.8

4.1 COMMITMENT TO RADIATION PROTECTION PROGRAM IMPLEMENTATION

The TVA Nuclear Power Group (NPG) Radiation Protection (RP) program, which is applicable to WBN, implements the requirements of 10 CFR 19, 20, and 30 through 34. The RP Program is further established to meet, to the extent practicable, the guidelines contained in INPO 05-008, and ANI Inspection Criteria 8.1 through 8.10.

The RP Program consists of four elements that are directed toward essential support to TVA's nuclear power program.

- Radiological impact assessments.
- Radiation protection planning and radiological safety evaluation, including preliminary safety analysis reports, final safety analysis reports, and radiological emergency plans.
- Radiological environmental monitoring.
- Radiological control activities

The RADCON Section is under the supervision of the Plant Manager.

The RADCON Section is responsible for the radiological control activities at the plant. It applies radiation standards and procedures; reviews proposed methods of plant operation; participates in development of plant documents; and assists in the plant training program, providing specialized training in radiation protection. It provides coverage for all operations involving radiation or radioactive materials including maintenance, fuel handling, waste disposal, and decontamination. It is responsible for personnel and inplant radiation monitoring, and maintains continuing records of personnel exposures, plant radiation, and contamination levels.

4.2 COMMITMENT TO AN ALARA PROGRAM

Consistent with TVA's overall commitment to keep occupational radiation exposures as low as reasonably achievable, specific plans and procedures are followed by operating and maintenance staff to assure that ALARA goals are achieved in the operation of the plant. Operational ALARA policy and procedures are formulated at the corporate level in Nuclear Power and are implemented at each nuclear plant through the issuance of division procedures and plant instructions for the purpose of maintaining Total Effective Dose Equivalent (TEDE) ALARA. These procedures and instructions are consistent with the intent of Section C.1 of Regulatory Guide 8.8 and Regulatory Guide 8.10. Included in these operating procedures and plant instructions are the provision that employee radiation exposure trends are reviewed periodically by management staff at the plant and in the central office. Summary reports are prepared that describe: (a) major problem areas where high radiation exposures are encountered; (b) which worker group is accumulating the highest exposures; and (c) recommendations for changes in operating, maintenance, and inspection procedures or modifications to the plant as appropriate to reduce exposures.

An ALARA committee composed primarily of supervisory personnel is established to review periodically the effectiveness of implementation of the ALARA Program. Reviews include the site performance against ALARA goals, employee ALARA suggestions, ALARA planning documents, and trends. The Plant Manager or Assistant Plant Manager will normally serve as chairman of the site ALARA committee.

4.3 ORGANIZATION AND PERSONNEL QUALIFICATIONS

The TVA and Watts Bar Nuclear Plant specific organizations are discussed in Chapter 2 of this application.

As described previously in section 2.2.4 of this application, the site Radiation Protection Manager shall have the education and experience as described in Regulatory Guide 1.8, Revisions 1 and 2 in the context of Regulatory Guide 1.8 and the endorsed ANSI N18.1-1971 and ANSI/ANS-3.1-1981. Because of TVA's commitment to both documents, the Radiation Protection Manager must meet the more restrictive of the composite qualifications and training of both documents.

The Radiation Protection Manager shall have a bachelor's degree in a science or engineering subject, including formal training in radiation protection. At the time of initial core loading or appointment to the active position, whichever is later, the responsible individual shall have five years of experience in applied radiation protection. At least three of the five years shall be professional-level experience in applied radiation protection work in a nuclear facility dealing with radiological problems similar to those encountered in nuclear power plants, preferably in a nuclear power plant. During the three years, the individual shall participate in the radiation protection section of an operating nuclear power plant during the following periods: (1) routine refueling outage (one to two months); and (2) two months operation above 20 percent power. The Radiation Protection Manager shall have at least six months experience onsite.

4.4 COMMITMENT TO WRITTEN PROCEDURES

Radiation control instructions are maintained and made available to all site personnel. These instructions are written to implement the requirements of 10 CFR 20, applicable codes and standards, and commitments to outside agencies (American Nuclear Insurers, Institute of Nuclear Plant Operations, etc.). Chapter 11 of this application provides a detailed discussion of procedure controls and implementation.

Radiation protection procedures are prepared, reviewed and approved to carry out activities related to the Radiation Protection Program. Procedures are used to control radiation protection activities in order to ensure that the activities are carried out in a safe and effective manner. Radiation protection procedures are reviewed and revised as needed to incorporate facility or operational changes.

4.4.1 Radiation Work Permit Procedures

A Radiation Work Permit (RWP) system shall be established to document radiological conditions and prescribe appropriate protective requirements for work in radiologically controlled areas.

- Site Radiation Protection shall be responsible for establishing entry requirements for radiological areas via the RWP.

- The area in which the work is to be performed is surveyed for radiological hazards before the start of work and/or as appropriate during work to ensure that radiological hazards are properly identified.

- Protective clothing and equipment, dosimetry, and work limitation requirements are specified for all workers entering the area.

RWPs will normally be required for all work in radiologically controlled areas. RWPs shall always be required for areas where radiological conditions meet or exceed the criteria listed below.

- Entering a “Radiation Area.”
- Entering a “High Radiation Area” or “Very High Radiation Area.”
- Entering a “Contaminated Area.”
- Entering an “Airborne Radioactivity Area.”
- Breaching a contaminated system or component.
- RP discretion to provide adequate radiological control.
- For radiographic examinations conducted at licensed nuclear facilities.
- Entering an area or component where radiological conditions are unknown.

Each worker shall be responsible for awareness and compliance with the radiation protection requirements of an RWP and for meeting the prerequisites for RWP entry.

4.5 TRAINING COMMITMENTS

A radiation protection training program shall be developed, documented, and administered consistent with expectations as outlined in NEI 95-04, “Guideline for General Access Training”. This program is implemented in General Employee Training for NPG power plant facilities. All individuals who in the course of employment are likely to receive an occupational exposure to radiation from licensed and unlicensed radiation sources under the control of the licensee in excess of 100 mrem in a year shall receive radiation protection training commensurate with their duties and responsibilities (10 CFR 19.12) and instructions on U.S. NRC Regulatory Guides 8.13 and 8.29.

A training program for RP personnel shall be developed by Nuclear Training. Nuclear Training shall issue procedures detailing the program. The Program Manager of Radiological Services will concur with the initial issuance and any change to procedures for the training of RP personnel. The National Voluntary Laboratory Accreditation Program (NVLAP), Technical Director will concur with the training requirements and procedures involving NVLAP accredited activities.

4.6 VENTILATION AND RESPIRATORY PROTECTION PROGRAMS

Internal occupational dose is controlled though facility design, engineering controls, confinement and reduction of contaminated areas, limiting access to radiological controlled areas, and the use of respiratory protective equipment. Personnel are not routinely monitored for internal deposited radioactive material. Confirmatory monitoring (by licensee) is performed for individuals through the assessment and tracking of DAC-h. Radio-bioassay (in vitro and in vivo measurement and analysis) is employed to confirm and/or evaluate probable intake.

4.6.1 Respiratory Protection Program

A respiratory protection program shall be established and maintained in accordance with 10 CFR 20. Workers shall have respiratory protection training before wearing respiratory protection equipment.

TVA is responsible for providing a workplace environment in which individuals are adequately protected from hazards, including hazards from exposure to ionizing radiation. As part of TVA's program to maintain exposures ALARA, the TEDE is to be ALARA for activities subject to the 10 CFR 20 "Standards for Protection Against Radiation." These requirements allow intakes of radioactive material by workers, if such intakes result in lower external dose and maintain TEDE.ALARA. Under these requirements intakes of radioactive material are permissible if evaluations predict that use of respiratory protection equipment will result in a higher TEDE. Additionally, other factors may be considered in the evaluation for maintaining TEDE ALARA. These factors may include, but are not limited to, environmental conditions, safety conditions, accessibility conditions, worker comfort, wear times, and the type of respiratory equipment specified or available. All TEDE ALARA evaluations shall be documented and retained as a Facility based Radiological Control Program record. Dose calculations/investigations are reviewed and approved by radiation protection supervision.

Unplanned intakes (no documented TEDE ALARA evaluation) of radioactive material by workers that result in an internal dose of 10 mrem or greater shall be documented in the Corrective Action Program.

Respiratory Protection Program elements include:

- Air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate exposures;
- Surveys and bioassays, as appropriate, to evaluate actual intakes;
- Testing of respirators for operability immediately prior to each use;
- Written procedures shall be established that address: selection, fitting, issuance, maintenance, and testing of respirators, including testing for operability immediately prior to each use; program audits; minimum qualifications of program supervisors and implementing personnel; limitations on periods of respirator use and relief from respirator use; maintaining TEDE ALARA and performing evaluations; supervision and training of personnel; monitoring (including air sampling and bioassays), and recordkeeping; a description of the applications of respirators for routine, non-routine, and emergency respirator use; and periodic medical evaluation (NRC Regulatory Guide 8.15).
- Determination by a physician prior to the initial fitting of respirators, and annually (quarter ending) thereafter or periodically at a frequency determined by a physician, that the individual user is medically fit to use the respiratory protection equipment.

4.6.2 Ventilation Systems

The fuel handling area ventilation system, a subsystem of the Auxiliary Building ventilating system, serves the fuel-handling area at Elevation 757, the penetration rooms at Elevation 737, Elevation 757 and Elevation 782, and the fuel, waste, and cask handling areas at Elevation 729 and Elevation 692.

The system is designed to: (1) maintain acceptable environmental conditions for personnel access, operation, inspection, maintenance, and testing, (2) protect mechanical and electrical equipment and controls, and (3) control airborne activity during normal operation. The environmental control system is designed to maintain building temperatures between 60°F minimum and 104°F maximum.

During accident conditions, the fuel handling area ventilation system is shut down and all environmental control is handled by the Auxiliary Building Gas Treatment System (ABGTS), described in FSAR Section 6.2.3.

All ductwork, dampers, and grilles of the fuel handling area ventilation system essential to operation of the ABGTS are designed to Seismic Category I and Safety Class 2b requirements. Each fueling handling area exhaust fan is provided with a primary circuit breaker and a shunt trip isolation switch which is tripped by a signal of the opposite train from that for the primary circuit breaker to ensure that power is isolated from the fan. All other system components, including exhaust fans and remaining ductwork and dampers, are designed to Seismic Category I(L) requirements.

To control airborne activity, ventilation air is supplied to clean areas, then routed to areas of progressively greater contamination potential. The fuel handling area is maintained at a slightly negative pressure to limit out leakage, and can be physically isolated from the outdoors in case of radiological contamination.

Air utilized to ventilate the fuel handling area, waste packaging, and cask shipping areas is exhausted through the fuel handling area exhaust fans. An exhaust duct system from the waste packaging area and cask loading area is connected to a duct system around the periphery of the spent fuel pit and fuel transfer canal. Thus, exhaust air from the fuel handling area passes across the spent fuel pit forming an air curtain across the pool. During periods of irradiated fuel movement in the fuel transfer canal, air curtain exhaust flow at the fuel transfer canal area is required to be interrupted. The fuel transfer canal exhaust flow is isolated to prevent the uptake of source terms emitted during a postulated fuel handling accident in the fuel transfer canal and to support proper spent fuel pool accident radiation monitor operation.

Exhaust is provided by two 100% capacity fuel handling area exhaust fans. During normal operation one fan is in operation with the other on standby. Both fans discharge to the Auxiliary Building exhaust stack.

An inlet damper furnished with each fuel handling area exhaust fan is used to regulate the volume of air exhausted as required to maintain a ¼-inch negative pressure within the building. These dampers are automatically operated by static pressure controllers.

During periods of high radiation in the fuel handling area or upon initiation of a containment isolation signal, or for high air temperature at the supply intake the Auxiliary Building supply and exhaust fans and the fuel handling exhaust fans are automatically stopped and isolation dampers located in the ducts that penetrate the Auxiliary Building Secondary Containment Enclosure (ABSCE) are closed. Additionally, during refueling operations when containment and/or the annulus is open to the ABSCE spaces, a Containment Vent Isolation (CVI) signal will automatically stop the above described fans and close the same isolation dampers as described above. Similarly, the high radiation signal in the fuel handling area can also automatically initiate a CVI during refueling operations when containment and/or the annulus is open to the Auxiliary Building ABSCE spaces. An isolation barrier is thus formed between the building and the outdoor environment, and the ABGTS is started up automatically (see FSAR Section 6.2.3) to maintain the ABSCE at less than a 1/4-inch water gauge negative pressure during these high radiation or accident periods. **In additional if both containments are open to the auxiliary building, a CVI in one unit will initiate a CVI on the other unit to assure ABSCE integrity.**

The fuel-handling area ventilation system is located completely within Seismic Category I structures and all safety-related components are fully protected from floods and tornado-missile damage.

4.7 RADIATION SURVEYS AND MONITORING PROGRAM COMMITMENTS

Prospective monitoring determinations for internal and external dose monitoring are performed for individuals or group of individuals entering the restricted area. Personnel monitoring, for dose from sources external to the body, is conducted using appropriate dosimeters as required by 10 CFR 20. TVA maintains accreditation as a processing laboratory for dosimeters, as described in American Standards Institute (ANSI) N13.11-1983, "Personnel Dosimeter - Criteria for Performance". This accreditation is under the National Voluntary Laboratory Accreditation Program conducted by the National Institute of Standards and Technology. Dosimeters may be processed onsite by WBN, an accredited sub-facility, or by another processing laboratory within the scope of TVA's accreditation. Dose information for whole body (total effective dose equivalent), external exposure of the skin, lens of the eye, and extremities is recorded in a dose tracking system and retained in a permanent historical database for generating required reports. Real time control is generally implemented using information from direct reading dosimeters. Official doses of record are taken from dosimeters. However, doses are calculated when dosimeter results are not available or do not accurately represent actual dose received.

Personnel monitoring and confirmatory monitoring for dose from intakes of radioactive material is conducted using DAC-HR tracking and bioassays, including whole body counting. Monitoring is performed for each person required to be monitored by 10 CFR 20. The whole body counter is calibrated with standard radioisotopes in configurations that approximate the human body. It is able to detect expected gamma emitting radionuclides per ANSI-N13.30, September 1989, Table-1, "Acceptable Minimum Detectable Activities."

Routine radiological surveys to detect radiation, radioactive contamination, and airborne radioactivity are performed throughout the plant on periodic schedules. Survey frequencies are determined by the RADCON Superintendent based upon the actual or potential radiological conditions. Schedules for completion of routine surveys are issued to the technicians. As plant conditions change, the schedule will be updated. Radiological surveys may be performed whenever personnel enter potential or actual radiological areas and there is any doubt as to the existing conditions. Retention of survey records follows the requirements of 10 CFR 20.2103 and Regulatory Guide 1.88

Radiation and contamination surveys will be made on the new fuel shipments by Radiological Control personnel. The purpose of the survey is to protect personnel from unnecessary exposure to radiation and/or contamination. Smears shall be counted for alpha and beta-gamma radiation.

The designated fuel receiving areas will be zoned according to 10 CFR 20. When the fuel arrives onsite, radiation and contamination surveys will be taken on the transport vehicle. Dose rate at contact and 2 meters from the vehicle will be taken, Contact dose rates, dose rates at 1 meter, and smears will be taken on the external surfaces of the shipping containers. After the shipping containers are opened, smears will be taken of the fuel assembly covering and the inside of the container. The dose rate of each fuel assembly will be obtained, and the fuel assembly will be smeared when the polyethylene covering has been removed for inspection. When all fuel containers are removed from the truck, radiation and smear surveys will be taken on the truck before allowing it to leave.

Periodic surveys will be performed within the storage/handling area. Upon detection of contamination, a personnel monitoring station will be established and the area controlled to prevent the spread of the contamination. The work controlling document will describe the protective clothing, dosimetry, and methods to be followed to prevent unnecessary exposure to personnel. The contaminated area or item will be cleaned and/or disposed of appropriately.

Portable survey instruments are calibrated and checked periodically with standard radioactive sources in accordance with instrument specific calibration and maintenance procedures. Accurate records on the performance of each instrument during each calibration are maintained. Each laboratory counting system is checked at regular intervals with standard radioactive sources for proper counting efficiencies, background count rates, and operating parameters.

4.7.1 Radiological Zones

Radiological zones at WBN have been established to (1) control the spread of contamination, (2) control personnel access to avoid unnecessary exposure of personnel to radiation, and (3) to control access to radioactive sources present in the facility. The following definitions of areas are provided to describe how the facility Radiation Protection Program is implemented to protect workers and the general public on the site.

- **Owner Controlled Area** - An area, outside of a restricted area but inside the site boundary, access to which can be limited by the licensee for any reason.

- **Restricted Area** - Any area access to which is limited by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials (10 CFR 20.1003).

- **Radiologically Controlled Area (RCA)** - An area within (or that may coincide with) the Restricted Area (defined in 10 CFR 20.1003) boundaries that may have increasing radiological hazards

- **Radiation Area** - An area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 5 mrem in one hour at 30 cm from the radiation source or from any surface that the radiation penetrates.

- **High Radiation Area (HRA)** - An area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving a dose equivalent in excess of 100 mrem in 1 hour at 30 centimeters from the radiation source or 30 centimeters from any surface that the radiation penetrates.

- **Very High Radiation Area** - An area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual

4.7.2 Access and Egress Control

Controls have been established for entry into and exit from radiological controlled areas (RCA). Prior to entry, workers are provided training, radiation monitoring devices (thermoluminescent dosimeter TLD and electronic dosimetry) and are required to have a radiation work permit (RWP) applicable to the assigned work activity. Upon exiting a RCA, workers are expected to proceed to the nearest frisker station and perform a self-survey of their hands and feet at a minimum. Once frisking is completed, workers will exit the RCA via a personal contamination monitor (PCM). Prior to leaving the WBN protected area workers exit through a portal monitor that again measures the individual for contamination.

Access controls to prevent unplanned exposures in high radiation areas are implemented in accordance with WBN Unit 1 Technical Specifications. In addition to the access control requirements for high radiation areas, the following control measures are implemented to control access to very high radiation areas in which radiation levels could be encountered at 500 rads or more in 1 hour at 1 meter from a radiation source or any surface through which the radiation penetrates:

- Conspicuously posted with a sign(s) stating GRAVE DANGER - VERY HIGH RADIATION AREA
- Area is locked. Each lock shall have a unique core. The keys shall be administratively controlled by the RADCON Superintendent.
- Plant manager's (or designee) approval required for entry.
- RADCON personnel shall be in accompaniment of the person(s) making the entry.

4.7.3 Posting for Radiation Protection Awareness

Each RCA shall be posted by yellow and magenta signs bearing the standard radiation warning symbol and the words “Caution - Radiologically Controlled Area.” The posting shall also state that a monitoring device is required (unless it has been determined that monitoring is not required).

Contamination areas shall have conspicuous boundaries consisting of such items as rad-ribbon, rad-rope, rad-tape, and step-off pads and be posted by yellow and magenta signs bearing the standard radiation warning symbol and the words “Caution-Contaminated Area” or “Caution-Contamination Area.” Where, due to physical space limitations, it is impractical to post a contaminated area as described above, the area may be noted with radiation tape and/or radiation hazard tags. Physical space limitation is intended to apply to such areas as floor drains, electrical panels, sample sinks, etc.

Radiological postings shall be displayed with yellow and magenta colors in accordance with 10 CFR 20.1901.

4.7.4 Protective Clothing and Equipment

TVA provides protective clothing for use in radiological areas. Clothing required for a particular instance is prescribed by RADCON based upon the actual or potential radiological conditions. Protective clothing is cleaned, surveyed for contamination, checked for physical condition, and returned to service if acceptable. Additional protective clothing stock is available from the plant warehouse as required. Protective clothing available for use includes but is not limited to:

1. Coveralls
2. Lab coats
3. Gloves
4. Head covers
5. Foot covers

4.7.5 Personnel Monitoring for External Exposures

All individuals who are expected to work in a radiologically controlled area (RCA) shall process through RP when arriving, transferring, or terminating at a Nuclear Power Group (NPG) site. In addition, monitored and NPG staff individuals who will visit another licensee or TVA plant, and require a thermoluminescent dosimeter (TLD) on that visit, must check out prior to leaving their respective sites unless exempted by RP. If an employee is assigned to work at a non-TVA installation where an exposure to radiation is incurred, the employee shall inform RP of this assignment. The employee shall turn in their dosimetry, obtain any required bioassays, and complete any requested documentation. When the employee returns, they must report to RP to obtain any required bioassay and update their exposure records.

TVA will provide each worker entering an RCA with dosimetry capable of measuring the worker's dose. This is accomplished by using a dosimeter of record (for example, a TLD), appropriate for the radiological environment, provided by a National Voluntary Laboratory Accreditations Program (NVLAP) certified processor (utility or vendor).

Administrative dose levels (ADLs) to be used as guidelines for maintaining doses below regulatory limits have been established within the NPG and shall be observed for routine work. This program is not applicable to minors or declared pregnant women. Obtain appropriate station supervision and radiation protection management approval to increase a worker's administrative dose level. Examples of a bona fide need for a dose extension are that 1) the unique ability or experience of the individual will minimize collective dose; and 2) other qualified individuals with lower doses are not available.

The RPM shall prepare a report for the TVA Chief Nuclear Officer and Executive Vice President for submittal within 30 days to INPO's Radiological Protection and Emergency Preparedness Division and the NRC (10 CFR 20.2105) if a regulatory limit is exceeded or a Planned Special Exposure (PSE) is used (10 CFR 20.2203, 20.2204, and 20.2205).

Any worker who exceeds a regulatory dose limit shall not be permitted to enter any RCA until all investigations surrounding the event are completed. The RPM or designee must approve reentry.

Any personnel exposure received which is in excess of the limits of 10 CFR 20.1201 shall be reported by the RPM to Radiation Effects Advisory Group (REAG) and the appropriate area chief physician for an examination.

Information regarding an individual's occupational radiation exposure is maintained pursuant to and in accordance with the Privacy Act of 1974, 5 U.S.C. 552a and TVA's Privacy Act regulations (18 CFR 1301 Subpart B).

4.7.6 Personnel Monitoring for Internal Exposures

Internal occupational dose is controlled though facility design, engineering controls, confinement and reduction of contaminated areas, limiting access to radiological controlled areas, and the use of respiratory protective equipment. Personnel are not routinely monitored for internal deposited radioactive material. Confirmatory monitoring (by licensee) is performed for individuals through the assessment and tracking of DAC-h. Radio-bioassay (in vitro and in vivo measurement and analysis) is employed to confirm and/or evaluate probable intake.

The primary means to minimize the intake of airborne radioactive materials is to control the generation of airborne radioactivity. This is best accomplished at its source and by process or other engineering controls. These controls include identification and repair of leaks, process modification, decontamination, containment, and ventilation control. Routine and special tasks should be planned such that potential sources of airborne radioactive material are managed by repair, decontamination, process, or other engineering controls.

If it is impractical to repair, decontaminate, apply process or other engineering controls or while these processes are being implemented, other measures should be taken to limit the uptake of radioactive materials. These measures include increased surveillance, limitation of working times, use of respiratory protective devices, or combination thereof.

Internal Exposure Monitoring and Control Program elements, at a minimum, are to include:

- Air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate exposures;
- Surveys and bioassays, as appropriate, to evaluate actual intakes;
- Testing of respirators for operability immediately prior to each use;
- Written procedures shall be established that address: selection, fitting, issuance, maintenance, and testing of respirators, including testing for operability immediately prior to each use; program audits; minimum qualifications of program supervisors and implementing personnel; limitations on periods of respirator use and relief from respirator use; maintaining TEDE ALARA and performing evaluations; supervision and training of personnel; monitoring (including air sampling and bioassays), and recordkeeping; a description of the applications of respirators for routine, non-routine, and emergency respirator use; and periodic medical evaluation (NRC Regulatory Guide 8.15).
- Determination by a physician prior to the initial fitting of respirators, and annually (quarter ending) thereafter or periodically at a frequency determined by a physician, that the individual user is medically fit to use the respiratory protection equipment.

Internal dose monitoring (DAC-hr tracking including bioassay) is required for:
Adult workers that are likely to receive an occupational intake in excess of 0.1 ALI or 200 DAC-h in a year.

4.7.7 Evaluation of Dose

A dose record system shall be implemented by RP for purposes of maintaining historical dose records for all persons for whom personnel monitoring or dose calculations are performed. These records are collected and maintained pursuant to and in accordance with the Privacy Act of 1974, 5 U.S.C. 552a and TVA's Privacy Act regulations (18 CFR 1301 Subpart B). The records maintained shall include: the deep-dose equivalent to the whole-body, lens dose equivalent, shallow-dose equivalent to the skin, and shallow-dose equivalent to the extremities; the estimated intake of radionuclides; the committed effective dose equivalent assigned to the intake of radionuclides; and the specific information used to assess the committed effective dose equivalent pursuant to 10 CFR 20.1204(a) and (c), and when required by 10 CFR 20.2106.

Deep Dose Equivalent, Lens Dose Equivalent, Shallow Dose Equivalent (Whole-body), Shallow Dose Equivalent (Maximum extremity), Committed Effective Dose Equivalent, Committed Dose Equivalent, Total Effective Dose Equivalent, and Total Organ Dose Equivalent dose information shall be calculated, maintained, and reported to the NRC and individuals according to NRC Regulatory Guides 8.7 and 8.34 and NRC Technical Communication RADIATION RECORDS DATA COLLECTION AND ANALYSIS to TVA dated January 4, 1994. The dose record system shall make a clear distinction among the quantities entered on the records (e.g., total effective dose equivalent, shallow-dose equivalent, lens dose equivalent, deep-dose equivalent, committed effective dose equivalent).

Those individuals who receive occupational exposure and require monitoring per 10 CFR 20.1502 shall have their doses reported annually to the NRC and the individuals with greater than 100 mrem of TEDE, EDE, DDE, LDE, SDE, SDEME, CEDE, or CDE on an NRC FORM-5 or an electronic record containing all the information required by a FORM-5.

4.8 ADDITIONAL PROGRAM COMMITMENTS

TVA has developed the following program to track, trend and report attributes of the radiation protection program.

4.8.1 Records and Reporting

A tracking system shall be implemented which will track radiation exposure for purposes of trend analysis and work planning, and provide data for management evaluations of the ALARA program.

A. Exposure Control System

An exposure control system will be implemented which will:

- Keep up-to-date exposure data from dosimeters, calculated doses, and DAC-hr.
- Compare individual dose data with TVA Administrative Dose Limits and regulatory limits.
- Keep the supervisor informed of workers' exposure.
- Keep employees informed of their own exposure.

B. Dose Record System

A dose record system shall be implemented by RP for purposes of maintaining historical dose records for all persons for whom personnel monitoring or dose calculations are performed. These records are collected and maintained pursuant to and in accordance with the Privacy Act of 1974, 5 U.S.C. 552a and TVA's Privacy Act regulations (18 CFR 1301 Subpart B). The records maintained shall include: the deep-dose equivalent to the whole-body, lens dose equivalent, shallow-dose equivalent to the skin, and shallow-dose equivalent to the extremities; the estimated intake of radionuclides; the committed effective dose equivalent assigned to the intake of radionuclides; and the specific information used to assess the committed effective dose equivalent pursuant to 10 CFR 20.1204(a) and (c), and when required by 10 CFR 20.2106.

Deep Dose Equivalent, Lens Dose Equivalent, Shallow Dose Equivalent (Whole-body), Shallow Dose Equivalent (Maximum extremity), Committed Effective Dose Equivalent, Committed Dose Equivalent, Total Effective Dose Equivalent, and Total Organ Dose Equivalent dose information shall be calculated, maintained, and reported to the NRC and individuals according to NRC Regulatory Guides 8.7 and 8.34 and NRC Technical Communication RADIATION RECORDS DATA COLLECTION AND ANALYSIS to TVA dated January 4, 1994. The dose record system shall make a clear distinction among the quantities entered on the records (e.g., total effective dose equivalent, shallow-dose equivalent, lens dose equivalent, deep-dose equivalent, committed effective dose equivalent).

The system includes:

- All official dose records for each individual, including externally measured or calculated doses, whole-body counting results and internal dose commitment calculation, personnel contamination reports, and investigation reports as appropriate.
- Means to store and retrieve records in accordance with NPG's quality assurance program requirements.
- Means to retrieve individual dose records by name or employee identification number.
- Means for RP personnel to obtain individual records.
- Means to generate all required reports.

C. Dose Record Reporting

- Those individuals who receive occupational exposure and require monitoring per 10 CFR 20.1502 shall have their doses reported annually to the NRC and the individuals with greater than 100 mrem of TEDE, EDE, DDE, LDE, SDE, SDEME, CEDE, or CDE on an NRC FORM-5 or an electronic record containing all the information required by a FORM-5.
- These reports are generated and reported by licensee as required by 10 CFR 20.2206.
- External exposures as measured with a NVLAP accredited device will be recorded and reported at a 10 mrem threshold value.
- When determining the dose from airborne radioactive material, NPG shall include the contribution to the deep-dose equivalent, lens dose equivalent, and shallow-dose equivalent from external exposure to the radioactive cloud. External exposures as calculated for noble gas submersion dose will be integrated in the Radiation Protection Records system. Doses calculated by the RP Computer system will be reported at a 1 mrem monitoring period threshold value.
- Internal exposures as calculated for derived air concentration (DAC-hrs) exposures and/or bioassay data will be integrated in the Radiation Protection Records system. Doses calculated by the Radiation Protection Computer system are reported at a 1 mrem threshold.

4.8.2 Abnormal Events and Reporting

All plant abnormal occurrences shall be investigated in accordance the WBN Corrective Action Program.

TVA is required by 10 CFR 50.72 to notify NRC immediately if certain types of events occur. The WBN Unit 1 Operations Department is responsible for making the reportability determinations for 10 CFR 50.72 and 10 CFR 50.73 reports. Operations is responsible for making the immediate notification to NRC in accordance with 10 CFR 50.72.

- 10 CFR 50.72(b)(3)(xii) - Any event requiring the transport of a radioactively contaminated person to an offsite medical facility for treatment.
- 10 CFR 50.73(a)(2)(viii)(A) - Any airborne radioactivity release that, when averaged over a time period of 1 hour, resulted in airborne radionuclide concentrations in an unrestricted area that exceeded 20 times the applicable concentration limits specified in Appendix B to Part 20, table 2, column 1.
- 10 CFR 50.73(a)(2)(viii)(B) - Any liquid effluent release that, when averaged over a time period of 1 hour, exceeds 20 times the applicable concentrations specified in Appendix B to Part 20, table 2, column 2, at the point of entry into the receiving waters (i.e., unrestricted area) for all radionuclides except tritium and dissolved noble gases.

TVA is required by its various NRC licenses to report certain events or conditions. 10 CFR Part 20 contains reporting requirements for events involving licensed byproduct, source, or special nuclear material. 10 CFR 30.50 contains reporting requirements for events involving licensed byproduct material. 10 CFR 40.60 contains reporting requirements for events involving licensed source material. 10 CFR Part 70 contains reporting requirements for events and conditions involving licensed special nuclear material.

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5. NUCLEAR CRITICALITY SAFETY

This section of the application contains an overview of the criticality design and administrative controls in place at the Watts Bar Nuclear Plant (WBN). The methodologies and analyses discussed are currently in-place and licensed in support of WBN Unit 1 fuel receipt, handling and storage operations. No changes to the criticality methodologies, analysis or system, structures and component design are required to receive and store new fuel for WBN Unit 2.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed based on the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 5 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 5.1 Nuclear Criticality Safety (NCS) Program				
Management of the NCS Program	70.61(d) 70.64(a)	5.4.3.1	9.1.1 Criticality Safety of Fresh and Spent Fuel Storage and Handling	See Section 5.1
Control Methods for Prevention of Criticality	70.61	5.4.3.4.2	9.1.1 – Criticality Safety of Fresh and Spent Fuel Storage and Handling	See Section 5.1

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 5 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Safe Margins Against Criticality	70.61	5.4.3.4.2	9.1.1 – Criticality Safety of Fresh and Spent Fuel Storage and Handling 9.1.2 – New and Spent Fuel Storage	See Section 5.1
Description of Safety Criteria	70.61	5.4.3.4.2		See Section 5.1
Organization and Administration	70.61	5.4.3.2		See Section 5.1
Section 5.2 Methodologies and Technical Practices				
Methodology	70.61	5.4.3.4.1 5.4.3.4.4 5.4.3.4.6		4.3.2.7 Criticality of Fuel Assemblies
Section 5.3 Criticality Accident Alarm System				
Criticality Accident Alarm System	70.24	5.4.3.4.3	9.1.1 – Criticality Safety of Fresh and Spent Fuel Storage and Handling 9.1.2 – New and Spent Fuel Storage	See Section 5.3
Section 5.4 Reporting				

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 5 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Reporting Requirements	10 CFR 50.72 & 10 CFR 50.73	5.4.3.4.7(7)		See Section 5.4

5.1. NUCLEAR CRITICALITY SAFETY PROGRAM

Criticality of fuel assemblies outside the reactor is precluded by adequate design of fuel transfer and fuel storage facilities and by administrative control procedures in accordance with 10 CFR 50.68, "Criticality accident requirements," paragraph (b). This section identifies those criteria important to criticality safety analyses.

5.1.1 Management of the Nuclear Criticality Safety Program

It is the policy of the TVA Nuclear Power Group to operate its nuclear plants in a safe, conservative and cautious manner such that the health and safety of the public and employees are protected at all times. It is the intent of this policy that reactivity be controlled and managed in a conservative and cautious manner such that the integrity of the fuel cladding and the reactor system pressure boundary is not challenged.

This policy requires that nuclear fuel be operated, handled, and stored in a monitored and defined condition within the bounds of fuel and/or core design limits and analyses assumptions. All activities potentially affecting reactivity must be performed in a well-planned and deliberate manner in accordance with approved procedures. Before any actions are undertaken which could affect reactivity, the effects of the reactivity changes must be known and indications of the effects must be monitored during the changes. All responses to anomalous reactivity indications are required to be conservative actions.

Individuals with reactivity-related responsibilities are required to be capable of recognizing potential reactivity events or conditions and when an unexpected situation occurs, know and take conservative actions. It is not possible to provide procedural guidance for all possible reactivity-related situations; therefore, the key elements of the Reactivity Management Program are a reactivity consciousness and the implementation of conservative actions. The program includes the following.

- Criticality safety requirements have been developed, implemented and maintained to comply with 10 CFR 50.68.
- The criticality analyses are maintained consistent with current configuration by means of the configuration management function described in Chapter 11 of this application.
- Criticality safety limits and requirements are established in Technical Specifications and procedures and maintained consistent with the criticality analyses.

- Modifications to design and to operations procedures are evaluated to ensure that nuclear criticality safety is not adversely impacted.

- Nuclear criticality safety deficiencies are promptly identified by means of operational inspections, audits, and investigations. Deficiencies are entered into the corrective action program so as to prevent recurrence of unacceptable performance deficiencies related to nuclear criticality safety.

Additional discussion of management measures is provided in Chapter 11 of this application.

5.1.2 Control Methods for Prevention of Criticality

The controls implemented at WBN to prevent criticality during the handling and storage of fuel assemblies include WBN Unit 1 Technical Specifications requirements for the storage of new and spent fuel assemblies, plant procedures to control of handling and storage of fuel assemblies to ensure that the assumptions of the criticality safety analyses are satisfied, and procedural requirements to ensure independent verification of certain required activities, e.g., verification of storage of fuel assemblies in proper locations.

5.1.3 Safe Margins Against Criticality/Safety Criteria

The following safe margins/safety criteria are established for the criticality analyses used for new fuel and spent fuel storage.

- The k_{eff} of new fuel in the new fuel storage racks is calculated assuming the racks are loaded with fuel of the maximum fuel assembly reactivity and flooded with unborated water and must not exceed 0.95, at a 95 percent probability, 95 percent confidence level.

- If optimum moderation of fresh fuel in the fresh fuel storage racks occurs when the racks are assumed to be loaded with fuel of the maximum fuel assembly reactivity and filled with low-density hydrogenous fluid, the k_{eff} corresponding to this optimum moderation must not exceed 0.98, at a 95 percent probability, 95 percent confidence level.

- If no credit for soluble boron is taken, the k_{eff} of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with unborated water. If credit is taken for soluble boron, the k_{eff} of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with borated water, and the k_{eff} must remain below 1.0 (subcritical), at a 95 percent probability, 95 percent confidence level, if flooded with unborated water.

5.1.4 Organization and Administration

The WBN Unit 1 Shift Manager has the direct responsibility for controlling reactivity. The WBN Unit 1 Reactor Engineers are responsible for performance of the required criticality analyses and establishing the required Technical Specification and procedural limits and controls consistent with assumptions of the criticality analyses. Refer to Chapter 2 of this application for additional information regarding the TVA and WBN organizations.

5.2. METHODOLOGIES AND TECHNICAL PRACTICES

5.2.1 New Fuel Storage

New fuel is normally stored dry in the new fuel storage vault. The design basis for preventing criticality within the new fuel storage vault is that, including uncertainties, there is a 95% probability at a 95% confidence level that the effective multiplication factor (k_{eff}) of the fuel assembly array will be less than 0.95 under full moderator density conditions and less than 0.98 under low water density (optimum moderation) conditions.

The new fuel rack criticality analysis demonstrated that this rack will meet the design basis limits for k_{eff} for storage of Westinghouse 17x17 STANDARD and VANTAGE 5H fuel assemblies with nominal enrichments up to 4.3 wt% U-235 utilizing all (130) available storage cell locations. The analysis also showed that nominal enrichments above 4.3 wt% and up to 5.0 wt% U-235 can be stored provided that only 120 specific cells of the 130 available locations are utilized. When fuel enrichment above 4.3 wt% are to be stored in the new fuel vault, ten physical restricting devices such as insert plates will be placed in the proper locations to provide additional assurance, over procedural controls, that the fuel will only be stored in the 120 analyzed positions. The insert plates may have a non-fuel bearing component stored in them such as thimble plugging assemblies, rod cluster control assemblies, burnable poison rod assemblies, or tritium producing burnable absorber rod assemblies which are described in FSAR Sections 4.2.3.2.1 and 4.2.4. The allowed location for the 120 usable cells is described in the new fuel storage rack criticality report.

The design method which ensures the criticality safety of fuel assemblies in the spent fuel storage rack uses the AMPX system of codes for cross-section generation and KENO IV for reactivity determination. The 227 energy group cross-section library that is the common starting point for all cross-sections used for the benchmarks and the storage rack analysis is generated from ENDF/B-V data. The NITAWL program includes, in this library, the self-shielded resonance cross-sections that are appropriate for each particular geometry. The Nordheim Integral Treatment is used. Energy and spatial weighting of cross-sections is performed by the XSDRNPM program which is a one-dimensional Sn transport theory code. These multigroup cross-section sets are then used as input to KENO IV which is a three dimensional Monte Carlo theory program designed for reactivity calculations.

Under normal conditions, the fresh fuel racks are maintained in a dry environment. The introduction of water into the fresh fuel rack area is the worst case accident scenario. The full density and low density optimum moderation cases are bounding accident situations which result in the most conservative fuel rack k_{eff}.

Other accidents can be postulated which would cause some reactivity increase (i.e., dropping a fuel assembly between the rack and wall or on top of the rack). For these other accident conditions, the double contingency principle of ANSI N16.1-1975, “Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors,” is applied. This states that one is not required to assume two unlikely, independent, concurrent events to ensure protection against a criticality accident. Thus, for these other accident conditions, the absence of a moderator in the fresh fuel storage racks can be assumed as a realistic initial condition since assuming its presence would be a second unlikely event.

The maximum reactivity increase for these kinds of postulated accidents is less than 10% delta-k/k, and since the normal, dry fresh fuel rack reactivity is less than 0.70, these postulated accidents will not result in a k_{eff} which is more limiting than the analyzed worst case accident scenarios of full density and optimum moderation water flooding. Thus, using the method described above, the maximum k_{eff} was determined to be less than 0.95, which meets the criteria stated in Section 4.3.1.65.

5.2.2 Spent Fuel Storage - Wet

The high density spent fuel storage racks for WBN are designed to assure that the effective neutron multiplication factor (k_{eff}) is equal to or less than 0.95. Design calculations model the racks fully loaded with fuel of the highest anticipated reactivity, and with a margin for uncertainty in reactivity calculations including mechanical tolerances. Uncertainties are statistically combined, such that the final k_{eff} will be equal to or less than 0.95 with a 95% probability at a 95% confidence level.

The layout of storage cells in the WBN spent fuel pool is shown in FSAR Figure 9.1-15. The criticality analysis of the WBN spent fuel pool configuration assures that the maximum k_{eff} will be less than or equal to 0.95 with fuel up to 4.95 $\pm$ .05 wt% U-235 enrichment.

Analysis of the WBN spent fuel rack configuration was performed using the SCALE system of codes for cross section generation and reactivity calculations, and CASMO was used for depletion calculations. The design basis fuel is a 17x17 Westinghouse VANTAGE-5H assembly containing a maximum initial enrichment of 4.95 $\pm$ .05 wt% U-235. The calculations were performed with a moderator temperature of 4^{o}C.

Margin for uncertainty in the reactivity calculations and manufacturing tolerances were included such that the final k_{eff} for allowed storage configurations will be less than or equal to 0.95 with a 95% probability at a 95% confidence level. In order to store fuel with U-235 enrichment as high as 4.95 $\pm$ .05 wt%, administrative controls and burnup credit must be applied. Therefore, the analysis takes credit for the reactivity decrease due to burnup of the stored fuel and for administrative controls on fuel placement. Burnup in discharged fuel was treated using CASMO4, performing depletion calculations which explicitly describe the fission product nuclide concentration. This methodology incorporates approximately 40 of the most important fission products. The fission product nuclide concentrations obtained from the CASMO4 depletions were then modeled in three-dimensions using KENO5a.

The VANTAGE 5H fuel design was modeled as the design basis fuel. The VANTAGE 5H design contains a smaller guide tube outer diameter and thus slightly increased neutron moderation compared with the Westinghouse Standard 17x17 fuel assembly. In addition, VANTAGE 5H fuel assemblies have zircaloy spacer grids as opposed to the more neutron-absorbing material Inconel found on the Standard 17x17 fuel assembly. As a result of these differences, VANTAGE 5H fuel has a higher reactivity for a given enrichment than Standard fuel. Therefore, analysis of VANTAGE 5H fuel also covers storage of Standard 17x17 fuel. VANTAGE 5H fuel assembly data is provided in FSAR Table 4.3-12. The analysis model bounds the design basis fuel assembly using the data provided in FSAR Table 4.3-12 or a more conservative value depending on the specific calculation.

WBN 2 uses Robust Fuel Assembly (RFA)2. An analysis showed the RFA2 fuel design is less reactive than the VANTAGE 5H fuel design at the same enrichment. The ZIRLO material used in the midgrids, fuel cladding and guide tubes has a slight reactivity penalty relative to ZIRC-4. Therefore, the analysis of VANTAGE 5H also covers and is considered bounding for the RFA2 fuel design.

5.2.3 Analytical Technique and Results

As previously discussed, the criticality analysis for the WBN racks were performed primarily with KENO5a, a three-dimensional Monte Carlo computer code, using the 238-group SCALE cross-section library and the Nordheim integral treatment for resonance shielding effects found in NITAWL. Depletion analyses were performed using CASMO4, a two-dimensional transport theory code. The models included explicit descriptions of the fission product nuclide concentrations, incorporating approximately 40 of the most important fission products.

Analysis of the spent fuel racks confirmed the racks can safely and conservatively accommodate storage of fuel up to 5 wt% U-235 enrichment with the following storage conditions:

1. Fuel assemblies with 3.8 wt% or less U-235 enrichment may be stored in Region 1 without restrictions.

2. Fuel assemblies with initial with enrichment greater than 3.8 wt% and up to 5.0 wt% (4.95 $\pm$ 0.05) U-235 and less than a maximum of 5.0 wt% (4.95 $\pm$ 0.05) may be stored in one of four arrangements with the limits specified below:

   A. Fuel assemblies may be stored in the racks without further restrictions provided the burnup of each assembly is in the acceptable domain identified in FSAR Figure 4.3-46, depending on the specified initial enrichment.

   B. New and spent fuel assemblies may be stored in a checkerboard arrangement of 2 new and 2 spent assemblies, provided the accumulated burnup of each spent assembly is in the acceptable domain identified in FSAR Figure 4.3-47, depending on the specified initial enrichment.

   C. New fuel assemblies may be stored in 4-cell arrays with 1 of the 4 cells remaining empty of fuel (containing only water or water with up to 75% by volume of non-fuel bearing material).

   D. New fuel assemblies with a minimum of 32 integral fuel burnable absorber (IFBA) rods may be stored in the racks without further restrictions provided the loading of ZrB_2 in the coating of each IFBA rod is a minimum of 1.25x (1.9625 mg/in).

A water cell is less reactive than any cell containing fuel and therefore may be used at any location in the loading arrangements. A water cell is defined as a cell containing water or non-fissile material with no more than 75% of the water displaced.

The WBN Unit 1 Technical Specifications include curves defining the limiting burnup for fuel of various initial enrichments for both unrestricted storage and checkerboard arrangements assuming the fresh fuel region is enriched to 4.95±0.05 wt% U-235. The calculated maximum reactivity is 0.948, which is within the regulatory limit of a k_{eff} of 0.95. This maximum reactivity includes calculational uncertainties and manufacturing tolerances (95% probability at the 95% confidence level), an allowance for uncertainty in depletion calculations, and the evaluated effect of the axial distribution in burnup. Fresh fuel of less than 4.95% enrichment would result in lower reactivity.

Accounting for biases and uncertainties, the maximum k_{eff} values for the above spent fuel storage rack conditions are less than 0.95. The maximum k_{eff} was determined as follows:

$$k_{eff} = k_{eff}\ \text{(KENO)} + \text{BIASES} + \text{UNCERTAINTIES}$$

Biases include the CASMO and KENO method biases, a boron particle self-shielding allowance, and a bias for the extrapolation of enrichment from the critical benchmark comparisons. The uncertainties include the KENO statistical uncertainty, the KENO and CASMO method uncertainties, and the mechanical tolerance uncertainty.

The analyses conservatively do not take credit for presence of borated water, presence of discrete burnable absorbers, lower enrichment and higher burnup which would decrease reactivity. Other conservative assumptions include:

- Ignoring radial neutron leakage from the spent fuel storage racks
- Ignoring the presence of control rods
- Ignoring the presence of spent burnable absorber assemblies in storage
- Ignoring the higher water temperature of the spent fuel pool
- Maximizing burnable poison history effects
- Maximizing water density history effects
- Minimizing the ^{10}B content in the Boral

A water gap of 1.5 inches between Region 1 and Region 2 racks, two rack modules with Boral panels on both sides of the water gap (i.e., a flux trap), precludes any adverse interaction between the two regions modules.

The effect of various parameters on reactivity was determined to ensure the conservatism of the analysis. This was accomplished by performing sensitivity studies on these parameters with either KENO or CASMO-3. Parameters evaluated were axial burnup distribution, water temperature/density, assembly placement, mechanical tolerances, poison loading, pellet density, cell dimensions/bow, boron particle self shielding effect, borated water activity worth, Boral width tolerance, cell lattice spacing tolerance, stainless steel thickness tolerance, and fuel enrichment and density tolerance.

5.2.4 Credit for Soluble Boron

Although credit for soluble poison normally present in the spent fuel pool water is permitted under abnormal or accident conditions (double contingency principle), most abnormal or accident conditions will not result in exceeding the limiting reactivity (k_{eff} = 0.95) even in the absence of soluble poison. However, the inadvertent misplacement of a fresh fuel assembly in a location intended to be a water cell has the potential for exceeding the limiting reactivity and results in the worst-case accident scenario, should there be a concurrent loss of all soluble boron. Misplacement of a fuel assembly outside the periphery of a storage module, or a dropped assembly lying on top of the rack would have a smaller reactivity effect. Under this worst-case accident condition, calculations show that approximately 55 ppm of soluble boron would be sufficient to ensure that the limiting k_{eff} of 0.95 is not exceeded. Assuring the presence of soluble boron during fuel handing operations will preclude the possibility of the simultaneous occurrence of the two independent accident conditions. Administrative controls require that the spent fuel pool boron concentration be monitored (to ensure at least 2000 ppm) during operations requiring fuel moves in the pool until verification is made of assembly locations.

5.3. *CRITICALITY ACCIDENT ALARM SYSTEM*

In accordance with 10 CFR 50.68(b)(3), radiation monitors are provided in the storage and associated handling areas when fuel is present. These radiation monitors are capable of detecting excessive radiation levels and allow appropriate safety actions to be taken in accordance with plant procedures.

5.4. *REPORTING*

Reports to NRC associated with nuclear criticality safety shall be made in accordance with 10 CFR 50.72, “Immediate notification requirements for operating nuclear power reactors,” and 10 CFR 50.73, “Licensee event report system,” as applicable.

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6 CHEMICAL PROCESS SAFETY

As described in NUREG-1520, “Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility,” Chapter 6, “Chemical Process Safety,” the primary purpose of the NRC review is to determine with reasonable assurance that the applicant has designed a facility that will provide adequate protection against chemical hazards related to the storage, handling, and processing of licensed materials. Chapter 6 of NUREG-1520 also states that the facility design must adequately protect the health and safety of workers and the public during normal operations and credible accident conditions from the chemical risks of licensed material and from hazardous chemicals produced from licensed material.

The activities associated with this license application include receiving, possessing, inspecting, and storing special nuclear materials in the form of 193 fully assembled new fuel assemblies for the initial core of the WBN Unit 2 reactor. The special nuclear material is fully contained within the ZIRLO cladding of these fuel assemblies and does not represent a chemical hazard. For the scope of this license application, i.e., to receive, inspect, handle and store new fuel assemblies, there are no credible accident conditions from the chemical risks associated with the contained special nuclear material within the new fuel assemblies. In addition, since the special nuclear material is contained within the new fuel assembly cladding, there are no hazardous chemicals produced from the contained special nuclear material. As a result, there are no chemical process safety hazards associated with the receipt, inspection, handling, and storage of new fuel assemblies for WBN Unit 2.

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7 FIRE SAFETY

This section of the application contains an overview of the fire protection design and associated administrative controls at the Watts Bar Nuclear (WBN) Plant Site and the types of activities that will be performed when receiving, possessing, inspecting, and storing special nuclear materials in the form of 193 fully assembled fuel assemblies for the initial core of the WBN Unit 2 reactor.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed using the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	**10 CFR Citation**	**NUREG-1520 Chapter 7 Reference**	**NUREG-0800 Comparable Chapter**	**WBN FSAR CHAPTER / TITLE**
Section 7.1 Fire Safety Management Measures	70.62(a),(d) & 70.64(b)	7.4.3.1	9.5.1 Fire Protection Program	9.5.1 Fire Protection System
Section 7.2 Fire Hazards Analysis	70.61(a),(c) & 70.62(a) & (c)	7.4.3.2	9.5.1 Fire Protection Program	9.5.1 Fire Protection System
Section 7.3 Facility Design	70.62(a),(c) & 70.64(b)	7.4.3.3	9.5.1 Fire Protection Program	9.5.1 Fire Protection System
Section 7.4 Process Fire Safety	70.64(b)	7.4.3.4	9.5.1 Fire Protection Program	9.5.1 Fire Protection System

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 7 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 7.5 Fire Protection and Emergency Response	70.62(a),(c) & 70.64(b)	7.4.3.5	9.5.1 Fire Protection Program & 13.3 Emergency Planning	9.5.1 Fire Protection System & 13.3 Emergency Planning

The purpose of the WBN Fire Protection Report (FPR) is to consolidate a sufficiently detailed summary of the WBN regulatory required Fire Protection Program into a single document and to reflect the design as-constructed at the time of fuel load. The Final Safety Analysis Report (FSAR) references this report as detailing WBN's Fire Protection Program. This report is updated in conjunction with updates to the FSAR. The Fire Protection Report has been developed in accordance with the guidelines of NRC Generic Letter 86-10, "Implementation of Fire Protection Requirements" and NRC Generic Letter 88-12, "Removal of Fire Protection Requirements from Technical Specifications". The FPR brings WBN into compliance with NRC recommendations for documenting the Fire Protection Plan and commitments.

7.1 Fire Safety Management Measures

WBN administers and ensures fire safety in accordance with the WBN Fire Protection Report (FPR). The fire safety management measures included in the FPR applicable to the receipt, inspection, handling and storage of new fuel are as follows

7.1.1 Fire Brigade

Effective handling of fire emergencies is an important aspect of the WBN Fire Protection Program. This is accomplished by trained and qualified emergency response personnel. The fire response organization is staffed and equipped for firefighting activities. The fire brigade is comprised of a fire brigade leader and four fire brigade members. The fire brigade shall not include the Shift Manager nor the other members of the minimum shift crew necessary for safe shutdown of the unit, nor any personnel required for other essential functions during a fire emergency. Additional support is available when needed through an agreement with a local fire department.

An Incident Commander is available to direct each shift fire brigade. The Incident Commander meets the requirements of a Unit Supervisor, Shift Technical Advisor or Shift Support Supervisor and has sufficient training in or knowledge of plant safety-related systems to understand the effects of fire and fire suppressants on safe shutdown capability.

7.1.2 Training and Qualifications

WBN fire brigade training ensures that the fire brigade's capability to combat fires is established and maintained. Prior to training and annually thereafter (with a 25% allowable extension), each fire brigade member and leader receives medical evaluation to ensure the ability to perform strenuous physical activity, to wear special respiratory equipment, and for unescorted access to nuclear plants.

The training program consists of initial (classroom and practical) training and recurrent training which includes periodic instruction, fire drills and annual fire brigade training. In addition, fire brigade leaders receive additional training that provides the fire brigade leader with the knowledge and skills necessary to supervise and direct the activities of the fire brigade during an incident.

7.1.3 Availability of Firefighting Equipment

Firefighting equipment for the Fire Brigade is provided throughout the plant. The availability of firefighting equipment is such that delays in obtaining equipment by the fire brigade for fire emergencies will be minimized. Firefighting equipment may, alternatively, be staged adjacent to or at the access to areas/locations to facilitate equipment availability. This may be necessary to address equipment surveillance test concerns relative to life safety and ALARA practices.

7.1.4 Fire Emergency Procedures and Pre-fire Plans

Fire emergency procedures and pre-fire plans specify actions taken by the individual discovering a fire and actions considered by the emergency response organization. Included in these procedures are operational instructions for response to the fire detection system annunciation. These procedures provide different levels of response based on whether there is an actual fire or an annunciation (e.g., a single zone annunciation in a cross zoned area will not carry the same level of response as a cross zone annunciation in the same area). An annunciation may or may not carry the same level of response as the report of a fire by site personnel. Pre-fire plans are not intended to establish a procedure or step-by-step process but to provide guidance, depending upon the particular circumstances, to aid in firefighting efforts. It is recognized that many different firefighting techniques or strategies exist which would be acceptable for fire suppression efforts.

7.1.5 Control of Combustibles

Combustibles are controlled to reduce the severity of a fire which might occur in a given area and to minimize the amount and type of material available for combustion. The use and application of combustible materials at WBN are controlled utilizing the following methods:

- Instructions/guidelines provided during general employee training/orientation programs.
- The chemical traffic control program.
- Periodic plant housekeeping inspections/tours by management and/or the plant fire protection organization.

- Design/modification review and installation process.
- Administrative procedures (e.g., Transient Combustible Control Program).

The fire protection organization performs a periodic fire safety inspection of the safety-related areas of the plant to identify and minimize potential fire hazards. The use and handling of combustible materials such as fire retardant-treated lumber, paper, plastic, and flammable/combustible gases and liquids are controlled in safety-related areas. The use of untreated lumber requires specific approval of the fire protection organization. Combustible materials generated as a result of work activities are removed/cleaned up from the work area at the end of the shift or at the conclusion of the work activity, whichever is sooner. The storage of combustible materials within safety-related areas is controlled by the fire protection organization. The control of hazardous waste and hazardous materials is conducted in accordance with the chemical control and hazardous material processes.

Design considerations in the control of combustibles is utilized when appropriate. For example, these considerations include the application of noncombustible or limited combustible construction materials or components, use of noncombustible fluids in operating equipment, dikes, or containments provided for equipment containing combustible liquids, etc.

Combustible Control Zones (CCZs) are established at WBN to strictly control or prohibit the placement of transient combustibles. Transient combustibles brought into CCZs require an evaluation in accordance with site administrative procedures. The strict control or prohibition of combustibles by site procedures within the combustible control zone provides reasonable assurance that fire will not propagate and jeopardize required equipment or components.

7.1.6 Control of Ignition Sources

The use of ignition sources such as welding, flame cutting, thermite welding, brazing, grinding, arc gouging, torch applied roofing, and open flame soldering within safety-related areas are controlled through the approval and issuance of an ignition source permit. Permits are reviewed and approved by appropriate plant personnel. The ignition source permit is valid for one job. Job area inspection shall be performed and documented at the start of each shift that ignition source activities are being performed. If no ignition sources activities are performed, then reinspection is not required.

Designated ignition source activity areas are located and approved by the fire protection organization. A fire watch system shall be established for all ignition source work activities that are performed in safety-related areas of the plant. Ignition source fire watches are established and will remain for 30 minutes following the elimination of the ignition source, unless other durations are approved by the fire protection organization.

7.2 Fire Hazards Analysis

As discussed above the Fire Hazards Analysis (FHA) is part of the FPR. The FHA results are documented on a fire area basis, broken down into separate discussions of classical fire protection features and safe shutdown analysis for each fire area. The FHA includes the following:

- A summary of the evaluation performed to determine the adequacy of the fire protection features for each fire area.

- A discussion of the ability to achieve safe shutdown in case of a fire in each fire area.

The fire hazards and safe shutdown evaluation were performed by qualified nuclear, mechanical, electrical and fire protection engineers. The deviation requests and evaluations applicable to each fire area are also summarized.

7.3 Facility Design

7.3.1 Building Construction

The facility is designed in accordance with 10 CFR 50, Appendix A, General Design Criteria 3, which requires that noncombustible and fire-resistant materials be used throughout the facility. Noncombustible materials are used to the extent practicable.

7.3.2 Fire Area Determination and Fire Barriers

Fire area barriers are 2-hour or 3-hour rated. WBN fire areas and room compartmentation does not always comply with the specific fire barrier rating guidelines contained in BTP 9.5-1 Appendix A. The differences are judged acceptable given the extensive use of suppression systems at WBN, the low combustible loading in many areas of the plant, the detailed and rigorous Appendix R analysis performed, the conservative nature of the plant design evaluations and the fire hazards analysis performed.

Penetrations in these barriers, including conduit and piping, are generally sealed or evaluated to provide a fire-resistant rating equivalent to the required rating of the barrier.

Normally, doors, frames and hardware in required fire barriers have a fire rating equivalent to the required rating of the barrier, and have been tested and approved by a nationally recognized laboratory. Fire doors have been evaluated per the requirements of NFPA 80-1975.

7.3.3 Electrical Installation

Plant design minimizes the use of combustible material. Cables within certain areas are generally coated with a fire resistant coating or are qualified to the requirements of IEEE 383-1974. Noncombustible material is used for cable tray construction. Where appropriate, in situ plastics are included in the fire area combustible inventories utilized in the FHA.

High amperage transformers are not installed within building spaces. Transformers installed within safety-related buildings are either dry-type or insulated and cooled with “high fire point” liquid.

7.3.4 Life Safety

Access and egress routes are established in the Prefire Plans and are included as part of the drills practiced by operating and fire brigade personnel. Stairwells in the Control Building are enclosed and designed to minimize smoke infiltration.

Emergency lighting and communication are provided. Fixed emergency lighting consists of sealed beam units with individual 8-hour minimum battery power supplies are provided for access and egress routes. An alternate emergency communication system consisting of sound powered phones with head sets is provided.

NIOSH-approved self-contained full-face positive pressure breathing apparatus is available for the fire brigade, damage control and control room personnel. The operating life of the self-contained units is a minimum of one-half hour.

7.3.5 Ventilation

Plant ventilation systems are generally used for smoke removal, or manual smoke venting can be performed with portable smoke ejectors located on site. Non recirculating ventilation systems are provided for fire areas which may contain airborne radioactive materials. Smoke from fires which might occur in areas containing radioactive materials are monitored for radioactivity.

7.3.6 Drainage

Means of drainage is provided in the main buildings. In areas containing fire suppression systems or hose stations, drainage provided removes expected fire protection water flows or controls accumulations or such water could not cause unacceptable damage to equipment in the area. Water drainage from areas which may contain radioactivity are sampled and analyzed before discharge to the environment.

7.3.7 Lightning Protection

Lightning protection is incorporated in the facility design. A direct low impedance path for the lightning to travel to ground, rather than through structures and / or equipment, is provided. The lightning protection system consists of three basic parts which provide the low impedance path:

- The air terminals on roofs and other elevated locations
- The ground grid
- The conductors connecting the air terminals to the ground grid

7.3.8 Criticality Concerns

Criticality analyses of new fuel assemblies, under the analyzed worst case accident scenarios of full density and optimum moderation water flooding, have been performed. These analyses demonstrate, under these conditions, that the new fuel assemblies remain subcritical. Refer to FSAR Section 4.3.2.7 for discussion of these analyses. As such, actuation of the plant automatic fire suppression systems or use of manual suppression systems will not result in new fuel assembly criticality.

7.4 Process Fire Safety

The Fire Hazards Analysis summarizes the engineering evaluations performed to determine the adequacy of the fire protection features for the fire areas and rooms identified for WBN to ensure process fire safety. The Fire Hazards Analysis also summarizes the physical characteristics of required fire barriers (including fire doors and fire dampers), combustible loading and fire severity, suppression and detection capabilities, deviations and evaluations, and fire safe shutdown capability for each area and room.

7.5 Fire Protection and Emergency Response

7.5.1 Fire Protection

The fire protection equipment in the fuel handling area of the Auxiliary Building is common to both WBN Unit 1 and WBN Unit 2.

Equipment available during fuel receipt and movement for the fuel cask receipt area (Auxiliary Building, elevation 729) consists of the following:

a) A minimum of five 10-pound dry chemical fire extinguishers located in the cask receiving area and adjacent nitrogen storage area.
b) Two 1 1/2-inch hose stations equipped with 100 feet of hose and fog nozzles (ABC-rated). One hose station is located in the cask fuel receipt area and the other is located in the adjacent nitrogen storage area.

Equipment available during fuel storage inside the new fuel storage vault and/or the spent-fuel storage pit (Auxiliary Building, elevation 757) consists of the following:

a) A minimum of four 10-pound dry chemical fire extinguishers located strategically on the refueling floor.
b) One 100-pound C02 or dry chemical wheeled extinguisher located in the area.
c) Two 1 1/2 inch hose connections equipped with 100 feet of hose and adjustable fog nozzles (ABC-rated). One hose station is located south of stairway No. 4, and the other is available from the 1 1/2 inch Siamese connection in the Unit 1 Reactor Building access room.

A fire pump, with a flow path to the hose stations listed above, will be available.

Site procedures for the maintenance and surveillance testing of the above-listed equipment, including fire pump, fire mains, standpipes, and hoses, have been developed and will be performed as described in the FPR. In addition, the compensatory actions described in the FPR will be used should any of the listed fire equipment become unavailable.

7.5.2 Emergency Response

Effective handling of fire emergencies is an important aspect of the WBN Fire Protection Program. This is accomplished by trained and qualified emergency response personnel. The fire response organization is staffed and equipped for firefighting activities. The fire brigade is composed of a fire brigade leader and four fire brigade members. The fire brigade does not include the Shift Manager or other members of the minimum shift crew necessary for safe shutdown of the unit, nor any personnel required for other essential functions during a fire emergency. Additional support is available when needed through an agreement with a local fire department.

Training ensures that the fire brigades capability to combat fires is established and maintained. The training program consists of initial (classroom and practical) training and recurrent training which includes periodic instruction, fire drills and annual fire brigade training.

Firefighting equipment is provided throughout the plant. Fire emergency procedures and prefire plans specify actions taken by the individual discovering the fire and by the emergency response organization. A specific pre-fire plan has been prepared for the fuel receipt area and the fuel storage area. Discussion of this pre-fire plan is included in the periodic classroom instruction's training program provided for the emergency response team.

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8 EMERGENCY MANAGEMENT

This section contains a brief discussion of the radiological emergency plan (REP) developed for the Watts Bar Nuclear Plant. Based on the shared nature of the areas where new fuel will be received, handled, inspected and stored, the existing Appendix C to the REP is applicable to this application.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed using the guidance in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 8 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Emergency Plan	70.22(i)(3)	8.4.3.1	13.3 Emergency Planning	13.3 Emergency Planning and REP
Facility Description	70.22(i)(3)(i)	8.4.3.1.1	2.1.1 Site Location and Description	1.2.2: Facility Description
Onsite and Offsite Emergency Facilities	70.22(i)(3)(i)	8.4.3.1.2	13.3 Emergency Planning	13.3 Emergency Planning and REP
Types of Accidents	70.22(i)(3)(ii)	8.4.3.1.3	13.3 Emergency Planning	13.3 Emergency Planning and REP
Classification of	70.22(i)(3)(iii)	8.4.3.1.4	13.3 Emergency	13.3 Emergency

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 8 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Accidents			Planning	Planning and REP
Detection of Accidents	70.22(i)(3)(iv)	8.4.3.1.5	13.3 Emergency Planning	13.3 Emergency Planning and REP
Mitigation of Consequences	70.22(i)(3)(v)	8.4.3.1.6	13.3 Emergency Planning	13.3 Emergency Planning and REP
Assessment of Releases	70.22(i)(3)(vi)	8.4.3.1.7	13.3 Emergency Planning	13.3 Emergency Planning and REP
Responsibilities	70.22(i)(3)(vii)	8.4.3.1.8	13.3 Emergency Planning	13.3 Emergency Planning and REP
Notification and Coordination	70.22(i)(3)(viii)	8.4.3.1.9	13.3 Emergency Planning	13.3 Emergency Planning and REP
Information to be Communicated	70.22(i)(3)(ix)	8.4.3.1.10	13.3 Emergency Planning	13.3 Emergency Planning and REP
Training	70.22(i)(3)(x)	8.4.3.1.11	13.3 Emergency Planning	13.3 Emergency Planning and REP
Safe Shutdown (Recovery and Facility Restoration)	70.22(i)(3)(xi)	8.4.3.1.12	13.3 Emergency Planning	13.3 Emergency Planning and REP
Exercises and Drills	70.22(i)(3)(xii)	8.4.3.1.13	13.3 Emergency Planning	13.3 Emergency Planning and REP
Responsibilities for	N/A	8.4.3.1.14	13.3	13.3 Emergency

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 8 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Developing and Maintaining the Emergency Program and Procedures Correct			Emergency Planning	Planning and REP

The TVA Radiological Emergency Plan (REP) and Emergency Plan Implementing Procedures have been developed to provide protective measures for TVA personnel and to protect the health and safety of the public in the event of a radiological emergency resulting from an accident at WBN. The REP fulfils the requirements set forth in 10 Part 50, Appendix E, “Emergency Planning and Preparedness for Production and Utilization Facilities. It also satisfies the requirements of NUREG-0800, Chapter 13.3 Emergency Planning. The REP contains site-specific appendices for each TVA plant. WBN’s radiological emergency information is in Appendix C of the REP. Changes to the REP are processed in accordance with 10 CFR 50.54(q).

For events related to fuel handling, Appendix C contains emergency action levels that are common to both Watts Bar Unit 1 and Unit 2. These emergency action levels address events occurring in the common spent fuel pool area and include, loss of water level in the spent fuel pool, loss of spent fuel pool cooling, and elevated radiation levels.

A detailed description of the Watts Bar Nuclear Plant is contained in Chapter 1, General Information.

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9 ENVIRONMENTAL PROTECTION

This section of the application describes the Watts Bar Nuclear (WBN) Plant Site environmental protection measures associated with the receipt, possession, inspection, and storage special nuclear materials in the form of 193 fully assembled fuel assemblies for the initial core of the WBN Unit 2 reactor.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed using the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 9 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 9.1 Environmental Report	70.21(h)	9.4.3.1.1	None	None
9.1.1 Date of Application	70.21(f)	9.4.3.1.1(1)	None	None
9.1.2 Environmental Considerations	51.45(b)	9.4.3.1.1(2)	None	None
9.1.3 Analysis of Effects of Proposed Actions and Alternatives	51.45(c)	9.4.3.1.1(3)	None	None
9.1.4 Status of Compliance	51.45(d)	9.4.3.1.1(4)	None	None
9.1.5 Adverse Information	51.45(e)	9.4.3.1.1(5)	None	None

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 9 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 9.2 Environmental Protection Measures	70.22(a)(8)	9.4.3.2	-	-
9.2.1 Radiation Safety	20.1101(a)	9.4.3.2.1	12.3	12.3 Radiation Protection Design Features and 12.5 Radiological Control Program
ALARA Controls and Monitoring	20.1101(d)	9.4.3.2.1(1)-(3)	12.1	12.1 Assuring that Occupational Radiation Exposures are as Low as Reasonably Achievable
Waste Minimization	20.1406	9.4.3.2.1(4)	11.2, 11.3 and 11.4	11.2 - Liquid Waste Systems, 11.3 - Gaseous Waste Systems, and 11.5 Solid Waste Management System
9.2.2 Effluent and Environmental Controls and Monitoring	70.59(a)(1)	9.4.3.2.2	-	-
9.2.2.1 Effluent Monitoring	20.1501(a)	9.4.3.2.2(1)	11.5	11.4 Process and Effluent Monitoring and Sampling System
9.2.2.2 Environmental Monitoring	20.1501(a)	9.4.3.2.2(2)	None	None
9.2.2.3 ISA Summary	70.65(b)	9.4.3.2.2(3)	15	15 Accident

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 9 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
				Analysis

TVA's Final Supplemental Environmental Impact Statement (FSEIS) for the Completion and Operation of Watts Bar Nuclear Plant Unit 2 was issued on June 23, 2007. The TVA Board authorized completion of WBN Unit 2 on August 1, 2007. Subsequently, TVA informed the NRC of its intention to reactivate and complete construction activities at WBN Unit 2. The TVA Board Record of Decision was posted in the Federal Register on August 15, 2007. The FSEIS was submitted to the NRC on February 15, 2008. The FSEIS includes an evaluation of the need for increased baseload power; an analysis of potential socioeconomic, cultural, and environmental effects of completing WBN Unit 2; and it identifies potential mitigation measures.

This FSEIS supplements TVA's original 1972 "Final Environmental Statement, Watts Bar Nuclear Plant Units 1 and 2." In December 1978, NRC issued a "Final Environmental Statement Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, NUREG-0498." In 1993, TVA conducted a review to determine whether additional environmental review was needed to inform decision makers about whether to complete both units and concluded that neither plant design nor environmental considerations had changed in a manner that materially altered the environmental impact analysis set forth in its 1972 Final Environmental Statement (FES). TVA provided additional analyses and information in support of NRC's "Final Environmental Statement Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2, NUREG-0498," which was issued in April 1995. Following an independent review of NRC's analyses and a new analysis of the need for additional power, TVA adopted NRC's 1995 FES in July 1995.

Other major reviews of WBN environmental impacts include TVA's cooperation with the U. S. Department of Energy in evaluating the production of tritium in commercial light water reactors, which resulted in a 1999 "Final Environmental Impact Statement for the Production of Tritium in a Commercial Light Water Reactor." Also, in February 2004, TVA issued its "Reservoir Operations Study Final Programmatic Environmental Impact Statement" evaluating the impacts of alternative ways of operating TVA's reservoir system, the water supply needs of TVA's generating facilities, including WBN, and compliance with environmental permits. A more detailed description of environmental reviews and studies pertaining to the operation and construction of WBN is provided in the FSEIS.

TVA's assessment of the actions required to complete WBN Unit 2 as described in the FSEIS remains valid, and no additional environmental reviews are anticipated at this time. TVA will, of course, review and assess any supplemental environmental review completed by the NRC in connection with the completion and operation of WBN Unit 2 in the future. Background information and analyses used in the preparation of TVA's FSEIS, including that associated with the severe accident analysis section, are available at the WBN site for review.

9.1 Environmental Report

TVA's Final Supplemental Environmental Impact Statement (FSEIS) for the Completion and Operation of Watts Bar Nuclear Plant Unit 2 was submitted to the NRC on February 15, 2008.

9.1.1 Date of Application

The 10 CFR 70 license application, requesting approval to receive, possess, inspect, and store special nuclear materials in the form of 193 fully assembled fuel assemblies for the initial core of the WBN Unit 2 reactor, was submitted in November 2009. TVA expects to receive the first shipment of new fuel for WBN Unit 2 in the second quarter of 2011 at the earliest.

9.1.2 Environmental Considerations

The impact of the activities in this license application are bounded by the NRC FES. The environmental considerations of the entire fuel cycle were analyzed as part of NUREG-0498 Environmental Statement related to operation of Watts Bar Nuclear Plant Units Nos. 1 and 2 (NRC, 1978). In NUREG-0498 Supplement 1, the NRC concluded that there were no significant changes in the environmental impacts since the NRC 1978 FES-OL.

9.1.3 Analysis of Effects of Proposed Actions and Alternatives

TVA's FSEIS provides a description of the proposed action (Chapter 1), the purpose of the proposed action (Chapter 1), a description of the affected environment (Chapter 3), and a discussion of considerations (Chapter 3). TVA's FSEIS provides an analysis of the effects of the proposed action and alternatives (Chapters 2 and 3).

9.1.4 Status of Compliance

TVA's FSEIS provides a discussion of the environmental permits and approval required for the operation of WBN Unit 2 (Chapter 1). Because WBN Unit 1 is already operating, there should be few additional permits and approvals required. The FSEIS documents TVA's compliance with the National Historic Preservation Act (Section 3.7)

9.1.5 Adverse Information

Various sections of the FSEIS discuss adverse effects. TVA's FSEIS Table 2-1 provides a summary of the environmental effects from completing WBN Unit 2.

9.2 Environmental Protection Measures

TVA is committed to protecting the public, plant workers and the environment from the harmful effects of ionizing radiation due to plant operation.

9.2.1 Radiation Safety

FSAR section 12.5 provides details of the radiological control program including the organization, equipment and procedures. FSAR section 12.3 describes specific design features to limit in plant radiation exposures. TVA has a formal program to ensure that occupational exposure to employees is kept as low as reasonably achievable. This program is discussed in FSAR section 12.1.

9.2.2 Effluent and Environmental Controls and Monitoring

9.2.2.1 Effluent Monitoring

FSAR section 11.4 describes the process and effluent radiological monitoring and sampling system. Specific monitoring capability applicable to fuel assembly handling and storage is as follows.

Spent Fuel Pool Accident Radiation Monitors

These monitors continuously monitor the fuel pool area. Two Geiger Mueller tubes with preamplifiers are mounted above the fuel pool. A high radiation signal initiates Auxiliary Building ventilation isolation. In addition, a high radiation signal from these monitors during refueling operations with containment and/or the annulus open to the Auxiliary Building ABSCE spaces will result in a containment valve Isolation (CVI). The two fuel pool monitors are supplied from separate Class 1E power supplies. The setpoint of these monitors is selected to prevent exceeding a significant fraction of the 10 CFR 100 limits subsequent to a fuel handling accident in the Auxiliary Building. These monitors are safety related.

Auxiliary Building Vent Monitor

The Auxiliary Building Vent Monitor assembly continuously monitors the Auxiliary Building Vent stack exhaust for radioactivity. The effluent stream is sampled by an isokinetic sampling probe assembly fitted with 72 sample nozzles. The nozzles are arranged such that a representative sample of the effluent stream is taken. The monitor consists of a particulate, gas, and iodine channel. The monitor noble gas and particulate detectors are beta scintillators. The iodine detector is a gamma scintillator. Particulate and iodine filters are available for laboratory analysis. Monitor setpoints for the gas channel are established using the methodology provided in the Offsite Dose Calculation Manual. Setpoints for the particulate and iodine channels are based on plant personnel protection requirements.

9.2.2.2 Environmental Monitoring

Environmental monitoring requirements are included in the Watts Bar Nuclear Plant National Pollutant Discharge Elimination System (NPDES) permit. In accordance with Appendix B "Environmental Protection Plan" of the WBN Unit 1 Operating License, TVA provides an annual nonradiological environmental operating report. This report provides a summary of the reports submitted as specified in the NPDES permit and other, non-routine and special biological monitoring, reports.

9.2.2.3 ISA Summary

FSAR Chapter 15 addresses accident analysis. Specific sections of this chapter address normal operation and operational transients, faults of moderate frequency, infrequent faults, and limiting faults. FSAR section 15.5 addresses the environmental consequences of accidents.

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10 DECOMMISSIONING

At the time of new fuel receipt, decommissioning funding may not be in place. Since the new fuel will not have been activated in the reactor, residual radioactivity from operation will not exist. In the event a decision was made to delay or defer Watts Bar Nuclear Plant Unit 2 after fuel receipt, the fuel could be returned to the vendor.

Reasonable assurance of decommissioning funding will be provided in accordance with the requirements of 10 CFR 50.33(k)(1), as part of the application for an operating license (OL) that will contain information in the form of a report, as described in 10 CFR 50.75, indicating how funds will be available to decommission the facility.

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11 MANAGEMENT MEASURES

It is the policy of the Tennessee Valley Authority (TVA) that activities which affect quality be accomplished in a planned and systematic manner to achieve compliance with pre-established quality objectives and acceptance criteria. Accordingly, Nuclear Assurance has established and will maintain a Nuclear Quality Assurance Program (NQAP). The NQAP includes the Nuclear Quality Assurance Plan and the approved documents which are used to implement the Plan. The quality assurance program and requirements for specific items and activities are applied commensurate with their importance to safe, reliable nuclear operations, construction, and independent spent fuel storage.

Management policies and requirements for the TVA NQAP are established by the Chief Operating Officer through the Chief Nuclear Officer and Executive Vice President, Nuclear Power Group (NPG), for operating units and the Senior Vice President, Nuclear Generation Development and Construction, for units with construction permits. These management policies and requirements provide the controls that must be applied to the activities performed by and for the agency to ensure implementation of TVA commitments.

This section contains a brief discussion of the management measures described in the final safety analysis report and the TVA Quality Assurance Plan and the Organizational Topical Report. Both documents are applicable to the Watts Bar Nuclear Plant and the receipt, handling, inspection and storage of new fuel.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed using the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 11 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 11.1 Configuration Management	70.62(d) & 70.72	11.4.3.1	17.1 Quality Assurance During the Design and Construction	17.1 Quality Assurance for Design and Construction 17.2 Quality

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 11 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
			Phases 17.2 Quality Assurance During the Operations Phase 17.3 Quality Assurance Program Description	Assurance for Station Operation
Section 11.2 Maintenance	70.62(d)	11.4.3.2	17.6 Maintenance Rule	17.2 Quality Assurance for Station Operation TVA Nuclear Quality Assurance Plan
Section 11.3 Training and Qualifications	70.62(d) & 10 CFR 19	11.4.3.3	13.1.2, 13.1.3 Operating Organization 13.2.1 Reactor Operator Requalification Program, Reactor Operator Training 13.2.2 Non-Licensed Plant Staff Training	13.1.3 Qualification Requirements for Nuclear Facility Personnel 13.2 Training Programs
Section 11.4 Procedures Development and Implementation	70.62(d) & 70.22(a)(8)	11.4.3.4	13.5.1 Administrative Procedures	13.5 Site Procedures
Section 11.5 Audits and Assessments	70.62(d)	11.4.3.5	13.4 Operational Programs	13.4 Review and Audit

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 11 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 11.6 Incident Investigations and Corrective Action Process	70.74(a)& (b) 70.62(a)(3)	11.4.3.6	17.1 Quality Assurance During the Design and Construction Phases 17.2 Quality Assurance During the Operations Phase	17.1 Quality Assurance for Design and Construction 17.2 Quality Assurance for Station Operation
Section 11.7 Records Management	70.62(a)(2) & (3) 70.62(d)	11.4.3.7	17.1 Quality Assurance During the Design and Construction Phases 17.2 Quality Assurance During the Operations Phase 17.3 Quality Assurance Program Description	13.6 Plant Records
Section 11.8 Other QA Elements	70.62(d)	11.4.3.8	17.1 Quality Assurance During the Design and Construction Phases 17.2 Quality Assurance During the Operations Phase 17.3 Quality Assurance	17.1 Quality Assurance for Design and Construction 17.2 Quality Assurance for Station Operation

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 11 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
			Program Description	

11.1 Configuration Management
Configuration management is a critical element of the engineering standard programs as well as essentially all other functional areas involved with operating, maintaining and modifying a nuclear plant. It encompasses and is implemented through various plant organizations' procedures which are established to ensure the objectives below are achieved. The detailed aspects of configuration management are integrated into many of the engineering processes and procedures to ensure that (1) plant structures, systems, components, and computer software conform to approved design requirements, and (2) the plant's physical and functional characteristics are accurately reflected in plant documents, plant simulator, and other data systems.

Configuration management philosophies are incorporated into processes for (1) operating and maintaining the plant systems and components, (2) evaluation of hardware and components to meet the plant design basis, (3) generation of design output and changes to plant configuration, (4) installation and testing of plant systems and components, and (5) revision, updating, storage, and retrieval of documents which document the configuration of the plant.

The controls established in these processes shall ensure that design bases are maintained, design output is consistent with the defined bases, the as-built plant configuration meet design output requirements, and the as-built documents accurately reflect the plant's configuration.

Design Basis Management and Control
The design basis for plant and system performance shall be established and maintained for systems and components critical to the safe and reliable operation of the plant. Controls and requirements for the establishment and maintenance of the design bases will address identification, establishment, and maintenance of design related configuration documents and design/licensing basis documents.

Design Change Control
The design change control process is established to ensure that new designs, as well as changes to existing designs, satisfy plant design bases and established design requirements. The process ensures that additional design input considerations such as constructability, system and component operability and maintainability, radiological protection, and operating experience are included in the design. The design process ensures effective resolution of plant problems and enhancement of plant safety and reliability.

The key elements of the design change process include the following:
- Issue identification and analysis

- Evaluation of alternative solutions
- Authorization
- Detailed design development and change package issuance
- Installation
- Testing
- Return to service
- Documentation updates
- Package close-out activities

Design Input Control
Design input consists of design requirements that govern the design of plant structures, systems, and components. These design inputs are used to develop and support design output. Examples of design input includes laws, regulations, industry codes and standards, design bases, interface requirements, design criteria, documented tests and NPG design standards, design guides, and standard procurement specifications. Mechanisms are established to ensure appropriate design inputs are incorporated into engineering designs for plant systems and facilities.

Design Output Control
Design outputs:

- Correlate the technical and design requirements applicable to structures, systems and components to the required physical configuration in the plant, and/or
- Communicate engineering requirements which affect plant activities (e.g., construction, installation, operation, maintenance, modification, surveillance, and testing).

Documents which constitute design output are defined by engineering management and are based on approved and issued design input. Other organizations shall take engineering requirements only from those documents identified as design outputs.

Design Verification
Design verification is the process of reviewing, confirming or substantiating design inputs and outputs by one or more methods to provide assurance that safety-related and, where specifically required, quality-related designs meet the specified design inputs and will not unacceptably increase the probability or consequences of potential adverse events.

Use and Control of Design Standards and Guides
Engineering utilizes standards and guides to provide input to and support the design process. The term standards and guides is the term used to collectively denote Design Standards, Design Guides, drafting standards, standard drawings, standard specifications, general engineering specifications, and any other documents that provide proven and accepted engineering and design parameters, practices and/or approaches, designs, or technical requirements. Requirements and controls for the use, development, review, and approval of the standards and guides are specified in order to ensure they are authorized, applicable, accurate, and up to date.

Operational Configuration Controls

- **Fuel Related**
  Plants are operated with a strategic objective of zero fuel defects. Fuel supply, fuel design, plant operations, refueling outages, and other related activities will be controlled and managed to comply with applicable Technical Specification and regulatory requirements, licensing commitments, licensing and design bases, or additional commitments made due to industry practices.

  Fuel shall be stored only in approved locations. Approved locations are those licensed by the NRC. These are the reactor cores, the fuel storage racks and shipping containers. Requirements, restrictions, limitations, and controls for these locations are given in site Technical Specifications for cores and racks and in Certificates of Compliance for containers. To preclude the possibility of accidental criticality when fuel is outside of these locations, limited quantities of fuel are allowed out of approved storage locations.

  The maximum quantity of fuel assemblies allowed out of approved storage locations per approved plant procedures are as follows:

  - One un-irradiated fuel assembly shall be allowed within the fuel-handling area. The fuel handling area includes all areas of the refueling floor where un-irradiated fuel assemblies are handled outside of metal shipping containers. The fuel-handling area also includes the new fuel storage vault and the truck bay where metal shipping containers are unloaded.
  - One fuel assembly shall be allowed within the spent fuel storage pool boundary (excluding the inspection, reconstitution, or cleaning locations with appropriate evaluation for each configuration that must be performed prior to implementation). The spent fuel storage pool boundary includes the cask loading area, fuel transfer canal (excluding the transfer cart), and spent fuel pool.
  - Three fuel assemblies shall be allowed within the refueling canal. The refueling canal includes the fuel transfer tube boundary (including the transfer cart) and the rod cluster control changing fixture. This allows for two fuel assemblies to be in the rod cluster control changing fixture while the third fuel assembly is being transferred through the fuel transfer tube, is in the upender, or is in transit to or from the reactor cavity.
  - One fuel assembly shall be allowed within the reactor cavity.
  - Loose fuel rods or pellets must be evaluated for criticality before removal from a fuel assembly or storage at the site.

- **System Status Control**
  The responsibilities and programmatic methods have been established for obtaining, maintaining, and documenting system status as well as documenting off-normal alignments not controlled by other administrative or procedural control.

- **Clearance Program**
  Processes have been established to ensure that, before any employee performs any service or maintenance on a machine or equipment where the unexpected energizing, startup, or release of stored energy could occur and cause injury or equipment damage, the machine or equipment is isolated from the energy source and rendered inoperative.

11.2 Maintenance

The maintenance and modification (M/M) program assures that equipment, systems, and structures (1) are maintained and modified in accordance with applicable requirements, (2) supports safe, reliable, and efficient operation of the nuclear power plants, and (3) are maintained at a quality level required for them to perform their intended functions as specified in the original design, material specifications, and inspection requirements. In the context of this program, the modification process refers only to the physical implementation of design changes.

Corrective Maintenance (CM)

Corrective maintenance is the classification of any work on systems, structures, or components (SSCs) where the SSC has failed or is significantly degraded to the point that failure is imminent (within its operating cycle/preventive maintenance interval) and no longer conforms to or is incapable of performing the SSC's design function. An SSC should be considered failed or significantly degraded if the deficiency is similar to any of the following examples:

- Is removed from service because of actual or incipient failure
- Significant component degradation that affects system operability-The SSC may be determined operable by engineering assessment, but the degradation is significant and requires immediate corrective action. This normally includes any deficiency that requires a basis for continued operation as defined in NRC Generic Letter 91-18, and should be considered as corrective maintenance.
- Creates the potential for rapidly increasing component degradation (for example, leaks of borated water, steam leaks where cutting degradation is possible)
- Releases fluids that create significant exposure or contamination concerns (or has the potential to under postulated accident conditions)
- Adversely affects controls or process indications that directly or indirectly impair operator ability to operate the plant or that reduce redundancy of important equipment
- Significant component degradation identified from the conduct of predictive, periodic, or preventive maintenance which, if not resolved, could result in equipment failure or significant additional damage prior to its next scheduled preventive maintenance period

Preventive Maintenance (PM)

PM consists of predictive, periodic, and planned maintenance actions taken to maintain equipment within design operating conditions and extend its life.
~~PM is performed before equipment failure. This work is controlled by the work order (WO) process.~~
The program requires that site PM activities be performed on critical components and be re-evaluated, revised, or updated periodically based on industry experience, plant equipment history, or trend analysis.

Predictive Maintenance

Predictive maintenance results from vibration analysis, thermography, etc., should be used to trend and monitor equipment performance so that needed planned maintenance can be performed before equipment failure or to prevent equipment failure, and that periodic maintenance can be modified to prevent future equipment failures.

Periodic Preventive Maintenance
Periodic PM activities are performed on a routine basis on equipment to prevent breakdown and involve servicing such as lubrication, filter changes, cleaning, and adjustments.

Planned Preventive Maintenance
Planned PM activities are performed before equipment failure but not necessarily on a routine basis like periodic PM activities. Planned PM can be initiated by predictive or periodic maintenance results, vendor recommendation, experience, or identification in the field such as during operator rounds.

Long-Term Maintenance Plan (Rolling Schedule)
The long-term maintenance plan is a product of the preventive and surveillance process, and specifies the frequency for implementation of maintenance and surveillance activities necessary for the reliability of components in each system. The rolling schedule includes the preliminary defense-in-depth assessment, which documents the allowable combinations of system and Functional Equipment Groups (FEGs) that may be simultaneously worked on line or during shutdown conditions. FEGs are common sets of boundaries encompassing equipment that has been evaluated for acceptable out-of-service combinations. They are used to schedule planned maintenance and establish equipment clearances.

Surveillance/monitoring
A Surveillance Test Program has been established to ensure that plant equipment and components will continue to operate or operate on demand in accordance with design and other regulatory requirements. Technical requirements are specified in Plant Technical Specifications, Technical Requirements Manuals, Offsite Dose Calculation Manuals, and plant Fire Protection Plans/Reports.

Within the Surveillance Test Program, controls have been established to ensure that required testing is identified test instructions are prepared which satisfy regulatory requirements, tests are scheduled and conducted within prescribed frequencies, and tests results are documented and reviewed to ensure that system/component performance satisfies the identified acceptance criteria.

Equipment and Maintenance Activities Requiring Post Maintenance Testing (PMT)
Post-maintenance testing shall be based on the extent of maintenance performed. The PMT shall be sufficiently comprehensive to ensure that the maintenance performed does not adversely affect the equipment's ability to perform its intended function, that the original deficiency has been corrected, and that no new or related problems were created by the maintenance activity.

Equipment within the scope of the PMT program is plant safety-related, quality related and non-quality-related equipment necessary for plant operations.

All work orders (WOs) do not require PMT; e.g., WOs which do not perform physical work such as inspection activities. Maintenance activities on plant equipment under Operations' control which require PMT are exemplified by the following:

- Maintenance that affects the integrity or operation of a fluid or gas system, or components within those systems,
- Maintenance that affects the wall thickness of pressure boundaries or affects mechanical strength of components or fittings,
- Maintenance that affects the function of electrical distribution equipment,
- Maintenance that affects the function of electrical control circuitry or electronic components,
- Maintenance that affects the function of instrument detectors or components in an instrument loop,
- Maintenance that affects the engineered or design function of a system or component such as pressure, flow rate, etc.,
- Maintenance that requires the development of pre-maintenance tests, e.g., containment isolation valves requiring a local leak rate test before maintenance.

Return to operability (RTO) testing shall be considered for maintenance activities on equipment with Technical Specification operability requirements.

11.3 Training and Qualifications

The purpose of the TVA qualification and training program is to provide criteria for the training and qualification of personnel for TVA's nuclear power plants. The program addresses the training of personnel in operating and support organizations to ensure the safe and efficient operation of nuclear power plants. The program also addresses the qualifications of personnel who occupy positions to which TVA is committed through its licensing documents. This commitment is to ensure that the minimum qualifications, which are contained in national standards, for positions in operating and support organizations, are appropriate for the safe and efficient operation of TVA's nuclear power plants.

To ensure the qualifications for these positions, TVA will meet the requirements of Regulatory Guide 1.8, Revision 2 (4/87) for all new personnel qualifying on positions identified in regulatory position C.1 after January 1, 1990. Personnel qualified on these positions prior to this date will still meet the requirements of Regulatory Guide 1.8, Revision 1-R (5/77). As specified in regulatory position C.2, all other positions will meet the requirements of ANSI/ANS N18.1-1971. TVA's Nuclear Power Group (NPG) is committed to comply with the requirements of ANSI N18.1-1971 and ANSI/ANS 3.1-1981 as endorsed by the Regulatory Guide 1.8, Revision 2, April 1987, "Qualification and Training of Personnel for Nuclear Power Plants" except as outlined in the Nuclear Quality Assurance Plan, Appendix B. Qualifications of key members of the organization are contained in Section 2.2.4 of this application.

It is the policy of TVA Nuclear Power Group (NPG) to develop and implement performance-based training programs which promote and support the safe, reliable, and efficient operation of TVA's nuclear power plants. This demands that the personnel who operate, maintain, and support those plants be fully qualified to perform their duties. Effective training is an essential element of achieving and maintaining such qualifications. Effective training thus requires definition of the skills, knowledge, and competencies necessary to perform required duties; establishment and implementation of learning opportunities which develop those desired skills, knowledge, and competencies; and, documentation of attainment of such skills, knowledge, and competencies.

The programs for training of nuclear power plant personnel subject to accreditation by the National Nuclear Accrediting Board are developed and maintained by the responsible training managers using a Systems Approach to Training (SAT). Program guidelines promulgated by Federal regulation, pertinent ANSI/ANS Standards, the Academy, and the Institute for Nuclear Power Operations (INPO) are used to develop those training programs.

Training program procedures (TRNs) shall be developed by the Training Managers Peer Team for the following Academy-accreditable training programs:

- Non-licensed operator (initial and continuing training)
- Reactor operator (initial training)
- Senior reactor operator (initial training)
- Shift manager (initial training)
- Continuing training for licensed personnel (including simulator training and control room team training)
- Shift technical advisor
- Instrument and control technician
- Electrical maintenance personnel
- Mechanical maintenance personnel
- Chemistry technician
- Radiological control technician
- Engineering Support personnel
- Maintenance supervisor

11.4 Procedures

The hierarchy of NPG procedures is defined in the NPG Procedure and Document Control Program. Descriptions of the major types of procedures are given below to assist in the determination of where a particular procedure fits in this hierarchy.

Standard Programs and Processes (SPPs)

These procedures describe administrative controls for processes that cross organizational boundaries, and based on their content, must be available, understood, and followed by all personnel. For example, clearance administration and fitness for duty procedures are SPPs since all employees need to be aware of these processes and their requirements. The following functional areas are provided from TVA's Administration of Standards Programs and Processes (TVA-SPPs). This list provides a sample of the types of procedures developed to support TVA Nuclear Power Group functions associated with nuclear plant operations:

- Policy and Management
  Includes administrative controls necessary to ensure consistency in TVA policies, programs, procedures, process documentation, process improvement and assessment methods.
- Performance Planning
  Includes business planning, comparative analysis, benchmarking, project justification, performance and resource planning, measurement and analysis, improvement initiative justification and cost analysis.
- Regulatory Compliance
  Includes legislative and regulatory legal requirements, licensing and corrective action program.

- Supply Chain Management
  Includes all activities and supporting processes and systems related to sourcing strategy; supplier relations; contracting for products and services; transportation and TVA logistics; materials management, including receipts, warehousing, distribution, inventory strategy, inventory management, disbursement, and disposal of all surplus material. This excludes contracts for purchase and sale of power, purchase and transportation of fossil fuel, the sale of fossil operation byproducts, the purchase and sale of land, the sale of services, loan agreements, and cooperative agreements.
- Environmental Management
  Includes Environmental Management System (EMS), environmental compliance, pollution prevention and control, environmental reviews (NEPA), hazardous material management, waste management, air & water quality, environmental stewardship, emergency preparedness, and environmental auditing.
- Asset Maintenance and Modification
  Includes asset maintenance, modification and unit optimization.
- Work Management
  Includes planning and scheduling system administration, work control and outage planning and management.
- Fuel Management
  Includes supply planning, purchase, transport and management of both fossil and nuclear fuel.
- Engineering and Technical Support
  Includes project design and management, configuration and design change control, Includes specialized services related to TVA's core businesses and delivered to external customers and internal TVA organizations. These specialized services include: energy and environmental technologies and services, integrate resource management tools and power production and delivery technologies.
- Asset Operations
  Includes plant operations and clearance procedures

Standard Department Procedures (SDPs)
SDPs describe administrative controls for processes that normally do not cross organizational boundaries and are generally contained within one organization. SDPs, like SPPs, are applicable to all NPG sites and locations unless reduced or limited applicability is specified in the procedure.

Site Instructions
Site Instructions are used to specify implementing instructions in the operation and maintenance of the plant. These instructions are normally technical in nature and are not administrative procedures. Examples of Site Instructions are Surveillance Instructions, Maintenance Instructions, Physical Security Instructions, Radiological Control Instructions, and Operating instructions. Site instructions are typically site-specific, but in some cases they may be common procedures used at all sites. If common procedures are used, licensing and Technical Specification requirements must be met for all sites.

Review and Approval Process
A procedure review and approval process will be established to meet all applicable regulatory and NQAP requirements. It shall include provisions for affected organization reviews, reviews required by individual site technical specifications and other regulatory documents, and independent technical reviews for quality-related procedures and major revisions to these procedures.

Verification and Validation of Procedures
The Procedure Control Program includes a Verification and Validation (V&V) Program for, as a minimum, critical quality-related, man-machine interface procedures. For Emergency Operating Instructions (EOIs), the V&V Program will meet the requirements of the applicable Owner's Group Guidelines for EOIs. The verification process ensures a thorough and detailed review of the procedure before approval to ensure, to the extent practical, that the procedure is complete, accurate, and can be performed as written. The validation process will normally be conducted after approval by actual performance of the procedure, and provides (1) validation that the procedure can be performed as written and (2) a mechanism for the performer to provide feedback to the author on ways to improve the procedure from a performer's perspective.

11.5 Audits and Assessments

Audits
Measures shall be established to implement a comprehensive audit program which consists of internal audits, including NPG and other TVA organizations, which support the nuclear program and contractor/supplier audits to determine and assess the adequacy and effectiveness of the QA program.

Program Elements
- An audit plan shall be prepared identifying the audits to be performed and their frequencies and schedule.
- Audits shall include: a determination of the effectiveness of QA program elements; evaluation of work areas, activities, processes, and items; review of documents and records; review of audit results with responsible management; follow-up on corrective action taken for deviations identified during the audit; and escalation to appropriate senior management of any safety significant disagreement between the auditing organization and the organization or function being audited.
- Audits shall be performed in accordance with written procedures or checklists by qualified, certified, and appropriately trained personnel not having direct responsibilities in the areas being audited.
- Audited organizations shall provide access to facilities, documents, and personnel needed to perform the audits. They shall take necessary action to correct deviations identified by the audit in a timely manner.

Assessments
Quality Assurance Assessments are performed as a type of verification to ensure that observed quality-related activities are performed in accordance with requirements and desired results are achieved.

Program Elements
- Assessment procedures and instructions shall address assessment techniques.
- Assessment frequencies shall be based on such factors as the status and safety significance of the activity or process, frequency of occurrence, degree and acceptability of previous experience, adverse trends, and testing or operation sequences.
- The results of assessments shall be documented and reported to appropriate levels of management.

- Records shall be maintained in sufficient detail to provide adequate documentation of assessed activities.
- Follow-up verifications or additional assessments shall be conducted as necessary to ensure that required corrective action has been taken.
- Assessments shall be performed in accordance with written procedures and instructions by qualified and appropriately trained personnel not having direct responsibility in the areas being assessed.

11.6 Incident Investigations

Measures shall be established to ensure that items that do not conform to requirements are controlled to prevent their inadvertent installation or use. Adverse conditions, including nonconforming items or non-hardware problems such as failure to comply with operating license, technical specifications, or procedures, shall be identified, evaluated, corrected, tracked, trended, and when required, reported to appropriate levels of management. Procedures or instructions implementing the corrective action program shall establish the criteria for documenting and tracking adverse conditions.

NPG organizations, NGDC, and onsite non-NPG service organizations performing quality-related activities at nuclear facilities shall promptly identify and resolve adverse conditions.

Minor deficiencies which may be brought into compliance within an acceptable timeframe shall be corrected on the spot in accordance with established instructions.

Adverse conditions shall be dispositioned by organizations with defined responsibility and authority and shall be corrected in accordance with documented plans.

Disposition actions for nonconforming items may be accept-as-is, repair, rework, scrap, or return to vendor. Dispositions of accept-as-is or repair shall be reviewed and approved by Corporate or Site Engineering or, for nuclear fuel-related items, Nuclear Fuels. Reworked or repaired, and replaced items shall satisfy the original inspection and test requirements or acceptable alternatives.

The cause of significant adverse conditions shall be determined and corrective action taken to preclude recurrence. Significant adverse conditions shall be reported to appropriate levels of management.

The satisfactory completion of corrective actions shall be verified and documented by the appropriate organization. Independent verification of corrective action implementation is performed as specified within the corrective action program.

11.7 Records Management

The QA program requires that for activities affecting quality, measures shall be established to ensure that documents prescribing the activity, including changes, are approved for release by authorized personnel, reviewed for adequacy, and made available to personnel performing the prescribed activity prior to commencing work.

Identification and Distribution

- The types of documents to be controlled shall be identified.

- Master document indexes shall be established and maintained for identifying all controlled documents and their revision status.
- The distribution of documents shall be controlled and maintained to assist in preventing the use of obsolete or superseded documents.

Controlled Use

- Quality related activities shall be performed in accordance with approved and controlled instructions, procedures, and drawings.
- Organizations shall ensure through procedures or instructions that those participating in an activity are made aware of and use proper and current documents.

Control of Equipment Technical Information

- Administrative controls shall provide for control and distribution of equipment technical information (ETI) supplied to TVA.

11.8 Other QA Elements

Other QA elements and their application are as described in the TVA Nuclear Quality Assurance Plan (NQAP). The TVA NQAP addresses and complies with the 18 criteria provided in 10 CFR 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants.” In addition, changes to the TVA NQAP are performed in accordance with 10 CFR 50.54, “Conditions of licenses,” paragraph (a).

Enclosure 4

Watts Bar Nuclear Plant Unit 2 – Revised Part 70 SAR – Changes Incorporated

Chapter 1 Table of Contents

1 GENERAL INFORMATION

This section of the application contains a general description of the Watts Bar Nuclear (WBN) Plant Site and the types of activities that will be performed when receiving, possessing, inspecting, and storing special nuclear materials in the form of 193 fully assembled fuel assemblies for the initial core of the WBN Unit 2 reactor.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed using the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 1 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 1.1 Facility and Process Description				
Facility Location, Site Layout, and Surrounding Characteristics	70.22(a)(7) & 70.65(b)(1)	1.1.4.3(2)	2.1.1 Site Location and Description	1.2: General Plant Description
Facilities Description	70.22(a)(7) & 70.65(b)(2)	1.1.4.3(2)	2.1.1 Site Location and Description	1.2.2: Facility Description
Process Descriptions	70.22(a)(7) & 70.65(b)(3)	1.1.4.3(3)	9.1.1 – Criticality Safety of Fresh and Spent Fuel Storage and Handling 9.1.2 – New	9.1.1: New Fuel Storage 9.1.2: Spent Fuel Storage 9.1.4: Fuel Handling System

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 1 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
			and Spent Fuel Storage	
Raw materials, by-products, wastes, and finished products		1.1.4.3(4)	None	None
Section 1.2 Institutional Information				
Corporate identity	70.22(a)(1)	1.2.4.3(1)		See Section 1.2.1
Financial information	70.22(a) note	1.2.4.3(2)		See Section 1.2.2
Type, quantity, and form of licensed material	70.22(a)(4)	1.2.4.3(3)		See Section 1.2.3
Requested licenses and authorized uses	70.22(a)(2) & 70.22(a)(3)	1.2.4.3(4)		See Section 1.2.4
Special exemptions or special authorizations	70.17	1.2.4.3(5)		See Section 1.2.5
Security of classified information	10 CFR Part 95	1.2.4.3(6)		See Section 1.2.6
Section 1.3 Site Description				
Site Geography	70.65(b)(1)	1.3.3(1)	2.1.1 Site Location and Description	2.1: Geography And Demography
Demographics	70.65(b)(1)	1.3.3(2)	2.1.3 Population Distribution	2.1 Geography And Demography 2.2: Nearby

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 1 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
			2.2.1-2.2.2 Identification of Potential Hazards in Site Vicinity	Industrial Transportation, And Military Facilities
Meteorology	70.65(b)(1)	1.3.3(3)	2.3.1 Regional Climatology/ Local Meteorology	2.3: Meteorology
Hydrology	70.65(b)(1)	1.3.3(4)	2.4.1 Hydrologic Description	2.4: Hydrologic Engineering
Geology	70.65(b)(1)	1.3.3(5)	2.5.1 Basic Geologic an Seismic Information	2.5 Geology, Seismology, and Geotechnical Engineering Summary of Foundation Conditions

1.1 FACILITY AND PROCESS DESCRIPTION

1.1.1 Facility Location, Site Layout, and Surrounding Characteristics

The Watts Bar Nuclear Plant (WBN) Site is located on a site of approximately 1770 acres in Rhea County, Tennessee on the west bank of the Tennessee River at river mile 528. The site is just south of the Watts Bar Dam, approximately 50 miles northeast of Chattanooga, and 31 miles north-northeast of the Sequoyah Nuclear Plant site. WBN Unit 1 was licensed on February 7, 1996, Docket No. 50-390 NFP-90 and operates at 3459 MWt. WBN Unit 2 is presently under construction as authorized by Construction Permit CPPR 92, Docket NO. 50-391 issued by the Atomic Energy Commission on January 23, 1973. On July 7, 2008, the NRC issued an Order extending the construction completion date of Watts Bar Unit 2 to March 31, 2013.

1.1.2 Facilities Description

The major structures are two Reactor Buildings, a Turbine Building, an Auxiliary Building, a Control Building, a Service and Office Building, Diesel Generator Buildings, an Intake Pumping Station, and two natural draft cooling towers. The arrangement of these structures is shown in Final Safety Analysis (FSAR) Figures 2.1-1 through 2.1-5. Plant arrangement plans and cross sections are presented in FSAR Figures 1.2-1 through 1.2-15.

The fuel storage and handling area is located in the Auxiliary Building of WBN. All handling and storage will be within this defined area. The fuel will be inspected in the fuel-handling area and stored in the new fuel storage vault and the spent-fuel storage pit. Detailed elevation and plan views of the Auxiliary Building showing the fuel-handling areas are shown on Figures 1.2-3, 1.2-4, and 1.2-8 of the WBN FSAR, subsection 1.2.3.

New fuel is stored in racks (WBN FSAR Figure 9.1-1). Each rack is composed of individual vertical cells which can be fastened together in any number to form a module that can be firmly bolted to anchors in the floor of the new fuel storage pit. The new fuel storage racks are designed to include storage for 1/3 core for each unit at a center to center spacing of 21 inches. Space between storage positions is blocked to prevent insertion of fuel. The center-to-center distance between new fuel assemblies is sufficient to assure $k_{eff} < 0.98$ when the new fuel storage area is dry or fogged (optimally moderated). For the fully flooded condition assuming cold, clean, unborated water, the value of k_{eff} is less than or equal to 0.95. Under these conditions, a criticality accident during refueling and storage is not considered credible.

All surfaces that come into contact with the fuel assemblies are made of annealed austenitic stainless steel, whereas the supporting structure may be painted carbon steel.

The racks are designed to withstand nominal operating loads as well as SSE and OBE seismic loads in accordance with Regulatory Guides 1.29 and 1.13.

Floor areas of the Auxiliary Building elevation 757 are designated critical lift zones. Lifting of heavy loads in this area is controlled by site procedures.

The new fuel storage racks are located in the new fuel pit area which has a cover that protects the racks from dropped objects. The new fuel storage vault is a reinforced concrete structure. A three inch drain is provided in the new fuel storage vault. This vault is a part of the Auxiliary Building, which is a Seismic Category I Structure. The new fuel storage vault opens on to the elevation 757 floor, but is normally covered by a series of hatches which are designed to withstand the effects of an OBE or SSE. These hatches are removed as necessary during handling of the new fuel. Administrative controls are utilized when a section of the protective cover is removed for handling of the new fuel assemblies.

The spent fuel storage pool is a reinforced concrete structure with a stainless steel liner for leak tightness. This storage pool is a part of the Seismic Category I Auxiliary Building, and is shared between units one and two. Both the liner and pool walls are designed to withstand the effects of an OBE and SSE. The location of the spent fuel storage pool is shown on WBN FSAR Figures 1.2-3 and 1.2-8. The spent fuel storage pool opens onto the elevation 757 floor, and is protected by a guard rail which surrounds the pool. The depth of the pool is sufficient to allow some 26 feet of water shielding (nominally) above the spent fuel. This water depth ensures that the doses on the operating floor from stored spent fuel are negligibly small. The spent fuel storage racks consist of stainless steel structures with cells or receptacles for nuclear fuel assemblies as they are used in a reactor. Twenty-four of these flux trap racks provide 1386 storage positions in eighteen 7 x 8 cell array modules and six 7 x 9 cell array modules. Each rack is supported by four pedestals (one rack has five pedestals) sitting on two-inch thick stainless steel bearing pads which spread the load on the pool floor imposed by the dead load of the fuel assemblies, the maximum uplift force from the spent-fuel bridge hoist, thermal loads, and loads from SSE and OBE.

The spent fuel racks are designed in accordance with the following listed criteria:

(1) The spent fuel storage racks were designed for storage of 1386 fuel assemblies. The design meets all the structural and seismic requirements of Category I equipment as defined by the NRC Position Paper dated April 14, 1978, on spent fuel storage and handling applications and the references listed in Table 9.1-3.
(2) Burnup credit and fuel assembly placement controls are used to ensure the fuel array in the spent fuel racks is maintained subcritical assuming the array is fully flooded with non-borated water, the fuel is new with a maximum anticipated enrichment of 5.0 weight percent U-235, and the geometric array is the worst possible considering mechanical tolerances and abnormal conditions.
(3) The spent fuel storage facility is designed to prevent severe natural phenomena, including missiles generated from high winds, from causing damage to the spent fuel. The spent fuel storage facility, including the spent fuel racks, is Seismic Category I.
(4) The spent fuel storage racks are designed to withstand handling and normal operating loads and the maximum uplift forces generated by the fuel handling equipment.
(5) A loss of pool cooling accident is not considered a credible accident because the pool cooling system is Seismic Category I and single failure proof.
(6) The spent fuel storage racks are designed to withstand the impact of a dropped spent fuel assembly from the maximum lift height of the spent fuel pit bridge hoist.
(7) The spent fuel storage facilities provide the capability for limiting the potential offsite exposures, in the event of significant release of radioactivity from the stored fuel, to well less than 10 CFR 100 guidelines.

Design of these storage racks is in accordance with Regulatory Guide 1.13 and ensures a safe condition under normal and postulated accident conditions. The distance between spent fuel assemblies is maintained to ensure a $k_{eff} < 0.95$ even if unborated water is used to fill the spent fuel storage pool.

The spent fuel racks are designed as free standing and are qualified as seismic Category I structures. The seismic design considered fully loaded racks in water at less than boiling temperature undergoing a safe shutdown earthquake (SSE). Composite, dynamic simulations which modeled all racks in the pool were utilized to determine limiting loads and displacements for each rack in the pool, to establish limiting relative motion between racks, and to evaluate the potential for and the consequences of inter-rack and rack-wall phenomena in the entire assemblage of racks. The racks were also checked for operating basis earthquake (OBE) loads and found to be satisfactory. The racks can withstand the drop of a fuel assembly from its maximum supported height and the drop of tools used in the pool. The racks are also capable of withstanding accidental drops of the gates which cover the slots between the spent fuel pool and the transfer canal and cask loading pit from a height of eight feet above the top of the racks. Electrical and mechanical stops prevent the movement of heavy objects over the spent fuel pool including the shipping casks. The movement of the casks is restricted to areas away from the pool. The wall which separates the fuel storage area from the cask loading area has been designed to restrict damage to the cask loading area if a cask were dropped even in a tipped position in the cask loading area.

1.1.3 Process Descriptions

All fuel handling will be performed with cranes and hoists located in the auxiliary building which is common to both WBN Units 1 and 2. These will include the Auxiliary Building crane, the 6-ton overhead crane in the cask loading area, the spent-fuel pit bridge hoist, and the new fuel elevator. The new fuel assemblies and their inserts are handled with handling fixtures designed specifically for this purpose and with a special sling suspended from the Auxiliary Building cranes or bridge hoist. All handling devices have provisions to avoid dropping or jamming of fuel assemblies during fuel movement. The Auxiliary Building crane, the spent-fuel pit bridge hoist, and the associated handling devices are capable of supporting maximum loads under SSE conditions. The equipment is inspected and tested for safe operation before use in fuel handling activities.

When the fuel arrives onsite, the shipping containers will be unloaded and placed on the refuel floor. The shipping containers will be opened, and the fuel will be removed one at a time and inspected in the fuel handling area. After inspection, the fuel will be placed in either the new fuel storage vault or the spent fuel storage pool.

1.1.4 Raw Materials, By-Products, Wastes, and Finished Goods

There are no reflectors or moderators with special characteristics associated with this license application. There are no raw materials associated with this license application.

1.2 INSTITUTIONAL INFORMATION

1.2.1 Corporate Identity

TVA is a wholly owned corporate agency and instrumentality of the United States of America established pursuant to the Tennessee Valley Authority Act of 1933, as amended ("TVA Act"). As an agency of the United States Government, TVA is not owned, controlled, nor dominated by an alien, a foreign corporation, nor a foreign government. TVA's latest annual report (2011 Form 10-K) filed with United States Securities and Exchange Commission provides a current description of TVA including TVA's service area. The address of TVA's principal executive offices is 400 W. Summit Hill Drive, Knoxville, Tennessee.

TVA is administered by a board of nine part-time members appointed by the President of the United States with the advice and consent of the Senate. The Chairman of the TVA Board is selected by the members of the TVA Board. Under the terms of the TVA Act, in order to be eligible to be appointed as a member of the Board of Directors, an individual must be a citizen of the United States.

The current TVA Board members are William B. Sansom, Chairman; Marilyn A. Brown; William Graves; Barbara S. Haskew; Richard Howorth; and Neil McBride. There are three vacancies.

Tom Kilgore is President and Chief Executive Officer and Preston D. Swafford is Executive Vice President and Chief Nuclear Officer. The most current list of TVA Board Members and Executive Officers is available at www.tva.com/abouttva/leadership.htm. All of TVA's Executive Officers are citizens of the United States.

The applicant is not acting as agent or representative of another person in filing this application.

The Watts Bar Nuclear Plant (WBN) Site is located on a site of approximately 1770 acres in Rhea County, Tennessee on the west bank of the Tennessee River at river mile 528. The site is just south of the Watts Bar Dam, approximately 50 miles northeast of Chattanooga, and 31 miles north-northeast of the Sequoyah Nuclear Plant site. The site address is P O Box 2000, Spring City, Tennessee.

For Unit 2 construction completion, Bechtel Power Corporation provides the engineering, procurement, and construction services with TVA oversight. Bechtel uses major specialty subcontractors such as Siemens and Westinghouse. Westinghouse will supply the initial fuel loading for WBN Unit 2.

WBN is owned by the United States and operated by TVA.

1.2.2 Financial Qualifications

Information to demonstrate TVA's financial qualification is contained in the annual reports filed with the Securities and Exchange Commission. TVA's 2011 annual report is attached.

1.2.3 Type, Quantity and Form of Licensed Material

The maximum quantity of SNM for WBN Unit 2 including the initial core of 193 fuel assemblies and allowance for extra material onsite will be 2600 kg of U-235. A more detailed description of the fuel assemblies to be stored is set forth in section 4.2 of the WBN FSAR.

The average core enrichment is approximately 2.70 wt. percent U-235. A nominal enrichment is the design enrichment plus or minus a manufacturing tolerance. The maximum enrichment under this license will be 5 wt. percent U-235. Each fuel assembly will contain approximately 462 kilograms (kg) of uranium.

This information is summarized as follows.

Special Nuclear Material	Form	Maximum Amount
Uranium enriched in isotope U-235 up to 5% by weight and uranium daughters	Physical: Solid Chemical: UO_2	91,800 kg

1.2.4 Authorized Uses

TVA hereby requests an extension of SNM License SNM-2014 to provide for receipt, possession, inspections, and storage of 193 fully assembled fuel assemblies for the initial core of the WBN Unit 2 reactor. This license is requested until September 30, 2016 or until the receipt of an operating license for WBN Unit 2.

1.2.5 Special Exemptions or Special Authorizations

None.

1.2.6 Security of Classified Information

This license application does not contain any classified National Security Information, Restricted Data, or Formerly Restricted Data (FRD) nor does it result in a change in access to such information. In addition, it is not expected that activities conducted in accordance with the proposed license will involve classified National Security Information, Restricted Data or Formerly Restricted Data (FRD).

1.3 SITE DESCRIPTION

1.3.1 Site Geography

The Watts Bar Nuclear Plant is located on a tract of approximately 1770 acres in Rhea County on the west bank of the Tennessee River at river mile 528. The site is approximately 1-1/4 miles south of the Watts Bar Dam and approximately 31 miles north-northeast of the Sequoyah Nuclear Plant. The site (about 700 feet MSL) is near the center of a northeast-southwest aligned valley, 10 to 15 miles wide, flanked to the west by Walden Ridge (900 to 1,800 feet MSL and to the east by a series of ridges reaching elevations of 800 to 1,000 feet MSL. FSAR Figure 2.1-3 consists of a map of the topographic features (as modified by the plant) of the site area for 10 miles in all directions from the plant. Profiles of maximum elevation versus distance from the center of the plant are shown in FSAR Figures 2.3-14 through 2.3-29 for the sixteen compass point sectors (keyed to true north) to a radial distance of 10 miles.

The 1770 acre reservation is owned by the United States and is in the custody of TVA. Also located within the reservation are the Watts Bar Dam and Hydro-Electric Plant, the TVA Central Maintenance Facility, and the Watts Bar Resort Area.

The resort area buildings and improvements have been sold to private individuals and the associated land mass leased to the Watts Bar Village Corporation, Inc. Due to this sale and leasing arrangement no services are provided to the resort area from the Watts Bar Nuclear Plant.

The location of each reactor is given below:

LONGITUDE AND LATITUDE (degrees/minutes/seconds)

UNIT 1 35°36' 10.430" N	84°47' 24.267" W
UNIT 2 35°36' 10.813" N	84°47' 21.398" W

UNIVERSAL TRANSVERSE MERCATOR (Meters)

Northing	Easting
UNIT 1 N3, 941,954.27	E 700,189.94
UNIT 2 N3, 941,967.71	E 700,261.86

FSAR Figure 2.1-2 shows the Watts Bar site location with respect to prominent geophysical and political features of the area. This map is used to correlate with the population distribution out to 50 miles. The population density within 10 miles is keyed to FSAR Figure 2.1-3.This map shows greater detail of the site area. FSAR Figures 2.1-4a and 2.1-4b are maps of the Watts Bar Site Area. The Watts Bar reservation boundary and the exclusion area boundary are boldly outlined. Details of the site and the plant structures may be found on FSAR Figure 2.1-5.

There are no significant industrial facilities near WBN. The nearest land transportation route is State Route 68, about one mile north of the Site. The Tennessee River is navigable past the site. A main line of the CNO&TP (Norfolk Southern Corporation) is located approximately 7 miles west of the site. A TVA railroad spur track connects with this main line and serves the Watts Bar Nuclear Plant. The spur has fallen into disuse and would need to be repaired prior to use. No significant industrial land use, military facilities, or transportation routes are in the vicinity of the nuclear plant.

1.3.2 Demographics

Historical and projected population information is contained in this section. Both resident and transient populations are included. For 2000, population was based on data from the U.S. Census Bureau, Census of Population, 2000, including block group, block, and census track data. Projections were based on county projections by Woods& Poole. Sub-county population estimates were prepared using a constant share of the 1990 county total. County Census maps and 1:250,000 topographic maps were used to desegregate sub-county population data into the annular segments.

Considerations included municipal limits, topography, road system, land ownership (e.g., National Forest), and land use (e.g., strip mines). Transient population consists of two components - recreation visitation and school enrollments. Peak hour visitation to recreation facilities is based on the maximum capacity of the facility plus some overflow. School enrollments for 2008 are from the Tennessee Department of Education Report Card 2008 (http://www.state.tn.us/education/). Projected enrollments are based on projected population growth in the respective counties.

About 18,900 people lived within 10 miles of the Watts Bar site in 2000, with more than 75% of them between five and 10 miles from the site. Two small towns, Spring City and Decatur, which in 2007 had populations of 2,002 and 1,456 respectively, are located between five and 10 miles from the site. Decatur is south and south-west of the site, while Spring City is northwest and north-northwest. Most of the remainder of the area is sparsely populated, especially within five miles of the site. The pattern is expected to continue. FSAR Tables 2.1-2 through 2.1-8b show the estimated and projected population distribution within ten miles of the site for 2000, 2010, 2020, 2030, 2040, 2050, and 2060. FSAR Figure 2.1-3 shows the area within ten miles of the site overlaid by circles and sixteen compass sectors.

The area between 10 and 50 miles from the site lies mostly in the lower and middle portions of east Tennessee, with small areas in southwestern North Carolina and in northern Georgia. The population of this area is projected to increase by about 62%, or 660,000 persons, between 2000 and 2060. About 71% of this total increase is expected to be in the area between 30 and 50 miles from the site. The largest urban concentration between 10 and 50 miles is the city of Chattanooga, located to the southwest and south-southwest. This city had a population in 2007 of 169,884; about 80% of this population is located between 40 and 50 miles from the site, while the rest is located beyond 50 miles. The city of Knoxville is located to the east-northeast of the site and is slightly larger than Chattanooga. However, only a small share, less than 10 percent, of its population of 183,546, is located between 40 and 50 miles of the site with the remainder beyond 50 miles. There are three smaller urban concentrations in this area with population greater than 20,000. The city of Oak Ridge, which had a 2007 population of 27,514, is located about 40 miles to the northeast. The twin cities of Alcoa and Maryville, which had a combined population in 2007 of about 35,300, are located between 45 to 50 miles to the east-northeast. Cleveland, with a 2007 population of 39,200, is located about 30 miles to the south. Most of the population growth is expected to occur around these and the larger population centers.

There are, in addition, a number of smaller communities dispersed throughout the area, surrounded by low-density rural areas. FSAR Tables 2.1-8 through 2.1-14 contain the 2000, 2010, 2020, 2030, 2040, 2050, and 2060 population distribution at various distances and directions from the site out to 50 miles. FSAR Figure 2.1-2 shows the area within 50 miles of the site overlaid by the circles and 16 compass sectors.

Maps showing the area are found on FSAR Figures 2.1-2 and 2.1-3. The only significant nearby industrial facility is the Watts Bar Steam Plant. The nearest land transportation route is State Route 68, about one mile north of the Site. The Tennessee River is navigable past the site. A main line of the CNO&TP (Norfolk Southern Corporation) is located approximately 7 miles west of the site. A TVA railroad spur track connects with this main line and serves the Watts Bar Nuclear Plant. The spur has fallen into disuse and would need to be repaired prior to use. No other significant industrial land use, military facilities, or transportation routes are in the vicinity of the nuclear plant.

The Watts Bar Nuclear Plant site is located on a 9-foot navigable channel on Chickamauga Reservoir. Its intake structure is located approximately two miles downstream of Watts Bar Lock and Dam. Watts Bar lock is located on the left bank of the Tennessee River with dimensions of 60' wide x 360' long. Towboat sizes vary from 1500 to 1800 horsepower for this section of the Tennessee River (Chattanooga to Knoxville). The most common type barge using the water way is the 35'x 195' jumbo barge with 1,500 ton capacity. There were also numerous liquid cargo (tank) barges of varying size with capacity to 3,000 tons.

1.3.3 Meteorology

Short-term site-specific meteorological data from the TVA meteorological facility at the Watts Bar Nuclear Plant site are the basis for dispersion meteorology analysis. Data representative of the site or indicative of site conditions for temperature, precipitation, snowfall, humidity, fog, or wind were also obtained from climatological records for

Chattanooga, Dayton, Knoxville, Oak Ridge, and Watts Bar Dam, all in Tennessee. Short-term records for the Sequoyah Nuclear Plant site were used.

These data source locations are shown relative to the plant site in FSAR Figure 2.3-3.

Temperature data for Dayton and for Chattanooga are presented in FSAR Tables 2.3-2 and 2.3-3, respectively. The Chattanooga and Dayton data are provided as reasonably representative and recent (1971-2000) temperature information. Mean temperatures have ranged from the low 40s in the winter to the upper 70's in the summer at both locations. Mean maxima ranged from about 50°F in mid winter to about 90°F in midsummer. The mean minima ranged from about 24°F for both locations to about 74°F for Dayton and 75°F for Chattanooga. The extreme maxima recorded for the respective data periods were 107°F at Decatur and 106°F at Chattanooga, while the extreme minima recorded were -15°F and -10°F, respectively.

Precipitation data for Watts Bar Dam are presented in FSAR Table 2.3-4. Rain or snow has fallen on an average of 110 days per year, and the annual average precipitation for 1941 through 1970 was nearly 53 inches. The maximum monthly rainfall has ranged from about seven inches to nearly 15 inches. The minimum monthly amount for September 1939 through September 1989 was zero. The maximum in 24 hours was 5.3 inches on January 6-7, 1946. Mean monthly data reveal the wettest period as late fall through early spring, with March normally the wettest month of the year. The data show a secondary peak of rainfall in July. Thunderstorm activity is most predominant in the spring and summer seasons, and the maximum frequency of thunderstorm days (FSAR Table 2.3-1) is normally in July.

Appreciable snowfall is relatively infrequent in the area. Snowfall data are summarized in FSAR Table 2.3-5 for Dayton and in FSAR Table 2.3-6 for Chattanooga and Knoxville. The Dayton, Chattanooga and Knoxville records provide current information and offer a complete picture of the pattern of snowfall in the Tennessee River Valley from Chattanooga to Knoxville. Mean annual snowfall has ranged from 4.4 inches at Chattanooga to about 10 inches at Knoxville. Dayton, about halfway between those locations, averaged about 4 inches annually for an earlier period of record. Generally, significant snowfalls are limited to November through March. For the data periods presented in the tables, respective 24-hour maximum snowfalls have been 20.0, 8, and 18.2 inches at Chattanooga, Dayton, and Knoxville. Severe ice storms of freezing rain (or glaze) are infrequent, as discussed in the regional climatology section. Atmospheric water vapor content is generally rather high in the site area, as was indicated in the discussion of the regional climatology.

Long-term relative humidity and absolute humidity data for Chattanooga are presented in FSAR Tables 2.3-7 through 2.3-9. Short-term humidity data based on measurements at the onsite meteorological facility are summarized in FSAR Tables 2.3-10 and 2.3-11 for comparison with the data in FSAR Tables 2.3-8 and 2.3-9. A typical diurnal variation is apparent in FSAR Table 2.3-7. Relative humidity and absolute humidity are normally greatest in the summer. Fog data for Chattanooga, Knoxville, and Oak Ridge, Tennessee, and from Hardwick are presented in FSAR Table 2.3-12. These data indicate that heavy fog at the Watts Bar site likely occurs on about 35 days per year with the fall normally the foggiest season. Sources of data on fogs with visibilities significantly less than 1/4 mile and on durations of fogs which can be considered representative of the site have not been identified.

Wind direction patterns are strongly influenced by the northeast-southwest orientation of the major topographic features, as evidenced in the onsite data, Sequoyah Nuclear Plant data, and the records for Knoxville and Oak Ridge. The Watts Bar wind direction and wind speed data are summarized in FSAR Tables 2.3-13 and 2.3-14 (annual at 10 and 46 meters); FSAR Tables 2.3-15 and 2.3-16 (directional persistence at 10 and 46 meters); and FSAR Tables 2.3-17 through 2.3-40 (monthly at 10 and 46 meters). The annual wind roses for each level are shown in FSAR Figures 2.3-4 and 2.3-5. The most frequent wind direction at 10 meters has been from south-southwest (about 16%). The next highest frequencies (about 8%) are from the north-northeast and northwest wind. The data in FSAR Table 2.3-41 and the data in FSAR Table 2.3-13 show a predominance of wind from the north-northwest and northwest, respectively, for wind speeds less than about 3.5 mph. More discussion of this very light wind speed pattern is contained in FSAR Section 2.3.3.3. It is very significant that the frequencies of calms differ so markedly between the two sets of onsite data. It appears that the higher frequency of calm conditions is primarily a consequence of the location of the temporary meteorological facility in a "sink." The maximum wind direction persistence period at 10 meters is shown in FSAR Table 2.3-15 as 44 hours from the south-southwest direction.

The monthly summaries show some minor variation in the wind direction patterns, but the upvalley-downvalley primary and secondary frequency maxima generally are fully evident.

In the FSAR summary tables for 46 meters, the upvalley-downvalley wind direction pattern is very clear and dominant. The two highest frequencies are 19% from the south-southwest wind direction and 11% from the north-northeast wind direction. The maximum wind direction persistence (FSAR Table 2.3-16) during the 17-year period was 48 hours from the south-southwest.

The site is located in Region I for Design Basis Tornado considerations. The design conditions assumed for the Watts Bar Nuclear Plant reactor shield building (and other safety-related structures) are the following:

(1) 300 mph = Rotational Speed
(2) 60 mph = Translational Speed
(3) 360 mph = Maximum Wind Speed
(4) 3 psi = Pressure Drop
(5) 1psi/sec = Rate of Pressure Drop (3 psi/3 sec is assumed)

For the additional Diesel Generator Building and structures initiated after July 1979, the design basis tornado parameters are as follows:
(1) 290 mph = Rotational Speed
(2) 70 mph = Translational Speed
(3) 360 mph = Maximum Wind Speed
(4) 3 psi = Pressure Drop
(5) 2 psi/sec = Rate of Pressure Drop (3 psi/1.5 sec is assumed)

These and tornado-driven missile criteria are discussed in FSAR Sections 3.3 and 3.5. The fastest mile of wind at 30 feet above ground is about 95 mph for a 100-year return period in the site area. The vertical distribution of horizontal wind speeds at 50, 100, and 150 feet above ground is 102, 113, and 120 mph on the basis of the speed at 30 feet and a power law exponent of 1/7. A gust factor of 1.3 is often used at the 30-foot level, but this would be conservative for higher levels. The wind load for the Shield Building is based on 95 mph for that level, as discussed in FSAR Section 3.3. Estimates of the probable maximum precipitation (PMP) and the design considerations for the PMP are discussed in FSAR Section 2.4.

1.3.4 Hydrology

Watts Bar Nuclear Plant is located on the right bank of the Chickamauga Lake at Tennessee River Mile (TRM) 528 with plant grade at elevation 728 MSL. The plant has been designed to have the capability for safe shutdown in floods up to the computed maximum water level, in accordance with regulatory position 2 of Regulatory Guide 1.59, Revision 2, August 1977.

Determination of the maximum flood level included consideration of postulated dam failures from seismic and hydrologic causes. The maximum flood Elevation 739.2 ft would result from an occurrence of the probable maximum storm.

The wave run-up elevations on the 4:1 slopes on the critical wall of the Intake Pumping Station would be 741.4, on the Diesel Generator Building would be 741.6, and elevation 741.0 on the Auxiliary Building, Control Building and Shield Building.

The nearest surface water user located downstream from Watts Bar Nuclear Plant is Dayton, Tennessee, at TRM 503.8, 24.2 miles downstream. All surface water supplies withdrawn from the 58.9 mile reach of the mainstream of the Tennessee River between Watts Bar Dam (TRM 529.9) and Chickamauga Dam (TRM 471.0) are listed in FSAR Table 2.4-4.

The required minimum flow past the site is 3200 cubic feet per second (cfs), which is more than adequate for plant water requirements.

Ground water sources within a two-mile radius of the site are listed in FSAR Table 2.4-10 and their locations are shown on FSAR Figure 2.4-102. Of the 89 wells listed, only 58 are equipped with pumps. Two of the thirteen spring sources listed are equipped with pumps. Seventy-nine residences are supplied by ground water, with one well supplying five houses. Assuming three persons per residence and a per capita use rate of 75 gallons per day (gpd), total ground-water use is less than 10,000 gpd.

Drawdown data are available only for the Watts Bar Reservation wells, as listed in the previous section. Water-level fluctuations have been observed monthly in six observation wells since January 1973. Data collection for wells 7, 8, & 9 began in December 1981. The locations of these wells are shown on FSAR Figure 2.4-104. Data for the period January 1973 through December 1975 is shown on FSAR Figure 2.4-103.

As elsewhere in the region, water levels normally reach maximum elevations in February or March and are at minimum elevations in late summer and early fall. Depth to the water table is generally less than 20 feet throughout the plant site.

FSAR Figure 2.4-105 is a water-table contour map of the area within a two-mile radius of the plant site, based on 48 water-level measurements made in January 1972. The water table conforms fairly closely to surface topography, so that directions of ground-water movement are generally the same as those of surface-water movement. The water-table gradient between plant site and Chickamauga Lake at maximum water-table elevation and minimum river stage is about 44 feet in 3200 feet, or 0.014.

Water occurs in the Conasauga Shale in very small openings along fractures and bedding planes. Examination of records of 5500 feet of foundation exploration drilling showed only one cavity, 0.6-foot thick, penetrated.

Water occurs in the terrace deposit material in pore spaces between particles. The deposit is composed mostly of poorly-sorted clay- to gravel-sized particles and is poorly water bearing, although an approximately six-foot-thick permeable gravel zone is locally present at the base of the terrace deposit. The foundation excavation required only intermittent dewatering after initial drainage. The excavation was taken below the base of the terrace deposit into fresh shale. No weathered shale was found to be present; the contact between the terrace deposit and fresh shale is sharp.

The average depth to the water table in the plant area, based on data collected during August through December 1970, is 17 feet; the average overburden thickness is 40 feet; the saturated overburden thickness is therefore, 24 feet. No weathered zones or cavities were penetrated in the Conasauga Shale below a depth of 85 feet, so that the average saturated thickness of bedrock is assumed to be less than 50 feet.

The plant site is hydraulically isolated by Yellow Creek and Chickamauga Lake to the west, south, and east; it is hydraulically isolated to the north by the relatively impermeable Rome Formation underlying the site. Therefore, it is believed that any off-site groundwater withdrawals could not result in altered groundwater movement at the site.

No attempt was made to measure hydraulic properties of overburden or of bedrock at this site because of the very limited occurrence of ground water and the heterogeneity and anisotropy of the materials underlying the site.

1.3.5 Geology

The Watts Bar Nuclear Plant site is located in Rhea County, Tennessee, on the right side of the Tennessee River at river mile 528, about two miles south of Watts Bar Dam (FSAR Figure 2.5-9). Physiographically, the site is located in the Tennessee section of the Valley and Ridge Province of the Appalachian Highlands (FSAR Figure 2.5-1). This section is the southernmost of the three sections comprising the Valley and Ridge Province and extends from the Tennessee River-New River divide southwestward into central Alabama. It is bounded on the west by the Appalachian Plateaus Province and on the east by the Blue Ridge Province.

The site is located along the northeast-southwest trending portion of the Tennessee River drainage basin. At the site area the elevation of the flood plain is approximately 700 feet and to the west of the plant location is a series of knobs reaching elevation 900 feet. The plant lies on an alluvial terrace of approximate elevation 735 feet (FSAR Figures 2.5-9 and 2.5-10).

The site is located in the folded and faulted Southern Appalachian Structural Province and in the Southern Appalachian Tectonic Subdivision. A Modified Mercalli Intensity

(MM) VIII earthquake is assumed to occur at the site with accelerations of 0.18 G's horizontal and 0.12 G's vertical for SSE requirements.

Regional and sub-regional fault maps are provided as FSAR Figures 2.5-7 and 2.5-8 and cover radii of 200 and 100 miles, respectively.

The plant site is situated in a bend of the Tennessee River that has been covered by alluvial terrace deposits (FSAR Figures 2.5-9 and 2.5-10). Beneath these deposits lies the Middle Cambrian Conasauga Formation, an inter-bedded shale and limestone upon which the Category I structures are founded. The regional strike of this formation is approximately N35°- 40°E (Figure 2.5-110) and beds for the most part dip to the southeast. However, because of relatively complex folding at the site, the attitudes of the bedding range from horizontal to vertical. Photographs, sections, and maps of the excavations of the plant showing rock quality and structural complexity are included in the Watts Bar FSAR as Figures 2.5-110 through 2.5-122.

Chapter 2 Table of Contents

2 ORGANIZATION AND ADMINISTRATION

This section of the application contains a description of the management systems and administrative procedures at TVA and the Watts Bar Nuclear Plant (WBN) in place to assure that corporate management is involved with, informed about, and dedicated to the safe design, and operation of the nuclear plant and that sufficient technical resources have or are being provided to adequately accomplish these objectives. WBN is an existing Site that has management systems and procedures already established to support the receipt, handling, inspection and storage of fuel. WBN Unit 1 personnel shall be responsible for receipt, handling, inspection, and storage of the new fuel for WBN Unit 2.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed using the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 2 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 2.1 Organizational Structure				
Functional description of specific organization groups responsible for operating and managing the design changes to the facility	70.22(a)(6)	2.4.3(1) & 2.4.3(7)	13.1.1 - Management and Technical Support Organization	13.1 Organization Structure of Applicant TVA-NPOD89-A Rev. 18
Section 2.2 Key Management Positions				
Qualifications, responsibilities, and authorities for key management personnel	70.22(a)(6)	2.4.3 (2) 2.4.3(3) & 2.4.3(4)	13.1.2, 13.1.3 - Operating Organization	13.1.3: Qualification Requirements for Nuclear Facility Personnel

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 2 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 2.3 Administration				
Effective implementation of HS&E functions using written procedures	70.22(a)(8)	2.4.3(5)	13.5.1 - Administrative Procedures	13.5: Site Instructions
Reporting of unsafe conditions or activities	70.62(a)	2.4.3(6)	17.2 – QA During the Operations Phase 17.3 – Quality Assurance Program Description	17.2: Quality Assurance for Station Operation
Commitment to establish formal management measures to ensure availability of IROFS	70.62(d)	2.4.3(8)	13.5.1 - Administrative Procedures	13.5: Site Instructions
Written agreements with offsite emergency resources	70.22(i)	2.4.3(9)	13.3 - Emergency Planning	13.3: Emergency Planning

2.1 Organizational Structure

The TVA and the WBN organizational structures are briefly described in the following sections. The summaries are based on TVA Standard Program and Process Procedures, FSAR Chapter 13.1, Organizational Structure of Applicant, the Nuclear Quality Assurance Plan, TVA-NQA-PLN89-A and the Organization Topical Report TVA-NPOD89-A, TVA Nuclear Power Group Organization Description.

Lines of authority, responsibility, and communication shall be defined and established throughout highest management levels, intermediate levels, and all operating organization positions. These relationships shall be documented and updated, as appropriate, in organization charts, functional descriptions of departmental responsibilities and relationships, and job descriptions for key personnel positions, or in equivalent forms of documentation. These requirements are documented in the Nuclear Power Organization Topical Report (TVA-NPOD89-A).

2.1.1 Corporate Functions, Responsibilities and Authorities

TVA is an agency of the federal government whose major policies, programs, and organization are determined by a part-time, nine member Board of Directors (BOD) structure pursuant to the TVA Governance Restructuring provisions of the Consolidated Appropriations Act, 2005. The BOD members are appointed by the President of the United States and confirmed by the Senate for five-year terms. The BOD selects a Chief Executive Officer (CEO) who also serves as President to manage TVA's day-to-day business. The BOD shapes the long-term business strategies, recommends major program initiatives, and guides TVA's day-to-day operations.

The CEO is responsible for managing all aspects of TVA, including power production, transmission, power trading, resource management programs, and economic development, as well as TVA's corporate functions. The CEO heads TVA's Executive Committee and chairs its Business Council.

The Office of Inspector General (OIG) supports TVA in addressing its challenges and meeting its goals through the conduct of a comprehensive Audit and Inspection Programs designed to focus on areas of high risk and strategic importance. In addition, OIG responds to allegations of fraud, waste, and abuse affecting TVA. The OIG is a statutory requirement as delineated by the Inspector General Act of 1978 as amended. The Office of General Counsel (OGC) provides legal services to TVA in all aspects of operations, including offering guidance and advice to the BOD on the legal ramifications of TVA activities and operations and representing them in litigation.

TVA encourages and is committed to the voluntary expression of concerns and differing views. Employees, contractors, and others who support TVA functions are encouraged to express concerns and differing views, cooperate, and participate in the investigation of concerns and in the development of concern resolution without fear of reprisal, thus furthering the employees' fulfillment of duties, productive efforts, observance of standards and a safety conscious work environment. This commitment has been elevated to be agency wide. Concerns Resolution staff members are located at all major TVA facilities.

The Executive Vice President and Chief Nuclear Officer (CNO) is responsible for the overall safety, efficiency, and economy of TVA's Nuclear Power Program and the overall Nuclear Power Group (NPG) organization.

The Senior Vice President (VP) Nuclear Generation Construction is accountable for the construction of additional nuclear generation assets and technologies to meet demands for safe, clean, reliable and low cost power.

The Corporate Organization leadership and reporting relationships are shown in Figure 1-0 of the Organizational Topical Report TVA-NPOD89-A.

2.1.2 Operating Organization

The Vice President WBN is responsible and accountable for activities at the site, including Unit operations, modifications, maintenance, support, training, and engineering services. To accomplish these activities, the following departments report to the Vice President WBN:

- Plant Management
- Engineering
- Training
- Project Management
- Safety and Licensing

The Plant Manager reports to the Vice President WBN and is responsible for overall plant safe operation and shall have control over the onsite resources necessary for safe operation and maintenance of the plant. He directs the activities of the following departments:

- Operations
- Maintenance
- Radiological Protection
- Chemistry/Environmental
- Work Control

The organization structure, position responsibilities and authorities are contained in the Organizational Topical Report TVA-NPOD89-A. Figure 2-1 of the Organizational Topical Report represents the Watts Bar Nuclear Plant operating organization.

2.2 Key Management Positions

This section describes the functional positions responsible for managing the operation of the WBN. The responsibilities, authorities, and lines of communication for each key management position are provided in this section. Responsible managers have the authority to delegate tasks to other individuals; however, the responsible manager retains the ultimate responsibility and accountability for implementing the applicable requirements.

2.2.1 Operating Organization

The functions and responsibilities of key personnel are described in the following paragraphs. Additional detailed responsibilities are provided in Organizational Topical Report TVA-NPOD89-A and corporate and site procedures.

2.2.1.1 Executive Vice President and Chief Nuclear Officer (CNO)

The Executive Vice President and CNO is the senior nuclear manager with direct authority and responsibility for the management, control, and supervision of TVA's Nuclear Power Group (NPG) and for the execution of nuclear programs, policies, and decisions that the Board of Directors approves or adopts. The Executive Vice President and CNO has corporate responsibility for overall plant nuclear safety and shall take measures needed to ensure acceptable performance of the staff in operating, maintaining, and providing technical support in the plant so that continued nuclear safety is assured.

2.2.1.2 Senior Vice President Nuclear Operations

This position reports directly to the Executive Vice President and CNO. Responsibilities of this position include oversight of the licensed NPG nuclear plants. The Senior Vice President Nuclear Operations direct reports are the three site Vice Presidents.

2.2.1.3 Vice President Watts Bar Nuclear Plant (WBN)
This position is responsible and accountable for activities at the site, including unit operations, modifications, maintenance, support, training, and engineering services.

2.2.1.4 Director Site Engineering
This position is responsible for integrated management and execution of site projects to provide overall management of the Engineering Design, Systems Engineering, Engineering Support, Technical Support, and Components Test and Inspection functions at the site.

2.2.1.5 Director Site Training
This position directs the planning, development, implementation, and evaluation of Training Programs to ensure sufficient qualified personnel to operate, maintain, and modify the nuclear power plant.

2.2.1.6 Director Project Management
This position is responsible for cost engineering functions including estimating, forecasting, trending/scope control, data analysis, and reporting.

2.2.1.7 Director Safety and Licensing
This position is responsible for the Site Performance Improvement, Emergency Planning, and Site Licensing functions.

2.2.1.7.1 Manager Site Emergency Preparedness
This position is responsible for directing the technical professionals of the Site Emergency Preparedness (EP) organization which provides technical direction and support the site staffs in managing the development, maintenance, and implementation of the site-specific portions of the Radiological Emergency Plan (REP), site Emergency Plan implementing procedures, site response organization, facilities, and communications programs to meet NRC Federal regulations for maintaining an operating license and to provide protective measures to ensure the health and safety of TVA employees and the general public in the event of an accident at a NPG facility. This position reports to the site Director of Safety and Licensing.

2.2.1.8 Manager Site Nuclear Security
This position is responsible for the management and direction of the Site Nuclear Security Program to ensure security at the nuclear plant sites and compliance with TVA and NRC requirements. This position reports to the Senior Manager Security Operations (Corporate).

2.2.1.9 Manager Site Quality Assurance
This position provides oversight of quality activities associated with the operation of Watts Bar. Responsibilities are described in detail in TVA's Nuclear Quality Assurance Plan (TVA-NQA-PLN89-A). This position reports to the General Manager, Quality Assurance (Corporate) and has a reporting relationship to the Site Vice President.

2.2.1.10 Plant Manager
This position is responsible for ensuring that plant operations and support activities are conducted in accordance with applicable requirements. The Plant Manager shall be responsible for overall plant safe operation and shall have control over the onsite resources necessary for safe operation and maintenance of the plant.

2.2.1.10.1 Manager Maintenance
This position is responsible for planning, directing, and managing the plant's Maintenance Program to ensure that equipment and systems are maintained in accordance with operability and reliability engineering practices and requirements.

2.2.1.10.2 Manager Radiological Protection
This position guides programs and activities at the plant ensuring that all operations, maintenance, modifications and engineering activities are conducted in a radiologically safe manner and protect plant systems and equipment.

2.2.1.10.3 Manager Chemistry/Environmental
The position guides programs and activities at the plant ensuring that all operations, maintenance, modifications, and engineering activities that potentially impact plant chemistry/environmental are conducted in a manner consistent with applicable requirements.

2.2.1.10.4 Manager Work Control
This position provides overall responsibility for planning, coordination, scheduling and monitoring of all on line and outage work. Responsible for establishing work priorities and coordinating shift turnover; managing the plant scheduling processes; and ensuring efficient and effective management of the work control function that is the basis of the site schedule.

2.2.1.10.5 Manager Operations
This position has responsibility for planning, organizing, and setting policy, and support activities (e.g., fire protection surveillances). These activities include operational strategies for generation, water and waste usage, approval authority for system enhancements, and prioritization of maintenance activities.

2.2.1.10.5.1 Superintendent Operations
This position is responsible for all plant operations. The superintendent, through the Shift Manager, manages the day-to-day operation of the facility, refueling operations, start-up, operational testing, water and waste processing, and plant operations.

2.2.1.10.5.2 Superintendent Operations Support
This position is responsible for budget preparation, training oversight, performance monitoring, and assists the Manager, Operations, in overall program direction for operations. The Supervisor, Fire Operations, with the overall responsibility for the Fire Protection Program, reports to the Superintendent, Operations Support.

2.2.2 Shift Crew Composition

The shift crew for one unit operating normally consists of the Shift Manager, Unit Supervisor, Nuclear Unit Operators, and Assistant Unit Operators. Additional licensed and non-licensed personnel are required for two-unit operation. Additional operators are assigned as required by the Technical Specifications to meet the requirements of 10 CFR 50.54(m)(2). Plant management and technical support personnel will be present or on call at all times.

2.2.3 Safety Review Committee

The WBN has a Plant Onsite Review Committee (PORC) that functions to advise the Plant Manager in matters related to nuclear safety. This advisory function is performed by the PORC acting in a formal meeting periodically and as situations demand. The PORC Chairman and members are appointed in writing by the Plant Manager. PORC members meet the experience requirements of ANSI N18.1-1971 and ANSI/ANS 3.1-1981 as endorsed by Regulatory Guide 1.8, Revision 2, April 1987, "Qualification and Training of Personnel for Nuclear Power Plants,".

Technical reviewers and PORC are qualified, organized, and conduct business as described in the Nuclear Quality Assurance Plan, TVA-NQA-PLN89A.

The PORC is used to conduct, as a minimum, reviews of the following. The PORC may delegate the performance of reviews, but shall maintain cognizance over and responsibility for them (e.g., subcommittees).

- New procedures or changes to existing procedures recommended by Regulatory Guide 1.33, Revision 2, Appendix A, February 1978 that require an evaluation in accordance with 10 CFR 50.59.
- The emergency operating procedures which implement NUREG-0737 and NUREG-0737, Supplement 1, as stated in Generic Letter 82-33.
- Physical Security Plan.
- Radiological Emergency Plan.
- Offsite Dose Calculation Manual (ODCM).
- Process Control Program (radwaste packaging and shipping).
- Additional PORC reviews specifically required by site-specific technical specifications or the plant's licensing basis.
- Proposed changes to Technical Specifications; Technical Requirements Manual; their Bases; and amendments to the Operating License.
- Selected 50.59 evaluations and 72.48 evaluations.

2.2.4 Personnel Qualification Requirements

NPG personnel at the WBN meet the qualification and training requirements of NRC Regulatory Guide 1.8 (ANSI N18.1-1971 and ANSI/ANS 3.1-1981) with the alternatives as outlined in the Nuclear Quality Assurance Plan, TVA-NQA-PLN89-A.

2.3 Administration

This section provides the requirements for fuel and fuel related components (FRCs). Fuel supply, fuel design, plant operations, refueling outages, dry cask storage, and other related activities are controlled and managed to comply with applicable Technical Specification and regulatory requirements, licensing commitments, licensing and design bases, or additional commitments made due to industry practices. Further detailed discussions of management measures are contained in Chapter 11 of this application.

2.3.1 Configuration Management

Configuration management is a critical element of the engineering standard programs as well as essentially all other functional areas involved with operating, maintaining and modifying a nuclear plant. It encompasses and is implemented through various plant organizations' procedures that are established to ensure the objectives below are achieved. The detailed aspects of configuration management are integrated into many of the engineering processes and procedures to ensure that (1) plant structures, systems, components, and computer software conform to approved design requirements, and (2) the plant's physical and functional characteristics are accurately reflected in plant documents, plant simulator, and other data systems.

Configuration management philosophies are incorporated into processes for (1) operating and maintaining the plant systems and components, (2) evaluation of hardware and components to meet the plant design basis, (3) generation of design output and changes to plant configuration, (4) installation and testing of plant systems and components, and (5) revision, updating, storage, and retrieval of documents which document the configuration of the plant.

The controls established in these processes ensure that design bases are maintained, design output is consistent with the defined bases, the as-built plant configuration meet design output requirements, and the as-built documents accurately reflect the plant's configuration.

2.3.1.1 Fuel Related Aspects

Plants are operated with a strategic objective of zero fuel defects. Fuel supply, fuel design, plant operations, refueling outages, and other related activities are controlled and managed to comply with applicable Technical Specification and regulatory requirements, licensing commitments, licensing and design bases, or additional commitments made due to industry practices.

Fuel is stored only in approved locations. Approved locations are those licensed by the NRC. These are the reactor cores, the fuel storage racks and shipping containers. Requirements, restrictions, limitations, and controls for these locations are given in site Technical Specifications for cores and racks and in Certificates of Compliance for containers. To preclude the possibility of accidental criticality when fuel is outside of these locations, limited quantities of fuel are allowed out of approved storage locations.

The maximum quantity of fuel assemblies allowed out of approved storage locations per approved plant procedures are as follows:

- One un-irradiated fuel assembly shall be allowed within the fuel-handling area. The fuel handling area includes all areas of the refueling floor where un-irradiated fuel assemblies are handled outside of metal shipping containers. The fuel-handling area also includes the new fuel storage vault and the truck bay where metal shipping containers are unloaded.
- One fuel assembly shall be allowed within the spent fuel storage pool boundary (excluding the inspection, reconstitution, or cleaning locations with appropriate evaluation for each configuration that must be performed prior to implementation). The spent fuel storage pool boundary includes the cask loading area, fuel transfer canal (excluding the transfer cart), and spent fuel pool.
- Three fuel assemblies shall be allowed within the refueling canal. The refueling canal includes the fuel transfer tube boundary (including the transfer cart) and the rod cluster control changing fixture. This allows for two fuel assemblies to be in the rod cluster control changing fixture while the third fuel assembly is being transferred through the fuel transfer tube, is in the upender, or is in transit to or from the reactor cavity.
- One fuel assembly shall be allowed within the reactor cavity.

- Loose fuel rods or pellets must be evaluated for criticality before removal from a fuel assembly or storage at the site.

2.3.1.2 Maintenance
The maintenance and modification (M/M) program assures that equipment, systems, and structures (1) are maintained and modified in accordance with applicable requirements, (2) supports safe, reliable, and efficient operation of the nuclear power plants, and (3) are maintained at a quality level required for them to perform their intended functions as specified in the original design, material specifications, and inspection requirements. In the context of this program, the modification process refers only to the physical implementation of design changes.

2.3.1.3 Corrective Maintenance (CM)
Corrective maintenance is the classification of any work on systems, structures, or components (SSCs) where the SSC has failed or is significantly degraded to the point that failure is imminent (within its operating cycle/preventive maintenance interval) and no longer conforms to or is incapable of performing the SSC's design function.

2.3.1.4 Preventive Maintenance (PM)
PM consists of predictive, periodic, and planned maintenance actions taken to maintain equipment within design operating conditions and extend its life. The program requires that site PM activities be performed on critical components and be re-evaluated, revised, or updated periodically based on industry experience, plant equipment history, or trend analysis.

2.3.1.5 Long-Term Maintenance Plan (Rolling Schedule)
The long-term maintenance plan is a product of the preventive and surveillance process, and specifies the frequency for implementation of maintenance and surveillance activities necessary for the reliability of components in each system. The rolling schedule includes the preliminary defense-in-depth assessment, which documents the allowable combinations of system and Functional Equipment Groups (FEGs) that may be simultaneously worked on line or during shutdown conditions. FEGs are common sets of boundaries encompassing equipment that has been evaluated for acceptable out-of-service combinations. They are used to schedule planned maintenance and establish equipment clearances.

2.3.2 Training and Qualification
It is the policy of TVA NPG to develop and implement performance-based training programs which promote and support the safe, reliable, and efficient operation of TVA's nuclear power plants. This demands that the personnel who operate, maintain, and support those plants be fully qualified to perform their duties. Effective training is an essential element of achieving and maintaining such qualifications. Effective training thus requires definition of the skills, knowledge, and competencies necessary to perform required duties; establishment and implementation of learning opportunities which develop those desired skills, knowledge, and competencies; and, documentation of attainment of such skills, knowledge, and competencies

The training and qualification program at TVA and WBN for personnel in operating and support organizations has been developed to ensure the safe and efficient operation of nuclear power plants. The program also addresses the qualifications of personnel who occupy positions to which TVA is committed through its licensing documents. This commitment is to ensure that the minimum qualifications, which are contained in national standards for positions in operating and support organizations, are appropriate for the safe and efficient operation of TVA's nuclear power plants.

TVA will meet the requirements of Regulatory Guide 1.8, Revision 2 (4/87) for all new personnel qualifying on positions identified in regulatory position C.1 after January 1, 1990. Personnel qualified on these positions prior to this date will still meet the requirements of Regulatory Guide 1.8, Revision 1-R (5/77). As specified in regulatory position C.2, all other positions will meet the requirements of ANSI/ANS N18.1-1971.

The objective of the training programs is to provide qualified personnel to operate and maintain the facility in compliance with its license, technical specifications, and appropriate governmental regulations.

Training programs are kept up-to-date by the responsible training manager to reflect plant modifications, changes in procedures, and lessons learned from in-house and industry operating experience. Training materials are updated and approved prior to use.

Continuing training is established by responsible managers to ensure that individuals performing safety-related functions remain cognizant of changes to the facility, procedures, governmental regulations, and quality assurance requirements as well as industry operating experience, Licensee Event Reports (LERs), historical INPO SOERs and other past significant facility experience, and personnel errors as applicable for their area of responsibility.

2.3.3 Procedures

The hierarchy of NPG procedures is defined in the NPG Procedure and Document Control Program. Descriptions of the major types of procedures are given below to assist in the determination of where a particular procedure fits in this hierarchy. Procedures for receipt, handling, inspection and storage of fuel are contained in the following procedure categories.

2.3.3.1 Standard Programs and Processes (SPPs)

These procedures describe administrative controls for processes that cross organizational boundaries, and based on their content, must be available, understood, and followed by all personnel. For example, clearance administration and fitness for duty procedures are SPPs since all employees need to be aware of these processes and their requirements. The following functional areas are provided from TVA's Administration of Standards Programs and Processes (TVA-SPPs). This list provides a sample of the types of procedures developed to support TVA Nuclear Power Group functions associated with nuclear plant operations:

2.3.3.2 Standard Department Procedures (SDPs)

SDPs describe administrative controls for processes that normally do not cross organizational boundaries and are generally contained within one organization. SDPs, like SPPs, are applicable to all NPG sites and locations unless reduced or limited applicability is specified in the procedure.

2.3.3.3 Site Instructions

Site Instructions are used to specify implementing instructions in the operation and maintenance of the plant. These instructions are normally technical in nature and are not administrative procedures. Examples of Site Instructions are Surveillance Instructions, Maintenance Instructions, Physical Security Instructions, Radiological Control Instructions, and Operating instructions. Site instructions are typically site-specific, but in some cases they may be common procedures used at all sites. If common procedures are used, licensing and Technical Specification requirements must be met for all sites.

2.3.4 Incident Investigation

The corrective action process is the primary tool used to document problems, analyze why problems exist, correct problems, and to document and close our gaps to excellence. As station leaders, all members of the WBN staff understand the importance of effectively using this process. Every opportunity is to be taken to ensure we and others are documenting issues. Strong and timely actions to correct and improve our equipment, performance and processes are expected from all organizations.

The WBN Unit 1 Technical Specifications (TSs) require that a system, structure, or component (SSC) be operable given the plant condition (operational mode); thus there should be a reasonable expectation that the SSC in question is operable while an operability determination is being made, or an appropriate TS action requirement should be entered.

Operations and/or Site Licensing shall take action when Problem Evaluation Reports are determined reportable and document the reportability determination.

2.3.5 Audits and Assessments

2.3.5.1 Audits

Measures are established to implement a comprehensive audit program which consists of internal audits, including NPG and other TVA organizations, which support the nuclear program and contractor/supplier audits to determine and assess the adequacy and effectiveness of the QA program.

2.3.5.2 Assessments

Quality Assurance Assessments are performed as a type of verification to ensure that observed quality-related activities are performed in accordance with requirements and desired results are achieved.

A detailed description of the program elements related to Audits and Assessments is contained in Chapter 11 of this application.

2.3.6 Quality Assurance Department

The Quality Assurance department is responsible for developing and administering the Nuclear Quality Assurance Plan (NQAP) and the Nuclear Assurance organization procedures required to ensure that TVA activities provide the required degree of safety and reliability.

Providing oversight of TVA activities by auditing, inspecting, assessing and observing the conduct of activities at Corporate and nuclear plant sites to ensure that they provide the required high degree of safety and reliability and are carried out consistent with applicable laws, regulations, regulatory commitments, licenses, and other requirements. The depth and scope of oversight is dependent on the item's or subject's importance to safety and performance history.

The TVA NQAP addresses and complies with the 18 criteria provided in 10 CFR 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants.” In addition, changes to the TVA NQAP are performed in accordance with 10 CFR 50.54, “Conditions of licenses,” paragraph (a).

2.3.7 Operating Organization

At WBN, the fundamental approach to operating the plant safely requires a site operational focus. Operational Focus consists of three elements: Operational Safety, Operational Decision Making and Organizational Alignment around the roles and responsibilities of the organization in meeting the needs of Operations and minimizing operational challenges.

A licensed Unit Operator is designated as the “Operator at the Controls” or OATC whose primary focus is the monitoring of the critical parameters necessary to support safe reactor operation (typically power, level, pressure and other critical parameters as determined by Operations or Shift Management

2.3.8 Employee Concerns

The Concerns Resolution Program (CRP) is established to ensure (1) that all employees supporting NPG are free to express safety issues, concerns, or differing views to NPG or TVA management without fear of reprisal and (2) all such concerns and issues are investigated and resolved in a timely manner.

NPG places special emphasis on resolving concerns which are important to the safe and reliable operation of its nuclear plants. The normal process for resolving concerns and differing views is through the responsible line management. Employees are encouraged to use the chain of command so that corrective actions can be handled promptly at the working level. Use of the Corrective Action Program (CAP) is the preferred avenue to identify, evaluate, and resolve issues related to the safe operation of NPG plants. In addition to the CAP, the following additional avenues are available:

- NPG Concerns Resolution Staff (CRS)
- Nuclear Construction Concerns Resolution Staff
- TVA Ombudsmen
- Office of the Inspector General (OIG)
- Nuclear Regulatory Commission (NRC), and
- Other governmental agencies with jurisdiction

2.3.9 Records Management

The QA program requires that for activities affecting quality, measures shall be established to ensure that documents prescribing the activity, including changes, are approved for release by authorized personnel, reviewed for adequacy, and made available to personnel performing the prescribed activity prior to commencing work.

2.3.10 Written Agreements with Offsite Emergency Resources

Interfaces between TVA, State, and local governmental agencies, and emergency response organizations are defined in the TVA REP and in the emergency plans of the affected State and local governments.

The State Radiological Emergency Plans, as well as the plans for those portions of states within the 50-mile ingestion pathway, are referenced in the TVA REP, Appendix E. These plans provide for the coordinated response of the State and affected local governments as well as the States and local governments within the 50-mile ingestion pathway.

Agreements have been established for services of outside organizations during an emergency. Agreement letters for offsite law enforcement support are maintained by the site Nuclear Security Services and are updated annually. The following provides the types of agreements established:

- Agreements maintained with ambulance services for 24-hour availability of EMT-staffed ambulances for the transport of irradiated/contaminated patients:
- Agreements maintained with medical centers to provide 24-hour availability of medical treatment for patients who may have been exposed to or contaminated with radioactive material:
- Agreements maintained with fire departments with 24-hour assistance capabilities:
- DOE Radiation Emergency Assistance Center/Training Site (REAC/TS), Oak Ridge, Tennessee - 24-hour availability of backup assistance to TVA for medical/radiological emergencies which exceed in-house and commercially available capabilities.

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3 INTEGRATED SAFETY ANALYSIS (ISA) AND ISA SUMMARY

Based on TVA's review of the regulations and discussions with the NMSS staff during a public meeting on October 22, 2009, the regulations requiring an Integrated Safety Analysis are not applicable to licensing the use of special nuclear material in a nuclear power plant. The regulations in 10 CFR 70.61 through 10 CFR 70.76 apply, in addition to other applicable Commission regulations, to each applicant or licensee that is or plans to be authorized to possess greater than a critical mass of special nuclear material, and engaged in enriched uranium processing, fabrication of uranium fuel or fuel assemblies, uranium enrichment, enriched uranium hexafluoride conversion, plutonium processing, fabrication of mixed-oxide fuel or fuel assemblies, scrap recovery of special nuclear material, or any other activity that the Commission determines could significantly affect public health and safety.

Section 50.34 of 10 CFR Part 50 specifies the technical information required to be contained in an application for an Operating License (OL). 10 CFR 50.34 (b) requires that an application for an OL include a final safety analysis report (FSAR) that includes information that describes the facility, presents the design bases and the limits of its operation, and presents a safety analysis of the structures, systems, and components and of the facility as a whole. Since the areas where fuel handling is conducted are shared between Watts Bar Nuclear Plant Unit 1 and Unit 2, the fuel handling accident analyses currently contained in Chapter 15 of the WBN Updated Final Safety Analysis Report (FSAR) are applicable to this application. Criticality analyses associated with fuel handling and storage are described in WBN FSAR Section 4.3.2.7.

The following refueling accident cases were evaluated by TVA: (1) two cases for drop of a fuel assembly with its handling tool, which impacts the baseplate (deep drop scenario) and (2) one case for drop of a fuel assembly with its handling tool, which impacts the top of a rack (shallow drop scenario). An analysis of the drop of the spent fuel pool gate was performed. Fuel handling accident dose consequence analysis was performed assuming rods in a fuel assembly were damaged. In addition, criticality analyses were performed for fuel storage in the new fuel vault and the spent fuel pool. These analyses are considered to bound potential accidents associated with the receipt, inspection, handling, and storage of the new fuel for WBN Unit 2.

The FSAR states that the fuel handling system devices and equipment have provisions to avoid dropping or jamming fuel assemblies while conducting refueling operations. The combined weight of a fuel assembly plus handling tool is approximately 2100 lbs. Controls on crane movement are such that the top of an active fuel assembly can only be raised to within approximately 10 feet of the top of normal water level. Despite the handling system provisions and the controls imposed on the crane, a conservative accident evaluation of the fuel racks should include the effect of a fuel assembly falling. Drop accidents focusing on the integrity of the rack structure due to such drops are considered for the bounding rack cases. The consequences of dropping a fuel assembly as it is being moved over stored fuel are discussed below. Based on the highest lift of a fuel assembly, the maximum distance from the bottom of a fuel assembly, traveling over fuel racks, to the top of the rack is 36 inches.

Dropped Fuel Assembly - Accident I
A fuel assembly plus its handling tool (2100 lbs.) is dropped from 36 inches above the top of an empty storage location away from a rack support pedestal and impacts the base of the rack module. Local failure of the baseplate or bottom casting is acceptable; however, the rack design should ensure that gross structural failure of the rack does not occur and that the subcriticality of

the adjacent stored fuel assemblies is not violated. Calculated results show that there will be no change in spacing between cells. The load transmitted to the pool liner through the support pedestal by such an accident is well below the loads caused by the seismic event results provided in FSAR Chapter 6. Local failure of the rack bottom casting occurs during a "straight deep drop" accident away from the pedestal locations. The rack design allows local failure in that the amount of casting material present at the base of each cell is insufficient to support the postulated impact load. A finite element analysis using DYNA 2-D3 shows that the local failure of the bottom casting grid structure absorbs only 12 percent of the total impact energy. The pool liner is impacted following failure of the bottom casting. Local damage of the liner and its supporting concrete structure in the leak chase area was investigated using the LS-DYNA3D computer code to address the nonlinear elasto-plastic problem. The results show that there is no rupture of the liner.

Dropped Fuel Assembly - Accident II
Pedestal parameters were used to address the case of the "straight deep drop" accident over a pedestal. The resulting impact transmits a load of 191,000 lbs. to the slab through the pedestal. The magnitude of this impact is less than the peak pedestal load, 300,000 lbs., obtained from the seismic analysis for the racks. Furthermore, the impact load is less than the calculated peak pedestal load from the single rack analyses under OBE conditions (198,000 lbs.). In that analysis, the pedestals were shown to satisfy the allowable stress limits for Level A conditions. This accident, therefore, is not limiting. The bearing pressure on the pool slab, 2,432 psi, is below the allowable concrete pressure, 2,890 psi.

Dropped Fuel Assembly - Accident III
For the "straight shallow drop" of a fuel assembly and its handling tool on the top of the rack modules, a very conservative energy balance calculation was used together with the more conservative physical parameter values from the rack. Permanent deformation of the rack is acceptable, but such deformation is required to be limited to the top region such that the rack cross-sectional geometry at the level of the top of the active fuel region (and below) is not altered. Analysis results demonstrate that permanent damage to any fuel storage cell is limited to a maximum depth of 3.06 inches below the top of the rack. This is less than the distance from the top of the rack to the beginning of the active fuel region (approximately 20 inches). Therefore, there will be no effect on the subcriticality of fuel stored in adjacent cells as a result of this accident.

Dropped Gate
The drop of the 3820 lb. spent fuel pool gate from eight feet above the top of the racks was also evaluated. It was determined that permanent damage to a fuel storage cell is limited to a maximum depth of 5.325 inches below the top of the rack. Again, there will be no effect on the subcriticality of fuel stored in adjacent cells as a result of this accident.

The analysis results of Dropped Fuel Assembly - Accident I show that the load transmitted to the liner through the rack structure is properly distributed through the bearing pads located near the fuel handling area; therefore, the liner would not be ruptured by the impact as a result of the fuel assembly drop through the rack structure. The analysis results of Dropped Fuel Assembly - Accident III and the dropped gate show that damage will be restricted such that there is no effect on the subcriticality of fuel stored in adjacent cells. The NRC staff reviewed TVA's analysis results in its submittal of October 23, 1996 and concurred with the findings. This is acceptable based on the TVA's structural integrity conclusions supported by the parametric studies.

Consequences of a Fuel Handling Accident (FHA)

A discussion of the offsite dose consequences of a FHA was provided in the SAR. The discussion was taken from Chapter 15.5.6 of the WBN Unit 2 FSAR. In a recent amendment of the Unit 2 FSAR, an updated FHA analysis was provided. For new, unirradiated fuel, a fuel handling accident in the containment during initial core loading will not have offsite radiological consequences. The event of concern would be damage to an irradiated fuel assembly in the spent fuel pool due to damage caused by a new Unit 2 assembly. The FHA analysis for Unit 2 outside of containment has been reanalyzed using the alternate source term methodology of Regulatory Guide 1.183. The following discussion is taken from the updated FSAR Section 15.5.6.2.

> The analysis of a postulated fuel handling accident in the Auxiliary Building refueling Area is based on Regulatory Guide 1.183. i.e., Alternate Source Terms (AST).The bases for evaluation are:
>
> *(1)* In the Regulatory Guide 1.183 analysis, the accident occurs 100 hours after plant shutdown. Radioactive decay of the fission product inventory during the interval between shutdown and placement of the first spent fuel assembly into the spent fuel pit is taken into account.
>
> *(2)* In the Regulatory Guide 1.183 analysis, damage was assumed for all rods in one assembly.
>
> *(3)* The assembly damaged is the highest powered assembly in the core region to be discharged. The values for individual fission product inventories in the damaged assembly are calculated assuming full-power operation at the end of core life immediately preceding shutdown. Nuclear core characteristics used in the analysis are given in Table 15.5-21. A radial peaking factor of 1.65 is used.
>
> *(4)* The Regulatory Guide 1.183 analysis assumes all of the gap activity in the damaged rods is released to the spent fuel pool and consists of 8% I-131, 10% Kr-85, and 5% of other noble gases and other halogens.
>
> *(5)* Noble gases released to the Auxiliary Building spent fuel pool are released through the Auxiliary Building vent to the environment.
>
> *(6)* In the Regulatory Guide 1.183 analysis, the iodine gap inventory is composed of inorganic species (99.85%) and organic species (0.15%).
>
> *(7)* In the Regulatory Guide 1.183 analysis, the overall inorganic and organic iodine spent fuel pool decontamination factor is 200.
>
> *(8)* In the Regulatory Guide 1.183 analysis, all iodine escaping from the Auxiliary Building spent fuel pool is exhausted unfiltered through the Auxiliary Building vent.
>
> *(9)* No credit is taken for the ABGTS or Containment Purge System Filters in the analysis.

(10) No credit is taken for natural decay either due to holdup in the Auxiliary Building or after the activity has been released to the atmosphere.

(11) The short-term (i.e., 0-2 hour) atmospheric dilution factors at the exclusion area boundary and low population zone given in Table 15A-2 are used. The thyroid dose utilizes ICRP-30 [25] iodine dose conversion factors. Doses are based on the dose models presented in Appendix 15A.

Fuel Handling Accident Results

The radiation dose results of the Regulatory Guide 1.183 fuel handling accident (FHA) are given in Table 15.5-23. Alternate source term (AST) described in RG 1.183 was selectively used to evaluate the FHA due to an event in the spent fuel pool located in the Auxiliary Building or in the containment when the equipment hatch or both doors in a personnel air lock are open. As part of this selective implementation of AST, the following assumptions are used in the analysis:

- The total effective dose equivalent (TEDE) acceptance criterion of 10 CFR 50.67(b)(2) replaces the previous whole body and thyroid dose guidelines of 10 CFR 100.11.
- The gap activity is revised to be consistent with that required by RG 1.183.
- The decontamination factors were changed to be consistent with those required by RG. 1.183.
- No Auxiliary Building isolation is assumed.
- No filtration of the release from the Containment or the spent fuel pool to the environment by the Containment Purge filters or the ABGTS is assumed.

The evaluation for the FHA at the spent fuel pool is a bounding analysis for a dropped assembly in containment when the containment is open. The release point for the containment purge system is the Unit 2 shield building stack. The X/Qs are lower for this release point than for the normal auxiliary building exhaust. In addition, any release from the shield building stack would go through the purge system HEPA and Charcoal filter assemblies prior to release. Currently, when the purge lines isolate on high radiation, the auxiliary building also isolates and ABGTS is actuated. The release point for ABGTS is the shield building stacks and the releases are filtered through HEPA and Charcoal assemblies. Thus AST analysis for the FHA in the Auxiliary Building that considers no filtration is conservative and acceptable as the basis for the containment open evaluation.

The thyroid, gamma, and beta doses for FHAs in the Auxiliary and the open containment are given in Table 15.5-23 for the exclusion area boundary and low population zone. These doses are less than 25% of the 10 CFR 100.11 limits of 300 rem to the thyroid, and 25 rem gamma to the whole body and less than the 10 CFR 50.67 limit of 25 rem TEDE. These doses are calculated using the computer code FENCDOSE [16].

The whole body, beta, and thyroid doses to control room personnel from the radiation sources discussed above are presented in Table 15.5-23. The doses are calculated by the COROD computer code [17]. Parameters for the control room analysis are found in Table 15.5-14. The dose to whole body is below the 10 CFR 50 Appendix A, GDC

19 limit of 5 rem for control room personnel, and the thyroid dose is below the limit of 30 rem and the 10CFR 50.67 limit of 5 rem TEDE.

The NRC review of the Regulatory Guide 1.183 FHA for WBN Unit 2 was documented in NUREG-0847, Supplement 25, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Unit 2. The review states that "The staff concludes that the doses estimated by TVA for the WBN Unit 2 FHA will meet the requirements of 10 CFR50.67 and the guidelines of RG 1.183 and are, therefore, acceptable."

Criticality Accidents

See Chapter 5 of this license application for a discussion of the criticality analyses performed for the new fuel storage vault and spent fuel storage pool.

Chapter 4 Table of Contents

4 RADIATION PROTECTION

This section of the application describes the radiation protection program at the Watts Bar Nuclear (WBN) Plant.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed based on the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 4 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 4.1 Commitment to Radiation Protection Program Implementation	10 CFR 20.1101, Subpart B	4.4.1.3	12.5 Operational Radiation Protection Program	12.5 Radiological Control (RADCON) Program
Section 4.2 Commitment to an ALARA Program	10 CFR 20.1101	4.4.2.3	12.1 Assuring that Occupational Radiation Exposure Are ALARA	12.1 Assuring that Occupational Radiation Exposure Are ALARA
Section 4.3 Organization and Personnel Qualifications	10 CFR 70.22	4.4.3.3	13.1.2, 13.1.3 Operating Organization	13.1.3 Qualification Requirements for Nuclear Facility Personnel
Section 4.4 Commitment to Written Procedures	10 CFR 70.22(8)	4.4.4.3	13.5.1 Administrative Procedures	13.5 Site Instructions

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 4 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 4.5 Training Commitments	10 CFR 19.12 & 10 CFR 20.2110	4.4.5.3	13.2.2 Non-Licensed Plant Staff Training	13.2.1 Accredited Training Programs
Section 4.6 Ventilation and Respiratory Protection Programs Commitments	10 CFR 20, Subpart H	4.4.6.3	12.3 & 12.4 Radiation Protection Design Features, 12.5 Operational Radiation Protection Program	12.3.3 Ventilation, 12.5.2 Equipment, Instrumentation, and Facilities
Section 4.7 Radiation Surveys and Monitoring Programs Commitments	10 CFR 20, Subpart F, C, L, M	4.4.7.3	12.3 & 12.4 Radiation Protection Design Features, 12.5 Operational Radiation Protection Program	12.3.3 Ventilation, 12.5.2 Equipment, Instrumentation, and Facilities
Section 4.8 Additional Program Commitments	10 CFR 20, Subpart L, M, 10 CFR 50.72 & 10 CFR 50.73	4.4.8.3	N/A	See Section 4.8

4.1 COMMITMENT TO RADIATION PROTECTION PROGRAM IMPLEMENTATION

The TVA Nuclear Power Group (NPG) Radiation Protection (RP) program, which is applicable to WBN, implements the requirements of 10 CFR 19, 20, and 30 through 34. The RP Program is further established to meet, to the extent practicable, the guidelines contained in INPO 05-008, and ANI Inspection Criteria 8.1 through 8.10.

The RP Program consists of four elements that are directed toward essential support to TVA's nuclear power program.

- Radiological impact assessments.
- Radiation protection planning and radiological safety evaluation, including preliminary safety analysis reports, final safety analysis reports, and radiological emergency plans.
- Radiological environmental monitoring.
- Radiological control activities

The RADCON Section is under the supervision of the Plant Manager.

The RADCON Section is responsible for the radiological control activities at the plant. It applies radiation standards and procedures; reviews proposed methods of plant operation; participates in development of plant documents; and assists in the plant training program, providing specialized training in radiation protection. It provides coverage for all operations involving radiation or radioactive materials including maintenance, fuel handling, waste disposal, and decontamination. It is responsible for personnel and inplant radiation monitoring, and maintains continuing records of personnel exposures, plant radiation, and contamination levels.

4.2 COMMITMENT TO AN ALARA PROGRAM

Consistent with TVA's overall commitment to keep occupational radiation exposures as low as reasonably achievable, specific plans and procedures are followed by operating and maintenance staff to assure that ALARA goals are achieved in the operation of the plant. Operational ALARA policy and procedures are formulated at the corporate level in Nuclear Power and are implemented at each nuclear plant through the issuance of division procedures and plant instructions for the purpose of maintaining Total Effective Dose Equivalent (TEDE) ALARA. These procedures and instructions are consistent with the intent of Section C.1 of Regulatory Guide 8.8 and Regulatory Guide 8.10. Included in these operating procedures and plant instructions are the provision that employee radiation exposure trends are reviewed periodically by management staff at the plant and in the central office. Summary reports are prepared that describe: (a) major problem areas where high radiation exposures are encountered; (b) which worker group is accumulating the highest exposures; and (c) recommendations for changes in operating, maintenance, and inspection procedures or modifications to the plant as appropriate to reduce exposures.

An ALARA committee composed primarily of supervisory personnel is established to review periodically the effectiveness of implementation of the ALARA Program. Reviews include the site performance against ALARA goals, employee ALARA suggestions, ALARA planning documents, and trends. The Plant Manager or Assistant Plant Manager will normally serve as chairman of the site ALARA committee.

4.3 ORGANIZATION AND PERSONNEL QUALIFICATIONS

The TVA and Watts Bar Nuclear Plant specific organizations are discussed in Chapter 2 of this application.

As described previously in section 2.2.4 of this application, the site Radiation Protection Manager shall have the education and experience as described in Regulatory Guide 1.8, Revisions 1 and 2 in the context of Regulatory Guide 1.8 and the endorsed ANSI N18.1-1971 and ANSI/ANS-3.1-1981. Because of TVA's commitment to both documents, the Radiation Protection Manager must meet the more restrictive of the composite qualifications and training of both documents.

The Radiation Protection Manager shall have a bachelor's degree in a science or engineering subject, including formal training in radiation protection. At the time of initial core loading or appointment to the active position, whichever is later, the responsible individual shall have five years of experience in applied radiation protection. At least three of the five years shall be professional-level experience in applied radiation protection work in a nuclear facility dealing with radiological problems similar to those encountered in nuclear power plants, preferably in a nuclear power plant. During the three years, the individual shall participate in the radiation protection section of an operating nuclear power plant during the following periods: (1) routine refueling outage (one to two months); and (2) two months operation above 20 percent power. The Radiation Protection Manager shall have at least six months experience onsite.

4.4 COMMITMENT TO WRITTEN PROCEDURES

Radiation control instructions are maintained and made available to all site personnel. These instructions are written to implement the requirements of 10 CFR 20, applicable codes and standards, and commitments to outside agencies (American Nuclear Insurers, Institute of Nuclear Plant Operations, etc.). Chapter 11 of this application provides a detailed discussion of procedure controls and implementation.

Radiation protection procedures are prepared, reviewed and approved to carry out activities related to the Radiation Protection Program. Procedures are used to control radiation protection activities in order to ensure that the activities are carried out in a safe and effective manner. Radiation protection procedures are reviewed and revised as needed to incorporate facility or operational changes.

4.4.1 Radiation Work Permit Procedures

A Radiation Work Permit (RWP) system shall be established to document radiological conditions and prescribe appropriate protective requirements for work in radiologically controlled areas.

- Site Radiation Protection shall be responsible for establishing entry requirements for radiological areas via the RWP.

- The area in which the work is to be performed is surveyed for radiological hazards before the start of work and/or as appropriate during work to ensure that radiological hazards are properly identified.

- Protective clothing and equipment, dosimetry, and work limitation requirements are specified for all workers entering the area.

RWPs will normally be required for all work in radiologically controlled areas. RWPs shall always be required for areas where radiological conditions meet or exceed the criteria listed below.

- Entering a “Radiation Area.”
- Entering a “High Radiation Area” or “Very High Radiation Area.”
- Entering a “Contaminated Area.”
- Entering an “Airborne Radioactivity Area.”
- Breaching a contaminated system or component.
- RP discretion to provide adequate radiological control.
- For radiographic examinations conducted at licensed nuclear facilities.
- Entering an area or component where radiological conditions are unknown.

Each worker shall be responsible for awareness and compliance with the radiation protection requirements of an RWP and for meeting the prerequisites for RWP entry.

4.5 TRAINING COMMITMENTS

A radiation protection training program shall be developed, documented, and administered consistent with expectations as outlined in NEI 95-04, “Guideline for General Access Training”. This program is implemented in General Employee Training for NPG power plant facilities. All individuals who in the course of employment are likely to receive an occupational exposure to radiation from licensed and unlicensed radiation sources under the control of the licensee in excess of 100 mrem in a year shall receive radiation protection training commensurate with their duties and responsibilities (10 CFR 19.12) and instructions on U.S. NRC Regulatory Guides 8.13 and 8.29.

A training program for RP personnel shall be developed by Nuclear Training. Nuclear Training shall issue procedures detailing the program. The Program Manager of Radiological Services will concur with the initial issuance and any change to procedures for the training of RP personnel. The National Voluntary Laboratory Accreditation Program (NVLAP), Technical Director will concur with the training requirements and procedures involving NVLAP accredited activities.

4.6 VENTILATION AND RESPIRATORY PROTECTION PROGRAMS

Internal occupational dose is controlled though facility design, engineering controls, confinement and reduction of contaminated areas, limiting access to radiological controlled areas, and the use of respiratory protective equipment. Personnel are not routinely monitored for internal deposited radioactive material. Confirmatory monitoring (by licensee) is performed for individuals through the assessment and tracking of DAC-h. Radio-bioassay (in vitro and in vivo measurement and analysis) is employed to confirm and/or evaluate probable intake.

4.6.1 Respiratory Protection Program

A respiratory protection program shall be established and maintained in accordance with 10 CFR 20. Workers shall have respiratory protection training before wearing respiratory protection equipment.

TVA is responsible for providing a workplace environment in which individuals are adequately protected from hazards, including hazards from exposure to ionizing radiation. As part of TVA's program to maintain exposures ALARA, the TEDE is to be ALARA for activities subject to the 10 CFR 20 "Standards for Protection Against Radiation." These requirements allow intakes of radioactive material by workers, if such intakes result in lower external dose and maintain TEDE.ALARA. Under these requirements intakes of radioactive material are permissible if evaluations predict that use of respiratory protection equipment will result in a higher TEDE. Additionally, other factors may be considered in the evaluation for maintaining TEDE ALARA. These factors may include, but are not limited to, environmental conditions, safety conditions, accessibility conditions, worker comfort, wear times, and the type of respiratory equipment specified or available. All TEDE ALARA evaluations shall be documented and retained as a Facility based Radiological Control Program record. Dose calculations/investigations are reviewed and approved by radiation protection supervision.

Unplanned intakes (no documented TEDE ALARA evaluation) of radioactive material by workers that result in an internal dose of 10 mrem or greater shall be documented in the Corrective Action Program.

Respiratory Protection Program elements include:

- Air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate exposures;
- Surveys and bioassays, as appropriate, to evaluate actual intakes;
- Testing of respirators for operability immediately prior to each use;
- Written procedures shall be established that address: selection, fitting, issuance, maintenance, and testing of respirators, including testing for operability immediately prior to each use; program audits; minimum qualifications of program supervisors and implementing personnel; limitations on periods of respirator use and relief from respirator use; maintaining TEDE ALARA and performing evaluations; supervision and training of personnel; monitoring (including air sampling and bioassays), and recordkeeping; a description of the applications of respirators for routine, non-routine, and emergency respirator use; and periodic medical evaluation (NRC Regulatory Guide 8.15).
- Determination by a physician prior to the initial fitting of respirators, and annually (quarter ending) thereafter or periodically at a frequency determined by a physician, that the individual user is medically fit to use the respiratory protection equipment.

4.6.2 Ventilation Systems

The fuel handling area ventilation system, a subsystem of the Auxiliary Building ventilating system, serves the fuel-handling area at Elevation 757, the penetration rooms at Elevation 737, Elevation 757 and Elevation 782, and the fuel, waste, and cask handling areas at Elevation 729 and Elevation 692.

The system is designed to: (1) maintain acceptable environmental conditions for personnel access, operation, inspection, maintenance, and testing, (2) protect mechanical and electrical equipment and controls, and (3) control airborne activity during normal operation. The environmental control system is designed to maintain building temperatures between 60°F minimum and 104°F maximum.

During accident conditions, the fuel handling area ventilation system is shut down and all environmental control is handled by the Auxiliary Building Gas Treatment System (ABGTS), described in FSAR Section 6.2.3.

All ductwork, dampers, and grilles of the fuel handling area ventilation system essential to operation of the ABGTS are designed to Seismic Category I and Safety Class 2b requirements. Each fueling handling area exhaust fan is provided with a primary circuit breaker and a shunt trip isolation switch which is tripped by a signal of the opposite train from that for the primary circuit breaker to ensure that power is isolated from the fan. All other system components, including exhaust fans and remaining ductwork and dampers, are designed to Seismic Category I(L) requirements.

To control airborne activity, ventilation air is supplied to clean areas, then routed to areas of progressively greater contamination potential. The fuel handling area is maintained at a slightly negative pressure to limit out leakage, and can be physically isolated from the outdoors in case of radiological contamination.

Air utilized to ventilate the fuel handling area, waste packaging, and cask shipping areas is exhausted through the fuel handling area exhaust fans. An exhaust duct system from the waste packaging area and cask loading area is connected to a duct system around the periphery of the spent fuel pit and fuel transfer canal. Thus, exhaust air from the fuel handling area passes across the spent fuel pit forming an air curtain across the pool. During periods of irradiated fuel movement in the fuel transfer canal, air curtain exhaust flow at the fuel transfer canal area is required to be interrupted. The fuel transfer canal exhaust flow is isolated to prevent the uptake of source terms emitted during a postulated fuel handling accident in the fuel transfer canal and to support proper spent fuel pool accident radiation monitor operation.

Exhaust is provided by two 100% capacity fuel handling area exhaust fans. During normal operation one fan is in operation with the other on standby. Both fans discharge to the Auxiliary Building exhaust stack.

An inlet damper furnished with each fuel handling area exhaust fan is used to regulate the volume of air exhausted as required to maintain a ¼-inch negative pressure within the building. These dampers are automatically operated by static pressure controllers.

During periods of high radiation in the fuel handling area or upon initiation of a containment isolation signal, or for high air temperature at the supply intake the Auxiliary Building supply and exhaust fans and the fuel handling exhaust fans are automatically stopped and isolation dampers located in the ducts that penetrate the Auxiliary Building Secondary Containment Enclosure (ABSCE) are closed. Additionally, during refueling operations when containment and/or the annulus is open to the ABSCE spaces, a Containment Vent Isolation (CVI) signal will automatically stop the above described fans and close the same isolation dampers as described above. Similarly, the high radiation signal in the fuel handling area can also automatically initiate a CVI during refueling operations when containment and/or the annulus is open to the Auxiliary Building ABSCE spaces. An isolation barrier is thus formed between the building and the outdoor environment, and the ABGTS is started up automatically (see FSAR Section 6.2.3) to maintain the ABSCE at less than a 1/4-inch water gauge negative pressure during these high radiation or accident periods. In additional if both containments are open to the auxiliary building, a CVI in one unit will initiate a CVI on the other unit to assure ABSCE integrity.

The fuel-handling area ventilation system is located completely within Seismic Category I structures and all safety-related components are fully protected from floods and tornado-missile damage.

4.7 RADIATION SURVEYS AND MONITORING PROGRAM COMMITMENTS

Prospective monitoring determinations for internal and external dose monitoring are performed for individuals or group of individuals entering the restricted area. Personnel monitoring, for dose from sources external to the body, is conducted using appropriate dosimeters as required by 10 CFR 20. TVA maintains accreditation as a processing laboratory for dosimeters, as described in American Standards Institute (ANSI) N13.11-1983, "Personnel Dosimeter - Criteria for Performance". This accreditation is under the National Voluntary Laboratory Accreditation Program conducted by the National Institute of Standards and Technology. Dosimeters may be processed onsite by WBN, an accredited sub-facility, or by another processing laboratory within the scope of TVA's accreditation. Dose information for whole body (total effective dose equivalent), external exposure of the skin, lens of the eye, and extremities is recorded in a dose tracking system and retained in a permanent historical database for generating required reports. Real time control is generally implemented using information from direct reading dosimeters. Official doses of record are taken from dosimeters. However, doses are calculated when dosimeter results are not available or do not accurately represent actual dose received.

Personnel monitoring and confirmatory monitoring for dose from intakes of radioactive material is conducted using DAC-HR tracking and bioassays, including whole body counting. Monitoring is performed for each person required to be monitored by 10 CFR 20. The whole body counter is calibrated with standard radioisotopes in configurations that approximate the human body. It is able to detect expected gamma emitting radionuclides per ANSI-N13.30, September 1989, Table-1, "Acceptable Minimum Detectable Activities."

Routine radiological surveys to detect radiation, radioactive contamination, and airborne radioactivity are performed throughout the plant on periodic schedules. Survey frequencies are determined by the RADCON Superintendent based upon the actual or potential radiological conditions. Schedules for completion of routine surveys are issued to the technicians. As plant conditions change, the schedule will be updated. Radiological surveys may be performed whenever personnel enter potential or actual radiological areas and there is any doubt as to the existing conditions. Retention of survey records follows the requirements of 10 CFR 20.2103 and Regulatory Guide 1.88

Radiation and contamination surveys will be made on the new fuel shipments by Radiological Control personnel. The purpose of the survey is to protect personnel from unnecessary exposure to radiation and/or contamination. Smears shall be counted for alpha and beta-gamma radiation.

The designated fuel receiving areas will be zoned according to 10 CFR 20. When the fuel arrives onsite, radiation and contamination surveys will be taken on the transport vehicle. Dose rate at contact and 2 meters from the vehicle will be taken, Contact dose rates, dose rates at 1 meter, and smears will be taken on the external surfaces of the shipping containers. After the shipping containers are opened, smears will be taken of the fuel assembly covering and the inside of the container. The dose rate of each fuel assembly will be obtained, and the fuel assembly will be smeared when the polyethylene covering has been removed for inspection. When all fuel containers are removed from the truck, radiation and smear surveys will be taken on the truck before allowing it to leave.

Periodic surveys will be performed within the storage/handling area. Upon detection of contamination, a personnel monitoring station will be established and the area controlled to prevent the spread of the contamination. The work controlling document will describe the protective clothing, dosimetry, and methods to be followed to prevent unnecessary exposure to personnel. The contaminated area or item will be cleaned and/or disposed of appropriately.

Portable survey instruments are calibrated and checked periodically with standard radioactive sources in accordance with instrument specific calibration and maintenance procedures. Accurate records on the performance of each instrument during each calibration are maintained. Each laboratory counting system is checked at regular intervals with standard radioactive sources for proper counting efficiencies, background count rates, and operating parameters.

4.7.1 Radiological Zones

Radiological zones at WBN have been established to (1) control the spread of contamination, (2) control personnel access to avoid unnecessary exposure of personnel to radiation, and (3) to control access to radioactive sources present in the facility. The following definitions of areas are provided to describe how the facility Radiation Protection Program is implemented to protect workers and the general public on the site.

- **Owner Controlled Area** - An area, outside of a restricted area but inside the site boundary, access to which can be limited by the licensee for any reason.

- **Restricted Area** - Any area access to which is limited by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials (10 CFR 20.1003).

- **Radiologically Controlled Area (RCA)** - An area within (or that may coincide with) the Restricted Area (defined in 10 CFR 20.1003) boundaries that may have increasing radiological hazards

- **Radiation Area** - An area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 5 mrem in one hour at 30 cm from the radiation source or from any surface that the radiation penetrates.

- **High Radiation Area (HRA)** - An area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving a dose equivalent in excess of 100 mrem in 1 hour at 30 centimeters from the radiation source or 30 centimeters from any surface that the radiation penetrates.

- **Very High Radiation Area** - An area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving an absorbed dose in excess of 500 rads in 1 hour at 1 meter from a radiation source or 1 meter from any surface that the radiation penetrates.

4.7.2 Access and Egress Control

Controls have been established for entry into and exit from radiological controlled areas (RCA). Prior to entry, workers are provided training, radiation monitoring devices (thermoluminescent dosimeter TLD and electronic dosimetry) and are required to have a radiation work permit (RWP) applicable to the assigned work activity. Upon exiting a RCA, workers are expected to proceed to the nearest frisker station and perform a self-survey of their hands and feet at a minimum. Once frisking is completed, workers will exit the RCA via a personal contamination monitor (PCM). Prior to leaving the WBN protected area workers exit through a portal monitor that again measures the individual for contamination.

Access controls to prevent unplanned exposures in high radiation areas are implemented in accordance with WBN Unit 1 Technical Specifications. In addition to the access control requirements for high radiation areas, the following control measures are implemented to control access to very high radiation areas in which radiation levels could be encountered at 500 rads or more in 1 hour at 1 meter from a radiation source or any surface through which the radiation penetrates:

- Conspicuously posted with a sign(s) stating GRAVE DANGER - VERY HIGH RADIATION AREA
- Area is locked. Each lock shall have a unique core. The keys shall be administratively controlled by the RADCON Superintendent.
- Plant manager's (or designee) approval required for entry.
- RADCON personnel shall be in accompaniment of the person(s) making the entry.

4.7.3 Posting for Radiation Protection Awareness

Each RCA shall be posted by yellow and magenta signs bearing the standard radiation warning symbol and the words “Caution - Radiologically Controlled Area.” The posting shall also state that a monitoring device is required (unless it has been determined that monitoring is not required).

Contamination areas shall have conspicuous boundaries consisting of such items as rad-ribbon, rad-rope, rad-tape, and step-off pads and be posted by yellow and magenta signs bearing the standard radiation warning symbol and the words “Caution-Contaminated Area” or “Caution-Contamination Area.” Where, due to physical space limitations, it is impractical to post a contaminated area as described above, the area may be noted with radiation tape and/or radiation hazard tags. Physical space limitation is intended to apply to such areas as floor drains, electrical panels, sample sinks, etc.

Radiological postings shall be displayed with yellow and magenta colors in accordance with 10 CFR 20.1901.

4.7.4 Protective Clothing and Equipment

TVA provides protective clothing for use in radiological areas. Clothing required for a particular instance is prescribed by RADCON based upon the actual or potential radiological conditions. Protective clothing is cleaned, surveyed for contamination, checked for physical condition, and returned to service if acceptable. Additional protective clothing stock is available from the plant warehouse as required. Protective clothing available for use includes but is not limited to:

1. Coveralls
2. Lab coats
3. Gloves
4. Head covers
5. Foot covers

4.7.5 Personnel Monitoring for External Exposures

All individuals who are expected to work in a radiologically controlled area (RCA) shall process through RP when arriving, transferring, or terminating at a Nuclear Power Group (NPG) site. In addition, monitored and NPG staff individuals who will visit another licensee or TVA plant, and require a thermoluminescent dosimeter (TLD) on that visit, must check out prior to leaving their respective sites unless exempted by RP. If an employee is assigned to work at a non-TVA installation where an exposure to radiation is incurred, the employee shall inform RP of this assignment. The employee shall turn in their dosimetry, obtain any required bioassays, and complete any requested documentation. When the employee returns, they must report to RP to obtain any required bioassay and update their exposure records.

TVA will provide each worker entering an RCA with dosimetry capable of measuring the worker's dose. This is accomplished by using a dosimeter of record (for example, a TLD), appropriate for the radiological environment, provided by a National Voluntary Laboratory Accreditations Program (NVLAP) certified processor (utility or vendor).

Administrative dose levels (ADLs) to be used as guidelines for maintaining doses below regulatory limits have been established within the NPG and shall be observed for routine work. This program is not applicable to minors or declared pregnant women. Obtain appropriate station supervision and radiation protection management approval to increase a worker's administrative dose level. Examples of a bona fide need for a dose extension are that 1) the unique ability or experience of the individual will minimize collective dose; and 2) other qualified individuals with lower doses are not available.

The RPM shall prepare a report for the TVA Chief Nuclear Officer and Executive Vice President for submittal within 30 days to INPO's Radiological Protection and Emergency Preparedness Division and the NRC (10 CFR 20.2105) if a regulatory limit is exceeded or a Planned Special Exposure (PSE) is used (10 CFR 20.2203, 20.2204, and 20.2205).

Any worker who exceeds a regulatory dose limit shall not be permitted to enter any RCA until all investigations surrounding the event are completed. The RPM or designee must approve reentry.

Any personnel exposure received which is in excess of the limits of 10 CFR 20.1201 shall be reported by the RPM to Radiation Effects Advisory Group (REAG) and the appropriate area chief physician for an examination.

Information regarding an individual's occupational radiation exposure is maintained pursuant to and in accordance with the Privacy Act of 1974, 5 U.S.C. 552a and TVA's Privacy Act regulations (18 CFR 1301 Subpart B).

4.7.6 Personnel Monitoring for Internal Exposures

Internal occupational dose is controlled though facility design, engineering controls, confinement and reduction of contaminated areas, limiting access to radiological controlled areas, and the use of respiratory protective equipment. Personnel are not routinely monitored for internal deposited radioactive material. Confirmatory monitoring (by licensee) is performed for individuals through the assessment and tracking of DAC-h. Radio-bioassay (in vitro and in vivo measurement and analysis) is employed to confirm and/or evaluate probable intake.

The primary means to minimize the intake of airborne radioactive materials is to control the generation of airborne radioactivity. This is best accomplished at its source and by process or other engineering controls. These controls include identification and repair of leaks, process modification, decontamination, containment, and ventilation control. Routine and special tasks should be planned such that potential sources of airborne radioactive material are managed by repair, decontamination, process, or other engineering controls.

If it is impractical to repair, decontaminate, apply process or other engineering controls or while these processes are being implemented, other measures should be taken to limit the uptake of radioactive materials. These measures include increased surveillance, limitation of working times, use of respiratory protective devices, or combination thereof.

Internal Exposure Monitoring and Control Program elements, at a minimum, are to include:

- Air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate exposures;
- Surveys and bioassays, as appropriate, to evaluate actual intakes;
- Testing of respirators for operability immediately prior to each use;
- Written procedures shall be established that address: selection, fitting, issuance, maintenance, and testing of respirators, including testing for operability immediately prior to each use; program audits; minimum qualifications of program supervisors and implementing personnel; limitations on periods of respirator use and relief from respirator use; maintaining TEDE ALARA and performing evaluations; supervision and training of personnel; monitoring (including air sampling and bioassays), and recordkeeping; a description of the applications of respirators for routine, non-routine, and emergency respirator use; and periodic medical evaluation (NRC Regulatory Guide 8.15).
- Determination by a physician prior to the initial fitting of respirators, and annually (quarter ending) thereafter or periodically at a frequency determined by a physician, that the individual user is medically fit to use the respiratory protection equipment.

Internal dose monitoring (DAC-hr tracking including bioassay) is required for:
Adult workers that are likely to receive an occupational intake in excess of 0.1 ALI or 200 DAC-h in a year.

4.7.7 Evaluation of Dose

A dose record system shall be implemented by RP for purposes of maintaining historical dose records for all persons for whom personnel monitoring or dose calculations are performed. These records are collected and maintained pursuant to and in accordance with the Privacy Act of 1974, 5 U.S.C. 552a and TVA's Privacy Act regulations (18 CFR 1301 Subpart B). The records maintained shall include: the deep-dose equivalent to the whole-body, lens dose equivalent, shallow-dose equivalent to the skin, and shallow-dose equivalent to the extremities; the estimated intake of radionuclides; the committed effective dose equivalent assigned to the intake of radionuclides; and the specific information used to assess the committed effective dose equivalent pursuant to 10 CFR 20.1204(a) and (c), and when required by 10 CFR 20.2106.

Deep Dose Equivalent, Lens Dose Equivalent, Shallow Dose Equivalent (Whole-body), Shallow Dose Equivalent (Maximum extremity), Committed Effective Dose Equivalent, Committed Dose Equivalent, Total Effective Dose Equivalent, and Total Organ Dose Equivalent dose information shall be calculated, maintained, and reported to the NRC and individuals according to NRC Regulatory Guides 8.7 and 8.34 and NRC Technical Communication RADIATION RECORDS DATA COLLECTION AND ANALYSIS to TVA dated January 4, 1994. The dose record system shall make a clear distinction among the quantities entered on the records (e.g., total effective dose equivalent, shallow-dose equivalent, lens dose equivalent, deep-dose equivalent, committed effective dose equivalent).

Those individuals who receive occupational exposure and require monitoring per 10 CFR 20.1502 shall have their doses reported annually to the NRC and the individuals with greater than 100 mrem of TEDE, EDE, DDE, LDE, SDE, SDEME, CEDE, or CDE on an NRC FORM-5 or an electronic record containing all the information required by a FORM-5.

4.8 ADDITIONAL PROGRAM COMMITMENTS

TVA has developed the following program to track, trend and report attributes of the radiation protection program.

4.8.1 Records and Reporting

A tracking system shall be implemented which will track radiation exposure for purposes of trend analysis and work planning, and provide data for management evaluations of the ALARA program.

A. Exposure Control System

An exposure control system will be implemented which will:

- Keep up-to-date exposure data from dosimeters, calculated doses, and DAC-hr.
- Compare individual dose data with TVA Administrative Dose Limits and regulatory limits.
- Keep the supervisor informed of workers' exposure.
- Keep employees informed of their own exposure.

B. Dose Record System

A dose record system shall be implemented by RP for purposes of maintaining historical dose records for all persons for whom personnel monitoring or dose calculations are performed. These records are collected and maintained pursuant to and in accordance with the Privacy Act of 1974, 5 U.S.C. 552a and TVA's Privacy Act regulations (18 CFR 1301 Subpart B). The records maintained shall include: the deep-dose equivalent to the whole-body, lens dose equivalent, shallow-dose equivalent to the skin, and shallow-dose equivalent to the extremities; the estimated intake of radionuclides; the committed effective dose equivalent assigned to the intake of radionuclides; and the specific information used to assess the committed effective dose equivalent pursuant to 10 CFR 20.1204(a) and (c), and when required by 10 CFR 20.2106.

Deep Dose Equivalent, Lens Dose Equivalent, Shallow Dose Equivalent (Whole-body), Shallow Dose Equivalent (Maximum extremity), Committed Effective Dose Equivalent, Committed Dose Equivalent, Total Effective Dose Equivalent, and Total Organ Dose Equivalent dose information shall be calculated, maintained, and reported to the NRC and individuals according to NRC Regulatory Guides 8.7 and 8.34 and NRC Technical Communication RADIATION RECORDS DATA COLLECTION AND ANALYSIS to TVA dated January 4, 1994. The dose record system shall make a clear distinction among the quantities entered on the records (e.g., total effective dose equivalent, shallow-dose equivalent, lens dose equivalent, deep-dose equivalent, committed effective dose equivalent).

The system includes:

- All official dose records for each individual, including externally measured or calculated doses, whole-body counting results and internal dose commitment calculation, personnel contamination reports, and investigation reports as appropriate.
- Means to store and retrieve records in accordance with NPG's quality assurance program requirements.
- Means to retrieve individual dose records by name or employee identification number.
- Means for RP personnel to obtain individual records.
- Means to generate all required reports.

C. Dose Record Reporting

- Those individuals who receive occupational exposure and require monitoring per 10 CFR 20.1502 shall have their doses reported annually to the NRC and the individuals with greater than 100 mrem of TEDE, EDE, DDE, LDE, SDE, SDEME, CEDE, or CDE on an NRC FORM-5 or an electronic record containing all the information required by a FORM-5.
- These reports are generated and reported by licensee as required by 10 CFR 20.2206.
- External exposures as measured with a NVLAP accredited device will be recorded and reported at a 10 mrem threshold value.
- When determining the dose from airborne radioactive material, NPG shall include the contribution to the deep-dose equivalent, lens dose equivalent, and shallow-dose equivalent from external exposure to the radioactive cloud. External exposures as calculated for noble gas submersion dose will be integrated in the Radiation Protection Records system. Doses calculated by the RP Computer system will be reported at a 1 mrem monitoring period threshold value.
- Internal exposures as calculated for derived air concentration (DAC-hrs) exposures and/or bioassay data will be integrated in the Radiation Protection Records system. Doses calculated by the Radiation Protection Computer system are reported at a 1 mrem threshold.

4.8.2 Abnormal Events and Reporting

All plant abnormal occurrences shall be investigated in accordance the WBN Corrective Action Program.

TVA is required by 10 CFR 50.72 to notify NRC immediately if certain types of events occur. The WBN Unit 1 Operations Department is responsible for making the reportability determinations for 10 CFR 50.72 and 10 CFR 50.73 reports. Operations is responsible for making the immediate notification to NRC in accordance with 10 CFR 50.72.

- 10 CFR 50.72(b)(3)(xii) - Any event requiring the transport of a radioactively contaminated person to an offsite medical facility for treatment.
- 10 CFR 50.73(a)(2)(viii)(A) - Any airborne radioactivity release that, when averaged over a time period of 1 hour, resulted in airborne radionuclide concentrations in an unrestricted area that exceeded 20 times the applicable concentration limits specified in Appendix B to Part 20, table 2, column 1.
- 10 CFR 50.73(a)(2)(viii)(B) - Any liquid effluent release that, when averaged over a time period of 1 hour, exceeds 20 times the applicable concentrations specified in Appendix B to Part 20, table 2, column 2, at the point of entry into the receiving waters (i.e., unrestricted area) for all radionuclides except tritium and dissolved noble gases.

TVA is required by its various NRC licenses to report certain events or conditions. 10 CFR Part 20 contains reporting requirements for events involving licensed byproduct, source, or special nuclear material. 10 CFR 30.50 contains reporting requirements for events involving licensed byproduct material. 10 CFR 40.60 contains reporting requirements for events involving licensed source material. 10 CFR Part 70 contains reporting requirements for events and conditions involving licensed special nuclear material.

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5. NUCLEAR CRITICALITY SAFETY

This section of the application contains an overview of the criticality design and administrative controls in place at the Watts Bar Nuclear Plant (WBN). The methodologies and analyses discussed are currently in-place and licensed in support of WBN Unit 1 fuel receipt, handling and storage operations. No changes to the criticality methodologies, analysis or system, structures and component design are required to receive and store new fuel for WBN Unit 2.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed based on the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 5 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 5.1 Nuclear Criticality Safety (NCS) Program				
Management of the NCS Program	70.61(d) 70.64(a)	5.4.3.1	9.1.1 Criticality Safety of Fresh and Spent Fuel Storage and Handling	See Section 5.1
Control Methods for Prevention of Criticality	70.61	5.4.3.4.2	9.1.1 – Criticality Safety of Fresh and Spent Fuel Storage and Handling	See Section 5.1

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 5 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Safe Margins Against Criticality	70.61	5.4.3.4.2	9.1.1 – Criticality Safety of Fresh and Spent Fuel Storage and Handling 9.1.2 – New and Spent Fuel Storage	See Section 5.1
Description of Safety Criteria	70.61	5.4.3.4.2		See Section 5.1
Organization and Administration	70.61	5.4.3.2		See Section 5.1
Section 5.2 Methodologies and Technical Practices				
Methodology	70.61	5.4.3.4.1 5.4.3.4.4 5.4.3.4.6		4.3.2.7 Criticality of Fuel Assemblies
Section 5.3 Criticality Accident Alarm System				
Criticality Accident Alarm System	70.24	5.4.3.4.3	9.1.1 – Criticality Safety of Fresh and Spent Fuel Storage and Handling 9.1.2 – New and Spent Fuel Storage	See Section 5.3
Section 5.4 Reporting				

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 5 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Reporting Requirements	10 CFR 50.72 & 10 CFR 50.73	5.4.3.4.7(7)		See Section 5.4

5.1. NUCLEAR CRITICALITY SAFETY PROGRAM

Criticality of fuel assemblies outside the reactor is precluded by adequate design of fuel transfer and fuel storage facilities and by administrative control procedures in accordance with 10 CFR 50.68, "Criticality accident requirements," paragraph (b). This section identifies those criteria important to criticality safety analyses.

5.1.1 Management of the Nuclear Criticality Safety Program

It is the policy of the TVA Nuclear Power Group to operate its nuclear plants in a safe, conservative and cautious manner such that the health and safety of the public and employees are protected at all times. It is the intent of this policy that reactivity be controlled and managed in a conservative and cautious manner such that the integrity of the fuel cladding and the reactor system pressure boundary is not challenged.

This policy requires that nuclear fuel be operated, handled, and stored in a monitored and defined condition within the bounds of fuel and/or core design limits and analyses assumptions. All activities potentially affecting reactivity must be performed in a well-planned and deliberate manner in accordance with approved procedures. Before any actions are undertaken which could affect reactivity, the effects of the reactivity changes must be known and indications of the effects must be monitored during the changes. All responses to anomalous reactivity indications are required to be conservative actions.

Individuals with reactivity-related responsibilities are required to be capable of recognizing potential reactivity events or conditions and when an unexpected situation occurs, know and take conservative actions. It is not possible to provide procedural guidance for all possible reactivity-related situations; therefore, the key elements of the Reactivity Management Program are a reactivity consciousness and the implementation of conservative actions. The program includes the following.

- Criticality safety requirements have been developed, implemented and maintained to comply with 10 CFR 50.68.

- The criticality analyses are maintained consistent with current configuration by means of the configuration management function described in Chapter 11 of this application.

- Criticality safety limits and requirements are established in Technical Specifications and procedures and maintained consistent with the criticality analyses.

- Modifications to design and to operations procedures are evaluated to ensure that nuclear criticality safety is not adversely impacted.

- Nuclear criticality safety deficiencies are promptly identified by means of operational inspections, audits, and investigations. Deficiencies are entered into the corrective action program so as to prevent recurrence of unacceptable performance deficiencies related to nuclear criticality safety.

Additional discussion of management measures is provided in Chapter 11 of this application.

5.1.2 Control Methods for Prevention of Criticality

The controls implemented at WBN to prevent criticality during the handling and storage of fuel assemblies include WBN Unit 1 Technical Specifications requirements for the storage of new and spent fuel assemblies, plant procedures to control of handling and storage of fuel assemblies to ensure that the assumptions of the criticality safety analyses are satisfied, and procedural requirements to ensure independent verification of certain required activities, e.g., verification of storage of fuel assemblies in proper locations.

5.1.3 Safe Margins Against Criticality/Safety Criteria

The following safe margins/safety criteria are established for the criticality analyses used for new fuel and spent fuel storage.

- The k_{eff} of new fuel in the new fuel storage racks is calculated assuming the racks are loaded with fuel of the maximum fuel assembly reactivity and flooded with unborated water and must not exceed 0.95, at a 95 percent probability, 95 percent confidence level.

- If optimum moderation of fresh fuel in the fresh fuel storage racks occurs when the racks are assumed to be loaded with fuel of the maximum fuel assembly reactivity and filled with low-density hydrogenous fluid, the k_{eff} corresponding to this optimum moderation must not exceed 0.98, at a 95 percent probability, 95 percent confidence level.

- If no credit for soluble boron is taken, the k_{eff} of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with unborated water. If credit is taken for soluble boron, the k_{eff} of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with borated water, and the k_{eff} must remain below 1.0 (subcritical), at a 95 percent probability, 95 percent confidence level, if flooded with unborated water.

5.1.4 Organization and Administration

The WBN Unit 1 Shift Manager has the direct responsibility for controlling reactivity. The WBN Unit 1 Reactor Engineers are responsible for performance of the required criticality analyses and establishing the required Technical Specification and procedural limits and controls consistent with assumptions of the criticality analyses. Refer to Chapter 2 of this application for additional information regarding the TVA and WBN organizations.

5.2. METHODOLOGIES AND TECHNICAL PRACTICES

5.2.1 New Fuel Storage

New fuel is normally stored dry in the new fuel storage vault. The design basis for preventing criticality within the new fuel storage vault is that, including uncertainties, there is a 95% probability at a 95% confidence level that the effective multiplication factor (k_{eff}) of the fuel assembly array will be less than 0.95 under full moderator density conditions and less than 0.98 under low water density (optimum moderation) conditions.

The new fuel rack criticality analysis demonstrated that this rack will meet the design basis limits for k_{eff} for storage of Westinghouse 17x17 STANDARD and VANTAGE 5H fuel assemblies with nominal enrichments up to 4.3 wt% U-235 utilizing all (130) available storage cell locations. The analysis also showed that nominal enrichments above 4.3 wt% and up to 5.0 wt% U-235 can be stored provided that only 120 specific cells of the 130 available locations are utilized. When fuel enrichment above 4.3 wt% are to be stored in the new fuel vault, ten physical restricting devices such as insert plates will be placed in the proper locations to provide additional assurance, over procedural controls, that the fuel will only be stored in the 120 analyzed positions. The insert plates may have a non-fuel bearing component stored in them such as thimble plugging assemblies, rod cluster control assemblies, burnable poison rod assemblies, or tritium producing burnable absorber rod assemblies which are described in FSAR Sections 4.2.3.2.1 and 4.2.4. The allowed location for the 120 usable cells is described in the new fuel storage rack criticality report.

The design method which ensures the criticality safety of fuel assemblies in the spent fuel storage rack uses the AMPX system of codes for cross-section generation and KENO IV for reactivity determination. The 227 energy group cross-section library that is the common starting point for all cross-sections used for the benchmarks and the storage rack analysis is generated from ENDF/B-V data. The NITAWL program includes, in this library, the self-shielded resonance cross-sections that are appropriate for each particular geometry. The Nordheim Integral Treatment is used. Energy and spatial weighting of cross-sections is performed by the XSDRNPM program which is a one-dimensional Sn transport theory code. These multigroup cross-section sets are then used as input to KENO IV which is a three dimensional Monte Carlo theory program designed for reactivity calculations.

Under normal conditions, the fresh fuel racks are maintained in a dry environment. The introduction of water into the fresh fuel rack area is the worst case accident scenario. The full density and low density optimum moderation cases are bounding accident situations which result in the most conservative fuel rack k_{eff}.

Other accidents can be postulated which would cause some reactivity increase (i.e., dropping a fuel assembly between the rack and wall or on top of the rack). For these other accident conditions, the double contingency principle of ANSI N16.1-1975, "Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors," is applied. This states that one is not required to assume two unlikely, independent, concurrent events to ensure protection against a criticality accident. Thus, for these other accident conditions, the absence of a moderator in the fresh fuel storage racks can be assumed as a realistic initial condition since assuming its presence would be a second unlikely event.

The maximum reactivity increase for these kinds of postulated accidents is less than 10% delta-k/k, and since the normal, dry fresh fuel rack reactivity is less than 0.70, these postulated accidents will not result in a k_{eff} which is more limiting than the analyzed worst case accident scenarios of full density and optimum moderation water flooding. Thus, using the method described above, the maximum k_{eff} was determined to be less than 0.95, which meets the criteria stated in Section 4.3.1.65.

5.2.2 Spent Fuel Storage - Wet

The high density spent fuel storage racks for WBN are designed to assure that the effective neutron multiplication factor (k_{eff}) is equal to or less than 0.95. Design calculations model the racks fully loaded with fuel of the highest anticipated reactivity, and with a margin for uncertainty in reactivity calculations including mechanical tolerances. Uncertainties are statistically combined, such that the final k_{eff} will be equal to or less than 0.95 with a 95% probability at a 95% confidence level.

The layout of storage cells in the WBN spent fuel pool is shown in FSAR Figure 9.1-15. The criticality analysis of the WBN spent fuel pool configuration assures that the maximum k_{eff} will be less than or equal to 0.95 with fuel up to 4.95 $\pm$ .05 wt% U-235 enrichment.

Analysis of the WBN spent fuel rack configuration was performed using the SCALE system of codes for cross section generation and reactivity calculations, and CASMO was used for depletion calculations. The design basis fuel is a 17x17 Westinghouse VANTAGE-5H assembly containing a maximum initial enrichment of 4.95 $\pm$ .05 wt% U-235. The calculations were performed with a moderator temperature of 4^{o}C.

Margin for uncertainty in the reactivity calculations and manufacturing tolerances were included such that the final k_{eff} for allowed storage configurations will be less than or equal to 0.95 with a 95% probability at a 95% confidence level. In order to store fuel with U-235 enrichment as high as 4.95 $\pm$ .05 wt%, administrative controls and burnup credit must be applied. Therefore, the analysis takes credit for the reactivity decrease due to burnup of the stored fuel and for administrative controls on fuel placement. Burnup in discharged fuel was treated using CASMO4, performing depletion calculations which explicitly describe the fission product nuclide concentration. This methodology incorporates approximately 40 of the most important fission products. The fission product nuclide concentrations obtained from the CASMO4 depletions were then modeled in three-dimensions using KENO5a.

The VANTAGE 5H fuel design was modeled as the design basis fuel. The VANTAGE 5H design contains a smaller guide tube outer diameter and thus slightly increased neutron moderation compared with the Westinghouse Standard 17x17 fuel assembly. In addition, VANTAGE 5H fuel assemblies have zircaloy spacer grids as opposed to the more neutron-absorbing material Inconel found on the Standard 17x17 fuel assembly. As a result of these differences, VANTAGE 5H fuel has a higher reactivity for a given enrichment than Standard fuel. Therefore, analysis of VANTAGE 5H fuel also covers storage of Standard 17x17 fuel. VANTAGE 5H fuel assembly data is provided in FSAR Table 4.3-12. The analysis model bounds the design basis fuel assembly using the data provided in FSAR Table 4.3-12 or a more conservative value depending on the specific calculation.

WBN 2 uses Robust Fuel Assembly (RFA)2. An analysis showed the RFA2 fuel design is less reactive than the VANTAGE 5H fuel design at the same enrichment. The ZIRLO material used in the midgrids, fuel cladding and guide tubes has a slight reactivity penalty relative to ZIRC-4. Therefore, the analysis of VANTAGE 5H also covers and is considered bounding for the RFA2 fuel design.

5.2.3 Analytical Technique and Results

As previously discussed, the criticality analysis for the WBN racks were performed primarily with KENO5a, a three-dimensional Monte Carlo computer code, using the 238-group SCALE cross-section library and the Nordheim integral treatment for resonance shielding effects found in NITAWL. Depletion analyses were performed using CASMO4, a two-dimensional transport theory code. The models included explicit descriptions of the fission product nuclide concentrations, incorporating approximately 40 of the most important fission products.

Analysis of the spent fuel racks confirmed the racks can safely and conservatively accommodate storage of fuel up to 5 wt% U-235 enrichment with the following storage conditions:

1. Fuel assemblies with 3.8 wt% or less U-235 enrichment may be stored in Region 1 without restrictions.

2. Fuel assemblies with initial with enrichment greater than 3.8 wt% and up to 5.0 wt% (4.95 $\pm$ 0.05) U-235 and less than a maximum of 5.0 wt% (4.95 $\pm$ 0.05) may be stored in one of four arrangements with the limits specified below:

    A. Fuel assemblies may be stored in the racks without further restrictions provided the burnup of each assembly is in the acceptable domain identified in FSAR Figure 4.3-46, depending on the specified initial enrichment.

    B. New and spent fuel assemblies may be stored in a checkerboard arrangement of 2 new and 2 spent assemblies, provided the accumulated burnup of each spent assembly is in the acceptable domain identified in FSAR Figure 4.3-47, depending on the specified initial enrichment.

    C. New fuel assemblies may be stored in 4-cell arrays with 1 of the 4 cells remaining empty of fuel (containing only water or water with up to 75% by volume of non-fuel bearing material).

    D. New fuel assemblies with a minimum of 32 integral fuel burnable absorber (IFBA) rods may be stored in the racks without further restrictions provided the loading of ZrB_2 in the coating of each IFBA rod is a minimum of 1.25x (1.9625 mg/in).

A water cell is less reactive than any cell containing fuel and therefore may be used at any location in the loading arrangements. A water cell is defined as a cell containing water or non-fissile material with no more than 75% of the water displaced.

The WBN Unit 1 Technical Specifications include curves defining the limiting burnup for fuel of various initial enrichments for both unrestricted storage and checkerboard arrangements assuming the fresh fuel region is enriched to 4.95±0.05 wt% U-235. The calculated maximum reactivity is 0.948, which is within the regulatory limit of a k_{eff} of 0.95. This maximum reactivity includes calculational uncertainties and manufacturing tolerances (95% probability at the 95% confidence level), an allowance for uncertainty in depletion calculations, and the evaluated effect of the axial distribution in burnup. Fresh fuel of less than 4.95% enrichment would result in lower reactivity.

Accounting for biases and uncertainties, the maximum k_{eff} values for the above spent fuel storage rack conditions are less than 0.95. The maximum k_{eff} was determined as follows:

$$k_{eff} = k_{eff}\text{ (KENO)} + \text{BIASES} + \text{UNCERTAINTIES}$$

Biases include the CASMO and KENO method biases, a boron particle self-shielding allowance, and a bias for the extrapolation of enrichment from the critical benchmark comparisons. The uncertainties include the KENO statistical uncertainty, the KENO and CASMO method uncertainties, and the mechanical tolerance uncertainty.

The analyses conservatively do not take credit for presence of borated water, presence of discrete burnable absorbers, lower enrichment and higher burnup which would decrease reactivity. Other conservative assumptions include:

- Ignoring radial neutron leakage from the spent fuel storage racks
- Ignoring the presence of control rods
- Ignoring the presence of spent burnable absorber assemblies in storage
- Ignoring the higher water temperature of the spent fuel pool
- Maximizing burnable poison history effects
- Maximizing water density history effects
- Minimizing the ^{10}B content in the Boral

A water gap of 1.5 inches between Region 1 and Region 2 racks, two rack modules with Boral panels on both sides of the water gap (i.e., a flux trap), precludes any adverse interaction between the two regions modules.

The effect of various parameters on reactivity was determined to ensure the conservatism of the analysis. This was accomplished by performing sensitivity studies on these parameters with either KENO or CASMO-3. Parameters evaluated were axial burnup distribution, water temperature/density, assembly placement, mechanical tolerances, poison loading, pellet density, cell dimensions/bow, boron particle self shielding effect, borated water activity worth, Boral width tolerance, cell lattice spacing tolerance, stainless steel thickness tolerance, and fuel enrichment and density tolerance.

5.2.4 Credit for Soluble Boron

Although credit for soluble poison normally present in the spent fuel pool water is permitted under abnormal or accident conditions (double contingency principle), most abnormal or accident conditions will not result in exceeding the limiting reactivity (k_{eff} = 0.95) even in the absence of soluble poison. However, the inadvertent misplacement of a fresh fuel assembly in a location intended to be a water cell has the potential for exceeding the limiting reactivity and results in the worst-case accident scenario, should there be a concurrent loss of all soluble boron. Misplacement of a fuel assembly outside the periphery of a storage module, or a dropped assembly lying on top of the rack would have a smaller reactivity effect. Under this worst-case accident condition, calculations show that approximately 55 ppm of soluble boron would be sufficient to ensure that the limiting k_{eff} of 0.95 is not exceeded. Assuring the presence of soluble boron during fuel handing operations will preclude the possibility of the simultaneous occurrence of the two independent accident conditions. Administrative controls require that the spent fuel pool boron concentration be monitored (to ensure at least 2000 ppm) during operations requiring fuel moves in the pool until verification is made of assembly locations.

5.3. *CRITICALITY ACCIDENT ALARM SYSTEM*

In accordance with 10 CFR 50.68(b)(3), radiation monitors are provided in the storage and associated handling areas when fuel is present. These radiation monitors are capable of detecting excessive radiation levels and allow appropriate safety actions to be taken in accordance with plant procedures.

5.4. *REPORTING*

Reports to NRC associated with nuclear criticality safety shall be made in accordance with 10 CFR 50.72, “Immediate notification requirements for operating nuclear power reactors,” and 10 CFR 50.73, “Licensee event report system,” as applicable.

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6 CHEMICAL PROCESS SAFETY

As described in NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," Chapter 6, "Chemical Process Safety," the primary purpose of the NRC review is to determine with reasonable assurance that the applicant has designed a facility that will provide adequate protection against chemical hazards related to the storage, handling, and processing of licensed materials. Chapter 6 of NUREG-1520 also states that the facility design must adequately protect the health and safety of workers and the public during normal operations and credible accident conditions from the chemical risks of licensed material and from hazardous chemicals produced from licensed material.

The activities associated with this license application include receiving, possessing, inspecting, and storing special nuclear materials in the form of 193 fully assembled new fuel assemblies for the initial core of the WBN Unit 2 reactor. The special nuclear material is fully contained within the ZIRLO cladding of these fuel assemblies and does not represent a chemical hazard. For the scope of this license application, i.e., to receive, inspect, handle and store new fuel assemblies, there are no credible accident conditions from the chemical risks associated with the contained special nuclear material within the new fuel assemblies. In addition, since the special nuclear material is contained within the new fuel assembly cladding, there are no hazardous chemicals produced from the contained special nuclear material. As a result, there are no chemical process safety hazards associated with the receipt, inspection, handling, and storage of new fuel assemblies for WBN Unit 2.

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7 FIRE SAFETY

This section of the application contains an overview of the fire protection design and associated administrative controls at the Watts Bar Nuclear (WBN) Plant Site and the types of activities that will be performed when receiving, possessing, inspecting, and storing special nuclear materials in the form of 193 fully assembled fuel assemblies for the initial core of the WBN Unit 2 reactor.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed using the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	**10 CFR Citation**	**NUREG-1520 Chapter 7 Reference**	**NUREG-0800 Comparable Chapter**	**WBN FSAR CHAPTER / TITLE**
Section 7.1 Fire Safety Management Measures	70.62(a),(d) & 70.64(b)	7.4.3.1	9.5.1 Fire Protection Program	9.5.1 Fire Protection System
Section 7.2 Fire Hazards Analysis	70.61(a),(c) & 70.62(a) & (c)	7.4.3.2	9.5.1 Fire Protection Program	9.5.1 Fire Protection System
Section 7.3 Facility Design	70.62(a),(c) & 70.64(b)	7.4.3.3	9.5.1 Fire Protection Program	9.5.1 Fire Protection System
Section 7.4 Process Fire Safety	70.64(b)	7.4.3.4	9.5.1 Fire Protection Program	9.5.1 Fire Protection System

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 7 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 7.5 Fire Protection and Emergency Response	70.62(a),(c) & 70.64(b)	7.4.3.5	9.5.1 Fire Protection Program & 13.3 Emergency Planning	9.5.1 Fire Protection System & 13.3 Emergency Planning

The purpose of the WBN Fire Protection Report (FPR) is to consolidate a sufficiently detailed summary of the WBN regulatory required Fire Protection Program into a single document and to reflect the design as-constructed at the time of fuel load. The Final Safety Analysis Report (FSAR) references this report as detailing WBN's Fire Protection Program. This report is updated in conjunction with updates to the FSAR. The Fire Protection Report has been developed in accordance with the guidelines of NRC Generic Letter 86-10, "Implementation of Fire Protection Requirements" and NRC Generic Letter 88-12, "Removal of Fire Protection Requirements from Technical Specifications". The FPR brings WBN into compliance with NRC recommendations for documenting the Fire Protection Plan and commitments.

7.1 Fire Safety Management Measures

WBN administers and ensures fire safety in accordance with the WBN Fire Protection Report (FPR). The fire safety management measures included in the FPR applicable to the receipt, inspection, handling and storage of new fuel are as follows

7.1.1 Fire Brigade

Effective handling of fire emergencies is an important aspect of the WBN Fire Protection Program. This is accomplished by trained and qualified emergency response personnel. The fire response organization is staffed and equipped for firefighting activities. The fire brigade is comprised of a fire brigade leader and four fire brigade members. The fire brigade shall not include the Shift Manager nor the other members of the minimum shift crew necessary for safe shutdown of the unit, nor any personnel required for other essential functions during a fire emergency. Additional support is available when needed through an agreement with a local fire department.

An Incident Commander is available to direct each shift fire brigade. The Incident Commander meets the requirements of a Unit Supervisor, Shift Technical Advisor or Shift Support Supervisor and has sufficient training in or knowledge of plant safety-related systems to understand the effects of fire and fire suppressants on safe shutdown capability.

7.1.2 Training and Qualifications

WBN fire brigade training ensures that the fire brigade's capability to combat fires is established and maintained. Prior to training and annually thereafter (with a 25% allowable extension), each fire brigade member and leader receives medical evaluation to ensure the ability to perform strenuous physical activity, to wear special respiratory equipment, and for unescorted access to nuclear plants.

The training program consists of initial (classroom and practical) training and recurrent training which includes periodic instruction, fire drills and annual fire brigade training. In addition, fire brigade leaders receive additional training that provides the fire brigade leader with the knowledge and skills necessary to supervise and direct the activities of the fire brigade during an incident.

7.1.3 Availability of Firefighting Equipment

Firefighting equipment for the Fire Brigade is provided throughout the plant. The availability of firefighting equipment is such that delays in obtaining equipment by the fire brigade for fire emergencies will be minimized. Firefighting equipment may, alternatively, be staged adjacent to or at the access to areas/locations to facilitate equipment availability. This may be necessary to address equipment surveillance test concerns relative to life safety and ALARA practices.

7.1.4 Fire Emergency Procedures and Pre-fire Plans

Fire emergency procedures and pre-fire plans specify actions taken by the individual discovering a fire and actions considered by the emergency response organization. Included in these procedures are operational instructions for response to the fire detection system annunciation. These procedures provide different levels of response based on whether there is an actual fire or an annunciation (e.g., a single zone annunciation in a cross zoned area will not carry the same level of response as a cross zone annunciation in the same area). An annunciation may or may not carry the same level of response as the report of a fire by site personnel. Pre-fire plans are not intended to establish a procedure or step-by-step process but to provide guidance, depending upon the particular circumstances, to aid in firefighting efforts. It is recognized that many different firefighting techniques or strategies exist which would be acceptable for fire suppression efforts.

7.1.5 Control of Combustibles

Combustibles are controlled to reduce the severity of a fire which might occur in a given area and to minimize the amount and type of material available for combustion. The use and application of combustible materials at WBN are controlled utilizing the following methods:

- Instructions/guidelines provided during general employee training/orientation programs.
- The chemical traffic control program.
- Periodic plant housekeeping inspections/tours by management and/or the plant fire protection organization.

- Design/modification review and installation process.
- Administrative procedures (e.g., Transient Combustible Control Program).

The fire protection organization performs a periodic fire safety inspection of the safety-related areas of the plant to identify and minimize potential fire hazards. The use and handling of combustible materials such as fire retardant-treated lumber, paper, plastic, and flammable/combustible gases and liquids are controlled in safety-related areas. The use of untreated lumber requires specific approval of the fire protection organization. Combustible materials generated as a result of work activities are removed/cleaned up from the work area at the end of the shift or at the conclusion of the work activity, whichever is sooner. The storage of combustible materials within safety-related areas is controlled by the fire protection organization. The control of hazardous waste and hazardous materials is conducted in accordance with the chemical control and hazardous material processes.

Design considerations in the control of combustibles is utilized when appropriate. For example, these considerations include the application of noncombustible or limited combustible construction materials or components, use of noncombustible fluids in operating equipment, dikes, or containments provided for equipment containing combustible liquids, etc.

Combustible Control Zones (CCZs) are established at WBN to strictly control or prohibit the placement of transient combustibles. Transient combustibles brought into CCZs require an evaluation in accordance with site administrative procedures. The strict control or prohibition of combustibles by site procedures within the combustible control zone provides reasonable assurance that fire will not propagate and jeopardize required equipment or components.

7.1.6 Control of Ignition Sources

The use of ignition sources such as welding, flame cutting, thermite welding, brazing, grinding, arc gouging, torch applied roofing, and open flame soldering within safety-related areas are controlled through the approval and issuance of an ignition source permit. Permits are reviewed and approved by appropriate plant personnel. The ignition source permit is valid for one job. Job area inspection shall be performed and documented at the start of each shift that ignition source activities are being performed. If no ignition sources activities are performed, then reinspection is not required.

Designated ignition source activity areas are located and approved by the fire protection organization. A fire watch system shall be established for all ignition source work activities that are performed in safety-related areas of the plant. Ignition source fire watches are established and will remain for 30 minutes following the elimination of the ignition source, unless other durations are approved by the fire protection organization.

7.2 Fire Hazards Analysis

As discussed above the Fire Hazards Analysis (FHA) is part of the FPR. The FHA results are documented on a fire area basis, broken down into separate discussions of classical fire protection features and safe shutdown analysis for each fire area. The FHA includes the following:

- A summary of the evaluation performed to determine the adequacy of the fire protection features for each fire area.

- A discussion of the ability to achieve safe shutdown in case of a fire in each fire area.

The fire hazards and safe shutdown evaluation were performed by qualified nuclear, mechanical, electrical and fire protection engineers. The deviation requests and evaluations applicable to each fire area are also summarized.

7.3 Facility Design

7.3.1 Building Construction

The facility is designed in accordance with 10 CFR 50, Appendix A, General Design Criteria 3, which requires that noncombustible and fire-resistant materials be used throughout the facility. Noncombustible materials are used to the extent practicable.

7.3.2 Fire Area Determination and Fire Barriers

Fire area barriers are 2-hour or 3-hour rated. WBN fire areas and room compartmentation does not always comply with the specific fire barrier rating guidelines contained in BTP 9.5-1 Appendix A. The differences are judged acceptable given the extensive use of suppression systems at WBN, the low combustible loading in many areas of the plant, the detailed and rigorous Appendix R analysis performed, the conservative nature of the plant design evaluations and the fire hazards analysis performed.

Penetrations in these barriers, including conduit and piping, are generally sealed or evaluated to provide a fire-resistant rating equivalent to the required rating of the barrier.

Normally, doors, frames and hardware in required fire barriers have a fire rating equivalent to the required rating of the barrier, and have been tested and approved by a nationally recognized laboratory. Fire doors have been evaluated per the requirements of NFPA 80-1975.

7.3.3 Electrical Installation

Plant design minimizes the use of combustible material. Cables within certain areas are generally coated with a fire resistant coating or are qualified to the requirements of IEEE 383-1974. Noncombustible material is used for cable tray construction. Where appropriate, in situ plastics are included in the fire area combustible inventories utilized in the FHA.

High amperage transformers are not installed within building spaces. Transformers installed within safety-related buildings are either dry-type or insulated and cooled with “high fire point” liquid.

7.3.4 Life Safety

Access and egress routes are established in the Prefire Plans and are included as part of the drills practiced by operating and fire brigade personnel. Stairwells in the Control Building are enclosed and designed to minimize smoke infiltration.

Emergency lighting and communication are provided. Fixed emergency lighting consists of sealed beam units with individual 8-hour minimum battery power supplies are provided for access and egress routes. An alternate emergency communication system consisting of sound powered phones with head sets is provided.

NIOSH-approved self-contained full-face positive pressure breathing apparatus is available for the fire brigade, damage control and control room personnel. The operating life of the self-contained units is a minimum of one-half hour.

7.3.5 Ventilation

Plant ventilation systems are generally used for smoke removal, or manual smoke venting can be performed with portable smoke ejectors located on site. Non recirculating ventilation systems are provided for fire areas which may contain airborne radioactive materials. Smoke from fires which might occur in areas containing radioactive materials are monitored for radioactivity.

7.3.6 Drainage

Means of drainage is provided in the main buildings. In areas containing fire suppression systems or hose stations, drainage provided removes expected fire protection water flows or controls accumulations or such water could not cause unacceptable damage to equipment in the area. Water drainage from areas which may contain radioactivity are sampled and analyzed before discharge to the environment.

7.3.7 Lightning Protection

Lightning protection is incorporated in the facility design. A direct low impedance path for the lightning to travel to ground, rather than through structures and / or equipment, is provided. The lightning protection system consists of three basic parts which provide the low impedance path:

- The air terminals on roofs and other elevated locations
- The ground grid
- The conductors connecting the air terminals to the ground grid

7.3.8 Criticality Concerns

Criticality analyses of new fuel assemblies, under the analyzed worst case accident scenarios of full density and optimum moderation water flooding, have been performed. These analyses demonstrate, under these conditions, that the new fuel assemblies remain subcritical. Refer to FSAR Section 4.3.2.7 for discussion of these analyses. As such, actuation of the plant automatic fire suppression systems or use of manual suppression systems will not result in new fuel assembly criticality.

7.4 Process Fire Safety

The Fire Hazards Analysis summarizes the engineering evaluations performed to determine the adequacy of the fire protection features for the fire areas and rooms identified for WBN to ensure process fire safety. The Fire Hazards Analysis also summarizes the physical characteristics of required fire barriers (including fire doors and fire dampers), combustible loading and fire severity, suppression and detection capabilities, deviations and evaluations, and fire safe shutdown capability for each area and room.

7.5 Fire Protection and Emergency Response

7.5.1 Fire Protection

The fire protection equipment in the fuel handling area of the Auxiliary Building is common to both WBN Unit 1 and WBN Unit 2.

Equipment available during fuel receipt and movement for the fuel cask receipt area (Auxiliary Building, elevation 729) consists of the following:

a) A minimum of five 10-pound dry chemical fire extinguishers located in the cask receiving area and adjacent nitrogen storage area.
b) Two 1 1/2-inch hose stations equipped with 100 feet of hose and fog nozzles (ABC-rated). One hose station is located in the cask fuel receipt area and the other is located in the adjacent nitrogen storage area.

Equipment available during fuel storage inside the new fuel storage vault and/or the spent-fuel storage pit (Auxiliary Building, elevation 757) consists of the following:

a) A minimum of four 10-pound dry chemical fire extinguishers located strategically on the refueling floor.
b) One 100-pound C02 or dry chemical wheeled extinguisher located in the area.
c) Two 1 1/2 inch hose connections equipped with 100 feet of hose and adjustable fog nozzles (ABC-rated). One hose station is located south of stairway No. 4, and the other is available from the 1 1/2 inch Siamese connection in the Unit 1 Reactor Building access room.

A fire pump, with a flow path to the hose stations listed above, will be available.

Site procedures for the maintenance and surveillance testing of the above-listed equipment, including fire pump, fire mains, standpipes, and hoses, have been developed and will be performed as described in the FPR. In addition, the compensatory actions described in the FPR will be used should any of the listed fire equipment become unavailable.

7.5.2 Emergency Response

Effective handling of fire emergencies is an important aspect of the WBN Fire Protection Program. This is accomplished by trained and qualified emergency response personnel. The fire response organization is staffed and equipped for firefighting activities. The fire brigade is composed of a fire brigade leader and four fire brigade members. The fire brigade does not include the Shift Manager or other members of the minimum shift crew necessary for safe shutdown of the unit, nor any personnel required for other essential functions during a fire emergency. Additional support is available when needed through an agreement with a local fire department.

Training ensures that the fire brigades capability to combat fires is established and maintained. The training program consists of initial (classroom and practical) training and recurrent training which includes periodic instruction, fire drills and annual fire brigade training.

Firefighting equipment is provided throughout the plant. Fire emergency procedures and prefire plans specify actions taken by the individual discovering the fire and by the emergency response organization. A specific pre-fire plan has been prepared for the fuel receipt area and the fuel storage area. Discussion of this pre-fire plan is included in the periodic classroom instruction's training program provided for the emergency response team.

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8 EMERGENCY MANAGEMENT

This section contains a brief discussion of the radiological emergency plan (REP) developed for the Watts Bar Nuclear Plant. Based on the shared nature of the areas where new fuel will be received, handled, inspected and stored, the existing Appendix C to the REP is applicable to this application.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed using the guidance in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 8 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Emergency Plan	70.22(i)(3)	8.4.3.1	13.3 Emergency Planning	13.3 Emergency Planning and REP
Facility Description	70.22(i)(3)(i)	8.4.3.1.1	2.1.1 Site Location and Description	1.2.2: Facility Description
Onsite and Offsite Emergency Facilities	70.22(i)(3)(i)	8.4.3.1.2	13.3 Emergency Planning	13.3 Emergency Planning and REP
Types of Accidents	70.22(i)(3)(ii)	8.4.3.1.3	13.3 Emergency Planning	13.3 Emergency Planning and REP
Classification of	70.22(i)(3)(iii)	8.4.3.1.4	13.3 Emergency	13.3 Emergency

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 8 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Accidents			Planning	Planning and REP
Detection of Accidents	70.22(i)(3)(iv)	8.4.3.1.5	13.3 Emergency Planning	13.3 Emergency Planning and REP
Mitigation of Consequences	70.22(i)(3)(v)	8.4.3.1.6	13.3 Emergency Planning	13.3 Emergency Planning and REP
Assessment of Releases	70.22(i)(3)(vi)	8.4.3.1.7	13.3 Emergency Planning	13.3 Emergency Planning and REP
Responsibilities	70.22(i)(3)(vii)	8.4.3.1.8	13.3 Emergency Planning	13.3 Emergency Planning and REP
Notification and Coordination	70.22(i)(3)(viii)	8.4.3.1.9	13.3 Emergency Planning	13.3 Emergency Planning and REP
Information to be Communicated	70.22(i)(3)(ix)	8.4.3.1.10	13.3 Emergency Planning	13.3 Emergency Planning and REP
Training	70.22(i)(3)(x)	8.4.3.1.11	13.3 Emergency Planning	13.3 Emergency Planning and REP
Safe Shutdown (Recovery and Facility Restoration)	70.22(i)(3)(xi)	8.4.3.1.12	13.3 Emergency Planning	13.3 Emergency Planning and REP
Exercises and Drills	70.22(i)(3)(xii)	8.4.3.1.13	13.3 Emergency Planning	13.3 Emergency Planning and REP
Responsibilities for	N/A	8.4.3.1.14	13.3	13.3 Emergency

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 8 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Developing and Maintaining the Emergency Program and Procedures Correct			Emergency Planning	Planning and REP

The TVA Radiological Emergency Plan (REP) and Emergency Plan Implementing Procedures have been developed to provide protective measures for TVA personnel and to protect the health and safety of the public in the event of a radiological emergency resulting from an accident at WBN. The REP fulfils the requirements set forth in 10 Part 50, Appendix E, “Emergency Planning and Preparedness for Production and Utilization Facilities. It also satisfies the requirements of NUREG-0800, Chapter 13.3 Emergency Planning. The REP contains site-specific appendices for each TVA plant. WBN’s radiological emergency information is in Appendix C of the REP. Changes to the REP are processed in accordance with 10 CFR 50.54(q).

For events related to fuel handling, Appendix C contains emergency action levels that are common to both Watts Bar Unit 1 and Unit 2. These emergency action levels address events occurring in the common spent fuel pool area and include, loss of water level in the spent fuel pool, loss of spent fuel pool cooling, and elevated radiation levels.

A detailed description of the Watts Bar Nuclear Plant is contained in Chapter 1, General Information.

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9 ENVIRONMENTAL PROTECTION

This section of the application describes the Watts Bar Nuclear (WBN) Plant Site environmental protection measures associated with the receipt, possession, inspection, and storage special nuclear materials in the form of 193 fully assembled fuel assemblies for the initial core of the WBN Unit 2 reactor.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed using the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 9 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 9.1 Environmental Report	70.21(h)	9.4.3.1.1	None	None
9.1.1 Date of Application	70.21(f)	9.4.3.1.1(1)	None	None
9.1.2 Environmental Considerations	51.45(b)	9.4.3.1.1(2)	None	None
9.1.3 Analysis of Effects of Proposed Actions and Alternatives	51.45(c)	9.4.3.1.1(3)	None	None
9.1.4 Status of Compliance	51.45(d)	9.4.3.1.1(4)	None	None
9.1.5 Adverse Information	51.45(e)	9.4.3.1.1(5)	None	None

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 9 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 9.2 Environmental Protection Measures	70.22(a)(8)	9.4.3.2	-	-
9.2.1 Radiation Safety	20.1101(a)	9.4.3.2.1	12.3	12.3 Radiation Protection Design Features and 12.5 Radiological Control Program
ALARA Controls and Monitoring	20.1101(d)	9.4.3.2.1(1)-(3)	12.1	12.1 Assuring that Occupational Radiation Exposures are as Low as Reasonably Achievable
Waste Minimization	20.1406	9.4.3.2.1(4)	11.2, 11.3 and 11.4	11.2 - Liquid Waste Systems, 11.3 - Gaseous Waste Systems, and 11.5 Solid Waste Management System
9.2.2 Effluent and Environmental Controls and Monitoring	70.59(a)(1)	9.4.3.2.2	-	-
9.2.2.1 Effluent Monitoring	20.1501(a)	9.4.3.2.2(1)	11.5	11.4 Process and Effluent Monitoring and Sampling System
9.2.2.2 Environmental Monitoring	20.1501(a)	9.4.3.2.2(2)	None	None
9.2.2.3 ISA Summary	70.65(b)	9.4.3.2.2(3)	15	15 Accident

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 9 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
				Analysis

TVA's Final Supplemental Environmental Impact Statement (FSEIS) for the Completion and Operation of Watts Bar Nuclear Plant Unit 2 was issued on June 23, 2007. The TVA Board authorized completion of WBN Unit 2 on August 1, 2007. Subsequently, TVA informed the NRC of its intention to reactivate and complete construction activities at WBN Unit 2. The TVA Board Record of Decision was posted in the Federal Register on August 15, 2007. The FSEIS was submitted to the NRC on February 15, 2008. The FSEIS includes an evaluation of the need for increased baseload power; an analysis of potential socioeconomic, cultural, and environmental effects of completing WBN Unit 2; and it identifies potential mitigation measures.

This FSEIS supplements TVA's original 1972 "Final Environmental Statement, Watts Bar Nuclear Plant Units 1 and 2." In December 1978, NRC issued a "Final Environmental Statement Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, NUREG-0498." In 1993, TVA conducted a review to determine whether additional environmental review was needed to inform decision makers about whether to complete both units and concluded that neither plant design nor environmental considerations had changed in a manner that materially altered the environmental impact analysis set forth in its 1972 Final Environmental Statement (FES). TVA provided additional analyses and information in support of NRC's "Final Environmental Statement Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2, NUREG-0498," which was issued in April 1995. Following an independent review of NRC's analyses and a new analysis of the need for additional power, TVA adopted NRC's 1995 FES in July 1995.

Other major reviews of WBN environmental impacts include TVA's cooperation with the U. S. Department of Energy in evaluating the production of tritium in commercial light water reactors, which resulted in a 1999 "Final Environmental Impact Statement for the Production of Tritium in a Commercial Light Water Reactor." Also, in February 2004, TVA issued its "Reservoir Operations Study Final Programmatic Environmental Impact Statement" evaluating the impacts of alternative ways of operating TVA's reservoir system, the water supply needs of TVA's generating facilities, including WBN, and compliance with environmental permits. A more detailed description of environmental reviews and studies pertaining to the operation and construction of WBN is provided in the FSEIS.

TVA's assessment of the actions required to complete WBN Unit 2 as described in the FSEIS remains valid, and no additional environmental reviews are anticipated at this time. TVA will, of course, review and assess any supplemental environmental review completed by the NRC in connection with the completion and operation of WBN Unit 2 in the future. Background information and analyses used in the preparation of TVA's FSEIS, including that associated with the severe accident analysis section, are available at the WBN site for review.

9.1 Environmental Report

TVA's Final Supplemental Environmental Impact Statement (FSEIS) for the Completion and Operation of Watts Bar Nuclear Plant Unit 2 was submitted to the NRC on February 15, 2008.

9.1.1 Date of Application

The 10 CFR 70 license application, requesting approval to receive, possess, inspect, and store special nuclear materials in the form of 193 fully assembled fuel assemblies for the initial core of the WBN Unit 2 reactor, was submitted in November 2009. TVA expects to receive the first shipment of new fuel for WBN Unit 2 in the second quarter of 2011 at the earliest.

9.1.2 Environmental Considerations

The impact of the activities in this license application are bounded by the NRC FES. The environmental considerations of the entire fuel cycle were analyzed as part of NUREG-0498 Environmental Statement related to operation of Watts Bar Nuclear Plant Units Nos. 1 and 2 (NRC, 1978). In NUREG-0498 Supplement 1, the NRC concluded that there were no significant changes in the environmental impacts since the NRC 1978 FES-OL.

9.1.3 Analysis of Effects of Proposed Actions and Alternatives

TVA's FSEIS provides a description of the proposed action (Chapter 1), the purpose of the proposed action (Chapter 1), a description of the affected environment (Chapter 3), and a discussion of considerations (Chapter 3). TVA's FSEIS provides an analysis of the effects of the proposed action and alternatives (Chapters 2 and 3).

9.1.4 Status of Compliance

TVA's FSEIS provides a discussion of the environmental permits and approval required for the operation of WBN Unit 2 (Chapter 1). Because WBN Unit 1 is already operating, there should be few additional permits and approvals required. The FSEIS documents TVA's compliance with the National Historic Preservation Act (Section 3.7)

9.1.5 Adverse Information

Various sections of the FSEIS discuss adverse effects. TVA's FSEIS Table 2-1 provides a summary of the environmental effects from completing WBN Unit 2.

9.2 Environmental Protection Measures

TVA is committed to protecting the public, plant workers and the environment from the harmful effects of ionizing radiation due to plant operation.

9.2.1 Radiation Safety

FSAR section 12.5 provides details of the radiological control program including the organization, equipment and procedures. FSAR section 12.3 describes specific design features to limit in plant radiation exposures. TVA has a formal program to ensure that occupational exposure to employees is kept as low as reasonably achievable. This program is discussed in FSAR section 12.1.

9.2.2 Effluent and Environmental Controls and Monitoring

9.2.2.1 Effluent Monitoring

FSAR section 11.4 describes the process and effluent radiological monitoring and sampling system. Specific monitoring capability applicable to fuel assembly handling and storage is as follows.

<u>Spent Fuel Pool Accident Radiation Monitors</u>

These monitors continuously monitor the fuel pool area. Two Geiger Mueller tubes with preamplifiers are mounted above the fuel pool. A high radiation signal initiates Auxiliary Building ventilation isolation. In addition, a high radiation signal from these monitors during refueling operations with containment and/or the annulus open to the Auxiliary Building ABSCE spaces will result in a containment valve Isolation (CVI). The two fuel pool monitors are supplied from separate Class 1E power supplies. The setpoint of these monitors is selected to prevent exceeding a significant fraction of the 10 CFR 100 limits subsequent to a fuel handling accident in the Auxiliary Building. These monitors are safety related.

<u>Auxiliary Building Vent Monitor</u>

The Auxiliary Building Vent Monitor assembly continuously monitors the Auxiliary Building Vent stack exhaust for radioactivity. The effluent stream is sampled by an isokinetic sampling probe assembly fitted with 72 sample nozzles. The nozzles are arranged such that a representative sample of the effluent stream is taken. The monitor consists of a particulate, gas, and iodine channel. The monitor noble gas and particulate detectors are beta scintillators. The iodine detector is a gamma scintillator. Particulate and iodine filters are available for laboratory analysis. Monitor setpoints for the gas channel are established using the methodology provided in the Offsite Dose Calculation Manual. Setpoints for the particulate and iodine channels are based on plant personnel protection requirements.

9.2.2.2 Environmental Monitoring

Environmental monitoring requirements are included in the Watts Bar Nuclear Plant National Pollutant Discharge Elimination System (NPDES) permit. In accordance with Appendix B “Environmental Protection Plan” of the WBN Unit 1 Operating License, TVA provides an annual nonradiological environmental operating report. This report provides a summary of the reports submitted as specified in the NPDES permit and other, non-routine and special biological monitoring, reports.

9.2.2.3 ISA Summary

FSAR Chapter 15 addresses accident analysis. Specific sections of this chapter address normal operation and operational transients, faults of moderate frequency, infrequent faults, and limiting faults. FSAR section 15.5 addresses the environmental consequences of accidents.

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10 DECOMMISSIONING

At the time of new fuel receipt, decommissioning funding may not be in place. Since the new fuel will not have been activated in the reactor, residual radioactivity from operation will not exist. In the event a decision was made to delay or defer Watts Bar Nuclear Plant Unit 2 after fuel receipt, the fuel could be returned to the vendor.

Reasonable assurance of decommissioning funding will be provided in accordance with the requirements of 10 CFR 50.33(k)(1), as part of the application for an operating license (OL) that will contain information in the form of a report, as described in 10 CFR 50.75, indicating how funds will be available to decommission the facility.

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11 MANAGEMENT MEASURES

It is the policy of the Tennessee Valley Authority (TVA) that activities which affect quality be accomplished in a planned and systematic manner to achieve compliance with pre-established quality objectives and acceptance criteria. Accordingly, Nuclear Assurance has established and will maintain a Nuclear Quality Assurance Program (NQAP). The NQAP includes the Nuclear Quality Assurance Plan and the approved documents which are used to implement the Plan. The quality assurance program and requirements for specific items and activities are applied commensurate with their importance to safe, reliable nuclear operations, construction, and independent spent fuel storage.

Management policies and requirements for the TVA NQAP are established by the Chief Operating Officer through the Chief Nuclear Officer and Executive Vice President, Nuclear Power Group (NPG), for operating units and the Senior Vice President, Nuclear Generation Development and Construction, for units with construction permits. These management policies and requirements provide the controls that must be applied to the activities performed by and for the agency to ensure implementation of TVA commitments.

This section contains a brief discussion of the management measures described in the final safety analysis report and the TVA Quality Assurance Plan and the Organizational Topical Report. Both documents are applicable to the Watts Bar Nuclear Plant and the receipt, handling, inspection and storage of new fuel.

The level of detail provided in this chapter is based on a comparison of NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (July 1981) and information previously docketed in the Watts Bar Nuclear Plant Final Safety Evaluation Report (FSAR), which was developed using the guidance provided in NUREG-0800, and the guidance recommended by NUREG-1520, Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (NRC, 2002). Where a comparison is made, a brief discussion of the area is provided with the detailed discussion incorporated by reference. Where no direct comparison is available, a detailed discussion is provided.

The following table provides the requested information, the corresponding regulatory requirement, the applicable section of NUREG-1520, the applicable section of NUREG-0800 and the applicable section(s) of the WBN FSAR.

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 11 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
Section 11.1 Configuration Management	70.62(d) & 70.72	11.4.3.1	17.1 Quality Assurance During the Design and Construction	17.1 Quality Assurance for Design and Construction 17.2 Quality

Information Category and Requirement	**10 CFR Citation**	**NUREG-1520 Chapter 11 Reference**	**NUREG-0800 Comparable Chapter**	**WBN FSAR CHAPTER / TITLE**
			Phases 17.2 Quality Assurance During the Operations Phase 17.3 Quality Assurance Program Description	Assurance for Station Operation
Section 11.2 Maintenance	70.62(d)	11.4.3.2	17.6 Maintenance Rule	17.2 Quality Assurance for Station Operation TVA Nuclear Quality Assurance Plan
Section 11.3 Training and Qualifications	70.62(d) & 10 CFR 19	11.4.3.3	13.1.2, 13.1.3 Operating Organization 13.2.1 Reactor Operator Requalification Program, Reactor Operator Training 13.2.2 Non-Licensed Plant Staff Training	13.1.3 Qualification Requirements for Nuclear Facility Personnel 13.2 Training Programs
Section 11.4 Procedures Development and Implementation	70.62(d) & 70.22(a)(8)	11.4.3.4	13.5.1 Administrative Procedures	13.5 Site Procedures
Section 11.5 Audits and Assessments	70.62(d)	11.4.3.5	13.4 Operational Programs	13.4 Review and Audit

Information Category and Requirement	**10 CFR Citation**	**NUREG-1520 Chapter 11 Reference**	**NUREG-0800 Comparable Chapter**	**WBN FSAR CHAPTER / TITLE**
Section 11.6 Incident Investigations and Corrective Action Process	70.74(a)& (b) 70.62(a)(3)	11.4.3.6	17.1 Quality Assurance During the Design and Construction Phases 17.2 Quality Assurance During the Operations Phase	17.1 Quality Assurance for Design and Construction 17.2 Quality Assurance for Station Operation
Section 11.7 Records Management	70.62(a)(2) & (3) 70.62(d)	11.4.3.7	17.1 Quality Assurance During the Design and Construction Phases 17.2 Quality Assurance During the Operations Phase 17.3 Quality Assurance Program Description	13.6 Plant Records
Section 11.8 Other QA Elements	70.62(d)	11.4.3.8	17.1 Quality Assurance During the Design and Construction Phases 17.2 Quality Assurance During the Operations Phase 17.3 Quality Assurance	17.1 Quality Assurance for Design and Construction 17.2 Quality Assurance for Station Operation

Information Category and Requirement	10 CFR Citation	NUREG-1520 Chapter 11 Reference	NUREG-0800 Comparable Chapter	WBN FSAR CHAPTER / TITLE
			Program Description	

11.1 Configuration Management

Configuration management is a critical element of the engineering standard programs as well as essentially all other functional areas involved with operating, maintaining and modifying a nuclear plant. It encompasses and is implemented through various plant organizations' procedures which are established to ensure the objectives below are achieved. The detailed aspects of configuration management are integrated into many of the engineering processes and procedures to ensure that (1) plant structures, systems, components, and computer software conform to approved design requirements, and (2) the plant's physical and functional characteristics are accurately reflected in plant documents, plant simulator, and other data systems.

Configuration management philosophies are incorporated into processes for (1) operating and maintaining the plant systems and components, (2) evaluation of hardware and components to meet the plant design basis, (3) generation of design output and changes to plant configuration, (4) installation and testing of plant systems and components, and (5) revision, updating, storage, and retrieval of documents which document the configuration of the plant.

The controls established in these processes shall ensure that design bases are maintained, design output is consistent with the defined bases, the as-built plant configuration meet design output requirements, and the as-built documents accurately reflect the plant's configuration.

Design Basis Management and Control
The design basis for plant and system performance shall be established and maintained for systems and components critical to the safe and reliable operation of the plant. Controls and requirements for the establishment and maintenance of the design bases will address identification, establishment, and maintenance of design related configuration documents and design/licensing basis documents.

Design Change Control
The design change control process is established to ensure that new designs, as well as changes to existing designs, satisfy plant design bases and established design requirements. The process ensures that additional design input considerations such as constructability, system and component operability and maintainability, radiological protection, and operating experience are included in the design. The design process ensures effective resolution of plant problems and enhancement of plant safety and reliability.

The key elements of the design change process include the following:

- Issue identification and analysis
- Evaluation of alternative solutions
- Authorization
- Detailed design development and change package issuance
- Installation
- Testing
- Return to service
- Documentation updates
- Package close-out activities

Design Input Control
Design input consists of design requirements that govern the design of plant structures, systems, and components. These design inputs are used to develop and support design output. Examples of design input includes laws, regulations, industry codes and standards, design bases, interface requirements, design criteria, documented tests and NPG design standards, design guides, and standard procurement specifications. Mechanisms are established to ensure appropriate design inputs are incorporated into engineering designs for plant systems and facilities.

Design Output Control
Design outputs:

- Correlate the technical and design requirements applicable to structures, systems and components to the required physical configuration in the plant, and/or
- Communicate engineering requirements which affect plant activities (e.g., construction, installation, operation, maintenance, modification, surveillance, and testing).

Documents which constitute design output are defined by engineering management and are based on approved and issued design input. Other organizations shall take engineering requirements only from those documents identified as design outputs.

Design Verification
Design verification is the process of reviewing, confirming or substantiating design inputs and outputs by one or more methods to provide assurance that safety-related and, where specifically required, quality-related designs meet the specified design inputs and will not unacceptably increase the probability or consequences of potential adverse events.

Use and Control of Design Standards and Guides
Engineering utilizes standards and guides to provide input to and support the design process. The term standards and guides is the term used to collectively denote Design Standards, Design Guides, drafting standards, standard drawings, standard specifications, general engineering specifications, and any other documents that provide proven and accepted engineering and design parameters, practices and/or approaches, designs, or technical requirements. Requirements and controls for the use, development, review, and approval of the standards and guides are specified in order to ensure they are authorized, applicable, accurate, and up to date.

Operational Configuration Controls

- **Fuel Related**
  Plants are operated with a strategic objective of zero fuel defects. Fuel supply, fuel design, plant operations, refueling outages, and other related activities will be controlled and managed to comply with applicable Technical Specification and regulatory requirements, licensing commitments, licensing and design bases, or additional commitments made due to industry practices.

  Fuel shall be stored only in approved locations. Approved locations are those licensed by the NRC. These are the reactor cores, the fuel storage racks and shipping containers. Requirements, restrictions, limitations, and controls for these locations are given in site Technical Specifications for cores and racks and in Certificates of Compliance for containers. To preclude the possibility of accidental criticality when fuel is outside of these locations, limited quantities of fuel are allowed out of approved storage locations.

  The maximum quantity of fuel assemblies allowed out of approved storage locations per approved plant procedures are as follows:

  - One un-irradiated fuel assembly shall be allowed within the fuel-handling area. The fuel handling area includes all areas of the refueling floor where un-irradiated fuel assemblies are handled outside of metal shipping containers. The fuel-handling area also includes the new fuel storage vault and the truck bay where metal shipping containers are unloaded.
  - One fuel assembly shall be allowed within the spent fuel storage pool boundary (excluding the inspection, reconstitution, or cleaning locations with appropriate evaluation for each configuration that must be performed prior to implementation). The spent fuel storage pool boundary includes the cask loading area, fuel transfer canal (excluding the transfer cart), and spent fuel pool.
  - Three fuel assemblies shall be allowed within the refueling canal. The refueling canal includes the fuel transfer tube boundary (including the transfer cart) and the rod cluster control changing fixture. This allows for two fuel assemblies to be in the rod cluster control changing fixture while the third fuel assembly is being transferred through the fuel transfer tube, is in the upender, or is in transit to or from the reactor cavity.
  - One fuel assembly shall be allowed within the reactor cavity.
  - Loose fuel rods or pellets must be evaluated for criticality before removal from a fuel assembly or storage at the site.

- **System Status Control**
  The responsibilities and programmatic methods have been established for obtaining, maintaining, and documenting system status as well as documenting off-normal alignments not controlled by other administrative or procedural control.

- **Clearance Program**
  Processes have been established to ensure that, before any employee performs any service or maintenance on a machine or equipment where the unexpected energizing, startup, or release of stored energy could occur and cause injury or

equipment damage, the machine or equipment is isolated from the energy source and rendered inoperative.

11.2 Maintenance

The maintenance and modification (M/M) program assures that equipment, systems, and structures (1) are maintained and modified in accordance with applicable requirements, (2) supports safe, reliable, and efficient operation of the nuclear power plants, and (3) are maintained at a quality level required for them to perform their intended functions as specified in the original design, material specifications, and inspection requirements. In the context of this program, the modification process refers only to the physical implementation of design changes.

Corrective Maintenance (CM)

Corrective maintenance is the classification of any work on systems, structures, or components (SSCs) where the SSC has failed or is significantly degraded to the point that failure is imminent (within its operating cycle/preventive maintenance interval) and no longer conforms to or is incapable of performing the SSC's design function. An SSC should be considered failed or significantly degraded if the deficiency is similar to any of the following examples:

- Is removed from service because of actual or incipient failure
- Significant component degradation that affects system operability-The SSC may be determined operable by engineering assessment, but the degradation is significant and requires immediate corrective action. This normally includes any deficiency that requires a basis for continued operation as defined in NRC Generic Letter 91-18, and should be considered as corrective maintenance.
- Creates the potential for rapidly increasing component degradation (for example, leaks of borated water, steam leaks where cutting degradation is possible)
- Releases fluids that create significant exposure or contamination concerns (or has the potential to under postulated accident conditions)
- Adversely affects controls or process indications that directly or indirectly impair operator ability to operate the plant or that reduce redundancy of important equipment
- Significant component degradation identified from the conduct of predictive, periodic, or preventive maintenance which, if not resolved, could result in equipment failure or significant additional damage prior to its next scheduled preventive maintenance period

Preventive Maintenance (PM)

PM consists of predictive, periodic, and planned maintenance actions taken to maintain equipment within design operating conditions and extend its life. The program requires that site PM activities be performed on critical components and be re-evaluated, revised, or updated periodically based on industry experience, plant equipment history, or trend analysis.

Predictive Maintenance

Predictive maintenance results from vibration analysis, thermography, etc., should be used to trend and monitor equipment performance so that needed planned maintenance can be performed before equipment failure or to prevent equipment failure, and that periodic maintenance can be modified to prevent future equipment failures.

Periodic Preventive Maintenance
Periodic PM activities are performed on a routine basis on equipment to prevent breakdown and involve servicing such as lubrication, filter changes, cleaning, and adjustments.

Planned Preventive Maintenance
Planned PM activities are performed before equipment failure but not necessarily on a routine basis like periodic PM activities. Planned PM can be initiated by predictive or periodic maintenance results, vendor recommendation, experience, or identification in the field such as during operator rounds.

Long-Term Maintenance Plan (Rolling Schedule)
The long-term maintenance plan is a product of the preventive and surveillance process, and specifies the frequency for implementation of maintenance and surveillance activities necessary for the reliability of components in each system. The rolling schedule includes the preliminary defense-in-depth assessment, which documents the allowable combinations of system and Functional Equipment Groups (FEGs) that may be simultaneously worked on line or during shutdown conditions. FEGs are common sets of boundaries encompassing equipment that has been evaluated for acceptable out-of-service combinations. They are used to schedule planned maintenance and establish equipment clearances.

Surveillance/monitoring
A Surveillance Test Program has been established to ensure that plant equipment and components will continue to operate or operate on demand in accordance with design and other regulatory requirements. Technical requirements are specified in Plant Technical Specifications, Technical Requirements Manuals, Offsite Dose Calculation Manuals, and plant Fire Protection Plans/Reports.

Within the Surveillance Test Program, controls have been established to ensure that required testing is identified test instructions are prepared which satisfy regulatory requirements, tests are scheduled and conducted within prescribed frequencies, and tests results are documented and reviewed to ensure that system/component performance satisfies the identified acceptance criteria.

Equipment and Maintenance Activities Requiring Post Maintenance Testing (PMT)
Post-maintenance testing shall be based on the extent of maintenance performed. The PMT shall be sufficiently comprehensive to ensure that the maintenance performed does not adversely affect the equipment's ability to perform its intended function, that the original deficiency has been corrected, and that no new or related problems were created by the maintenance activity.

Equipment within the scope of the PMT program is plant safety-related, quality related and non-quality-related equipment necessary for plant operations.

All work orders (WOs) do not require PMT; e.g., WOs which do not perform physical work such as inspection activities. Maintenance activities on plant equipment under Operations' control which require PMT are exemplified by the following:

- Maintenance that affects the integrity or operation of a fluid or gas system, or components within those systems,
- Maintenance that affects the wall thickness of pressure boundaries or affects mechanical strength of components or fittings,
- Maintenance that affects the function of electrical distribution equipment,
- Maintenance that affects the function of electrical control circuitry or electronic components,
- Maintenance that affects the function of instrument detectors or components in an instrument loop,
- Maintenance that affects the engineered or design function of a system or component such as pressure, flow rate, etc.,
- Maintenance that requires the development of pre-maintenance tests, e.g., containment isolation valves requiring a local leak rate test before maintenance.

Return to operability (RTO) testing shall be considered for maintenance activities on equipment with Technical Specification operability requirements.

11.3 Training and Qualifications

The purpose of the TVA qualification and training program is to provide criteria for the training and qualification of personnel for TVA's nuclear power plants. The program addresses the training of personnel in operating and support organizations to ensure the safe and efficient operation of nuclear power plants. The program also addresses the qualifications of personnel who occupy positions to which TVA is committed through its licensing documents. This commitment is to ensure that the minimum qualifications, which are contained in national standards, for positions in operating and support organizations, are appropriate for the safe and efficient operation of TVA's nuclear power plants.

To ensure the qualifications for these positions, TVA will meet the requirements of Regulatory Guide 1.8, Revision 2 (4/87) for all new personnel qualifying on positions identified in regulatory position C.1 after January 1, 1990. Personnel qualified on these positions prior to this date will still meet the requirements of Regulatory Guide 1.8, Revision 1-R (5/77). As specified in regulatory position C.2, all other positions will meet the requirements of ANSI/ANS N18.1-1971. TVA's Nuclear Power Group (NPG) is committed to comply with the requirements of ANSI N18.1-1971 and ANSI/ANS 3.1-1981 as endorsed by the Regulatory Guide 1.8, Revision 2, April 1987, "Qualification and Training of Personnel for Nuclear Power Plants" except as outlined in the Nuclear Quality Assurance Plan, Appendix B. Qualifications of key members of the organization are contained in Section 2.2.4 of this application.

It is the policy of TVA Nuclear Power Group (NPG) to develop and implement performance-based training programs which promote and support the safe, reliable, and efficient operation of TVA's nuclear power plants. This demands that the personnel who operate, maintain, and support those plants be fully qualified to perform their duties. Effective training is an essential element of achieving and maintaining such qualifications. Effective training thus requires definition of the skills, knowledge, and competencies necessary to perform required duties; establishment and implementation of learning opportunities which develop those desired skills, knowledge, and competencies; and, documentation of attainment of such skills, knowledge, and competencies.

The programs for training of nuclear power plant personnel subject to accreditation by the National Nuclear Accrediting Board are developed and maintained by the responsible training managers using a Systems Approach to Training (SAT). Program guidelines promulgated by Federal regulation, pertinent ANSI/ANS Standards, the Academy, and the Institute for Nuclear Power Operations (INPO) are used to develop those training programs.

Training program procedures (TRNs) shall be developed by the Training Managers Peer Team for the following Academy-accreditable training programs:

- Non-licensed operator (initial and continuing training)
- Reactor operator (initial training)
- Senior reactor operator (initial training)
- Shift manager (initial training)
- Continuing training for licensed personnel (including simulator training and control room team training)
- Shift technical advisor
- Instrument and control technician
- Electrical maintenance personnel
- Mechanical maintenance personnel
- Chemistry technician
- Radiological control technician
- Engineering Support personnel
- Maintenance supervisor

11.4 Procedures

The hierarchy of NPG procedures is defined in the NPG Procedure and Document Control Program. Descriptions of the major types of procedures are given below to assist in the determination of where a particular procedure fits in this hierarchy.

Standard Programs and Processes (SPPs)
These procedures describe administrative controls for processes that cross organizational boundaries, and based on their content, must be available, understood, and followed by all personnel. For example, clearance administration and fitness for duty procedures are SPPs since all employees need to be aware of these processes and their requirements. The following functional areas are provided from TVA's Administration of Standards Programs and Processes (TVA-SPPs). This list provides a sample of the types of procedures developed to support TVA Nuclear Power Group functions associated with nuclear plant operations:

- Policy and Management
  Includes administrative controls necessary to ensure consistency in TVA policies, programs, procedures, process documentation, process improvement and assessment methods.
- Performance Planning

Includes business planning, comparative analysis, benchmarking, project justification, performance and resource planning, measurement and analysis, improvement initiative justification and cost analysis.

- Regulatory Compliance
  Includes legislative and regulatory legal requirements, licensing and corrective action program.
- Supply Chain Management
  Includes all activities and supporting processes and systems related to sourcing strategy; supplier relations; contracting for products and services; transportation and TVA logistics; materials management, including receipts, warehousing, distribution, inventory strategy, inventory management, disbursement, and disposal of all surplus material. This excludes contracts for purchase and sale of power, purchase and transportation of fossil fuel, the sale of fossil operation byproducts, the purchase and sale of land, the sale of services, loan agreements, and cooperative agreements.
- Environmental Management
  Includes Environmental Management System (EMS), environmental compliance, pollution prevention and control, environmental reviews (NEPA), hazardous material management, waste management, air & water quality, environmental stewardship, emergency preparedness, and environmental auditing.
- Asset Maintenance and Modification
  Includes asset maintenance, modification and unit optimization.
- Work Management
  Includes planning and scheduling system administration, work control and outage planning and management.
- Fuel Management
  Includes supply planning, purchase, transport and management of both fossil and nuclear fuel.
- Engineering and Technical Support
  Includes project design and management, configuration and design change control, Includes specialized services related to TVA's core businesses and delivered to external customers and internal TVA organizations. These specialized services include: energy and environmental technologies and services, integrate resource management tools and power production and delivery technologies.
- Asset Operations
  Includes plant operations and clearance procedures

Standard Department Procedures (SDPs)
SDPs describe administrative controls for processes that normally do not cross organizational boundaries and are generally contained within one organization. SDPs, like SPPs, are applicable to all NPG sites and locations unless reduced or limited applicability is specified in the procedure.

Site Instructions
Site Instructions are used to specify implementing instructions in the operation and maintenance of the plant. These instructions are normally technical in nature and are not administrative procedures. Examples of Site Instructions are Surveillance Instructions, Maintenance Instructions, Physical Security Instructions, Radiological Control Instructions, and Operating instructions. Site instructions are typically site-specific, but in some cases they may be common procedures used at all sites. If common procedures are used, licensing and Technical Specification requirements must be met for all sites.

Review and Approval Process
A procedure review and approval process will be established to meet all applicable regulatory and NQAP requirements. It shall include provisions for affected organization reviews, reviews required by individual site technical specifications and other regulatory documents, and independent technical reviews for quality-related procedures and major revisions to these procedures.

Verification and Validation of Procedures
The Procedure Control Program includes a Verification and Validation (V&V) Program for, as a minimum, critical quality-related, man-machine interface procedures. For Emergency Operating Instructions (EOIs), the V&V Program will meet the requirements of the applicable Owner's Group Guidelines for EOIs. The verification process ensures a thorough and detailed review of the procedure before approval to ensure, to the extent practical, that the procedure is complete, accurate, and can be performed as written. The validation process will normally be conducted after approval by actual performance of the procedure, and provides (1) validation that the procedure can be performed as written and (2) a mechanism for the performer to provide feedback to the author on ways to improve the procedure from a performer's perspective.

11.5 Audits and Assessments

Audits
Measures shall be established to implement a comprehensive audit program which consists of internal audits, including NPG and other TVA organizations, which support the nuclear program and contractor/supplier audits to determine and assess the adequacy and effectiveness of the QA program.

Program Elements
- An audit plan shall be prepared identifying the audits to be performed and their frequencies and schedule.
- Audits shall include: a determination of the effectiveness of QA program elements; evaluation of work areas, activities, processes, and items; review of documents and records; review of audit results with responsible management; follow-up on corrective action taken for deviations identified during the audit; and escalation to appropriate senior management of any safety significant disagreement between the auditing organization and the organization or function being audited.
- Audits shall be performed in accordance with written procedures or checklists by qualified, certified, and appropriately trained personnel not having direct responsibilities in the areas being audited.
- Audited organizations shall provide access to facilities, documents, and personnel needed to perform the audits. They shall take necessary action to correct deviations identified by the audit in a timely manner.

Assessments
Quality Assurance Assessments are performed as a type of verification to ensure that observed quality-related activities are performed in accordance with requirements and desired results are achieved.

Program Elements
- Assessment procedures and instructions shall address assessment techniques.

- Assessment frequencies shall be based on such factors as the status and safety significance of the activity or process, frequency of occurrence, degree and acceptability of previous experience, adverse trends, and testing or operation sequences.
- The results of assessments shall be documented and reported to appropriate levels of management.
- Records shall be maintained in sufficient detail to provide adequate documentation of assessed activities.
- Follow-up verifications or additional assessments shall be conducted as necessary to ensure that required corrective action has been taken.
- Assessments shall be performed in accordance with written procedures and instructions by qualified and appropriately trained personnel not having direct responsibility in the areas being assessed.

11.6 Incident Investigations

Measures shall be established to ensure that items that do not conform to requirements are controlled to prevent their inadvertent installation or use. Adverse conditions, including nonconforming items or non-hardware problems such as failure to comply with operating license, technical specifications, or procedures, shall be identified, evaluated, corrected, tracked, trended, and when required, reported to appropriate levels of management. Procedures or instructions implementing the corrective action program shall establish the criteria for documenting and tracking adverse conditions.

NPG organizations, NGDC, and onsite non-NPG service organizations performing quality-related activities at nuclear facilities shall promptly identify and resolve adverse conditions.

Minor deficiencies which may be brought into compliance within an acceptable timeframe shall be corrected on the spot in accordance with established instructions.

Adverse conditions shall be dispositioned by organizations with defined responsibility and authority and shall be corrected in accordance with documented plans.

Disposition actions for nonconforming items may be accept-as-is, repair, rework, scrap, or return to vendor. Dispositions of accept-as-is or repair shall be reviewed and approved by Corporate or Site Engineering or, for nuclear fuel-related items, Nuclear Fuels. Reworked or repaired, and replaced items shall satisfy the original inspection and test requirements or acceptable alternatives.

The cause of significant adverse conditions shall be determined and corrective action taken to preclude recurrence. Significant adverse conditions shall be reported to appropriate levels of management.

The satisfactory completion of corrective actions shall be verified and documented by the appropriate organization. Independent verification of corrective action implementation is performed as specified within the corrective action program.

11.7 Records Management

The QA program requires that for activities affecting quality, measures shall be established to ensure that documents prescribing the activity, including changes, are approved for release by authorized personnel, reviewed for adequacy, and made available to personnel performing the prescribed activity prior to commencing work.

Identification and Distribution

- The types of documents to be controlled shall be identified.
- Master document indexes shall be established and maintained for identifying all controlled documents and their revision status.
- The distribution of documents shall be controlled and maintained to assist in preventing the use of obsolete or superseded documents.

Controlled Use

- Quality related activities shall be performed in accordance with approved and controlled instructions, procedures, and drawings.
- Organizations shall ensure through procedures or instructions that those participating in an activity are made aware of and use proper and current documents.

Control of Equipment Technical Information

- Administrative controls shall provide for control and distribution of equipment technical information (ETI) supplied to TVA.

11.8 Other QA Elements

Other QA elements and their application are as described in the TVA Nuclear Quality Assurance Plan (NQAP). The TVA NQAP addresses and complies with the 18 criteria provided in 10 CFR 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants.” In addition, changes to the TVA NQAP are performed in accordance with 10 CFR 50.54, “Conditions of licenses,” paragraph (a).

Enclosure 5

TVA Annual Report From 10-K-2011

TENNESSEE VALLEY AUTHORITY

FORM 10-K
(Annual Report)

Filed 11/18/11 for the Period Ending 09/30/11

Address	400 WEST SUMMIT HILL DRIVE
	KNOXVILLE, TN 37902
Telephone	865-632-2101
CIK	0001376986
Symbol	TVC
SIC Code	4911 - Electric Services
Fiscal Year	09/30

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

(MARK ONE)

☒ ANNUAL REPORT PURSUANT TO SECTION 13, 15(d), OR 37 OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended September 30, 2011
OR

☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from _____ to _____

Commission file number 000-52313

TENNESSEE VALLEY AUTHORITY
(Exact name of registrant as specified in its charter)

A corporate agency of the United States created by an act of Congress *(State or other jurisdiction of incorporation or organization)*	62-0474417 *(IRS Employer Identification No.)*
400 W. Summit Hill Drive Knoxville, Tennessee *(Address of principal executive offices)*	37902 *(Zip Code)*

(865) 632-2101
Registrant's telephone number, including area code

Securities registered pursuant to Section 12(b) of the Act: None
Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.
Yes ☐ No ☒

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13, Section 15(d), or Section 37 of the Securities Exchange Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13, 15(d), or 37 of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.
Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files).
Yes ☒ No ☐

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☒

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer," and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer ☐	Accelerated filer ☐
Non-accelerated filer ☒ *(Do not check if a smaller reporting company)*	Smaller reporting company ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Securities Exchange Act). Yes ☐ No ☒

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GLOSSARY OF COMMON ACRONYMS

Following are definitions of terms or acronyms frequently used in this Annual Report on Form 10-K for the fiscal year ended September 30, 2011 (the "Annual Report"):

Term or Acronym	Definition
AFUDC	Allowance for funds used during construction
ARO	Asset retirement obligation
ARP	Acid Rain Program
ART	Asset retirement trust
ASLB	Atomic Safety and Licensing Board
BEST	Bellefonte Efficiency and Sustainability Team
BREDL	Blue Ridge Environmental Defense League
CAA	Clean Air Act
CCOLA	Combined construction and operating license application
CCP	Coal combustion products
CCR	Coal combustion residual
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CME	Chicago Mercantile Exchange
CO_2	Carbon dioxide
COLA	Cost of living adjustment
CVA	Credit valuation adjustment
CY	Calendar year
EPA	Environmental Protection Agency
FASB	Financial Accounting Standards Board
FERC	Federal Energy Regulatory Commission
FTP	Financial Trading Program
GAAP	Accounting principles generally accepted in the United States of America
GHG	Greenhouse gas
GWh	Gigawatt hour(s)
IRP	Integrated Resource Plan
KDAQ	Kentucky Division for Air Quality
kWh	Kilowatt-hour(s)
mmBtu	Million British thermal unit(s)
MtM	Mark-to-market
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NDT	Nuclear decommissioning trust
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NO_x	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NRP	Natural Resource Plan
NSR	New Source Review
PSD	Prevention of Significant Deterioration
QSPE	Qualifying special-purpose entity
REIT	Real estate investment trust
SACE	Southern Alliance for Clean Energy
SCRs	Selective catalytic reduction systems
SDE	Seasonal demand and energy

SEC	Securities and Exchange Commission
SERP	Supplemental Executive Retirement Plan
Seven States	Seven States Power Corporation
SO_2	Sulfur dioxide
SSSL	Seven States Southaven, LLC
TDEC	Tennessee Department of Environment and Conservation
TOU	Time-of-use
TVARS	Tennessee Valley Authority Retirement System
VIE	Variable interest entity

FORWARD-LOOKING INFORMATION

This Annual Report on Form 10-K ("Annual Report") contains forward-looking statements relating to future events and future performance. All statements other than those that are purely historical may be forward-looking statements. In certain cases, forward-looking statements can be identified by the use of words such as "may," "will," "should," "expect," "anticipate," "believe," "intend," "project," "plan," "predict," "assume," "forecast," "estimate," "objective," "possible," "probably," "likely," "potential," or other similar expressions.

Although the Tennessee Valley Authority ("TVA") believes that the assumptions underlying the forward-looking statements are reasonable, TVA does not guarantee the accuracy of these statements. Numerous factors could cause actual results to differ materially from those in the forward-looking statements. These factors include, among other things:

- New or changed laws, regulations, and administrative orders, including those related to environmental matters, and the costs of complying with these new or changed laws, regulations, and administrative orders, as well as complying with existing laws, regulations, and administrative orders;
- The requirement or decision to make additional contributions to TVA's pension or other post-retirement benefit plans or to TVA's nuclear decommissioning trust ("NDT");
- Events at a TVA nuclear facility, which, among other things, could result in loss of life, damage to the environment, damage to or loss of the facility, and damage to the property of others;
- Events at a nuclear facility, whether or not operated by or licensed to TVA, which, among other things, could lead to increased regulation or restriction on the construction, operation, and decommissioning of nuclear facilities or on the storage of spent fuel, obligate TVA to pay retrospective insurance premiums, reduce the availability and affordability of insurance, increase the costs of operating TVA's existing nuclear units, negatively affect the cost and schedule for completing Watts Bar Nuclear Plant ("Watts Bar") Unit 2 and Bellefonte Nuclear Plant ("Bellefonte") Unit 1, and cause TVA to forego future construction at these or other facilities;
- Significant delays, cost increases, or cost overruns associated with the construction of generation or transmission assets;
- Fines, penalties, natural resource damages, and settlements associated with the Kingston Fossil Plant ("Kingston") ash spill;
- The outcome of legal and administrative proceedings;
- Significant changes in demand for electricity;
- Addition or loss of customers;
- The continued operation, performance, or failure of TVA's generation, transmission, and related assets, including coal combustion residual ("CCR") facilities;
- The economics of modernizing aging coal-fired generating units and installing emission control equipment to meet anticipated emission reduction requirements, which could make continued operation of certain coal-fired units uneconomical and lead to more than anticipated removals of such units from service, perhaps permanently;
- Disruption of fuel supplies, which may result from, among other things, weather conditions, production or transportation difficulties, labor challenges, or environmental laws or regulations affecting TVA's fuel suppliers or transporters;
- Purchased power price volatility and disruption of purchased power supplies;
- Events involving transmission lines, dams, and other facilities not operated by TVA, including those that affect the reliability of the interstate transmission grid of which TVA's transmission system is a part, as well as inadequacies in the supply of water to TVA's generation facilities;
- Inability to obtain regulatory approval for the construction or operation of assets;
- Weather conditions;
- Catastrophic events such as fires, earthquakes, solar events, floods, hurricanes, tornadoes, pandemics, wars, national emergencies, terrorist activities, and other similar events, especially if these events occur in or near TVA's service area;
- Restrictions on TVA's ability to manage real property currently under its control;
- Reliability and creditworthiness of counterparties;
- Changes in the market price of commodities such as coal, uranium, natural gas, fuel oil, crude oil, construction materials, reagents, electricity, and emission allowances;
- Changes in the market price of equity securities, debt securities, and other investments;
- Changes in interest rates, currency exchange rates, and inflation rates;
- Rising pension and health care costs;
- Increases in TVA's financial liability for decommissioning its nuclear facilities and retiring other assets;
- Limitations on TVA's ability to borrow money which may result from, among other things, TVA's approaching or reaching its debt ceiling and changes in TVA's borrowing authority;
- An increase in TVA's cost of capital which may result from, among other things, changes in the market for TVA's debt securities, changes in the credit rating of TVA or the U.S. government, and an increased reliance by TVA on alternative financing arrangements as TVA approaches its debt ceiling;
- Changes in the economy and volatility in financial markets;

- Inability to eliminate identified deficiencies in TVA's systems, standards, controls, and corporate culture;
- Ineffectiveness of TVA's disclosure controls and procedures and its internal control over financial reporting;
- Problems attracting and retaining a qualified workforce;
- Changes in technology;
- Failure of TVA's information technology assets to operate as planned and the failure of TVA's cyber security program to protect TVA's information technology assets from cyber attacks;
- Differences between estimates of revenues and expenses and actual revenues and expenses incurred; and
- Unforeseeable events.

See also Item 1A, Risk Factors, and Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations. New factors emerge from time to time, and it is not possible for TVA to predict all such factors or to assess the extent to which any factor or combination of factors may impact TVA's business or cause results to differ materially from those contained in any forward-looking statement. TVA undertakes no obligation to update any forward-looking statement to reflect developments that occur after the statement is made.

GENERAL INFORMATION

Fiscal Year

References to years (2011, 2010, etc.) in this Annual Report are to TVA's fiscal years ending September 30 except for references to years in the biographical information about directors and executive officers in Item 10, Directors, Executive Officers and Corporate Governance, as well as to years that are preceded by "CY," which references are to calendar years.

Notes

References to "Notes" are to the Notes to Financial Statements contained in Item 8, Financial Statements and Supplementary Data in this Annual Report.

Property

TVA does not own real property. TVA acquires real property in the name of the United States, and such legal title in real property is entrusted to TVA as the agent of the United States to accomplish the purposes of the Tennessee Valley Authority Act of 1933, as amended, 16 U.S.C. §§ 831-831ee (as amended, the "TVA Act"). TVA acquires personal property in the name of TVA. Accordingly, unless the context indicates the reference is to TVA's personal property, any statement in this Annual Report referring to TVA property shall be read as referring to the real property of the United States which has been entrusted to TVA as its agent.

Available Information

TVA's Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and all amendments to those reports are available on TVA's web site, free of charge, as soon as reasonably practicable after such material is electronically filed with or furnished to the Securities and Exchange Commission ("SEC"). TVA's web site is www.tva.gov. Information contained on TVA's web site shall not be deemed to be incorporated into, or to be a part of, this Annual Report. TVA's SEC reports are also available to the public without charge from the web site maintained by the SEC at www.sec.gov. In addition, the public may read and copy any reports or other information that TVA files with or furnishes to the SEC at the SEC's Public Reference Room at 100 F Street N.E., Washington, D.C. 20549. The public may obtain information about the operation of the Public Reference Room by calling the SEC at 1-800-SEC-0330.

PART I

ITEM 1. BUSINESS

The Corporation

In response to a request by President Franklin D. Roosevelt, the U.S. Congress in 1933 enacted legislation that created the Tennessee Valley Authority ("TVA"), a government corporation. TVA was created to, among other things, improve navigation on the Tennessee River, reduce the damage from destructive flood waters within the Tennessee River system and downstream on the lower Ohio and Mississippi Rivers, further the economic development of TVA's service area in the southeastern United States, and sell the electricity generated at the facilities TVA operates.

Today, TVA operates the nation's largest public power system and supplies power in most of Tennessee, northern Alabama, northeastern Mississippi, and southwestern Kentucky and in portions of northern Georgia, western North Carolina, and southwestern Virginia to a population of over nine million people. In 2011, the revenues generated from TVA's electricity sales were $11.7 billion and accounted for virtually all of TVA's revenues.

TVA also manages the Tennessee River, its tributaries, and certain shorelines to provide, among other things, year-round navigation, flood damage reduction, and affordable and reliable electricity. Consistent with these primary purposes, TVA also manages the river system to provide recreational opportunities, adequate water supply, improved water quality, natural resource protection, and economic development. TVA performs these management duties in cooperation with other federal and state agencies which have jurisdiction and authority over certain aspects of the river system. TVA's stewardship responsibilities are conducted within the Tennessee Valley watershed, whose boundaries are similar to, though not exactly the same as, the TVA service area. TVA's management of the Tennessee River, its tributaries, and certain shorelines is sometimes referred to as TVA's "stewardship" program in this Annual Report.

Initially, all TVA operations were funded by federal appropriations. Direct appropriations for the TVA power program ended in 1959, and appropriations for TVA's stewardship, economic development, and multipurpose activities ended in 1999. Since 1999, TVA has funded all of its operations almost entirely from the sale of electricity and power system financings. The TVA Board also established a council under the Federal Advisory Council Act to advise TVA on its stewardship activities. TVA's power system financings consist primarily of the sale of debt securities and secondarily of alternative financings such as lease financings. As a wholly-owned government corporation, TVA is not authorized to issue equity securities.

Service Area

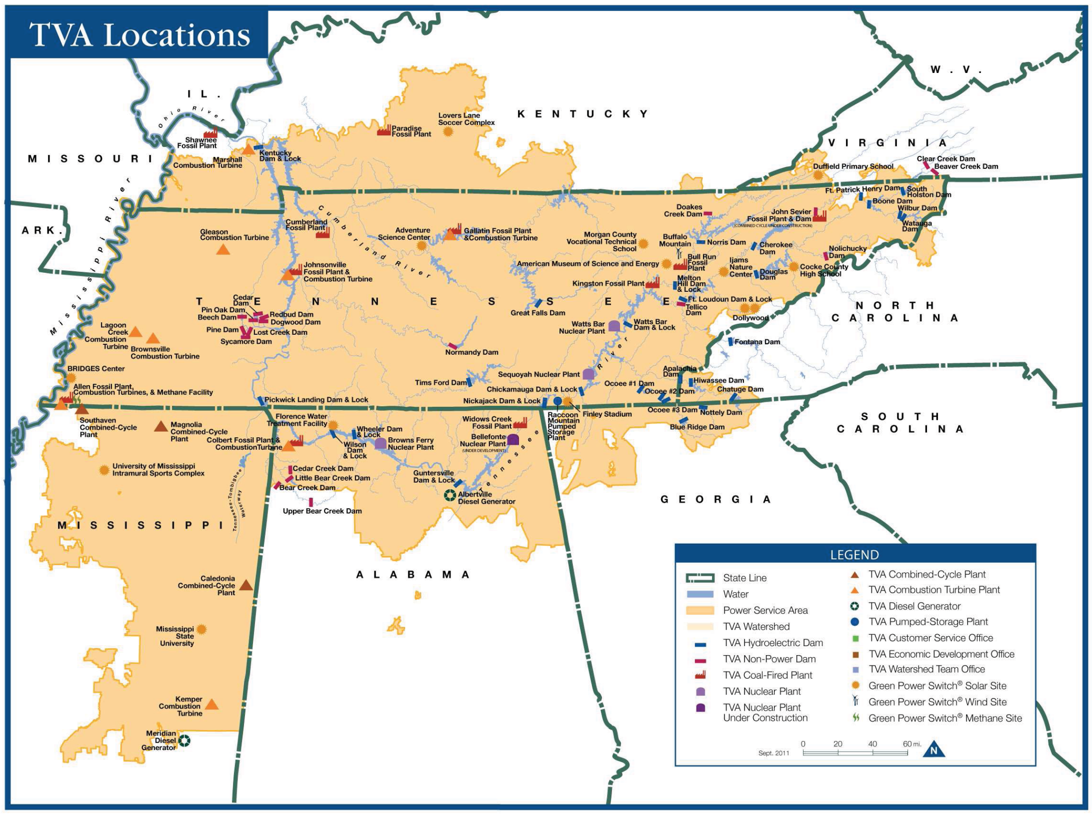
The area in which TVA sells power, its service area, is defined by the TVA Act. Under the TVA Act, subject to certain minor exceptions, TVA may not, without specific authorization from the U.S. Congress, enter into contracts that would have the effect of making it, or the distributor customers of its power, a source of power supply outside the area for which TVA or its distributor customers were the primary source of power supply on July 1, 1957. This provision is referred to as the "fence" because it bounds TVA's sales activities, essentially limiting TVA to power sales within a defined service area.

In addition, an amendment to the Federal Power Act ("FPA") includes a provision that helps protect TVA's ability to sell power within its service area. This provision, called the "anti-cherrypicking" provision, prevents the Federal Energy Regulatory Commission ("FERC") from ordering TVA to provide access to its transmission lines to others for the purpose of using TVA's transmission lines to deliver power to customers within substantially all of TVA's defined service area. As a result, the anti-cherrypicking provision reduces TVA's exposure to loss of customers.

TVA's revenues by state for each of the last three years are detailed in the table below.

Operating Revenues By State
For the years ended September 30
(in millions)

	2011	2010	2009
Alabama	$ 1,699	$ 1,495	$ 1,526
Georgia	272	253	264
Kentucky	1,159	1,195	1,252
Mississippi	1,095	974	1,017
North Carolina	58	53	58
Tennessee	7,370	6,693	6,970
Virginia	60	48	51
Subtotal	11,713	10,711	11,138
Sale for resale and other	10	2	4
Subtotal	11,723	10,713	11,142
Other revenues	118	161	113
Operating revenues	$ 11,841	$ 10,874	$ 11,255



Customers

TVA is primarily a wholesaler of power. It sells power to distributor customers which then resell power to their customers at retail rates. TVA's distributor customers consist of (1) municipalities and other local government entities (referred to collectively below as "municipalities") and (2) cooperative organizations of citizens ("cooperatives"). These municipalities and cooperatives operate public power electric systems that are not doing business for profit but are operated primarily for the purpose of supplying electricity to their own citizens or members. TVA also sells power to directly served customers, consisting primarily of federal agencies and customers with large or unusual loads. In addition, power that exceeds the needs of the TVA system may, where consistent with the provisions of the TVA Act, be sold under exchange power arrangements with other electric systems.

Operating Revenues by Customer Type
For the years ended September 30
(in millions)

	2011	2010	2009
Sales of electricity			
Municipalities and cooperatives	$ 10,144	$ 9,275	$ 9,644
Industries directly served	1,440	1,321	1,367
Federal agencies and other	139	117	131
Total sales of electricity	11,723	10,713	11,142
Other revenues	118	161	113
Operating revenues	$ 11,841	$ 10,874	$ 11,255

Municipalities and Cooperatives

Revenues from distributor customers accounted for 86 percent of TVA's total operating revenues in 2011. At September 30, 2011, TVA had wholesale power contracts with 155 municipalities and cooperatives. Each of these contracts requires distributor customers to purchase from TVA all of their electric power and energy used within the TVA service area.

All distributor customers purchase power under one of three basic termination notice arrangements:

- Contracts that require five years' notice to terminate;
- Contracts that require 10 years' notice to terminate; and
- Contracts that require 15 years' notice to terminate.

The number of distributor customers with the contract arrangements described above, the revenues derived from such arrangements in 2011, and the percentage of TVA's 2011 total operating revenues represented by these revenues are summarized in the table below.

TVA Distributor Customer Contracts
At September 30, 2011

Contract Arrangements (1)	Number of Distributor Customers	Sales to Distributor Customers in 2011	Percentage of Total Operating Revenues in 2011
		(in millions)	
15-year termination notice	5	$ 112	0.9%
10-year termination notice	47	3,390	28.6%
5-year termination notice	103	6,642	56.1%
Total	155	$ 10,144	85.6%

Note
(1) Ordinarily the distributor customer and TVA have the same termination notice period; however, in contracts with six of the distributor customers with five-year termination notices, TVA has a 10-year termination notice (which becomes a five-year termination notice if TVA loses its discretionary wholesale rate-setting authority). Also, under TVA's contract with Bristol Virginia Utilities, a five-year termination notice may not be given by the distributor customer until January 2018.

TVA's two largest distributor customers — Memphis Light, Gas and Water Division ("MLGW") and Nashville Electric Service ("NES") — have contracts with five-year and 10-year termination notice periods, respectively. Although no single customer accounted for 10 percent or more of TVA's total operating revenues in 2011, sales to MLGW and NES accounted for nine percent and eight percent, respectively.

The power contracts between TVA and the distributor customers provide for purchase of power by the distributor customers at the wholesale rates established by the TVA Board of Directors (the "TVA Board"). Under section 10 of the TVA Act, the TVA Board is authorized to regulate the municipal and cooperative distributors of TVA power to carry out the purposes of the TVA Act through contract terms and conditions as well as through rules and regulations. TVA regulates distributor customers primarily through the provisions of TVA's wholesale power contracts. All of the power contracts between TVA and the distributor customers require that power purchased from TVA be sold and distributed to the ultimate consumer without discrimination among consumers of the same class, and prohibit direct or indirect discriminatory rates, rebates, or other special concessions. In addition, there are a number of wholesale power contract provisions through which TVA seeks to ensure that the electric system revenues of the distributor customers are used only for electric system purposes. Furthermore, almost all of these contracts specify the specific resale rates and charges at which the distributor customers must resell TVA power to their customers. These rates are revised from time to time, subject to TVA approval, to reflect changes in costs, including changes in the wholesale cost of power. The regulatory provisions in TVA's wholesale power contracts are designed to carry out the objectives of the TVA Act, including the objective of providing for an adequate supply of power at the lowest feasible rates. See *Rates — Rate Methodology* below.

Other Customers

Revenues from directly served industrial customers accounted for 12 percent of TVA's total operating revenues in 2011. Contracts with these customers are subject to termination by the customer or TVA upon a minimum notice period that varies according to the customer's contract demand and the period of time service has been provided.

The United States Enrichment Corporation ("USEC") is TVA's largest directly served industrial customer. Sales to USEC for its Paducah, Kentucky, facility represented four percent of TVA's total operating revenues in 2011. TVA's current power supply contract with USEC expires on May 31, 2012. See Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations — *Risk Management Activities — Counterparty Credit Risk — Credit of Customers* . In January 2004, USEC announced its decision to construct a new commercial centrifuge facility in Piketon, Ohio, which is outside TVA's service area. TVA believes USEC will reduce its electricity purchases at the Paducah, Kentucky, facility. Loss of the USEC load would result in a loss of revenue, but the resulting lower demand on the TVA system could result in opportunities to reduce TVA's reliance on less economical power sources.

Rates

Rate Authority

The TVA Act gives the TVA Board sole responsibility for establishing the rates TVA charges for power. These rates are not subject to judicial review or to review or approval by any state or federal regulatory body.

Under the TVA Act, TVA is required to charge rates for power which will produce gross revenues sufficient to provide funds for:

- Operation, maintenance, and administration of its power system;
- Payments to states and counties in lieu of taxes ("tax equivalents");
- Debt service on outstanding indebtedness;
- Payments to the U.S. Treasury in repayment of and as a return on the government's appropriation investment in TVA's power facilities (the "Power Program Appropriation Investment"); and
- Such additional margin as the TVA Board may consider desirable for investment in power system assets, retirement of outstanding bonds, notes, or other evidences of indebtedness ("Bonds") in advance of maturity, additional reduction of the Power Program Appropriation Investment, and other purposes connected with TVA's power business.

In setting TVA's rates, the TVA Board is charged by the TVA Act to have due regard for the primary objectives of the TVA Act, including the objective that power shall be sold at rates as low as are feasible.

Rate Methodology

In view of demand for electricity and the level of competition, it is reasonable to assume that rates, set at levels that will recover TVA's costs, can be charged and collected from customers. Further, the TVA Board has the discretion to determine when costs will be recovered in rates. As a result of these factors, TVA records certain assets and liabilities that result from the self-regulated ratemaking process that could not otherwise be so recorded under accounting principles generally accepted in the United States. See Note 1 — *Cost-Based Regulation* and Note 7.

In setting rates to cover the costs set out in the TVA Act, TVA uses a wholesale rate structure that is comprised of a base rate and a fuel rate that is automatically determined by the operation of the fuel cost adjustment formula each month. In setting the base rates, TVA uses a debt-service coverage ("DSC") methodology to derive annual revenue requirements in a manner similar to that used by other public power entities that also use the DSC rate methodology. Under the DSC methodology, rates are calculated so that an entity will be able to cover its operating costs and to satisfy its obligations to pay principal and interest on debt. This ratemaking approach is particularly suitable for use by entities financed primarily, if not entirely, by debt capital, such as TVA.

TVA's revenue requirements for costs or projected costs (other than the fuel, purchased power, and related costs covered by the fuel rate) are calculated under the DSC methodology as the sum of the following components:

- Operating and maintenance costs;

- Tax equivalents (other than the amount attributable to fuel cost-related revenues);
- Other costs in accordance with the TVA Act; and
- Debt service coverage.

This methodology reflects the cause-and-effect relationship between TVA's costs and the corresponding rates TVA charges for its regulated products and services. Once the revenue requirements (or projected costs) are determined, they are compared to the projected revenues for the year in question, at existing rates, to arrive at the shortfall or surplus of revenues as compared to the projected costs. Power rates are adjusted by the TVA Board to a level deemed by the TVA Board to be sufficient to produce revenues approximately equal to projected costs (exclusive of the costs collected through the fuel rate).

Prior to April 2011, TVA's wholesale rate structure was largely based on end-use customer demand and/or energy consumption. Under this rate structure, wholesale charges were specified for each customer classification, and each distributor customer's wholesale bill reflected the application of these charges to actual end-use customers' volumes within each classification. Wholesale meter-reading was used only to bill distributors for losses occurring between the wholesale meters and the retail meters.

At its August 20, 2010 meeting, the TVA Board approved revised wholesale and retail rate structures which became effective in April 2011. The new wholesale and retail rate structures include time-of-use ("TOU") and seasonal demand and energy ("SDE") rates. The revised rate structures provide price signals intended to incentivize distributor and end-use customers to shift energy usage from high-cost periods to less expensive periods. The rates are not intended to provide additional revenue for TVA (although individual customers may see some effects on their bills), but are intended to more closely align TVA's revenues with its costs.

For distributor customers, the default rate structure is TOU with an option to elect an SDE structure for a limited time. The TVA Board-approved rate structures provide that all distributor customers are to be on a TOU wholesale structure by no later than October 2012; however, TVA will continue to have discussions with distributors on alternative rate structures.

For directly served and most distributor-served customers with contract demands in excess of five MW, the default rate structure is a TOU structure. In addition, an optional SDE structure is available. A majority of directly served and these distributor-served customers transitioned to TOU or SDE pilot rates during the three months ended December 31, 2010 to take advantage of lower transitional fall and winter rates.

As noted above, TVA's rates also include a fuel cost adjustment that automatically adjusts TVA's rates each month to recover TVA's fuel costs. Prior to April 2011, a portion of TVA's fuel costs were included in the base rate, and the fuel cost adjustment formula adjusted the energy rates to collect the total fuel costs relative to the fuel amount included in the base rate.

The new rate structure that became effective in April 2011 removed most fuel costs from the base rate. In conjunction with that change, the rate structure was also revised to establish a separate fuel rate that includes the costs of natural gas, fuel oil, purchased power, coal, emission allowances, nuclear fuel and other fuel-related commodities; realized gains and losses on derivatives purchased to hedge the costs of such commodities; and tax equivalents associated with the fuel cost adjustments. Instead of adjusting the energy rates as was the case with the previous rate structure where fuel costs were a component of the base rate, the fuel cost adjustment now establishes the separate fuel rate that is applicable for each month. TVA sometimes refers to this separate fuel rate as the total fuel rate or the total monthly fuel cost.

The TVA Board approved a rate adjustment at its August 18, 2011 meeting that went into effect in October 2011. The rate adjustment is expected to increase existing wholesale base rate charges by two percent. See Item 7, Management's Discussion of Financial Condition and Results of Operations — *2011 Highlights — Rate Changes and Adjustments* .

Current Power Supply

General

Power generating facilities operated by TVA at September 30, 2011, included 29 conventional hydroelectric sites, one pumped storage hydroelectric site, 11 coal-fired sites, three nuclear sites, 12 natural gas and/or oil-fired sites, two diesel generator sites, one wind energy site (currently nonoperational), and 14 solar energy sites. In addition, TVA has biomass cofiring capability at one of its coal-fired sites and digester gas cofiring capability at a second coal-fired site. TVA acquires power under power purchase agreements of varying durations as well as short-term contracts of less than 24-hours in duration.

TVA's generation fleet is among the oldest of any utility in the southeastern United States. TVA has invested substantially less in maintaining its coal-fired generation assets than surrounding utilities. Although TVA is planning to increase its maintenance expenditures on its generating assets in 2012, some assets may not operate as planned in the future due to their age and condition.

The following table summarizes TVA's net generation in millions of kilowatt-hours ("kWh") by generating source and the percentage of all electric power generated by TVA for the years indicated:

Power Supply from TVA-Operated Generation Facilities
For the years ended September 30
(millions of kWh)

	2011		2010		2009	
Coal-fired	74,583	52%	74,590	51%	76,794	53%
Nuclear	49,562	34%	53,339	36%	53,047	37%
Hydroelectric	12,706	9%	14,013	9%	11,421	8%
Natural gas and/or oil-fired	6,809	5%	5,475	4%	3,481	2%
Renewable resources (non-hydro)	17 (1)	<1%	4 (1)	<1%	29	<1%
Total	143,677	100%	147,421	100%	144,772	100%

Note
(1) Operation and maintenance issues reduced the available renewable generation during 2011 and 2010 from several facilities, including those utilizing methane, solar, and wind.

Net Capability

The following table summarizes the summer net capability in MW TVA had available at September 30, 2011:

SUMMER NET CAPABILITY [1]
At September 30, 2011

Source of Capability	Location	Number of Units	Summer Net Capability (MW)	Date First Unit Placed in Service	Date Last Unit Placed in Service
TVA-Operated Generating Facilities					
Coal-Fired					
Allen [2]	Tennessee	3	702	1959	1959
Bull Run	Tennessee	1	870	1967	1967
Colbert	Alabama	5	1,184	1955	1965
Cumberland	Tennessee	2	2,386	1973	1973
Gallatin	Tennessee	4	976	1956	1959
John Sevier [3]	Tennessee	4	704	1955	1957
Johnsonville [3]	Tennessee	10	1,206	1951	1959
Kingston	Tennessee	9	1,398	1954	1955
Paradise	Kentucky	3	2,201	1963	1970
Shawnee [3]	Kentucky	9	1,206	1953	1955
Widows Creek [3]	Alabama	3	974	1954	1965
Total Coal-Fired		53	13,807		
Nuclear					
Browns Ferry	Alabama	3	3,300	1974	1977
Sequoyah	Tennessee	2	2,282	1981	1982
Watts Bar	Tennessee	1	1,109	1996	1996
Total Nuclear		6	6,691		
Hydroelectric					
Conventional Plants	Alabama	36	1,188	1925	1962
	Georgia	2	35	1931	1956
	Kentucky	5	223	1944	1948
	North Carolina	6	492	1940	1956
	Tennessee	60	1,889	1912	1972
Pumped Storage	Tennessee	4	1,616	1978	1979
Total Hydroelectric		113	5,443		
Natural Gas and/or Oil-Fired [4]					
Simple Cycle Combustion Turbine					
Allen	Tennessee	20	456	1971	1972
Brownsville	Tennessee	4	468	1999	1999
Colbert	Alabama	8	392	1972	1972
Gallatin	Tennessee	8	600	1975	2000
Gleason	Tennessee	3	360	2000	2000
Johnsonville	Tennessee	20	1,128	1975	2000
Kemper	Mississippi	4	312	2002	2002
Lagoon Creek	Tennessee	12	904	2001	2002
Marshall County	Kentucky	8	616	2002	2002
Subtotal Simple Cycle Combustion Turbine		87	5,236		
Combined Cycle Combustion Turbine					
Caledonia	Mississippi	3	765	2003	2003
Lagoon Creek	Tennessee	2	540	2010	2010
Magnolia	Mississippi	3	909	2003	2003
Southaven	Mississippi	3	774	2003	2003
Subtotal Combined Cycle Combustion Turbine		11	2,988		
Total Natural Gas and/or Oil-Fired		98	8,224		
Diesel Generator					
Meridian	Mississippi	5	9	1998	1998
Albertville	Alabama	4	4	2000	2000

Total Diesel Generators	9	13
TVA Renewable Resources (non-hydro) (5)		< 1
Total TVA-Operated Generating Facilities		34,178
Contract Renewable Resources (non-hydro) (6)		35
Power Purchase and Other Agreements		3,087
Total Summer Net Capability		37,300

Notes
(1) Net capability is defined as the ability of an electric system, generating unit, or other system component to carry or generate power for a specified time period.
(2) 17 MW of cofired methane is accounted for as coal generation as opposed to TVA Renewable Resources.
(3) See *Current Power Supply — Coal-Fired* for a discussion of TVA's idling plans for coal-fired units.
(4) See *Current Power Supply — Natural Gas and/or Oil-Fired* for a discussion of TVA-operated natural gas and/or oil-fired facilities subject to leaseback and long-term lease arrangements.
(5) TVA's three wind turbines (2 MW) at its Buffalo Mountain site are currently not operational and do not appear to be economical for returning to operation. TVA owns 0.3 MW of solar installations at 14 sites.
(6) Contract Renewable Resources (non-hydro) include wind, landfill gas, and Generation Partners contracts. See *Current Power Supply — Purchased Power and Other Agreements* for a discussion of TVA's Generation Partners program.

Coal-Fired

TVA began its coal-fired plant construction program in the 1940s, and its coal-fired units were placed in service between 1951 and 1973. Coal-fired units are either active or inactive. TVA considers units to be in an active state when the unit is generating, available for service, or is temporarily unavailable due to equipment failures, inspections, or repairs. As of September 30, 2011, TVA had 11 coal-fired plants consisting of 53 active units, accounting for 13,807 MW of summer net capability. TVA considers units to be inactive if those units have been retired, mothballed, or placed in inactive reserve. As of September 30, 2011, TVA had six inactive units, discussed below.

Inactive units may be in three categories: retired, mothballed, or inactive reserve. Retired units are unavailable for service and are not expected to return to service in the future. TVA currently has no retired units. Mothballed units are unavailable for service but can be brought back into service after some repairs with appropriate amount of notification, typically weeks or months. As of September 30, 2011, TVA had three mothballed units: Shawnee Unit 10, Widows Creek Unit 2, and Widows Creek Unit 5. Inactive reserve is the state in which a unit is unavailable for service but can be brought back into service after some minor repairs in a relatively short duration of time, typically measured in days. As of September 30, 2011, TVA had three units in inactive reserve: Widows Creek Unit 1, Widows Creek Unit 3, and Widows Creek Unit 4. Effective October 1, 2011, Widows Creek Unit 6 was placed in inactive reserve. TVA refers to units which are in inactive reserve or mothballed status as idled.

Coal-fired plants have been subject to increasingly stringent regulatory requirements over the last few decades, including those of the Clean Air Act ("CAA") and subsequent laws and regulations. On April 14, 2011, TVA entered into two agreements (collectively, the "Environmental Agreements"). The first agreement is a Federal Facilities Compliance Agreement with the Environmental Protection Agency ("EPA"). The second agreement is with Alabama, Kentucky, North Carolina, Tennessee, and three environmental advocacy groups: the Sierra Club, National Parks Conservation Association, and Our Children's Earth Foundation. Under the Environmental Agreements, TVA agreed to retire 18 of its 59 coal-fired units by the end of 2017 and was generally absolved, from any liability, subject to certain limitations and exceptions under the New Source Review ("NSR") requirements of the CAA for maintenance, repair, and component replacement projects that were commenced at TVA's coal-fired units prior to the execution of the agreements. Failure to comply with the terms of the Environmental Agreements would subject TVA to penalties stipulated in the agreements. TVA is taking actions necessary to comply with the Environmental Agreements.

The following table summarizes the actions TVA is required to take under the Environmental Agreements, and actions TVA has already taken or is planning to take with respect to its coal-fired units.

Plant	Total Units	Existing Scrubbers and SCRs [2]	Requirements Under Environmental Agreements	Actions Taken or Planned to Be Taken by TVA
Allen	3	SCRs on all three units	Install scrubbers or retire no later than December 31, 2018	Add scrubbers on all three units by December 31, 2018
Bull Run	1	Scrubber and SCRs on unit	Continuously operate current and any new emission control equipment	Continuously operate existing emission control equipment
Colbert	5	SCR on Unit 5	· Remove from service, control [1], convert [3], or retire Units 1-4 no later than June 30, 2016 · Remove from service, control [1], or retire Unit 5 no later than December 31, 2015 · Control or retire removed from service units within three years	TVA has not yet decided what actions to take with respect to the Colbert units.
Cumberland	2	Scrubbers and SCRs on both units	Continuously operate current and any new emission control equipment	Continuously operate existing emission control equipment
Gallatin	4	None	Control [1], convert [3], or retire all four units no later than December 31, 2017	Add scrubbers and SCRs on all four units by December 31, 2017
John Sevier	4	None	· Retire two units no later than December 31, 2012 · Remove from service two units no later than December 31, 2012 and control [1], convert [3], or retire those units no later than December 31, 2015	· Retire two units by December 31, 2012 · Remove from service the other two units by December 31, 2012. TVA has not yet decided what additional actions to take with respect to these two units.
Johnsonville	10	None	· Retire six units no later than December 31, 2015 · Retire four units no later than December 31, 2017	· Retire six units by December 31, 2015 · Retire four units by December 31, 2017
Kingston	9	Scrubbers and SCRs on all nine units	Continuously operate current and any new emission control equipment	Continuously operate existing emission control equipment
Paradise	3	Scrubbers and SCRs on all three units	Upgrade scrubbers on Units 1 and 2 no later than December 31, 2012	Upgrade scrubbers on Units 1 and 2 by December 31, 2012
Shawnee	10	None	Control [1], retire, or convert [3] Units 1 and 4 no later than December 31, 2017	· Idled Unit 10 in October 2010 · TVA has not yet decided what actions to take with respect to Units 1 and 4.
Widows Creek	8	Scrubbers and SCRs on Units 7 and 8	· Retire two of Units 1-6 no later than July 31, 2013 · Retire two of Units 1-6 no later than July 31, 2014 · Retire two of Units 1-6 no later than July 31, 2015 · Continuously operate current and any new emissions control equipment on Units 7 and 8.	· As of September 30, 2011, TVA had idled Units 1-5. · TVA idled Unit 6 effective October 1, 2011. · Continuously operate current or equivalent emissions control equipment on Units 7 and 8

Notes
(1) If TVA decides to add emission controls to these units, TVA must continuously operate the emission controls once they are installed.
(2) Selective catalytic reduction systems ("SCRs").
(3) Convert to renewable biomass.

TVA's long-range plans will continue to attempt to balance the costs and benefits of significant investments at its remaining coal-fired plants without scrubbers and/or SCRs. TVA expects to decide whether to control, convert, or retire its remaining coal-fired capacity on a unit-by-unit schedule.

Coal Combustion Residual Facilities

TVA retained an independent third-party engineering firm to perform a multi-phased evaluation of the overall stability and safety of all existing embankments associated with TVA's wet coal combustion residual ("CCR") facilities. The first phase of the evaluation, which is finished, involved a detailed inspection of all wet CCR facilities, detailed documentation reviews, and a determination of any immediate actions necessary to reduce risks. The second phase of the program, which is also complete, included geotechnical explorations, material testing, stability analyses, and studies. The study showed that none of TVA's other coal-fired plants showed the same set of conditions that existed at Kingston Fossil Plant ("Kingston") at the time of the ash spill, and that the ongoing remediation work being done at the plants should bring all of them within industry standards in terms of stability. The third phase of the program, which is implementation of recommended actions, is ongoing. This phase includes risk mitigation steps such as performance monitoring, designing and completing repairs, developing planning documents, obtaining permits, and generally implementing the lessons learned from the Kingston ash spill at TVA's other wet CCR facilities. As a part of this effort, an ongoing dam oversight program has been undertaken, and TVA employees have received additional training in dam safety and monitoring.

TVA is planning to convert all of its wet CCR facilities to dry collection facilities. The expected cost of the CCR work is between $1.5 billion and $2.0 billion, and the work is expected to be completed by 2022. At September 30, 2011, $275 million of costs had been incurred since the start of the work. See Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations — *2011 Challenges — Coal Combustion Residuals* for a discussion of the challenges of dealing with coal combustion residuals, and Note 8 for a discussion of the Kingston ash spill.

On December 15, 2010, a leak was identified in the clay liner of the gypsum pond at Kingston. TVA submitted to the Tennessee Department of Environment and Conservation ("TDEC") a two-phase Corrective Action Plan ("CAP") to install a synthetic liner on the gypsum pond. The synthetic liner is being designed and installed to meet the requirements of the CAP, current TDEC regulations, and anticipated RCRA Subtitle D requirements for CCR storage. The gypsum pond was expected to be back in service by September 2011; however, due to weather and other unforeseeable conditions, implementation of the CAP was delayed. Under the Environmental Agreements, TVA is generally not allowed to operate Kingston after September 20, 2011, without the scrubbers in operation, and the scrubbers cannot be operated unless TVA has the ability to store the gypsum the scrubbers produce. Accordingly, TVA stopped operating Kingston on September 19, 2011, and began the fall maintenance outage to tie in the new dry fly ash handling system. Work on the first phase of the new gypsum storage facility was completed on October 21, 2011 and TDEC approval to place the facility back in operation was received on November 16, 2011. As the Kingston fall outage work is completed, and as power is needed, Kingston's units will be brought back on line. The approximate cost of the first phase of work for the gypsum facility is $24 million. The estimate and schedule for the second phase of work has not been established at this time.

Nuclear

TVA has three nuclear sites consisting of six units in operation. The units at Browns Ferry Nuclear Plant ("Browns Ferry") are boiling water reactor units, and the units at the Sequoyah Nuclear Plant ("Sequoyah") and Watts Bar Nuclear Plant ("Watts Bar") are pressurized water reactor units. Statistics for each of these units are included in the table below.

TVA Nuclear Power
At September 30, 2011

Nuclear Unit	Status	Nameplate Capacity (MW)	Net Capacity Factor for 2011	Date of Expiration of Operating License	Date of Expiration of Construction Permits
Sequoyah Unit 1	Operating	1,221	81.1	2020	—
Sequoyah Unit 2	Operating	1,221	86.8	2021	—
Browns Ferry Unit 1	Operating	1,150	80.5	2033	—
Browns Ferry Unit 2	Operating	1,190	77.7	2034	—
Browns Ferry Unit 3	Operating	1,190	83.7	2036	—
Watts Bar Unit 1	Operating	1,230	80.9	2035	—
Watts Bar Unit 2	Under construction	1,220	—	—	2013

Response to Recent Events. TVA management has established a response team to analyze the March 2011 events at the Fukushima Daiichi Nuclear Power Plant ("Fukushima Daiichi") in Japan. A comprehensive review is in progress to determine the status of safety-related equipment and other aspects of plant operations that affect nuclear, radiological, and personal safety so that TVA can make any necessary changes. In response to the Japanese nuclear events and the April 27 and April 28, 2011, storms that caused significant damage to the TVA system, TVA is analyzing the ability of its nuclear plants to shut down safely during simultaneous natural disasters.

The nuclear industry and regulators have been working to understand the events that damaged the Fukushima Daiichi reactors and spent fuel storage pools and whether any changes might be necessary at nuclear plants in the United States. As part of its response to the events at Fukushima Daiichi, the Nuclear Regulatory Commission ("NRC") conducted special inspections of nuclear power plants in the United States, including TVA's three nuclear power plants. The focus of the inspections was on the licensee's capability to mitigate conditions that could result from fire and flood events during an earthquake. The results of the inspections are reported in letters from the NRC dated May 13, 2011. The NRC's reactor oversight process will further evaluate any issues identified during the inspection and will determine, in a separate report, whether there are regulatory findings or violations, but no response to the May 13, 2011 letters was required. Although the NRC is still evaluating the inspection results, no material concerns have been identified relating to any of TVA's nuclear power plants nor have any of these activities yet resulted in new regulatory requirements affecting any of the plants.

The NRC also formed the Near-Term Task Force ("task force") on the Fukushima Event to perform a systematic and methodical review of its regulations and practices to determine if any changes should be made to further ensure health and safety protections in light of what has been learned from the Japanese nuclear events. On July 13, 2011, the task force released its first report. The task force report recommends that the NRC pursue both short-term and long-term actions to improve its safety regulations and oversight. The report also recommends that the NRC propose safety improvements in areas ranging from loss of power to earthquakes, flooding, spent fuel pools, containment venting, and emergency preparedness. The task force's recommended strategy includes several rulemaking activities to establish new requirements and interim actions to be taken while the rulemaking activities are conducted. The NRC staff reviewed the task force's July 2011 report and provided a proposal to the NRC Commissioners on its recommendations. On October 19, 2011, the NRC voted to fast track seven of the 12 recommendations from the task force. Recommendations for action in the short-term include reevaluating seismic and flood hazards; strengthening the ability to withstand complete loss of power; improving spent fuel monitoring instrumentation; and bolstering emergency operating procedures and plant staff training. Longer-term actions include improvements to the containment structures that surround nuclear reactors, especially for the 23 U.S. reactors with designs similar to those in Japan (including TVA's Browns Ferry), and improvements to venting systems that are used to relieve steam pressure inside the containment structures following an accident. TVA does not yet know the extent to which the changes in the regulations, programs, and processes of the NRC as a result of the recommendations of the task force will affect its operations. See Note 20 — *Legal Proceedings — Petitions Resulting from Japanese Nuclear Events*.

The Japanese nuclear events have also created broader economic uncertainties that may affect future nuclear plant operating costs. The political climate, public pressure, or other forces may make it more difficult or expensive to continue to operate, construct, or improve nuclear power generation facilities. Internationally, some governments are changing their positions on nuclear power. For example, operations have been suspended at several existing nuclear power facilities in Japan, and Germany has committed to the elimination of its use of nuclear power altogether by 2022. Legislation has been introduced in the U.S. Congress that would require an overhaul of the NRC safety regulations. TVA cannot predict whether this or any similar legislation may be enacted and, if enacted, the impact on the operation and costs of TVA's nuclear power plants. These broader economic uncertainties could adversely affect the demand for nuclear power, and TVA cannot know their impact on its operations.

Sequoyah License Renewal. On August 5, 2009, TVA notified the NRC of its intent to submit license renewal applications for both Sequoyah units in the third quarter of 2013. If approved, the licenses for both units would be extended by an additional 20 years to 2040 for Unit 1 and 2041 for Unit 2. On May 25, 2011, TVA amended its schedule and notified the NRC of its intent to submit license renewal applications for both Sequoyah units in the second quarter of 2013. In June 2011, TVA issued a final Supplemental Environmental Impact Statement ("SEIS") that addresses the impacts of renewing Sequoyah's operating licenses. On August 18, 2011, the TVA Board approved proceeding with the license renewal application development and submittal. The NRC's review of the applications is expected to take up to three years after their submission.

Completion of Nuclear Units. On August 1, 2007, the TVA Board approved the completion of Watts Bar Unit 2. This unit is expected to be completed in CY 2013 and to provide approximately 1,180 MW of summer net capability. In addition, on August 18, 2011, the TVA Board approved the completion of Bellefonte Nuclear Plant ("Bellefonte") Unit 1. This unit is expected to be completed by 2020 and to provide approximately 1,260 MW of summer net capability. See *Future Power Supply — Nuclear Generation* for more information regarding these projects.

Other Nuclear Matters. See *Fuel Supply — Nuclear Fuel* below for a discussion of spent nuclear fuel and low-level radioactive waste, Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations — *2011 Challenges — Construction Projects* for a discussion of challenges associated with the Watts Bar Unit 2 construction project, challenges associated with the construction of a cooling tower at Browns Ferry, a problem involving a Browns Ferry Unit 1 low pressure coolant injection valve, and the impact of extreme weather on the operation of Browns Ferry Unit 1, Note 20 — *Contingencies* for a discussion of TVA's nuclear decommissioning liabilities and the related trust and nuclear insurance, and Note 20 — *Legal Proceedings* for a discussion of legal and administrative proceedings related to TVA's nuclear program, which discussions are incorporated herein by reference.

Hydroelectric

TVA maintains 29 conventional hydroelectric dams throughout the Tennessee River system and one pumped-storage facility for the production of electricity. At September 30, 2011, these facilities accounted for 5,443 MW of summer net capability. The amount of electricity that TVA is able to generate from its hydroelectric plants depends on a number of factors, including the amount of precipitation, runoff, initial water levels, and the need for water for competing water management objectives. The amount of electricity generated also depends on the availability of TVA's hydroelectric generation plants. When these factors are unfavorable, TVA must increase its reliance on more expensive generation plants and purchased power. In addition, four hydroelectric dams owned by a third party on the Little Tennessee River and eight U.S. Army Corps of Engineers dams on the Cumberland River contribute to the TVA power system. See *Weather and Seasonality.*

TVA's Hydro Modernization Program began in 1992 to address reliability issues on a majority of its conventional hydroelectric units and on its Raccoon Mountain pumped storage facility. At September 30, 2011, uprates to 57 hydroelectric units were completed. The capacity gain was 565 MW, and the average efficiency gain was approximately five percent. There are 38 units remaining to be uprated for reliability and/or capacity increases.

A preliminary analysis performed as part of an update to TVA's hydrology model indicated that under "probable maximum flood" assumptions, four of TVA's dams would not be high enough to contain the flood waters. A "maximum flood" is an extremely unlikely event, and TVA is taking actions with the aim of ensuring that flood waters would pass safely. TVA implemented interim dam modifications in the second quarter of 2010. Permanent dam modifications are being assessed to determine appropriate changes needed at TVA dams.

As a result of the update to TVA's hydrology model, TVA is performing additional hydrological assessments at all of its other dams. The total financial impact of permanent modifications to any additional dams identified as a result of the assessment is being evaluated and should be completed during the later part of 2012.

Natural Gas and/or Oil-Fired

On August 31, 2011, TVA purchased the Magnolia Combined Cycle Plant ("Magnolia") for $436 million. The three-unit natural gas-fired plant is located in Benton County, Mississippi, and has a summer net capability of 909 MW. At September 30, 2011, TVA operated 98 combustion turbine units, 87 of which are simple-cycle and 11 of which are combined cycle. The 87 simple-cycle units provide a maximum of 5,236 MW of summer net capability. The 11 combined cycle units provide a maximum of 2,988 MW of summer net capability. Eighty of the simple-cycle units are fueled by either natural gas or diesel fuel. The remaining seven simple-cycle units as well as the 11 combined cycle units are fueled by natural gas only. Seventy-six of the simple-cycle units are capable of quick-start response allowing full generation capability in approximately 10 minutes. TVA uses simple-cycle units as peaking or backup units. Their relatively low capital requirements and quick start-up capabilities make them favorable for intermittent operation to generate power in periods of high demand or to provide ancillary services. Additionally, low natural gas prices during 2011 have made these units more economical to operate. At September 30, 2011, 24 of the simple-cycle combustion turbine units were leased by private entities and leased back to TVA under long-term leases. TVA also leases the three Caledonia combined cycle units under a long-term lease. Since April 17, 2009, Seven States Southaven, LLC ("SSSL") has owned an undivided 90 percent interest in the three Southaven combined cycle units, and TVA has entered into an agreement under which TVA leases SSSL's undivided 90 percent interest in Southaven and operates the entire facility through April 23, 2013. For additional details, see Note 12.

Diesel Generators

TVA has two diesel generator plants consisting of nine units. At September 30, 2011, these facilities provided 13 MW of summer net capability.

Renewable Resources

TVA owns three wind turbines, capability for digester gas cofiring and biomass cofiring (located at coal-fired sites), and 14 solar energy sites. At September 30, 2011, the wind sites did not provide any summer net capability because they were not operational and the digester gas cofiring site and solar sites provided less than 1 MW of summer net capability.

Purchased Power and Other Agreements

TVA acquires power from a variety of power producers through long-term and short-term power purchase agreements as well as through power spot market purchases. During 2011, TVA acquired approximately 20 percent of the power that it purchased on the power spot market, six percent through short-term power purchase agreements (agreements with a duration of one year or less but longer than the term of spot market purchase), and approximately 74 percent through long-term power purchase agreements (agreements with a duration of more than one year).

A portion of TVA's capability provided by power purchase agreements is provided under contracts that expire between 2012 and 2032, and the most significant of these contracts are described below.

Power Purchase Contracts (Excluding Wind Contracts)
At September 30, 2011

Type of facility	Location	Summer Net Capability (MW)	Contract Termination Date
Natural gas	Alabama	720	2012
Natural gas	Alabama	500	2012
Natural gas	Mississippi	690	2013
Lignite	Mississippi	440	2032

Under federal law, TVA is required to purchase energy from qualifying facilities, cogenerators, and small power producers at TVA's avoided cost of self-generating or purchasing this energy from another source. At September 30, 2011, there were five suppliers, with a combined capacity of 914 MW, whose power is purchased by TVA under this law.

At September 30, 2011, TVA was a party to nine contracts of approximately 20 years' duration for the purchase of up to 1,565 MW of energy from wind generation in various midwest states. TVA began receiving up to 415 MW of energy under these contracts during 2010 and expects to begin receiving energy under the remainder of the contracts during 2012 and 2013 as long as environmental and other contingencies in these contracts are satisfied. TVA may work with counterparties to renegotiate or even terminate existing arrangements based on its evaluation of the economics of the contracts given that bringing power from distant locations raises transmission issues and costs.

Renewable Wind Contracts
At September 30, 2011

Location of Wind Farm	Wind Farm Nameplate Capacity (in MW)	Date Delivery Began or Is Expected to Begin
Illinois	300 *	2010
Iowa	115	2010
Iowa	83	2012
Iowa	101	2012
Kansas	201	2012
Kansas	165	2013
Illinois	200	2012
Illinois	150	2012
South Dakota	250	2013

Note
*TVA is currently purchasing the energy output of this 300 MW of generation. The owner of the facility retains the renewable attributes, but TVA has the option to purchase the renewable attributes of this generation in the future.

In addition, TVA has contracted for 27 MW of nameplate renewable energy generation from 15 wind turbine generators located in Buffalo Mountain near Oak Ridge, Tennessee.

In 2003, TVA developed a Generation Partners program to test the interest and feasibility of renewable consumer-owned generation as a source of power for TVA. Since 2009, TVA has seen the program grow from 79 installations to nearly 700 installations in operation providing more than 30 MW of solar, wind, and biomass generation. In addition, there are more than 300 projects approved by TVA that are in various stages of construction. Those projects represent an additional 45 MW of renewable power.

The Renewable Standard Offer program is a pilot program that began in October 2010. Under the program, TVA will accept up to 100 MW of renewable energy. At September 30, 2011, TVA had 8 MW of renewable energy signed up under the program, including two landfill gas generation projects and two solar projects.

Technology advancements will be needed to address some of the operational issues associated with some renewable energy sources, such as energy storage to address intermittency. In addition, most renewable energy resources are geographically specific. Some regions of the United States have an abundance of wind and solar resources, whereas other regions have more hydroelectric resources. Regional differences and limitations play a primary role in the types and amount of renewable and clean energy developed across the country. Within the area served by TVA, two of the most abundant renewable resources are hydroelectric and biomass. Feasible wind energy in this region is primarily associated with mountain top and ridgeline installations, and the total potential capacity is more limited when compared to other parts of the nation where wind energy is more abundant. If TVA is required to increase its use of renewable resources and the cost of doing so is greater than the costs of other sources of generation, TVA's costs may increase.

During the past five years, TVA supplemented its power generation through power purchases as follows:

Purchased Power *
For the years ended September 30

	2011	2010	2009
Millions of kWh	27,168	28,782	22,088
Percent of TVA's Total Power Supply	15.9%	16.3%	13.1%

Note
* Purchased power amounts include generation from Caledonia, which is currently a leased facility operated by TVA. Additionally, purchased power amounts include generation from Magnolia for 2009, 2010, and for a portion of 2011. On August 31, 2011, TVA acquired Magnolia.

Future Power Supply

During 2011, the TVA Board accepted an Integrated Resource Plan ("IRP"), the purpose of which is to create a framework for the analysis of alternatives to address the electricity needs in TVA's service area for the next 20 years. TVA has adopted a vision to lead the nation toward a cleaner energy future. TVA intends to balance production capabilities with power supply requirements by promoting the conservation and efficient use of electricity and, when necessary, buying, building and/or leasing assets or entering into purchased power agreements. TVA also intends to employ a diverse mix of energy generating sources and is working toward obtaining greater amounts of its power supply from clean (low or zero carbon emitting) or renewable resources.

Coal-Fired Generation

Consistent with its vision and IRP, TVA is planning to significantly reduce its reliance on coal-fired generation in the future. See *Current Power Supply — Coal-Fired* above *.*

Nuclear Generation

Watts Bar Unit 2 . On August 1, 2007, the TVA Board approved the completion of Watts Bar Unit 2. The project was originally scheduled to be completed in CY 2012 for an anticipated cost of approximately $2.5 billion, excluding allowance for funds used during construction (“AFUDC”) and the cost of the initial fuel load. TVA has a license to receive and store new nuclear fuel for use in the unit. TVA has applied for an operating license from the NRC and plans to load the new fuel into the Watts Bar Unit 2 reactor following the receipt of the operating license. The project's schedule has experienced some delays as a result of lower than expected construction productivity. Additional delays are expected related to licensing, including a delay from a hearing to be scheduled to take place before an Atomic Safety and Licensing Board to resolve a pending aquatic contention. See Note 20 — *Legal Proceedings — Administrative Proceedings Regarding Watts Bar Nuclear Plant Unit 2.* As a result, the completion of Watts Bar Unit 2 will take longer than originally planned. As discussed above, on July 13, 2011, the NRC's Near-Term Task Force on the Fukushima Event released its review of insights from the Japanese nuclear events. The report and recommendations based upon it could result in TVA being required to make changes to its operating nuclear units and Watts Bar Unit 2. Such changes are expected to impact the cost and schedule of the project. As a result of one or more of the above developments, TVA believes that the Watts Bar Unit 2 completion date will extend into CY 2013, rather than the last quarter of CY 2012. The construction project and schedule for Watts Bar Unit 2 is currently being reviewed by TVA. Project costs are expected to significantly exceed the previous estimate of approximately $2.5 billion. Updates to the schedule and cost estimates are expected to be completed by the second quarter of FY 2012.

Bellefonte Units 1 and 2 . On August 18, 2011, the TVA Board approved the completion of Bellefonte Unit 1. The project is expected to be completed by 2020 for anticipated additional costs of $4.9 billion, exclusive of AFUDC and the cost of the initial fuel load. Advance notification by TVA and additional reviews by both TVA and the NRC are required before construction activities resume. In addition, the TVA Board directed TVA staff not to resume construction activities until the initial loading of fuel at Watts Bar Unit 2 has been accomplished. See Note 20 — *Legal Proceedings — Case Regarding Bellefonte Nuclear Plant Units 1 and 2.* On September 29, 2011, the NRC extended the Unit 1 and Unit 2 construction permits for Bellefonte to October 2020. The extension is expected to provide the time necessary to complete engineering, licensing, and construction of Unit 1. Bellefonte's construction permits are currently in deferred plant status. TVA will provide notice to the NRC at least four months in advance of activating construction. Asset-preservation and equipment-maintenance activities for Units 1 and 2 are continuing at the site, as well as Unit 1 engineering design work, detailed plant system physical reviews, and assessments.

Bellefonte Units 3 and 4 . In October 2007, TVA submitted a combined construction and operating license application ("CCOLA") to the NRC for two new designed Advanced Passive 1000 reactors to be located at the Bellefonte site and designated as Bellefonte Units 3 and 4. On September 29, 2010, TVA notified the NRC that the recently completed final SEIS had determined that completion of the partially constructed Bellefonte Unit 1 is the preferred alternative for near-term additional generating capacity at the Bellefonte site. Consequently, with the exception of the ongoing review of hydrology-related portions of the application, TVA requested that the NRC defer review of the Bellefonte Units 3 and 4 CCOLA pending a final decision of the TVA Board regarding new generation capacity at the Bellefonte site. Contentions have been filed with respect to this application. See Note 20 — *Legal Proceedings — Administrative Proceedings Regarding Bellefonte Units 3 and 4.*

Extended Power Uprate . TVA is undertaking an Extended Power Uprate (“EPU”) project at Browns Ferry which is expected to increase the amount of electrical generation by increasing the amount of steam produced by the reactors. Additional fuel would be added to the reactors during each refueling outage to support the increased steam production. The NRC license for each reactor must be modified to allow reactor operation at the higher power level. TVA has submitted license amendment requests and is currently in discussions with the NRC on selected technical issues affecting EPU licensing. The result of these discussions may impact the amount of power level increase realized by the EPU. Completion of the licensing process will determine the final implementation schedule.

Other Nuclear Initiatives . TVA signed a letter of intent to begin evaluating a site and perform studies for a small modular reactor ("SMR") at its Clinch River site in Oak Ridge, Tennessee. The SMR would have a scalable, modular design allowing utilities to add electrical generation capacity in increments of 150-300 MW. The SMR could be competitive with and able to be built more quickly than larger reactors on the market. TVA notified the NRC in August 2010 that it intends to submit a construction permit application for up to six SMR units on the Clinch River site by the third quarter of 2012.

Impact of Recent Events.   TVA believes that the responses to the Japanese nuclear events could translate into changes in plant operations, design, or safety and the imposition of additional requirements by the NRC or other regulatory bodies. Should potential changes prove to be significant, the schedule for the commercial operation of Watts Bar Unit 2, as well as future plans for construction at Bellefonte Unit 1 or other facilities, could be affected. To date, several petitions have been filed with the NRC that seek to take actions in response to the Japanese nuclear events that could impact TVA nuclear operations or licensing activities if the requested actions are taken by the NRC. See Note 20 — *Legal Proceedings — Petitions Resulting from Japanese Nuclear Events*.

Natural Gas-Fired Generation

Part of TVA's strategy of portfolio diversification and reducing air emissions involves the addition of natural gas plants to its generation fleet in the near future. During 2011, TVA expanded its fleet of natural gas-fired units by purchasing Magnolia in Benton County, Mississippi. In addition, TVA is in the process of completing the John Sevier Combined Cycle Facility in northeastern Tennessee. TVA expects to complete this combined cycle facility by mid-CY 2012. The completed facility is expected to add approximately 880 MW of summer net capability to the TVA system at a cost of approximately $820 million. TVA may also decide to make further strategic investments in natural gas-fired facilities in the future. See *Current Power Supply — Natural Gas and/or Oil-Fired* and Note 19 — *New Generation — Combined Cycle* .

Hydroelectric Generation

Hydroelectric generation will continue to be an important part of TVA's energy mix as TVA strives to provide clean and low-cost energy. TVA through its Hydro Modernization Program continues to assess its conventional hydroelectric units for reliability and/or capacity increases through 2030. Annual hydroelectric generation is highly dependent on weather conditions and can vary significantly from year to year.

Future Wind Contracts

For a discussion of future wind contracts, see *Current Power Supply — Purchased Power and Other Agreements* .

Power Purchases

Purchasing power from others will likely remain a component of how TVA addresses the power needs of its service area. TVA intends to balance production capabilities with power supply requirements by promoting the conservation and efficient use of electricity and, when necessary, entering into purchased power agreements.

Energy Efficiency and Demand Response Programs

TVA, in partnership with its distributors and directly served customers, is developing a broad portfolio of energy efficiency and demand response programs designed to help reduce long-term energy supply costs in the TVA service area. An effective set of energy efficiency and demand response programs is consistent with TVA's vision to be one of the nation's leading providers of low-cost and cleaner energy by 2020 and its goal to become the regional leader in energy efficiency. TVA is currently working with its power distributors and directly served customers to develop a five-year plan for its energy efficiency and demand response programs building on success of its program in 2010 and 2011. TVA realized 210 gigawatt hour ("GWh") and 559 GWh of energy efficiency savings in 2010 and 2011, respectively, and expects those savings to continue to grow through 2015.

Fuel Supply

General

TVA's consumption of various types of fuel depends largely on the demand for electricity by TVA's customers, the availability of various generating units, and the availability and cost of fuel. The following table summarizes TVA's expenses for various fuels for the years indicated:

Fuel for TVA-Operated Facilities*
For the years ended September 30
(in millions)

	2011	2010	2009
Coal	$ 2,315	$ 2,126	$ 2,127
Natural gas	265	236	129
Fuel oil	54	38	38
Nuclear fuel	261	277	267
Total fuel	$ 2,895	$ 2,677	$ 2,561

Note
* Excludes effects of the fuel cost adjustment deferrals and amortization on fuel expense in the amount of $31 million, $(585) million, and $553 million for the years ended September 30, 2011, 2010, and 2009, respectively.

The following table indicates TVA's average fuel expense by generation-type for the years indicated:

Fuel Expense Per kWh*
For the years ended September 30
(cents/kWh)

	2011	2010	2009
Coal	3.17	2.90	2.81
Natural gas and fuel oil	3.96	4.37	3.77
Nuclear	0.53	0.52	0.50
Average fuel cost per kWh net thermal generation from all sources	2.21	2.01	1.92

Note
* Excludes effects of the fuel cost adjustment deferrals and amortization on fuel expense.

TVA also has tolling agreements under which it obtains electricity from outside suppliers. Under these tolling agreements, TVA supplies the fuel to the outside supplier, and the outside supplier converts the fuel into electricity. The following table indicates the cost of fuel supplied by TVA under these agreements and also the average fuel expense per kWh for the years indicated:

Natural Gas Purchases for Tolling Plants
For the years ended September 30

	2011	2010	2009
Cost of fuel (in millions)	$ 343	$ 381	$ 255
Average fuel expense (cents/kWh)	5.40	5.93	6.54

Coal

Coal consumption at TVA's coal-fired generating facilities during 2011 was approximately 36 million tons. At September 30, 2011, and 2010, TVA had 29 days and 36 days of system-wide coal supply at full burn rate, respectively, with net book values of $404 million and $465 million, respectively.

TVA utilizes both short-term and long-term (longer than one year) coal contracts. During 2011, long-term contracts made up 96 percent of coal purchases and short-term contracts accounted for the remaining four percent. TVA plans to continue using contracts of various lengths, terms, and coal quality to meet its expected consumption and inventory requirements. During 2011, TVA purchased coal by basin as follows:

- 38 percent from the Illinois Basin;
- 33 percent from the Powder River Basin in Wyoming;
- 18 percent from the Uinta Basin of Utah and Colorado; and
- 11 percent from the Appalachian Basin of Kentucky, Pennsylvania, Tennessee, Virginia, and West Virginia.

Total system coal inventories were at or below target levels for most of 2011. During 2011, 38 percent of TVA's coal supply was delivered by rail, 22 percent was delivered by barge, and 32 percent was delivered by a combination of barge and rail. The remainder was delivered by truck.

Natural Gas and Fuel Oil

During 2011, TVA purchased substantially all of its natural gas requirements from a variety of suppliers under contracts with terms of one year or less but managed its exposure to spot market volatility through its Financial Trading Program ("FTP"). At September 30, 2011, all but 18 of TVA's gas generation units were dual fuel capable, and TVA has fuel oil stored on each site for its dual fuel combustion turbines as a backup to natural gas.

During 2011, TVA purchased substantially all of its fuel oil on the spot market, but managed its exposure to spot market volatility through its FTP. At September 30, 2011, and 2010, the net book value of TVA's natural gas in inventory was $7 million and $8 million, respectively, and the net book value of TVA's fuel oil in inventory was $77 million and $66 million, respectively.

Nuclear Fuel

Converting uranium to nuclear fuel generally involves four stages: the mining and milling of uranium ore to produce uranium concentrates; the conversion of uranium concentrates to uranium hexafluoride gas; the enrichment of uranium hexafluoride; and the fabrication of the enriched uranium hexafluoride into fuel assemblies. For its forward five-year (2012-2016) requirements, TVA currently has 100 percent of its uranium mining and milling, conversion services, enrichment services, and fabrication services requirements either in inventory or under contract. TVA anticipates being able to fill its needs beyond this period by normal contracting processes as market forecasts indicate that the fuel cycle components will be readily available.

TVA, the Department of Energy ("DOE"), and certain nuclear fuel contractors have entered into agreements providing for surplus DOE highly enriched uranium (uranium that is too highly enriched for use in a nuclear power plant) to be blended with other uranium. The enriched uranium that results from this blending process, which is called blended low enriched uranium ("BLEU"), is fabricated into fuel that can be used in a nuclear power plant. This blended nuclear fuel was first loaded in a Browns Ferry reactor in 2005 and is expected to continue to be used to reload the Browns Ferry reactors through at least 2016. BLEU fuel was loaded into Sequoyah Unit 2 in CY 2008, CY 2009 and CY 2011.

Under the terms of an interagency agreement between the DOE and TVA, in exchange for supplying highly enriched uranium materials for processing into usable BLEU fuel for TVA, the DOE participates to a degree in the savings generated by TVA's use of this blended nuclear fuel. See Note 1 — *Blended Low Enriched Uranium Program* for a more detailed discussion of the BLEU project.

TVA owns all nuclear fuel held for its nuclear plants. At September 30, 2011, and 2010, the net book value of this nuclear fuel was $1.1 billion.

Mixed Oxide Nuclear Fuel. TVA signed an interagency agreement with the DOE on February 25, 2010, for pre-planning and evaluation activities under which the DOE would reimburse TVA for its costs in investigating the potential use of mixed oxide ("MOX") fuel in TVA's Browns Ferry and Sequoyah nuclear reactors. The MOX fuel is a mixture of plutonium and depleted uranium oxide with the plutonium originating from surplus nuclear weapon material. The DOE is building a plant near Aiken, South Carolina to produce MOX fuel.

The DOE is completing a SEIS with TVA as a cooperating agency to evaluate the potential impact of MOX fuel at Sequoyah and Browns Ferry. TVA is in the evaluation phase and has not committed to using MOX fuel. TVA will only go forward with the program if TVA believes it is safe to do so and will result in a benefit to TVA customers. A decision on whether to go from the evaluation to a licensing phase is expected at the end of 2012. A significant regulatory and planning effort must be completed before the first potential delivery of MOX fuel in 2018.

Low-Level Radioactive Waste. Low-level radioactive waste ("radwaste") results from the normal operation of nuclear units and includes such materials as disposable protective clothing, mops, and filters. TVA has certain types of radwaste processed and shipped to a disposal facility in Clive, Utah, and TVA also stores some radwaste at its own facilities. In June 2011, TVA entered into a six year contract to enable shipments of radwaste to a new burial facility in Andrews, Texas . TVA is also capable of storing radwaste at its facilities for an extended period of time.

Spent Nuclear Fuel. Under the Nuclear Waste Policy Act of 1982, TVA (and other domestic nuclear utility licensees) entered into a contract with the DOE for the disposal of spent nuclear fuel. Payments to the DOE are based upon TVA's nuclear generation and charged to nuclear fuel expense. Although the contracts called for the DOE to begin accepting spent nuclear fuel from the utilities by January 31, 1998, the DOE has yet to establish a permanent disposal site for spent nuclear fuel. TVA, like other nuclear utilities, stores spent nuclear fuel at its nuclear sites. TVA would have had sufficient space to continue to store spent nuclear fuel in storage pools indefinitely had the DOE begun accepting spent nuclear fuel. The DOE's failure to do so in a timely manner required TVA to construct dry cask storage facilities at Sequoyah and Browns Ferry and to purchase special storage containers for the spent nuclear fuel. The Sequoyah and Browns Ferry dry cask storage facilities have been in use since 2004 and 2005, respectively, and are expected to provide storage capacity through 2026 at Sequoyah and 2018 at Browns Ferry. Watts Bar has sufficient storage capacity in its spent fuel pool to last until approximately 2015. In September 2010, the NRC announced its approval of final revisions to its waste confidence findings and regulations expressing the NRC's confidence that spent nuclear fuel can be safely stored for at least 60 years beyond the licensed life of any reactor and that sufficient repository capacity will be available when necessary.

To recover the cost of providing long-term, on-site storage for spent nuclear fuel, TVA filed a breach of contract suit against the United States in the Court of Federal Claims in 2001. In August 2006, the United States paid TVA almost $35 million in damages awarded by the Court of Federal Claims, which offset partially the construction costs of the dry cask storage facilities that TVA incurred through 2004. The United States has also paid TVA approximately $35 million in damages to offset costs for on-site storage from 2005 to 2008. TVA entered into a settlement agreement with the United States in July 2011 that delineates recoverable and non-recoverable costs from the United States for the disposal of spent nuclear fuel and that sets forth a claim submittal and review process. TVA anticipates submitting additional claims to the DOE on an annual basis pursuant to the settlement agreement.

Tritium-Related Services. TVA and the DOE are engaged in a long-term interagency agreement under which TVA will, at the DOE's request, irradiate tritium producing burnable absorber rods to assist the DOE in producing tritium for the Department of Defense ("DOD"). This agreement, which ends in 2035, requires the DOE to reimburse TVA for the costs that TVA incurs in connection with providing irradiation services and to pay TVA an irradiation services fee at a specified rate per tritium-producing rod over the period when irradiation has occurred.

In general, tritium-producing rods are irradiated for a full fuel cycle, which lasts about 18 months. At the end of the cycle, TVA removes the irradiated rods and loads them into a shipping cask. The DOE then ships them to its tritium-extraction facility. TVA loads a fresh set of tritium-producing rods into the reactor during each refueling outage. Irradiating the tritium-producing rods does not affect TVA's ability to operate the reactors to produce electricity.

The interagency agreement provides for irradiation services to be performed in Watts Bar Unit 1 and Sequoyah Units 1 and 2. TVA has provided irradiation services using only Watts Bar Unit 1 since 2003. TVA believes it can meet the DOE and the DOD tritium requirements using Watts Bar Unit 1 while maintaining Sequoyah reactors as backups.

Transmission

The TVA transmission system is one of the largest in North America. TVA's transmission system has 62 interconnections with 14 neighboring electric systems, and delivered nearly 168 billion kWh of electricity to TVA customers in 2011. In carrying out its responsibility for grid reliability in the TVA service area, TVA has operated with 99.999 percent reliability over the last 12 years in delivering electricity to customers. See Item 2, Properties — *Transmission Properties* .

To the extent that federal law requires access to the TVA transmission system, the TVA transmission organization offers transmission services to others to transmit power at wholesale in a manner that is comparable to TVA's own use of the transmission system. TVA has also adopted and operates in accordance with a published Standards of Conduct for Transmission Providers and separates its transmission functions from its marketing functions.

TVA is subject to federal reliability standards that are set forth by the North American Electric Reliability Corporation ("NERC") and approved by the FERC. These standards are designed to maintain the reliability of the bulk electric system, including TVA's generation and transmission system. These standards include areas such as maintenance, training, operations, planning, modeling, critical infrastructure, physical and cyber security, vegetation management, and facility ratings. TVA recognizes that reliability standards and expectations are becoming more complex and stringent for transmission systems. Compliance with these standards and expectations may necessitate additional personnel and expanded programs to address the associated exposure to risk of noncompliance. TVA continues to evaluate its options to meet these new measures.

Weather and Seasonality

Weather affects both the demand for and the market prices of electricity. TVA uses degree days to measure the impact of weather on its power operations. Degree days measure the extent to which average temperatures in the five largest cities in TVA's service area vary from 65 degrees Fahrenheit. During 2011, TVA had 280, or nearly eight percent, fewer heating degree days and 215, or over nine percent, fewer cooling degree days than in 2010.

	2011	Percent Change	2010	Percent Change	2009
Combined degree days (normal 5,223)	5,541	(8.2)%	6,036	15.9%	5,209

TVA's power system is generally a dual-peaking system where the demand for electricity peaks during the summer and winter months to meet cooling and heating needs. TVA met an all-time summer peak demand of 33,482 MW on August 16, 2007, at 102 degrees Fahrenheit and an all-time winter peak demand of 32,572 MW on January 16, 2009, at nine degrees Fahrenheit. As a result of a cold wave during the first week of January 2010, TVA set a number of energy demand records. A new total daily energy demand record of 701 GWh was set on January 8, 2010, and a total weekly energy demand record of 4,633 GWh was set for the seven-day period ended January 10, 2010, when TVA experienced an average demand of 27,582 MW per hour for the entire week.

After several years of dry weather and drought conditions in the TVA service area, rainfall and runoff totals improved in the Tennessee Valley during 2011 and 2010. Rainfall in the Tennessee Valley was 96 percent of normal in 2011 and 93 percent of normal in 2010. Runoff was 95 percent of normal in 2011 and 111 percent of normal in 2010. Runoff is the amount of rainfall that is not absorbed by vegetation or the ground and actually reaches the rivers and reservoirs that TVA manages. TVA's conventional hydroelectric generation decreased nine percent in 2011 over 2010, and increased 21 percent in 2010 over 2009. Conventional hydroelectric generation was 94 percent of normal in 2011 and 103 percent of normal in 2010. See Item 1A, Risk Factors, for a discussion of the potential impact of weather on TVA.

TVA's service area experienced an unprecedented series of storms on April 27, 2011, and April 28, 2011, causing significant damage to the TVA power system. See Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations — *2011 Challenges — Weather Extremes* for more information regarding the impact of the storms on TVA. In addition, during the summer of 2011, as in prior years, TVA had to reduce generation from certain nuclear and coal-fired plants to prevent issues associated with high water temperatures in the Tennessee and Cumberland Rivers.

Competition

TVA provides electricity in a service area that is largely free of competition from other electric power providers. This service area is defined primarily by two provisions of law: the fence and the anti-cherrypicking provision. The fence limits the region in which TVA or distributors of TVA power may provide power. The anti-cherrypicking provision limits the ability of others to use the TVA transmission system for the purpose of serving customers within TVA's service area.

From time-to-time there have been efforts to erode the protection of the anti-cherrypicking provision, and the protection of the anti-cherrypicking provision could be limited and perhaps eliminated by Congressional legislation at some time in the future.

Research and Development

TVA makes investments in science and technological innovation to help enable TVA to meet future challenges in a variety of areas. TVA is currently focused on the following initiatives:

- Development of roadmaps for technologies, including smart grid for transmission, SMRs, and strategic transportation electrification;
- Development and testing of infrastructure and technologies to enable consumer awareness and access to demand response and energy efficiency tools;
- Development and demonstration of coal ash utilization technologies;
- Evaluation, demonstration, and implementation of clean and renewable energy technologies that reduce TVA's environmental footprint, including participation in technology evaluations for carbon capture and sequestration and biomass conversion;
- Evaluation, demonstration, and implementation of technologies that improve the operational efficiency and extend asset life of TVA's generation fleet (fossil, nuclear, and hydroelectric);
- Demonstration of Smartwires technology to enable control of individual transmission line power flow;
- Establishment of an integrated carbon sequestration and environmental stewardship pilot project to provide education about carbon cycle, carbon sequestration, and carbon offsets, bioenergy, and TVA's reforestation and environmental stewardship activities; and
- Development of techniques to secure critical cyber transmission assets.

TVA seeks to leverage research and development activities through partnerships with distributors of TVA power, the Electric Power Research Institute ("EPRI"), the DOE, Oak Ridge National Laboratory, other utilities, universities, and industry vendors. Some of these activities include developing technologies to make electric vehicles and the charging stations that fuel them work together efficiently, dealing with demands on the power grid caused by charging stations, finding ways to minimize demands on the power grid, including solar-assisted charging stations and distributed energy storage, and refining existing processes for power system control to maximize energy efficiency.

Environmental Stewardship Activities

TVA's mission includes managing the Tennessee River, its tributaries, and public lands along the shoreline to provide, among other things, year-round navigation, flood damage reduction, affordable and reliable electricity, and, consistent with these primary purposes, recreational opportunities, adequate water supply, improved water quality, and natural resource protection. There are 49 dams that comprise TVA's integrated reservoir system. The reservoir system provides 800 miles of commercially navigable waterways and also provides significant flood reduction benefits both within the Tennessee River system and downstream on the lower Ohio and Mississippi Rivers. The reservoir system also provides a water supply for residential and industrial customers, as well as cooling water for some of TVA's coal-fired and nuclear power plants. TVA's Environmental Policy provides objectives for an integrated approach related to providing cleaner, reliable, and affordable energy, supporting sustainable economic growth, and engaging in proactive environmental stewardship. The Environmental Policy provides additional direction in several environmental stewardship areas, including water resource protection and improvements, sustainable land use, and natural resource management. TVA also manages approximately 293,000 acres of reservoir lands for natural resource protection, recreation, and other purposes.

On August 18, 2011, the TVA Board accepted the Natural Resource Plan ("NRP"). The NRP is designed to enhance stewardship of public recreation facilities, water resources, wildlife and plants, and historic and cultural sites on TVA-managed reservoir lands by helping to guide TVA management to better meet public stewardship objectives while responding to the needs of the TVA region's communities and residents. Implementation of the NRP is expected to be staged over a 20-year period. It is expected to be reviewed and updated at least every five years.

Economic Development Activities

Since its creation in 1933, TVA has promoted the development of the Tennessee Valley. TVA works with its distributor customers, regional, state, and local agencies, and communities to showcase the advantages available to businesses locating or expanding in TVA's service area. At its October 30, 2008 meeting, the TVA Board approved a new economic development initiative, the Valley Investment Initiative. Under the Valley Investment Initiative, TVA and its distributor customers provide an incentive award to new and existing companies in TVA's service area that demonstrate a multi-year commitment to sustained capital investment, the creation of quality jobs, compatible and efficient power use, and a commitment to remain in the TVA service area. Continued recruitment of desirable companies and retention of the current industrial and manufacturing base also continue to be critical to TVA's economic development mission.

Governance

TVA is governed by the TVA Board. The TVA Act provides that the TVA Board shall be composed of nine members, at least seven of whom shall be legal residents of the TVA service area. TVA Board members are appointed by the President of the United States with the advice and consent of the U.S. Senate. TVA Board members serve five-year terms, and at least one member's term ends each year. The TVA Board, among other things, establishes broad goals, objectives, and policies for TVA; develops long-range plans to guide TVA in achieving these goals, objectives, and policies; approves annual budgets; and establishes a compensation plan for employees. Information about members of the TVA Board and TVA's executive officers is discussed in Item 10, Directors, Executive Officers and Corporate Governance.

Regulation

Congress

TVA exists pursuant to legislation enacted by Congress and carries on its operations in accordance with this legislation. Congress can enact legislation expanding or reducing TVA's activities, change TVA's structure, and even eliminate TVA. Congress can also enact legislation requiring the sale of some or all of the assets TVA operates or reduce the United States's ownership in TVA. To allow TVA to operate more flexibly than a traditional government agency, Congress exempted TVA from certain general federal laws that govern other agencies, such as federal labor relations laws and the laws related to the hiring of federal employees, the procurement of supplies and services, and the acquisition of land. Other federal laws enacted since the creation of TVA have been made applicable to TVA, including those related to paying employees overtime and protecting the environment, cultural resources, and civil rights.

Securities and Exchange Commission

Section 37 of the Securities Exchange Act of 1934 (the "Exchange Act") requires TVA to file with the SEC such periodic, current, and supplementary information, documents, and reports as would be required pursuant to section 13 of the Exchange Act if TVA were an issuer of a security registered pursuant to section 12 of the Exchange Act. Section 37 of the Exchange Act exempts TVA from complying with section 10A(m)(3) of the Exchange Act, which requires each member of a listed issuer's audit committee to be an independent member of the board of directors of the issuer. Since TVA is an agency and instrumentality of the United States, securities issued or guaranteed by TVA are "exempted securities" under the Securities Act of 1933, as amended (the "Securities Act"), and may be offered and sold without registration under the Securities Act. In addition, securities issued or guaranteed by TVA are "exempted securities" and "government securities" under the Exchange Act. TVA is also exempt from sections 14(a)-(d) and 14(f)-(h) of the Exchange Act (which address proxy solicitations) insofar as those sections relate to securities issued by TVA, and transactions in TVA securities are exempt from rules governing tender offers under Regulation 14E of the Exchange Act. Also, since TVA securities are exempted securities under the Securities Act, TVA is exempt from the Trust Indenture Act of 1939 insofar as it relates to securities issued by TVA, and no independent trustee is required for these securities.

Federal Energy Regulatory Commission

Under the FPA, TVA is not a "public utility," a term which generally includes investor-owned utilities. Therefore, TVA is not subject to the full jurisdiction that FERC exercises over public utilities under the FPA. TVA is, however, an "electric utility" and a "transmitting utility" as defined in the FPA and, thus, is directly subject to certain aspects of FERC's jurisdiction.

- Under section 210 of the FPA, TVA can be ordered to interconnect its transmission facilities with the electrical facilities of qualified generators and other electric utilities that meet certain requirements. It must be found that the requested interconnection is in the public interest and would encourage conservation of energy or capital, optimize efficiency of facilities or resources, or improve reliability. The requirements of section 212 concerning the terms and conditions of interconnection, including reimbursement of costs, must also be met.

- Under section 211 of the FPA, TVA can be ordered to transmit power at wholesale rates provided that the order (1) does not impair the reliability of the TVA or surrounding systems and (2) meets the applicable requirements of section 212 concerning terms, conditions, and rates for service. Under section 211A of the FPA, TVA is subject to FERC review of the transmission rates and the terms and conditions of service that TVA provides others to ensure comparability of treatment of such service with TVA's own use of its transmission system and that the terms and conditions of service are not unduly discriminatory or preferential. The anti-cherrypicking provision of section 212 of the FPA precludes TVA from being ordered to wheel another supplier's power to a customer if the power would be consumed within TVA's defined service territory.

- Sections 221 and 222 of the FPA, applicable to all market participants, including TVA, prohibit (1) using manipulative or deceptive devices or contrivances in connection with the purchase or sale of power or transmission services subject to FERC's jurisdiction and (2) reporting false information on the price of electricity sold at wholesale or the availability of transmission capacity to a federal agency with intent to fraudulently affect the data being compiled by the agency.

- Under section 215 of the FPA, TVA must comply with certain standards designed to maintain transmission system reliability. These standards are approved by FERC and enforced by the Electric Reliability Organization.

- Section 206(e) of the FPA provides FERC with authority to order refunds of excessive prices on short-term sales (transactions lasting 31 days or less) by all market participants, including TVA, in market manipulation and price gouging situations if such sales are under a FERC-approved tariff.

- Section 220 of the FPA provides FERC with authority to issue regulations requiring the reporting, on a timely basis, of information about the availability and prices of wholesale power and transmission service by all market participants, including TVA.

- Under sections 306 and 307 of the FPA, FERC may investigate electric industry practices, including TVA's operations previously mentioned that are subject to FERC's jurisdiction.

- Under sections 316 and 316A of the FPA, FERC has authority to impose civil penalties of up to $1 million a day for each violation on entities subject to the provisions of Part II of the FPA, which includes the above provisions applicable to TVA. Criminal penalties may also result from such violations.

Finally, while not required to do so, TVA has elected to implement various FERC orders and regulations pertaining to public utilities on a voluntary basis to the extent that they are consistent with TVA's obligations under the TVA Act.

Nuclear Regulatory Commission

TVA operates its nuclear facilities in a highly regulated environment and is subject to the oversight of the NRC, an independent agency which sets the rules that users of radioactive materials must follow. The NRC has broad authority to impose requirements relating to the licensing, operation, and decommissioning of nuclear generating facilities. In addition, if TVA fails to comply with requirements promulgated by the NRC, the NRC has the authority to impose fines, shut down units, or modify, suspend, or revoke TVA's operating licenses.

Environmental Protection Agency

TVA is subject to regulation by the EPA in a variety of areas, including air quality control, water quality control, and management and disposal of hazardous wastes. See *Environmental Matters.*

States

The Supremacy Clause of the U.S. Constitution prohibits states, without congressional consent, from regulating the manner in which the federal government conducts its activities. As a federal agency, TVA is exempt from regulation, control, and taxation by states except in certain areas such as air and water quality where Congress has given the states limited powers to regulate federal activities.

Other Federal Entities

TVA's activities and records are also subject to review to varying degrees by other federal entities, including the Government Accountability Office and the Office of Management and Budget. There is also an Office of the Inspector General which reviews TVA's activities and records.

Taxation and Tax Equivalents

TVA is not subject to federal income taxation. In addition, neither TVA nor its property, franchises, or income is subject to taxation by states or their subdivisions. Section 13 of the TVA Act does, however, require TVA to make tax equivalent payments to states and counties in which TVA conducts power operations or in which TVA has acquired power-producing properties previously subject to state and local taxation. The total amount of these payments is five percent of gross revenues from the sale of power during the preceding year excluding sales or deliveries to other federal agencies and off-system sales with other utilities, with a provision for minimum payments under certain circumstances. Except for certain direct payments TVA is required to make to counties, distribution of tax equivalent payments within a state is determined by individual state legislation.

Environmental Matters

TVA's power generation activities, like those across the utility industry and in other industrial sectors, are subject to most federal, state, and local environmental laws and regulations. Major areas of regulation affecting TVA's activities include clean air control, water quality control, and management and disposal of solid and hazardous wastes. In the future, regulations in all of these areas are expected to become more stringent and to apply to additional emissions and sources.

Clean Air Regulations

The CAA establishes a comprehensive program to protect and improve the nation's air quality and control sources of air emissions. The major CAA programs that affect TVA's power generation activities are described below.

National Ambient Air Quality Standards. The CAA requires the EPA to set minimum National Ambient Air Quality Standards ("NAAQS") for certain air emissions and the EPA has done this for ozone, particulate matter ("PM"), sulfur dioxide ("SO_2"), and nitrogen dioxide ("NO_2"). The CAA established two types of NAAQS: (1) primary standards, which set limits to protect public health, and (2) secondary standards, which set limits to protect public welfare. Most NAAQS require measurement over a defined period of time (typically one hour, eight hours, twenty-four hours, or one year) to determine the average concentration of the pollutant present in a defined geographic area.

When a NAAQS has been established, each state must recommend, and the EPA must designate, the areas within its boundaries that meet NAAQS ("attainment areas") and those that do not ("non-attainment areas"). Each state must develop a state implementation plan ("SIP") to bring non-attainment areas into compliance with NAAQS and maintain good air quality in attainment areas. Non-attainment designations can have serious repercussions by, among other things, causing states to impose stricter controls on industrial facilities, including TVA's power plants, and complicating the air permitting process for the construction, expansion, or modification of industrial facilities. If counties in which TVA facilities are located are designated as non-attainment for one or more types of emissions, TVA's expansion or modification plans could be affected, possibly resulting in increased costs or schedule delays. The NAAQS that affect or potentially affect TVA operations are summarized below.

NAAQS for Ozone. In March 2008, the EPA issued final rules adopting new, more stringent eight-hour NAAQS for ozone. The EPA lowered the primary standard from 84 parts per billion to 75 parts per billion and promulgated a new secondary standard that is the same as the primary standard. Virtually all of the larger cities in the TVA service area, as well as those rural counties where ozone monitors are present, will likely be designated as non-attainment areas under the new standard. States must submit to the EPA no later than CY 2014 plans that demonstrate attainment with the standard. Areas must reach attainment by deadlines that vary (CY 2016 to CY 2030) depending on the severity of the ozone problem.

On January 19, 2010, the EPA published a proposed rule that would establish more stringent primary and secondary ozone NAAQS. The EPA announced that it planned to publish the final rule with the new ozone standards before the end of CY 2011. However, on September 2, 2011, the EPA decided to reconsider the proposal at the request of the White House. This effectively leaves the 75 parts per billion ozone standard in place until the required review in 2013. As the ozone standards become more stringent, utilities are expected to come under increasing pressure to further reduce nitrogen oxides ("NO_x") emissions from their existing fossil plants.

NAAQS for Particulate Matter. The EPA has developed annual NAAQS for coarse particulate matter (defined as particles of 10 micrometers or larger) and both annual and 24-hour NAAQS for fine particulate matter (particles with a size of up to 2.5 micrometers). The EPA has stated they will not be changing the current standard for coarse particulate matter. On October 8, 2009, the EPA issued non-attainment designations for areas not meeting the 24-hour NAAQS for fine particulate matter. In the TVA service area, some counties have been designated as non-attainment. TVA operates coal-fired power plants in Anderson and Roane Counties, which have been designated as non-attainment. TVA also operates a coal-fired plant in Jackson County, Alabama, and part of that county is designated non-attainment for the annual fine particulate standard. State and some local governments will be required to take steps to control fine particulate pollution affecting these non-attainment areas. Those steps may include stricter controls on industrial facilities, possibly including TVA's power plants, and additional planning requirements for transportation-related sources. States must submit their SIPs to the EPA within three years after the EPA makes final nonattainment area designations. Areas are required to attain the standard no later than five years after the effective date of the designations. The EPA may grant attainment date extensions for up to five additional years in areas with more severe fine particulate matter problems as well as in areas where emissions control measures are not available or feasible. The EPA is currently reconsidering the annual and 24-hour fine particulate standards, and if lowered as expected, it is likely that there will be additional non-attainment designations in the TVA service area.

NAAQS for SO_2. On June 2, 2010, the EPA established a new one-hour SO_2 NAAQS at 75 parts per billion and revoked the 24 hour and annual SO_2 NAAQS. The EPA expects to designate areas as attainment, non-attainment, or unclassifiable by January 2012 based on the existing monitoring network. The State of Tennessee has submitted two areas in the state to the EPA to be considered for non-attainment designations. These recommended designations are based on actual monitoring data from these areas. Non-attainment designations are expected to result in lower SO_2 emission limits for sources of SO_2 in or near these areas. The EPA expects to make attainment designations based on modeling by 2015. Several areas in the TVA service area are expected to be designated non-attainment, and the new standard is expected to make permitting for some new and modified sources, including TVA sources, more difficult. SO_2 emission reductions from some existing TVA and industrial sources may be required.

NAAQS for NO_2. On January 22, 2010, the EPA established a new one-hour NAAQS for NO_2 at the level of 100 parts per billion. To determine compliance with the new standard, the EPA is establishing new ambient air monitoring requirements near major roads as well as in other locations where maximum concentrations are expected. Although existing air quality monitors do not currently show exceedances of this new standard in the TVA service area, additional community and roadside monitoring is expected to result in the designation of new non-attainment areas. The EPA intends to re-designate areas in CY 2016 or CY 2017, as appropriate, based on the air quality data from the new monitoring network. This new short-term standard could make permitting new and modified sources, including TVA sources, more difficult. Several areas in the TVA service area are expected to be designated non-attainment. The EPA considers the TVA service areas as unclassifiable until the required monitoring is completed.

New Source Review. The NSR provisions of the CAA require persons constructing new major air emission sources or making major modifications to existing air pollution sources to obtain a permit prior to such construction or modifications. Major modifications are non-routine physical or operational changes that increase the emissions from an air emission source above specified thresholds. In order to proceed with a project, the facility must first obtain a permit which requires the identification and implementation of Best Available Control Technology ("BACT") for all regulated air pollutants emitted above the prescribed thresholds and an analysis of the ambient air quality impacts of the new construction or major modification. In 1999, the EPA announced plans to actively pursue NSR enforcement actions against electric utilities for making changes to their coal-fired power plants without obtaining an NSR permit. Under section 114 of the CAA, the EPA has the authority to request from any person who owns or operates an emission source information and records about operation, maintenance, and emissions as well as other data relating to such source for the purpose of developing regulatory programs, determining if a violation occurred (such as the failure to comply with NSR), or carrying out other statutory responsibilities. If violations are found to have occurred, the EPA or, possibly, other enforcement authorities could require the installation of new pollution control equipment and could impose fines and penalties. See *Current Power Supply — Coal-Fired* and Note 20 — *Legal Proceedings — Environmental Agreements, — Case Involving Alleged Violations of the New Source Review Regulations at Bull Run, — John Sevier Fossil Plant Clean Air Act Permit, — Paradise Fossil Plant Clean Air Act Permit, — Shawnee Fossil Plant Clean Air Act Permit,* and — *Information Request from the EPA* for a discussion of the Environmental Agreements into which TVA entered that resolve most issues concerning NSR. Possible claims for NSR violations involving increases in greenhouse gases ("GHG") and sulfuric acid mist from projects can still be pursued in the future.

Cross State Air Pollution Rule. On July 7, 2011, the EPA announced the final Cross State Air Pollution Rule ("CSAPR"). This rule, required by court order, will replace the existing Clean Air Interstate Rule ("CAIR") effective January 1, 2012. CSAPR will regulate SO_2 and NO_x emissions from upwind states that are negatively impacting ozone and fine particulate air quality in downwind states. This rule will affect electrical generating utilities within 27 states, including TVA coal and gas-fired plants in Alabama, Kentucky, Mississippi, and Tennessee. Stringent state level emission caps for SO_2 and NO_x will begin in 2012 with further reductions required in 2014 for some states. TVA is in the process of evaluating the impact of the rule. On October 6, 2011, the EPA proposed revisions to CSAPR which will allow slightly more ozone season NO_x emissions in Mississippi, where TVA has purchased a combined cycle natural gas plant. It also proposes to reduce the SO_2 and NO_x allowances allocated to coal-fired plants in Alabama, Kentucky, and Tennessee to match the more stringent requirements of the Environmental Agreements for the years 2013, 2018, and 2019.

Hazardous Air Pollutants from Industrial, Commercial, and Institutional Boilers. On March 21, 2011, the EPA published a final rule to establish standards for hazardous air pollutants emitted from industrial, commercial, and institutional boilers and process heaters. The final rule will have minor impacts beginning in CY 2014 for some of TVA's startup and auxiliary boilers. Most boilers will require scheduled maintenance to ensure optimized combustion, and a few may require the installation of controls. Concurrently with the issuance of the rule, the EPA announced reconsideration of several elements in the rule. Until the reconsideration process is completed, final specific requirements are too uncertain to predict. The EPA expects to issue final standards by the end of April 2012.

Hazardous Air Pollutants from Steam Electric Utility Units. On March 16, 2011, the EPA released for public comment a proposed rule to establish standards for hazardous air pollutants emitted from steam electric utility units. As proposed, the rule would require additional controls for hazardous air pollutants including mercury, non-mercury metals, and acid gasses for many of TVA's coal-fired units in the 2015-2016 timeframe. Boiler combustion systems will require scheduled maintenance to ensure optimized combustion to minimize emissions of organic hazardous air pollutants. TVA may choose to idle or retire some units in lieu of investing in additional controls. The EPA also is proposing to revise the New Source Performance Standards ("NSPS") for new and reconstructed coal and oil-fired units for emissions of PM, SO_2, and NO_x. New PM and NO_x standards for modified units are also included in the NSPS. The EPA intends to issue the final rule for utility hazardous air pollutants in December 2011. Until the final rules are published, specific requirements are too uncertain to predict.

The Environmental Agreements. The Environmental Agreements became effective on June 13, 2011. These Agreements settled several outstanding legal challenges resulting in TVA agreeing to pay, among other payments, a total of $10 million in civil penalties to the EPA, Alabama, Kentucky, and Tennessee. In the agreements TVA agreed to retire 18 coal-fired units by the end of 2017 and to remove from service, control, convert, or retire an additional 16 units by June 20, 2019. See Note 20 — *Legal Proceedings — Environmental Agreements.*

Multi-Pollutant Legislation. The U.S. Congress has expressed interest in prior years in adopting multi-pollutant control legislation focused on the electric power sector. Among other things, such an approach could seek to establish coordinated caps for power plant emissions of mercury, SO_2, NO_x, and, in some cases, carbon dioxide ("CO_2"). TVA cannot predict whether multi-pollutant legislation will ultimately become law. The legislative and regulatory landscape is continuing to change for these and other issues, and the outcome cannot be predicted accurately at this time.

Acid Rain Program. Congress established the Acid Rain Program to achieve reductions in emissions of SO_2 and NO_x, the primary causes of acid rain. The program includes a cap-and-trade emission reduction program for SO_2 emissions from power plants. By CY 2000, the program established a nationwide cap on power plant SO_2 emissions of 8.9 million tons per year. The program also contains requirements for power plants to reduce NO_x emissions through the use of available combustion controls. The EPA's CAIR and CSAPR programs are more stringent in the Tennessee Valley region than the Acid Rain Program legislation established by Congress. Therefore, TVA forecasts that the Acid Rain Program will have no impact on TVA other than administrative reporting.

Regional Haze Program. On June 15, 2005, the EPA issued the Clean Air Visibility Rule, amending its CY 1999 regional haze rule, which had established time lines for states to improve visibility in national parks and wilderness areas throughout the United States. Under the amended rule, certain types of older sources may be required to install best available retrofit technology. To comply with this requirement, certain utilities, including TVA, may have to install additional controls for particulate matter, SO_2, and NO_x emissions. TVA does not anticipate that this program has the potential to impact any unit other than Colbert Unit 5.

Opacity. Opacity, or visible emissions, measures the denseness (or color) of power plant plumes and has traditionally been used by states as a means of monitoring good maintenance and operation of particulate control equipment. Under some conditions, retrofitting a unit with additional equipment to better control SO_2 and NO_x emissions can adversely affect opacity performance, and TVA and other utilities are addressing this issue. The evaluation of a utility's compliance with state opacity requirements is coming under increased scrutiny, especially compliance during periods of startup, shutdown, and malfunction. SIPs developed under the CAA typically exclude periods of startup, shutdowns, and malfunctions. The EPA recently reversed its previous approval of Alabama's SIP for opacity and this has been challenged in court.

Climate Change

Legislation. Although it is unlikely that climate change legislation will pass during the 112th Congress, Congress may consider climate change and energy-related proposals. It is not unreasonable to anticipate that new EPA regulations or laws may set limits on GHG emissions for the electric utility sector. Prospects for future proposals becoming law, and the resulting potential impact on electric rates, are not clear at this time. However, if GHG emission reductions from electricity generating facilities become mandatory, the costs and impacts are expected to be significant, especially for coal-fired plants.

Regulation. On April 2, 2007, the U.S. Supreme Court issued a decision in *Massachusetts v. EPA* holding that GHG emissions, including CO_2, are "air pollutants" under the CAA and requiring the EPA to determine whether GHGs from new motor vehicles pose a threat to health and welfare. On December 15, 2009, the EPA published its finding under the CAA that six identified GHGs contribute to air pollution that may endanger public health or welfare, which triggered the statutory requirement that the EPA regulate emissions of GHGs from motor vehicles. CAA permitting programs for stationary sources must now, as of January 2011, also address GHGs.

PSD/Title V Permitting Programs. On May 13, 2010, the EPA issued a final rule to establish applicability thresholds that trigger reviews under the Prevention of Significant Deterioration ("PSD") and Title V permitting programs for GHG emissions from major stationary sources. The threshold levels established by this rule, known as the Tailoring Rule, include both a mass-based calculation and a metric known as the carbon dioxide equivalent (“CO_2e”), which incorporates the global warming potential for each of the six individual gases identified in the endangerment finding. This final rule “tailors” the requirements of these CAA permitting programs to designate which facilities will be required to obtain PSD and Title V permits. Under the Tailoring Rule, the EPA will phase in the CAA permitting requirements for emissions of GHG from stationary sources in at least three phases, the first two of which are relevant to large GHG sources such as TVA’s coal-fired generation facilities.

The first phase of the Tailoring Rule became effective January 2, 2011, and applies only to sources that were already subject to PSD and/or Title V programs because of their emission levels of other regulated pollutants. Under the first phase, a source will be subject to PSD requirements for GHGs if (1) the source is already subject to PSD requirements for another pollutant and (2) the source increases its GHG emissions by at least 75,000 tons per year on a CO_2e basis. Those sources may be required to conduct a BACT review for their GHG emissions. The EPA has issued guidance on the technologies or operations that would constitute BACT for GHGs. Pending the commercial demonstration of technologies such as carbon capture and sequestration, it is expected that the use of energy efficiency measures will constitute BACT. Additionally, under the first phase, any source that was required to have a Title V permit for a non-GHG pollutant is required to address GHG requirements, including monitoring, record keeping, and reporting requirements, when it applies for, renews, or revises its Title V permit.

The second phase of the Tailoring Rule became effective July 1, 2011, and, unlike the first phase, is not limited to sources that are already subject to PSD and/or Title V programs. Under the second phase, the EPA has established different thresholds for construction and modification activities. Construction of a major source will become subject to PSD requirements for GHGs if the construction results in an increase in GHG emissions of at least 100,000 tons per year on a CO_2e basis. The modification of an existing major source will become subject to PSD requirements for GHGs if the modification results in an increase in GHG emissions of at least 75,000 tons per year on a CO_2e basis. Additionally, under the second phase, sources that emit GHGs in an amount equal to at least 100,000 ton per year on a CO_2e basis will be required to obtain a Title V permit if they do not have one already.

New Source Performance Standards for GHG Emissions. In December 2010, the EPA entered into a settlement agreement with various states and environmental groups that establishes a schedule for setting new standards for regulating GHG emissions from oil and coal-fired electric generating units. On June 13, 2011, the EPA and these states and environmental groups agreed to a two-month postponement of the EPA’s deadline to propose GHG limits on new and modified power plants. The original deadline for the EPA to propose NSPS standards for power plants was July 26, 2011. The deadline was extended to September 30, 2011, but the EPA announced that it will miss that deadline and is working on developing a new schedule for the rule. The original deadline for the final rule was May 26, 2012, but it is possible that the EPA will request an extension for the final rule deadline. These rules will affect TVA, but the extent of the impact is not yet known.

Biomass CO_2 Emissions. On July 1, 2011, the EPA’s final rule that determined that GHG emissions from biomass combustion will not be counted toward emission thresholds for PSD and Title V permitting under the second phase of the EPA’s Tailoring Rule for a period of three years became effective. During this three-year interim period, the EPA will examine how to evaluate CO_2 emissions from biomass. The EPA released a companion document that provides guidance for the determination of BACT in PSD proceedings involving biogenic CO_2 emissions from bioenergy facilities.

GHG Emission Reporting. On October 30, 2009, the EPA published the final rule for mandatory monitoring and annual reporting of GHG emissions from various categories of facilities, including fossil fuel suppliers, industrial gas suppliers, direct GHG emitters (such as electric generating facilities), and manufacturers of heavy-duty and off-road vehicles and engines. This rule does not require controls or limits on emissions, but requires data collection beginning January 1, 2010, with the first annual reports due on September 30, 2011. The requirements for monitoring, reporting, and record keeping with respect to GHG emissions from existing units should not have a material impact on TVA.

Executive Orders. In October 2009, President Obama signed Executive Order (“EO”) 13514, which requires federal agencies to establish GHG emission reduction targets and prepare inventories of GHG emissions including emissions of CO_2, methane, nitrous oxide, hydroflourocarbons, perfluorocarbon gases, and sulfur hexafluoride. The White House Council on Environmental Quality (“CEQ”) released final Federal Greenhouse Gas Accounting and Reporting Guidance on October 6, 2010, which is the basis for these inventories. TVA submitted its first Strategic Sustainability Performance Plan to OMB in June 2010 and updated it per the Executive Order.

In March 2011, the CEQ issued formal guidance to federal agencies on the development of climate change adaptation plans, intended to assist those agencies in fulfilling the requirements of EO 13514. Pursuant to EO 13514, TVA incorporated climate change-related considerations into its existing planning processes, including the development of measurable goals and performance metrics to guide adaptation efforts and assess whether efforts are achieving desired outcomes. TVA completed all 2011 EO 13514 requirements.

International Accords . The Kyoto Protocol was adopted in 1997 by the United Nations to address global climate change by reducing emissions of CO_2 and other GHGs. Although the United States has not adopted the Kyoto Protocol, the

United States pledged to reduce its GHG emissions in the range of 17 percent below CY 2005 levels by CY 2020 in connection with the 15th Conference of the Parties to the United Nations Framework Convention on Climate Change. An act of the U.S. Congress is required to make such a reduction in GHG emissions enforceable. TVA is unable to predict whether any such climate-related legislation requiring such reductions in GHG emissions ultimately will become law.

Litigation . In addition to legislative activity, climate change issues are the subject of a number of lawsuits, including lawsuits against TVA. See Note 20 — *Legal Proceedings — Cases Arising out of Hurricane Katrina* and — *Global Warming Cases, Southern District of New York* .

Indirect Consequences of Regulation or Business Trends . Legal, technological, political, and scientific developments regarding climate change may create new opportunities and risks. The potential indirect consequences could include an increase or decrease in electricity demand, increased demand for generation from alternative energy sources, and subsequent impacts to business reputation and public opinion. See *Future Power Supply.*

Physical Impacts of Climate Change . The United States Global Change Research Program has concluded, in its 2009 Global Climate Change Impacts in the U.S., that warming of the climate is unequivocal and that the warming observed over the past 50 years is due primarily to human-induced emissions of GHGs. Climate change creates physical and financial risk. Physical risks from climate change may include an increase in sea level and changes in weather conditions, such as changes in precipitation and extreme weather events. TVA does not serve any coastal communities, so the possibility of sea level rise does not directly affect TVA or its customers. Changes in weather conditions, primarily temperature and humidity, will vary TVA's customers' energy needs. Energy use may increase or decrease depending on the duration and magnitude of the changes, having a positive or negative effect on TVA revenues. To the extent climate change impacts the economic health of the TVA service area, it will also impact TVA's revenues as TVA's financial performance is tied to the regional economies it serves.

In November 2009, EPRI published a report entitled *Potential Impacts of Climate Change on Natural Resources in the Tennessee Valley Authority Region* (the "EPRI Report"). TVA co-sponsored this report, with the objective of providing preliminary information on climate change impacts across the TVA service area. The EPRI Report was based on data from the Fourth Assessment Report of the Interagency Panel on Climate Change published in CY 2007. Subject to substantial uncertainties, the EPRI Report predicted that future (2020-2100) precipitation in the TVA service area will increase approximately three percent during the winter and will be unchanged over the summer in the eastern portion of the TVA service area, but will decline six to seven percent over the western portion of TVA's service area. In addition, extreme weather events such as droughts and floods are also expected to become more frequent, although their frequency is difficult to quantify. The EPRI Report also predicted that temperatures could increase across the TVA service area by approximately one degree Celsius by 2020, two degrees Celsius by 2050, and three to four degrees Celsius by 2100.

If realized, projected changes in precipitation and increasing temperatures could impact future TVA management of water resources in the Tennessee Valley in the following ways:

Power generation . Power generation depends on having sufficient water flow available for hydroelectric generation. Hydroelectric generation will depend on the precipitation runoff within each reservoir drainage basin and the upstream flow into each reservoir. Power generation also depends on having water available for cooling fossil and nuclear power plants. Cooling water is withdrawn and then returned to the source. Increasing water temperatures would require withdrawing more water to achieve the same amount of cooling at fossil and nuclear power plants, increasing the cooling capacities of plants, or reducing power generation to match the available water supply. See *Water Quality Control Developments.*

Agricultural, municipal, and industrial uses . Agricultural, municipal, and industrial water uses are driven by temperature and extreme weather. Warmer temperatures and drought will increase water demand for these purposes.

Navigation . Commercial navigation relies on maintaining the minimum channel depth as well as reasonable flow rates. Increasingly frequent extreme weather events (drought episodes and flooding) may create more challenges to maintaining the entire length of a commercial navigation channel.

Aquatic life . Water quality impacts the aquatic life dependent on the river system. Changes in water flow due to the increasing frequency of extreme weather events may impact the habitats and biodiversity of the Tennessee River system.

As changes in future precipitation and temperature develop, the current river management system employed by TVA may require periodic re-evaluations to balance the competing water use interests across the Tennessee Valley.

Actions Taken by TVA to Reduce GHG Emissions . TVA has taken significant voluntary steps to reduce GHG emissions, including the following:

- As discussed earlier in this Item 1, Business, TVA has increased its nuclear capacity, modernized its hydroelectric program, increased its purchases of renewable resources, and helped reduce demand for electricity through its energy efficiency initiatives.

- In 2011, TVA began planting carbon sequestration test plots near Watts Bar Dam in Rhea County, Tennessee. The test plots are designed to demonstrate the beneficial use of two types of vegetation in the terrestrial sequestration of CO_2. While TVA has a long history of tree planting and reforestation efforts, this project is the first time TVA is planting trees to generate offsets from CO_2 sequestration. The project will also evaluate growing biomass as a sustainable energy crop and investigate how terrestrial CO_2 sequestration, wildlife habitat, and land protection can be integrated with environmental stewardship.

- TVA is a member of the Southeast Regional Carbon Sequestration Partnership and is working with EPRI and other electric utilities on projects investigating technologies for CO_2 capture and geologic storage, as well as CO_2 sequestration via reforestation. TVA is also a federal agency participant in the Southeast Climate Center and the Appalachian Landscape Conservation Cooperative.

- Under the Environmental Agreements, TVA agreed to significantly reduce its reliance on coal-fired generation in the future. See *Current Power Supply — Coal-Fired* for a discussion of the Environmental Agreements and TVA's plans with respect to coal-fired generation.

- In August 2011, the TVA Board approved the completion of Bellefonte Unit 1. This unit is expected to be completed by 2020 and to provide approximately 1,260 MW of capacity.

TVA's CO_2 Emissions. In FY 2011, TVA produced about 85 million tons of CO_2. Historically, TVA has produced about 100 million tons of CO_2 per year. TVA produced less CO_2 in 2011 because of a decrease in coal-fired generation.

Renewable Energy Standards

It is unclear whether the U.S. Congress will adopt a law that will require TVA to acquire a certain percentage of electric generation from a specified list of eligible renewable energy technologies. Under legislation proposing a federal renewable energy standard, TVA would likely be required to ensure that a certain percentage of the electricity it sells is produced by defined renewable energy sources. Although TVA considers all hydroelectric generation a renewable source, it is unlikely all hydroelectric generation will contribute to a future renewable portfolio standard requirement. Some proposals would allow utilities to count hydroelectric facility upgrade generation as renewables for these purposes. In addition, utilities may be allowed to pay alternative compliance payments if the required percentage of electricity generation by renewable energy sources could not be met because of certain restrictions.

Some states have established various requirements for electric utilities to generate a certain amount of electricity from renewable sources, including one state in the TVA service area (North Carolina). The North Carolina program does not apply directly to TVA but does apply to TVA distributor customers located in that state. TVA's policy is to provide compliance assistance to any distributor of TVA power, and TVA is providing assistance to the four distributors that sell TVA power in North Carolina.

Water Quality Control Developments

The EPA proposed a new rule on March 28, 2011, designed to minimize the adverse impacts to fish and shellfish from the design and operation of cooling water intake structures at existing power plants. The new rule identifies proposed changes in the operation of cooling water intakes and modifications to their design. All of the intakes at TVA's existing coal-fired and nuclear generating facilities are likely to be subject to the new rule. Because of the uncertainty of the final rule development, the impacts of the rulemaking are uncertain at this time. However, compliance with the final rule could potentially result in significant increases in TVA's capital costs and operating and maintenance costs.

The EPA and many states are taking increased interest in potential effects of hydrothermal discharges. TVA is working with states and the EPA to demonstrate that the data collected in the vicinity of TVA plants is sufficient to assess the impacts of thermal discharges on the aquatic environment and validate existing thermal limits. TVA expects to collect substantially more in-stream biological and temperature data than in the past to justify current thermal limits. Specific data requirements in the future will be determined based on negotiations between TVA and regulators.

Water temperature issues at TVA's Cumberland Fossil Plant ("Cumberland") continue to be complicated by reduced flows in the Cumberland River due to ongoing repairs at Wolf Creek and Center Hill dams initiated by the U.S. Army Corps of Engineers in CY 2007. The greatly reduced flows, combined with thermal discharges at Cumberland, have resulted in increased stress to aquatic organisms and have contributed to a portion of Barkley Reservoir being included on the State of Tennessee's CY 2008 list of impaired waters. The lower river flows are expected to continue to impact TVA's ability to operate Cumberland at normal rates, which may result in increased spending for power purchases. TVA continues to work with the U.S. Army Corps of Engineers and TDEC to alleviate aquatic impacts in the Barkley Reservoir and to improve the conditions in the reservoir.

The effluent guidelines required by the Clean Water Act for the Steam Electric Power Generating Category were last revised by the EPA in CY 1982. The EPA is currently conducting studies and surveys of wastewater discharges from the industry, and is expected to issue a proposed rule to revise the existing guidelines in CY 2012. A future rule is expected to focus on wastewaters from ash handling and clean air control systems. The revised effluent guidelines are likely to require more restrictive discharge limitations through more advanced wastewater treatment, resulting in significant additional expenditures to meet the new requirements.

As is the case in other industrial sectors, TVA and other utilities are also facing more stringent requirements related to the protection of wetlands, reductions in storm water impacts from construction activities, new water quality criteria for nutrients and other pollutants, wastewater analytical methods, and regulation of herbicide discharges. In addition, other new environmental requirements under the Clean Water Act related to mountain top mining of coal in the Appalachian region may result in additional increases in the costs of fuel for TVA's coal-fired power plants.

Cleanup of Solid and Hazardous Wastes

Liability for releases and cleanup of hazardous substances is primarily regulated under the federal Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), and other federal and parallel state statutes. In a manner similar to many other industries and power systems, TVA has generated or used hazardous substances over the years.

Non-TVA Sites. TVA is aware of alleged hazardous-substance releases at eight non-TVA areas for which it may have some liability. There is little or no known evidence that TVA contributed any significant quantity of hazardous substances to six of the non-TVA areas. There is evidence that TVA sent some materials to the remaining two non-TVA sites: the David Witherspoon site in Knoxville, Tennessee and the Ward Transformer site in Raleigh, North Carolina.

David Witherspoon Site. The David Witherspoon site in Knoxville, Tennessee, was contaminated with radionuclides, polychlorinated biphenyls ("PCBs"), and metals. The DOE admitted to being the main contributor of materials to the site and cleaned the site up at a reported cost of about $35 million. Although the DOE asked TVA to "cooperate" in completing the cleanup, TVA believes it sent only a relatively small amount of equipment to the site and that none of it was radioactive; accordingly, TVA believes that its liability for these cleanup costs is limited.

Ward Transformer Site. The Ward Transformer site in Raleigh, North Carolina, is contaminated by PCBs from electrical equipment. There is documentation showing that TVA sent a limited amount of electrical equipment containing PCBs to the site in CY 1974. A working group of potentially responsible parties (the "PRP Work Group") is cleaning up on-site contamination in accordance with an agreement with the EPA. The cleanup effort has been divided into four areas: two phases of soil cleanup; cleanup of off-site contamination in the downstream drainage basin; and supplemental groundwater remediation. The cost estimate for the first phase of soil cleanup is approximately $55 million. The cost estimate for the second phase of soil cleanup is $10 million. Estimates for cleanup of off-site contamination in the downstream drainage basin range from $6 million to $25 million. There are no reliable estimates for the supplemental groundwater remediation phase. On April 30, 2009, the PRP Work Group filed an amended complaint in federal court against potentially responsible parties who had not yet settled, including TVA, regarding the two phases of soil cleanup. TVA settled this lawsuit and its potential liability for the two phases of soil cleanup for $300 thousand and has been dismissed as a party. Although the settlement with respect to the first two phases does not prohibit TVA from having liability in connection with the other two phases or any natural resource damages, the U.S. Department of Justice is attempting to negotiate a government-wide settlement of the liability of all federal agencies (including TVA) for cleanup of offsite contamination in the downstream drainage basin and the investigative portion of the supplemental groundwater remediation.

TVA operations at some TVA facilities have resulted in oil spills and other contamination that TVA is addressing. At September 30, 2011, TVA's estimated liability for cleanup and similar environmental work for those sites for which sufficient information is available to develop a cost estimate is approximately $22 million and is included in Other liabilities on the Balance Sheet.

Coal Combustion Wastes

On May 4, 2010, the EPA released the text of a proposed rule describing two possible regulatory options it is considering under the Resource Conservation and Recovery Act ("RCRA") for the disposal of coal combustion wastes ("CCWs") generated from the combustion of coal by electric utilities and independent power producers. Under either option, the EPA would regulate the construction of impoundments and landfills, and seek to ensure both the physical and environmental integrity of disposal facilities. CCWs include fly ash, bottom ash, boiler slag, and flue gas desulfurization materials. If these materials are beneficially reused, they are referred to as coal combustion products ("CCP"). If these materials are destined for disposal, they are referred to as CCRs.

Under the first proposed regulatory option, the EPA would list CCRs destined for disposal in landfills or surface impoundments as "special wastes" subject to regulation under Subtitle C of RCRA. Subtitle C regulations set forth the EPA's hazardous waste regulatory program, which regulates management and disposal of wastes. The proposed rule would create a new category of waste so that CCRs would be subject to many of the Subtitle C regulatory requirements. Under this option, coal ash would be subject to technical requirements from the point of generation to final disposal. Transporters and treatment, storage, and disposal facilities would be subject to federal requirements and permits. The EPA is considering imposing disposal facility requirements such as liners, groundwater monitoring, fugitive dust controls, financial assurance, corrective action, closure of units, and post-closure care. This first option also proposes requirements for dam safety and stability for surface impoundments, land disposal restrictions, treatment standards for coal ash, and a prohibition on the disposal of treated CCRs below the natural water table. This first option would not apply to certain beneficial reuses of CCWs.

Under the second proposed regulatory option, the EPA would regulate the disposal of CCRs under Subtitle D of RCRA, the regulatory program for non-hazardous solid wastes. Under this option, the EPA is considering issuing national minimum criteria to ensure the safe disposal of CCRs, which would subject disposal units to location standards, composite liner requirements, groundwater monitoring, corrective action standards for releases, closure and post-closure care requirements, and requirements to address the stability of surface impoundments. This second option would not regulate the storage or treatment of CCRs prior to disposal, and no federal permits would be required.

The proposed rule also states that the EPA is considering listing CCRs as a hazardous substance under CERCLA, and includes proposals for alternative methods to adjust the statutory reportable quantity for CCRs. The extension of CERCLA to CCRs could significantly increase TVA's liability for cleanup of past and future CCR disposal.

The EPA has not announced which regulatory approach it will take with respect to the management and disposal of CCWs. TVA is therefore unable to determine the effects of this proposed rule at this time.

Kingston Ash Spill

See Note 8 for a discussion of the environmental issues associated with the Kingston ash spill.

Environmental Investments

From 1977 to 2011, TVA spent approximately $5.4 billion to reduce emissions from its power plants, including $34 million, $58 million, and $172 million in 2011, 2010, and 2009, respectively. Among other things, TVA has taken the following steps to reduce emissions:

SO_2 Emissions. To reduce SO_2 emissions, TVA installed scrubbers on 17 of its coal-fired units, and switched to lower-sulfur coals at 41 coal-fired units. In addition, in August 2011, the TVA Board approved adding scrubbers to three units at Allen Fossil Plant and four units at Gallatin Fossil Plant.

NO_x Emissions. To reduce NO_x emissions, TVA installed SCRs on 21 coal-fired units, installed selective non-catalytic reduction systems on two coal-fired units (although TVA is no longer operating one of these systems because of technical challenges), installed High Energy Reagent Technology systems on seven coal-fired units, installed low-NO_x burners or low-NO_x combustion systems on 46 coal-fired units, optimized combustion on 12 coal-fired units, and began operating NO_x control equipment year round when units are operating (except during maintenance periods) starting in October 2008.

Particulate Emissions. To reduce particulate emissions, TVA has equipped all of its coal-fired units with scrubbers, mechanical collectors, electrostatic precipitators, or baghouses.

Primarily on account of the actions described above, emissions of NO_x on the TVA system have been reduced by 86 percent below peak 1995 levels, and emissions of SO_2 on the TVA system have been reduced by 90 percent below 1977 levels. In addition, the actions described above have also provided a co-benefit of reducing hazardous air pollutants, including mercury, at some units.

TVA estimates that compliance with future CAA requirements (excluding GHG requirements) could lead to additional costs of $3.4 billion from 2012 to 2018. There could be additional material costs if reductions of GHGs, including CO_2, are mandated under the CAA or by legislation, or if future legislative, regulatory, or judicial actions lead to more stringent emission reduction requirements for conventional pollutants. These costs cannot reasonably be predicted at this time because of the uncertainty of such potential actions.

In addition to the costs described above, TVA is planning to invest between $1.5 billion and $2.0 billion to convert wet CCR facilities to dry storage facilities to be completed by 2022. See Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations — *2011 Challenges — Regulatory Compliance — Coal Combustion Residuals.*

Estimated Required Environmental Expenditures

The following table contains information about TVA's current estimates on projects related to environmental laws and regulations.

Air, Water, and Waste Quality Estimated Potential Environmental Expenditures
At September 30, 2011
(in millions)

	Estimated Timetable	Total Estimated Expenditures	
Site environmental remediation costs [1]	2012+	$	22
Coal combustion residuals [2]	2012-2022	$	1,542
Proposed clean air projects [3]	2012-2018	$	3,436
Clean Water Act requirements [4]	2015-2020		TBD*

Notes
(1) Estimated liability for cleanup and similar environmental work for those sites for which sufficient information is available to develop a cost estimate.
(2) Includes closure of impoundments, construction of lined landfills, and construction of dewatering systems.
(3) Includes air quality projects that TVA is currently planning to undertake to comply with existing and proposed air quality regulations, but does not include any projects that may be required to comply with potential GHG regulations.
(4) Compliance plans to meet the requirements of a revised or new implementing rule under Section 316(b) of the Clean Water Act and the EPA's revised steam electric effluent guidelines will be determined upon finalization of the rules.
* TBD – to be determined as regulations become final.

Employees

On September 30, 2011, TVA had 12,893 employees, of whom 4,771 were trades and labor employees. Under the TVA Act, TVA is required to pay trades and labor workers hired by TVA and certain of its contractors the rate of wages for work of a similar nature prevailing in the vicinity where the work is being performed. Neither the federal labor relations laws covering most private sector employers nor those covering most federal agencies apply to TVA. However, the TVA Board has a long-standing policy of acknowledging and dealing with recognized representatives of its employees, and that policy is reflected in long-term agreements to recognize the unions (or their successors) that represent TVA employees. Federal law prohibits TVA employees from engaging in strikes against TVA.

ITEM 1A. RISK FACTORS

The risk factors described below, as well as the other information included in this Annual Report, should be carefully considered. Risks and uncertainties described in these risk factors could cause future results to differ materially from historical results as well as from the results anticipated in forward-looking statements. Although the risk factors described below are the ones that TVA considers significant, additional risk factors that are not presently known to TVA or that TVA presently does not consider significant may also impact TVA's business operations. Although the TVA Board has the authority to set TVA's own rates and may thus mitigate some risks by increasing rates, there may be instances in which TVA would be unable to partially or completely eliminate one or more of these risks through rate increases over a reasonable period of time or at all. Accordingly, the occurrence of any of the following could have a material adverse effect on TVA's cash flows, results of operations, and financial condition.

New laws, regulations, and administrative orders may negatively affect TVA's cash flows, results of operations, and financial condition, as well as the way TVA conducts its business.

Because TVA is a corporate agency and instrumentality established by federal law, it may be affected by a variety of laws, regulations, and administrative orders that do not affect other electric utilities. For example, Congress may enact legislation that expands or reduces TVA's activities, changes its governance structure, requires TVA to sell some or all of the assets that it operates, reduces or eliminates the United States's ownership of TVA, or even liquidates TVA. Although it is difficult to predict exactly how new laws, regulations, and administrative orders may impact TVA, some of the possible effects are described below.

TVA may lose its protected service territory .

TVA's service area is defined by the fence and protected by the anti-cherrypicking provision. If Congress were to eliminate or reduce the coverage of the anti-cherrypicking provision but retain the fence, TVA could more easily lose customers that it could not replace within its specified service area. The loss of these customers could adversely affect TVA's cash flows, results of operations, and financial condition.

The TVA Board may lose its sole authority to set rates for electricity.

Under the TVA Act, the TVA Board has the sole authority to set the rates that TVA charges for electricity, and these rates are not subject to further review. If the TVA Board loses this authority or if the rates become subject to outside review, there could be material adverse effects on TVA including, but not limited to, the following:

The TVA Board might be unable to set rates at a level sufficient to generate adequate revenues to service TVA’s financial obligations, properly operate and maintain its power assets, and provide for reinvestment in its power program; and

TVA might become subject to additional regulatory oversight that could impede its ability to manage its business.

TVA may lose responsibility for managing the Tennessee River system.

TVA’s management of the Tennessee River system is important to effective operation of the power system. TVA’s ability to integrate management of the Tennessee River system with power system operations increases power system reliability and reduces costs. Restrictions on how TVA manages the Tennessee River system could negatively affect its operations.

TVA may lose responsibility for managing real property currently under its control.

TVA's management of certain reservoir shorelines and real property containing power generation and transmission structures is important for navigation, flood control, and the effective operation of the power system. The integrated management of the shorelines and property assists TVA in fulfilling its overall mission. Restrictions on or the loss of the authority to manage these properties could negatively affect TVA's operations, change the way it conducts such operations, or increase costs.

TVA may become subject to additional environmental regulation.

New environmental laws, regulations, and orders may become applicable to TVA or the facilities it operates, and existing environmental regulations may be revised or reinterpreted in a way that adversely affects TVA. Possible areas of future regulation include, but are not limited to, the following:

Greenhouse gases. Costs to comply with future regulation of CO_2 and other GHGs may negatively impact TVA’s cash flows, financial position, and results of operations. The cost impact of legislation or regulation cannot be determined at this time.

Coal combustion residuals. The federal government has proposed stronger regulations concerning coal-combustion residuals, and state governments may impose additional regulations. These regulations may require TVA to make additional capital expenditures, increase operating and maintenance costs, or even lead it to shut down certain facilities.

Renewable energy portfolio standards. TVA is not currently obligated to provide a percentage of the power it sells from renewable sources but may be required to do so in the future. Such developments could require TVA to make significant capital expenditures, increase its purchased power costs, or make changes in how it operates its facilities.

Existing laws, regulations, and orders may negatively affect TVA’s cash flows, results of operations, and financial condition, as well as the way TVA conducts its business.

TVA is required to comply with comprehensive and complex laws, regulations, and orders. The costs of complying with these laws, regulations, and orders are expected to be substantial, and costs could be significantly more than TVA anticipates, especially in the environmental area. To settle the EPA and other claims involving the NSR violations, TVA agreed to retire 18 units and pay various penalties. The cost to install the necessary equipment to comply with existing environmental laws, regulations, settlement agreements, and orders at some other facilities may render some facilities uneconomical, which may cause TVA to retire or idle additional facilities. In addition, TVA is required to obtain numerous permits and approvals from governmental agencies that regulate its business, and TVA may be unable to obtain or maintain all required regulatory approvals. If there is a delay in obtaining required regulatory approvals or if TVA fails to obtain or maintain any approvals or to comply with any law, regulation, or order, TVA may have to change how it operates certain facilities, may be unable to operate certain facilities, or may have to pay fines or penalties.

TVA may be responsible for environmental clean-up activities.

TVA may be responsible for on-site liabilities associated with the environmental condition of facilities or property that TVA has acquired or that TVA operates regardless of when the liabilities arose, whether they are known or unknown, and whether they were caused by TVA, prior owners or operators, or a third party. TVA may also be responsible for off-site liabilities associated with the off-site disposal of waste materials containing hazardous substances or hazardous wastes.

The costs associated with remediating the Kingston ash spill as well as other CCR facilities may be significantly higher than TVA anticipates.

TVA estimates that the cost of remediating the Kingston ash spill will be between $1.1 billion and $1.2 billion. Actual costs could substantially exceed expected costs if, among other things, TVA has to remove more ash than currently anticipated, additional environmentally sensitive material is uncovered in the river sediment, there are delays in the ash removal process, or the methods of final remediation change. Also, certain costs that are currently either not probable or reasonably estimable are not included in this estimate, such as any additional penalties and natural resource damages, future lawsuits, future claims, and costs associated with new laws and regulations. In addition, TVA expects to spend between $1.5 billion and $2.0 billion to convert its wet CCR facilities to dry collection facilities. Actual costs may substantially exceed expected costs.

TVA may have to make significant contributions in the future to fund its pension plans.

At September 30, 2011, TVA's pension plans had assets of $6.5 billion compared to liabilities of $11.3 billion. The qualified plan is mature with nearly 24,000 retirees receiving benefits of approximately $600 million per year. The costs of providing pension benefits depend upon a number of factors, including, but not limited to:

- Provisions of the pension plans;
- Changing employee demographics;
- Rates of increase in compensation levels;
- Rates of return on plan assets;
- Discount rates used in determining future benefit obligations and required funding levels;
- Future government regulation; and
- Levels of contributions made to the plans.

Any of these factors or any number of these factors could keep at high levels or even increase the costs of providing pension benefits and require TVA to make significant contributions to the pension plans. Financial market conditions such as those experienced during the recession of CY 2008 - 2009 and an unfavorable fourth quarter of 2011 may result in lower expected rates of return on plan assets, loss in value of the investments, and lower discount rates used in determining future benefit obligations. These changes would negatively impact the funded status of the plans. Additional contributions to the plans and absorption of additional costs would negatively affect TVA's cash flows, results of operations, and financial condition.

Approaching or reaching TVA's debt ceiling could limit TVA's ability to carry out its business. Additionally, TVA's debt ceiling could be made more restrictive.

The TVA Act provides that TVA can issue Bonds in an amount not to exceed $30.0 billion outstanding at any time. At September 30, 2011, TVA had $24.7 billion of Bonds outstanding (not including noncash items of foreign currency exchange loss of $7 million and net discount on sale of Bonds of $235 million).

Approaching or reaching the debt ceiling may adversely affect TVA's business by limiting TVA's ability to access capital markets and increasing the amount of debt TVA must service. Also, Congress may lower TVA's debt ceiling or broaden the types of financial instruments that are covered by the ceiling. Either of these scenarios may also restrict TVA's ability to raise capital to maintain power program assets, to construct additional generation facilities, to purchase power under long-term purchase power agreements, or to meet regulatory requirements. In addition, approaching or reaching the debt ceiling may lead to increased legislative or regulatory oversight of TVA's activities and could lead to negative credit rating actions.

Demand for electricity may be significantly reduced, negatively affecting TVA's cash flows, results of operations, and financial condition.

Some of the factors that could reduce the demand for electricity include the following:

Economic downturns . Renewed economic downturns in TVA's service area or other parts of the United States could reduce overall demand for power and thus reduce TVA's power sales and cash flows, especially if TVA's industrial customers reduce their operations and thus their consumption of power .

Loss of customers . The loss of customers could have a material adverse effect on TVA's cash flows, results of operations, or financial condition, and could result in higher rates.

Change in technology . Research and development activities are ongoing to improve existing and alternative technologies to produce electricity, including gas turbines, wind turbines, fuel cells, microturbines, solar cells, and distributed generation devices. It is possible that advances in these or other alternative technologies could reduce the costs of electricity production from alternative technologies to a level that will enable these technologies to compete effectively with traditional power plants like TVA's. To the extent these technologies become a more cost-effective option for certain customers, TVA's sales to these customers could be reduced, negatively affecting TVA's cash flows, results of operations, and financial condition.

Catastrophic events may negatively affect TVA's cash flows, results of operations, and financial condition.

TVA's cash flows, results of operations, and financial condition may be adversely affected, either directly or indirectly, by catastrophic events such as fires, earthquakes, solar events, droughts, floods, tornadoes, wars, national emergencies, terrorist activities, pandemics, and other similar destructive events. Examples of such events include, but are not limited to, the effect of the Japanese nuclear events, the April 2011 storms in TVA's service area, and the August 2011 earthquake in the eastern United States. These events, the frequency and severity of which are unpredictable, may, among other things, lead to legislative or regulatory changes that affect the construction, operation, and decommissioning of nuclear units and the storage of spent fuel; limit or disrupt TVA's ability to generate and transmit power; reduce the demand for power; disrupt fuel or other supplies; require TVA to produce additional tritium; lead to an economic downturn; require TVA to make substantial capital investments for repairs, improvements, or modifications; and create instability in the financial markets. If costs to construct nuclear units significantly increase or the public determines that nuclear power is less desirable as a result of any of these events, TVA may be forced to forego any future construction at its nuclear facilities or shut them down. This would make it substantially more difficult for TVA to obtain greater amounts of its power supply from low or zero carbon emitting resources and to replace its generation capacity when faced with retiring or idling certain coal-fired units. Additionally, some studies have predicted that climate change may cause certain catastrophic events, such as droughts and floods, to occur more frequently in the Tennessee Valley region, which could lead to adverse impacts on TVA.

Weather conditions may influence TVA's ability to supply power and its customers' demands for power.

Extreme temperatures may increase the demand for power and require TVA to purchase power at high prices to meet the demand from customers, while unusually mild weather may result in decreased demand for power and lead to reduced electricity sales. In addition, in periods of below normal rainfall or drought, TVA's low-cost hydroelectric generation may be reduced, requiring TVA to purchase power or use more costly means of producing power. Furthermore, high river water temperatures in the summer may limit TVA's ability to use water from the Tennessee or Cumberland River systems for cooling at certain of TVA's generating facilities, thereby limiting its ability to operate these generating facilities.

TVA may incur delays and additional costs in power plant construction and may be unable to obtain necessary regulatory approval.

TVA is completing the construction of Watts Bar Unit 2, planning to resume construction of Bellefonte Unit 1, completing construction of the John Sevier Combined Cycle Facility, scheduling major upgrades to and modernization of current generating plants, and evaluating construction of more generating facilities in the future. These activities involve risks of schedule delays and overruns in the cost of labor and materials. In addition, if TVA does not obtain the necessary regulatory approvals, is otherwise unable to complete the development or construction of a facility, decides to cancel construction of a facility, or incurs delays or cost overruns in connection with constructing a facility, TVA's cash flows, financial condition, and results of operations could be negatively affected. In addition, if construction projects are not completed according to specifications, TVA may suffer, among other things, reduced plant efficiency, reduced transmission system integrity and reliability, and higher operating costs.

TVA is the sole power provider for its customers within its service area, and if demand for power in TVA's service area increases, TVA is contractually obligated to take steps to meet this increased demand.

If demand for power in TVA's service area increases, TVA may need to meet this increased demand by purchasing additional power from other sources, building new generation and transmission facilities, or purchasing existing generation and transmission facilities. Purchasing power from external sources, as well as acquiring or building new generation and transmission facilities, may negatively affect TVA's cash flows, results of operations, and financial condition.

TVA's assumptions about the future may be inaccurate.

TVA uses certain assumptions in order to develop its plans for the future. Such assumptions include economic forecasts, anticipated commodity prices, cost estimates, construction schedules, power demand forecasts, the appropriate generation mix to meet demand, and potential regulatory environments. Should these assumptions be inaccurate, or be superseded by subsequent events, TVA's plans may not be effective in achieving the intended results which could negatively affect TVA's ability to meet electricity demand, cash flows, results of operations, and financial condition, as well as the way TVA conducts its business.

Failure to meet TVA's energy efficiency and demand reduction goals may negatively impact TVA's cash flows, results of operations, and financial condition.

TVA's energy efficiency and demand reduction initiatives are important components of TVA's plan to meet future power needs in its service territory. It is possible, however, that results from these programs may be less favorable than TVA anticipates. If TVA fails to meet its energy efficiency and demand reduction goals, TVA may, among other things, need to purchase additional power from third parties or build or purchase additional generation facilities.

Owning and operating nuclear units subjects TVA to nuclear risks and may result in significant costs that adversely affect its cash flows, results of operations, and financial condition.

TVA has six operating nuclear units, has resumed construction of one nuclear unit that is scheduled to be placed in service in CY 2013, and is scheduled to resume construction on another unit to be placed in service by 2020. Risks associated with these units include the following:

Nuclear Risks. A nuclear incident at a TVA facility could have significant consequences including loss of life, damage to the environment, damage to or loss of the facility, and damage to non-TVA property. Although TVA carries certain types of nuclear insurance, the amount that TVA is required to pay in connection with a nuclear incident could significantly exceed the amount of coverage provided by insurance. Also, any nuclear incident in the United States, even at a facility that is not operated by or licensed to TVA, has the potential to impact TVA adversely by obligating TVA to pay up to $105 million per year and a total of $705 million per nuclear incident under the Price-Anderson Act. In addition, a nuclear incident could negatively affect TVA by, among other things, obligating TVA to pay retrospective insurance premiums, reducing the availability and affordability of insurance, increasing the costs of operating nuclear units, or leading to increased regulation or restriction on the construction, operation, and decommissioning of nuclear facilities. Moreover, Congress could impose revenue-raising measures on the nuclear industry to pay claims exceeding the limit for a single incident under the Price-Anderson Act.

Decommissioning Costs. TVA maintains a nuclear decommissioning trust ("NDT") for the purpose of providing funds to decommission its nuclear facilities. The NDT is invested in securities generally designed to achieve a return in line with overall equity market performance. TVA might have to make unplanned contributions to the trust if, among other things:

- The value of the investments in the trust declines significantly, as it did during the 2008-2009 recession, or the investments fail to achieve the assumed real rate of return;
- The decommissioning funding requirements are changed by law or regulation;
- The assumed real rate of return on plan assets, which is currently five percent, is lowered by the TVA Board or is overly optimistic;
- The actual costs of decommissioning are more than planned;
- Changes in technology and experience related to decommissioning cause decommissioning cost estimates to increase significantly; or
- TVA is required to decommission a nuclear plant sooner than it anticipates.

If TVA makes additional contributions to the NDT, the contributions may negatively affect TVA's cash flows, results of operations, and financial condition.

Increased Regulation . The NRC has broad authority to adopt requirements related to the licensing, operation, and decommissioning of nuclear generation facilities that can result in significant restrictions or requirements on TVA. If the NRC modifies existing requirements or adopts new requirements, TVA may be required to make substantial capital expenditures at its nuclear plants or make substantial contributions to the NDT. In addition, if TVA fails to comply with requirements promulgated by the NRC, the NRC has the authority to impose fines, shut down units, or modify, suspend, or revoke TVA's operating licenses.

TVA's generation and transmission assets or their supporting infrastructure may not operate as planned.

Many of TVA's generation and transmission assets have been operating since the 1950s or earlier and have been in nearly constant service since they were completed. If these assets or their supporting infrastructure fail to operate as planned or if necessary repairs or upgrades are delayed, TVA, among other things:

- May have to invest a significant amount of resources to repair or replace the assets or the supporting infrastructure;
- May be unable to operate the assets for a significant period of time;
- May have to purchase replacement power on the open market;
- May not be able to meet its contractual obligations to deliver power;
- May not be able to maintain the integrity or reliability of the transmission system at normal levels;
- May have to remediate collateral damage caused by a failure of the assets or the supporting infrastructure;
- May have to increase its efforts to reduce vegetation intrusions onto transmission lines to comply with applicable regulations; and
- May be required to invest substantially to meet more stringent reliability standards.

In addition, the failure of TVA's generation and transmission assets or their supporting infrastructure to perform as planned may cause health, safety, and environmental problems and may even result in events such as the failure of a dam, the failure of a containment pond, or a nuclear incident. Any of these potential outcomes may negatively affect TVA's cash flows, results of operations, and financial condition .

TVA's information technology assets may not operate as planned.

TVA's operations are extensively computerized, and a failure of TVA's information technology assets may significantly disrupt operations. Among other things, such a failure may negatively impact TVA's accounting and administrative systems as well as TVA's ability to generate and transmit power, and may also lead to the loss or inappropriate release of critical data. Such a failure may be caused by, among other things, a cyber attack, a natural disaster, a solar event, an electromagnetic event, the age and condition of TVA's information technology assets, and human error. Any of these occurrences could negatively affect TVA's cash flows, results of operations, and financial condition .

TVA's organizational transformation efforts may fail.

TVA has been working to improve its control systems, operating standards, and corporate culture. The failure to achieve or maintain improvements in these areas may contribute to the likelihood of incidents such as the Kingston ash spill occurring or other operational or financial challenges that could adversely affect TVA's cash flow, results of operations, and financial condition.

TVA's reputation may be negatively impacted.

As with any company, TVA's reputation is a vital element of its ability to effectively conduct its business. TVA's reputation could be harmed by a variety of factors, including the failure of a generating asset or supporting infrastructure, a failure of its organizational transformation efforts, acts or omissions of TVA management, or a significant dispute with a TVA distributor-customer . Any deterioration in TVA's reputation may harm TVA's relationships with its distributor-customers and stakeholders, may increase TVA's cost of doing business, and may potentially lead to the imposition of additional laws and regulations that negatively affect the way TVA conducts its business.

TVA's service reliability could be affected by problems at other utilities or at TVA facilities or by the increase in intermittent sources of power.

TVA's transmission facilities are directly interconnected with the transmission facilities of neighboring utilities and are thus part of the larger interstate power transmission grid. Accordingly, problems at other utilities or at TVA's facilities may cause interruptions in TVA's service to its customers. In addition, the increasing contribution of intermittent sources of power such as wind and solar may place additional strain on TVA's system as well as on surrounding systems. If TVA suffers a service interruption, TVA's cash flows, results of operations, financial condition, and reputation may be negatively affected.

Events which affect the supply of water in the Tennessee River system and Cumberland River system may interfere with TVA's ability to generate power.

An inadequate supply of water in the Tennessee River system and Cumberland River system could negatively impact TVA's cash flows, results of operations, and financial condition by reducing generation not only at TVA hydroelectric plants but also at its coal-fired and nuclear plants, which depend on water from the river systems near which they are located for cooling and for use in boilers where water is converted into steam to drive turbines. An inadequate supply of water could result, among other things, from periods of low rainfall or drought, the withdrawal of water from the river systems by governmental entities or others, and incidents affecting bodies of water not managed by TVA. While TVA manages the Tennessee River and large portions of its tributary system in order to provide much of the water necessary for the operation of its power plants, the U.S. Army Corps of Engineers operates and manages other bodies of water upon which some TVA facilities rely. Events at these non-TVA managed bodies of water or their associated hydroelectric facilities may interfere with the flow of water and may result in TVA's having insufficient water to meet the needs of its plants. If TVA has insufficient water to meet the needs of its plants, TVA may be required to reduce generation at its affected facilities to levels compatible with the available supply of water.

TVA's fuel and purchased power supplies may be disrupted.

TVA purchases coal, uranium, natural gas, fuel oil, and electricity from a number of suppliers. Disruption in the acquisition or delivery of fuel or purchased power may result from a variety of physical and commercial events, political developments, or environmental regulations affecting TVA's fuel and purchased power suppliers as well as from transportation or transmission constraints. If one of TVA's fuel or purchased power suppliers fails to perform under the terms of its contract with TVA, TVA might have to purchase replacement fuel or power, perhaps at a significantly higher price than TVA was entitled to pay under the contract. In some circumstances, TVA may not be able to recover this difference from the supplier. In addition, any disruption of TVA's fuel and purchased power supplies could require TVA to operate higher cost plants, thereby adversely affecting TVA's cash flows, results of operations, and financial condition. Moreover, if TVA is unable to acquire enough replacement power or fuel and does not have enough reserve generation capacity available to offset the loss of power or fuel, TVA may not be able to supply enough power to meet demand, resulting in power curtailments, brownouts, or even blackouts .

Failure to attract and retain an appropriately qualified workforce may negatively affect TVA's results of operations.

TVA's business depends on its ability to recruit and retain key executive officers as well as skilled professional and technical employees. The inability to attract and retain an appropriately qualified workforce could adversely affect TVA's ability to, among other things, operate and maintain generation and transmission facilities, complete large construction projects such as Watts Bar Unit 2 and Bellefonte Unit 1, and successfully implement its organizational transformation efforts.

TVA is involved in various legal and administrative proceedings whose outcomes may affect TVA's finances and operations.

TVA is involved in various legal and administrative proceedings and is likely to become involved in other legal proceedings in the future in the ordinary course of business, as a result of catastrophic events or otherwise. Although TVA cannot predict the outcome of the individual matters in which TVA is involved or will become involved, the resolution of these matters could require TVA to make expenditures in excess of established reserves and in amounts that could have a material adverse effect on TVA's cash flows, results of operations, and financial condition. Similarly, resolution of any such proceedings may require TVA to change its business practices or procedures and may require TVA to reduce emissions from its coal-fired units, including emissions of GHGs, to a greater extent than TVA had planned.

TVA is subject to a variety of market risks that may negatively affect TVA's cash flows, results of operations, and financial condition.

TVA is subject to a variety of market risks, including, but not limited to, commodity price risk, investment price risk, interest rate risk, counterparty credit and performance risk, and currency exchange rate risk.

Commodity Price Risk. Prices of commodities critical to TVA's operations, including coal, uranium, natural gas, fuel oil, crude oil, construction materials, emission allowances, and electricity, have been extremely volatile in recent years. If prices of these commodities increase, TVA's rates may increase.

Investment Price Risk. TVA is exposed to investment price risk in its NDT, its asset retirement trust ("ART"), and its pension plan. If the value of the investments held in the NDT or the pension fund either decrease or fail to increase in accordance with assumed rates of return, TVA may be required to make substantial contributions to these funds.

Interest Rate Risk. Changes in interest rates may increase the amount of interest that TVA pays on new Bonds that it issues, decrease the return that TVA receives on its short-term investments, decrease the value of the investments in TVA's pension fund and trusts, and increase the losses on the mark-to-market valuation of certain derivative transactions into which TVA has entered.

Counterparty Credit and Performance Risk. TVA is exposed to the risk that its counterparties will not be able to perform their contractual obligations. If TVA's counterparties fail to perform their obligations, TVA's cash flows, results of operations, and financial condition may be adversely affected. In addition, the failure of a counterparty to perform may make it difficult for TVA to perform its obligations, particularly if the counterparty is a supplier of electricity or fuel.

Currency Exchange Rate Risk . Over the next several years, TVA plans to spend a significant amount of capital on clean air projects, capacity expansion, and other projects. A portion of this amount may be spent on contracts that are denominated in one or more foreign currencies. The value of the U.S. dollar compared with other currencies has fluctuated widely in recent years, and, if not effectively managed, foreign currency exposure could negatively impact TVA's cash flows, results of operations, and financial condition.

TVA's ability to use derivatives to hedge certain risks may be limited.

TVA currently uses derivatives to hedge a variety of risks. Depending on how regulatory agencies interpret and implement the provisions of the Dodd-Frank Wall Street Reform and Consumer Protection Act, TVA's hedging costs may increase and its ability to use derivatives to hedge certain risks may be limited. These occurrences may, among other things, cause TVA to change its operations, increase the risks to which TVA is exposed, and negatively affect TVA's cash flows.

TVA may be unable to meet its current cash requirements if TVA's access to the debt markets is limited.

TVA uses cash provided by operations together with proceeds from power program financings to fund its current cash requirements. It is critical that TVA continues to have access to the debt markets in order to meet its cash requirements. The importance of having access to the debt markets is underscored by the fact that TVA, unlike many utilities, relies almost entirely on debt capital since TVA is not authorized to issue equity securities .

TVA's credit ratings may be impacted by Congressional actions or by a downgrade of the United States's sovereign credit ratings.

TVA's current credit ratings are not based solely on its underlying business or financial condition but are based to a large extent on the legislation that defines TVA's business structure. Key characteristics of TVA's business defined by legislation include (1) the TVA Board's ratemaking authority, (2) the current competitive environment, which is defined by the fence and the anti-cherrypicking provision, and (3) TVA's status as a corporate agency and instrumentality of the United States. Accordingly, if Congress takes any action that effectively alters any of these characteristics, TVA's credit ratings could be downgraded.

Although TVA Bonds are not obligations of the United States, TVA, as a corporate agency and instrumentality of the United States government, may be impacted if the sovereign credit ratings of the United States are downgraded. This occurred in August 2011, when one rating agency lowered its long-term rating on the United States and then lowered TVA's rating based on the application of the rating agency's government-related entities criteria. Among other things, an additional or further downgrade of the United States's sovereign credit ratings could have the following effects:

- TVA's access to funds held in United States Treasury accounts could be limited or denied.
- TVA's own credit ratings could be downgraded as a result of a downgrade of the United States's credit ratings.
- The economy could be negatively impacted, resulting in reduced demand for electricity, increased expenses for borrowings, and increased cost of fuels, supplies, and other material required for TVA's operations.

TVA, together with owners of TVA securities, may be impacted by additional or further downgrades of TVA's credit ratings.

Additional or further downgrades of TVA's credit ratings may have material adverse effects on TVA's cash flows, results of operations, and financial condition as well as on investors in TVA securities. Among other things, a downgrade may have the following effects:

- A downgrade could increase TVA's interest expense by increasing the interest rates that TVA pays on new Bonds that it issues. An increase in TVA's interest expense may reduce the amount of cash available for other purposes, which may result in the need to increase borrowings, to reduce other expenses or capital investments, or to increase power rates.

- A downgrade may result in TVA's having to post collateral under certain physical and financial contracts that contain rating triggers.
- A downgrade below a contractual threshold may prevent TVA from borrowing under three credit facilities totaling $2.5 billion.
- A downgrade may lower the price of TVA's securities in the secondary market, thereby hurting investors who sell TVA securities after the downgrade and diminishing the attractiveness and marketability of TVA Bonds.

TVA's financial control system cannot guarantee that all control issues and instances of fraud or errors will be detected.

No financial control system, no matter how well designed and operated, can provide absolute assurance that the objectives of the control system are met, and no evaluation of financial controls can provide absolute assurance that all control issues and instances of fraud or errors can be detected. The design of any system of financial controls is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions, regardless of how remote.

Payment of principal and interest on TVA securities is not guaranteed by the United States.

Although TVA is a corporate agency and instrumentality of the United States government, TVA securities are not backed by the full faith and credit of the United States. If TVA were to experience extreme financial difficulty and were unable to make payments of principal or interest on its Bonds, the federal government would not be legally obligated to prevent TVA from defaulting on its obligations. Principal and interest on TVA securities are payable solely from TVA's net power proceeds. Net power proceeds are the remainder of TVA's gross power revenues after deducting the costs of operating, maintaining, and administering its power properties and payments to states and counties in lieu of taxes, but before deducting depreciation accruals or other charges representing the amortization of capital expenditures, plus the net proceeds from the sale or other disposition of any power facility or interest therein.

The market for TVA's securities might be limited.

All of TVA's Bonds are listed on the New York Stock Exchange except for TVA's discount notes, which have maturities of less than one year, the 2009 Series A and B power bonds, and the power bonds issued under TVA's electronotes® program, which is a medium-term retail notes program. In addition, some of TVA's Bonds are listed on foreign stock exchanges.

Although many of TVA's Bonds are listed on stock exchanges, there can be no assurances that any market will develop or continue to exist for any Bonds. Additionally, no assurances can be made as to the ability of the holders to sell their Bonds or as to the price at which holders will be able to sell their Bonds. Future trading prices of Bonds will depend on many factors, including prevailing interest rates, the then-current ratings assigned to the Bonds, the amount of Bonds outstanding, the time remaining until the maturity of the Bonds, the redemption features of the Bonds, the market for similar securities, and the level, direction, and volatility of interest rates generally, as well as the liquidity of the markets for those securities.

If a particular series of Bonds is offered through underwriters, those underwriters may attempt to make a market in the Bonds. Dealers other than underwriters may also make a market in TVA securities. However, the underwriters and dealers are not obligated to make a market in any TVA securities and may terminate any market-making activities at any time without notice.

In addition, legal limitations may affect the ability of banks and others to invest in Bonds. For example, national banks may purchase TVA Bonds for their own accounts in an amount not to exceed 10 percent of unimpaired capital and surplus. Also, TVA Bonds are "obligations of a corporation which is an instrumentality of the United States" within the meaning of section 7701(a)(19)(C)(ii) of the Internal Revenue Code for purposes of the 60 percent of assets limitation applicable to U.S. building and loan associations.

ITEM 1B. UNRESOLVED STAFF COMMENTS

Not applicable.

ITEM 2. PROPERTIES

TVA holds personal property in its own name but holds real property as agent for the United States of America. TVA may acquire real property as an agent of the United States by negotiated purchase or by eminent domain.

Generating Properties

At September 30, 2011, generating assets operated by TVA consisted of 53 active coal-fired units and six idled coal-fired units, six nuclear units, 109 conventional hydroelectric units, four pumped storage units, 11 combined cycle units, 87 simple cycle units, 9 diesel generator units, one wind energy site (currently nonoperational), and 14 solar energy sites. In addition, TVA has biomass cofiring capability at one of its coal-fired sites and digester gas cofiring capability at a second coal-fired site. See Item 1, Business — *Current Power Supply — Net Capability* for a chart that indicates the location, capability, and in-service dates for each of these properties, which chart is incorporated by reference into this Item 2, Properties . At September 30, 2011, 24 of the simple cycle combustion turbine units were leased to private entities and leased back to TVA under long-term leases, and TVA is leasing the three Caledonia combined cycle units under a long-term lease. In addition, since April 17, 2009, SSSL has owned an undivided 90 percent interest in the three Southaven combined cycle units, and TVA has entered into a lease with SSSL under which TVA leases SSSL's undivided 90 percent interest in the facility and operates the entire facility through April 23, 2013. For additional details, see Note 12. TVA is also in the process of constructing additional generating assets. For a discussion of these assets, see Item 1, Business — *Future Power Supply.*

Transmission Properties

TVA's transmission system interconnects with systems of surrounding utilities and consists primarily of the following assets:

- Approximately 15,940 circuit miles of transmission lines (primarily 500 kilovolt and 161 kilovolt lines);
- 498 transmission substations, power switchyards, and switching stations; and
- 1,240 customer connection points (customer, generation, and interconnection).

At September 30, 2011, certain qualified technological equipment and other software related to TVA's transmission system were leased to private entities and leased back to TVA under long-term leases.

Natural Resource Stewardship Properties

TVA operates and maintains 49 dams and manages the following natural resource stewardship properties:

- Approximately 11,000 miles of reservoir shoreline;
- Approximately 293,000 acres of reservoir land;
- Approximately 650,000 surface acres of water; and
- Over 100 TVA managed recreation facilities (campgrounds, boat ramps, fishing piers, hiking trails, and day use areas).

As part of its stewardship responsibilities, TVA approval is required to be obtained before any obstruction affecting navigation, flood control, or public lands can be constructed in or along the Tennessee River and its tributaries. TVA manages licenses, leases or easements on United States property entrusted to TVA to over 250 commercial campgrounds and over 200 commercial marinas.

Buildings

TVA has a variety of buildings throughout its service area in addition to the buildings located at its generation and transmission facilities, including office buildings, customer service centers, power service centers, warehouses, visitor centers, and crew quarters. The most significant of these buildings are the Knoxville Office Complex and the Chattanooga Office Complex. TVA purchased the majority of its Chattanooga Office Complex on January 1, 2011, and leases the remaining portion of this complex. TVA plans to purchase the remaining portion of this complex after the lease expires on September 30, 2012. TVA also has a significant number of buildings in Muscle Shoals, Alabama, and is currently evaluating strategies to further reduce its Muscle Shoals portfolio.

Disposal of Property

Under the TVA Act, TVA has broad authority to dispose of personal property but only limited authority to dispose of real property. The primary but not exclusive sources of TVA's authority to dispose of real property are briefly described below:

- Under section 31 of the TVA Act, TVA has authority to dispose of surplus real property at a public auction.
- Under section 4(k) of the TVA Act, TVA can dispose of real property for certain specified purposes, including providing replacement lands for certain entities whose lands were flooded or destroyed by dam or reservoir construction and to grant easements and rights-of-way upon which are located transmission or distribution lines.
- Under section 15d(g) of the TVA Act, TVA can dispose of real property in connection with the construction of generating plants or other facilities under certain circumstances.
- Under 40 U.S.C. § 1314, TVA has authority to grant easements for rights-of-way and other purposes.

In addition, the Basic Tennessee Valley Authority Power Bond Resolution adopted by the TVA Board on October 6, 1960, as amended on September 28, 1976, October 17, 1989, and March 25, 1992 (the "Basic Resolution"), prohibits TVA from mortgaging any part of its power properties and from disposing of all or any substantial portion of these properties unless TVA provides for a continuance of the interest, principal, and sinking fund payments due and to become due on all outstanding Bonds, or for the retirement of such Bonds.

ITEM 3. LEGAL PROCEEDINGS

From time to time, TVA is party to or otherwise involved in lawsuits, claims, proceedings, investigations, and other legal matters ("Legal Proceedings") that have arisen in the ordinary course of conducting TVA's activities, as a result of catastrophic events or otherwise. While the outcome of the Legal Proceedings to which TVA is a party cannot be predicted with certainty, any adverse outcome to a Legal Proceeding involving TVA may have a material adverse effect on TVA's cash flows, results of operations, and financial condition.

For a discussion of Legal Proceedings involving TVA, see Note 20 — *Legal Proceedings,* which discussion is incorporated by reference into this Item 3.

ITEM 4. REMOVED AND RESERVED

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Not applicable.

ITEM 6. SELECTED FINANCIAL DATA

The following selected financial data for the years 2007 through 2011 should be read in conjunction with the audited financial statements and notes thereto (collectively, the "Financial Statements") presented in Item 8, Financial Statements and Supplementary Data. Certain reclassifications have been made to the 2007, 2008, 2009, and 2010 financial statement presentation to conform to the 2011 presentation.

Selected Financial Data [(1), (2)]
For the years ended, or at, September 30
(dollars in millions)

	2011	2010	2009	2008	2007
Sales (millions of kWh)	167,730	173,662	163,804	176,304	175,529
Peak load (MW)	31,434	31,778	32,572	32,027	33,482
Operating revenues	$ 11,841	$ 10,874	$ 11,255	$ 10,382	$ 9,326
Fuel expense	$ 2,926	$ 2,092	$ 3,114	$ 2,756	$ 2,249
Purchased power expense	$ 1,427	$ 1,127	$ 1,631	$ 1,420	$ 1,200
Operating and maintenance expense	$ 3,617	$ 3,232	$ 2,395	$ 2,307	$ 2,353
Net interest expense	$ 1,305	$ 1,294	$ 1,272	$ 1,376	$ 1,232
Net income	$ 162	$ 972	$ 726	$ 817	$ 423
Construction expenditures	$ 2,417	$ 2,015	$ 1,793	$ 1,984	$ 1,379
Total assets	$ 46,393	$ 42,753	$ 40,017	$ 37,137	$ 33,732
Financial obligations					
Net long-term statutory debt, excluding current maturities	$ 22,412	$ 22,389	$ 21,788	$ 20,404	$ 21,099
Discount notes	482	27	844	185	1,422
Current maturities of long-term debt, net	1,537	1,008	8	2,030	90
Total short-term statutory debt	2,019	1,035	852	2,215	1,512
Total statutory debt [(3)]	$ 24,431	$ 23,424	$ 22,640	$ 22,619	$ 22,611
Capital leases [(4)]	$ 5	$ 47	$ 77	$ 95	$ 104
Leaseback obligations	$ 1,282	$ 1,353	$ 1,403	$ 1,353	$ 1,072
Energy prepayment obligations	$ 717	$ 822	$ 927	$ 1,033	$ 1,138

Notes
(1) See Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations for a description of special items in 2011, 2010, and 2009 affecting results in those years.
(2) See Item 1A, Risk Factors and Note 20 for a discussion of risks and contingencies that could affect TVA's future financial results.
(3) Statutory debt is debt subject to the $30.0 billion limit on bonds, notes, and other evidences of indebtedness as defined in the TVA Act of 1933, as amended.
(4) Included in Accounts payable and accrued liabilities and Other long-term liabilities on the balance sheets.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

(Dollars in millions except where noted)

Business Overview

The Tennessee Valley Authority ("TVA") operates the nation's largest public power system. At September 30, 2011, TVA provided electricity to approximately 50 large industrial customers, six federal agency customers, and 155 distributor customers that serve over nine million people in parts of seven southeastern states. TVA generates virtually all of its revenues from the sale of electricity, and in 2011 revenues from the sale of electricity totaled $11.7 billion. As a wholly-owned agency and instrumentality of the United States, however, TVA differs from other electric utilities in a number of ways:

(1) TVA is a government corporation.

(2) The area in which TVA sells power is limited by the Tennessee Valley Authority Act of 1933, as amended, 16 U.S.C. §§ 831-831ee (as amended, the "TVA Act") under a provision known as the "fence"; however, another provision of federal law known as the "anti-cherrypicking" provision generally protects TVA from being forced to provide access to its transmission lines to others for the purpose of delivering power to customers within substantially all of TVA's defined service area.

(3) The rates TVA charges for power are not set or reviewed by another entity, such as a public utility commission. TVA's rates are set solely by the TVA Board. In setting rates, however, the TVA Board is charged by the TVA Act to have due regard for the primary objectives of the TVA Act, including the objective that power be sold at rates as low as feasible.

(4) TVA is not authorized to raise capital by issuing equity securities. TVA relies primarily on cash from operations and proceeds from power program borrowings to fund its operations and is authorized by the TVA Act to issue bonds, notes, and other evidences of indebtedness ("Bonds") in an amount not to exceed $30.0 billion outstanding at any given time. Although TVA's operations were originally funded primarily with appropriations from Congress, TVA has not received any appropriations from Congress for any activities since 1999 and, as directed by Congress, has funded essential stewardship activities primarily with power revenues.

Executive Summary

Although the worst recession since the 1930s has technically ended, difficult economic conditions and decreased customer demand continued to persist in 2011. In addition, more stringent environmental regulations have impacted generating resources and production costs, and the timing and magnitude of pending regulations create uncertainty. Customers and stakeholders are also expecting power system operations to be cleaner and have less of an impact on the environment in the future. TVA is taking actions to address these challenges, such as idling or retiring older coal-fired generating units, changing the way coal combustion residuals are stored, continuing to install clean air equipment, and continuing its focus on the safe operation of its nuclear units in light of global events.

TVA Vision

TVA's renewed vision is to be one of the nation's leading providers of low-cost and cleaner energy by 2020. More specifically, TVA intends to be:

- The nation's leader in improving air quality;
- The nation's leader in increased nuclear production;
- The Southeast's leader in increased energy efficiency.

During 2011, the TVA Board accepted an integrated resource plan ("IRP") which recommends a strategic direction focusing on a diverse mix of electricity generation sources, including nuclear power, renewable energy, natural gas and energy efficiency, as well as traditional coal and hydroelectric power. TVA intends to move toward more generation with low or no emissions. TVA considers fuel mix in making decisions about additional generation, and is expected to rely on nuclear, natural gas-fired capacity, and energy efficiency as the primary means to meet future electricity needs. The restart of Browns Ferry Nuclear Plant ("Browns Ferry") Unit 1, the decision to complete Watts Bar Nuclear Plant ("Watts Bar") Unit 2, the reactivation of the construction permits for the existing Bellefonte Nuclear Plant ("Bellefonte") units, the decision to complete Bellefonte Unit 1, the filing of combined construction and operating license applications ("CCOLA") for two new units at Bellefonte, the purchase of the Magnolia Combined Cycle Plant ("Magnolia"), and the construction of the John Sevier Combined Cycle Facility are examples of TVA's pursuit of generation sources with low or no emissions. These projects require capital investment in the current year and over the next several years. Another challenge in this area is that TVA must have sufficient generation capacity to meet peak demands. Consequently, TVA is exploring alternatives to reduce or shift peak energy demands.

Linking the Vision to Performance

During 2011, TVA set measures and evaluated its operational performance by focusing on two key indicators. The first measure was net cash flow, which is cash flow from operations plus investing cash flow less net cash flow from change in the fuel cost adjustment deferral account. The second measure was equivalent availability factor, which measures the availability of TVA's generation units within the nuclear and fossil-fueled fleets. The 2011 results compared with targets for these key indicators are reflected in the following chart.

Corporate Measure	Target	Actual
Net cash flow	$(935) Million	$(774) Million
Equivalent availability factor	86.0%	85.1%

TVA exceeded its target for net cash flow by $161 million due to higher cash received from power sales and lower spending on construction expenditures than expected. These items were partially offset by the acquisition of the Magnolia facility which was not included in the 2011 target.

TVA did not meet its equivalent availability factor target for 2011 because of extended outages at two of its larger coal-fired plants as well as an extended outage at one of its combined cycle plants.

Beginning in 2012, TVA plans to measure success using a vision scorecard. Processes will be established to monitor progress in meeting the vision's objectives.

Net cash flow is not a measure of financial performance under accounting principles generally accepted in the United States ("GAAP"). Accordingly, it should not be considered as a substitute for cash flow data prepared in accordance with GAAP. However, TVA uses net cash flow as an indicator of TVA's ability to meet its debt service and availability of funds for capacity expansion and other business requirements.

TVA calculates net cash flow as Net cash provided by operating activities plus Net cash used from investing activities less net cash flow from change in fuel cost adjustment deferral. The following reconciles the net cash flow to Net cash provided by operating activities.

Non-GAAP Reconciliation
For the year ended September 30, 2011

Net cash provided by operating activities	$	2,437
Plus: Net cash used from investing activities		(3,142)
Less: Net cash flow from change in fuel cost adjustment deferral		(69)
Net cash flow	$	(774)

2011 Highlights

Financial

Power sales were three percent lower during 2011 than 2010. The lower demand for electricity was primarily weather-driven but was also affected by lower demand for electricity by TVA's largest industrial customer, which has been curtailing operations. See *2011 Challenges — Weather Extremes* below.

TVA had net income for 2011 of $162 million as compared to $972 million for 2010. Revenues from the sale of electricity totaled $11.7 billion for 2011, and despite the decrease in sales, revenues were nine percent higher in 2011 as compared to 2010. The $1.0 billion increase in revenue was related to the recovery of fuel and purchased power costs in rates and substantially offset the $1.1 billion increase in fuel and purchased power costs. Expenses related to repair of damage caused by storms, higher operating and maintenance expenses related to nuclear refueling outages at generating facilities, the Environmental Agreements, and increases in the cost of employee benefit programs all contributed to the decrease in net income for 2011 as compared to 2010.

Rate Changes and Adjustments

In April 2011, TVA implemented a new wholesale rate structure, which includes seasonal demand and energy ("SDE") and time-of-use ("TOU") rates. The revised rate structures provide price signals intended to incentivize distributor and end-use customers to shift energy usage from high-cost periods to less expensive periods. The rates are not intended to provide additional revenue for TVA (although individual customers may see some effect on their bills), but are intended to more closely align TVA's revenues with its costs.

The new rate structure removed most fuel costs from the base rate. In conjunction with that change, the rate structure was also revised to establish a separate fuel rate that includes the costs of natural gas, fuel oil, purchased power, coal, emission allowances, nuclear fuel and other fuel-related commodities; realized gains and losses on derivatives purchased to hedge the costs of such commodities; and tax equivalents associated with the fuel cost adjustments. Instead of adjusting the energy rates as was the case with the previous rate structure where fuel costs were a component of the base rate, the fuel cost adjustment now establishes the separate fuel rate that is applicable for each month. The following table summarizes the impact that the fuel cost adjustment had on TVA's average wholesale firm rate during 2011.

Month	Base Fuel Rate (¢/kWh)	Fuel Cost Adjustment Rate (¢/kWh)	Total Fuel Rate (¢/kWh)	Impact on Total Average Wholesale Firm Rate
October 2010	1.851	1.127	2.978	6.4%
November 2010	1.851	0.735	2.586	(5.0)%
December 2010	1.851	0.476	2.327	(3.5)%
January 2011	1.851	0.548	2.399	1.0%
February 2011	1.851	0.436	2.287	(1.5)%
March 2011	1.851	0.613	2.464	2.5%
April 2011	n/a	n/a	2.376	(1.2)%
May 2011	n/a	n/a	2.347	(0.4)%
June 2011	n/a	n/a	2.366	0.3%
July 2011	n/a	n/a	2.689	4.5%
August 2011	n/a	n/a	2.741	0.7%
September 2011	n/a	n/a	2.664	(1.0)%

At its August 18, 2011 meeting, the TVA Board approved an adjustment addendum that increased existing base wholesale rate charges beginning in October 2011, and that is expected to result in an increase of approximately two percent in total existing wholesale rate charges. The adjustment to base rates was designed to generate an additional $234 million in revenue in 2012. This increase in revenue will help fund projects tied to TVA's vision, including increasing efficiency of operating assets, increasing energy efficiency/demand response initiatives and funding compliance with emerging regulatory requirements resulting from events like Fukushima.

Environmental Matters

In December 2010, the Environmental Protection Agency ("EPA") issued a report that evaluated progress under its Acid Rain Program ("ARP"). The ARP, established under Title IV of the 1990 Clean Air Act ("CAA") Amendments, requires major emission reductions of sulfur dioxide ("SO_2") and nitrogen oxides ("NO_x") by the electric power industry. The December 2010 report contains information examining emission reductions, reviewing compliance results and market activity, and comparing changes in emissions to changes in pollutant concentrations. Data contained in this report indicates TVA has reduced SO_2 emissions from its coal-fired generating plants at a faster rate than the national average for the industry during the past three decades and that TVA has significantly reduced SO_2 emissions during the past three decades. Furthermore, the report indicates that TVA's NO_x emissions have been significantly reduced since CY 1990 and that the reduction in these emissions has been at a rate faster than the national average during the past two decades.

New Generation

Natural Gas-Fired Generation. Despite the impacts of the recession of 2008-2009, which reduced TVA sales by approximately seven percent at its peak, and the current relatively sluggish economy, TVA believes new generation sources will be needed to meet anticipated load growth. Load growth is a key planning assumption that was examined and approved by both the TVA Board and TVA external stakeholders through the IRP process in 2011. In keeping with its generation strategy to move toward more generation with low or no emissions, TVA continues to evaluate natural gas-fired resource options. Existing combined cycle plants located within or closely adjacent to the TVA service territory generally meet these criteria and provide suitable opportunities for acquisition or long-term purchased power contracts.

On August 31, 2011, TVA acquired Magnolia for $436 million. The Magnolia facility is a three-unit natural gas-fired combined cycle plant with approximately 900 MW of summer net capability located in Benton County, Mississippi, and has been a source of purchased power for TVA since the plant began operation in 2003. See Note 19 — *New Generation.*

Additionally, TVA is in the process of completing the John Sevier Combined Cycle Facility in northeast Tennessee. TVA expects to complete the combined cycle facility by mid-CY 2012. The completed facility is expected to add approximately 880 MW of summer net capability to the TVA system at a cost of approximately $820 million.

Nuclear Generation. On August 18, 2011, the TVA Board approved a plan to finish construction of Bellefonte Unit 1, located in Hollywood, Alabama. TVA began construction of Bellefonte Unit 1 in 1974 but placed the site in deferred status in 1988. Bellefonte Unit 1 is scheduled to be completed by 2020, at an estimated additional cost of $4.9 billion exclusive of Allowance for Funds Used During Construction ("AFUDC") and the cost of the initial fuel load. Construction of Bellefonte Unit 1 is planned to begin after initial fuel loading at Watts Bar Unit 2.

Stewardship Activities

On August 18, 2011, the TVA Board accepted the Natural Resource Plan ("NRP"). The NRP is designed to enhance stewardship of public recreation facilities, water resources, wildlife and plants, and historic and cultural sites on TVA-managed reservoir lands by helping to guide TVA management to better meet public stewardship objectives while responding to the needs of the TVA region's communities and residents. Implementation of the NRP is expected to be staged over a 20-year period. It is expected to be reviewed and updated at least every five years.

Economic Development

TVA's economic development efforts helped recruit or expand over 140 companies into the TVA service area during 2011. These companies announced capital investments of over $4.9 billion and the expected creation and/or retention of over 43,000 jobs.

2011 Challenges

TVA faced several challenges during 2011 which impacted its operations and financial condition, including those discussed below.

Construction Projects

TVA had two major projects that experienced construction delays in 2011.

Watts Bar Unit 2. The project's schedule has experienced some delays as a result of lower than expected construction productivity and there will likely be a delay from licensing-related activities, including a delay resulting from a hearing scheduled to take place before an Atomic Safety and Licensing Board to resolve a pending aquatic contention.

On July 13, 2011, the Nuclear Regulatory Commission's ("NRC") Near-Term Task Force on the Fukushima Event released its review of insights following the Japanese nuclear events recommending that the NRC propose safety improvements in areas ranging from loss of power to earthquakes, flooding, spent fuel pools, containment venting, and preparedness. Actions taken upon the review could result in TVA being required to make changes to its operating nuclear units and Watts Bar Unit 2. Such changes are expected to possibly impact the cost and schedule of the project. See Item 1, Business — *Current Power Supply — Nuclear — Response to Recent Events* .

As a result of one or more of these developments, TVA believes that the Watts Bar Unit 2 completion date will extend into CY 2013, rather than the last quarter of CY 2012 as had been scheduled. The construction project and schedule for Watts Bar Unit 2 is currently being reviewed by TVA. Project costs are expected to significantly exceed the previous estimate of $2.5 billion. Updates to the schedule and cost estimates are expected to be completed by the second quarter of FY 2012.

TVA has received a license from the NRC to allow TVA to receive, inspect, and store new nuclear fuel at the Unit 2 site. The new fuel began arriving at the Watts Bar site during the summer of 2011. TVA plans to load the new nuclear fuel into the Unit 2 reactor following receipt of the operating license.

In November 2011, the NRC provided notice of its draft environmental report issued in connection with the licensing of Watts Bar Unit 2. In the draft report, the NRC staff concludes that the environmental impacts from the operation of Watts Bar Unit 2 are generally consistent with previous environmental reviews of the unit's operation and are in some cases less than previously identified.

For legal proceedings related to Watts Bar Unit 2, see Note 20 — *Legal Proceedings — Administrative Proceedings Regarding Watts Bar Nuclear Plant Unit 2* .

Browns Ferry Cooling Tower. A new cooling tower for Browns Ferry had been scheduled to go into operation in the summer of 2011. Completion of the project has been delayed, and TVA now expects the new cooling tower to be completed in the spring of 2012. As a result of not having the additional cooling capacity the new cooling tower would have provided, TVA was required to reduce generation at Browns Ferry during parts of the summer of 2011 to comply with permit requirements related to discharge water temperature.

Regulatory Compliance

Environmental Agreements. On April 14, 2011, TVA entered into two agreements (collectively, the "Environmental Agreements") that generally absolve TVA until 2019 from any liability, subject to certain limitations and exceptions, under the New Source Review (“NSR”) requirements of the CAA for maintenance, repair, and component replacement projects that were commenced at TVA’s coal-fired units prior to the execution of the Environmental Agreements. Possible claims for NSR violations involving increases in greenhouse gases (“GHG”) and sulfuric acid mist from projects can still be pursued in the future. Claims for increases in particulates also can be pursued except at TVA’s Allen Fossil Plant, Bull Run Fossil Plant, Kingston Fossil Plant (“Kingston”), and Gallatin Fossil Plant and Unit 5 at TVA’s Colbert Fossil Plant.

The Environmental Agreements provide for a civil penalty of $10 million which was paid in July 2011 and require TVA to provide $60 million to be divided by Alabama, Kentucky, North Carolina, and Tennessee to fund environmental projects with a preference for projects in the Tennessee River watershed, of which $4 million was paid in 2011. In addition, TVA will invest $290 million in energy efficiency projects, demand response projects, renewable energy projects, and other projects.

Certain legal and administrative proceedings have been terminated or will be narrowed in scope as a result of the Environmental Agreements. See Note 20 — *Legal Proceedings — Environmental Agreements* for more information regarding these proceedings.

In conjunction with the Environmental Agreements and TVA’s movement towards more generation with low or no emissions, TVA announced plans to retire 2,700 MW of coal-fired capacity through the end of 2017.

Browns Ferry. TVA discovered a problem involving Browns Ferry Unit 1 low pressure coolant injection valve, which had failed because of a manufacturing deficiency, when the reactor was shut down for refueling in October 2010. TVA repaired the valve, and reported the problem to the NRC. Other similar valves were also inspected and improvements made to prevent future problems of this type. On May 9, 2011, the NRC notified TVA that it issued a red finding related to the valve's performance. The red finding denotes an issue of “high safety significance” and places Browns Ferry in the multiple/repetitive degraded cornerstone category of the NRC's Reactor Oversight Program. TVA appealed the red finding determination. A decision to uphold the finding was made following an NRC internal review. This red finding also means that all of the Browns Ferry units will be subject to increased oversight and inspection, including a maintenance inspection, and inspections focusing on reactor safety and safety culture. The inspections will continue through 2012. TVA is taking actions to address the performance deficiency, which could include mid-cycle outages to perform corrective work, as well as safety-related issues. TVA anticipates spending between $75 million and $120 million during 2012 related to the acceleration of material improvements at Browns Ferry. Estimates of costs related to additional corrective actions over the next several years are in the process of being developed, including improvements at Watts Bar and TVA's Sequoyah Nuclear Plant.

Kingston Ash Spill. Cleanup and recovery efforts related to the Kingston ash spill in conjunction with federal and state agencies continued during 2011. TVA currently estimates the recovery process will be substantially completed in 2014 although monitoring may continue beyond that date. TVA has accrued a portion of the estimated cost in current liabilities, with the remaining portion accrued as a long-term liability on TVA’s balance sheets. Costs incurred since the event through September 30, 2011, totaled $749 million with a remaining estimated liability of $376 million. As work continues to progress and more information is available, TVA will review its estimates and revise them as appropriate. See Note 8.

TVA has not included the following categories of costs in the above estimate since it has determined that these costs are currently either not probable or not reasonably estimable: penalties (other than the penalties set out in the Tennessee Department of Environment and Conservation ("TDEC") order), regulatory directives, natural resources damages (other than payments required under a memorandum of agreement with TDEC and the Fish and Wildlife Service establishing a process and a method for resolving the natural resource damages claim), future lawsuits, future claims, long-term environmental impact costs, final long-term disposition of ash processing area, costs associated with new laws and regulations, or costs of remediating any mixed waste discovered during ash removal process. There are certain other costs that will be incurred that have not been included in the estimate as they are appropriately accounted for in other areas of the financial statements. Associated capital asset purchases are recorded in property, plant, and equipment. Ash handling and disposition costs from current plant operations are recorded in operating expenses. A portion of the pond and dredge cell closure costs are also not included in the estimate as those costs are included in the non-nuclear asset retirement obligation liability.

TDEC issued a civil penalty order of approximately $12 million to TVA for the Kingston ash spill, citing violations of the Tennessee Solid Waste Disposal Act and the Tennessee Water Quality Control Act. Of the $12 million, TVA has already satisfied $8 million of the obligation and may also be credited up to $2 million for performing environmental projects approved by TDEC. The remaining obligation will be paid in installments through July 2012.

Coal Combustion Residuals ("CCRs"). On December 15, 2010, a leak was identified in the clay liner of the gypsum pond at Kingston. TVA submitted to the TDEC a two-phase Corrective Action Plan (“CAP”) to install a synthetic liner on the gypsum pond. The synthetic liner is being designed and installed to meet the requirements of the CAP, current TDEC regulations, and anticipated RCRA Subtitle D requirements for CCR storage. The gypsum pond was expected to be back in service by September 2011; however, due to weather and other unforeseeable conditions, implementation of the CAP was delayed. Under the Environmental Agreements, TVA is generally not allowed to operate Kingston after September 20, 2011, without the scrubbers in operation, and the scrubbers cannot be operated unless TVA has the ability to store the gypsum the scrubbers produce. Accordingly, TVA stopped operating Kingston on September 19, 2011, and began the fall maintenance outage to tie in the new dry fly ash handling system. Work on the first phase of the new gypsum storage facility was completed on October 21, 2011 and TDEC approval to place the facility back in operation was received on November 16, 2011. As the Kingston fall outage work is completed, and as power is needed, Kingston's units will be brought back on line. The approximate cost of the first phase of work for the gypsum facility is $24 million. The estimate and schedule for the second phase of work has not been established at this time.

TVA is studying the adequacy of storage capacity at other fossil-fuel plants. If it is found that remaining capacity is not adequate, interruptions in the capability of these plants to operate may also result.

Weather Extremes

TVA’s service area experienced an unprecedented series of storms on April 27, 2011, and April 28, 2011, causing significant damage to the TVA power system. The hardest hit areas were central and northern Mississippi, northern Alabama, and the eastern portion of Tennessee.

Browns Ferry, located in northern Alabama, and the switchyard at Browns Ferry sustained only minimal damage from the storms, but damage to the TVA transmission system at offsite locations resulted in the plant being without sufficient external electricity supply. Emergency backup power systems, including on-site diesel generators, provided power to safely cool down the reactors during the ensuing shutdown. All Browns Ferry units returned to full availability status by early June 2011. Additionally, transmission lines at Widows Creek Fossil Plant (“Widows Creek”), also located in north Alabama, were damaged as a result of this storm system.

TVA estimates the cost of the events to be $39 million for structural repairs including capitalized expenditures of $29 million and operating and maintenance expenditures of $10 million. The cost of power purchased to meet demand while Browns Ferry and other generating units were not connected to the electric grid was $95 million. The increase in TVA’s fuel rate from May 2011 to July 2011 is due in part to help recover the cost of the replacement power purchased as a result of these storms.

Investment Funds

Nuclear Decommissioning Trust Fund . The nuclear decommissioning trust (“NDT”) portfolio increased in value by $4 million in 2011. The balance at September 30, 2011, was less than the present value of the estimated future nuclear decommissioning costs under the NRC methodology and under GAAP. TVA submitted an NDT funding assurance plan to the NRC during 2009 utilizing the external sinking fund method as described in the NRC’s regulations. The plan is based on estimated positive long-term investment performance above an anticipated increase in the decommissioning liability over the remaining lives of TVA’s nuclear units. The funding assurance plan provides mechanisms to address any potential shortfalls under a schedule with the goal of ensuring sufficient funds are available when the nuclear plants are eventually decommissioned. At September 30, 2011, the NDT was 114 percent funded under the assurance plan that TVA submitted to the NRC.

Pension Plans . Although financial markets improved during the first part of 2011, they lost the majority of gains during a downturn in the last months of 2011. Net assets in the plans at September 30, 2011, were approximately $6.5 billion and obligations were approximately $11.3 billion for a net underfunded status of $4.7 billion at September 30, 2011. The ability of the qualified plan’s funded status to quickly improve is limited because the qualified pension plan pays approximately $600 million of benefits each year to nearly 24,000 retirees. TVA made a contribution to the plan of $270 million in September 2011.

In September 2011, the Tennessee Valley Authority Retirement System ("TVARS") Board approved a long-term investment plan which contains a “dynamic de-risking” strategy that calls for investments to be shifted into assets that better match the liability, such as long duration fixed income securities, over time as funding targets are met. See *Risk Management Activities — Investment Price Risk* and Note 18 — *Plan Investments.*

Future Challenges

Many of the challenges that TVA faced in 2011 will continue to be challenges in the future, including those related to constructing or acquiring new generating assets, converting TVA’s CCR facilities, idling, retiring, or adding emissions control equipment to TVA’s coal-fired units, funding new capital projects as TVA nears the $30.0 billion ceiling on Bonds outstanding, and funding TVA’s NDT and pension plan, as well as slower than expected economic recovery resulting in lower projected sales for 2012. In addition, TVA may face additional challenges discussed below.

Capital Investments

TVA faces potentially large capital requirements to maintain its power system infrastructure and invest in new power assets, including generation assets using cleaner energy sources. Due to the age, lower capacity, and lower efficiency of TVA’s older coal-fired units, it may not be economical to continue to operate some units in the future, particularly if new environmental laws or regulations become effective. However, discontinuing the use of some coal-fired units may be constrained by transmission expansion that will be required before the units are taken out of service. TVA is also planning to convert all of its wet CCR facilities to dry collection facilities and the estimated cost of this conversion is between $1.5 billion and $2.0 billion. See Item 1, Business — *Current Power Supply* and — *Future Power Supply.*

Pending Regulation and Legislation

Environmental . TVA anticipates that clean air regulations will eventually require all coal-fired units to install air quality controls, including scrubbers and selective catalytic reduction systems (“SCRs”) for SO_2, NO_x, and mercury control. TVA also expects that legislation or regulations will eventually require it to reduce carbon dioxide (“CO_2”) emissions or purchase CO_2 allowances. Furthermore, TVA believes it is likely that new laws or regulations will come into effect in the future that will require electric utilities to obtain a specified portion of their power supply from renewable resources. The cost of compliance with any such laws and regulations is currently unknown, but compliance could require significant expenditures by TVA. TVA would have to recover such costs in rates or pursue some other action which, among other options, might include idling or retiring additional coal-fired units. See Item 1, Business — *Current Power Supply* and — *Future Power Supply.*

Health Care. There is a risk of increased health care costs associated with federal health care reform legislation. TVA plans to continue to monitor the changes required by this legislation and to review its medical plan to comply with required changes in a cost-effective manner. During 2011, TVA experienced an 11 percent increase in health care cost provided to active and retired employees.

Generating Fleet

Nuclear Generation. TVA management has established a response team to analyze the Japanese nuclear events of 2011 and is also analyzing the ability of TVA’s plants to safely shut down and safely remain in that state during simultaneous natural disasters such as floods, earthquakes, and/or tornadoes.

The team also provided short, intermediate, and long-term recommendations for TVA sites related to additional precautionary actions TVA may adopt. Short-term actions include adding additional satellite phones for emergency responders when normal communications are damaged and adding small portable electric generators for lights, charging batteries, and other vital equipment. Longer-term actions may include changes to the storage methods for spent nuclear fuel. Finally, TVA will further evaluate its switch-yards for seismic vulnerabilities and may provide additional backup power sources at its nuclear plants.

TVA believes that the Japanese nuclear events could translate into changes in plant operations, design, or safety and the imposition of additional requirements by the NRC or other regulatory bodies. Should potential changes prove to be significant, the schedule to complete and the costs associated with the commercial operation of Watts Bar Unit 2, as well as future plans for construction at Bellefonte Unit 1 or other facilities, could be affected. Several petitions have been filed with the NRC that seek to take actions in response to the Japanese nuclear events that could impact TVA nuclear operations or licensing activities if the requested actions are taken by the NRC. See Note 20 — *Legal Proceedings — Petitions Resulting from Japanese Nuclear Events.*

In addition to the anticipated changes from the Japanese nuclear events, the issuance of the red finding at Browns Ferry will also impact TVA's nuclear operations over the next few years. The red finding requires the NRC to conduct special inspections at Browns Ferry, the results of which could have ramifications for TVA's nuclear generation facilities. The results of the inspections will aid the NRC in deciding whether additional regulatory actions are necessary to assure public health and safety. The special inspections will look at the entire range of programs, processes, and procedures in place for operating, maintaining, designing, and modifying Browns Ferry. The NRC will also review the results from a third-party assessment of Brown Ferry's safety culture. The NRC inspections and reviews related to the red finding are anticipated to occur over the next couple of years.

Coal-Fired Generation. Future environmental regulations could result in significant increases in capital expenditures and operating costs, which, in turn, could lead to increased liquidity needs and financing requirements. TVA currently has approximately 13,800 MW of coal-fired generation. Approximately 4,900 MW have neither scrubbers nor SCRs. Although TVA uses scrubbers on its largest generating units and low sulfur coal on other units to remove SO_2 and SCRs and other controls to reduce NO_x emissions, several of TVA’s older coal-fired plants do not have a complete set of modern clean air equipment, and their lower efficiency leads to higher CO_2 emission rates. As part of the Environmental Agreements, the TVA Board approved the retirement of 18 older coal-fired units at three power plants. Due to the age, lower capacity, and lower efficiency of some units, it may not be economical to install new emission control equipment; accordingly, TVA may choose to idle or retire additional coal-fired units. As TVA idles or retires coal-fired units, there may be some risks related to TVA’s ability to meet customer demand for low-cost power in the future. TVA is attempting to address these risks through a process which includes the diversification of fuel sources and fuel type, as well as physical and financial hedging programs for fuel and purchased power, and increased emphasis on investments in energy efficiency, demand response, and communication technologies and end-use customer devices. See Item I, Business — *Current Power Supply — Coal-Fired* and *Environmental Matters.*

Thermal Issues . During the summer of 2011, as in prior years, TVA had to reduce generation from certain nuclear and coal-fired plants to prevent issues associated with high water temperatures in the Tennessee and Cumberland Rivers. As discussed above, an additional cooling tower is being constructed at Browns Ferry, but the potential for future reductions in generation exist at larger coal-fired plants such as Cumberland Fossil Plant.

Debt Ceiling

The TVA Act specifies that TVA may not have more than $30.0 billion Bonds outstanding at one time. At September 30, 2011, TVA had $24.7 billion of Bonds outstanding. Increased future capital expenditures along with a restrictive debt ceiling may pose a challenge to TVA's ability to maintain low and competitive power rates.

Inflation

The economy recently experienced a very deep recession which has led to increased unemployment and low industrial capacity utilization. Given the current low levels of capacity utilization and high unemployment, inflationary pressures should remain low. However, a strong, sustained recovery with increasing labor, construction, and commodity costs, as well as high interest rates, could result in higher costs for TVA and pressure to increase power rates.

Safeguarding Assets

Physical Security. TVA is responsible for the physical security of the assets entrusted to it across its service area. In seeking to protect these assets, TVA follows numerous regulatory requirements that set minimum standards for physical security and uses a combination of threat analysis, technology, and partnerships with the public to help deter, detect, and respond to specific threats to critical assets. In addition, training programs for TVA's workforce are being developed in order to help foster a strong culture of security awareness throughout TVA. TVA is likely to invest in future protective measures based on security assessments being performed through 2012 that are expected to identify opportunities for improvement.

Nuclear Security . Nuclear security is carried out in accordance with federal regulations as set forth by the NRC. These regulations are designed for the protection of TVA's nuclear power plants, the public, and employees from the threat of radiological sabotage and other nuclear-related terrorist threats. TVA has nuclear security forces to guard against such threats. TVA currently plans to spend between $100 million and $140 million between 2012 and 2013 on upgrades to its nuclear security infrastructure which includes amounts related to the implementation of the NRC recommendations from the Japanese nuclear event. See Part 1, *Current Power Supply — Nuclear — Response to Recent Events* .

Cyber Security. Cyber security is a serious and ongoing challenge for the energy sector. Cyber threats to energy delivery systems exist and can impact critical functions that, if lost or degraded, could result in an inability to generate or effectively transmit power, which could lead to lost revenue.

Cyber security and the protection of TVA operations and activities are a priority. TVA uses a defense-in-depth security model in an effort to prevent, detect, respond to, and recover from threats against its systems. TVA plans to modify and upgrade its protections as technology advances and threat environments and business requirements change. TVA currently plans to spend approximately $30 million to $40 million in cyber security updates between 2012 and 2015.

As part of the U.S. government, TVA coordinates with and works closely with the Department of Homeland Security ("DHS") and the United States Computer Emergency Readiness Team ("US-CERT"). US-CERT functions as a liaison between DHS and the public and private sector to coordinate responses to security threats from the internet.

Future Workforce Needs and Development

Although TVA has traditionally experienced low employee turnover, potential risks exist because of retirements and competition for talent from other companies. Attracting and retaining employees with the skills needed to achieve TVA's vision of becoming one of the nation's leading providers of low-cost and cleaner energy (skills related to new nuclear construction, installation of new environmental equipment, construction of additional environmental controls, and the implementation of new regulations, for example) also present workforce challenges, especially given the growing need to control costs and the salary freeze for federal employees enacted on December 22, 2010. (See *Legislative and Regulatory Matters* for a discussion of the salary freeze.) To ensure that TVA is able to attract and retain the workforce needed to achieve its vision, TVA established a new organization to focus on human capital, including recruiting programs and outreach to high school, trade school, and college students, in 2010 and revised its workforce planning program in 2011. The revised workforce planning program is targeted for implementation agency-wide in the first quarter of 2012.

Liquidity and Capital Resources

Sources of Liquidity

To meet cash needs and contingencies, TVA depends on various sources of liquidity. TVA's primary sources of liquidity are cash from operations and proceeds from the issuance of short-term and long-term debt. Current liabilities may exceed current assets from time to time in part because TVA uses short-term debt to fund short-term cash needs as well as pay off scheduled maturities and other redemptions of long-term debt. The daily balance of cash and cash equivalents maintained is based on near-term expectations for cash expenditures and funding needs.

Financial markets have experienced higher than normal volatility from 2008 amid negative developments in housing and mortgage-related activities, weakness of major financial institutions, and negative economic developments. These conditions initially resulted in severe disruptions in credit and lending activities, particularly in the short-term credit markets through which corporate institutions borrow and lend to each other. In more recent periods, market volatility has been driven by slow economic growth, uncertainty related to the financial health of governments in the United States and Europe, and negative developments in sovereign debt markets.

Despite the disruptions in the credit and financial markets, TVA has not experienced difficulty in issuing short-term or long-term debt or in refunding maturing short-term or long-term debt. Disruptions in the short-term credit markets have the potential to very negatively impact TVA because TVA uses short-term debt to meet working capital needs. Throughout the period of market volatility, TVA has experienced strong demand for short-term borrowings issued under its discount notes program and long-term bonds, and has been able to issue debt at competitive rates. TVA issued $99 million of electronotes® and $1.5 billion of other power bonds in 2011. TVA expects continued demand for its debt securities.

In addition to cash from operations and proceeds from the issuance of short-term and long-term debt, TVA's sources of liquidity include a $150 million credit facility with the U.S. Treasury, three long-term revolving credit facilities totaling $2.5 billion, and occasional proceeds from other financing arrangements including call monetization transactions, sales of assets, and sales of receivables and loans. Management expects these sources to provide adequate liquidity to TVA for the foreseeable future. However, the TVA Act authorizes TVA to issue Bonds in an amount not to exceed $30.0 billion outstanding at any time. Due to this limit on Bonds, TVA may not be able to use Bonds to finance all of the capital investments planned over the next decade. Capital spending needs could be met with a combination of Bonds, other forms of financing such as leasing and energy prepayments, additional power revenues through rate increases, cost reductions, or other ways. Additionally, energy efficiency and demand response initiatives may reduce generation requirements and thereby reduce capital needs. Certain sources of liquidity are discussed below.

Issuance of Debt. TVA Bonds are not obligations of the United States, and the United States does not guarantee the payments of principal or interest on Bonds. At September 30, 2011, TVA had only two types of Bonds outstanding: power bonds and discount notes. Power bonds have maturities of between one and 50 years, and discount notes have maturities of less than one year. Power bonds and discount notes have a first priority and equal claim of payment out of net power proceeds. Net power proceeds are defined as the remainder of TVA's gross power revenues after deducting the costs of operating, maintaining, and administering its power properties and payments to states and counties in lieu of taxes, but before deducting depreciation accruals or other charges representing the amortization of capital expenditures, plus the net proceeds from the sale or other disposition of any power facility or interest therein. See Note 1 — *General* .

Power bonds and discount notes are both issued pursuant to section 15d of the TVA Act and pursuant to the Basic Tennessee Valley Authority Power Bond Resolution adopted by the TVA Board on October 6, 1960, as amended on September 28, 1976, October 17, 1989, and March 25, 1992 (the "Basic Resolution"). The TVA Act and the Basic Resolution each contain two bond tests: the rate test and the bondholder protection test.

Under the rate test, TVA must charge rates for power which will produce gross revenues sufficient to provide funds for:

- Operation, maintenance, and administration of its power system;
- Payments to states and counties in lieu of taxes;
- Debt service on outstanding Bonds;
- Payments to the U.S. Treasury as a repayment of and a return on the government's appropriation investment in TVA's power facilities (the "Power Program Appropriation Investment"); and
- Such additional margin as the TVA Board may consider desirable for investment in power system assets, retirement of outstanding Bonds in advance of maturity, additional reduction of the Power Program Appropriation Investment, and other purposes connected with TVA's power business, having due regard for the primary objectives of the TVA Act, including the objective that power shall be sold at rates as low as are feasible. See Note 15 — *Appropriation Investment* .

The rate test for the one-year period ended September 30, 2011, was calculated after the end of 2011, and TVA met the test's requirements.

Under the bondholder protection test, TVA must, in successive five-year periods, use an amount of net power proceeds at least equal to the sum of:

- The depreciation accruals and other charges representing the amortization of capital expenditures, and
- The net proceeds from any disposition of power facilities,

for either

- The reduction of its capital obligations (including Bonds and the Power Program Appropriation Investment), or
- Investment in power assets.

The bondholder protection test for the five-year period ended September 30, 2010, was calculated after the end of 2010, and TVA met the test's requirements. TVA must next meet the bondholder protection test for the five-year period ending September 30, 2015.

As discussed above, TVA uses proceeds from the issuance of discount notes, in addition to other sources of liquidity, to fund short-term cash needs and scheduled maturities of long-term debt. The following table provides additional information regarding TVA's short-term borrowings .

Short-Term Borrowing Table

	At September 30, 2011	For Quarter Ended September 30, 2011	For Year Ended September 30, 2011	At September 30, 2010	For Year Ended September 30, 2010	At September 30, 2009	For Year Ended September 30, 2009
Amount Outstanding (at End of Period) or Average Amount Outstanding (During Period)							
Discount notes	$ 482	$ 680	$ 363	$ 27	$ 905	$ 844	$ 1,650
Weighted Average Interest Rate							
Discount notes	0.001%	0.196%	0.137%	0.040%	0.089%	0.063%	0.323%
Maximum Month-End Amount Outstanding During Period							
Discount notes	N/A	$ 1,000	$ 1,401	N/A	$ 1,176	N/A	$ 2,637

TVA held a higher balance of short-term debt at September 30, 2011, than at September 30, 2010, due to the timing of cash flows and the desire to meet management's target for short-term cash on hand. The average balance of short-term debt was lower in 2011 than 2010 because TVA issued more long-term debt than it redeemed in 2011 to take advantage of the historically low interest rate environment by locking-in long-term lower borrowing rates. Some of those proceeds were used to redeem short-term debt. TVA held a lower balance of short-term debt at September 30, 2010, than September 30, 2009, primarily because it issued more long-term debt than it redeemed in 2010 and applied some of those proceeds to the redemption of short-term debt. The redemption of short-term debt also accounted for the average balance of short-term debt being lower in 2010 than in 2009. The variance in the average interest rate on discount notes is primarily due to changes in market conditions.

TVA uses a significant portion of its power bond proceeds to refinance previously-issued power bonds as they mature or are redeemed. From time to time, TVA also uses power bond proceeds for other power program purposes, including financing its construction projects, as was the case in 2011 and 2010.

During 2011 and 2010, TVA issued $1.6 billion and $1.7 billion of power bonds, respectively, and redeemed $1.0 billion and $69 million of power bonds, respectively. Power bonds outstanding, excluding unamortized discounts and premiums and net exchange losses from foreign currency transactions, at September 30, 2011 were $24.2 billion (including current maturities) and at September 30, 2010 were $23.6 billion (including current maturities). For additional information about TVA debt issuance activity and debt instruments issued and outstanding at September 30, 2011, and 2010, including rates, maturities, outstanding principal amounts, and redemption features, see Note 11 — *Debt Securities Activity* .

TVA Bonds are traded in the public bond markets. TVA's Bonds are listed on the New York Stock Exchange ("NYSE") except for TVA's discount notes and the power bonds issued under TVA's electronotes ® program. TVA's Putable Automatic Rate Reset Securities are traded on the NYSE under the exchange symbols "TVC" and "TVE," respectively. Other NYSE-listed bonds are assigned various symbols by the exchange, which are noted on the NYSE's website. TVA has also listed certain bonds on foreign exchanges from time to time, including the Luxembourg, Hong Kong, and Singapore Stock Exchanges. See Item 1A, Risk Factors for additional information regarding the market for TVA's Bonds. At September 30, 2011, all of TVA's Bonds were rated by at least one rating agency except for two issues of power bonds and the discount notes. Ratings are not recommendations to buy, sell, or hold any TVA securities and may be subject to revision or withdrawal at any time by the rating agencies. Ratings are assigned independently, and each should be evaluated as such.

On August 2, 2011, one of the rating agencies confirmed the Aaa rating of the United States and assigned a Negative rating outlook following the government's action to raise the debt limit in order to avoid a default on the government's obligations. On August 3, 2011, this same agency confirmed the Aaa senior secured and unsecured ratings of TVA Bonds and assigned a Stable rating outlook.

On August 5, 2011, one of the rating agencies lowered its long-term rating on the United States to AA+ from AAA and affirmed the A-1+ short-term rating. This action was based on concerns regarding the fiscal and economic position of the United States. The outlook on the long-term rating is Negative. The rating agency removed the short- and long-term ratings of the United States from review for possible downgrade. On August 8, 2011, this same rating agency lowered the long-term rating on TVA Bonds to AA+ from AAA and removed the rating from review for possible downgrade. The outlook on TVA's rating is Negative. The action taken on the rating on TVA Bonds was based on the application of the rating agency's government-related entities criteria.

The downgrade of the rating on TVA Bonds to AA+ by this one rating agency may increase TVA's interest expense by increasing the interest rates TVA pays on the short-term or long-term debt securities it issues. The downgrade required TVA to post $100 million of additional collateral under certain physical and financial contracts that contain rating triggers.

On August 16, 2011, the third national rating agency that provides a rating on TVA Bonds affirmed the AAA rating of the United States with a Stable outlook. Prior to this action, on June 15, 2011, this same rating agency affirmed the AAA rating on TVA Bonds with a Stable outlook.

Credit Facility Agreements . TVA and the U.S. Treasury have entered into a memorandum of understanding under which the U.S. Treasury provides TVA with a $150 million credit facility. This credit facility matures on September 30, 2012, and is expected to be renewed. This arrangement is pursuant to the TVA Act. Access to this credit facility or other similar financing arrangements has been available to TVA since the 1960s. TVA plans to use the U.S. Treasury credit facility as a secondary source of liquidity. The interest rate on any borrowing under this facility is based on the average rate on outstanding marketable obligations of the United States with maturities from date of issue of one year or less. There were no outstanding borrowings under the facility at September 30, 2011 .

TVA also has funding available in the form of three long-term revolving credit facilities totaling $2.5 billion.

Summary of Long-Term Credit Facilities
At September 30, 2011
(in billions)

Maturity Date	Facility Limit	Letters of Credit Outstanding	Cash Borrowings	Availability
January 2014	$ 0.5	$ 0.5	$ —	$ —
January 2014	1.0	—	—	1.0
May 2014	1.0	0.1	—	0.9
	$ 2.5	$ 0.6	$ —	$ 1.9

The credit facilities accommodate the issuance of letters of credit. The interest rate on any borrowing under these facilities is variable based on market factors and the rating of TVA's senior unsecured long-term non-credit enhanced debt. TVA is required to pay an unused facility fee on the portion of the total $2.5 billion which TVA has not borrowed or committed under letters of credit. This fee, along with letter of credit fees, may fluctuate depending on the rating of TVA's senior unsecured long-term non-credit enhanced debt. At September 30, 2011, there were $575 million of letters of credit outstanding under the facilities, and there were no borrowings outstanding. See Note 11 — *Credit Facility Agreements*.

Lease Financing. TVA expects to enter into a lease purchase arrangement for its John Sevier Combined Cycle Facility in 2012. Under a lease purchase arrangement, interest in a facility under construction is sold or otherwise conveyed to investors and then leased back to TVA through a long-term lease. At the end of the lease term, TVA would own the facility without making any additional payments. TVA may seek to enter into similar arrangements for other assets under construction in 2012 and thereafter. Other assets under construction for consideration for lease-purchase transactions or other leasing transactions may include natural gas units, nuclear units, or pollution control equipment.

While leasing allows TVA to diversify its asset financing program, financing an asset by using the proceeds of leasing transactions is typically more costly to TVA than financing an asset with the proceeds of Bonds.

Call Monetization Transactions. TVA has entered into swaption transactions to monetize the value of call provisions on certain of its Bond issues. A swaption essentially grants a third party the right to enter into a swap agreement with TVA under which TVA receives a floating rate of interest and pays the third party a fixed rate of interest equal to the interest rate on the Bond issue whose call provision TVA monetized. Through September 30, 2011, TVA had entered into four swaption transactions that generated proceeds of $261 million.

- In 2003, TVA monetized the call provisions on a $1.0 billion Bond issue and a $476 million Bond issue by entering into swaption agreements with a third party in exchange for $175 million and $81 million, respectively.

- In 2005, TVA monetized the call provisions on two Bond issues ($42 million total par value) by entering into swaption agreements with a third party in exchange for $5 million.

For more information regarding TVA’s call monetization transactions, see Note 13 — *Derivatives Not Receiving Hedge Accounting Treatment — Swaption and Interest Rate Swaps.*

Sale of Interest in TVA Generating Facility . Seven States Power Corporation (“Seven States”), through its subsidiary, Seven States Southaven, LLC (“SSSL”), exercised Seven States’s option to purchase an undivided 90 percent interest in a combined cycle combustion turbine facility in Southaven, Mississippi. As part of interim joint-ownership arrangements, Seven States has the right at any time during the interim period, and for any reason, to require TVA to buy back Seven States's interest in the facility. The interim period under the original agreements was to expire on April 30, 2010. On April 22, 2010, TVA and Seven States, through SSSL, amended the joint ownership agreement, lease agreement, and buy-back arrangements to extend the term of the interim arrangements by approximately three years, until April 23, 2013. The other material terms and conditions of the agreements were not changed and remain in full force and effect. Under the amended agreements, TVA will buy back Seven States's interest if long-term operational and power sales arrangements for the facility among TVA, Seven States, and SSSL, or alternative arrangements, are not in place by April 23, 2013. TVA’s buy-back obligation will terminate if such long-term arrangements are in place by that date. In the event of a buy-back, TVA will re-acquire Seven States's interest in the facility and the related assets. At September 30, 2011, the carrying amount of the obligation was approximately $397 million.

On August 8, 2011, a nationally recognized credit rating agency lowered TVA's long-term rating from AAA to AA+. This downgrade constituted an event of default under the Amended and Restated Credit Agreement between Seven States and its lenders. Upon the occurrence of such an event of default, Seven States's lenders may either impose a higher default interest rate on the loan or exercise an option to require TVA to re-acquire its interest in the Southaven facility and the related assets.

On November 1, 2011, Seven States and its lenders, with the consent of TVA, executed an Amendment to the Amended and Restated Credit Agreement. In this amendment, Seven States' s lenders agreed to waive this event of default and thus waive their lenders' right to force TVA to re-acquire Seven States's interest in the Southaven facility and the related assets or to force Seven States to pay the default interest rate for this event of default. Also, the amendment ties the interest rate on Seven States's credit facilities to TVA's credit rating. Seven States will pay interest on the loan at either 1) LIBOR plus 62.5 basis points if TVA's corporate credit rating is AAA (or its equivalent) by all nationally recognized credit rating agencies, or 2) LIBOR plus 87.5 basis points if TVA's corporate credit rating is AA+ (or its equivalent) by one or more nationally recognized credit rating agencies and AAA (or its equivalent) by the other nationally recognized credit agencies. The amendment also states that any future downgrade of TVA's credit rating to below AA+ (or its equivalent) by any nationally recognized credit rating agency would constitute an event of default by Seven States. Because the monthly rent that TVA pays to Seven States for Southaven passes through to TVA the cost of Seven States's loan, TVA's rent payments will increase under this amendment by the amount that Seven States's interest payments on the loan increase, but because of the waiver, the event of default had no other effect on the terms of TVA's lease with Seven States. TVA will continue to present on its financial statements both current and long-term portions of its leaseback obligation to Seven States.

Summary Cash Flows

A major source of TVA’s liquidity is operating cash flows resulting from the generation and sales of electricity. A summary of cash flow components for the years ended September 30 follows:

Summary Cash Flows
For the years ended September 30

	2011	2010	2009
Cash provided by (used in):			
Operating activities	$ 2,437	$ 1,901	$ 2,163
Investing activities	(3,142)	(2,458)	(2,287)
Financing activities	884	684	112
Net increase (decrease) in cash and cash equivalents	$ 179	$ 127	$ (12)

Operating Activities

2011 Compared to 2010

Net cash flows from operating activities increased $536 million in 2011 compared to 2010. This increase was primarily due to the timing of revenues related to fuel cost recovery as well as a decrease in cash spent on the Kingston ash spill environmental cleanup costs as compared to the prior year. See *2011 Highlights* .

2010 Compared to 2009

Net cash flows from operating activities decreased $262 million in 2010 compared to 2009. This decrease resulted from lower operating revenues as a result of rate decreases related to lower fuel costs, which reduced operating revenues by $1.7 billion. The decrease was nearly fully offset by a $1.0 billion advance contribution to TVA's pension fund in 2009 and a $707 million base rate increase. See *Results of Operations* .

Investing Activities

The majority of TVA's investing cash flows are related to investments in property, plant, and equipment for new generating assets as well as additions and upgrades to existing facilities. A summary of changes in investing cash flows is provided below.

2011 Compared to 2010

Net cash flows used in investing activities increased $684 million in 2011 compared to 2010. The increase resulted primarily from the purchase of Magnolia for $436 million and an increase of $402 million spent on major capital projects, including new combined cycle combustion turbine units, as well as ongoing construction on Watts Bar Unit 2 and CCR-related costs in 2011. The increase was partially offset by a decrease in nuclear fuels expenditures of $185 million resulting from less purchases of uranium and enrichment services in 2011 as compared to 2010. Nuclear reactors are refueled every 18 to 24 months and uranium is purchased in advance of the refueling date. In 2010, uranium was purchased to supply fuel for five nuclear reactors that were refueled in 2011, whereas in 2011 uranium purchases were made to supply two nuclear reactors that will be refueled in 2012.

2010 Compared to 2009

Net cash flows used in investing activities increased $171 million in 2010 compared to 2009. The increase resulted primarily from an additional $222 million spent on major capital projects including new combined cycle and combustion turbine units, as well as ongoing construction on Watts Bar Unit 2, in 2010.

Financing Activities

2011 Compared to 2010

Net cash flows provided by financing activities increased $200 million in 2011 compared to 2010. The change was primarily due to issuance of debt exceeding redemptions by $1.0 billion in 2011, as compared to issuance of debt exceeding redemptions by $793 million in 2010. The net increase in debt was due to funding of capacity expansion investments.

2010 Compared to 2009

Net cash flows provided by financing activities increased $572 million in 2010 compared to 2009. The change was primarily due to a decrease of $2.8 billion in redemptions and repurchases of long-term debt offset partially by a decrease of $1.5 billion in net issuances of short-term debt and a decrease of $690 million in long-term debt issuances. The increase in debt reflects the need for cash primarily to fund capital investments.

Cash Requirements and Contractual Obligations

The future planned construction expenditures for property, plant, and equipment additions, including clean air projects and new generation, are estimated to be as follows:

Future Planned Construction Expenditures [1]
As of September 30

	Actual	Estimated Construction Expenditures		
	2011	2012	2013	2014
Watts Bar Unit 2 [2]	$ 669	$ 369	$ 100	$ —
Other capacity expansion expenditures [3]	929	788	863	775
Environmental expenditures	52	181	860	1,160
Coal combustion residual	142	218	146	100
Transmission expenditures	246	278	316	333
Other capital expenditures [4]	787	850	777	775
Total construction expenditures	$ 2,825 [5]	$ 2,684	$ 3,062	$ 3,143

Notes
(1) TVA plans to fund these expenditures with cash from operations and proceeds from power program financings. This table shows only expenditures that are currently planned. Additional expenditures may be required, among other things, for TVA to meet growth in demand for power in its service area or to comply with new environmental laws, regulations, or orders.
(2) The construction project and schedule for Watts Bar Unit 2 are currently being reviewed by TVA. Updates to the schedule and cost estimates are expected to be completed by the second quarter of FY 2012.
(3) Other capacity expansion expenditures includes the purchase of Magnolia for $436 million.
(4) Other capital expenditures are primarily associated with short lead time construction projects aimed at the continued safe and reliable operation of generating assets.
(5) The numbers above exclude AFUDC related to construction expenditures of $97 million and include items accrued of $69 million.

TVA conducts a continuing review of its construction expenditures and financing programs. The amounts shown in the table above are forward-looking amounts based on a number of assumptions and are subject to various uncertainties. Amounts may differ materially based upon a number of factors, including, but not limited to, changes in assumptions about system load growth, environmental regulation, rates of inflation, total cost of major projects, and availability and cost of external sources of capital. See Forward-Looking Information .

In the near term, TVA's cash flows may be negatively impacted by investments in new generation, such as Watts Bar Unit 2 and the John Sevier Combined Cycle Facility, that are not expected to provide a cash return until put into service.

TVA has certain obligations and commitments to make future payments under contracts, including contracts executed in connection with certain of the planned construction expenses. The following table sets forth TVA's estimates of future payments at September 30, 2011. See Note 11, Note 12, Note 15, and Note 20 for a further description of these obligations and commitments.

Commitments and Contingencies
Payments due in the year ending September 30

	2012	2013	2014	2015	2016	Thereafter	Total
Debt [1]	$ 2,019	$ 2,308	$ 32	$ 1,032	$ 32	$ 19,236	$ 24,659
Interest payments relating to debt	1,372	1,227	1,142	1,141	1,096	19,212	25,190
Lease obligations							
Capital	6	—	—	—	—	3	9
Non-cancelable operating	74	59	34	24	24	147	362
Purchase obligations							
Power	223	158	158	161	168	4,212	5,080
Fuel	1,856	1,502	1,252	1,205	760	1,942	8,517
Other	109	73	62	58	57	574	933
Environmental Agreements	85	87	87	87	—	—	346
Litigation settlements	29	3	3	—	—	—	35
Environmental cleanup costs-Kingston ash spill	182	127	68	—	—	—	377
Payments on other financings	138	488	100	104	104	609	1,543
Payments to U.S. Treasury							
Return of Power Program Appropriation Investment	20	20	10	—	—	—	50
Return on Power Program Appropriation Investment	22	20	19	18	18	217	314
Total	$ 6,135	$ 6,072	$ 2,967	$ 3,830	$ 2,259	$ 46,152	$ 67,415

Note
(1) Does not include noncash items of foreign currency exchange loss of $7 million and net discount on sale of Bonds of $235 million.

In addition to the cash requirements above, TVA has contractual obligations in the form of revenue discounts related to energy prepayments.

Energy Prepayment Obligations

	2012	2013	2014	2015	2016	Thereafter	Total
Energy Prepayment Obligations	$ 105	$ 102	$ 100	$ 100	$ 100	$ 210	$ 717

Results of Operations

Sales of Electricity

Sales of electricity accounted for virtually all of TVA's operating revenues in 2011, 2010, and 2009. TVA sells power at wholesale to distributor customers, consisting of municipalities and cooperatives that resell the power to their customers at retail rates. TVA also sells power to directly served customers, consisting primarily of federal agencies and customers with large or unusual loads. In addition, power that exceeds the needs of the TVA system is sold under exchange power arrangements with other power systems. The following table compares TVA's electricity sales statistics for 2011, 2010, and 2009.

Sales of Electricity
For the years ended September 30
(millions of kWh)

	2011	Percent Change	2010	Percent Change	2009
Municipalities and cooperatives	137,042	(3.1)%	141,448	6.3%	133,078
Industries directly served	28,563	(5.1)%	30,099	4.8%	28,718
Federal agencies and other	2,125	0.5 %	2,115	5.3%	2,008
Total sales of electricity	167,730	(3.4)%	173,662	6.0%	163,804
Weather normalized sales	167,654	(0.7)%	168,852	0.6%	167,807
Heating degree days (1) (normal 3,360)	3,418	(7.6)%	3,698	8.0%	3,423
Cooling degree days (1) (normal 1,863)	2,123	(9.2)%	2,338	30.9%	1,786
Combined degree days (1) (normal 5,223)	5,541	(8.2)%	6,036	15.9%	5,209

Note
(1) The prior years' degree day information has been adjusted in order to incorporate a change in TVA's current calculation of this information. Every five years this calculation is updated in order to incorporate the most recent 30 years of weather history. The most recent update, to incorporate CYs 2006-2010, occurred during the second quarter of 2011.

2011 Compared to 2010

The 4.4 billion kilowatt-hour ("kWh") decrease in sales to Municipalities and cooperatives was primarily due to a decrease in both heating and cooling degree days as a result of a warmer winter and cooler summer in 2011 than 2010.

The 1.5 billion kWh decrease in sales to Industries directly served was primarily due to a decrease in sales to TVA's largest directly served industrial customer, which has been curtailing operations.

The 10 million kWh increase in sales to Federal agencies and other was due to a 62 million kWh decrease in sales to federal agencies directly served and an increase of 72 million kWh sold off-system due to an increase in excess generation available for resale.

2010 Compared to 2009

The 8.4 billion kWh increase in sales to Municipalities and cooperatives was primarily due to an increase in residential sales as a result of a record number of degree days due to both a colder than normal winter and a hotter than normal summer during 2010, as well as an increase in sales to the commercial and industrial customers of TVA's distributor customers due to improving economic conditions.

The 1.4 billion kWh increase in sales to Industries directly served was primarily due to improving economic conditions.

The 107 million kWh increase in sales to Federal agencies and other was due to a 57 million kWh increase in sales to federal agencies directly served and an increase of 50 million kWh sold off-system due to an increase in excess generation available for resale.

Financial Results

The following table compares operating results for 2011, 2010, and 2009:

Summary Statements of Operations
For the years ended September 30

	2011	2010	2009
Operating revenues	$ 11,841	$ 10,874	$ 11,255
Operating expenses	(10,404)	(8,632)	(9,282)
Operating income	1,437	2,242	1,973
Other income, net	30	24	25
Interest expense, net	(1,305)	(1,294)	(1,272)
Net income (loss)	$ 162	$ 972	$ 726

Operating Revenues.

Operating revenues during 2011, 2010, and 2009 consisted of the following:

Operating Revenue
For the years ended September 30

	2011	Percent Change	2010	Percent Change	2009
Sales of electricity					
Municipalities and cooperatives	10,144	9.4 %	$ 9,275	(3.8)%	$ 9,644
Industries directly served	1,440	9.0 %	1,321	(3.4)%	1,367
Federal agencies and other	139	18.8 %	117	(10.7)%	131
Total sales of electricity	11,723	9.4 %	10,713	(3.9)%	11,142
Other revenue	118	(26.7)%	161	42.5 %	113
Total operating revenues	$ 11,841	8.9 %	$ 10,874	(3.4)%	$ 11,255

Operating revenues increased $967 million in 2011 compared to 2010, and decreased $381 million in 2010 compared to 2009 due to the following:

	Variance 2011 vs. 2010	Variance 2010 vs. 2009
Fuel rate	$ 1,312	$ (1,714)
Volume	(360)	580
Base rates	49	707
Off system sales and other	9	(2)
Other revenue	(43)	48
Total	$ 967	$ (381)

2011 Compared to 2010

Operating revenues increased $967 million year over year due primarily to an increase in the fuel rate from 2010 to 2011 resulting in a $1.3 billion impact. The main driver behind the increase in the fuel rate was the unusually low rate in 2010 which resulted from the liquidation of the fuel cost adjustment liability. This fuel cost adjustment liability was the product of over collection of fuel costs in 2009 through the fuel cost adjustment formula. Prior to October 2009 the fuel cost adjustment formula was updated quarterly resulting in the potential for larger positive and negative swings. Starting in 2010 the TVA Board revised the operation of this formula so that it was updated monthly and the TVA Board also approved the liquidation of the remaining liability through rates charged to rate payers over the nine-month period from October 1, 2009 to June 30, 2010, thereby decreasing the fuel rate charged to customers for that period. If not for this decrease to the fuel rate, 2010 revenues would have been $822 million higher. Fuel rates also increased in 2011 as a result of the recovery of a $300 million increase in purchased power with approximately $95 million of this increase resulting from the issues related to the April 2011 storms and the remaining increase relating to TVA's decision to purchase lower-cost power as opposed to running its higher cost peaking units. Finally, fuel rates increased year over year by approximately $180 million as a result of an increase in average fuel cost per kWh of net thermal generation of approximately 10 percent.

Base rates also resulted in a $49 million increase in operating revenues. This increase was due to a change in overall customer product mix rather than a scheduled base rate increase. These increases were partially offset by sales volume decreases which reduced operating revenues by $360 million. This volume decrease related primarily to municipalities and cooperatives and was mainly due to milder weather conditions in 2011 as evidenced by the eight percent decrease in heating degree days and the nine percent decrease in cooling degree days from 2010. Additionally, TVA's largest directly served industrial customer continued to curtail operations, and as a result, revenues related to this customer decreased by approximately $70 million over 2010.

2010 Compared to 2009

Operating revenues decreased $381 million year over year due primarily to a decrease in the fuel rate from 2009 to 2010 resulting in a $1.7 billion impact. The main driver behind the decrease in the fuel rate was the unusually low rate in 2010 which resulted from the liquidation of the fuel cost adjustment liability. The fuel cost adjustment liability was the product of over collection of fuel costs in 2009 through the fuel cost adjustment formula. Prior to October 2009 the fuel cost adjustment formula was updated quarterly resulting in the potential for larger positive and negative swings. Starting in 2010 the TVA Board revised the operation of this formula so that it was updated monthly and the TVA Board also approved the liquidation of the remaining liability through rates charged to rate-payers over the nine-month period from October 1, 2009 to June 30, 2010, thereby decreasing the fuel rate charged to customers for that period. If not for this decrease to the fuel rate, 2010 revenues would have been $822 million higher. Fuel rates also decreased as a result of a $504 million reduction in purchased power and to a lesser extent as a result of overall decreases in the actual cost of fuel burned in TVA's generating units resulting in lower costs charged to customers through the current year portion of the fuel cost adjustment formula.

These decreases in operating revenues were offset by increases related primarily to sales volume of $580 million and a base rate increase resulting in an additional $707 million in revenues. The volume increase is due primarily to a six percent increase in kWhs sold to municipalities and cooperatives as a result of a colder than normal winter and a hotter than normal summer. This is evidenced by an increase in heating degree days of eight percent and an increase in cooling degree days of 31 percent over 2009. The increase related to the base rate change is a result in the TVA Board's approval of a nine percent base rate increase for 2010. Additionally, other revenues increased by $48 million primarily due to additional revenue related to fiber optic leases.

Operating Expenses. Operating expenses during 2011, 2010, and 2009 consisted of the following:

TVA Operating Expenses
For the years ended September 30

	2011	Percent Change	2010	Percent Change	2009
Fuel	$ 2,926	39.9%	$ 2,092	(32.8)%	$ 3,114
Purchased power	1,427	26.6%	1,127	(30.9)%	1,631
Operating and maintenance	3,617	11.9%	3,232	34.9 %	2,395
Depreciation and amortization	1,772	2.8%	1,724	7.9 %	1,598
Tax equivalents	662	44.9%	457	(16.0)%	544
Total operating expenses	$ 10,404	20.5%	$ 8,632	(7.0)%	$ 9,282

2011 Compared to 2010

The fuel cost adjustment provides a means to regularly alter rates to reflect changing fuel and purchased power costs, including realized gains and losses relating to transactions under TVA's Financial Trading Program ("FTP"). See *Risk Management Activities — Commodity Price Risk* . There is typically a lag between the occurrence of a change in fuel and purchased power costs and the reflection of the change in rates due to a portion of the fuel rate being based on forecasted information. A "true-up" between actual and forecasted costs is performed on a monthly basis, and the difference is recorded as a regulatory liability or asset. These amounts represent overcollected revenues (regulatory liabilities) or undercollected revenues (regulatory assets), which are subsequently used to offset fuel and purchased power costs and are recovered or refunded in fuel rates. See Note 1 — *Cost-Based Regulation* and Note 7 — *Fuel Cost Adjustment Receivable* .

The $834 million increase in fuel expense was driven by several factors including the dispatch of generating plants and effects of prior year fuel cost adjustments. $219 million of the increase in fuel expense in 2011 over 2010 resulted from reduced nuclear generation as a result of extended refueling outages and the April 27, 2011 and April 28, 2011 storms, which caused Browns Ferry to go offline for nearly a month; reduced hydro generation due to lower precipitation levels during 2011; and the replacement of lower-cost generation from Paradise and Cumberland Fossil Plants due to outages with generation from plants which burn higher-cost natural gas or higher-cost coal. Another driver behind TVA's increased fuel costs resulted from an increase in the average fuel cost for coal-fired generation. See Item 1, Business — *Fuel Supply* .

The remaining $615 million increase in fuel cost was driven by the fuel cost adjustment. In 2009 TVA over recovered fuel costs through the fuel cost adjustment. The over collection of fuel costs was recorded as a regulatory liability with a corresponding increase in 2009 fuel expense. TVA “returned” the over collection during 2010 by lowering the fuel cost adjustment, the effect of which was to reduce revenue. As the refunds were made, the regulatory liability was reduced by a corresponding reduction in fuel expense. See *Operating Revenues — 2011 Compared to 2010* above.

Purchased power expense also increased $300 million in 2011 from 2010 primarily because of the accounting for the fuel cost adjustment, described above. The fuel cost adjustment accounted for $340 million of the increase. In addition, the average price of purchased power increased three percent, which increased purchased power expense by $40 million.

The increases in purchased power expense were offset by a six percent decrease in the amount of power purchased in 2011 over 2010. This change in volume decreased purchased power expense by $80 million.

Operating and maintenance expense increased $385 million in 2011 over 2010 for several reasons. A major contributor to the increase was related to operation of TVA's nuclear fleet with nearly $200 million additional expense in 2011 over 2010, largely due to having five refueling outages in 2011 as compared to three during 2010. The scope and duration of these outages was greater in 2011 and included projects to increase plant reliability and increased security costs due to regulatory requirements. Also, prior to 2010, nuclear refueling outage costs were deferred and recognized in expense on a straight line basis over the estimated period until the next routine outage, which was usually between 18 and 24 months. Beginning in 2010, and continuing into 2011, however, outage costs have been expensed as incurred resulting in an overlap of refueling outage costs between prior and current years. Previously deferred outage costs continue to be amortized as the remaining amounts are collected in rates. Because a greater amount of expense was amortized in 2010, there was a decrease in expenses related to prior year outages of $60 million in 2011 over 2010. See Note 7 — *Deferred Outage Costs* .

Declines in the financial markets in prior years combined with a reduction in the assumed discount rate used to estimate post-retirement liabilities caused pension and post-retirement plan expenses to increase over $100 million between 2010 and 2011. See *Critical Accounting Policies and Estimates — Pension and Post-Retirement Benefits* . Other costs related to post-employment benefits decreased over $80 million primarily due to assumptions used in the actuarial valuation of the liability related to workers' compensation claims.

Expenses related to TVA's fossil fuel-fired plants increased nearly $70 million in 2011 as compared to 2010. Projects undertaken to improve the efficiency and effectiveness of generating assets increased expenses by nearly $40 million. Additional increases in expenses included larger writeoffs of obsolete inventory identified during 2011 and writeoffs of capital assets of $16 million. The 2011 expenses also included a full year of operating expenses of nearly $9 million related to the operation of Lagoon Creek Combined Cycle Plant which came on-line in August 2010.

Additional expenditures during 2011 over 2010 related to other initiatives to support TVA's vision including $27 million related to performance initiatives, $25 million to support economic development initiatives, and $14 million to support efficiency and demand response initiatives.

Depreciation and amortization expense increased $48 million primarily because of an increase in net plant additions and the implementation of accelerated depreciation rates on certain coal-fired units due to the long-term idling of those units.

Tax equivalents expense increased $205 million. This change primarily reflects an increase in the accrued tax equivalent expense. The accrued tax equivalent expense, which is equal to five percent of the fuel-cost related revenues, increased in 2011 due to the new wholesale rate structure implemented on April 1, 2011, whereby a portion of the fuel rate was separated out from the base rate. Due to regulatory accounting, tax equivalents related to fuel-cost related revenues are recognized in the same period the revenues are recognized. Tax equivalents related to all other revenues are recognized in the year paid.

2010 Compared to 2009

The primary reason for the $1.0 billion decrease in fuel expense was related to the accounting for the overcollection of fuel costs from customers in 2009 and the refund of those fuel costs in 2010. The overcollection of revenues was initially recorded as a liability in 2009 and a reduction of fuel expense. TVA subsequently “returned” the overcollection during 2010 by giving customers credit on their power bills with the effect of reducing revenues and also reducing fuel costs in the same period. See *Operating Revenues — 2010 Compared to 2009* .

The decrease in fuel expense related to the fuel cost adjustment was offset by a $120 million increase in fuel expense. The increase in fuel expense was primarily driven by significantly more gas generation due to extreme temperatures in summer and winter, which increased utilization of higher-cost generating resources as well as increased the cost of fuels.

Purchased power expense also decreased in 2010 from 2009 primarily because of the accounting for the fuel cost adjustment, described above. The fuel cost adjustment accounted for $580 million of the decrease. In addition, the average price of purchased power decreased approximately 19 percent, which decreased purchased power expense by $330 million.

The decreases in purchased power expense were partially offset by a 30 percent increase in the amount of power purchased in 2010 over 2009 due to three percent lower generation from TVA facilities. This change in volume increased purchased power expense by $400 million.

Operating and maintenance expense increased $837 million due to several conditions. Declines in the financial markets in prior years combined with a reduction in the assumed discount rate used to estimate post-retirement liabilities caused pension and post-retirement plan expenses to increase over $200 million between 2009 and 2010. See *Critical Accounting Policies and Estimates — Pension and Post-Retirement Benefits* . Other costs related to post-employment benefits increased nearly $100 million primarily due to assumptions used in the actuarial valuation of the liability related to workers' compensation claims. The assumption changes include a reduction of the discount rate along with the recognition of increased developing trends in claims experience.

Prior to 2010, nuclear refueling outage costs were deferred and recognized in expense on a straight line basis over the estimated period until the next routine outage which was usually between 18 and 24 months. Beginning in 2010, however, outage costs have been expensed as incurred resulting in an overlap of refueling outage costs between prior and current years. Previously deferred outage costs continue to be amortized as the remaining amounts are collected in rates. This accounting change as well as other outage work resulted in an increase in expenses of over $170 million in 2010 over 2009.

Expenses related to TVA's fossil-fueled plants increased nearly $80 million in 2010 over 2009. These expenses included costs associated with coal combustion residual handling due to increased activities related to converting from wet storage facilities to dry storage facilities; costs related to the TVA Board's cancellation of upgrades to the Gleason Combined Cycle Plant; and additional expenses related to forced maintenance outages at Paradise and Shawnee Fossil Plants and other maintenance projects.

TVA continued to amortize the environmental clean-up costs related to the Kingston ash spill. The increase in 2010 over 2009 was over $60 million. See Note 8.

Additional expenditures related to other initiatives during 2010 over 2009 included $50 million to support efficiency and demand response initiatives; $30 million to support economic development initiatives; and $20 million for on-going studies related to the future uses of the Bellefonte site.

Depreciation and amortization expense increased $126 million primarily because of an increase in net plant additions.

Tax equivalents expense decreased $87 million. This change primarily reflects a decrease in the accrued tax equivalent expense. The accrued tax equivalent expense, which is equal to five percent of the fuel-cost related revenues, decreased in 2010, since the fuel-cost related revenues were lower in 2010 than 2009.

Interest Expense . Interest expense and interest rates during 2011, 2010, and 2009 were as follows:

Interest Expense
For the years ended September 30

	2011	Percent Change	2010	Percent Change	2009
Interest expense	$ 1,431	4.2 %	$ 1,373	4.6 %	$ 1,312
Allowance for funds used during construction and nuclear fuel expenditures	(126)	59.5 %	(79)	97.5 %	(40)
Net interest expense	$ 1,305	0.9 %	$ 1,294	1.7 %	$ 1,272

	2011	Percent Change	2010	Percent Change	2009
Interest rates (average)					
Long-term (1)	5.80	(1.9)%	5.91	(1.2)%	5.98
Discount notes	0.14	55.6 %	0.09	(71.9)%	0.32
Blended (1)	5.71	0.5 %	5.68	2.0 %	5.57

Note
(1) The average interest rates on long-term debt reflected in the table above are calculated using an average of long-term debt balances at the end of each month in the fiscal years depicted and interest expense for those periods. Interest expense is interest on long-term debt, including amortization of debt discounts, issue, and reacquisition costs, net.

2011 Compared to 2010

The $11 million increase in net interest expense was primarily attributable to an increase in interest on debt as a result of an increase in the average balance of long-term debt in 2011 compared to 2010. This increase was partially offset by a greater amount of capitalized interest due to an increase in the construction work in progress base used to calculate AFUDC as a result of ongoing construction activities at Watts Bar Unit 2.

2010 Compared to 2009

The $22 million increase in net interest expense was primarily due to an increase in interest on debt as a result of an increase in the average balance of long-term debt in 2010 compared to 2009. This increase was offset partially by the greater amounts of capitalized interest in 2010 compared to 2009 due to an increase in the construction work in progress base used to calculate AFUDC as a result of ongoing construction activities at Watts Bar Unit 2.

Off-Balance Sheet Arrangements

At September 30, 2011, TVA had no off-balance sheet arrangements.

Critical Accounting Policies and Estimates

The preparation of financial statements requires TVA to estimate the effects of various matters that are inherently uncertain as of the date of the financial statements. Although the financial statements are prepared in conformity with GAAP, TVA is required to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities, and the amounts of revenues and expenses reported during the reporting period. Each of these estimates varies in regard to the level of judgment involved and its potential impact on TVA's financial results. Estimates are deemed critical either when a different estimate could have reasonably been used, or where changes in the estimate are reasonably likely to occur from period to period, and such use or change would materially impact TVA's financial condition, results of operations, or cash flows. TVA's accounting policies are also discussed in Note 1.

Regulatory Accounting

The TVA Board is authorized by the TVA Act to set rates for power sold to its customers; thus, TVA is "self regulated." Additionally, TVA's regulated rates are designed to recover its costs of providing electricity. In view of demand for electricity and the level of competition, TVA has assumed that rates, set at levels that will recover TVA's costs, can be charged and collected. As a result of these factors, TVA records certain assets and liabilities that result from the regulated ratemaking process that would not be recorded under GAAP for non-regulated entities. Regulatory assets generally represent incurred costs that have been deferred because such costs are probable of future recovery in customer rates. Regulatory liabilities generally represent obligations to make refunds to customers for previous collections for costs that are not likely to be incurred or deferral of gains that will be credited to customers in future periods. The timeframe over which the regulatory assets are recovered from customers or regulatory liabilities are credited to customers is subject to annual TVA Board approval. TVA assesses whether the regulatory assets are probable of future recovery by considering factors such as applicable regulatory changes, potential legislation, and changes in technology. Based on these assessments, TVA believes the existing regulatory assets are probable of recovery. This determination reflects the current regulatory and political environment and is subject to change in the future. If future recovery of regulatory assets ceases to be probable, or any of the other factors described above cease to be applicable, TVA would be required to write off these costs and recognize them in earnings. See Note 7.

Environmental Cleanup Costs – Kingston Ash Spill

Environmental clean-up costs related to the Kingston ash spill are based upon estimates of the incremental direct costs of the remediation effort, including costs of compensation and benefits for those employees who are expected to devote a significant amount of time directly to the remediation effort. Such amounts are included in the estimate when it is probable that a liability has been incurred as of the financial statement date and the amount of loss can be reasonably estimated. When both of those recognition criteria are met and the estimated loss is a range, TVA accrues the amount that appears to be a better estimate than any other estimate within the range, or accrues the minimum amount in the range if no amount within the range is a better estimate than any other amount. If the actual costs materially differ from the estimate, TVA's results of operations, financial condition, and cash flows could be affected materially.

At September 30, 2011, the costs included in the environmental cleanup estimate for Kingston included ash dredging and processing, ash disposition, infrastructure repair, dredge cell repair, root cause analysis, certain legal and settlement costs, environmental impact studies and remediation, human health assessments, community outreach and support, regulatory oversight, cenosphere recovery, skimmer wall installation, construction of temporary ash storage areas, dike reinforcement, project management, and certain other remediation costs associated with the clean up. At September 30, 2011, TVA estimates that these costs will range from $1.1 billion to $1.2 billion. TVA has incurred $749 million of remediation costs through September 30, 2011. TVA deferred the $1.1 billion cost estimate as a regulatory asset and is amortizing such costs into operating expenses over a 15-year period beginning in 2010 as such amounts are collected in rates. See Note 8 — *Financial*

Impact.

The following categories could have a significant effect on estimates related to the Kingston ash spill remediation costs:

- Final Closure Design – TVA is still in the process of designing the final closure of the failed dredge cell, other cells on-site, and the lateral expansion of the failed cell. Until the final design is completed and contracts for the work are awarded, costs estimates are subject to change.

- Excluded Costs – TVA has not included the following categories of costs because it has determined that these costs are currently either not probable or not reasonably estimable: penalties (other than the penalties set out in the TDEC order) or regulatory directives, natural resource damages (other than payments required under a memorandum of agreement with TDEC and the Fish and Wildlife Service establishing a process and a method for resolving the natural resource damages claim), future lawsuits and future claims, long-term environmental impact costs, final long-term disposition of ash processing area, costs associated with new laws and regulations, or costs of remediating any mixed waste discovered during the ash removal process. See Note 8 .

Revenue Recognition

Revenues from power sales are recorded as power is delivered to customers. TVA is primarily a wholesale provider of power to distributor customers that resell the power to end users at retail rates. TVA accrues estimated unbilled revenues for power sold to distributor customers for the period of time from the meter-read date to the end of the month. The methodology for estimating unbilled revenue from electricity sales uses the distributor customers' meter readings for the current billing period and actual demand and energy rates. See Note 1 — *Revenues.*

Asset Retirement Obligations

TVA recognizes legal obligations associated with the future retirement of certain tangible long-lived assets. These obligations relate to fossil-fired generating plants, nuclear generating plants, hydroelectric generating plants/dams, transmission structures, and other property-related assets. These other property-related assets include, but are not limited to, leases. Activities involved with retiring these assets could include decontamination and demolition of structures, removal and disposal of wastes, and site reclamation. Revisions to the amount and timing of certain cash flow estimates of AROs may be made based on engineering studies. For nuclear assets, the studies are performed annually in accordance with the NRC requirements. For non-nuclear obligations, revisions are made whenever factors indicate that the timing or amounts of estimated cash flows have changed. Any accretion or depreciation expense related to these liabilities and assets are charged to a regulatory asset. See Note 10.

Nuclear Decommissioning . Utilities that own and operate nuclear plants are required to use different procedures in estimating nuclear decommissioning costs under GAAP than those that are used in estimating nuclear decommissioning costs that are reported to the NRC. The two sets of procedures produce different estimates for the costs of decommissioning primarily because of the difference in the discount rates used to calculate the present value of decommissioning costs. At September 30, 2011, the present value of the estimated future nuclear decommissioning cost under GAAP was $2.1 billion and was included in AROs, and the unamortized regulatory asset of $1.0 billion was included in Regulatory assets. Under the NRC's regulations, the present value of the estimated future nuclear decommissioning cost was $828 million at September 30, 2011. This decommissioning cost estimate is based on the NRC's requirements for removing a plant from service, releasing the property for unrestricted use, and terminating the operating license. The actual decommissioning costs may vary from the derived estimates because of changes in current assumptions, such as the assumed dates of decommissioning, changes in regulatory requirements, changes in technology, and changes in the cost of labor, materials, and equipment.

TVA maintains an NDT to provide funding for the ultimate decommissioning of its nuclear power plants. The trust's funds are invested in securities generally designed to achieve a return in line with overall equity market performance. The assets of the trust are invested in debt and equity securities and certain derivative instruments. The derivative instruments are used across various asset classes to achieve a desired investment structure. The balance in the trust at September 30, 2011, is less than the present value of the estimated future nuclear decommissioning costs under both the NRC methodology and GAAP, but more than the level set forth in the assurance plan that TVA submitted to the NRC.

The following key assumptions can have a significant effect on estimates related to the nuclear decommissioning costs reported in TVA's nuclear ARO liability:

- Timing – In projecting decommissioning costs, two assumptions must be made to estimate the timing of plant decommissioning. First, the date of the plant's retirement must be estimated. (At a multiple unit site, the estimated retirement date is based on the unit with the longest license period remaining, or an assumption could be made that the plant will be relicensed and operate for some time beyond the original license term.) Second, an assumption must be made on the timing of decommissioning. Currently TVA uses the assumption that decommissioning will occur within the first seven years after plant shut down. While the impact of these assumptions cannot be determined with precision, either assuming license extension or extending the timing of decommissioning can significantly decrease the present value of these obligations.

- Technology and Regulation – There is limited experience with actual decommissioning of large nuclear facilities. Changes in technology and experience as well as changes in regulations regarding nuclear decommissioning could cause cost estimates to change significantly. TVA's cost studies assume current technology and regulations.

- Discount Rate – TVA uses rates between 5.15 percent and 5.66 percent to calculate the present value of the weighted estimated cash flows required to satisfy TVA's decommissioning obligation.

- Cost Escalation Factors – TVA's decommissioning estimates include an assumption that decommissioning costs will escalate over present cost levels by four percent annually.

Non-Nuclear Decommissioning . The present value of the estimated future non-nuclear decommissioning cost was $1.0 billion at September 30, 2011. This decommissioning cost estimate involves estimating the amount and timing of future expenditures and making judgments concerning whether or not such costs are considered a legal obligation. Estimating the amount and timing of future expenditures includes, among other things, making projections of the timing and duration of the asset retirement process and how costs will escalate with inflation. The actual decommissioning costs may vary from the derived estimates because of changes in current assumptions, such as the assumed dates of decommissioning, changes in regulatory requirements, changes in technology, and changes in the cost of labor, materials, and equipment.

TVA maintains an asset retirement trust ("ART") to help fund the ultimate decommissioning of its power assets. The trust's funds are invested in securities generally designed to achieve a return in line with equity and fixed-income market performance. The assets of the fund are invested in securities directly and indirectly through commingled funds. Estimates involved in determining if additional funding will be made to the ART include inflation rate and rate of return projections on the fund investments.

The following key assumptions can have a significant effect on estimates related to the non-nuclear decommissioning costs:

- Timing – In projecting non-nuclear decommissioning costs, the date of the asset's retirement must be estimated. TVA uses a probability-weighted scenario approach based on management assumptions, type of asset, and other factors to estimate the expected retirement time period. In instances where the retirement of a specific asset differs from the anticipated retirement date, the anticipated retirement date of that specific asset is used. Additionally, TVA expects to incur certain ongoing costs subsequent to the initial asset retirement.

- Technology and Regulation – Changes in technology and experience as well as changes in regulations regarding non-nuclear decommissioning could cause cost estimates to change significantly. TVA's cost studies generally assume current technology and regulations. With respect to the CCR facilities, TVA assumes that any future closures will require more costly materials and processes than what is legally required at September 30, 2011.

- Discount Rate – TVA uses its incremental lending rate over a period consistent with the remaining timeframe until the costs are expected to be incurred to calculate the present value of the weighted estimated cash flows required to satisfy TVA's non-nuclear decommissioning obligation. At September 30, 2011, the discount rates used in the calculations range from 0.64 percent to 5.66 percent.

- Cost Escalation Factors – TVA's non-nuclear decommissioning estimates include an assumption that decommissioning costs will escalate over present cost levels at rates between 1.88 percent and 4.00 percent annually.

Pension and Other Post-Retirement Benefits

TVA sponsors a defined benefit pension plan that is qualified under IRS rules and covers substantially all of its full-time annual employees. TVARS, a separate legal entity governed by its own board of directors, administers the qualified defined benefit pension plan. TVA also provides a Supplemental Executive Retirement Plan ("SERP") to certain executives in critical positions, which provides supplemental pension benefits tied to compensation levels that exceed limits imposed by IRS rules applicable to the qualified defined benefit pension plan. Additionally, TVA provides post-retirement health care benefits for most of its full-time employees who reach retirement age while still working for TVA. TVA's costs of providing these benefits are impacted by numerous factors including the provisions of the plans, changing employee demographics, and various actuarial calculations, assumptions, and accounting mechanisms. The most significant of these factors are discussed below.

Expected Return on Plan Assets . The qualified defined benefit pension plan is the only plan that is funded with qualified plan assets. The expected returns on pension plan assets used to develop net pension expense were 7.50 percent, 7.75 percent, and 8.00 percent during 2011, 2010, and 2009, respectively, and are determined at the beginning of the period. Changes in the expected return rates are generally based on studies performed by third party professional investment consultants. A higher expected rate of return decreases net periodic pension expense. A lower expected rate of return increases net periodic pension expense. TVA adjusted the expected rate of return on pension plan assets to 7.25 percent for 2012 based on a recent asset/liability study performed by third party professional investment consultants. The expected rate of return had been reduced for 2010 based on a similar study and upon a June 2009 change in the TVARS policy allocating the investment mix of plan assets. The change in 2010 shifted a portion of target asset investment allocations from equities to fixed income. The change in the TVARS investment allocation policy was based on a recommendation by the TVARS investment consultant. The recent changes in the expected rate of return on pension plan assets discussed above do not affect TVA's post-retirement benefits plan because TVA does not separately set aside assets to fund such benefits. TVA funds its post-retirement plan benefits on an as-paid basis. These changes in the expected rate of return on pension plan assets also do not impact the SERP as any assets set aside for that plan are not considered plan assets under GAAP. The actuarial loss related to the difference between expected and actual return on pension plan assets for 2011 was $444 million. This amount was recognized as an increase to the related regulatory asset.

Compensation Increases . Assumptions related to compensation increases are based on the results obtained from an actual company experience study performed during the most recent six years for retirees as well as other plan participants. TVA obtained an updated study in 2008 and determined that future compensation would increase at rates between 3.30 percent and 10.10 percent per year, depending upon the employee's age. Based upon the current active participants, the average assumed compensation increase used to determine benefit obligations for 2011 and 2010 was 4.43 percent and 4.41 percent, respectively.

Discount Rate. In the case of selecting an assumed discount rate, TVA reviews market yields on high-quality corporate debt and long-term obligations of the U.S. Treasury and endeavors to match, through the use of a hypothetical bond portfolio, instrument maturities with the maturities of its pension obligations in accordance with the prevailing accounting standards. In addition, TVA looks at published pension spot yield curves and applies expected cash flows to the curve to approximate the rate expected to settle the projected benefit payments. The discount rates used to determine net pension cost were 5.00 percent, 5.75 percent, and 7.50 percent during 2011, 2010, and 2009, respectively. The discount rate is determined at the beginning of the period. TVA plans to use a discount rate of 4.50 percent in the determination of 2012 net periodic pension expense and also used this rate to value plan obligations at the end of 2011. Changes in the discount rate for 2011 were due to decreased long-term interest rates. The discount rate is somewhat volatile because it is determined based upon the prevailing rate as of the measurement date. The discount rate used to determine the post-retirement benefits costs is the same rate used to determine pension benefits costs due to a similar expected duration of the post-retirement and pension benefit obligations. A higher discount rate decreases the plan obligations and correspondingly decreases the net periodic pension and post-retirement benefits expense for those plans where actuarial losses are being amortized. On the other hand, a lower discount rate increases net periodic pension and post-retirement benefits costs.

Mortality . Mortality assumptions are based on the results obtained from a recent actual company experience study performed which included retirees as well as other plan participants. TVA obtained an updated study in 2008 and, accordingly, adjusted the mortality rates from the 1983 Group Annuity Mortality Tables to the RP-2000 Mortality Tables. During 2010, company experience was reexamined and it was determined that TVA's mortality experience has continued to improve. As a result, TVA adjusted the mortality rates to RP-2000 Combined Healthy Mortality table projected to 2013 using scale AA at September 30, 2010. There were no changes to the mortality assumptions in 2011.

Health Care Cost Trends. TVA reviews actual recent cost trends and projected future trends in establishing health care cost trend rates. The assumed health care trend rate used for 2011 and 2010 was 8.0 percent. The 2011 health care cost trend rate of 8.0 percent used to determine benefit obligations is assumed to gradually decrease each successive year until it reaches a 5.0 percent annual increase in health care costs in the years beginning October 1, 2017, and beyond.

Cost of Living Adjustment. The qualified defined benefit pension plan includes a cost of living adjustment ("COLA") that is generally indexed against the Consumer Price Index ("CPI"), subject to a floor and ceiling. The CPI fell during 2009, and market-based measures of inflation expectations at the end of 2009 projected slow growth in the CPI through 2015. Additionally, the COLA was temporarily reduced for a four-year period beginning January 1, 2010 for current retirees, and eligibility for the COLA was changed to age 60 for employees retiring on or after January 1, 2010. The COLA assumption has been 2.50 percent since 2009. Due to stabilizing long-term expectations, TVA determined the COLA assumption should be held at 2.50 percent at September 30, 2011.

Sensitivity of Costs to Changes in Assumptions. The following chart reflects the sensitivity of pension costs to changes in certain actuarial assumptions:

Sensitivity to Certain Changes in Pension Assumptions
At September 30, 2011

Actuarial Assumption	Change in Assumption	Impact on 2012 Pension Cost	Impact on 2011 Projected Benefit Obligation
Discount rate	(0.25)%	$ 18	$ 332
Rate of return on plan assets	(0.25)%	$ 15	N/A

Each fluctuation above assumes that the other components of the calculation are held constant and excludes any impact for unamortized actuarial gains or losses.

The following chart reflects the sensitivity of post-retirement benefit costs to changes in the health care cost trend rate:

Sensitivity to Changes in Assumed Health Care Cost Trend Rates
At September 30, 2011

	1% Increase	1% Decrease
Effect on total of service and interest cost components	$ 5	$ (6)
Effect on end-of-year accumulated post-retirement benefit obligation	$ 293	$ (132)

Each fluctuation above assumes that the other components of the calculation are held constant and excludes any impact for unamortized actuarial gains or losses.

Accounting Mechanisms . In accordance with current accounting methodologies, TVA utilizes a number of accounting mechanisms that reduce the volatility of reported pension expense. Differences between actuarial assumptions and actual plan results are deferred and are amortized into periodic expense only when the accumulated differences exceed 10 percent of the greater of the projected benefit obligation or the market-related value of plan assets. If necessary, the excess is amortized over the average remaining service period of active employees.

Additionally, TVA recognizes the impact of asset performance on pension expense over a three-year phase-in period through a “market-related” value of assets calculation. Since the market-related value of assets recognizes investment gains and losses over a three-year period, the future value of assets will be impacted as previously deferred gains or losses are recognized. As a result, losses that the pension plan assets experience may have an adverse impact on pension expense in future years depending on whether the actuarial losses at each measurement date exceed 10 percent of the greater of the projected benefit obligation or the market-related value of plan assets in accordance with current accounting methodologies. See Note 18 for a discussion of obligations and funded status.

Expected Contributions. In 2011, TVA made contributions of $270 million to the defined benefit pension plan, $4 million to the SERP, and $38 million to the other post-retirement benefit plans. In addition, TVA expects to contribute $6 million to the SERP and $40 million to the other post-retirement benefit plans in 2012. The TVA Board has authorized the Chief Executive Officer to approve TVA making a discretionary contribution to the defined benefit pension plan of up to $300 million in 2012, subject to a review by the Finance, Rates and Portfolio Committee of the TVA Board. However, at this time, it has not been determined whether any contribution will be made.

Fair Value Measurements

Investments

Investments classified as trading consist of amounts held in the NDT, the ART, and the SERP. These assets are generally measured at fair value based on quoted market prices or other observable market data such as interest rate indices. These investments are primarily U.S. equities, international equities, real estate investment trusts, fixed income investments, high-yield fixed income investments, U.S. Treasury inflation-protected securities, commodities, currencies, derivative instruments, and other investments. TVA has classified all of these trading securities as either Level 1, Level 2, or Level 3 valuations. See Note 14 — *Valuation Techniques* for a discussion of valuation levels of the investments. See Note 18 — *Fair Value Measurements* for disclosure of fair value measurements for investments held by TVARS that support TVA’s qualified defined benefit pension plan.

Prices provided by third-parties for the investments are subjected to automated tolerance checks by the investment portfolio trustee to identify and avoid, where possible, the use of inaccurate prices. Any such prices identified as outside the tolerance thresholds are reported to the vendor which provided the price. If the prices are validated, the primary pricing source is used. If not, a secondary source price which has passed the applicable tolerance check is used (or queried with the vendor if it is out of tolerance), resulting in either the use of a secondary price, where validated, or the last reported default price, as in the case of a missing price. For monthly valued accounts, where secondary price sources are available, an automated inter-source tolerance report identifies prices with an inter-vendor pricing variance of over two percent at an asset class level. For daily valued accounts, each security is assigned, where possible, an indicative major market index, against which daily price movements are automatically compared. Tolerance thresholds are established by asset class. Prices found to be outside of the applicable tolerance threshold are reported and queried with vendors as described above.

Derivatives

Commodity derivatives under the Financial Trading Program ("FTP") are classified as Level 1 and Level 2 valuations. Currency swaps and interest rate swaps are classified as Level 2 valuations. The swaption and certain coal contract derivatives are classified as Level 3 valuations.

Currency Swaps, Swaption, and Interest Rate Swaps. TVA has three currency swaps, one swaption, and three "fixed for floating" interest rate swaps. The currency swaps and interest rate swaps are classified as Level 2 valuations as the rate curves and interest rates affecting the fair value of the contracts are based on observable data. While most of the fair value measurement is based on observable inputs, volatility for TVA's swaption is generally unobservable and it is classified as a Level 3 valuation. Therefore, the valuation is derived from an observable volatility measure with adjustments. The application of credit valuation adjustments ("CVAs") resulted in a decrease of $1.7 million in the fair value of the swaption and interest rate swaps, and did not materially affect the fair values of the currency swaps, at September 30, 2011.

Commodity Contracts . The fair value of this derivative portfolio is valued using internal models. The significant inputs to these models are price indications such as quoted spot prices and implied forward prices. The pricing model is based on significant unobservable inputs, similar products, or products priced in different time periods. TVA designs price curves and valuation models based on the best available information and industry accepted practices. As a result, these valuations are classified as Level 3 valuations. Additionally, any settlement fees related to early termination of coal supply contracts are included at the contractual amount. The application of CVAs resulted in a decrease of $108 million in the fair values of coal contracts in an asset position at September 30, 2011.

Commodity Derivatives under the Financial Trading Program. TVA uses quoted Chicago Mercantile Exchange ("CME") prices in its determination of the fair value of these contracts. Contracts settled on the CME are classified as Level 1 valuations. These are primarily natural gas futures, fuel oil futures, crude oil futures, and natural gas option contracts. Contracts where nonperformance risk exists outside of the exit price are measured with the incorporation of CVAs and are classified as Level 2 valuations. These are primarily natural gas, fuel oil, and crude oil swap contracts. The application of CVAs did not materially affect the fair value of these assets and liabilities at September 30, 2011.

TVA maintains policies and procedures to value commodity contracts using what is believed to be the best and most relevant data available. In addition, TVA's risk management group reviews valuations and pricing data. TVA retains independent pricing vendors to assist in valuing certain instruments without market liquidity.

Fair Value Considerations

In determining the fair value of its financial instruments, TVA considers the source of observable market data inputs, liquidity of the instrument, credit risk, and risk of nonperformance of itself or the counterparty to the contract. The conditions and criteria used to assess these factors are described below.

Sources of Market Assumptions. TVA derives its financial instrument market assumptions from market data sources (e.g., CME, Moody's Investors Service ("Moody's")). In some cases, where market data is not readily available, TVA uses comparable market sources and empirical evidence to derive market assumptions and determine a financial instrument's fair value.

Market Liquidity. Market liquidity is assessed by TVA based on criteria as to whether the financial instrument trades in an active or inactive market. A financial instrument is considered to be in an active market if the prices are fully transparent to the market participants, the prices can be measured by market bid and ask quotes, the market has a relatively high trading volume as compared to TVA's current trading volume, and the market has a significant number of market participants that will allow the market to rapidly absorb the quantity of the assets traded without significantly affecting the market price. Other factors TVA considers when determining whether a market is active or inactive include the presence of government or regulatory control over pricing that could make it difficult to establish a market based price upon entering into a transaction.

Nonperformance Risk. In determining the potential impact of nonperformance risk, which includes credit risk, TVA considers changes in current market conditions, readily available information on nonperformance risk, letters of credit, collateral, other arrangements available, and the nature of master netting arrangements. TVA is a counterparty to derivatives which subject TVA to nonperformance risk. Nonperformance risk on the majority of investments and certain exchange-traded instruments held by TVA is incorporated into the exit price that is derived from quoted market data that is used to mark the investment to market.

Nonperformance risk for most of TVA's derivative instruments is an adjustment to the initial asset/liability fair value. TVA adjusts for nonperformance risk, both of TVA (for liabilities) and the counterparty (for assets), by applying a CVA. TVA determines an appropriate CVA for each applicable financial instrument based on the term of the instrument and TVA's or the counterparty's credit rating as obtained from Moody's. For companies that do not have an observable credit rating, TVA uses internal analysis to assign a comparable rating to the company. TVA discounts each financial instrument using the historical default rate (as reported by Moody's for CY 1983 to CY 2010) for companies with a similar credit rating over a time period consistent with the remaining term of the contract.

All derivative instruments are analyzed individually and are subject to unique risk exposures. At September 30, 2011, the aggregate counterparty credit risk adjustments applied to TVA's derivative asset and liability positions were decreases of $108 million and $2 million, respectively.

Collateral . TVA's interest rate swaps, its currency swaps, and its swaption contain contract provisions that require a party to post collateral (in a form such as cash or a letter of credit) when the party's liability balance under the agreement exceeds a certain threshold. See Note 13 — *Other Derivative Instruments — Collateral* for a discussion of collateral related to TVA's derivative liabilities. Additionally, TVA's credit rating downgrade required TVA to post $100 million of additional collateral under certain physical and financial contracts that contain rating triggers.

Level 3 Information. Unrealized gains and/or losses on contracts classified as Level 3 valuations are included in regulatory assets and/or liabilities until the contracts are settled. TVA experienced unrealized gains on coal contracts with volume options due to changes in coal market prices during the year ended September 30, 2011. TVA also experienced unrealized losses on the swaption liability due to decreases in interest rates during the year ended September 30, 2011. Unrealized losses on these instruments did not have a material effect on liquidity or capital resources. There were no realized gains or losses during the year ended September 30, 2011 on any contract classified as Level 3 valuation. At September 30, 2011, Level 3 valuations represented 29 percent of total assets measured at fair value and 61 percent of total liabilities measured at fair value.

New Accounting Standards and Interpretations

The following accounting standards and interpretations became effective for TVA during the presented periods.

Noncontrolling Interests . In December 2007, the Financial Accounting Standards Board ("FASB") issued guidance that introduces significant changes in the accounting for noncontrolling interests (formerly minority interests) in a partially-owned consolidated subsidiary. The guidance also changes the accounting for and reporting for the deconsolidation of a subsidiary. The guidance requires that noncontrolling interests in a consolidated subsidiary be displayed in the consolidated statement of financial position as a separate component of equity. The guidance also requires that earnings attributed to noncontrolling interests be reported as part of consolidated earnings, and requires disclosure of the attribution of consolidated earnings to the controlling and noncontrolling interests on the face of the consolidated income statement. These changes became effective for TVA as of October 1, 2009. The adoption of this guidance did not materially impact TVA's financial condition, results of operations, or cash flows but will impact the accounting for any future noncontrolling interests.

Transfers of Financial Assets . In June 2009, FASB issued guidance regarding accounting for transfers of financial assets. This guidance eliminates the concept of a qualifying special-purpose entity ("QSPE") and subjects those entities to the same consolidation guidance as other variable interest entity ("VIEs"). The guidance changes the eligibility criteria for certain transactions to qualify for sale accounting and the accounting for certain transfers. The guidance also establishes broad disclosure objectives and requires extensive specific disclosure requirements related to the transfers. These changes became effective for TVA for any transfers of financial assets occurring on or after October 1, 2010. The adoption of this guidance did not materially affect TVA's financial condition, results of operations, or cash flows.

Variable Interest Entities . In June 2009, FASB issued guidance that changes the consolidation guidance for VIEs. The guidance eliminates the consolidation scope exception for QSPEs. The guidance amends the triggering events to determine if an entity is a VIE, establishes a primarily qualitative model for determining the primary beneficiary of the VIE, and requires on-going assessment of whether the reporting entity is the primary beneficiary. These changes became effective for TVA on October 1, 2010, and apply to all entities determined to be VIEs as of and subsequent to the date of adoption. The adoption of this guidance did not materially affect TVA's financial condition, results of operations, or cash flows.

In May 2011, the FASB issued an accounting standard that creates consistency between GAAP and International Financial Reporting Standards ("IFRS") on the definition of fair value and on the guidance on how to measure fair value and on what to disclose about fair value measurements. This guidance is effective for TVA on October 1, 2012. Although this standard may require additional disclosure, TVA does not expect the adoption of this guidance to have a material impact on its financial statements.

In June 2011, FASB issued guidance that will require adjustments to the presentation of TVA's financial information. The guidance eliminates the current option to report comprehensive income and its components in the statement of changes in proprietary capital. The guidance allows for presentation of net income and other comprehensive income in one continuous statement or in two separate, but consecutive statements. These changes become effective for TVA on October 1, 2012.

Legislative and Regulatory Matters

In December 2010, Congress passed the Continuing Appropriations and Surface Transportation Extensions Act, 2011, which included a two-year freeze on statutory pay adjustments for all executive branch pay schedules and a two-year freeze by executive agencies on base salary increases to all senior executives. These two-year freezes apply to calendar years 2011 and 2012. The directors of the TVA Board are covered by the first freeze and TVA's officers (Vice President and above) are covered by the second freeze. TVA will comply with these legislative freezes. Accordingly, TVA's officers will not receive any salary increases, including performance-based salary increases, during calendar years 2011 and 2012. Any salary increases that TVA's officers received for 2011, based on performance during 2010, were effective October 1, 2010, prior to the effective date of the salary freeze legislation and were not affected by the two-year freeze requirement.

Following the passage of the legislation described above, the President of the United States issued a memorandum to Federal agencies not directly covered by the legislation, which includes TVA, requesting that these agencies also comply with the terms of the salary freeze. In response, TVA has chosen to voluntarily implement a salary freeze for manager, specialist and excluded employees during calendar years 2011 and 2012 in accordance with the spirit in which the President and Congress approved the salary freeze. The federal salary freeze does not apply to TVA's represented employees, whose salary increases are governed by the terms of collective bargaining agreements, certain promotions and changes in positions, and other forms of non-salary compensation such as lump-sum and incentive-based awards.

A bill has been introduced in Congress, through which Congress would approve TVA's transfer, on behalf of the United States, of the Yellow Creek Port properties to Mississippi. The property was acquired to be part of a river terminal, a railroad, and industrial sites on the Pickwick Reservoir in Tishomingo County, Mississippi. The transfer would be made under section 4(k)(b) of the TVA Act that allows TVA to dispose of land for the purpose of erecting docks and buildings for shipping purposes or the manufacture or storage of products for the purpose of trading or shipping. Transfers under this section of the TVA Act require congressional approval.

For a discussion of environmental legislation and regulation, see Item 1, Business — *Environmental Matters.*

Environmental Matters

See Item 1, Business — *Environmental Matters,* which discussion is incorporated by reference into this Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations.

Legal Proceedings

From time to time, TVA is a party to or otherwise involved in lawsuits, claims, proceedings, investigations, and other legal matters ("Legal Proceedings") that have arisen in the ordinary course of conducting TVA's activities, as a result of a catastrophic event or otherwise. TVA had accrued approximately $391 million with respect to Legal Proceedings at September 30, 2011. No assurance can be given that TVA will not be subject to significant additional claims and liabilities. If actual liabilities significantly exceed the estimates made, TVA's results of operations, liquidity, and financial condition could be materially adversely affected.

For a discussion of certain current material Legal Proceedings, see Note 20 — *Legal Proceedings* , which discussion is incorporated by reference into this Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations.

Risk Management Activities

TVA is exposed to various market risks. These market risks include risks related to commodity prices, investment prices, interest rates, currency exchange rates, inflation, and counterparty credit and performance risk. To help manage certain of these risks, TVA has entered into various derivative transactions, principally commodity option contracts, forward contracts, swaps, swaptions, futures, and options on futures. Other than certain derivative instruments in its trust investment funds, it is TVA's policy to enter into these derivative transactions solely for hedging purposes and not for speculative purposes. See Note 13.

Risk Governance

The Enterprise Risk Council ("ERC") was created in 2005 to strengthen and formalize TVA's enterprise-wide risk management efforts. The ERC is responsible for the highest level of risk oversight at TVA and is also responsible for communicating enterprise-wide risks with policy implications to the TVA Board or a designated TVA Board committee. The ERC's current members are the President and Chief Executive Officer (chair); Chief Financial Officer; Group President, Strategy and External Relations; Chief Information Officer; Executive Vice President for People and Performance; Executive Vice President and General Counsel; Vice President, Office of the CEO; Chief Risk Officer; and a designated representative from Office of the Inspector General as an advisory member.

The ERC has established a subordinate Risk Management Steering Committee (“RMSC”). The RMSC is responsible for (1) reviewing risk management policies to ensure their consistency with TVA’s Enterprise Risk Management (“ERM”) policies and guidelines, (2) reviewing Strategic Business Unit risks and emerging issues, (3) providing executive guidance and support in enterprise risk assessments and risk management plans, (4) presenting enterprise risks for consideration by the ERC, (5) recommending general risk management processes and methodologies for the enterprise, and (6) sponsoring special projects related to cross-functional risk management activities.

TVA has a designated ERM organization within its Financial Services organization responsible for (1) coordinating risk assessment efforts at TVA organizations, (2) facilitating enterprise risk discussions with the risk subject matter experts at the RMSC, ERC, and TVA Board levels, and (3) developing and improving risk governance structure and risk assessment processes and methodologies.

TVA has cataloged major short-term and long-term enterprise level risks across the organization. A discussion of significant risks is presented in Item 1A, Risk Factors.

Commodity Price Risk

TVA is exposed to effects of market fluctuations in the price of commodities that are critical to its operations, including coal, uranium, natural gas, fuel oil, crude oil, construction materials, reagents, emission allowances, and electricity. TVA’s commodity price risk is substantially mitigated by its cost-based rates, including its total fuel rate mechanism. To manage cost volatility for its wholesale and directly served customers, TVA has established a FTP. Under the FTP, TVA currently hedges the risks associated with the price of natural gas, fuel oil, crude oil, and coal. TVA is prohibited from taking speculative positions in its FTP.

Following is a discussion of the impact on the value of TVA’s natural gas, coal, fuel oil, and crude oil derivative positions in its FTP that would result from hypothetical changes in commodity prices:

Natural Gas. A hypothetical 10 percent decline in the market price of natural gas on September 30, 2011, and 2010, would have resulted in decreases of approximately $101 million and $32 million, respectively, in the fair value of TVA’s natural gas trading derivative instruments at these dates.

Coal. A hypothetical 10 percent decline in the market price of coal on September 30, 2011, and 2010, would have resulted in decreases of approximately $1 million and $3 million, respectively, in the fair value of TVA’s financial coal derivative instruments at these dates.

Fuel Oil. A hypothetical 10 percent decline in the market price of fuel oil on September 30, 2011, and 2010, would have resulted in decreases of approximately $4 million and $6 million, respectively, in the fair value of TVA’s fuel oil derivative instruments at these dates.

Crude Oil. A hypothetical 10 percent decline in the market price of crude oil on September 30, 2011, and 2010, would have resulted in decreases of approximately $9 million and $8 million, respectively, in the fair value of TVA’s crude oil derivative instruments at these dates.

Investment Price Risk

TVA’s investment price risk relates primarily to investments in TVA’s NDT, ART, pension fund, and SERP.

Nuclear Decommissioning Trust. The NDT is generally designed to achieve a return in line with overall equity market performance. The assets of the trust are invested in debt and equity securities and certain derivative instruments including forwards, futures, options, and swaps, and through these investments the trust has exposure to U.S. equities, international equities, real estate investment trusts, high-yield debt, U.S. Treasury inflation-protected securities, commodities, currencies, and private partnerships. At September 30, 2011, and 2010, an immediate 10 percent decrease in the price of the investments in the trust would have reduced the value of the trust by $95 million and $94 million, respectively. See Results of Operations — *Critical Accounting Policies and Estimates — Asset Retirement Obligations — Nuclear Decommissioning* for more information regarding TVA’s NDT.

Asset Retirement Trust. The ART is presently invested to achieve a return in line with equity and fixed income market performance. The assets of the trust are invested in securities directly and indirectly through commingled funds. At September 30, 2011, and 2010, an immediate 10 percent decrease in the price of the investments in the trust would have reduced the value of the trust by $19 million and $16 million, respectively.

Qualified Pension Plan. In September 2011, the TVARS Board approved a long-term investment plan which contains a "dynamic de-risking" strategy that calls for investments to be shifted into assets that better match the liability, such as long duration fixed income securities, over time as funding targets are met. The new policy sets an initial target of 50 percent equity securities including U.S. and non U.S. equities, 38 percent fixed income securities, and 12 percent alternative investments including private equity, private real estate, distressed debt, and timber. The qualified pension plan assets are invested in equity securities, debt securities, U.S. equities, international equities, real estate investment trusts, private real estate, timber, investment-grade debt, high-yield debt, U.S. Treasury inflation-protected securities, commodities, currencies, and derivative instruments such as futures, options, swaps, and forwards. Under the derivative policy, investment managers may not use derivative financial instruments to fundamentally change the risk/return profile of their portfolio relative to their benchmarks. At September 30, 2011, and 2010, an immediate 10 percent decrease in the value of the net assets in the fund would have reduced the value of the fund by approximately $655 million and $680 million, respectively. See Results of Operations — *Critical Accounting Policies and Estimates — Pension and Other Post-Retirement Benefits* and Note 18 — *Fair Value Measurements* .

Supplemental Executive Retirement Plan . The SERP is a non-qualified defined benefit pension plan similar to those typically found in other companies in TVA's peer group and is provided to a limited number of executives. TVA's SERP was created to recruit and retain key executives. The plan is designed to provide a competitive level of retirement benefits in excess of the limitations on contributions and benefits imposed by TVA's qualified defined benefit plan and Internal Revenue Code section 415 limits on qualified retirement plans. The SERP currently targets an asset allocation policy for its plan assets of 65 percent equity securities, which includes U.S. and non U.S. equities, and 35 percent fixed income securities. The SERP plan assets are invested in equity and debt securities. At September 30, 2011, and 2010, an immediate 10 percent decrease in the value of the SERP investments would have reduced the value by approximately $3 million.

Interest Rate Risk

TVA's interest rate risk is related primarily to its short-term investments, short-term debt, long-term debt, swaption transaction, and interest rate swaps related to three of TVA's swaption transactions.

Short-Term Investments. At September 30, 2011, TVA had $507 million of cash and cash equivalents, and the average balance of cash and cash equivalents for 2011 was $909 million. The average interest rate that TVA received on its short-term investments during 2011 was less than one percent. If the rates of interest that TVA received on its short-term investments during 2011 were zero percent, TVA would have received $1 million less in interest from its short-term investments during 2011. At September 30, 2010, TVA had $328 million of cash and cash equivalents, and the average balance of cash and cash equivalents for 2010 was $234 million. The average interest rate that TVA received on its short-term investments during 2010 was less than one percent. If the rates that TVA received on its short-term investments during 2010 were zero percent, TVA would have received $1 million less in interest on short-term investments during 2010. In addition to affecting the amount of interest that TVA receives from its short-term investments, changes in interest rates could affect the value of the investments in its pension fund, ART, NDT, and SERP. See Results of Operations — *Risk Management Activities — Investment Price Risk* .

Short-Term Debt . At September 30, 2011, TVA's short-term borrowings were $482 million, and the current maturities of long-term debt were $1.5 billion. Based on TVA's interest rate exposure at September 30, 2011, an immediate one percentage point increase in interest rates would have resulted in an increase of $20 million in TVA's short-term interest expense. At September 30, 2010, TVA's short-term borrowings were $27 million, and the current maturities of long-term debt were $1.0 billion. Based on TVA's interest rate exposure at September 30, 2010, an immediate one percentage point increase in interest rates would have resulted in an increase of $10 million in TVA's short-term interest expense.

Long-Term Debt. At September 30, 2011, and 2010, the interest rates on all of TVA's outstanding long-term debt were fixed. Accordingly, an immediate one percentage point increase in interest rates would not have affected TVA's interest expense associated with its long-term debt. When TVA's long-term debt matures or is redeemed, however, TVA typically refinances this debt by issuing additional long-term debt. Accordingly, if interest rates are high when TVA issues this additional long-term debt, TVA's cash flows, results of operations, and financial condition may be adversely affected. This risk is somewhat mitigated by the fact that TVA's debt portfolio is diversified in terms of maturities and has a long average life. At September 30, 2011, and 2010, the average life of TVA's debt portfolio was 17.6 years and 18.2 years, respectively. A schedule of TVA's debt maturities is contained in Note 11 — *Debt Outstanding* .

Swaption and Interest Rate Swap Agreements. Changes in interest rates also affect the mark-to-market valuation of TVA's swaption agreement and interest rate swaps. Net unrealized gains and losses on these transactions are reflected on TVA's balance sheets in a regulatory asset account, and realized gains and losses are reflected in earnings. Based on TVA's interest rate exposure at September 30, 2011, an immediate one percentage point decrease in interest rates would have increased the interest rate swap liabilities by $194 million and a half percentage point decrease in interest rates would have increased the swaption liability by $197 million. Based on TVA's interest rate exposure at September 30, 2010, an immediate one percentage point decrease in interest rates would have increased the interest rate swap liabilities by $112 million and the swaption liability by $346 million.

Currency Exchange Rate Risk

At September 30, 2011, and 2010, TVA had three issues of Bonds outstanding whose principal and interest payments were denominated in British pounds sterling. TVA issued these Bonds in amounts of £200 million, £250 million, and £150 million in 1999, 2001, and 2003, respectively. When TVA issued these Bonds, it hedged its currency exchange rate risk by entering into currency swap agreements. Accordingly, at September 30, 2011, and 2010, a 10 percent change in the British pound sterling-U.S. dollar exchange rate would not have had a material impact on TVA's cash flows, results of operations, or financial position.

Counterparty Credit Risk

Counterparty credit risk is the exposure to economic loss that would occur as a result of a counterparty's nonperformance of its contractual obligations. Where exposed to counterparty credit risk, TVA analyzes the counterparty's financial condition prior to entering into an agreement, establishes credit limits, monitors the appropriateness of those limits, as well as any changes in the creditworthiness of the counterparty, on an ongoing basis, and employs credit mitigation measures, such as collateral or prepayment arrangements and master purchase and sale agreements, to mitigate credit risk.

Credit of Customers. The majority of TVA's counterparty credit risk is limited to trade accounts receivable from delivered power sales to municipal and cooperative distributor customers, all located in the Tennessee Valley region. To a lesser extent, TVA is exposed to credit risk from industries and federal agencies directly served and from exchange power arrangements with a small number of investor-owned regional utilities related to either delivered power or the replacement of open positions of longer-term purchased power or fuel agreements. As previously mentioned in Item 1, Business — *Customers — Other Customers* , power sales to United States Enrichment Corp ("USEC") represented four percent of TVA's total operating revenues in 2011. USEC's senior unsecured credit ratings are currently CCC- by Standard & Poor's and Caa2 by Moody's. As a result of its credit rating, USEC has provided credit assurance to TVA under the terms of its power contract. TVA also buys a significant amount of uranium enrichment services from USEC.

TVA had concentrations of accounts receivable from three customers that represented 26 percent of total accounts receivable at September 30, 2011. TVA had concentration of accounts receivable from five customers that represented 36 percent of total accounts receivable at September 30, 2010.

The table below summarizes TVA's customer credit risk from trade accounts receivable at September 30, 2011 and 2010:

Customer Credit Risk
At September 30

	2011	2010
Trade accounts receivable *		
Investment grade		
Municipalities and cooperative distributor customers	$ 995	$ 994
Exchange power arrangements	2	3
Industries and federal agencies directly served	51	40
Internally rated - investment grade		
Municipalities and cooperative distributor customers	573	542
Industries and federal agencies directly served	11	7
Non-investment grade		
Industries and federal agencies directly served	1	11
Internally rated - non-investment grade		
Exchange power arrangements	—	—
Industries and federal agencies directly served	5	4
Total trade accounts receivable	1,638	1,601
Other accounts receivable		
Miscellaneous accounts	102	40
Provision for uncollectible accounts	(1)	(2)
Total other accounts receivable	101	38
Accounts receivable, net	$ 1,739	$ 1,639

Note
* Includes unbilled power receivables of $10 million and $1.0 billion at September 30, 2011 and September 30, 2010, respectively.

Counterparty Performance Risk . In addition to being exposed to economic loss due to the nonperformance of TVA's customers, TVA is exposed to economic loss because of the nonperformance of its other counterparties, including suppliers and counterparties to its derivative contracts. Where exposed to performance risk, TVA analyzes the counterparty's financial condition prior to entering into an agreement and employs performance assurance measures, such as parent guarantees, letters of credit, cash deposits, or performance bonds, to mitigate the risk.

TVA has various agreements under which it has exposure to various financial institutions with which it does business. Most of these are not material on a net exposure basis. TVA believes its policies and procedures for counterparty performance risk reviews have generally protected TVA against significant exposure to financial institutions impacted by recent market and economic conditions.

Credit of Suppliers. If one of TVA's fuel or purchased power suppliers fails to perform under the terms of its contract with TVA, TVA might lose the money that it paid to the supplier under the contract and have to purchase replacement fuel or power on the spot market, perhaps at a significantly higher price than TVA was entitled to pay under the contract. In addition, TVA might not be able to acquire replacement fuel or power in a timely manner and thus might be unable to satisfy its own obligations to deliver power. TVA has a power purchase agreement with a supplier that expires on March 31, 2032. The supplier's senior secured credit ratings are currently CCC- by Standard & Poor's and B2 with Moody's. As a result of the supplier's credit ratings, the company has provided credit assurance to TVA under the terms of its agreement.

Credit of Derivative Counterparties. TVA has entered into derivative contracts for hedging purposes, and TVA's NDT and qualified pension plan have entered into derivative contracts for investment purposes. If a counterparty to one of TVA's hedging transactions defaults, TVA might incur substantial costs in connection with entering into a replacement hedging transaction. If a counterparty to the derivative contracts into which the NDT and the qualified pension plan have entered for investment purposes defaults, the value of the investment could decline significantly, or perhaps become worthless.

Credit of TVA

On August 8, 2011, one rating agency lowered the long-term rating on TVA Bonds to AA+ from AAA. A further downgrade in TVA's credit rating could have material adverse effects on TVA's cash flows, results of operation, and financial condition and could harm investors in TVA securities. Among other things, a downgrade could have the following effects:

- A downgrade could increase TVA's interest expense by increasing the interest rates that TVA pays on new Bonds that it issues. An increase in TVA's interest expense may reduce the amount of cash available for other purposes, which may result in the need to increase borrowings, to reduce other expenses or capital investments, or to increase power rates.
- A downgrade could result in TVA's having to post additional collateral under certain physical and financial contracts that contain rating triggers.
- A downgrade below a contractual threshold could prevent TVA from borrowing under three credit facilities totaling $2.5 billion.
- A downgrade could lower the price of TVA securities in the secondary market, thereby hurting investors who sell TVA securities after the downgrade and diminishing the attractiveness and marketability of TVA Bonds.

For a discussion of risk factors related to TVA's credit rating, see Item 1A, Risk Factors.

Subsequent Events

See Note 23, which discussion is incorporated by reference into Results of Operations.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Quantitative and qualitative disclosures about market risk are reported in Results of Operations — *Risk Management Activities* , which discussion is incorporated into this Item 7A, Quantitative and Qualitative Disclosures About Market Risk.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

TENNESSEE VALLEY AUTHORITY
STATEMENTS OF OPERATIONS
For the years ended September 30
(in millions)

	2011	2010	2009
Operating revenues			
Sales of electricity	$ 11,723	$ 10,713	$ 11,142
Other revenue	118	161	113
Total operating revenues	11,841	10,874	11,255
Operating expenses			
Fuel	2,926	2,092	3,114
Purchased power	1,427	1,127	1,631
Operating and maintenance	3,617	3,232	2,395
Depreciation and amortization	1,772	1,724	1,598
Tax equivalents	662	457	544
Total operating expenses	10,404	8,632	9,282
Operating income	1,437	2,242	1,973
Other income (expense), net	30	24	25
Interest expense			
Interest expense	1,431	1,373	1,312
Allowance for funds used during construction and nuclear fuel expenditures	(126)	(79)	(40)
Net interest expense	1,305	1,294	1,272
Net income (loss)	$ 162	$ 972	$ 726

See Note 21 for detail of related party transactions.

The accompanying notes are an integral part of these financial statements.

TENNESSEE VALLEY AUTHORITY
BALANCE SHEETS
At September 30
(in millions)

ASSETS

	2011	2010
Current assets		
Cash and cash equivalents	$ 507	$ 328
Restricted cash and investments	11	—
Accounts receivable, net	1,739	1,639
Inventories, net	1,028	1,012
Regulatory assets	543	791
Other current assets	215	78
Total current assets	4,043	3,848
Property, plant, and equipment		
Completed plant	44,187	42,997
Less accumulated depreciation	(20,643)	(19,326)
Net completed plant	23,544	23,671
Construction in progress	4,662	3,008
Nuclear fuel	1,073	1,102
Capital leases	26	49
Total property, plant, and equipment, net	29,305	27,830
Investment funds	1,168	1,128
Regulatory and other long-term assets		
Regulatory assets	11,505	9,756
Other long-term assets	372	191
Total regulatory and other long-term assets	11,877	9,947
Total assets	$ 46,393	$ 42,753

LIABILITIES AND PROPRIETARY CAPITAL

	2011	2010
Current liabilities		
Accounts payable and accrued liabilities	$ 1,840	$ 1,698
Environmental cleanup costs - Kingston ash spill	182	220
Accrued interest	403	407
Current portion of leaseback obligations	80	74
Current portion of energy prepayment obligations	105	105
Regulatory liabilities	280	63
Short-term debt, net	482	27
Current maturities of long-term debt	1,537	1,008
Total current liabilities	4,909	3,602
Other liabilities		
Post-retirement and post-employment benefit obligations	6,007	4,729
Asset retirement obligations	3,138	2,963
Other long-term liabilities	2,405	1,526
Leaseback obligations	1,202	1,279
Energy prepayment obligations	612	717
Environmental cleanup costs - Kingston ash spill	194	305
Regulatory liabilities	285	106
Total other liabilities	13,843	11,625
Long-term debt, net	22,412	22,389
Total liabilities	41,164	37,616
Commitments and contingencies (Note 20)		
Proprietary capital		
Power program appropriation investment	308	328
Power program retained earnings	4,429	4,264

Total power program proprietary capital	4,737	4,592
Nonpower programs appropriation investment, net	630	640
Accumulated other comprehensive income (loss)	(138)	(95)
Total proprietary capital	5,229	5,137
Total liabilities and proprietary capital	$ 46,393	$ 42,753

The accompanying notes are an integral part of these financial statements.

TENNESSEE VALLEY AUTHORITY
STATEMENTS OF CASH FLOWS
For the years ended September 30
(in millions)

	2011	2010	2009
Cash flows from operating activities			
Net income (loss)	$ 162	$ 972	$ 726
Adjustments to reconcile net income (loss) to net cash provided by operating activities			
Depreciation and amortization	1,792	1,743	1,618
Nuclear refueling outage amortization cost	42	102	122
Amortization of nuclear fuel cost	225	238	216
Non-cash retirement benefit expense	465	364	146
Prepayment credits applied to revenue	(105)	(105)	(105)
Fuel cost adjustment deferral	69	(898)	850
Fuel cost tax equivalents	135	(89)	81
Environmental cleanup costs – Kingston ash spill – non cash	76	62	—
Changes in current assets and liabilities			
Accounts receivable, net	(62)	(342)	90
Inventories and other, net	(110)	(119)	(182)
Accounts payable and accrued liabilities	60	308	23
Accrued interest	(4)	6	(40)
Pension contributions	(274)	(6)	(1,005)
Refueling outage costs	—	—	(128)
Environmental cleanup costs – Kingston ash spill, net	(108)	(369)	(231)
Other, net	74	34	(18)
Net cash provided by operating activities	2,437	1,901	2,163
Cash flows from investing activities			
Construction expenditures	(2,417)	(2,015)	(1,793)
Combustion turbine asset acquisition	(436)	—	—
Nuclear fuel expenditures	(216)	(401)	(432)
Change in restricted cash and investments	(11)	—	(17)
Purchases of investments, net	(56)	(42)	(42)
Loans and other receivables			
Advances	(21)	(25)	(13)
Repayments	11	21	11
Other, net	4	4	(1)
Net cash used in investing activities	(3,142)	(2,458)	(2,287)
Cash flows from financing activities			
Long-term debt			
Issues	1,599	1,679	2,369
Redemptions and repurchases	(1,021)	(69)	(2,874)
Short-term debt issues (redemptions), net	455	(817)	659
Proceeds from sale/leaseback financing	5	11	104
Payments on leases and leaseback financing	(118)	(94)	(79)
Bond premium received	—	28	—
Financing costs, net	(20)	(23)	(33)
Payments to U.S. Treasury	(27)	(29)	(33)
Other	11	(2)	(1)
Net cash provided by financing activities	884	684	112
Net change in cash and cash equivalents	179	127	(12)
Cash and cash equivalents at beginning of year	328	201	213
Cash and cash equivalents at end of year	$ 507	$ 328	$ 201

See Note 17 for supplemental cash flow information.

The accompanying notes are an integral part of these financial statements.

TENNESSEE VALLEY AUTHORITY
STATEMENTS OF CHANGES IN PROPRIETARY CAPITAL
For the years ended September 30
(in millions)

	Power Program Appropriation Investment	Power Program Retained Earnings	Nonpower Programs Appropriation Investment, Net	Accumulated Other Comprehensive Income (Loss)	Total	Comprehensive Income (Loss)
Balance at September 30, 2008	$ 368	$ 2,571	$ 661	$ (37)	$ 3,563	
Net income (loss)	—	733	(7)	—	726	$ 726
Other comprehensive income (loss)						
Net unrealized loss on future cash flow hedges	—	—	—	(146)	(146)	(146)
Reclassification to earnings from cash flow hedges	—	—	—	108	108	108
Total other comprehensive income (loss)	—	—	—	(38)	(38)	(38)
Total comprehensive income (loss)						$ 688
Return on power program appropriation investment	—	(13)	—	—	(13)	
Return of power program appropriation investment	(20)	—	—	—	(20)	
Balance at September 30, 2009	$ 348	$ 3,291	$ 654	$ (75)	$ 4,218	
Net income (loss)	—	982	(10)	—	972	$ 972
Other comprehensive income (loss)						
Net unrealized loss on future cash flow hedges	—	—	—	(37)	(37)	(37)
Reclassification to earnings from cash flow hedges	—	—	—	17	17	17
Total other comprehensive income (loss)	—	—	—	(20)	(20)	(20)
Total comprehensive income (loss)						$ 952
Return on power program appropriation investment	—	(9)	—	—	(9)	
Return of power program appropriation investment	(20)	—	(4)	—	(24)	
Balance at September 30, 2010	$ 328	$ 4,264	$ 640	$ (95)	$ 5,137	
Net income (loss)	—	172	(10)	—	162	$ 162
Other comprehensive income (loss)						
Net unrealized loss on future cash flow hedges	—	—	—	(50)	(50)	(50)
Reclassification to earnings from cash flow hedges	—	—	—	7	7	7
Total other comprehensive income (loss)	—	—	—	(43)	(43)	(43)
Total comprehensive income (loss)						$ 119
Return on power program appropriation investment	—	(7)	—	—	(7)	
Return of power program appropriation investment	(20)	—	—	—	(20)	
Balance at September 30, 2011	$ 308	$ 4,429	$ 630	$ (138)	$ 5,229	

The accompanying notes are an integral part of these financial statements.

NOTES TO FINANCIAL STATEMENTS
(Dollars in millions except where noted)

1. Summary of Significant Accounting Policies

General

In response to a request by President Franklin D. Roosevelt, the U.S. Congress in 1933 enacted legislation creating the Tennessee Valley Authority ("TVA"), a corporate agency and instrumentality of the United States. TVA was created to, among other things, improve navigation on the Tennessee River, reduce the damage from destructive flood waters within the Tennessee River system and downstream on the lower Ohio and Mississippi Rivers, further the economic development of TVA's service area in the southeastern United States, and sell the electricity generated at the facilities TVA operates.

Today, TVA operates the nation's largest public power system and supplies power in most of Tennessee, northern Alabama, northeastern Mississippi, and southwestern Kentucky and in portions of northern Georgia, western North Carolina, and southwestern Virginia to a population of over nine million people.

TVA also manages the Tennessee River, its tributaries, and certain shorelines to provide, among other things, year-round navigation, flood damage reduction, and affordable and reliable electricity. Consistent with these primary purposes, TVA also manages the river system to provide recreational opportunities, adequate water supply, improved water quality, natural resource protection, and economic development.

The power program has historically been separate and distinct from the stewardship programs. It is required to be self-supporting from power revenues and proceeds from power financings, such as proceeds from the issuance of bonds, notes, and other evidences of indebtedness ("Bonds"). Although TVA does not currently receive congressional appropriations, it is required to make annual payments to the U.S. Treasury in repayment of, and as a return on, the government's appropriation investment in TVA's power facilities (the "Power Program Appropriation Investment"). In the 1998 Energy and Water Development Appropriations Act, Congress directed TVA to fund essential stewardship activities related to its management of the Tennessee River system and TVA properties with power revenues in the event that there were insufficient appropriations or other available funds to pay for such activities in any fiscal year. Congress has not provided any appropriations to TVA to fund such activities since 1999. Consequently, during 2000, TVA began paying for essential stewardship activities primarily with power revenues, with the remainder funded with user fees and other forms of revenues derived in connection with those activities. The activities related to stewardship properties do not meet the criteria of an operating segment under accounting principles generally accepted in the United States of America ("GAAP"). Accordingly, these assets and properties are included as part of the power program, TVA's only operating segment.

Power rates are established by the TVA Board of Directors ("TVA Board") as authorized by the Tennessee Valley Authority Act of 1933, *as amended* , 16 U.S.C. §§ 831-831ee (as amended, the "TVA Act"). The TVA Act requires TVA to charge rates for power that will produce gross revenues sufficient to provide funds for operation, maintenance, and administration of its power system; payments to states and counties in lieu of taxes ("tax equivalents"); debt service on outstanding indebtedness; payments to the U.S. Treasury in repayment of and as a return on the Power Program Appropriation Investment; and such additional margin as the TVA Board may consider desirable for investment in power system assets, retirement of outstanding Bonds in advance of maturity, additional reduction of the Power Program Appropriation Investment, and other purposes connected with TVA's power business. In setting TVA's rates, the TVA Board is charged by the TVA Act to have due regard for the primary objectives of the TVA Act, including the objective that power shall be sold at rates as low as are feasible. Rates set by the TVA Board are not subject to review or approval by any state or federal regulatory body.

Fiscal Year

TVA's fiscal year ends September 30. Years (2011, 2010, etc.) refer to TVA's fiscal years unless they are proceeded by "CY," in which case the references are to calendar years.

Cost-Based Regulation

Since the TVA Board is authorized by the TVA Act to set rates for power sold to its customers, TVA is "self regulated." Additionally, TVA's regulated rates are designed to recover its costs of providing electricity. In view of demand for electricity and the level of competition, TVA assumes that rates, set at levels that will recover TVA's costs, can be charged and collected. As a result of these factors, TVA records certain assets and liabilities that result from the regulated ratemaking process that would not be recorded under GAAP for non-regulated entities. Regulatory assets generally represent incurred costs that have been deferred, because such costs are probable of future recovery in customer rates. Regulatory liabilities generally represent obligations to make refunds to customers for previous collections for costs that are not likely to be incurred or deferral of gains that will be credited to customers in future periods. TVA assesses whether the regulatory assets are probable of future recovery by considering factors such as applicable regulatory changes, potential legislation, and changes in technology. Based on these assessments, TVA believes the existing regulatory assets are probable of recovery. This determination reflects the current regulatory and political environment and is subject to change in the future. If future recovery of regulatory assets ceases to be probable, or any of the other factors described above cease to be applicable, TVA would no longer be considered to be a regulated entity and would be required to write off these costs. Most regulatory asset write-offs would be required to be recognized in earnings in the period in which future recovery ceases to be probable.

Use of Estimates

The preparation of financial statements requires TVA to estimate the effects of various matters that are inherently uncertain as of the date of the financial statements. Although the financial statements are prepared in conformity with GAAP, TVA is required to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities, and the amounts of revenues and expenses reported during the reporting period. Each of these estimates varies in regard to the level of judgment involved and its potential impact on TVA’s financial results. Estimates are deemed critical either when a different estimate could have reasonably been used, or where changes in the estimate are reasonably likely to occur from period to period, and such use or change would materially impact TVA’s financial conditions, results of operations, or cash flows.

Reclassifications

Certain reclassifications have been made to the 2009 and 2010 financial statements to conform to the 2011 presentation. Assets of $1.2 billion previously reported as Nuclear fuel and capital leases on the September 30, 2010 Balance Sheet have been reclassified as Nuclear fuel of $1.1 billion and Capital leases of $49 million. Liabilities of $4.7 billion previously reported as Other long-term liabilities on the September 30, 2010 Balance Sheet have been reclassified as Post-retirement and post-employment benefit obligations.

In the Net cash provided by operating activities section of the Statement of Cash Flows, $(81) million and $81 million previously reported as changes in Accounts payable and accrued liabilities for the years ended September 30, 2010 and 2009, respectively, and $(8) million previously reported in Other, net cash provided by operating activities for the year ended September 30, 2010 were reclassified as Fuel cost tax equivalents for the years ended September 30, 2010 and 2009, respectively. Additionally, $(10) million and $10 million previously reported in Other, net cash provided by operating activities for the years ended September 30, 2010 and 2009, respectively, were reclassified as changes in Accounts payable and accrued liabilities.

Operating expenses of $3.2 billion and $4.7 billion at September 30, 2010, and September 30, 2009, respectively, previously reported as Fuel and purchased power on the Statements of Operations, have been reclassified as follows:

	Year Ended September 30, 2010	Year Ended September 30, 2009
Fuel	$ 2,092	$ 3,114
Purchased power	1,127	1,631

Interest on debt and leaseback obligations and Amortization of debt discount, issue, and reacquisition costs, net were combined for the year ended September 30, 2011 and are shown as Interest expense on the Statements of Operations.

Allowance for Uncollectible Accounts

The allowance for uncollectible accounts reflects TVA's estimate of probable losses inherent in its accounts and loans receivable balances. TVA determines the allowance based on known accounts, historical experience, and other currently available information including events such as customer bankruptcy and/or a customer failing to fulfill payment arrangements after 90 days. It also reflects TVA's corporate credit department’s assessment of the financial condition of customers and the credit quality of the receivables.

The allowance for uncollectible accounts was $1 million and $2 million at September 30, 2011, and 2010, for accounts receivable. Additionally, loans receivable of $74 million and $68 million at September 30 2011, and 2010, respectively, are included in Other long-term assets, and reported net of allowances for uncollectible accounts of $11 million and $13 million at September 30, 2011, and 2010.

Revenues

Revenues from power sales are recorded as power is delivered to customers. In addition to power sales invoiced and recorded during the month, TVA accrues estimated unbilled revenues for power sales provided to customers for the period of time from the meter-read date to the end of the month. Exchange power sales are presented in the accompanying Statements of Operations as a component of Sales of electricity. Exchange power sales are sales of excess power after meeting TVA native load and directly served requirements. (Native load refers to the customers on whose behalf a company, by statute, franchise, regulatory requirement, or contract, has undertaken an obligation to serve.)

From time-to-time TVA transfers fiber optic capacity on TVA’s network to telecommunications service carriers and TVA distributor customers. These transactions are structured as indefeasible rights of use (“IRUs”) which are the exclusive right to use a specified amount of fiber optic capacity for a specified term. TVA accounts for the consideration received on transfers of fiber optic capacity for cash and on all of the other elements deliverable under an IRU as revenue ratably over the term of the agreement. TVA does not recognize revenue on any contemporaneous exchanges of its fiber optic capacity for an IRU of fiber optic capacity of the counterparty to the exchange.

TVA engages in a wide array of arrangements in addition to power sales. TVA records revenue when it is realized or realizable and earned when all of the following criteria are met: persuasive evidence of an arrangement exists; delivery has occurred or services have been rendered; the price or fee is fixed or determinable; and collectability is reasonably assured. Revenues from activities related to TVA's overall mission are recorded as other operating revenue versus those that are not related to the overall mission, which are recorded in Other income (expense), net.

Inventories

Certain Fuel, Materials, and Supplies . Coal, oil, limestone, tire-based fuel inventories, and materials and supplies inventories are valued using an average unit cost method. A new average cost is computed after each transaction, and inventory issuances are priced at the latest moving weighted average unit cost. Natural gas inventories are valued using an average cost method, and a new average cost is computed monthly.

Allowance for Inventory Obsolescence . TVA reviews supply and material inventories by category and usage on a periodic basis. Each category is assigned a probability of becoming obsolete based on the type of material and historical usage data. Based on the estimated value of the inventory, TVA adjusts its allowance for inventory obsolescence.

Emission Allowances . TVA has emission allowances for sulfur dioxide ("SO_2") and nitrogen oxides ("NO_x") which are accounted for as inventory. The average cost of allowances used each month is charged to operating expense based on tons of SO_2 and NO_x emitted during the respective compliance periods. Allowances granted to TVA by the Environmental Protection Agency ("EPA") are recorded at zero cost.

Property, Plant, and Equipment, and Depreciation

Property, Plant, and Equipment. Additions to plant are recorded at cost, which includes direct and indirect costs and an allowance for funds used during construction ("AFUDC"). The cost of current repairs and minor replacements is charged to operating expense. Nuclear fuel inventories, which are included in Property, plant, and equipment, are valued using the average cost method for raw materials and the specific identification method for nuclear fuel in a reactor. Amortization of nuclear fuel in a reactor is calculated on a units-of-production basis and is included in fuel expense.

Depreciation. TVA accounts for depreciation of its properties using the composite depreciation convention of accounting. Accordingly, the original cost of property retired, less salvage value, is charged to accumulated depreciation. Except as described below, depreciation is generally computed on a straight-line basis over the estimated service lives of the various classes of assets. Depreciation expense expressed as a percentage of the average annual depreciable completed plant was 3.21 percent for 2011, 2.92 percent for 2010, and 2.81 percent for 2009. Average depreciation rates by asset class are as follows:

Property, Plant, and Equipment Depreciation Rates
At September 30

	2011	**2010**	**2009**
Asset Class		*(percent)*	
Nuclear	2.58	2.59	2.59
Coal-Fired	3.80	3.22	3.22
Hydroelectric	1.43	1.43	1.43
Gas and oil-fired	3.70	4.09	4.09
Transmission	3.39	3.40	3.40
Other	7.39	6.03	4.91

Depreciation rates are determined based on an external depreciation study. TVA obtained and implemented a new study during the fourth quarter of 2008. Rates were changed prospectively as a change in estimate. Depreciation expense for the years ended September 30, 2011, 2010, and 2009, was \$1.3 billion, \$1.2 billion, and \$1.2 billion, respectively. Depreciation rates were adjusted to ensure that those coal-fired units which have been identified to be idled will be fully depreciated by the applicable idle dates. In September 2010, TVA idled Widows Creek Fossil Plant ("Widows Creek") Unit 2, and in October 2010 TVA idled Widows Creek Unit 5 as well as Shawnee Fossil Plant Unit 10. The accelerated depreciation expense of the three units in 2010 was \$35 million. In June 2011, TVA idled Widows Creek Units 1 and 3, and in August 2011 TVA idled Widows Creek Unit 4. The accelerated depreciation of these three units in 2011 was \$29 million. An additional 15 coal-fired units are expected to be idled by 2017, including Widows Creek Unit 6, which was idled in October 2011. John Sevier Fossil Plant ("John Sevier") Units 1-4 are currently expected to be idled by 2012, and Johnsonville Fossil Plant ("Johnsonville") Units 1-10 are currently expected to be idled by 2017. The accelerated depreciation expense on these 15 units in 2011 was $44 million and in 2010 was $2 million.

Capital Lease Agreements. Property, plant, and equipment also includes assets recorded under capital lease agreements which primarily consist of office facilities of $9 million and $27 million at September 30, 2011, and 2010, respectively, and fuel fabrication and blending facilities of $17 million and $22 million at September 30, 2011, and 2010, respectively.

Allowance for Funds Used During Construction. AFUDC capitalized during the year ended September 30, 2011, was $126 million as compared with $79 million capitalized during the year ended September 30, 2010. TVA capitalizes interest as AFUDC, based on the average interest rate of TVA's outstanding debt. The allowance is applicable to construction in progress related to certain projects and certain nuclear fuel inventories. Interest on funds invested in capital projects has been capitalized only for projects with (1) an expected total project cost of $1.0 billion or more, and (2) an estimated construction period of at least three years in duration.

The Watts Bar Nuclear Plant ("Watts Bar") Unit 2 construction and the Bellefonte Nuclear Plant ("Bellefonte") Unit 1 construction met the AFUDC criteria during the year ended September 30, 2011. The accumulated balance of costs for qualifying projects, which is used to calculate AFUDC, averaged approximately $1.8 billion for the year ended September 30, 2011.

Software Costs. TVA capitalizes certain costs incurred in connection with developing or obtaining internal-use software. Capitalized software costs are included in Property, plant, and equipment on the balance sheet and are amortized primarily over five years. At September 30, 2011, and 2010, unamortized computer software costs totaled $153 million and $145 million, respectively. Amortization expense related to capitalized computer software costs was $29 million, $29 million, and $22 million for 2011, 2010, and 2009, respectively. Software costs that do not meet capitalization criteria are expensed as incurred.

Impairment of Assets. TVA evaluates long-lived assets for impairment when events or changes in circumstances indicate that the carrying value of such assets may not be recoverable. For long-lived assets, TVA bases its evaluation on impairment indicators such as the nature of the assets, the future economic benefit of the assets, any historical or future profitability measurements, and other external market conditions or factors that may be present. If such impairment indicators are present or other factors exist that indicate that the carrying amount of an asset may not be recoverable, TVA determines whether an impairment has occurred based on an estimate of undiscounted cash flows attributable to the asset as compared with the carrying value of the asset. If an impairment has occurred, the amount of the impairment recognized is measured as the excess of the asset's carrying value over its fair value. Additionally, TVA regularly evaluates construction projects. If the project is canceled or deemed to have no future economic benefit, the project is written off as an asset impairment.

Decommissioning Costs

TVA recognizes legal obligations associated with the future retirement of certain tangible long-lived assets. These obligations relate to fossil-fired generating plants, nuclear generating plants, hydroelectric generating plants/dams, transmission structures, and other property-related assets. These other property-related assets include, but are not limited to, easements, leases, and coal rights. Activities involved with retiring these assets could include decontamination and demolition of structures, removal and disposal of wastes, and site reclamation. Revisions to the estimates of asset retirement obligations ("AROs") are made whenever factors indicate that the timing or amounts of estimated cash flows have changed. Any accretion or depreciation expense related to these liabilities and assets is charged to a regulatory asset. See Note 7 — *Nuclear Decommissioning Costs* and *Non-Nuclear Decommissioning Costs.*

Blended Low Enriched Uranium Program

Under the blended low enriched uranium ("BLEU") program, TVA, the Department of Energy ("DOE"), and certain nuclear fuel contractors have entered into agreements providing for surplus the DOE highly enriched uranium to be blended with other uranium down to a level that allows the blended uranium to be fabricated into fuel that can be used in nuclear power plants. This blended nuclear fuel was first loaded in a Browns Ferry Nuclear Plant ("Browns Ferry") reactor in 2005, which initiated the amortization of the costs of the BLEU fuel assemblies to nuclear fuel expense. TVA expects to continue to use the blended nuclear fuel to reload the Browns Ferry reactors through at least 2016. BLEU fuel was loaded into Sequoyah ("Sequoyah") Unit 2 in 2008, 2009, and 2011.

Under the terms of an interagency agreement between TVA and the DOE, in exchange for supplying highly enriched uranium materials to the appropriate third party fuel processors for processing into usable BLEU fuel for TVA, the DOE participates to a degree in the savings generated by TVA's use of this blended nuclear fuel. Over the life of the program, TVA projects that the DOE's share of savings generated by TVA's use of this blended nuclear fuel could result in future payments to the DOE of as much as $225 million. TVA accrues an obligation with each BLEU reload batch related to the portion of the ultimate future payments estimated to be attributable to the BLEU fuel currently in use. At September 30, 2011, this obligation was $37 million. During 2009, the DOE and TVA agreed that this obligation will be offset by amounts that the DOE expects to owe TVA in the future for certain decommissioning costs that TVA will pay on the DOE's behalf. Accordingly, TVA will remit the

BLEU fuel savings amounts to the DOE, only after those future decommissioning costs have been offset against TVA's obligation to the DOE.

The third party fuel processors own the conversion and processing facilities and will retain title to all land, property, plant, and equipment used in the BLEU fuel program. However, the fuel fabrication contract qualifies as a capital lease, and TVA recognized a capital lease asset and corresponding lease obligation related to amounts paid or payable to the processor.

Investment Funds

Investment funds consist primarily of trust funds designated to fund nuclear decommissioning requirements (see Note 20 — *Contingencies — Decommissioning Costs*), AROs (see Note 7 — *Non-Nuclear Decommissioning Costs*), and the Supplemental Executive Retirement Plan ("SERP") (see Note 18 — *Overview of Plans and Benefits — Supplemental Executive Retirement Plan)* . Nuclear decommissioning funds, asset retirement funds, and SERP funds, which are classified as trading, are invested in portfolios of securities generally designed to earn returns in line with overall equity market performance.

Energy Prepayment Obligations and Discounts on Sales

During 2002, TVA introduced an energy prepayment program, the discounted energy units ("DEU") program. Under this program, TVA customers could purchase DEUs generally in $1 million increments, and each DEU entitles the purchaser to a $0.025/kilowatt-hour discount on a specified quantity of firm power over a period of years (five, 10, 15, or 20) for each kilowatt-hour in the prepaid block. The remainder of the price of the kilowatt-hours delivered to the customer is due upon billing. TVA's DEU program allowed customers to use cash on hand to prepay TVA for some of their power needs, providing funding to TVA and a savings to customers in the form of a discount on future purchases. The distributor customer receives a discount on a specified volume of firm energy purchased. The supplement to the power contract specifies the discount rate (2.5 cents per kilowatt-hour), the monthly block of kilowatt-hours to which the discount applies, the number of years (term), and contingencies upon contract termination.

TVA has not offered the DEU program since the end of 2004. Total sales for the program since inception have been approximately $55 million. TVA is accounting for the prepayment proceeds as unearned revenue and is reporting the obligations to deliver power as Energy prepayment obligations and Current portion of energy prepayment obligations on the September 30, 2011, and 2010, Balance Sheets.

TVA recognizes revenue as electricity is delivered to customers, based on the ratio of units of kilowatt-hours delivered to total units of kilowatt-hours under contract. At September 30, 2011, approximately $48 million has been applied against power billings on a cumulative basis during the life of the program, of which approximately $5 million was recognized as noncash revenue during 2011. Approximately $5 million was applied against power billings during each of 2010 and 2009.

In 2004, TVA and its largest customer, Memphis Light, Gas and Water Division ("MLGW"), entered into an energy prepayment agreement under which MLGW prepaid TVA $1.5 billion for the future costs of electricity to be delivered by TVA to MLGW over a period of 180 months. TVA accounted for the prepayment as unearned revenue and is reporting the obligation to deliver power under this arrangement as Energy prepayment obligations and Current portion of energy prepayment obligations on the September 30, 2011 and 2010 Balance Sheets. TVA expects to recognize approximately $100 million of noncash revenue in each year of the arrangement as electricity is delivered to MLGW based on the ratio of units of kilowatt-hours delivered to total units of kilowatt-hours under contract. At September 30, 2011, $790 million had been recognized as noncash revenue on a cumulative basis during the life of the agreement, $100 million of which was recognized as noncash revenue during each of 2011, 2010, and 2009.

Discounts for both programs amounted to $47 million for each of the years ended September 30, 2011, 2010, and 2009.

Insurance

Although TVA uses private companies to administer its health-care plans for eligible active and retired employees not covered by Medicare, TVA does not purchase health insurance. Third party actuarial specialists assist TVA in determining certain liabilities for self-insured claims. TVA recovers the costs of claims through power rates and through adjustments to the participants' contributions to their benefit plans. These liabilities are included in Other liabilities on the balance sheets.

The Federal Employees' Compensation Act ("FECA") governs liability to employees for service-connected injuries. TVA purchases excess workers' compensation insurance above a self insured retention.

TVA purchases nuclear liability insurance, nuclear property, decommissioning, and decontamination insurance, and nuclear accidental outage insurance. See Note 20 — *Contingencies — Nuclear Insurance* .

TVA purchases excess liability insurance for aviation, auto, marine, and general liability exposures. TVA purchases property insurance for certain conventional (non-nuclear) assets as well as outage insurance (business interruption) for selected conventional generating assets. TVA also purchases liability insurance which provides coverage for its directors and officers.

The insurance policies are subject to the terms and conditions of the specific policy. Each of the insurance policies purchased contains deductibles or self-insured retentions. TVA recovers the costs of losses through power rates.

Research and Development Costs

Research and development costs are expensed when incurred. TVA's research programs include those related to transmission technologies, emerging technologies (clean energy, renewables, distributed resources, and energy efficiency), technologies related to generation (fossil, nuclear, and hydro), and environmental technologies.

Tax Equivalents

The TVA Act requires TVA to make payments to states and counties in which TVA conducts its power operations and in which TVA has acquired power properties previously subject to state and local taxation. The amount of these payments is five percent of gross revenues from sales of power during the preceding year, excluding sales or deliveries to other federal agencies and off-system sales with other utilities, with a provision for minimum payments under certain circumstances. TVA calculates tax equivalent expense by subtracting the prior year fuel cost-related tax equivalent regulatory asset or liability from the payments made to the states and counties and then adds back the current year fuel cost-related tax equivalent regulatory asset or liability. Fuel cost-related tax equivalent expense is recognized in the same accounting period in which the fuel cost-related revenue is recognized.

Maintenance Costs

TVA records maintenance costs and repairs related to its property, plant, and equipment on TVA's statements of operations as they are incurred except for the recording of certain regulatory assets. Historically, TVA deferred nuclear outage costs that were incurred during the operating cycle subsequent to the refueling outage. These costs are incurred in the process of performing a nuclear fuel reload outage, and the benefits of these costs are realized during the subsequent 18 to 24 months when the nuclear fuel is burned during its operating cycle in producing electricity. The TVA Board historically included in rates the amortization of these deferred nuclear outage costs during the operating cycle subsequent to the refueling outage.

Beginning in 2010, TVA implemented a new policy to expense any future outage costs as incurred. However, TVA continued to amortize the related existing regulatory asset and included such amounts in rates. These amounts became fully amortized in 2011. See Note 7 — *Deferred Outage Costs* .

2. Impact of New Accounting Standards and Interpretations

The following accounting standards and interpretations became effective for TVA during the presented periods.

Noncontrolling Interests . In December 2007, the Financial Accounting Standards Board ("FASB") issued guidance that introduces significant changes in the accounting for noncontrolling interests (formerly minority interests) in a partially-owned consolidated subsidiary. The guidance also changed the accounting for and reporting for the deconsolidation of a subsidiary. The guidance requires that noncontrolling interests in a consolidated subsidiary be displayed in the consolidated statement of financial position as a separate component of equity. The guidance also requires that earnings attributed to noncontrolling interests be reported as part of consolidated earnings, and requires disclosure of the attribution of consolidated earnings to the controlling and noncontrolling interests on the face of the consolidated income statement. These changes became effective for TVA as of October 1, 2009. The adoption of this guidance did not materially impact TVA's financial condition, results of operations, or cash flows but will impact the accounting for any future noncontrolling interests.

Transfers of Financial Assets . In June 2009, FASB issued guidance regarding accounting for transfers of financial assets. This guidance eliminates the concept of a qualifying special-purpose entity ("QSPE") and subjects those entities to the same consolidation guidance as other variable interest entity ("VIEs"). The guidance changes the eligibility criteria for certain transactions to qualify for sale accounting and the accounting for certain transfers. The guidance also establishes broad disclosure objectives and requires extensive specific disclosure requirements related to the transfers. These changes became effective for TVA for any transfers of financial assets occurring on or after October 1, 2010. The adoption of this guidance did not materially affect TVA's financial condition, results of operations, or cash flows.

Variable Interest Entities . In June 2009, FASB issued guidance that changes the consolidation guidance for VIEs. The guidance eliminates the consolidation scope exception for QSPEs. The statement amends the triggering events to determine if an entity is a VIE, establishes a primarily qualitative model for determining the primary beneficiary of the VIE, and requires on-going assessment of whether the reporting entity is the primary beneficiary. These changes became effective for TVA on October 1, 2010, and apply to all entities determined to be VIEs as of and subsequent to the date of adoption. The adoption of this guidance did not materially affect TVA's financial condition, results of operations, or cash flows.

In May 2011, the FASB issued an accounting standard that creates consistency between GAAP and International

Financial Reporting Standards ("IFRS") on the definition of fair value and on the guidance on how to measure fair value and on what to disclose about fair value measurements. This guidance is effective for TVA on October 1, 2012. Although this standard may require additional disclosure, TVA does not expect the adoption of this guidance to have a material impact on its financial statements.

In June 2011, FASB issued guidance that will require adjustments to the presentation of TVA's financial information. The guidance eliminates the current option to report comprehensive income and its components in the statement of changes in proprietary capital. The guidance allows for presentation of net income and other comprehensive income in one continuous statement or in two separated, but consecutive statements. These changes become effective for TVA on October 1, 2012.

3. Accounts Receivable, Net

Accounts receivable primarily consist of amounts due from customers for power sales. The table below summarizes the types and amounts of receivables:

Accounts Receivable, Net
At September 30

	2011	2010
Power receivables		
Billed	$ 1,625	$ 597
Unbilled	13	1,004
Total power receivables	1,638	1,601
Other receivables	102	40
Allowance for uncollectible accounts	$ (1)	$ (2)
Accounts receivable, net	$ 1,739	$ 1,639

The $991 million decrease in unbilled power receivables and the $1.0 billion increase in billed receivables are primarily due to the implementation of a new wholesale rate structure in April 2011. Under the previous end-use billing structure, sales were billed a month in arrears. Under the new wholesale base rate structure, customers are billed in the current month.

4. Inventories, Net

The table below summarizes the types and amounts of TVA's inventories:

Inventories, Net
At September 30

	2011	**2010**
Fuel inventory	$ 489	$ 539
Materials and supplies inventory	555	486
Emission allowance inventory	11	11
Allowance for inventory obsolescence	(27)	(24)
Inventories, net	$ 1,028	$ 1,012

5. Completed Plant

Completed plant consisted of the following:

Completed Plant
At September 30

	2011			2010		
	Cost	Accumulated Depreciation	Net	Cost	Accumulated Depreciation	Net
Coal-Fired	$ 13,218	$ 7,244	$ 5,974	$ 12,920	$ 6,731	$ 6,189
Gas and oil-fired	2,885	923	1,962	2,399	737	1,662
Nuclear	17,786	8,290	9,496	17,681	7,866	9,815
Transmission	5,536	2,142	3,394	5,532	2,084	3,448
Hydroelectric	2,232	848	1,384	2,193	819	1,374
Other electrical plant	1,558	844	714	1,300	745	555
Subtotal	43,215	20,291	22,924	42,025	18,982	23,043
Multipurpose dams	928	338	590	928	331	597
Other stewardship	44	14	30	44	13	31
Subtotal	972	352	620	972	344	628
Total	$ 44,187	$ 20,643	$ 23,544	$ 42,997	$ 19,326	$ 23,671

Certain reclassifications have been made to the 2010 information to conform to the 2011 presentation.

6. Other Long-Term Assets

The table below summarizes the types and amounts of TVA's Other long-term assets:

Other Long-Term Assets
At September 30

	2011	2010
Coal contract derivative assets	$ 285	$ 103
Loans and other long-term receivables, net	74	68
Other long-term assets	13	20
Total other long-term assets	$ 372	$ 191

7. Regulatory Assets and Liabilities

Regulatory assets generally represent incurred costs that have been deferred because such costs are probable of future recovery in customer rates. Regulatory liabilities generally represent obligations to make refunds to customers for previous collections for costs that are not likely to be incurred or deferral of gains that will be credited to customers in future periods. Components of regulatory assets and regulatory liabilities are summarized in the table below.

Regulatory Assets and Liabilities
At September 30

	2011	2010
Current regulatory assets		
Deferred nuclear generating units	$ 236	$ 391
Unrealized losses on commodity derivatives	225	184
Environmental cleanup costs – Kingston ash spill	73	76
Fuel cost adjustment receivable	7	84
Deferred capital leases	2	14
Deferred outage costs	—	42
Total current regulatory assets	543	791
Non-current regulatory assets		
Deferred pension costs and other post-retirement benefits costs	5,807	4,711
Unrealized losses on swaps and swaptions	1,164	797
Nuclear decommissioning costs	1,012	898
Environmental cleanup costs - Kingston ash spill	874	987
Deferred nuclear generating units	709	1,565
Construction costs	619	—
Non-nuclear decommissioning costs	519	410
Environmental agreements	346	—
Unrealized losses on commodity derivatives	221	144
Other non-current regulatory assets	234	244
Total non-current regulatory assets	11,505	9,756
Total regulatory assets	$ 12,048	$ 10,547
Current regulatory liabilities		
Unrealized gains on commodity derivatives	$ 153	$ 57
Fuel cost adjustment tax equivalents	127	—
Capital leases	—	6
Total current regulatory liabilities	280	63
Non-current regulatory liabilities		
Unrealized gains on commodity derivatives	285	106
Total regulatory liabilities	$ 565	$ 169

Deferred Nuclear Generating Units and *Construction Costs* . In July 2005, the TVA Board approved the amortization, and inclusion into rates, of TVA's $3.9 billion investment in the two deferred nuclear generating units at Bellefonte over a 10-year recovery period beginning in 2006. In August 2011, the TVA Board approved the completion of Bellefonte Unit 1. Approximately $619 million of the remaining balance in the deferred nuclear generating units regulatory asset will not continue to be amortized into rates, but will be included in the Bellefonte plant asset balance at completion. This amount has been segregated into a separate non-current regulatory asset account titled Construction costs. Accordingly, the amount of annual amortization to be included in rates will decrease beginning in 2012. The amount to be amortized over the next fiscal year is included as a current regulatory asset on the balance sheet.

Unrealized Gains (Losses) on Commodity Derivatives

Unrealized Gains (Losses) on Coal Contracts . Unrealized gains (losses) on coal purchase contracts, included as part of unrealized losses on commodity derivatives, relate to the mark-to-market ("MtM") valuation of coal purchase contracts that contain options to purchase additional or fewer quantities. These contracts qualify as derivative contracts but do not qualify for cash flow hedge accounting treatment. As a result, TVA recognizes the changes in the market value of these derivative contracts as a regulatory liability or asset. This treatment reflects TVA's ability and intent to recover the cost of these commodity contracts on a settlement basis for ratemaking purposes through the total fuel rate mechanism. TVA has historically recognized the actual cost of fuel received under these contracts in fuel expense at the time the fuel is used to generate electricity. These contracts expire at various times through 2013. Unrealized gains and losses on contracts with a maturity of less than one year are included as a current regulatory asset or liability on the balance sheet. See Note 13.

Deferred Gains and Losses Relating to TVA's Financial Trading Program . Deferred gains and losses relating to TVA's Financial Trading Program ("FTP") represent net unrealized gains and losses on swaps, futures, options, and combinations of these instruments and are also included as part of unrealized losses on commodity derivatives. The program is used to reduce TVA's economic risk exposure associated with electricity generation, purchases, and sales. TVA defers all FTP mark-to-market unrealized gains or losses as regulatory liabilities or assets, respectively, and records realized gains or losses in fuel and purchased power expense to match the delivery period of the underlying commodity product. Net unrealized losses at September 30, 2011, and September 30, 2010, were approximately $234 million and $254 million, respectively. This accounting treatment reflects TVA's ability and intent to recover the cost of these commodity contracts in future periods through the fuel rate. The current regulatory asset/liability for net unrealized gains and losses, included as part of the commodity derivatives, represents deferred gains and losses from contracts with a maturity of less than one year.

Environmental Cleanup Costs – Kingston Ash Spill . In August 2009, TVA began using regulatory accounting treatment to defer all actual costs incurred and expected future costs related to the Kingston Fossil Plant ("Kingston") ash spill. The TVA Board approved a plan of amortizing these costs over 15 years beginning October 1, 2009. At September 30, 2009, TVA's remediation cost estimate of $933 million was deferred as a regulatory asset. During 2010, the estimate was revised and increased by $192 million to a total estimate of $1.1 billion. The additional amount will be amortized over the remaining term of the initial life. Amounts included as a current regulatory asset on the balance sheet represent the amount to be amortized in the next 12 months. Any future revisions to the estimate will be amortized as a change in estimate over the remaining term.

Fuel Cost Adjustment Receivable. The fuel cost adjustment provides a mechanism to regularly alter rates to reflect changing fuel and purchased power costs, including realized gains and losses relating to transactions under TVA's FTP. There is typically a lag between the occurrence of a change in fuel and purchased power costs and the reflection of the change in rates. Balances in the fuel cost adjustment regulatory accounts represent overcollected or undercollected revenues to offset fuel and purchased power costs and are recovered or refunded in fuel rates.

Starting with the October 1, 2009, billing period, all fuel cost adjustments have been made on a monthly basis instead of a quarterly basis. Therefore, since October 1, 2009, the balance has been a current regulatory asset or liability. Monthly adjustments allow the rates to be more closely aligned with TVA's costs. The fuel cost adjustment formula also contains a deferred account which is used to reconcile the difference between actual and forecasted fuel and purchased power costs. The difference between the amounts is included in the deferred account, and starting with the October 1, 2009, billing period, 50 percent of the account has been disbursed or collected on a monthly basis. This change to a monthly fuel cost adjustment formula has resulted in smaller reconciliations and faster liquidation of any balances in the account. With the change to the monthly fuel cost adjustment formula on October 1, 2009, the remaining balance in the existing deferred liability account balance at that date of approximately $822 million was liquidated over a nine-month period from October 1, 2009, through June 30, 2010.

Deferred Capital Leases . Deferred capital lease asset costs represent the difference between the Federal Energy Regulatory Commission's ("FERC") Uniform System of Accounts Prescribed for Public Utilities and Licensees Subject to the Provisions of the Federal Power Act ("Uniform System of Accounts") model balances and the balances under GAAP guidance. Under the Uniform System of Accounts, TVA recognizes the initial capital lease asset and liability at inception of the lease; however, the annual expense under the Uniform System of Accounts is equal to the annual lease payments, which differs from GAAP treatment. This practice results in TVA's capital lease asset balances being higher than they otherwise would have been under GAAP, with the difference representing a regulatory asset related to each capital lease. These costs are being amortized over the respective lease terms as lease payments are made. The amount to be amortized over the next 12 months is included as a current regulatory asset on the balance sheet. These costs are included in current regulatory assets.

Deferred Outage Costs . The cost of fuel used in TVA's nuclear units has been amortized and accounted for as a component of fuel cost adjustment. Nuclear refueling outage and maintenance costs were deferred and amortized on a straight-line basis over the estimated period until the next refueling outage. In 2010, TVA began expensing outage and maintenance costs as incurred. Previously deferred outage costs continued to be amortized as the remaining amounts were collected in rates and were included as a current regulatory asset on the balance sheet. The remaining costs were fully amortized during 2011.

Deferred Pension Costs and Other Post-retirement Benefit Costs . TVA measures its benefit obligations related to pension and other post-retirement benefit ("OPEB") costs at the year-end balance sheet date. TVA recognizes the funded status of the plans on the balance sheet which in an unregulated environment would result in a corresponding offset to accumulated other comprehensive income ("AOCI"). "Incurred cost" is a cost arising from cash paid out or obligation to pay for an acquired asset or service, and a loss from any cause that has been sustained and has been or must be paid for. In the cases of pension and OPEB costs, the unfunded obligation represents a projected liability to the employee for services rendered, and thus it meets the definition of an incurred cost. Therefore, amounts otherwise charged to AOCI for these costs will be recorded as a regulatory asset since TVA has historically recovered pension and OPEB expense in rates. Through historical and current year expense included in ratemaking, the TVA Board has demonstrated the ability and intent to include pension and OPEB costs in allowable costs and in rates for ratemaking purposes. As a result, it is probable that future revenue, if necessary, will result from inclusion of the pension and OPEB regulatory assets in allowable costs for ratemaking purposes.

These regulatory assets are classified as long-term consistent with the pension and post-retirement liabilities and not amortized to the statement of operations over a specified recovery period. They are adjusted either upward or downward each year in conjunction with the adjustments in the unfunded pension liability as calculated by the actuaries. Ultimately this regulatory asset will flow through the statement of operations in the form of pension expense as the actuarial liability is eliminated in future periods. These costs are included in other non-current regulatory assets. See Note 18 — *Obligations and Funded Status* .

Unrealized Losses on Swaps and Swaption . TVA uses regulatory accounting treatment to defer the mark-to-market unrealized gains and losses on certain swap and swaption contracts to reflect that the gain or loss is included in the ratemaking formula when these transactions actually settle. The value of the swap and swaptions is recorded on TVA's balance sheet as a non-current regulatory asset with realized gains or losses, if any, recorded in TVA's statement of operations.

Nuclear Decommissioning Costs. Nuclear decommissioning costs include: (1) certain deferred charges related to the future closure and decommissioning of TVA's nuclear generating units under the Nuclear Regulatory Commission ("NRC") requirements and (2) recognition of changes in the liability, TVA's nuclear decommissioning trust ("NDT"), and certain other deferred charges under the accounting rules for AROs. These future costs will be funded through a combination of the NDT, future earnings on the NDT, and, if necessary, additional TVA cash contributions to the NDT, and future earnings thereon. See Note 1 — *Investment Funds.* There is not a specified recovery period; therefore, the regulatory asset is classified as long-term consistent with the NDT investments and ARO liability.

Non-Nuclear Decommissioning Costs. TVA has established an asset retirement trust ("ART") to more effectively segregate, manage, and invest funds to help meet future AROs. The funds from the ART may be used, among other things, to pay the costs of retiring non-nuclear long-lived assets. The costs of retiring non-nuclear long-lived assets represent the net deferred costs related to the future closure and retirement of TVA's non-nuclear long-lived assets under various legal requirements. The regulatory asset initially created related to this adjustment totaled $350 million. The offset to this adjustment was a one-time decrease to depreciation, amortization, and accretion expense. These future costs can be funded through a combination of investment funds already set aside in the ART, future earnings on those investment funds, and future cash contributions to the ART and future earnings thereon. There is not a specified recovery period; therefore, the regulatory asset is classified as long-term consistent with the ART investments and ARO liability.

Environmental Agreements. In conjunction with the Federal Facilities Compliance Agreement with the EPA and the agreement with Alabama, Kentucky, North Carolina, Tennessee, the Sierra Club, National Parks Conservation Association, and Our Children's Earth Foundation (collectively, the "Environmental Agreements") (see Note 20 — *Legal Proceedings — Environmental Agreements*), TVA recorded certain liabilities totaling $360 million ($290 million investment in energy efficiency projects, demand response projects, renewable energy projects, and other TVA projects; $60 million to be provided to Alabama, Kentucky, North Carolina, and Tennessee to fund environmental projects with preference for projects in the Tennessee River watershed, of which $4 million was paid in the fourth quarter of 2011; and $10 million in civil penalties). The TVA Board determined that these costs would be collected in customer rates in the future and, accordingly, the amounts were deferred as a regulatory asset. During the three months ended June 30, 2011, the civil penalties of $10 million were expensed, and they were subsequently paid in July 2011. The remaining amounts will be charged to expense and recovered in rates over future periods as payments are made.

Other Non-Current Regulatory Assets

Debt Reacquisition Costs . Reacquisition expenses, call premiums, and other related costs, such as unamortized debt issue costs associated with redeemed Bond issues, are deferred under provisions of the Uniform System of Accounts. These costs are deferred and amortized (accreted) on a straight-line basis over the weighted average life of TVA's debt portfolio (even though TVA is not a public utility subject generally to FERC jurisdiction) and are included in other non-current regulatory assets.

Nuclear Training Costs . As a result of refurbishing and restarting Browns Ferry Nuclear Unit 1 in 2007 and the construction and startup of Watts Bar Unit 2, nuclear training costs associated with these units have been deferred as a regulatory asset and will be amortized over a cost recovery period equivalent to the expected useful life of the operating nuclear units. These costs are included in other non-current regulatory assets.

Retirement Removal Costs . Retirement removal costs that are not legally required are capitalized into fixed assets to be depreciated consistent with the lives in the depreciation study. See Note 1 — *Property, Plant, and Equipment, and Depreciation — Depreciation* . The TVA Board has consistently provided rates to cover the depreciation of these assets; therefore, these assets are probable of future recovery and are included in other non-current regulatory assets.

Fuel Cost Adjustment Tax Equivalents. The fuel cost adjustment structure includes a provision related to the current funding of the future payments TVA will make. As TVA records the fuel cost adjustment, the percent of the calculation that relates to a future asset or liability for tax equivalent payments is recorded as a current regulatory asset or liability and paid in the following fiscal year.

Capital Leases . As a result of a capital lease of office space payment stream requiring larger cash payments during the latter years of the lease term than during the early years of the lease term, TVA levelized the annual lease expense recognition related to this lease in order to promote the fair and equitable cost recovery from ratepayers. These levelized costs were being amortized over the lease term. In 2011, TVA purchased the building subject to this lease, and with the final payment, removed the remaining regulatory liability that was included as a current regulatory liability on the September 30, 2010 Balance Sheet.

Preconstruction Costs. Certain preliminary work and costs associated with engineering, design, and licensing activities, as well as the procurement of long lead-time components for the partially completed Bellefonte Unit 1, had been deferred as a regulatory asset pending the TVA Board's decision on the completion of the project. On August 18, 2011, the TVA Board decided to complete Bellefonte Unit 1, and the costs were moved to construction in progress. At September 30, 2010, no such preconstruction asset had been established.

8. Kingston Fossil Plant Ash Spill

The Event

In December 2008, one of the dredge cells at Kingston failed, and approximately five million cubic yards of water and coal fly ash flowed out of the cell. TVA is continuing cleanup and recovery efforts in conjunction with federal and state agencies. TVA completed the removal of time-critical ash from the river during the third quarter of 2010, and removal of the remaining ash is considered to be non-time-critical. TVA estimates that the physical cleanup work (final removal) will be completed in the last quarter of 2014. A final assessment, a completion report, and approval by Tennessee and the EPA is expected to occur by the second quarter of 2015. Surveillance and monitoring of the site will continue, but this work is beyond the scope of the cleanup project.

Claims and Litigation

See Note 20 — *Legal Proceedings — Legal Proceedings Related to the Kingston Ash Spill* and — *Civil Penalty and Natural Resource Damages for the Kingston Ash Spill* .

Financial Impact

Because of the uncertainty at this time of the final costs to complete the work prescribed by the ash disposal plan, a range of reasonable estimates has been developed by cost category. Known amounts, most likely scenarios, or the low end of the range for each category have been accumulated and evaluated to determine the total estimate. The range of estimated costs varies from approximately $1.1 billion to approximately $1.2 billion.

TVA recorded an estimate of $1.1 billion for the cost of cleanup related to this event. In August 2009, TVA began using regulatory accounting treatment to defer all actual costs already incurred and expected future costs related to the ash spill. The cost is being charged to expense as it is collected in rates over 15 years, beginning October 1, 2009. As the estimate changes, additional costs may be deferred and charged to expense prospectively as they are collected in future rates.

As work continues to progress and more information is available, TVA will review its estimates and revise them as appropriate. TVA has accrued a portion of the estimated cost in current liabilities, with the remaining portion shown as a long-term liability on TVA's balance sheets. Amounts spent since the event through September 30, 2011, totaled $749 million. The remaining estimated liability at September 30, 2011, was $376 million.

TVA has not included the following categories of costs in the above estimate since it has been determined that these costs are currently either not probable or not reasonably estimable: penalties (other than the penalties set out in the June 2010 Tennessee Department of Environment and Conservation ("TDEC") order), regulatory directives, natural resources damages (other than payments required under a memorandum of agreement with TDEC and the Fish and Wildlife Service establishing a process and a method for resolving the natural resource damages claim), future lawsuits, future claims, long-term environmental impact costs, final long-term disposition of ash processing area, costs associated with new laws and regulations, or cost of remediating any ash which is commingled with radioactive material from non-TVA operations, to the extent it would have to be managed as low-level radioactive waste. There are certain other costs that will be incurred that have not been included in the estimate as they are appropriately accounted for in other areas of the financial statements. Associated capital asset purchases are recorded in property, plant, and equipment. Ash handling and disposition costs from current plant operations are recorded in operating expenses. A portion of the pond and dredge cell closure costs is also not included in the estimate as it is included in the non-nuclear ARO liability.

Insurance

TVA had property and excess liability insurance programs in place at the time of the Kingston ash spill. TVA pursued claims under both the property and excess liability programs and has settled all of its property insurance claims and some of its excess liability insurance claims. Through September 30, 2011, TVA received proceeds of $40 million. TVA continues to provide information about the nature and extent of TVA's claims under the policies to the remaining excess liability insurance companies. It is unclear at this time whether the parties will be able to resolve the outstanding claims without resorting to the policies' dispute resolution procedures. Any amounts received related to insurance settlements are being recorded as reductions to the regulatory asset and will reduce amounts collected in future rates.

9. Other Long-Term Liabilities

Other long-term liabilities consist primarily of liabilities related to certain derivative agreements as well as liabilities under the Environmental Agreements (see Note 20 — *Legal Proceedings — Environmental Agreements*). The table below summarizes the types and amounts of liabilities:

Other Long-Term Liabilities
At September 30

	2011	2010
Currency swap liabilities	$ 131	$ 81
Swaption liability	1,077	804
Interest rate swap liabilities	463	371
Coal contract derivative liabilities	119	2
Commodity swap derivative liabilities	78	118
Environmental agreements liability	346	—
Other long-term liabilities	191	150
Total other long-term liabilities	$ 2,405	$ 1,526

The swaption and interest rate swap liabilities increased during 2011 due primarily to a decrease in interest rates. See Note 13 — *Derivatives Not Receiving Hedge Accounting Treatment* for a discussion related to changes affecting coal contract derivative liabilities.

10. Asset Retirement Obligations

During the year ended September 30, 2011, $48 million of the decommissioning costs classified as regulatory assets were amortized into expense since these amounts were collected in rates. The table below summarizes the types and amounts of TVA's AROs.

Reconciliation of Asset Retirement Obligation Liability
At September 30

	Nuclear	Non-nuclear	Total
Balance at September 30, 2009	$ 1,837	$ 846	$ 2,683
Settlements	—	(6)	(6)
Accretion (recorded as regulatory asset)	104	43	147
Additional obligations	—	1	1
Revisions in estimates of cash flows	—	138	138
Balance at September 30, 2010	$ 1,941	$ 1,022	$ 2,963
Settlements	—	(22)	(22)
Accretion (recorded as regulatory asset)	111	47	158
Additional obligations	—	4	4
Revisions in estimates of cash flows	39	(4)	35
Balance at September 30, 2011	$ 2,091	$ 1,047	$ 3,138

11. Debt

General

The TVA Act authorizes TVA to issue Bonds in an amount not to exceed $30.0 billion at any time. At September 30, 2011, TVA had only two types of Bonds outstanding: power bonds and discount notes. Power bonds have maturities of between one and 50 years, and discount notes have maturities of less than one year. Power bonds and discount notes are both issued pursuant to section 15d of the TVA Act and pursuant to the Basic Tennessee Valley Authority Power Bond Resolution adopted by the TVA Board on October 6, 1960, as amended on September 28, 1976, October 17, 1989, and March 25, 1992 (the "Basic Resolution"). TVA Bonds are not obligations of the United States, and the United States does not guarantee the payments of principal or interest on Bonds.

Power bonds and discount notes rank on parity and have first priority of payment out of net power proceeds, which are defined as:

- the remainder of TVA's gross power revenues
- after deducting
  - — the costs of operating, maintaining, and administering its power properties, and
  - — tax equivalent payments, but
- before deducting depreciation accruals or other charges representing the amortization of capital expenditures, plus
- the net proceeds from the sale or other disposition of any power facility or interest therein.

Because TVA's scheduled lease payments under its leaseback transactions are considered costs of operating, maintaining, and administering its power properties, those payments have priority over TVA's payments on the Bonds. Once net power proceeds have been applied to payments on power bonds and discount notes as well as any other Bonds that TVA may issue in the future that rank on parity with or subordinate to power bonds and discount notes, Section 2.3 of the Basic Resolution provides that the remaining net power proceeds shall be used only for minimum payments into the U.S. Treasury required by the TVA Act in repayment of and as a return on the Power Program Appropriation Investment, investment in power assets, additional reductions of TVA's capital obligations, and other lawful purposes related to TVA's power program.

The TVA Act and the Basic Resolution each contain two bond tests: the rate test and the bondholder protection test. Under the rate test, TVA must charge rates for power which will produce gross revenues sufficient to provide funds for, among other things, debt service on outstanding Bonds. As of September 30, 2011, TVA was in compliance with the rate test. See Note 1 — *General.* Under the bondholder protection test, TVA must, in successive five-year periods, use an amount of net power proceeds at least equal to the sum of (1) the depreciation accruals and other charges representing the amortization of capital expenditures and (2) the net proceeds from any disposition of power facilities for either the reduction of its capital obligations (including Bonds and the Power Program Appropriation Investment) or investment in power assets.

TVA met the bondholder protection test for the five-year period ended September 30, 2010, and must next meet the bondholder protection test for the five-year period ending September 30, 2015 .

Short-Term Debt

The weighted average rates applicable to short-term debt outstanding in the public market at September 30, 2011, 2010, and 2009, were 0.00 percent, 0.04 percent, and 0.06 percent, respectively. During 2011, 2010, and 2009, the maximum outstanding balances of TVA short-term borrowings held by the public were $1.4 billion, $1.3 billion, and $2.7 billion, respectively. For these same years, the average amounts (and weighted average interest rates) of TVA short-term borrowings were approximately $363 million (0.14 percent), $905 million (0.09 percent), and $1.7 billion (0.32 percent), respectively.

Put and Call Options

Bond issues of $1.8 billion held by the public are redeemable in whole or in part, at TVA's option, on call dates ranging from the present to 2020 and at call prices ranging from 100 percent to 106 percent of the principal amount. Twenty-two Bond issues totaling $656 million, with maturity dates ranging from 2020 to 2041, include a "survivor's option," which allows for right of redemption upon the death of a beneficial owner in certain specified circumstances. There is no accounting difference between a "survivor's option" put and a "regular" put on any TVA put Bond.

Additionally, TVA has two issues of Putable Automatic Rate Reset Securities ("PARRS") outstanding. After a fixed-rate period of five years, the coupon rate on the PARRS may automatically be reset downward under certain market conditions on an annual basis. The coupon rate reset on the PARRS is based on a calculation. For both series of PARRS, the coupon rate will reset downward on the reset date if the rate calculated is below the then-current coupon rate on the Bond. The calculation dates, potential reset dates, and terms of the calculation are different for each series. The coupon rate on the 1998 Series D PARRS may be reset on June 1 (annually) if the sum of the five-day average of the 30-Year Constant Maturity Treasury ("CMT") rate for the week ending the last Friday in April, plus 94 basis points, is below the then-current coupon rate. The coupon rate on the 1999 Series A PARRS may be reset on May 1 (annually) if the sum of the five-day average of the 30-Year CMT rate for the week ending the last Friday in March, plus 84 basis points, is below the then-current coupon rate. The coupon rates may only be reset downward, but investors may request to redeem their Bonds at par value in conjunction with a coupon rate reset for a limited period of time prior to the reset dates under certain circumstances.

The coupon rate for the 1998 Series D PARRS, which mature in June 2028, has been reset four times, from an initial rate of 6.75 percent to the current rate of 4.728 percent. In connection with these resets, $238 million of the bonds have been redeemed, so that $330 million of the bonds were outstanding at September 30, 2011. The coupon rate for the 1999 Series A PARRS, which mature in May 2029, has been reset three times, from an initial rate of 6.50 percent to the current rate of 4.50 percent. In connection with these resets, $241 million of the bonds have been redeemed, so that $274 million of the bonds were outstanding at September 30, 2011.

Due to the contingent nature of the put option on the PARRS, TVA determines whether the PARRS should be classified as long-term debt or current maturities of long-term debt by calculating the expected reset rate for the bonds on the calculation dates, described above, which occur in the third quarter of TVA's fiscal year. If the reset rate is less than the then-current coupon rate on the PARRS, the PARRS are included in current maturities. Otherwise, the PARRS are included in long-term debt. At September 30, 2011, TVA has not determined that it is probable that the reset rate will be less than than the current coupon rate on the PARRS on the calculation dates in the third quarter of 2012; therefore, the par amount outstanding for each series of PARRS was classified as long-term debt.

Debt Securities Activity

The table below summarizes TVA's Bond activity for the period from October 1, 2009, to September 30, 2011.

Debt Securities Activity
For the year ended September 30

	2011	2010
Issues		
electronotes ®		
First quarter	$ —	$ 82
Second quarter	40	34
Third quarter	42	63
Fourth quarter	17	—
2009 Series C	—	500
2010 Series A	—	1,000
2011 Series A	1,500	—
Total	$ 1,599	$ 1,679
Redemptions/Maturities		
electronotes ®		
First quarter	$ 2	$ 1
Second quarter	10	25
Third quarter	2	3
Fourth quarter	1	34
2001 Series A	1,000	—
2009 Series A	4	3
2009 Series B	2	3
Total	$ 1,021	$ 69

Debt Outstanding

Debt outstanding at September 30, 2011, and 2010, consisted of the following:

Short-Term Debt
At September 30

CUSIP or Other Identifier	Maturity	Call/(Put) Date	Coupon Rate	2011 Par Amount	2010 Par Amount
Discount notes (net of discount)				$ 482	$ 27
Current maturities of long-term debt					
88059TEH0	10/15/2023	10/15/2011	5.00%	14	—
880591EE8	5/15/2012		2.25%	3	3
88059TEL1	5/15/2012		2.65%	3	3
880591EF5	6/15/2012		3.77%	2	2
880591DL3	5/23/2012		7.14%	29	—
880591DT6	5/23/2012		6.79%	1,486	—
880591DN9	1/18/2011		5.63%	—	1,000
				1,537	1,008
Total debt due within one year, net				$ 2,019	$ 1,035

Long-Term Debt [1]
At September 30

CUSIP or Other Identifier	Maturity	Coupon Rate	Call Date	2011 Par	2010 Par	Stock Exchange Listings
electronotes ®[2]	02/15/2020 - 07/15/2041	2.65 - 5.00%	10/15/2011 - 07/15/2016	$ 661	$ 591	None
880591DN9	1/18/2011	5.63%		—	—	New York, Luxembourg
880591DL3	5/23/2012	7.14%		—	29	New York
880591DT6	5/23/2012	6.79%		—	1,486	New York
880591CW0	3/15/2013	6.00%		1,359	1,359	New York, Hong Kong, Luxembourg, Singapore
880591DW9	8/1/2013	4.75%		940	940	New York, Luxembourg
880591DY5	6/15/2015	4.38%		1,000	1,000	New York, Luxembourg
880591EE8 [3]	11/15/2015	2.25%		11	15	None
880591DS8	12/15/2016	4.88%		524	524	New York
880591EA6	7/18/2017	5.50%		1,000	1,000	New York, Luxembourg
880591CU4	12/15/2017	6.25%		650	650	New York
880591EC2	4/1/2018	4.50%		1,000	1,000	New York, Luxembourg
880591EL2	2/15/2021	3.88%		1,500	—	New York
880591DC3	6/7/2021	5.81% [4]		312	314	New York, Luxembourg
880591CJ9	11/1/2025	6.75%		1,350	1,350	New York, Hong Kong, Luxembourg, Singapore
880591300 [5]	6/1/2028	4.73%		330	330	New York
880591409 [5]	5/1/2029	4.50%		274	274	New York
880591DM1	5/1/2030	7.13%		1,000	1,000	New York, Luxembourg
880591DP4	6/7/2032	6.59% [4]		390	393	New York, Luxembourg
880591DV1	7/15/2033	4.70%		472	472	New York, Luxembourg
880591EF5 [3]	6/15/2034	3.77%		443	445	None
880591DX7	6/15/2035	4.65%		436	436	New York
880591CK6	4/1/2036	5.98%		121	121	New York
880591CS9	4/1/2036	5.88%		1,500	1,500	New York
880591CP5	1/15/2038	6.15%		1,000	1,000	New York
880591ED0	6/15/2038	5.50%		500	500	New York
880591EH1	9/15/2039	5.25%		2,000	2,000	New York
880591BL5	4/15/2042	8.25%	4/15/2012	1,000	1,000	New York
880591DU3	6/7/2043	4.96% [4]		234	236	New York, Luxembourg

880591CF7	7/15/2045	6.24%	7/15/2020	140	140	New York
880591EB4	1/15/2048	4.88%		500	500	New York, Luxembourg
880591DZ2	4/1/2056	5.38%		1,000	1,000	New York
880591EJ7	9/15/2060	4.63%		1,000	1,000	New York
Subtotal				22,647	22,605	
Unamortized discounts, premiums, and other				(235)	(216)	
Total long-term outstanding power bonds, net				$ 22,412	$ 22,389	

Notes
(1) The above table includes net exchange losses from currency transactions of $7 million at September 30, 2011.
(2) Includes one electronote ® with partial maturities of principal for each required annual payment.
(3) These bonds include partial maturities of principal for each required annual payment.
(4) The coupon rate represents TVA's effective interest rate.
(5) TVA PARRS, CUSIP numbers 880591300 and 880591409, may be redeemed under certain conditions. See *Put and Call Options* .

Maturities Due in the Year Ending September 30

	2012	2013	2014	2015	2016	Thereafter	Total
Long-term debt including current maturities [1]	$ 1,537	$ 2,308	$ 32	$ 1,032	$ 32	$ 19,236	$ 24,177

Note
(1) Does not include noncash items of foreign currency exchange loss of $7 million and net discount on sale of Bonds of $235 million.

Credit Facility Agreements

TVA and the U.S. Treasury have entered into a memorandum of understanding under which the U.S. Treasury provides TVA with a $150 million credit facility. This credit facility matures on September 30, 2012, and is expected to be renewed. This arrangement is pursuant to the TVA Act. TVA plans to use the U.S. Treasury credit facility as a secondary source of liquidity. The interest rate on any borrowing under this facility is based on the average rate on outstanding marketable obligations of the United States with maturities from date of issue of one year or less. There were no borrowings outstanding under the facility at September 30, 2011.

TVA also has funding available in the form of three long-term revolving credit facilities totaling $2.5 billion. Both the $0.5 billion and one of the $1.0 billion credit facilities mature on January 14, 2014, and the other $1.0 billion credit facility matures on May 11, 2014. The credit facilities also accommodate the issuance of letters of credit. The interest rate on any borrowing under these facilities is variable based on market factors and the rating of TVA's senior unsecured long-term non-credit enhanced debt. TVA is required to pay an unused facility fee on the portion of the total $2.5 billion which TVA has not borrowed or committed under letters of credit. This fee, along with letter of credit fees, fluctuates depending on the rating of TVA's senior unsecured long-term non-credit enhanced debt. At September 30, 2011, and September 30, 2010, there were $575 million and $411 million, respectively, of letters of credit outstanding under the facilities in place at those times, and there were no borrowings outstanding. See Note 13 — *Other Derivative Instruments — Collateral* .

12. Leaseback Obligations

Prior to 2004, TVA received approximately $945 million in proceeds by entering into leaseback transactions for 24 new peaking combustion turbine units. TVA also received approximately $389 million in proceeds by entering into a leaseback transaction for qualified technological equipment and software in 2003. Due to TVA's continuing involvement in the operation and maintenance of the leased units and equipment and its control over the distribution of power produced by the combustion turbine facilities during the leaseback term, TVA accounted for the lease proceeds of $1.3 billion as financing obligations. The outstanding leaseback obligations on TVA's balance sheets were approximately $885 million at September 30, 2011, and $940 million at September 30, 2010.

Seven States Power Corporation ("Seven States"), through its subsidiary, Seven States Southaven, LLC ("SSSL"), exercised Seven States's option to purchase from TVA an undivided 90-percent interest in a combined cycle combustion turbine facility in Southaven, Mississippi. As part of interim joint-ownership arrangements, Seven States has the right at any time, and for any reason, until the earlier of the date long-term operational and power sales arrangements are in place or April 23, 2013, to require TVA to buy back Seven States's interest in the facility. TVA will buy back Seven States's interest if long-term operational and power sales arrangements for the facility among TVA, Seven States, and SSSL, or alternative arrangements, are not in place by April 23, 2013. TVA's buy-back obligation will terminate if such long-term arrangements are in place by that date. In the event of a buy-back, TVA will re-acquire Seven States's interest in the facility and the related assets. The carrying amount of the

Southaven obligation on TVA's balance sheets was approximately $397 million at September 30, 2011, and $413 million at September 30, 2010.

On August 8, 2011, a nationally recognized credit rating agency lowered the long-term rating of TVA's rated Bonds from AAA to AA+. This downgrade constituted an event of default under the Amended and Restated Credit Agreement between Seven States and its lenders. Upon the occurrence of such an event of default, Seven States's lenders may either impose a higher default interest rate on the loan or exercise an option to require TVA to re-acquire its interest in the Southaven facility and the related assets.

On November 1, 2011, Seven States and its lenders, with the consent of TVA, executed an Amendment to the Amended and Restated Credit Agreement. In this amendment, Seven States's lenders agreed to waive this event of default and thus waive their lenders' right to force TVA to re-acquire Seven States's interest in the Southaven facility and the related assets or to force Seven States to pay the default interest rate for this event of default. Also, the amendment ties the interest rate on Seven States's credit facilities to TVA's credit rating. Seven States will pay interest on the loan at either 1) LIBOR plus 62.5 basis points if TVA's corporate credit rating is AAA (or its equivalent) by all nationally recognized credit rating agencies, or 2) LIBOR plus 87.5 basis points if TVA's corporate credit rating is AA+ (or its equivalent) by one or more nationally recognized credit rating agencies and AAA (or its equivalent) by the other nationally recognized credit agencies. The amendment also states that any future downgrade of TVA's credit rating to below AA+ (or its equivalent) by any nationally recognized credit rating agency would constitute an event of default by Seven States. Because the monthly rent that TVA pays to Seven States for Southaven passes through to TVA the cost of Seven States's loan, TVA's rent payments will increase under this amendment by the amount that Seven States's interest payments on the loan increases, but because of the waiver, the event of default had no other effect on the terms of TVA's lease with Seven States. TVA will continue to present both current and long-term portions of its leaseback obligation to Seven States.

At September 30, 2011 and 2010, the total balances of the Leaseback obligations were $1.3 billion and $1.4 billion, respectively.

13. Risk Management Activities and Derivative Transactions

TVA is exposed to various market risks. These market risks include risks related to commodity prices, investment prices, interest rates, currency exchange rates, inflation, and counterparty credit and counterparty performance risk. To help manage certain of these risks, TVA has entered into various derivative transactions, principally commodity option contracts, forward contracts, swaps, swaptions, futures, and options on futures. Other than certain derivative instruments in investment funds, it is TVA’s policy to enter into these derivative transactions solely for hedging purposes and not for speculative purposes.

Overview of Accounting Treatment

TVA recognizes certain of its derivative instruments as either assets or liabilities on its balance sheets at fair value. The accounting for changes in the fair value of these instruments depends on (1) whether TVA uses regulatory accounting to defer the derivative gains and losses, (2) whether the derivative instrument has been designated and qualifies for hedge accounting treatment, and (3) if so, the type of hedge relationship (e.g., cash flow hedge).

The following tables summarize the accounting treatment that certain of TVA’s financial derivative transactions receive.

Summary of Derivative Instruments That Receive Hedge Accounting Treatment (part 1)

Derivatives in Cash Flow Hedging Relationship	Objective of Hedge Transaction	Accounting for Derivative Hedging Instrument	Amount of MtM Gain (Loss) Recognized in Other Comprehensive Income (Loss) (“OCI”) Years Ended September 30 2011	2010
Currency swaps	To protect against changes in cash flows caused by changes in foreign currency exchange rates (exchange rate risk)	Cumulative unrealized gains and losses are recorded in OCI and reclassified to interest expense to the extent they are offset by cumulative gains and losses on the hedged transaction	$ (50)	$ (37)

Summary of Derivative Instruments That Receive Hedge Accounting Treatment (part 2)

Derivatives in Cash Flow Hedging Relationship	Amount of Exchange Gain (Loss) Reclassified from OCI to Interest Expense Years Ended September 30 (1)	
	2011	2010
Currency swaps	$ 7	$ 17

Note
(1) There were no ineffective portions or amounts excluded from effectiveness testing for any of the periods presented. Also see Note 14.

Summary of Derivative Instruments That Do Not Receive Hedge Accounting Treatment

Derivative Type	Objective of Derivative	Accounting for Derivative Instrument	Amount of Gain (Loss) Recognized in Income on Derivatives Years Ended September 30 (1)	
			2011	2010
Swaption	To protect against decreases in value of the embedded call (interest rate risk)	MtM gains and losses are recorded as regulatory assets or liabilities until settlement, at which time the gains/losses (if any) are recognized in gain/loss on derivative contracts.	$ —	$ —
Interest rate swaps	To fix short-term debt variable rate to a fixed rate (interest rate risk).	MtM gains and losses are recorded as regulatory assets or liabilities until settlement, at which time the gains/losses (if any) are recognized in gain/loss on derivative contracts. (2)	—	—
Commodity contract derivatives	To protect against fluctuations in market prices of purchased coal or natural gas (price risk)	MtM gains and losses are recorded as regulatory assets or liabilities. Realized gains and losses (if any) due to contract settlements are recognized in fuel expense as incurred.	—	—
Commodity derivatives under FTP	To protect against fluctuations in market prices of purchased commodities (price risk)	MtM gains and losses are recorded as regulatory assets or liabilities. Realized gains and losses are recognized in fuel expense when the related commodity is used in production.	(145)	(137)

Notes
(1) All of TVA's derivative instruments that do not receive hedge accounting treatment have unrealized gains (losses) that would otherwise be recognized in income but instead are deferred as regulatory assets and liabilities. As such, there was no related gain (loss) recognized in income for these unrealized gains (losses) for 2011 and 2010.
(2) Generally, TVA maintains a level of outstanding discount notes equal to or greater than the notional amount of the interest rate swaps. However, in February 2011 and September 2010 TVA issued long-term Bonds in anticipation of the maturity of other long-term debt, and used the proceeds to pay down discount notes, which caused the balance of discount notes outstanding at September 30, 2011, to remain below the notional amount of the interest rate swaps. There is no impact on the statements of operations due to the use of regulatory accounting for these items.

MARK-TO-MARKET VALUES OF TVA DERIVATIVES
At September 30

	2011		2010	
Derivatives that Receive Hedge Accounting Treatment:				
	Balance	**Balance Sheet Presentation**	**Balance**	**Balance Sheet Presentation**
Currency swaps				
£200 million Sterling	$ (44)	Other long-term liabilities	$ (42)	Other long-term liabilities
£250 million Sterling	(24)	Other long-term liabilities	(5)	Other long-term liabilities
£150 million Sterling	(63)	Other long-term liabilities	(34)	Other long-term liabilities
Derivatives that Do Not Receive Hedge Accounting Treatment:				
	Balance	**Balance Sheet Presentation**	**Balance**	**Balance Sheet Presentation**
Swaption				
$1.0 billion notional	$ (1,077)	Other long-term liabilities	$ (804)	Other long-term liabilities
Interest rate swaps				
$476 million notional	(446)	Other long-term liabilities	(356)	Other long-term liabilities
$42 million notional	(17)	Other long-term liabilities	(15)	Other long-term liabilities
Commodity contract derivatives	239	Other long-term assets $285; Other current asset $150; Other long-term liabilities ($119); Accounts payable and accrued liabilities ($77)	103	Other long-term assets $103; Other current asset $49; Other long-term liabilities ($2); Accounts payable and accrued liabilities ($47)
Derivatives under FTP				
Margin cash account [(1)]	34	Other current assets	12	Other current assets
Derivatives under FTP [(2)]	(234)	Current regulatory assets ($135); Regulatory assets ($102); Current regulatory liabilities $3	(254)	Current regulatory assets ($136); Regulatory assets ($127); Current regulatory liabilities $6; Regulatory liabilities $3

Notes
(1) In accordance with certain credit terms, TVA uses leverage to trade financial instruments under the FTP. Therefore, the margin cash account balance does not represent 100 percent of the net market value of the derivative positions outstanding as shown in the Derivatives Under FTP table.
(2) The September 30, 2011, and September 30, 2010, balances in the Derivatives under FTP table show all open derivative positions in the FTP. TVA previously included both open derivative positions and closed derivative gains and losses in this amount. TVA changed the presentation to be consistent with the other derivatives in this table, which only show open positions, and revised the September 30, 2010 balances accordingly.

Cash Flow Hedging Strategy for Currency Swaps

To protect against the exchange rate risk related to three British pound sterling denominated Bond transactions, TVA entered into foreign currency hedges at the time the Bond transactions occurred. TVA had the following currency swaps outstanding at September 30, 2011:

Currency Swaps Outstanding
At September 30, 2011

Effective Date of Currency Swap Contract	Associated TVA Bond Issues – Currency Exposure	Expiration Date of Swap	Overall Effective Cost to TVA
2003	£150 million	2043	4.96%
2001	£250 million	2032	6.59%
1999	£200 million	2021	5.81%

When the dollar strengthens against the British pound sterling, the transaction gain on the Bond liability is offset by an exchange loss on the swap contract. Conversely, when the dollar weakens against the British pound sterling, the transaction loss on the Bond liability is offset by an exchange gain on the swap contract. All such exchange gains or losses on the Bond liability are included in Long-term debt, net. The offsetting exchange losses or gains on the swap contracts are recognized in Accumulated other comprehensive loss. If any gain (loss) were to be incurred as a result of the early termination of the foreign currency swap contract, the resulting income (expense) would be amortized over the remaining life of the associated Bond as a component of Interest expense.

Derivatives Not Receiving Hedge Accounting Treatment

Swaption and Interest Rate Swaps. Prior to 2006 , TVA entered into four swaption transactions to monetize the value of call provisions on certain of its Bond issues. A swaption grants a third party the right to enter into a swap agreement with TVA under which TVA receives a floating rate of interest and pays the third party a fixed rate of interest equal to the interest rate on the Bond issue whose call provision TVA has monetized. Subsequently, the counterparties to three of the swaptions exercised their rights to enter into interest rate swaps with TVA.

TVA uses regulatory accounting treatment to defer the MtM gains and losses on these swaps and swaption and includes the gain or loss in the ratemaking formula when these transactions settle. The values of the swaps and swaption and related deferred unrealized gains and losses are recorded on TVA's balance sheets with realized gains or losses, if any, recorded on TVA's statements of operations. There were no realized gains or losses for the years ended September 30, 2011, 2010, and 2009.

For the years ended 2011 and 2010, the changes in market value resulted in deferred unrealized losses on the value of the interest rate swaps and swaption of $365 million and $299 million, respectively. All net deferred unrealized gains and losses are reclassified as regulatory assets or liabilities on the balance sheet.

Commodity Derivatives. TVA enters into certain derivative contracts for coal and natural gas that require physical delivery of the contracted quantity of the commodity. Accordingly, these contracts qualify for normal purchases and normal sales accounting.

TVA marks to market all of its natural gas derivative contracts that require physical delivery. The total market value of these natural gas derivative contracts at September 30, 2011, and September 30, 2010, was less than $1 million. At September 30, 2011, these natural gas derivative contracts had terms of up to one month.

At December 31, 2010, TVA determined that certain quantities under the coal contract derivatives were no longer probable of physical delivery; therefore, these contracts were no longer eligible for normal purchases and normal sales accounting. Accordingly, TVA began marking all of its coal contract derivatives to market at December 31, 2010. At September 30, 2011, and September 30, 2010, TVA's coal contract derivatives had net market values of $239 million and $103 million, respectively, which TVA deferred as regulatory assets and liabilities on a gross basis. At September 30, 2011, TVA's coal contract derivatives had terms of up to seven years.

Commodity Contract Derivatives
At September 30

	2011			2010		
	Number of Contracts	Notional Amount	Fair Value (MtM)	Number of Contracts	Notional Amount	Fair Value (MtM)
Coal Contract Derivatives	38	66 million tons	$239	11	27 million tons	$103
Natural Gas Contract Derivatives	13	5 million mmBtu	$—	3	1 million mmBtu	$—

Derivatives Under FTP. TVA has a FTP under which it purchases and sells futures, swaps, options, and combinations of these instruments (as long as they are standard in the industry) to hedge TVA's exposure to (1) the price of natural gas, fuel oil, electricity, coal, emission allowances, nuclear fuel, and other commodities included in TVA's fuel cost adjustment calculation, (2) the price of construction materials, and (3) contracts for goods priced in or indexed to foreign currencies. The combined transaction limit for the fuel cost adjustment and construction material transactions is $130 million (based on one-day value at risk). In addition, the maximum hedge volume for the construction material transactions is 75 percent of the underlying net notional volume of the material that TVA anticipates using in approved TVA projects, and the market value of all outstanding hedging transactions involving construction materials is limited to $100 million at the execution of any new transaction. The portfolio value at risk limit for the foreign currency transactions is $5 million and is separate and distinct from the $130 million transaction limit discussed above. TVA is prohibited from trading financial instruments under the FTP for speculative purposes.

At September 30, 2011, the risks hedged under the FTP were the economic risks associated with the prices of natural gas, fuel oil, crude oil, and coal. Futures contracts and option contracts under the FTP had remaining terms of less than one year. Swap contracts under the FTP had remaining terms of five years or less.

Derivatives Under FTP

	At September 30, 2011		At September 30, 2010	
	Notional Amount	**Fair Value** (MtM) (in millions)	**Notional Amount**	**Fair Value** (MtM) (in millions)
Natural gas (in mmBtu)				
Futures contracts	1,300,000	$ (4)	7,920,000	$ (21)
Swap contracts	232,295,000	(223)	137,110,000	(241)
Option contracts	—	(1)	5,250,000	(2)
Natural gas financial positions	233,595,000	$ (228)	150,280,000	$ (264)
Fuel oil/crude oil (in barrels)				
Futures contracts	—	$ —	125,000	$ 2
Swap contracts	1,591,000	(7)	1,711,000	8
Option contracts	90,000	—	495,000	—
Fuel oil/crude oil financial positions	1,681,000	$ (7)	2,331,000	$ 10
Coal (in tons)				
Futures contracts	—	$ —	—	$ —
Swap contracts	120,000	1	480,000	—
Option contracts	—	—	—	—
Coal financial positions	120,000	$ 1	480,000	$ —

Note
Due to the right of setoff and method of settlement, TVA elects to record commodity derivatives under the FTP based on its net commodity position with the broker or other counterparty. Notional amounts disclosed represent the net absolute value of contractual amounts.

TVA defers all FTP unrealized gains (losses) as regulatory liabilities (assets) and records only realized gains or losses to match the delivery period of the underlying commodity product. In addition to the open commodity derivatives disclosed above, TVA had closed derivative contracts with market values of $(13) million at September 30, 2011, and $(15) million at September 30, 2010. The deferred unrealized losses related to natural gas hedges were $(228) million at September 30, 2011, and $(264) million at September 30, 2010. At September 30, 2011 and 2010, TVA recognized realized losses on natural gas hedges of $(164) million and $(152) million, respectively, which were recorded as increases to Fuel expense. The deferred unrealized gains (losses) related to fuel oil/crude oil hedges were $(7) million at September 30, 2011, and $10 million at September 30, 2010. At September 30, 2011 and 2010, TVA recognized realized gains on fuel oil/crude oil hedges of $20 million and $15 million, respectively, which were recorded as decreases to Fuel expense. The deferred unrealized gain related to coal hedges was $1 million at September 30, 2011. For the year ended September 30, 2011, TVA recognized realized losses on coal hedges of less than $(1) million, which was recorded as an increase to Fuel expense. There were no deferred unrealized gains or losses related to coal hedges at September 30, 2010.

Other Derivative Instruments

Investment Fund Derivatives. Investment funds consist primarily of funds held in the NDT, ART, and SERP. All securities in the trusts are classified as trading. See Note 14 for a discussion of the trusts' objectives and the types of investments included in the various trusts. Derivative instruments in these trusts include swaps, futures, options, forwards, and other instruments. At September 30, 2011, and September 30, 2010, the fair value of derivative instruments in these trusts was not material to TVA's financial statements.

Collateral . TVA's interest rate swaps, its currency swaps, and its swaption contain contract provisions that require a party to post collateral (in a form such as cash or a letter of credit) when the party's liability balance under the agreement exceeds a certain threshold. At September 30, 2011, the aggregate fair value of all derivative instruments with credit-risk related contingent features that were in a liability position was $1.7 billion. TVA's collateral obligation at September 30, 2011, under these arrangements was $575 million, for which TVA had posted $575 million under a letter of credit. These letter of credit postings reduce the available balance under the related credit facility. TVA's assessment of the risk of its nonperformance includes a reduction in its exposure under the contract as a result of this posted collateral.

For all of its derivative instruments with credit-risk related contingent features:

- If TVA remains a majority-owned U.S. government entity but Standard & Poors ("S&P") or Moody's Investors Service ("Moody's") downgrades TVA's credit rating to AA or Aa2, respectively, TVA would be required to post an additional $75 million of collateral in excess of its September 30, 2011, obligation; and

- If TVA ceases to be majority-owned by the U.S. government, its credit rating would likely change and TVA would be required to post additional collateral.

In addition, the threshold for certain of TVA's derivative instruments with credit-risk related contingent features will decrease by $160 million on January 1, 2012. Depending on the value of the underlying transactions, TVA may have to post additional collateral on this date.

Counterparty Credit Risk

Credit risk is the exposure to economic loss that would occur as a result of a counterparty's nonperformance of its contractual obligations. Where exposed to counterparty credit risk, TVA analyzes the counterparty's financial condition prior to entering into an agreement, establishes credit limits, monitors the appropriateness of those limits, as well as any changes in the creditworthiness of the counterparty on an ongoing basis, and employs credit mitigation measures, such as collateral or prepayment arrangements and master purchase and sale agreements, to mitigate credit risk.

Credit of Customers. The majority of TVA's counterparty credit risk is associated with trade accounts receivable from delivered power sales to municipal and cooperative distributor customers, all located in the Tennessee Valley region. To a lesser extent, TVA is exposed to credit risk from industries and federal agencies directly served and from exchange power arrangements with a small number of investor-owned regional utilities related to either delivered power or the replacement of open positions of longer-term purchased power or fuel agreements. TVA had concentrations of accounts receivable from three customers that represented 26 percent of total outstanding accounts receivable at September 30, 2011. TVA had concentrations of accounts receivable from five customers that represented 36 percent of total outstanding accounts receivable at September 30, 2010. Power sales to TVA's largest directly served industrial customer represented four percent of TVA's total operating revenues for the year ended September 30, 2011. This customer's senior unsecured credit ratings are currently CCC- by S&P and Caa2 by Moody's. As a result of its credit ratings, this customer has provided credit assurance to TVA under the terms of its power contract.

Credit of Derivative Counterparties. TVA has entered into derivative contracts for hedging purposes, and TVA's NDT and defined benefit pension plan have entered into derivative contracts for investment purposes. If a counterparty to one of TVA's hedging transactions defaults, TVA might incur substantial costs in connection with entering into a replacement hedging transaction. If a counterparty to the derivative contracts into which the NDT and the pension fund have entered for investment purposes defaults, the value of the investment could decline significantly or perhaps become worthless. TVA has concentrations of credit risk from the banking and coal industries because multiple companies in these industries serve as counterparties to TVA in various derivative transactions. At September 30, 2011, the swaption and all of TVA's currency swaps, interest rate swaps, and commodity derivatives under the FTP were with counterparties whose Moody's credit rating was A2 or higher. At September 30, 2011, all of TVA's coal contract derivatives were with counterparties whose Moody's credit rating, or TVA's internal analysis when such information was unavailable, was Caa2 or higher.

Credit of Suppliers. If one of TVA's fuel or purchased power suppliers fails to perform under the terms of its contract with TVA, TVA might lose the money that it paid to the supplier under the contract and have to purchase replacement fuel or power on the spot market, perhaps at a significantly higher price than TVA was entitled to pay under the contract. In addition, TVA might not be able to acquire replacement fuel or power in a timely manner and thus might be unable to satisfy its own obligations to deliver power. To help ensure a reliable supply of coal, TVA had coal contracts with 20 different suppliers at September 30, 2011. The contracted supply of coal is sourced from multiple geographic regions of the United States and is to be delivered via various transportation methods (e.g., barge, rail, and truck). TVA purchases all of its natural gas requirements from a variety of suppliers under short-term contracts.

TVA has a power purchase agreement with a supplier of electricity for 440 megawatt ("MW") of summer net capability from a lignite-fired generating plant that expires on March 31, 2032. The supplier's senior secured credit ratings are currently CCC- by S&P and B2 by Moody's. As a result of its credit ratings, the supplier has provided credit assurance to TVA under the terms of its agreement. Additionally, the senior unsecured credit ratings of TVA's largest supplier of uranium enrichment services, which is also TVA's largest industrial customer directly served, are currently CCC- by S&P and Caa2 by Moody's. Any nonperformance by this company could result in TVA incurring additional costs.

14. Fair Value Measurements

Fair value is determined based on the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the asset's principal market, or in the absence of a principal market, the most advantageous market for the asset or liability in an orderly transaction between market participants. TVA uses market or observable inputs as the preferred source of values, followed by assumptions based on hypothetical transactions in the absence of market inputs.

Valuation Techniques

There are three main approaches to measuring the fair value of assets and liabilities: (1) the market approach; (2) the income approach; and (3) the cost approach. The market approach uses prices and other relevant information generated from market transactions involving identical or comparable assets or liabilities. The income approach uses valuation techniques to convert future amounts to a single present value amount. The measurement is based on the value indicated by current market expectations about those future amounts of income. The cost approach is based on the amount that would currently be required to replace an asset. TVA uses the market approach and the income approach in its fair value measurements.

The valuation techniques used to measure fair value are based upon observable and unobservable inputs. Observable inputs reflect market data obtained from independent sources, while unobservable inputs reflect TVA's market assumptions. These two types of inputs create the following fair value hierarchy:

Level 1	—	Unadjusted quoted prices in active markets accessible by the reporting entity for identical assets or liabilities. Active markets are those in which transactions for the asset or liability occur with sufficient frequency and volume to provide pricing.
Level 2	—	Pricing inputs other than quoted market prices included in Level 1 that are based on observable market data and that are directly or indirectly observable for substantially the full term of the asset or liability. These include quoted market prices for similar assets or liabilities, quoted market prices for identical or similar assets in markets that are not active, adjusted quoted market prices, inputs from observable data such as interest rate and yield curves, volatilities and default rates observable at commonly quoted intervals, and inputs derived from observable market data by correlation or other means.
Level 3	—	Pricing inputs that are unobservable, or less observable, from objective sources. Unobservable inputs are only to be used to the extent observable inputs are not available. These inputs maintain the concept of an exit price from the perspective of a market participant and should reflect assumptions of other market participants. An entity should consider all market participant assumptions that are available without unreasonable cost and effort. These are given the lowest priority and are generally used in internally developed methodologies to generate management's best estimate of the fair value when no observable market data is available.

A financial instrument's level within the fair value hierarchy (where Level 3 is the lowest and Level 1 is the highest) is based on the lowest level of input significant to the fair value measurement.

The following sections describe the valuation methodologies TVA uses to measure different financial instruments at fair value. Except for gains and losses on SERP assets, all changes in fair value of these assets and liabilities have been reflected as changes in regulatory assets, regulatory liabilities, or accumulated other comprehensive loss on TVA's Balance Sheet at September 30, 2011, and Statements of Changes in Proprietary Capital for the year ended September 30, 2011. Except for gains and losses on SERP assets, there has been no impact to the Statements of Operations or the Statements of Cash Flows related to these fair value measurements.

Investments

At September 30, 2011, TVA's investment funds were composed of $1.2 billion of securities classified as trading and measured at fair value and $2 million of equity investments not required to be measured at fair value. Trading securities are held in the NDT, ART, and SERP. The NDT holds funds for the ultimate decommissioning of TVA's nuclear power plants. The ART holds funds for the costs related to the future closure and retirement of TVA's long-lived assets. TVA established a SERP for certain executives in critical positions to provide supplemental pension benefits tied to compensation that exceeds limits imposed by IRS rules applicable to the qualified defined benefit pension plan. The NDT and SERP are invested in securities generally designed to achieve a return in line with overall equity market performance. The ART is presently invested to achieve a return in line with fixed-income market performance.

The NDT, ART, and SERP are composed of multiple types of investments and are managed by external institutional managers. Most U.S. and international equities, Treasury inflation-protected securities, real estate investment trust ("REIT") securities, and cash securities, and certain derivative instruments are measured based on quoted exchange prices in active markets and are classified as Level 1 valuations. Fixed-income investments, high-yield fixed-income investments, currencies, and most derivative instruments are non-exchange traded and are classified as Level 2 valuations. These measurements are based on market and income approaches with observable market inputs.

Private partnership investments may include venture capital, buyout, mezzanine or subordinated debt, restructuring or distressed debt, and special situations. Investments in private partnerships generally involve a three to four year investment period where the investor contributes capital. This is followed by a period of distribution, typically over several years. The investment period is generally, at minimum, a 10-year or longer investment commitment. The NDT had unfunded commitments related to private partnerships of $77 million at September 30, 2011. These investments have no redemption or limited redemption options and may also restrict the NDT's ability to liquidate its investment interest. The private partnerships and other similar alternative investments are reported at fair value, which is derived by independent appraisals or judgment of the general partners of each such investment. The inputs used in estimating the fair value of the limited partnerships include the original transaction prices, recent transactions in the same or similar instruments, completed or pending third-party transactions in the underlying investments of comparable issuers, subsequent rounds of financing, recapitalizations and other transactions across the capital structure, offerings in the equity or debt capital markets, and changes in financial ratios or cash flows of the limited partnerships. The fair value of these investments may also be adjusted to reflect liquidity and/or non-transferability, with the amount of such discounts estimated by the general partners in the absence of market information. Due to the lack of observable inputs, the determination of the fair value by the general partners may differ materially from the value ultimately realized from the private partnership investments. TVA classifies its interest in these types of investment as Level 3 within the fair value hierarchy.

Commingled funds represent investment funds comprising multiple individual financial instruments. The commingled funds held by the NDT and SERP consist either of a single class of securities, such as equity, debt, or foreign currency securities, or multiple classes of securities. All underlying positions in these commingled funds are either exchange traded (Level 1) or measured using observable inputs for similar instruments (Level 2). The fair value of commingled funds is based on net asset values ("NAV") per fund share (the unit of account), derived from the prices of the underlying securities in the funds. These commingled funds can be liquidated at the measurement date NAV price and are classified as Level 2 valuations. Required notification periods range from zero to 30 days. The funds can be redeemed unless doing so would violate regulations to which the fund is subject, would be unreasonable or impracticable, or would be seriously prejudicial to the fund.

Realized and unrealized gains and losses on trading securities are recognized in current earnings and are based on average cost. The SERP had unrealized gains of $7 million for the years ended September 30, 2011 and 2010. The gains and losses of the NDT and ART both are subsequently reclassified to a regulatory liability or asset account in accordance with TVA's regulatory accounting policy. The NDT had unrealized losses of $73 million for the year ended September 30, 2011, compared with a $93 million unrealized gain for the year ended September 30, 2010. The ART had unrealized losses of $18 million for the year ended September 30, 2011, compared with unrealized losses of less than $1 million for the year ended September 30, 2010.

Currency Swaps, Swaption, and Interest Rate Swaps

See Note 13 — *Overview of Accounting Treatment* and — *Derivatives Not Receiving Hedge Accounting Treatment* for a discussion of the nature, purpose, and contingent features of TVA's currency swaps, swaption, and interest rate swaps.

The currency swaps and interest rate swaps are classified as Level 2 valuations and are valued based on income approaches using observable market inputs for similar instruments. The swaption is classified as a Level 3 valuation and is valued based on an income approach. The valuation is computed using a broker-provided pricing model utilizing interest and volatility rates. While most of the fair value measurement is based on observable inputs, volatility for TVA's swaption is generally unobservable. Therefore, the valuation is derived from an observable volatility measure with adjustments.

Commodity Contract Derivatives and Commodity Derivatives under FTP

Commodity Contract Derivatives. These contracts are classified as Level 3 valuations and are valued based on income approaches. TVA develops an overall coal price forecast using widely-used short-term and mid-range market data from an external pricing specialist in addition to long-term internal estimates. To value the volume option component of applicable coal contracts, TVA uses a Black-Scholes pricing model which includes inputs from overall coal price forecasts, contract-specific terms, and other market inputs.

Commodity Derivatives Under FTP. These contracts are valued based on market approaches which utilize Chicago Mercantile Exchange ("CME") quoted prices and other observable inputs. Futures and options contracts settled on the CME are classified as Level 1 valuations. Swap contracts are valued using a pricing model based on CME inputs and are subject to nonperformance risk outside of the exit price. These contracts are classified as Level 2 valuations.

See Note 13 — *Derivatives Not Receiving Hedge Accounting Treatment — Commodity Derivatives* and *Derivatives Under FTP* for a discussion of the nature and purpose of coal contracts and derivatives under TVA's FTP.

Nonperformance Risk

The impact of nonperformance risk, which includes credit risk, considers changes in current market conditions, readily available information on nonperformance risk, letters of credit, collateral, other arrangements available, and the nature of master netting arrangements. TVA is a counterparty to currency swaps, a swaption, interest rate swaps, commodity contracts, and other derivatives which subject TVA to nonperformance risk. Nonperformance risk on the majority of investments and certain exchange-traded instruments held by TVA is incorporated into the exit price that is derived from quoted market data that is used to mark the investment to market.

Nonperformance risk for most of TVA's derivative instruments is an adjustment to the initial asset/liability fair value. TVA adjusts for nonperformance risk, both of TVA (for liabilities) and the counterparty (for assets), by applying a credit valuation adjustment ("CVA"). TVA determines an appropriate CVA for each applicable financial instrument based on the term of the instrument and TVA's or counterparty's credit rating as obtained from Moody's. For companies that do not have an observable credit rating, TVA uses internal analysis to assign a comparable rating to the company. TVA discounts each financial instrument using the historical default rate (as reported by Moody's for CY 1983 to CY 2010) for companies with a similar credit rating over a time period consistent with the remaining term of the contract. The application of CVAs resulted in a $108 million decrease in the fair value of assets and a $2 million decrease in the fair value of liabilities at September 30, 2011.

The following table sets forth by level, within the fair value hierarchy, TVA's financial assets and liabilities that were measured at fair value on a recurring basis at September 30, 2011. Financial assets and liabilities have been classified in their entirety based on the lowest level of input that is significant to the fair value measurement. TVA's assessment of the significance of a particular input to the fair value measurement requires judgment and may affect the determination of the fair value of the assets and liabilities and their classification in the fair value hierarchy levels.

Fair Value Measurements
At September 30, 2011

Assets	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Netting [(1)]	Total
Investments					
Equity securities	$ 73	$ —	$ —	$ —	$ 73
Debt securities					
U.S. government corporations and agencies	117	79	—	—	196
Corporate debt securities	—	164	—	—	164
Residential mortgage-backed securities	—	17	—	—	17
Commercial mortgage-backed securities	—	3	—	—	3
Collateralized debt obligations	—	3	—	—	3
Private partnerships	—	—	22	—	22
Commingled funds [(2)]					
Equity security commingled funds	—	467	—	—	467
Debt security commingled funds	—	221	—	—	221
Foreign currency commingled funds	—	—	—	—	—
Other commingled funds	—	—	—	—	—
Total investments	190	954	22	—	1,166
Commodity contract derivatives	—	—	436	—	436
Commodity derivatives under FTP					
Swap contracts	—	15	—	(14)	1
Total commodity derivatives under FTP	—	15	—	(14)	1
Total	$ 190	$ 969	$ 458	$ (14)	$ 1,603

Liabilities	Quoted Prices in Active Markets for Identical Liabilities (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Netting [(1)]	Total
Currency swaps	$ —	$ 131	$ —	$ —	$ 131
Interest rate swaps	—	463	—	—	463
Swaption	—	—	1,077	—	1,077
Commodity contract derivatives	—	—	197	—	197
Commodity derivatives under FTP					
Futures contracts	4	—	—	—	4
Swap contracts	—	244	—	(14)	230
Option contracts	1	—	—	—	1
Total commodity derivatives under FTP	5	244	—	(14)	235
Total	$ 5	$ 838	$ 1,274	$ (14)	$ 2,103

Notes
(1) Due to the right of setoff and method of settlement, TVA elects to record commodity derivatives under the FTP based on its net commodity position with the counterparty or broker.
(2) Commingled funds represent investment funds comprising multiple individual financial instruments and are classified in the table based on their existing investment portfolio as of the measurement date. Commingled funds exclusively composed of one class of security are classified in that category. Commingled funds comprising multiple classes of securities are classified as "other commingled funds."

Fair Value Measurements
At September 30, 2010

Assets	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Netting [(1)]	Total
Investments					
Equity securities	$ 96	$ —	$ —	$ —	$ 96
Debt securities					
U.S. government corporations and agencies	136	57	—	—	193
Corporate debt securities	—	193	—	—	193
Residential mortgage-backed securities	—	22	—	—	22
Commercial mortgage-backed securities	—	2	—	—	2
Collateralized debt obligations	—	3	—	—	3
Private partnerships	—	—	13	—	13
Commingled funds [(2)]					
Equity security commingled funds	—	340	—	—	340
Debt security commingled funds	—	209	—	—	209
Foreign currency commingled funds	—	12	—	—	12
Other commingled funds	—	45	—	—	45
Total investments	232	883	13	—	1,128
Commodity contract derivatives	—	—	152	—	152
Commodity derivatives under FTP					
Futures contracts	2	—	—	—	2
Swap contracts	—	9	—	(1)	8
Total commodity derivatives under FTP	2	9	—	(1)	10
Total	$ 234	$ 892	$ 165	$ (1)	$ 1,290

Liabilities	Quoted Prices in Active Markets for Identical Liabilities (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Netting [(1)]	Total
Currency swaps	$ —	$ 81	$ —	$ —	$ 81
Interest rate swaps	—	371	—	—	371
Swaption	—	—	804	—	804
Commodity contract derivatives	—	—	49	—	49
Commodity derivatives under FTP					
Futures contracts	21	—	—	—	21
Swap contracts	15	227	—	(1)	241
Option contracts	2	—	—	—	2
Total commodity derivatives under FTP	38	227	—	(1)	264
Total	$ 38	$ 679	$ 853	$ (1)	$ 1,569

Notes
(1) Due to the right of setoff and method of settlement, TVA elects to record commodity derivatives under the FTP based on its net commodity position with the counterparty or broker.
(2) Commingled funds represent investment funds comprising multiple individual financial instruments and are classified in the table based on their existing investment portfolio as of the measurement date. Commingled funds exclusively composed of one class of security are classified in that category. Commingled funds comprising multiple classes of securities are classified as “other commingled funds.”

The following table presents a reconciliation of all assets and liabilities measured at fair value on a recurring basis using significant unobservable inputs (Level 3) for year ended September 30, 2011:

Fair Value Measurements Using Significant Unobservable Inputs
For the Year Ended September 30

	Private Partnerships	Commodity Contract Derivatives	Swaption
Balances at October 1, 2009	$ —	$ 7	$ (592)
Purchases	12	—	—
Issuances	—	—	—
Settlements	—	—	—
Total gains or losses (realized or unrealized)			
Net unrealized gains (losses) deferred as regulatory assets and liabilities	1	96	(212)
Balances at September 30, 2010	13	103	(804)
Purchases	17	—	—
Issuances	—	—	—
Settlements	(7)	—	—
Total gains or losses (realized or unrealized)			
Net unrealized gains (losses) deferred as regulatory assets and liabilities	(1)	136	(273)
Balances at September 30, 2011	$ 22	$ 239	$ (1,077)

There were no realized gains or losses related to the instruments measured at fair value using significant unobservable inputs that affected net income during the years ended September 30, 2011 and 2010. All unrealized gains and losses related to these instruments have been reflected as increases or decreases in regulatory assets and liabilities. See Note 7.

Other Financial Instruments Not Recorded at Fair Value

TVA uses the methods and assumptions described below to estimate the fair value of each significant class of financial instrument. The fair market value of the financial instruments held at September 30, 2011, and September 30, 2010, may not be representative of the actual gains or losses that will be recorded when these instruments mature or are called or presented for early redemption. The estimated values of TVA's financial instruments not recorded at fair value at September 30, 2011, and September 30, 2010, were as follows:

Estimated Values of Financial Instruments
At September 30

	2011		2010	
	Carrying Amount	Fair Value	Carrying Amount	Fair Value
Loans and other long-term receivables, net	$ 74	$ 68	$ 68	$ 60
Long-term debt (including current portion), net	23,949	29,190	23,397	27,193

Because of the short-term maturity of cash and cash equivalents, restricted cash and investments, and short-term debt, net, the carrying amounts of these instruments approximate their fair values.

Fair value of long-term debt traded in the public market is determined by multiplying the par value of the debt by the indicative market price at the balance sheet date.

Fair values for loans and other long-term receivables are estimated by determining the present value of future cash flows using a discount rate equal to lending rates for similar loans made to borrowers with similar credit ratings and for similar remaining maturities, where applicable.

See Note 18 — *Fair Value Measurements* for disclosure of fair value measurements for investments held by the Tennessee Valley Authority Retirement System ("TVARS") that support TVA's qualified defined benefit pension plan.

15. Proprietary Capital

Appropriation Investment

TVA's power program and stewardship (nonpower) programs were originally funded primarily by appropriations from Congress. In 1959, Congress passed an amendment to the TVA Act that required TVA's power program to be self-financing from power revenues and proceeds from power program financings. While TVA's power program did not directly receive appropriated funds after it became self-financing, TVA continued to receive appropriations for certain multipurpose and other nonpower mission-related activities as well as for its stewardship activities. TVA has not received any appropriations from Congress for any activities since 1999, and since that time, TVA has funded stewardship program activities primarily with power revenues.

The 1959 amendment to the TVA Act also required TVA, beginning in 1961, to make annual payments to the U.S. Treasury from net power proceeds as a repayment of and as a return on the Power Program Appropriation Investment until an additional $1.0 billion of the Power Program Appropriation Investment has been repaid. Of this $1.0 billion amount, $50 million remained unpaid at September 30, 2011. Once the $1.0 billion has been repaid, the TVA Act requires TVA to continue making payments to the U.S. Treasury as a return on the remaining Power Program Appropriation Investment. The remaining Power Program Appropriation Investment will be $258 million if TVA receives no additional appropriations from Congress for its power program.

The table below summarizes TVA's activities related to appropriated funds.

Summary of Proprietary Capital Activity
At September 30

	2011		2010	
Appropriation Investment	Power Program	Nonpower Programs	Power Program	Nonpower Programs
Balance at beginning of year	$ 328	$ 4,351	$ 348	$ 4,355
Return of power program appropriation investment	(20)	—	(20)	(4)
Balance at end of year	308	4,351	328	4,351
Retained Earnings				
Balance at beginning of year	4,264	(3,711)	3,291	(3,701)
Net income (expense) for year	172	(10)	982	(10)
Return on power program appropriation investment	(7)	—	(9)	—
Balance at end of year	4,429	(3,721)	4,264	(3,711)
Net proprietary capital at September 30	$ 4,737	$ 630	$ 4,592	$ 640

Payments to the U.S. Treasury

TVA paid $20 million each year for 2011, 2010, and 2009 as a repayment of the Power Program Appropriation Investment. In addition, TVA paid the U.S. Treasury $7 million in 2011, $9 million in 2010, and $13 million in 2009 as a return on the Power Program Appropriation Investment. The amount of the return on the Power Program Appropriation Investment is based on the Power Program Appropriation Investment balance at the beginning of that year and the computed average interest rate payable by the U.S. Treasury on its total marketable public obligations at the same date. The interest rates payable by TVA on the Power Program Appropriation Investment were 2.40 percent, 2.58 percent, and 3.67 percent for 2011, 2010, and 2009, respectively.

Accumulated Other Comprehensive Income (Loss)

The items included in Accumulated other comprehensive income (loss) consist of market valuation adjustments for certain derivative instruments. See Note 14.

Accumulated Other Comprehensive Income (Loss) Activity
For the years ended September 30

Accumulated other comprehensive loss, September 30, 2008	$	(37)
Changes in fair value		
Foreign currency swaps		(38)
Accumulated other comprehensive loss, September 30, 2009		(75)
Changes in fair value		
Foreign currency swaps		(20)
Accumulated other comprehensive loss, September 30, 2010		(95)
Changes in fair value		
Foreign currency swaps		(43)
Accumulated other comprehensive loss, September 30, 2011	$	(138)

Note
Foreign currency swap changes are shown net of reclassifications from Other comprehensive income (loss) to earnings.

TVA records exchange rate gains and losses on debt in net income and marks its currency swap assets and liabilities to market through other comprehensive income. TVA then reclassifies an amount out of other comprehensive income into earnings, offsetting the earnings gain/loss from recording the exchange gain/loss on the debt. The amounts reclassified from other comprehensive income into earnings were a decrease to earnings of $7 million in 2011, a decrease to earnings of $17 million in 2010, and a decrease to earnings of $108 million in 2009. These reclassifications, coupled with the recording of the exchange gain/loss on the debt, resulted in a net effect on earnings of zero for 2011, 2010, and 2009. Due to the number of variables affecting the future gains/losses on these instruments, TVA is unable to reasonably estimate the amount to be reclassified from other comprehensive income to earnings in future years.

Unrealized Losses on Swap/Swaption Contracts

TVA uses regulatory accounting treatment to defer the unrealized mark-to-market gains and losses on certain swap and swaption contracts to reflect that the gain or loss is included in the ratemaking formula when these transactions actually settle. The value of the swaps and swaption is still recorded on TVA's balance sheet with realized gains or losses on these contracts recorded in TVA's statement of operations. The deferred unrealized losses on the value of the swaps and swaption were $365 million for 2011 and $299 million for 2010, and are included as a Regulatory asset on TVA's balance sheets. See Note 7 — *Unrealized Losses on Swaps and Swaption.*

16. Other Income (Expense), Net

Other income (expense), net is comprised of the following:

Other Income (Expense), Net
For the years ended September 30

	2011	2010	2009
Interest income	$ 8	$ 6	$ 9
Gains (losses) on investments	1	3	(9)
External services	19	7	14
Claims settlement	—	—	4
Miscellaneous	2	8	7
Total other income (expense), net	$ 30	$ 24	$ 25

17. Supplemental Cash Flow Information

Interest paid was $1.4 billion in each of 2011, 2010, and 2009. These amounts differ from interest expense due to the timing of payments and interest capitalized of $126 million in 2011, $79 million in 2010, and $40 million in 2009 as a part of major capital expenditures.

Cash flows from futures contracts, forward contracts, option contracts, or swap contracts that are accounted for as hedges are classified in the same category as the item being hedged or on a basis consistent with the nature of the instrument.

As a result of the TVA Board approving the completion of Bellefonte Unit 1, Preconstruction costs, previously recorded as cash flows from operating activities for the first three quarters of 2011, are now presented as Construction expenditures in cash flows from investing activities. See Note 7 — *Regulatory Assets and Liabilities — Preconstruction Costs* .

TVA purchased the Magnolia Combined Cycle Plant ("Magnolia") for $436 million. Approximately $11 million of the purchase price will be held by TVA for 547 days after closing to secure the seller's indemnity obligations under the acquisition agreement. The $11 million is recorded in Restricted cash and investments and Other long-term liabilities on the September 30, 2011 Balance Sheet and as a Change in restricted cash flow and investments and as Other cash provided by financing activities on the 2011 Statement of Cash Flow.

18. Benefit Plans

TVA sponsors a qualified defined benefit pension plan and a qualified defined contribution plan that cover eligible employees, two unfunded post-retirement plans that provide for non-vested contributions toward the cost of certain eligible retirees' medical coverage, other postemployment benefits such as workers' compensation, and the SERP.

Overview of Plans and Benefits

Defined Benefit Pension Plan. TVA sponsors a qualified defined benefit pension plan for most of its full-time annual employees that provides two benefit structures: the Original Benefit Structure and the Cash Balance Benefit Structure.

- *Original Benefit Structure.* The pension benefit for a member participating in the Original Benefit Structure is based on the member's creditable service, the member's average monthly salary for the highest three consecutive years of base pay, and a pension factor based on the member's age and years of service, less a Social Security offset.

- *Cash Balance Benefit Structure.* The pension benefit for a member participating in the Cash Balance Benefit Structure is based on credits accumulated in the member's account and the member's age. A member's account receives pay credits equal to six percent of his or her straight-time earnings. The account also receives interest credits at a rate set at the beginning of each calendar year equal to the change in the Consumer Price Index ("CPI") plus three percent, with the provision that the rate may not be less than six percent or more than 10 percent. The rates of the credits were six percent for calendar years 2011 and 2010.

Members of both the Original Benefit Structure and the Cash Balance Benefit Structure can also become eligible for a vested supplemental pension benefit based on age and years of service, which is designed to help retirees offset the cost of medical insurance.

The defined benefit pension plan is administered by a separate legal entity, TVARS, which is governed by its own board of directors (the "TVARS Board"). Upon notification by the TVARS Board of a recommended contribution for the next fiscal year, TVA determines whether to make the recommended contribution or any contribution that may be required by the rules and regulations of TVARS.

Defined Contribution Plan. TVARS also administers a qualified defined contribution 401(k) plan to which TVA makes matching contributions of 25 cents on the dollar (up to 1.5 percent of annual pay) for members participating in the Original Benefit Structure and of 75 cents on the dollar (up to 4.5 percent of annual pay) for members participating in the Cash Balance Benefit Structure. TVA made matching contributions of approximately $31 million to the plan during 2011, $27 million during 2010, and $24 million during 2009.

Supplemental Executive Retirement Plan. In 1995, TVA established its SERP for certain executives in critical positions to provide supplemental pension benefits tied to compensation that exceeds limits imposed by IRS rules applicable to the qualified defined benefit pension plan. TVA has historically funded the annual calculated expense.

Other Post-Retirement Benefits. TVA sponsors two unfunded post-retirement benefit plans that provide for non-vested contributions toward the cost of certain eligible retirees' medical coverage. The first plan covers only certain retirees and surviving dependents who do not qualify for TVARS benefits, including the vested supplemental pension benefit. The second plan is designed to place a limit on the out-of-pocket amount certain eligible retirees pay for medical coverage and provides a credit based on years of TVA service and monthly base pension amount, reduced by any TVARS supplemental pension benefits or any TVA contribution from the first plan, described above.

Other Post-employment Benefits. TVA employees injured in work-related incidents are covered by the workers' compensation program for federal employees administered through the Department of Labor by the Office of Workers' Compensation Programs in accordance with the provisions of the FECA. FECA provides compensation benefits to federal employees for permanent and temporary disability due to employment-related injury or disease.

Accounting Mechanisms

Regulatory Accounting. TVA has classified all amounts related to unrecognized prior service costs, net actuarial gains or losses, and subsequent changes in the funded status as regulatory assets.

Cost Method. TVA uses the projected unit credit cost method to determine the service cost and the projected benefit obligation for retirement, termination, and ancillary benefits. Under this method, a "projected accrued benefit" is calculated at the beginning of the year and at the end of the year for each benefit that may be payable in the future. The "projected accrued benefit" is based on the plan's accrual formula and upon service at the beginning or end of the year, but it uses final average compensation, social security benefits, and other relevant factors projected to the age at which the employee is assumed to leave active service. The projected benefit obligation is the actuarial present value of the "projected accrued benefits" at the beginning of the year for employed participants and is the actuarial present value of all benefits for other participants. The service cost is the actuarial present value of the difference between the "projected accrued benefits" at the beginning and end of the year.

Amortization of Net Gain or Loss. TVA utilizes the corridor approach for gain/loss amortization. Differences between actuarial assumptions and actual plan results are deferred and amortized into periodic cost only when the accumulated differences exceed 10 percent of the greater of the projected benefit obligation or the market-related value of plan assets. If necessary, the excess is amortized over the average remaining service period of active employees.

Asset Method. TVA recognizes the impact of asset performance on pension expense over a three year phase-in period through a "market-related" value of assets calculation. Since the "market-related" value of assets recognizes investment gains and losses over a three year period, the future value of assets will be impacted as previously deferred gains or losses are recognized. The "market-related" value is used in calculating expected return on plan assets and net gain or loss for pension cost determination.

Obligations and Funded Status

The changes in plan obligations, assets, and funded status for the years ended September 30, 2011 and 2010, were as follows:

Obligations and Funded Status
For the year ended September 30

	Pension Benefits		Other Post-Retirement Benefits	
	2011	**2010**	**2011**	**2010**
Change in benefit obligation				
Benefit obligation at beginning of year	$ 10,394	$ 9,266	$ 658	$ 665
Service cost	120	99	13	12
Interest cost	502	513	32	37
Plan participants' contributions	30	29	78	81
Amendments	—	3	—	(90)
Actuarial loss	803	1,077	135	69
Net transfers from variable fund/401(k) plan	8	3	—	—
Expenses paid	(5)	(5)	—	—
Benefits paid	(597)	(591)	(116)	(116)
Benefit obligation at end of year	11,255	10,394	800	658
Change in plan assets				
Fair value of net plan assets at beginning of year	6,792	6,643	—	—
Actual return on plan assets	44	707	—	—
Plan participants' contributions	30	29	78	81
Net transfers from variable fund/401(k) plan	8	3	—	—
Employer contributions	274	6	38	35
Expenses paid	(5)	(5)	—	—
Benefits paid	(597)	(591)	(116)	(116)
Fair value of net plan assets at end of year	6,546	6,792	—	—
Funded status	$ (4,709)	$ (3,602)	$ (800)	$ (658)

The pension actuarial loss above for 2011 primarily reflects the impact of the reduction in the discount rate from 5.00 percent to 4.50 percent, which increased the liability by approximately $591 million. The pension actuarial loss for 2010 primarily reflects the impact of the reduction in the discount rate from 5.75 percent to 5.00 percent, which increased the liability by approximately $807 million.

The other post-retirement actuarial loss for 2011 primarily reflects the impact of the reduction in the discount rate from 5.00 percent to 4.50 percent, which increased the post-retirement liability by approximately $47 million. The other post-retirement actuarial loss for 2010 reflects the impact of the reduction in the discount rate from 5.75 percent to 5.00 percent, which increased the liability by $66 million. This increase was offset by a change in plan provisions which decreased the liability by $90 million.

The following changes were made to the cost of living adjustment ("COLA") provisions for the four years beginning January 1, 2010:

- For CY 2010, the COLA was zero.
- For CY 2011, the COLA will be the change in the CPI, capped at three percent.
- For CY 2012, the COLA will be zero.
- For CY 2013, the COLA will be the change in the CPI, capped at 2.5 percent.

At the end of the four year period, the COLA benefit of CPI, capped at five percent, will be restored. Further, the eligibility for the COLA changed to age 60 for employees who retire on or after January 1, 2010. Finally, the interest crediting rate for fixed fund balances and future contributions was reduced to six percent effective January 1, 2010.

No similarly significant pension plan amendments were enacted during 2010 or 2011.

Amounts recognized in the balance sheets consist of regulatory assets that have not been recognized as components of periodic benefit cost at September 30, 2011 and 2010, and the funded status of TVA's benefit plans, which are included in Accounts payable and accrued liabilities and Post-retirement and post-employment benefit obligations:

Amounts Recognized in the Balance Sheet
At September 30

	Pension Benefits		Other Post-Retirement Benefits	
	2011	2010	2011	2010
Regulatory assets	$ 5,433	$ 4,456	$ 374	$ 255
Accounts payable and accrued liabilities	(6)	(4)	(39)	(35)
Post-retirement and post-employment benefit obligations	(4,703)	(3,598)	(761)	(623)

Unrecognized amounts included in regulatory assets yet to be recognized as components of accrued benefit cost at September 30 consisted of:

Postretirement Benefit Costs Deferred as Regulatory Assets
At September 30

	Pension Benefits		Other Post-Retirement Benefits	
	2011	2010	2011	2010
Unrecognized prior service cost (credit)	$ (255)	$ (279)	$ (58)	$ (64)
Unrecognized net loss	5,688	4,724	432	319
Amount deferred due to actions of regulator	—	11	—	—
Total regulatory assets	$ 5,433	$ 4,456	$ 374	$ 255

The projected benefit obligation, accumulated benefit obligation, and fair value of plan assets for the pension plan with accumulated benefit obligations in excess of plan assets at September 30, 2011, and 2010, were as follows:

Projected Benefit Obligations and Accumulated Benefit Obligations in Excess of Plan Assets
At September 30

	2011	2010
Projected benefit obligation	$ 11,255	$ 10,394
Accumulated benefit obligation	10,943	10,085
Fair value of net plan assets	6,546	6,792

The components of net periodic benefit cost and other amounts recognized as changes in regulatory assets for the years ended September 30 were as follows:

Components of Net Periodic Benefit Cost
For the years ended September 30

	Pension Benefits			Other Post-Retirement Benefits		
	2011	**2010**	**2009**	**2011**	**2010**	**2009**
Components of net periodic benefit cost						
Service cost	$ 120	$ 99	$ 84	$ 13	$ 12	$ 7
Interest cost	502	513	581	32	37	36
Expected return on plan assets	(488)	(548)	(543)	—	—	—
Amortization of prior service cost (credit)	(23)	(24)	37	(6)	6	5
Recognized net actuarial loss	282	181	14	22	17	7
Net periodic benefit cost as actuarially determined	393	221	173	61	72	55
Amount charged (capitalized) due to actions of regulator	11	71	(82)	—	—	—
Total net periodic benefit cost recognized	$ 404	$ 292	$ 91	$ 61	$ 72	$ 55

The amounts in the regulatory asset that are expected to be recognized as components of net periodic benefit cost during the next fiscal year are as follows:

Expected Amortization of Regulatory Assets in 2012
At September 30, 2011

	Pension Benefits	Other Post-Retirement Benefits	Total
Prior service cost (credit)	$ (23)	$ (6)	$ (29)
Net actuarial loss	361	29	390

Plan Assumptions

TVA's reported costs of providing the plan benefits are impacted by numerous factors including the provisions of the plans, changing employee demographics, and various assumptions, the most significant of which are noted below.

Actuarial Assumptions
At September 30

	Pension Benefits		Other Post-Retirement Benefits	
	2011	**2010**	**2011**	**2010**
Assumptions utilized to determine benefit obligations at September 30				
Discount rate	4.50%	5.00%	4.50%	5.00%
Expected return on plan assets	7.25%	7.50%	N/A	N/A
Rate of compensation increase	4.43%	4.41%	N/A	N/A
Initial health care cost trend rate	N/A	N/A	8.00%	8.00%
Ultimate health care cost trend rate	N/A	N/A	5.00%	5.00%
Ultimate trend rate is reached in year beginning	N/A	N/A	2017	2016
Assumptions utilized to determine net periodic benefit cost for the years ended September 30				
Discount rate	5.00%	5.75%	5.00%	5.75%
Expected return on plan assets	7.50%	7.75%	N/A	N/A
Rate of compensation increase	4.41%	4.40%	N/A	N/A
Initial health care cost trend rate	N/A	N/A	8.00%	8.00%
Ultimate health care cost trend rate	N/A	N/A	5.00%	5.00%
Ultimate trend rate is reached in year beginning	N/A	N/A	2016	2015

Discount Rate. In the case of selecting an assumed discount rate, TVA reviews market yields on high-quality corporate debt and long-term obligations of the U.S. Treasury and endeavors to match, through the use of a hypothetical bond portfolio, instrument maturities with the maturities of its pension obligations in accordance with the prevailing accounting standards. Additionally, TVA looks at published pension spot yield curves and applies expected cash flows to these curves to approximate the rate expected to settle the projected benefit payments. Based on recent market trends in all these data points, TVA decreased its discount rate used to determine benefit obligations from 5.00 percent at the end of 2010 to 4.50 percent at the end of 2011. TVA had decreased its discount rate from 5.75 percent at the end of 2009 to 5.00 percent at the end of 2010.

Rate of Return. In determining its expected long-term rate of return on pension plan assets, TVA reviews past long-term performance, asset allocations, and long-term inflation assumptions. The expected rates of return used to develop net pension cost were 7.50 percent and 7.75 percent during 2011 and 2010, respectively, and were determined at the beginning of each year. TVA adjusted the expected rate for 2012 based on revisions to future expected returns as provided by third party professional investment consultants. At October 1, 2011, the expected rate of return was 7.25 percent. The actual rate of return for the year ended September 30, 2011, was a gain of 0.67 percent.

Compensation Increases . Assumptions related to compensation increases are based on the results obtained from an actual company experience study performed during the most recent six years for retirees as well as other plan participants. TVA obtained an updated study in 2008 and determined that future compensation would increase at rates between 3.30 percent and 10.10 percent per year, depending upon the employee's age. Based upon the current active participants, the average assumed compensation increase used to determine benefit obligations for 2011 and 2010 was 4.43 percent and 4.41 percent, respectively.

Mortality. Mortality assumptions are based on the results obtained from a recent actual company experience study performed which included retirees as well as other plan participants. TVA obtained an updated study in 2008 and, accordingly, adjusted the mortality rates from the 1983 Group Annuity Mortality Tables to the RP-2000 Mortality Tables. During 2010, company experience was reexamined and it was determined that TVA's mortality experience has continued to improve. As a result, TVA adjusted the mortality rates to RP-2000 Combined Healthy Mortality table projected to 2013 using scale AA at September 30, 2010. There were no changes to the mortality assumptions in 2011.

Health Care Cost Trends. TVA reviews actual recent cost trends and projected future trends in establishing health care cost trend rates. The assumed health care trend rate used for 2011 and 2010 was 8.0 percent. The 2011 health care cost trend rate of 8.0 percent used to determine benefit obligations is assumed to gradually decrease each successive year until it reaches a 5.0 percent annual increase in health care costs in the years beginning October 1, 2017, and beyond.

Cost of Living Adjustment. The qualified defined benefit pension plan includes a COLA that is generally indexed against the CPI, subject to a floor and ceiling. The CPI fell during 2009, and market-based measures of inflation expectations at the end of 2009 projected slow growth in the CPI through 2015. Additionally, the COLA was temporarily reduced for a four-year period beginning January 1, 2010 for current retirees, and the eligibility for the COLA was changed to age 60 for employees retiring on or after January 1, 2010. The COLA assumption has been 2.5 percent since 2009. Due to stabilizing long-term expectations, TVA determined the COLA assumption should be held at 2.5 percent at September 30, 2011.

Sensitivity of Costs to Changes in Assumptions. The following chart reflects the sensitivity of pension cost to changes in certain actuarial assumptions:

Sensitivity to Certain Changes in Pension Assumptions
At September 30, 2011

Actuarial Assumption	Change in Assumption	Impact on 2012 Pension Cost	Impact on 2012 Projected Benefit Obligation
Discount rate	(0.25)%	$ 18	$ 332
Rate of return on plan assets	(0.25)%	15	N/A

Each fluctuation above assumes that the other components of the calculation are held constant and excludes any impact for unamortized actuarial gains or losses.

The following chart reflects the sensitivity of post-retirement benefit cost to changes in the health care trend rate:

Sensitivity to Changes in Assumed Health Care Cost Trend Rates
At September 30, 2011

	1% Increase	1% Decrease
Effect on total of service and interest cost components	$ 5	$ (6)
Effect on end-of-year accumulated post-retirement benefit obligation	293	(132)

Each fluctuation above assumes that the other components of the calculation are held constant and excludes any impact for unamortized actuarial gains or losses.

Plan Investments

The qualified defined benefit pension plan, which includes the Original Benefit Structure and the Cash Balance Benefit Structure, is the only plan that includes qualified plan assets. The plan assets are primarily stocks and bonds. In September 2011, the TVARS Board approved a long-term investment plan with the goal of reaching a fully funded and "de-risked" status. The investment plan is referred to as an asset allocation policy and contains a "dynamic de-risking" strategy that calls for investments to be shifted into assets that better match the liability, such as long duration fixed income securities, over time as funding targets are met. The new policy targets an initial allocation of 50 percent equity securities, 38 percent fixed income securities, and 12 percent alternative investments. The TVARS asset allocation policy includes permissible deviations from these target allocations. The TVARS Board can take action, as appropriate, to rebalance the system's assets consistent with the asset allocation policy. At September 30, 2011 and 2010, the asset holdings of the system included the following:

Asset Holdings of TVARS
At September 30

		Plan Assets at September 30	
Asset Category	**Target Allocation**	**2011**	**2010**
U.S. equity securities	22.50%	20.37%	22.46%
Non-U.S. equity securities	22.50%	19.54%	23.30%
Private equity holdings or similar alternative investments	10.00%	10.94%	9.98%
Private real estate holdings	5.00%	4.26%	1.93%
Fixed income securities	31.00%	34.43%	32.87%
High yield securities	9.00%	9.53%	8.66%
Cash and equivalents	—%	0.93%	0.80%
Total	100.00%	100.00%	100.00%

Fair Value Measurements

The following table provides the fair value measurement amounts for assets held by TVARS at September 30, 2011:

TVA Retirement System
At September 30, 2011

	Total [1] [2]	Quoted Prices in Active Markets for Identical Assets/Liabilities (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets				
Equity securities	$ 1,045	$ 1,045	$ —	$ —
Preferred securities	20	15	—	5
Debt securities				
Corporate debt securities	1,276	—	1,275	1
Residential mortgage-backed securities	455	—	450	5
Debt securities issued by U.S. Treasury and other U.S. government agencies	454	450	4	—
Debt securities issued by foreign governments	35	—	35	—
Asset-backed securities	102	—	93	9
Debt securities issued by state/local governments	40	—	33	7
Commercial mortgage-backed securities	18	—	18	—
Commingled Funds				
Equity	924	—	924	—
Debt	779	—	779	—
Blended	300	—	300	—
Institutional mutual funds	51	51	—	—
Cash equivalents	599	1	598	—
Private equity funds	481	—	—	481
Private real estate funds	326	—	21	305
Treasury bills, U.S. Government notes and securities held as futures and other derivative collateral	57	28	29	—
Securities lending commingled funds	3	—	3	—
Derivatives				
Foreign currency forward receivable	599	—	599	—
Interest rate swaps	4	—	4	—
Purchased options	1	—	1	—
Total Assets	$ 7,569	$ 1,590	$ 5,166	$ 813
Liabilities				
Derivatives				
Foreign currency forward payable	$ 601	$ —	$ 601	$ —
Futures	17	17	—	—
Credit default swaps	5	—	5	—
Written option obligations	3	—	3	—
Total Liabilities	$ 626	$ 17	$ 609	$ —

Notes
(1) Excludes approximately $394 million in net payables associated with security purchases and sales and various other payables.
(2) Excludes a $3 million payable for collateral on loaned securities in connection with TVARS's participation in securities lending programs.

The following table provides the fair value measurement amounts for assets held by TVARS at September 30, 2010:

TVA Retirement System
At September 30, 2010

	Total (1) (2)	Quoted Prices in Active Markets for Identical Assets/Liabilities (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets				
Equity securities	$ 706	$ 706	$ —	$ —
Debt securities				
Corporate debt securities	1,180	—	1,180	—
Residential mortgage-backed securities	430	—	430	—
Debt securities issued by U.S. Treasury and other U.S. government agencies	430	426	4	—
Debt securities issued by foreign governments	177	—	177	—
Asset-backed securities	100	—	100	—
Debt securities issued by state/local governments	20	—	20	—
Commercial mortgage-backed securities	4	—	4	—
Commingled Funds				
Equity	1,733	—	1,733	—
Debt	766	—	766	—
Blended	318	—	318	—
Cash equivalents	410	3	407	—
Private equity funds	492	—	—	492
Private real estate funds	180	—	22	158
Treasury bills, U.S. Government notes and securities held as futures and other derivative collateral	46	29	17	—
Securities lending commingled funds	7	—	7	—
Derivatives				
Foreign currency forward receivable	737	—	737	—
Futures	19	19	—	—
Purchased options	1	—	1	—
Total Assets	$ 7,756	$ 1,183	$ 5,923	$ 650
Liabilities				
Derivatives				
Foreign currency forward payable	$ 742	$ —	$ 742	$ —
Interest rate swaps	2	—	2	—
Credit default swaps	1	—	1	—
Written option obligations	3	1	2	—
Total Liabilities	$ 748	$ 1	$ 747	$ —

Notes
(1) Excludes approximately $208 million in net payables and receivables associated with security purchases and sales.
(2) Excludes a $7 million payable for collateral on loaned securities in connection with TVARS's participation in securities lending programs.

The following table provides a reconciliation of beginning and ending balances of pension plan assets measured at fair value on a recurring basis where the determination of fair value includes significant unobservable inputs (Level 3):

Fair Value Measurements Using Significant Unobservable Inputs
For the year ended September 30, 2011

	Fair Value Measurements Using Significant Unobservable Inputs (Level 3)
Balance at October 1, 2009	$ 458
Net realized/unrealized depreciation	75
Purchases, sales, issuances, and settlements (net)	117
Balance at September 30, 2010	650
Net realized/unrealized depreciation	30
Purchases, sales, issuances, and settlements (net)	118
Transfers in and/or out of Level 3	15
Balance at September 30, 2011	$ 813

Vendor-provided prices for the pension plan's investments are subjected to automated tolerance checks by the trustee to identify and avoid, where possible, the use of inaccurate prices. Any questionable prices identified are reported to the vendor which provided the price. If the prices are validated, the primary pricing source is used. If not, a secondary source price that has passed the applicable tolerance check is used (or queried with the vendor if it is out of tolerance), resulting in either the use of a secondary price, where validated, or the last reported default price, as in the case of a missing price. For monthly valued accounts, where secondary price sources are available, an automated inter-source tolerance report identifies prices with an inter-vendor pricing variance of over two percent at an asset class level. For daily valued accounts, each security is assigned, where possible, an indicative major market index, against which daily price movements are automatically compared. Tolerance thresholds are established by asset class. Prices found to be outside of the applicable tolerance threshold are reported and queried with vendors as described above.

Equities . Investment securities, including common stock and mutual funds, listed on either a national or foreign securities exchange or traded in the over-the-counter market are generally valued each business day at the official closing price (typically the last reported sale price) on the exchange on which the security is primarily traded. If there are no current day sales, the securities are valued at their last quoted bid price. Equities priced by an exchange in an active market are classified as Level 1.

Preferred Securities . Preferred securities are valued at their quoted market price (Level 1 inputs), or in such instances where quoted market prices are unavailable, the fair value is estimated based on yields currently available on comparable securities of issues with similar credit ratings (Level 2 inputs). Certain preferred securities that are priced using unobservable inputs have been classified as Level 3.

Corporate Debt Securities . Corporate bonds are valued based upon recent bid prices or the average of recent bid and asked prices when available (Level 2 inputs) and, if not available, they are valued through matrix pricing models developed by sources considered by TVA to be reliable. Matrix pricing, which is a mathematical technique commonly used to price debt securities that are not actively traded, values debt securities without relying exclusively on quoted prices for the specific securities but rather by relying on the securities' relationship to other benchmark quoted securities (Level 2 inputs). Certain corporate debt securities priced using unobservable inputs have been classified as Level 3.

Residential Mortgage-Backed Securities . Residential mortgage-backed securities consist of collateralized mortgage obligations ("CMOs") and U.S. pass-through securities pools related to government-sponsored enterprises ("GSE"). CMO pricing is typically based on either a volatility-driven, multidimensional single cash flow stream model or an option-adjusted spread model. These models incorporate available market data such as trade information, dealer quotes, market color, spreads, bids and offers. Pricing for GSE securities, including the Federal Home Loan Mortgage Corporation, the Federal National Mortgage Association, and the Government National Mortgage Association, is typically based on quotes from the To Be Announced ("TBA") market, which is highly liquid with multiple electronic platforms that facilitate the execution of trading between investors and broker/dealers. Prices from the TBA market are then compared against other live data feeds as well as input obtained directly from the dealer community. A tolerance check, adjusted dynamically in response to market conditions, is applied to check for consistency across the trading platforms and dealer quotes. If discrepancies are identified, the data is reviewed to resolve the differences and determine an appropriate evaluation. Residential mortgage-backed securities are considered to be priced using Level 2 inputs because of the nature of their market-data-based pricing models with the exception of certain securities priced using unobservable inputs, which are classified as Level 3.

U.S. Treasury and Agency Securities . For U.S. Treasury securities, fair values reflect the closing price reported in the active market in which the security is traded (Level 1 inputs). Agency securities are typically priced using evaluated pricing applications and models incorporating U.S. Treasury yield curves. Agency securities are classified as Level 2 because of the nature of their market-data-based pricing models.

Debt Securities Issued by Foreign Governments . These include foreign government bonds and foreign government inflation linked securities. They are typically priced based on proprietary discounted cash flow models, incorporating option-adjusted spread features as appropriate. Debt securities issued by foreign governments are classified as Level 2 because of the nature of their market-data-based pricing models.

Asset-Backed Securities . Asset-backed securities are typically priced based on a single cash-flow stream model, which incorporates available market data such as trade information, dealer quotes, market color, spreads, bids, and offers. Because of the market-data-based nature of such pricing models, asset-backed securities are classified as Level 2 with the exception of certain securities priced using unobservable inputs, which are classified as Level 3.

Debt Securities Issued by State and Local Governments . Debt securities issued by state and local governments are typically priced using market-data-based pricing models, and are therefore classified as Level 2. These pricing models incorporate market data such as quotes, trading levels, spread relationships, and yield curves, as applicable. Certain debt securities issued by state and local governments priced using unobservable inputs have been classified as Level 3.

Commercial Mortgage-Backed Securities . Commercial mortgage-backed securities are typically priced based on a single cash flow stream model which incorporates available market data such as trade information, dealer quotes, market color, spreads, bids, and offers. Because of the market-data-based nature of such pricing models, commercial mortgage-backed securities are classified as Level 2.

Private Equity Funds . Private equity limited partnerships and other similar alternative investments are reported at fair value, which is derived by independent appraisals or investment management judgment. The inputs used by the general partners in estimating the fair value of the limited partnerships include the original transaction prices, recent transactions in the same or similar instruments, completed or pending third-party transactions in the underlying investments or comparable issues, subsequent rounds of financing, recapitalizations and other transactions across the capital structure, offerings in the equity or debt capital markets, and changes in financial ratios or cash flows. These investments may also be adjusted to reflect illiquidity and/or non-transferability, with the amount of such discounts estimated by the general partners in the absence of market information. Due to the lack of observable inputs, the determination of the fair value by the general partners may differ materially from the value ultimately realized by the partnership.

The private equity managers recognize realized gains or losses when they receive income or dispose of an investment. The net realized capital gains or losses, which include management fees and fund expenses, are allocated to the partners in proportion to their commitments. The private equity values are prepared by the fund managers and classified as Level 3.

The private equity limited partnerships typically make longer-term investments in private companies and seek to obtain financial returns through long-term appreciation based on corporate stewardship, improved operating processes, and financial restructuring, which may involve a merger or acquisition. Significant investment strategies include: venture capital; buyout; mezzanine/subordinate debt; restructuring or distressed debt; and special situations. Venture capital partnerships consist of two main groupings. Early-stage venture capital partnerships invest in businesses still in the conceptual stage where products may not be fully developed and where revenues and/or profits may be several years away. Later-stage venture capital partnerships invest in more mature companies in need of growth or expansion capital. Buyout partnerships provide the equity capital for acquisition transactions either from a private seller or the public, which may represent the purchase of the entire company or a refinancing or recapitalization transaction where equity is invested. Mezzanine/subordinated debt partnerships provide the intermediate capital between equity and senior debt in a buyout or refinancing transaction and typically own a security in the company which carries current interest payments as well as a potential equity interest in the company. Restructuring/distressed debt partnerships purchase opportunities generated by overleveraged or poorly managed companies. Special situations partnerships include organizations with a specific industry focus not covered by the other private equity subclasses or unique opportunities which fall outside the regular subclasses.

Private Real Estate Funds . The pension plan invests in commingled funds that invest in a wide variety of real estate opportunities and timberland investments. The valuation methodologies for these investments are as follows:

The pension plan is invested in a limited partnership formed for the purpose of providing investors with enhanced risk-adjusted total returns through long-biased opportunistic investments principally in mortgage and/or real estate-related fixed income instruments and related securities. This fund is invested primarily in mortgage-backed securities and asset-backed securities. Due to the market-data-based nature of the pricing models used for these types of securities, as described above, they are classified as Level 2.

The pension plan is invested in a private real estate investment trust formed to make direct or indirect investments i commercial timberland properties. Pricing for these types of investments is based on comprehensive appraisals that are conducted shortly after initial purchase of properties and at three-year intervals thereafter. All appraisals are conducted by third-party timberland appraisal firms. Appraisals are based on either a sales comparison analysis or a discounted cash flow analysis. Due to the inherent uncertainty of the valuation methodology, these investments are classified as Level 3.

The pension plan is invested in certain private real estate commingled funds that consist primarily of real estate investments, either directly owned or through partnership interests, and mortgage and other loans on income-producing real estate. Fair value estimates are based upon property appraisal reports prepared by independent real estate appraisers within a reasonable amount of time following acquisition of the real estate and no less frequently than annually thereafter. The appraisals are based on one or a combination of three methodologies: cost of reproduction analysis, discounted cash flow analysis, and sales comparison analysis. In general, the input values used in the appraisal process are unobservable; therefore, these funds are classified as Level 3.

Derivatives . The pension plan invests in a variety of derivative instruments. The valuation methodologies for these instruments are as follows:

Futures . The pension plan enters into equity futures, foreign currency futures, and interest rate futures. The futures contracts are listed on either a national or foreign securities exchange and generally valued each business day at the official closing price (typically the last reported sales price) on the exchange on which the security is primarily traded. The pricing is performed by third-party vendors. Since futures are priced by an exchange in an active market, they are classified as Level 1.

Options . The pension plan enters into interest rate options, foreign currency options, and fixed income options. Options that are listed on either a national or foreign securities exchange are generally valued each business day at the official closing price (typically the last reported sales price) on the exchange on which the security is primarily traded. These options are classified as Level 1 and include both written and purchased options on Treasury note futures and Eurodollar futures.

Options traded over the counter and not in exchanges are priced by third-party vendors and are classified as Level 2. These include both written and purchased options on interest rate swaps.

Swaps . The pension plan enters into various types of swaps. Credit default swaps are priced at market using models that consider cash flows, credit curves, recovery rates, and other factors. The pricing is performed by third party vendors. Interest rate swap contracts are priced at market using forward rates derived from the swap curve, and the pricing is also performed by third-party vendors. Other swaps such as currency swaps and total return swaps are priced by third-party vendors using market inputs such as spot rates and yield curves. All swaps are classified as Level 2.

Foreign Currency Forwards . The pension plan enters into foreign currency forwards. All commitments are marked to market daily at the applicable translation rates, and any resulting unrealized gains or losses are recorded. Foreign currency forwards are priced by third-party vendors and are classified as Level 2.

Commingled Funds . The pension plan invests in commingled funds which include collective trusts, unit investment trusts, and similar investment funds that predominantly hold debt and/or equity securities as underlying assets. The pension plan's ownership consists of a pro rata share and not a direct ownership of an underlying investment. These commingled funds are valued at their closing net asset values (or unit value) per share as reported by the managers of the commingled funds and as supported by the unit prices of actual purchase and sale transactions, occurring as of or close to the financial statement date (Level 2 inputs).

The pension plan is invested in equity commingled funds which can be categorized as either passively-managed index funds or actively-managed funds. The equity index funds seek to track the performance of a particular index by replicating its capitalization and characteristics. Passive fund benchmark indices include the Russell 1000 index, the S&P 500 index, and the Morgan Stanley Capital International All Country World Index ex-U.S. The actively-managed equity funds seek to outperform certain equity benchmarks through a combination of fundamental and technical analysis. Active funds select portfolio positions based upon their research.

The pension plan is invested in debt commingled funds which can be categorized as either passively-managed index funds or actively-managed funds. The pension plan's debt index fund invests in a diversified portfolio of fixed income securities and derivatives of varying maturities to replicate the characteristics of the Barclays Capital US Aggregate Bond index. The fund seeks to track the total return of the Barclays Capital US Aggregate Bond index. The actively-managed debt funds seek to outperform certain fixed-income benchmarks through fundamental research and analysis. The funds invest in a diversified portfolio of fixed income securities and derivatives of varying maturities. The objective is to achieve a positive relative total return through active credit selection.

The pension plan is invested in commingled funds which invest across multiple asset classes that can be categorized as blended. These funds seek to outperform a passive benchmark through active security selection. The funds invest in securities across equity, fixed income, currency, and commodities. The portfolios employ fundamental, quantitative, and technical analysis.

Institutional Mutual Funds. Participation units of institutional mutual funds are stated at their quoted redemption values as reported by the investment managers based on their net asset values, which reflect the fair values of the underlying investments. These funds are traded at published net asset values in an active market (Level 1 inputs).

Cash Collateral Held under Securities Lending Arrangements . Fair value has been determined to approximate the deposit account balances held in cash collateral pools (Level 2 inputs).

Cash Equivalents and Other Short-Term Investments . Cash equivalents and other short-term investments are highly liquid securities with a maturity of less than three months and 12 months, respectively. These consist primarily of U.S. Treasury securities, residential mortgage-backed securities, commercial paper, corporate bonds, asset-backed securities, and certificates of deposit. U.S. Treasury securities are priced based on Level 1 inputs as described above. The other types of cash equivalent securities and other short-term investments, as described above, are priced using models that incorporate market-based inputs and are therefore classified as Level 2.

The valuation methods described above may produce a fair value calculation that may not be indicative of net realizable value or reflective of future fair values. Furthermore, while TVA believes its valuation methods are appropriate and consistent with other market participants, the use of different methodologies or assumptions to determine the fair value of certain financial instruments could result in a different fair value measurement at the reporting date.

Cash Flows

Estimated Future Benefit Payments. The following table sets forth the estimated future benefit payments under the benefit plans.

Estimated Future Benefits Payments
At September 30, 2011

	Pension Benefits	Other Post-Retirement Benefits
2012	$ 717	$ 40
2013	707	41
2014	708	43
2015	713	44
2016	716	46
2017 - 2021	3,609	235

Contributions . In 2011, TVA made contributions of $270 million to the defined benefit pension plan, $4 million to the SERP, and $38 million to the other post-retirement benefit plans. In addition, TVA expects to contribute $6 million to the SERP and $40 million to the other post-retirement benefit plans in 2012. The TVA Board has authorized the Chief Executive Officer to approve TVA making a discretionary contribution of up to $300 million to the defined benefit pension plan for 2012 subject to a review by the Finance, Rates and Portfolio Committee of the TVA Board. At this time, management has not determined whether the contribution will be made.

Other Post-Employment Benefits

Post-employment benefit cost estimates are revised to properly reflect changes in actuarial assumptions made at the end of the year. TVA utilizes a discount rate determined by reference to the U.S. Treasury Constant Maturities corresponding to calculated average durations of TVA's future estimated post-employment claims payments. The use of a 1.92 percent discount rate resulted in the recognition of approximately $81 million in expenses in 2011 and an unpaid benefit obligation of about $596 million at September 30, 2011. The current portion of the obligation is $53 million and is recorded in Accounts payable and accrued liabilities. The long-term portion of $543 million is recorded in Post-retirement and post-employment benefit obligations. TVA utilized discount rates of 2.53 percent and 3.31 percent in 2010 and 2009, respectively. The use of these discount rates resulted in expense and unpaid benefit obligations of $141 million and $570 million, respectively, for 2010 and expense and unpaid benefit obligations of $47 million and $484 million, respectively, for 2009.

The decrease in the 2011 discount rate increased the expense for 2011, but the overall expense decreased for 2011 in comparison to 2010. In 2010, TVA made changes in the actuarial methods and assumptions for the September 30, 2010 actuarial valuation for other post-employment benefits. These changes stemmed from review of and recognition of developing trends in TVA's post-employment claims experience. The result of the changes and the decrease in the discount rate increased both the expense and unpaid benefit obligation for 2010.

19. Asset Additions and Dispositions

New Generation

Nuclear . On August 18, 2011, the TVA Board approved the completion of Bellefonte Unit 1. The project is scheduled to be completed by 2020 for anticipated additional costs of $4.9 billion exclusive of AFUDC and the cost of the initial fuel load. Further action by the NRC and reviews by TVA are required before construction activities can resume. In addition, the TVA Board directed that construction activities not be resumed at Bellefonte Unit 1 until the initial loading of fuel at Watts Bar Unit 2 has been accomplished. See Note 20 — *Legal Proceedings — Case Regarding Bellefonte Nuclear Plant Units 1 and 2.*

Combined Cycle . TVA is in the process of completing the John Sevier Combined Cycle Facility in northeastern Tennessee. TVA expects to complete this combined cycle facility by mid-CY 2012. The completed facility is expected to add approximately 880 MW of summer net capability to the TVA system at a cost of approximately $820 million.

On August 31, 2011, TVA purchased Magnolia for $436 million. As a result of the purchase price allocation performed in accordance with ASC 805 — Business Combinations, $424 million was allocated to Completed plant and $12 million was allocated to Inventories, net. Approximately $11 million of the purchase price will be held by TVA to secure the seller's indemnity obligations under the acquisition agreement. This amount is recorded in Restricted cash and investments and Other long-term liabilities and is to be paid to the seller on the 547th day after closing assuming the related obligations have been met. TVA expects the full amount to be paid at that time.

TVA expensed transaction costs related to the acquisition as incurred. Supplemental pro forma data has not been supplied as the acquisition was not significant.

Buildings

On January 3, 2011, TVA purchased the portion of TVA's Chattanooga Office Complex in Chattanooga, Tennessee, leased from Chattanooga Valley Associates (with the exception of Monteagle Place, which includes approximately 131,979 square feet) upon the expiration of the existing lease term for that portion on January 1, 2011. The purchase price was $22 million. On May 18, 2009, TVA finalized an agreement to purchase the Monteagle Place portion of the Chattanooga Office Complex upon the expiration of the existing lease term on October 1, 2012. The purchase price for Monteagle Place is $8 million. TVA paid $2 million on October 1, 2009, $2 million on October 1, 2010, $2 million on October 1, 2011, and will pay an additional $2 million on October 1, 2012, to satisfy its purchase price commitment. As a result of these transactions, the capital lease liability and the property, plant, and equipment account for capital leases were adjusted in accordance with the applicable accounting guidance related to leased assets purchased by a lessee during the term of a lease.

20. Commitments and Contingencies

Commitments

At September 30, 2011, the amounts of contractual cash commitments maturing in each of the next five years and beyond are shown below:

Commitments and Contingencies
Payments due in the year ending September 30

	2012	2013	2014	2015	2016	Thereafter	Total
Debt [1]	$ 2,019	$ 2,308	$ 32	$ 1,032	$ 32	$ 19,236	$ 24,659
Lease obligations							
Capital	6	—	—	—	—	3	9
Non-cancelable operating	74	59	34	24	24	147	362
Purchase obligations							
Power	223	158	158	161	168	4,212	5,080
Fuel	1,856	1,502	1,252	1,205	760	1,942	8,517
Other	109	73	62	58	57	574	933
Payments on other financings	138	488	100	104	104	609	1,543
Total	$ 4,425	$ 4,588	$ 1,638	$ 2,584	$ 1,145	$ 26,723	$ 41,103

Note
(1) Does not include noncash items of foreign currency exchange loss of $7 million and net discount on sale of Bonds of $235 million.

In addition to the cash requirements, above, TVA has contractual obligations in the form of revenue discounts related to energy prepayments. See Note 1 — *Energy Prepayment Obligations and Discounts on Sales.*

Energy Prepayment Obligations

	2012	2013	2014	2015	2016	Thereafter	Total
Energy Prepayment Obligations	$ 105	$ 102	$ 100	$ 100	$ 100	$ 210	$ 717

Debt. At September 30, 2011, TVA had outstanding discount notes of $482 million and long-term debt (including current maturities) at varying maturities and interest rates of $23.9 billion for total outstanding indebtedness of $24.4 billion. See Note 11.

Leases . TVA leases certain property, plant, and equipment under agreements with terms ranging from one to 80 years. Of the total obligations for TVA's capital leases, $2 million represents the cost of financing. TVA's rental expense for operating leases was $77 million in 2011, $57 million in 2010, and $62 million in 2009.

Power Purchase Obligations. TVA has contracted with various independent power producers and power distributor customers for additional capability to be made available to TVA. In total, these agreements provide 2,442 MW of summer net capability. The remaining terms of the agreements range from three months to 20 years. The total financial commitment for these non-renewable power supply contracts is approximately $5.1 billion. TVA spent $713 million, $504 million, and $370 million under power purchase agreements during 2011, 2010, and 2009, respectively. Costs under TVA's power purchase agreements are included in the Statements of Operations for 2011, 2010, and 2009 as purchased power expense and are expensed as incurred.

Under federal law, TVA is obligated to purchase power from qualifying facilities, cogenerators, and small power producers. At September 30, 2011, there was a combined qualifying capacity of 914 MW, from five different suppliers, from which TVA purchased power under this law. TVA's obligations to purchase power from these qualifying facilities are not included in the Commitments and Contingencies table.

TVA, along with others, contracted with the Southeastern Power Administration ("SEPA") to obtain power from eight U.S. Army Corps of Engineers hydroelectric facilities on the Cumberland River system. The agreement with SEPA can be terminated upon three years' notice, but this notice of termination may not become effective prior to June 30, 2017. The contract requires SEPA to provide TVA an annual minimum of 1,500 hours of power for each megawatt of TVA's 405 MW allocation, and all surplus power from the Cumberland River system. Because hydroelectric production has been reduced at two of the hydroelectric facilities on the Cumberland River system and because of reductions in the summer stream flow on the Cumberland River, SEPA declared "force majeure" on February 25, 2007. SEPA then instituted an emergency operating plan that, among other things, eliminates SEPA's obligation to provide TVA and other affected customers with a minimum amount of power. It is unclear how long the emergency operating plan will remain in effect. TVA's obligations under its contract with SEPA are not included in the Commitments and Contingencies table.

Fuel Purchase Obligations. TVA has approximately $4.9 billion in long-term fuel purchase commitments ranging in terms of up to 11 years primarily for the purchase and transportation of coal. TVA also has approximately $3.6 billion of long-term commitments ranging in terms of up to 19 years for the purchase of enriched uranium and fabrication of nuclear fuel assemblies.

Other Obligations. Other obligations of $933 million consist of contracts as of September 30, 2011, for goods and services primarily related to capital projects as well as other major recurring operating costs.

Contingencies

Nuclear Insurance . The Price-Anderson Act provides a layered framework of protection to compensate for losses arising from a nuclear event in the United States. For the first layer, all the NRC nuclear plant licensees, including TVA, purchase $375 million of nuclear liability insurance from American Nuclear Insurers for each plant with an operating license. Funds for the second layer, the Secondary Financial Program, would come from an assessment of up to $118 million from the licensees of each of the 104 NRC licensed reactors in the United States. The assessment for any nuclear accident would be limited to $18 million per year per unit. American Nuclear Insurers, under a contract with the NRC, administers the Secondary Financial Program. With its six licensed units, TVA could be required to pay a maximum of $705 million per nuclear incident, but it would have to pay no more than $105 million per incident in any one year. When the contributions of the nuclear plant licensees are added to the insurance proceeds of $375 million, over $12 billion, including a five percent surcharge for legal expenses, would be available. Under the Price-Anderson Act, if the first two layers are exhausted, the U.S. Congress is required to take action to provide additional funds to cover the additional losses.

TVA carries property, decommissioning, and decontamination insurance of $4.6 billion for its licensed nuclear plants, with up to $2.1 billion available for a loss at any one site, to cover the cost of stabilizing or shutting down a reactor after an accident. Some of this insurance, which is purchased from Nuclear Electric Insurance Limited ("NEIL"), may require the payment of retrospective premiums up to a maximum of approximately $73 million.

TVA purchases accidental outage (business interruption) insurance for TVA's nuclear sites from NEIL. In the event that an accident covered by this policy takes a nuclear unit offline or keeps a nuclear unit offline, NEIL will pay TVA, after a waiting period, an indemnity (a set dollar amount per week) up to a maximum indemnity of $490 million per unit. This insurance policy may require the payment of retrospective premiums up to a maximum of approximately $30 million.

Decommissioning Costs. TVA recognizes legal obligations associated with the future retirement of certain tangible long-lived assets related primarily to coal-fired generating plants and nuclear generating plants, hydroelectric generating plants/dams, transmission structures, and other property-related assets.

Nuclear . Provision for decommissioning costs of nuclear generating units is based on options prescribed by the NRC procedures to dismantle and decontaminate the facilities to meet the NRC criteria for license termination. At September 30, 2011, the present value under GAAP of the estimated future decommissioning cost of $2.1 billion was included in AROs. The actual decommissioning costs may vary from the derived estimates because of, among other things, changes in current assumptions, such as the assumed dates of decommissioning, changes in regulatory requirements, changes in technology, and changes in the cost of labor, materials, and equipment. Utilities that own and operate nuclear plants are required to use different procedures in calculating nuclear decommissioning costs under GAAP than those that are used in calculating nuclear decommissioning costs when reporting to the NRC. The two sets of procedures produce different estimates for the costs of decommissioning primarily because of the difference in the discount rates used to calculate the present value of decommissioning costs.

TVA maintains a NDT to provide funding for the ultimate decommissioning of its nuclear power plants. The balance at September 30, 2011, was less than the present value of the estimated future nuclear decommissioning costs under the NRC methodology and under GAAP. TVA monitors the monetary value of its NDT and believes that, over the long term and before cessation of nuclear plant operations and commencement of decommissioning activities, adequate funds from investments will be available to support decommissioning. TVA's nuclear power units are currently authorized to operate until 2020-2036, depending on the unit. It may be possible to extend the operating life of some of the units with approval from the NRC. See Note 7 — *Nuclear Decommissioning Costs* and Note 10.

Non-Nuclear Decommissioning . The present value of the estimated future non-nuclear decommissioning cost was $1.0 billion at September 30, 2011. This decommissioning cost estimate involves estimating the amount and timing of future expenditures and making judgments concerning whether or not such costs are considered a legal obligation. Estimating the amount and timing of future expenditures includes, among other things, making projections of the timing and duration of the asset retirement process and how costs will escalate with inflation. The actual decommissioning costs may vary from the derived estimates because of changes in current assumptions, such as the assumed dates of decommissioning, changes in regulatory requirements, changes in technology, and changes in the cost of labor, materials, and equipment.

TVA maintains an ART to help fund the ultimate decommissioning of its power assets. Estimates involved in determining if additional funding will be made to the ART include inflation rate and rate of return projections on the fund investments. See Note 7 — *Non-Nuclear Decommissioning Costs* and Note 10.

Environmental Matters. TVA's power generation activities, like those across the utility industry and in other industrial sectors, are subject to most federal, state, and local environmental laws and regulations. Major areas of regulation affecting TVA's activities include air quality control, water quality control, and management and disposal of solid and hazardous wastes. In the future, regulations in all of these areas are expected to become more stringent. Regulations are also expected to apply to new emissions and sources, with a particular emphasis on climate change, renewable generation, and energy efficiency.

TVA has incurred, and expects to continue to incur, substantial capital and operating and maintenance costs to comply with evolving environmental requirements primarily associated with, but not limited to, the operation of TVA's coal-fired generating units. It is virtually certain that environmental requirements placed on the operation of TVA's coal-fired and other generating units will continue to become more restrictive and potentially apply to new emissions and sources. Litigation over emissions from coal-fired generating units is also occurring, including litigation against TVA. Failure to comply with environmental and safety laws can result in TVA being subject to enforcement actions, which can lead to the imposition of significant civil liability, including fines and penalties, criminal sanctions, and/or the shutting down of non-compliant facilities .

From 1977 to 2011, TVA spent approximately $5.4 billion to reduce emissions from its power plants, including $34 million, $58 million, and $172 million in 2011, 2010, and 2009, respectively. TVA estimates that compliance with future Clean Air Act ("CAA") requirements (excluding greenhouse gas ("GHG") requirements) could lead to additional costs of $3.4 billion from 2012 to 2018. There could be additional material costs if reductions of GHGs, including carbon dioxide ("CO_2"), are mandated under the CAA or by legislation, or if future legislative, regulatory, or judicial actions lead to more stringent emission reduction requirements for conventional pollutants. These costs cannot reasonably be predicted at this time because of the uncertainty of such potential actions.

Liability for releases and cleanup of hazardous substances is primarily regulated by the federal Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), and other federal and parallel state statutes. In a manner similar to many other industries and power systems, TVA has generated or used hazardous substances over the years.

TVA is aware of alleged hazardous-substance releases at eight non-TVA areas for which it may have some liability. There is little or no known evidence that TVA contributed any significant quantity of hazardous substances to six of the non-TVA areas. There is evidence that TVA sent some materials to the remaining two non-TVA sites: the David Witherspoon site in Knoxville, Tennessee, and the Ward Transformer site in Raleigh, North Carolina.

David Witherspoon Site . The David Witherspoon site in Knoxville, Tennessee, was contaminated with radionuclides, polychlorinated biphenyls ("PCBs"), and metals. The DOE admitted to being the main contributor of materials to the site and cleaned the site up at a reported cost of about $35 million. The DOE asked TVA to "cooperate" in completing the cleanup, but TVA believes it sent only a relatively small amount of equipment and that none of it was radioactive. TVA therefore believes its liability for these cleanup costs is limited.

Ward Transformer Site . The Ward Transformer site in Raleigh, North Carolina, is contaminated by PCBs from electrical equipment. There is documentation showing that TVA sent a limited amount of electrical equipment containing PCBs to the site in 1974. A working group of potentially responsible parties (the "PRP Work Group") is cleaning up on-site contamination in accordance with an agreement with the EPA. The cleanup effort has been divided into four areas: two phases of soil cleanup; cleanup of off-site contamination in the downstream drainage basin; and supplemental groundwater remediation. The cost estimate for the first phase of soil cleanup is approximately $55 million. The cost estimate for the second phase of soil cleanup is $10 million. Estimates for cleanup of off-site contamination in the downstream drainage basin range from $6 million to $25 million. There are no reliable estimates for the supplemental groundwater remediation phase. On April 30, 2009, the PRP Work Group filed an amended complaint in federal court against potentially responsible parties who had not yet settled, including TVA, regarding the two phases of soil cleanup. TVA settled this lawsuit and its potential liability for the two phases of soil cleanup for $300 thousand and has been dismissed as a party. Although the settlement with respect to the first two phases does not prohibit TVA from having liability in connection with the other two phases or any natural resource damages, the U.S. Department of Justice is attempting to negotiate a government-wide settlement of the liability of all federal agencies (including TVA) for cleanup of offsite contamination in the downstream drainage basin and the investigative portion of the supplemental groundwater remediation.

TVA operations at some TVA facilities have resulted in oil spills and other contamination that TVA is addressing. At September 30, 2011, TVA's estimated liability for cleanup and similar environmental work for those sites for which sufficient information is available to develop a cost estimate (primarily the TVA sites) is approximately $22 million on a non-discounted basis and was included in Other liabilities on the balance sheet.

Legal Proceedings

From time to time, TVA is a party to lawsuits, claims, proceedings, investigations, and other legal matters ("Legal Proceedings") that have arisen in the ordinary course of conducting TVA's activities, as a result of a catastrophic event or otherwise.

General. TVA had accrued approximately $391 million of potential losses with respect to Legal Proceedings through September 30, 2011. Of this amount, $346 million is included in Other long-term liabilities, $35 million is included in Accounts payable and accrued liabilities, and $10 million is included in regulatory assets. No assurance can be given that TVA will not be subject to significant additional claims and liabilities. If actual liabilities significantly exceed the estimates made, TVA's results of operations, liquidity, and financial condition could be materially adversely affected.

Environmental Agreements. On April 14, 2011, TVA entered into two agreements. The first agreement is a Federal Facilities Compliance Agreement with the EPA . The second agreement is with Alabama, Kentucky, North Carolina, Tennessee, and three environmental advocacy groups: the Sierra Club, National Parks Conservation Association, and Our Children's Earth Foundation. The two agreements (collectively, the "Environmental Agreements") are substantially the same and are parts of a collective undertaking and are described below.

Under the Environmental Agreements:

- Most existing and possible claims against TVA based on alleged NSR and associated violations are waived and cannot be brought against TVA. Some possible claims for sulfuric acid mist and GHG emissions can still be brought against TVA. Additionally, the agreements do not address compliance with new laws and regulations or the cost associated with such compliance.

- The EPA generally will not enforce NSR requirements for new plant maintenance, repair, and component replacement projects against TVA until 2019. Possible claims for NSR violations involving increases in GHG and sulfuric acid mist from projects can still be pursued in the future. Claims for increases in particulates also can be pursued except at TVA's Allen Fossil Plant ("Allen"), Bull Run Fossil Plant ("Bull Run"), Kingston, and Gallatin Fossil Plant ("Gallatin") and Unit 5 at TVA's Colbert Fossil Plant ("Colbert").

- TVA commits to retiring on a phased schedule two units at John Sevier, the six small units at Widows Creek Fossil Plant, and 10 units at Johnsonville. This is a total of approximately 2,700 MW (nameplate capacity) or 2,200 MW (summer net dependable capability). The majority of these retirement costs have been previously included in the ARO liability. Further, the depreciation expense related to these facilities was changed beginning in April 2011 in order to depreciate the assets over their remaining useful lives.

- Of the remaining 5,600 MW (nameplate capacity) or 4,500 MW (summer net dependable capability) coal-fired fleet capacity that is not already fully equipped with advanced SO_2 or NO_x controls, TVA must decide whether to control, convert, or retire 4,300 MW (nameplate capacity) or 3,500 MW (summer net dependable capability) on a unit by unit schedule which can extend until 2019.

- Annual, declining emission caps are set for SO_2 and NO_x.

- TVA, with EPA approval, will invest $290 million in energy efficiency projects, demand response projects, renewable energy projects, and other TVA projects by approximately June 2016.

- TVA will provide Alabama, Kentucky, North Carolina, and Tennessee a total of $60 million in annual installments from 2011 through 2016 to fund environmental projects, giving a preference for projects in the Tennessee River watershed or service area, $4 million of which was paid in 2011.

- The civil penalties of $10 million were paid in July 2011 and expensed during the year ended September 30, 2011. The civil penalty was divided among the EPA, Alabama, Kentucky, and Tennessee.

Failure to comply with the terms of the Environmental Agreements would subject TVA to penalties stipulated in these agreements. TVA is taking actions necessary to comply with the Environmental Agreements.

The liabilities related to the Environmental Agreements detailed above are included in Other long-term liabilities on the September 30, 2011 Balance Sheet. In conjunction with the approval of the Environmental Agreements, the TVA Board determined that it was appropriate to record the amounts detailed above as regulatory assets, and they are included as such on the September 30, 2011 Balance Sheet and will be recovered in rates in future periods.

The agreement with the EPA became effective on June 13, 2011. The United States District Court for the Eastern District of Tennessee ("Eastern District of Tennessee") entered the second agreement on June 30, 2011. In connection with the Environmental Agreements, the following legal and administrative clean air proceedings discussed below are expected to be narrowed in scope:

- The Proceeding Involving the John Sevier CAA Permit, and

- The Proceeding Involving the Shawnee Fossil Plant ("Shawnee") CAA Permit.

Additionally, the following legal and administrative clean air proceedings have already been terminated in connection with the Environmental Agreements:

- The Case Involving Alleged Violations of New Source Review Regulations at Bull Run,

- The Case Brought by North Carolina Alleging Public Nuisance, and

- The Proceeding Involving the Paradise Fossil Plant ("Paradise") CAA Permit.

Legal Proceedings Related to the Kingston Ash Spill . Sixty lawsuits based on the Kingston ash spill have been filed in the Eastern District of Tennessee. Fifteen of these actions have been dismissed. The lawsuits, filed by residents, businesses, and property owners in the Kingston area, allege various causes of action in tort – including nuisance, strict liability, personal injury, and property damage – as well as inverse condemnation, and generally seek unspecified compensatory and punitive damages, court orders to clean up the plaintiffs' properties and surrounding properties, and other relief. Three of the four actions seeking class certification have been voluntarily consolidated in *Chesney* and the fourth action seeking class certification, *Mays* , has been voluntarily dismissed. The court has denied the request for class certification. TVA is the sole defendant in all actions, since the two non-TVA defendants in *Chesney* have been dismissed. On March 26, 2010, the court issued a decision finding (1) the discretionary function doctrine is applicable to TVA's ash pond design decisions and its spill response activities, (2) plaintiffs cannot recover punitive damages against TVA, and (3) plaintiffs have no right to a jury trial against TVA. The court denied TVA's motions with regard to plaintiffs' tort claims concerning TVA's maintenance and upkeep of the ash pond, along with the inverse condemnation claims raised by certain plaintiffs.

On March 22, 2011, the court issued decisions on two motions filed by TVA. With respect to the TVA motions, the court held that (1) a plaintiff could not bring a claim for TVA's allegedly having caused a nuisance with regard to property if the plaintiff did not have a valid property interest in that property and (2) a plaintiff who filed for bankruptcy after bringing suit against TVA but did not include the suit in the bankruptcy proceeding was barred from pursuing the suit against TVA.

On March 24, 2011, the court issued a decision which granted TVA's motion for summary judgment on any claim related to activities the court had previously ruled as being protected by the discretionary function doctrine (ash pond design and spill response activities). The court denied TVA's motion with regard to any alleged failures to adequately inform or train personnel in applicable policies or procedures or negligent maintenance. The court also held that while TVA's design and construction decisions concerning the ash pond were protected by the discretionary function doctrine, the court would not grant summary judgment on claims related to alleged negligence in carrying out such design and construction decisions.

On April 19, 2011, plaintiffs in one of the lawsuits requested permission from the court to file an amended complaint which asserts only claims based on alleged property damage, including nuisance and trespass. The court allowed the amended complaint, and the case with regard to these plaintiffs will proceed on the property damage claims and not on any personal injury or related claims, including requests for medical monitoring.

On August 2, 2011, the court granted summary judgment in favor of TVA on plaintiffs' personal injury, emotional distress, and inverse condemnation claims. The court denied summary judgment on the trespass, nuisance, and property injury claims.

Trial on the issue of causation took place in the seven earliest filed cases from September 15 to October 12, 2011. A decision is expected sometime in the spring or summer of 2012. The court held a proceeding involving 38 of the remaining cases on November 1, 2011. In this proceeding, the court entered a stipulation that the evidence introduced in the previous trial on the causation issue would provide the evidence to be used in making a decision in these 38 cases.

TVA has received several notices of intent to sue under various environmental statutes from both individuals and environmental groups. In addition, TVA has received substantial other claims from individuals and companies allegedly affected by the ash spill and may receive additional claims or be subject to additional lawsuits.

Civil Penalty and Natural Resource Damages for the Kingston Ash Spill . On June 14, 2010, TDEC issued a civil penalty order of approximately $12 million to TVA for the Kingston ash spill, citing violations of the Tennessee Solid Waste Disposal Act and the Tennessee Water Quality Control Act. Of the $12 million, TVA has already satisfied $8 million and may also be credited up to $2 million for performing environmental projects approved by TDEC. The remaining obligation will be paid in installments through July 2012. On January 24, 2011, TVA entered into a memorandum of agreement with the TDEC and the Fish and Wildlife Service establishing a process and a method for resolving the natural resource damage claim associated with the Kingston ash spill. As part of this memorandum of agreement, TVA agreed to pay $250 thousand each year for three years as a down payment on the amount of natural resource damages ultimately established. TVA is also required to reimburse TDEC and the Fish and Wildlife Service for their costs.

Case Brought by North Carolina Alleging Public Nuisance . On January 30, 2006, North Carolina filed suit against TVA in the United States District Court for the Western District of North Carolina, alleging that TVA's operation of its coal-fired power plants in Tennessee, Alabama, and Kentucky constitutes a public nuisance. On January 13, 2009, the court held that emissions from Bull Run, Kingston, and John Sevier, located in Tennessee, and Widows Creek, located in Alabama, constitute a public nuisance.

TVA appealed the decision to the United States Court of Appeals for the Fourth Circuit ("Fourth Circuit"), which on July 26, 2010, reversed the holding of the district court and directed the district court to dismiss the action against TVA. In its decision, the Fourth Circuit held that (1) state laws, including nuisance laws, could not be used to bypass the regulatory structure established by Congress and the EPA for controlling emissions; (2) the district court improperly applied North Carolina law to power plants located in Alabama and Tennessee; and (3) the plant operations in Alabama and Tennessee could not be considered nuisances because both states had specifically approved these operations. North Carolina requested an *en banc* rehearing, but the Fourth Circuit denied this request on September 21, 2010. The district court dismissed the case with prejudice on October 1, 2010. North Carolina filed a petition for review of the Fourth Circuit's decision with the U.S. Supreme Court on February 2, 2011. On July 22, 2011, the U.S. Supreme Court granted the parties joint motion to withdraw the petition for review, ending this case. See *Environmental Agreements* .

Case Involving Alleged Violations of the New Source Review Regulations at Bull Run . The National Parks Conservation Association and the Sierra Club filed suit against TVA on February 13, 2001, in the Eastern District of Tennessee, alleging that TVA did not comply with the NSR requirements of the CAA when TVA repaired Bull Run. On March 31, 2010, the court ruled in TVA's favor, holding that two maintenance projects at Bull Run fell under the exception for "routine maintenance repair and replacement" and therefore did not require NSR permits. The plaintiffs appealed this decision to the United States Court of Appeals for the Sixth Circuit ("Sixth Circuit"). On July 6, 2011, the Sixth Circuit granted the parties' joint motion to dismiss this case. See *Environmental Agreements* .

Case Involving Tennessee Valley Authority Retirement System . On March 5, 2010, eight current and former participants in and beneficiaries of TVARS filed suit in the United States District Court for the Middle District of Tennessee against the six then-current members of the TVARS Board. The lawsuit challenged the TVARS Board's decision to suspend the TVA contribution requirements for 2010 through 2013, and to amend the TVARS Rules and Regulations to (1) reduce the calculation for COLA benefits for CY 2010 through CY 2013, (2) reduce the interest crediting rate for the fixed fund accounts, and (3) increase the eligibility age to receive COLAs from age 55 to 60. The plaintiffs allege that these actions violated the TVARS Board members' fiduciary duties to the plaintiffs (and the purported class) and the plaintiffs' contractual rights, among other claims. The plaintiffs sought, among other things, unspecified damages, an order directing the TVARS Board to rescind the amendments, and the appointment of a seventh TVARS Board member. Five of the six individual defendants filed motions to dismiss the lawsuit, while the remaining defendant filed an answer to the complaint. On July 28, 2010, TVA moved to intervene in the suit in the event it was not dismissed. On September 7, 2010, the district court dismissed the breach of fiduciary duty claim against the directors without prejudice, allowing the plaintiffs to file an amended complaint within 14 days against TVARS and TVA but not the individual directors. The plaintiffs previously had voluntarily withdrawn their constitutional claims, so the court also dismissed those claims without prejudice. The court dismissed with prejudice the plaintiffs' claims for breach of contract, violation of the Internal Revenue Code, and appointment of a seventh TVARS Board member.

On September 21, 2010, the plaintiffs filed an amended complaint against TVARS and TVA. The plaintiffs allege, among other things, violations of their constitutional rights (due process, equal protection, and property rights), violations of the Administrative Procedure Act, and breach of statutory duties owed to the plaintiffs. They seek a declaratory judgment and appropriate relief for the alleged statutory and constitutional violations and breaches of duty. TVA filed its answer to the amended complaint on December 27, 2010. A briefing schedule has been issued and final disposition motions are due in 2012.

Case Arising out of Hurricane Katrina . In April 2006, TVA was added as a defendant to a class action lawsuit brought in the United States District Court for the Southern District of Mississippi by 14 Mississippi residents allegedly injured by Hurricane Katrina. The plaintiffs sued seven large oil companies and an oil company trade association, three large chemical companies and a chemical trade association, and 31 large companies involved in the mining and/or burning of coal, alleging that the defendants' GHG emissions contributed to global warming and were a proximate and direct cause of Hurricane Katrina's increased destructive force. Action by the United States Supreme Court on January 10, 2011, ended this case in a manner favorable to TVA.

On May 27, 2011, under a Mississippi state statute that permits the re-filing of lawsuits that were dismissed on procedural grounds, the plaintiffs filed another lawsuit against the same and additional defendants, again alleging that the defendants' greenhouse gas emissions contributed to global warming and were a proximate and direct cause of Hurricane Katrina' s increased destructive force. A number of defendants, including TVA, have filed motions to dismiss the complaint.

Global Warming Cases, Southern District of New York . On July 21, 2004, two lawsuits were filed in the United States District Court for the Southern District of New York against TVA and other companies that generate power from fossil-fuel electric generating facilities alleging that global warming is a public nuisance and that CO_2 emissions from fossil-fuel electric generating facilities should be ordered abated because they contribute to causing the nuisance. The first case was filed by various states (California, Connecticut, Iowa, New Jersey, New York, Rhode Island, Vermont, and Wisconsin) and the City of New York against TVA and other power suppliers. The second case, which also alleges private nuisance, was filed against the same defendants by Open Space Institute, Inc., Open Space Conservancy, Inc., and the Audubon Society of New Hampshire. The plaintiffs seek a court order requiring each defendant to cap its CO_2 emissions and then reduce these emissions by an unspecified percentage each year for at least a decade. In September 2005, the district court dismissed both lawsuits because they raised political questions that should not be decided by the courts. The plaintiffs appealed to the United States Court of Appeals for the Second Circuit ("Second Circuit"). On September 21, 2009, the Second Circuit reversed the district court's decision and remanded the cases to the district court for further proceedings. On November 5, 2009, TVA and the other defendants filed a petition seeking a rehearing by the entire Second Circuit, which petition was denied on March 5, 2010. On December 6, 2010, the U.S. Supreme Court granted a petition requesting that the Supreme Court review the Second Circuit's decision. The U.S. Solicitor General filed a brief on behalf of TVA on January 31, 2011. Oral arguments were held on April 19, 2011. On June 16, 2011, the Supreme Court issued a decision reversing the Second Circuit's ruling and holding that any federal common law cause of action was displaced by the CAA and its implementing regulations. The Supreme Court did not address the plaintiffs' state law claims, but instead remanded the case to the Second Circuit for consideration of these claims. The Second Circuit has sent both lawsuits back to the district court for further proceedings.

Case Regarding Bellefonte Nuclear Plant Units 1 and 2. On March 9, 2009, in response to a request by TVA, the NRC issued an order reinstating the construction permits for Bellefonte Units 1 and 2 and returning the Bellefonte construction permits to a terminated status. On March 30, 2009, Blue Ridge Environmental Defense League ("BREDL") filed a petition in the United States Court of Appeals for the District of Columbia Circuit ("D.C. Circuit") challenging the NRC's authority to reinstate the construction permits and alleging that the NRC failed to follow the requirements of the National Environmental Policy Act ("NEPA"). TVA was permitted to intervene in this proceeding. On June 11, 2009, the D.C. Circuit issued an order holding the case in abeyance pending further order of the court. On March 8, 2010, BREDL filed a second petition in the D.C. Circuit, again challenging the NRC's compliance with NEPA and the NRC's authority to reinstate the construction permits. TVA was granted intervenor status in this case as well, and requested that the court dismiss this second petition. On July 26, 2010, the D.C. Circuit consolidated the two BREDL petitions and continued the stay of the case pending the conclusion of an administrative proceeding concerning the same issues. The administrative proceeding, in which BREDL challenged the reinstatement of the construction permits before an NRC Atomic Safety and Licensing Board ("ASLB"), was completed on September 29, 2010, with the dismissal of all contentions. Upon completion of the administrative proceeding, the D.C. Circuit on November 5, 2010, issued an order returning the two cases to the court's active docket. Final briefs have been submitted, and oral arguments took place on October 20, 2011.

Administrative Proceedings Regarding Bellefonte Units 3 and 4 . TVA submitted its combined construction and operating license application ("CCOLA") for two Advanced Passive 1000 reactors at Bellefonte Units 3 and 4 to the NRC in October 2007. On June 6, 2008, Bellefonte Efficiency and Sustainability Team ("BEST"), BREDL, and Southern Alliance for Clean Energy ("SACE") submitted to the NRC a joint petition for intervention and a request for a hearing. The petition raised 20 potential contentions with respect to TVA's CCOLA. The ASLB denied standing to BEST and admitted four of the 20 contentions submitted by BREDL and SACE. The NRC later reversed the ASLB's decision to admit two of the four contentions, leaving only two contentions (which involve questions about the estimated costs of the new nuclear plant and the impact of the facility's operations, in particular the plant intake, on aquatic ecology) to be litigated in a future hearing. On September 29, 2010, TVA notified the NRC that the recently completed final Supplemental Environmental Impact Statement had determined that completion of the partially constructed Bellefonte Unit 1 is the preferred alternative for near-term additional generating capacity at the Bellefonte site. Consequently, with the exception of the ongoing review of hydrology-related portions of the application, TVA requested that the NRC defer review of the Bellefonte Units 3 and 4 CCOLA pending a final decision of the TVA Board regarding new generation capacity at the Bellefonte site. On September 2, 2011, TVA informed the ASLB that it is analyzing the path forward for the Bellefonte Units 3 and 4 CCOLA in light of the August 18, 2011 decision by the TVA Board to authorize completion of Bellefonte Unit 1. TVA expects to complete this analysis by the end of CY 2011, and has requested the Bellefonte Units 3 and 4 CCOLA continue to be deferred until a final decision is made.

On August 11, 2011, BREDL and SACE petitioned for the admission of a new, late-filed contention to require the environmental analysis completed for the CCOLA to consider the findings of the NRC's Near-Term Task Force on the Fukushima Event regarding the events at the Fukushima Daiichi Nuclear Power Plant ("Fukushima Daiichi"). TVA submitted a reply brief on August 25, 2011, opposing admission of such a contention on the grounds it does not satisfy the standards for non-timely contentions or the standards for admitting a new contention. The NRC submitted a brief opposing the new contention on similar grounds on September 6, 2011. BREDL and SACE filed their response to TVA's and the NRC's reply briefs on September 19, 2011. TVA filed a motion to strike the reply on administrative and procedural grounds on September 22, 2011.

Administrative Proceedings Regarding Watts Bar Nuclear Plant Unit 2 . On July 13, 2009, SACE, the Tennessee Environmental Council, the Sierra Club, We the People, and BREDL filed a request for a hearing and petition to intervene in the NRC administrative process reviewing TVA's application for an operating license for Watts Bar Unit 2. The petitioners raised seven contentions related to TVA's environmental review of the project and the NRC's basis for confidence in the availability of safe storage options for spent nuclear fuel. On November 19, 2009, the ASLB granted SACE's request for hearing, admitted two of SACE's seven contentions for hearing, and denied the request for hearing submitted on behalf of the other four petitioners. On March 26, 2010, the NRC affirmed the ASLB's decision denying the other petitioners the opportunity to participate. After providing additional information to the NRC on April 9, 2010, which addressed one of the two admitted contentions, TVA submitted a motion asking the ASLB to dismiss the contention as moot. The motion was unopposed by SACE and on June 2, 2010, the ASLB granted TVA's motion to dismiss the contention. SACE also asked the ASLB to waive the NRC's longstanding regulations establishing that, for the purposes of NEPA, the need for power and alternative energy source issues will not be considered in operating license proceedings. On June 29, 2010, the ASLB denied this request and declined to refer the waiver petition to the NRC for consideration. SACE subsequently filed a petition for interlocutory review of this decision with the NRC, which the NRC denied on November 30, 2010. Regarding the sole remaining contention which raises concerns about the aquatic impacts of two-unit operation, several additional reports have been provided to the NRC providing up-to-date information to address this contention. These reports include a mussel survey report and an entrainment report, both issued on March 24, 2011, and an impingement report issued on March 29, 2011. A supplement to the impingement report was submitted on April 28, 2011. A hearing on the remaining contention is expected to take place in the latter part of 2012. On August 11, 2011, SACE petitioned for the admission of a new, late-filed contention to require the environmental analysis completed for TVA's operating license application to consider the findings of the NRC's Near-Term Task Force on the Fukushima Event regarding the events at the Fukushima Daiichi reactors. TVA submitted a reply brief on September 6, 2011, opposing admission of such a contention on the grounds it does not satisfy the standards for non-timely contentions or the standards for admitting a new contention.

John Sevier Fossil Plant Clean Air Act Permit . On September 20, 2010, the Environmental Integrity Project, the Southern Environmental Law Center, and the Tennessee Environmental Council filed a petition with the EPA, requesting that the EPA Administrator object to the CAA permit issued to TVA for operation of John Sevier. Among other things, the petitioners allege that repair, maintenance, or replacement activities undertaken at John Sevier Unit 3 in 1986 triggered the Prevention of Significant Deterioration ("PSD") requirements for SO_2 and NO_x. The CAA permit, issued by TDEC, remains in effect pending the disposition of the EPA's petition. The Environmental Agreements should narrow the scope of this proceeding. See *Environmental Agreements* .

Paradise Fossil Plant Clean Air Act Permit . On December 21, 2007, the Sierra Club, the Center for Biological Diversity, Kentucky Heartwood, Preston Forsythe, and Hilary Lambert filed a petition with the EPA raising objections to the conditions of TVA's current CAA permit at Paradise. Among other things, the petitioners allege that activities at Paradise triggered the NSR requirements for NO_x and that the monitoring of opacity at Units 1 and 2 of the plant is deficient. In an order issued in July 2009, the EPA agreed that the permit failed to include a proper PSD analysis for NO_x emission increases as a result of physical changes made to the plant's three main boilers in the 1984-1986 period, that the permit failed to require adequate monitoring systems for opacity and NO_x, and that the monitoring of soot emissions from the coal washing and handling plant was inadequate. TVA's permit at Paradise is issued by the Kentucky Division for Air Quality ("KDAQ"). In November 2009, KDAQ determined that the actions at Paradise had not triggered NSR requirements and reissued the operating permit without including NSR compliance milestones. On January 9, 2010, the Sierra Club petitioned the EPA to object to the operating permit, alleging that KDAQ had failed to properly take into account the PSD requirements for the physical changes made in 1986. On May 21, 2010, the Sierra Club filed a lawsuit seeking to compel the EPA to act on the petition. To resolve this lawsuit, the EPA entered into with the Sierra Club under which the EPA agreed to respond to the petition. On May 2, 2011, the EPA denied the petition, citing the Environmental Agreements. See *Environmental Agreements* .

Shawnee Fossil Plant Clean Air Act Permit . On December 16, 2010, the Environmental Integrity Project and the SACE filed a petition with the EPA requesting that the EPA Administrator object to the proposed CAA renewal permit issued to TVA for operations at Shawnee. Among other things, the petitioners allege that repair, maintenance, or replacement undertaken at Shawnee Units 1 and 4 in the 1989-90 period triggered the PSD requirements for SO_2 and NO_x. The current permit remains in effect pending KDAQ's finalization of the renewal permit. The Environmental Agreements should narrow the scope of this proceeding. See *Environmental Agreements* .

Kingston NPDES Permit Appeal . The Sierra Club filed a challenge to the National Pollutant Discharge Elimination System ("NPDES") permit issued by Tennessee for the scrubber-gypsum pond discharge at Kingston in November 2009 before the Tennessee Water Quality Control Board ("TWQCB"). This is the second such challenge nationally. In addition to its allegation that Tennessee violated the Clean Water Act by failing to set specific limits on certain toxic discharges, the Sierra Club alleges that no discharges from the pond infrastructure should be allowed because zero-discharge scrubbers exist. TDEC is the defendant in the challenge, and TVA has intervened in support of TDEC's decision to issue the permit. The matter was set for a hearing before the TWQCB in February 2011 but has since been stayed by agreement of the parties. The other similar challenge involves an Allegheny Power NPDES permit for its scrubber discharge at a Pennsylvania plant.

Bull Run NDPES Permit Appeal. SACE and the Tennessee Clean Water Network ("TCWN") filed a challenge to the NPDES permit for Bull Run on November 1, 2010. TDEC is the defendant in the challenge and TVA's petition to intervene to support TDEC's decision to issue the permit was granted on January 12, 2011. The matter is expected to go to a hearing before the TWQCB in the spring of 2012.

Johnsonville Fossil Plant NDPES Permit Appeal. SACE and TCWN filed a challenge to the NPDES permit for Johnsonville on or about March 10, 2011. TDEC is the defendant in the challenge. TVA's motion to intervene was granted on August 3, 2011. The matter has not yet been given a hearing date before the TWQCB.

John Sevier Fossil Plant NDPES Permit Appeal. SACE and TCWN filed a challenge to the NPDES permit for John Sevier on or about May 31, 2011. TDEC is the defendant in the challenge. TVA's motion to intervene was granted on August 3, 2011. The matter has not yet been given a hearing date before the TWQCB.

Information Request from the EPA . On April 25, 2008, TVA received a request from the EPA under Section 114 of the CAA requesting extensive information about maintenance, repair, and replacement projects at and the operations of 14 coal-fired units. The Environmental Agreements have resolved most issues related to this information request, excluding claims related to sulfuric acid mist. See *Environmental Agreements* .

Petitions Resulting from Japanese Nuclear Events. As a result of the events precipitated by the March 11, 2011 Japanese nuclear events, petitions have been filed with the NRC which could impact TVA's nuclear program. While some petitions have been dismissed after review, petitions that remain open include the following:

- *Petition to Immediately Suspend the Operating Licenses of GE BWR Mark I Units Pending the Full NRC Review With Independent Expert and Public Participation From Affected Emergency Planning Zone Communities*

  Beyond Nuclear filed a petition on April 13, 2011, requesting that the NRC take emergency enforcement action against all nuclear reactor licensees that operate units that use the General Electric Mark I BWR design. TVA uses this design at Browns Ferry Units 1, 2, and 3. The petition requests the NRC to take several actions, including the suspension of the operating licenses at the affected nuclear units, including Browns Ferry Units 1, 2, and 3, until several milestones have been met.

- *Twelve separate petitions on various issues*

  On July 27, 2011, the Natural Resources Defense Council submitted twelve separate letters to the NRC requesting action on various health and safety aspects of operating nuclear facilities in the United States. The NRC is treating these as a single 2.206 Petition, and the issues are currently under review.

- *Petition Pursuant to 10 CFR 2.206 - Demand For Information Regarding Compliance with 10 CFR 50, Appendix A, General Design Criterion 44, Cooling Water, and 10 CFR 50.49, Environmental Qualification*

  A petition was filed by the Union of Concerned Scientists on July 29, 2011, requesting that a demand for information be issued for affected licensees, including TVA with regards to Browns Ferry, to describe how the facility complies with General Design Criterion 44, Cooling Water, within Appendix A to 10 CFR Part 50, and with 10 CFR 50.49, Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants, for all applicable design and licensing bases events. This petition is under review.

21. Related Parties

TVA is a wholly-owned corporate agency of the federal government, and because of this relationship, TVA's revenues and expenses are included as part of the federal budget. TVA's purpose and responsibilities as an agency are described under the "Other Agencies" section of the federal budget.

TVA currently receives no appropriations from Congress and funds its business using power system revenues, power financings, and other revenues. TVA is a source of cash to the federal government. TVA must repay $50 million of the Power Program Appropriation Investment, and then pay a return on the outstanding balance of this investment indefinitely. See Note 15 — *Appropriation Investment.*

TVA also has access to a financing arrangement with the U.S. Treasury pursuant to the TVA Act. TVA and the U.S. Treasury entered into a memorandum of understanding under which the U.S. Treasury provides TVA with a $150 million credit facility. This credit facility matures on September 30, 2012, and is expected to be renewed. Access to this credit facility or other similar financing arrangements has been available to TVA since the 1960s. See Note 11 — *Credit Facility Agreements.*

In the normal course of business, TVA contracts with other federal agencies for sales of electricity and other services. Transactions with agencies of the federal government were as follows:

Related Party Transactions
For the years ended, or at, September 30

	2011	2010	2009
Sales of electricity services	$ 130	$ 116	$ 127
Other revenues	104	99	134
Other expenses	295	263	250
Cash	2	2	1
Receivables	84	26	19
Investments	25	225	25
Payables	175	129	133
Return on Power Program Appropriation Investment	7	9	13
Repayment of Power Program Appropriation Investment	20	24	20

22. Unaudited Quarterly Financial Information

A summary of the unaudited quarterly results of operations for the years 2011 and 2010 follows. This summary should be read in conjunction with the audited financial statements appearing herein. Results for interim periods may fluctuate as a result of seasonal weather conditions, changes in rates, and other factors.

Unaudited Quarterly Financial Information
2011

	First	Second	Third	Fourth	Total
Operating revenues	$ 2,828	$ 2,968	$ 2,657	$ 3,388	$ 11,841
Operating expenses	2,558	2,401	2,575	2,870	10,404
Operating income	270	567	82	518	1,437
Net income (loss)	(48)	253	(240)	197	162

	2010				
	First	Second	Third	Fourth	Total
Operating revenues	$ 2,349	$ 2,622	$ 2,587	$ 3,316	$ 10,874
Operating expenses	1,878	1,875	2,073	2,806	8,632
Operating income	471	747	514	510	2,242
Net income (loss)	150	430	199	193	972

TVA experienced an increase in pension and post-retirement expense, higher operating and maintenance expenses, and an increase in expenses related to outages at nuclear and coal-fired plants which negatively affected the results of the first three quarters of 2011. The majority of the change in quarterly net income during 2011 occurred during the third quarter. This change is primarily due to an increase in expenses related to the repair of significant damage and purchase of replacement power necessitated by the series of storms on April 27, 2011, and April 28, 2011.

23. Subsequent Events

Redemption of Debt

On October 15, 2011, TVA redeemed all of its 2008 5.00 percent electronotes® due October 15, 2023. These securities are identified by the CUSIP number 88059TEH0. The notes were redeemed at 100 percent of par value. Approximately $15 million of the 88059TEH0 electronotes® were outstanding at September 30, 2011.

Liquidation of Commodity Broker-Dealer

On October 31, 2011, MF Global Holding Ltd. (parent company), and its subsidiary MF Global Finance USA Inc. filed for bankruptcy protection under Chapter 11 of the U.S. Bankruptcy Code. On the same date, a Securities Investor Protection Act proceeding was filed against MF Global Inc. (“MF Global”). TVA had used MF Global to clear certain trades and the MF Global Trustee has retained $33 million of TVA's cash collateral. While TVA expects to receive a substantial portion of the funds currently being held by the MF Global Trustee the timing and the amount of the funds' returns cannot be determined.

Report of Independent Registered Public Accounting Firm

The Board of Directors of Tennessee Valley Authority

We have audited the accompanying balance sheets of Tennessee Valley Authority as of September 30, 2011 and 2010, and the related statements of income, changes in proprietary capital, and cash flows for each of the three years in the period ended September 30, 2011. Our audit also included the financial statement schedule listed in the Index at Item 15(a) for the years ended September 30, 2011, 2010 and 2009. These financial statements and schedules are the responsibility of Tennessee Valley Authority's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Tennessee Valley Authority at September 30, 2011 and 2010 and the results of its operations and its cash flows for each of the three years in the period ended September 30, 2011, in conformity with U.S. generally accepted accounting principles. Also, in our opinion the related financial statement schedule, when considered in relation to the basic financial statements taken as a whole, presents fairly in all material respects the information set forth therein for the years ended September 30, 2011, 2010 and 2009.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), Tennessee Valley Authority's internal control over financial reporting as of September 30, 2011, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated November 17, 2011 expressed an unqualified opinion thereon.

/s/ Ernst & Young LLP

Chattanooga, Tennessee
November 17, 2011

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

Not Applicable.

ITEM 9A. CONTROLS AND PROCEDURES

Disclosure Controls and Procedures

TVA's management, including the President and Chief Executive Officer and members of the Disclosure Control Committee, including the Chief Financial Officer and the Vice President and Controller (Principal Accounting Officer), evaluated the effectiveness of TVA's disclosure and controls procedures (as defined in Rule 13a-15(e) under the Exchange Act) as of September 30, 2011. Based on this evaluation, TVA's management, including the President and Chief Executive Officer and members of the Disclosure Control Committee including the Chief Financial Officer and the Vice President and Controller (Principal Accounting Officer), concluded that TVA's disclosure controls and procedures were effective as of September 30, 2011, to ensure that information required to be disclosed by TVA in reports that it files or submits under the Exchange Act, is recorded, processed, summarized, and reported, within the time periods specified in the SEC's rules and forms, and include controls and procedures designed to ensure that information required to be disclosed by TVA in such reports is accumulated and communicated to TVA's management, including the President and Chief Executive Officer and members of the Disclosure Control Committee including the Chief Financial Officer and the Vice President and Controller (Principal Accounting Officer), as appropriate, to allow timely decisions regarding required disclosure.

Internal Control over Financial Reporting

(a) Management's Annual Report on Internal Control over Financial Reporting

TVA's management is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Exchange Act Rule 13a-15(f) and required by Section 404 of the Sarbanes-Oxley Act. TVA's internal control over financial reporting is designed to provide reasonable, but not absolute, assurance regarding the reliability of financial reporting and the preparation of financial statements in accordance with generally accepted accounting principles. Because of the inherent limitations in all control systems, internal controls over financial reporting and systems may not prevent or detect misstatements.

TVA's management, including the President and Chief Executive Officer and members of the Disclosure Control Committee including the Chief Financial Officer and the Vice President and Controller (Principal Accounting Officer), evaluated the design and effectiveness of TVA's internal control over financial reporting as of September 30, 2011, based on the framework in Internal Control — Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission, referred to as ("COSO"). Based on this evaluation, TVA's management concluded that TVA's internal control over financial reporting was effective as of September 30, 2011.

Although management's report on the effectiveness of internal control over financial reporting was not subject to attestation by TVA's registered public accounting firm, TVA has chosen to obtain such a report. Ernst & Young LLP, the registered public accounting firm that audited the financial statements included in this Annual Report, has issued an
attestation report on TVA's internal control over financial reporting. The attestation report appears below.

During 2011, TVA acquired all of the assets that comprise Magnolia Combined Cycle Plant ("Magnolia"). TVA excluded Magnolia from its assessment of internal control over financial reporting as of September 30, 2011, because it was not acquired by TVA until August 31, 2011. The assets related to Magnolia that have been excluded from the assessment were equal to 0.9 percent of TVA's assets as of September 30, 2011.

(b) Changes in Internal Control over Financial Reporting

During the quarter ended September 30, 2011, there were no changes in TVA's internal control over financial reporting that materially affected, or are reasonably likely to materially affect, TVA's internal control over financial reporting.

Report of Independent Registered Public Accounting Firm

The Board of Directors of Tennessee Valley Authority

We have audited Tennessee Valley Authority's internal control over financial reporting as of September 30, 2011, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (the COSO criteria). Tennessee Valley Authority's management is responsible for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Annual Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the company's internal control over financial reporting based on our audit.

We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions or that the degree of compliance with the policies or procedures may deteriorate.

As indicated in the accompanying Management's Annual Report on Internal Control over Financial Reporting, management's assessment of and conclusion on the effectiveness of internal control over financial reporting did not include the internal controls of the Magnolia Combined Cycle Plant (Magnolia), which is included in the 2011 financial statements of Tennessee Valley Authority and constituted approximately 0.9% of total net assets as of September 30, 2011. Our audit of internal control over financial reporting of the Tennessee Valley Authority also did not include an evaluation of the internal control over financial reporting of Magnolia.

In our opinion, Tennessee Valley Authority maintained, in all material respects, effective internal control over financial reporting as of September 30, 2011, based on the COSO criteria **.**

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the balance sheets of Tennessee Valley Authority as of September 30, 2011 and 2010, and the related statements of income, changes in proprietary capital, and cash flows for each of the three years in the period ended September 30, 2011 and our report dated November 17, 2011 expressed an unqualified opinion thereon.

/s/ Ernst & Young LLP

Chattanooga, Tennessee
November 17, 2011

ITEM 9B. OTHER INFORMATION

The TVA Board, at its November 17, 2011 meeting, approved the following items related to compensation: (i) design changes to TVA's Winning Performance Team Incentive Plan (“WPTIP”) and Executive Annual Incentive Plan (“EAIP”); (ii) TVA corporate measures and goals for 2012 on which TVA's performance will be measured and awards under the WPTIP and EAIP may be made to employees, including the executive officers named in the Summary Compensation Table (the “Named Executive Officers” or “NEOs”), for 2012; (iii) modifications to the Executive Long-Term Incentive Plan (“ELTIP”) performance measures and goals for the three-year cycle ending September 30, 2013 (2011-2013); and (iv) ELTIP performance measures and goals for the three-year cycle ending September 30, 2014 (2012-2014). In addition, on November 15, 2011, Mr. Kilgore approved certain compensation adjustments for Mr. Thomas, Mr. McCollum, Ms. Greene, and Mr. Swafford for 2012. Each of these items is discussed in more detail below.

WPTIP/EAIP Design Modifications

The TVA Board approved two design changes to the WPTIP and EAIP beginning in 2012. The first design change to the EAIP realigns the payout methodology of the EAIP with that of the WPTIP. The previous EAIP established a funding pool for all participants, including the NEOs other than Mr. Kilgore, that tied annual incentive awards to the achievement of TVA corporate-level performance measures only. This revision eliminates the EAIP funding pool and incorporates Strategic Business Unit (“SBU”) goal performance for those executives who support organizations with business-unit scorecards (TVA's operating plants, operating divisions, and strategy and external relations organization) (which include Ms. Greene and Mr. Swafford) in addition to TVA corporate-level performance measures. The performance of corporate executive EAIP participants (which include Mr. Kilgore, Mr. Thomas, and Mr. McCollum) will still be aligned to the performance of just TVA corporate-level performance measures. The second design change to both the EAIP and the WPTIP is the revision of the corporate modifier range used in the calculation of incentive awards under both plans from a range -20 percent to +10 percent to a range of -20 percent to +20 percent in order to provide an equivalent upside adjustment for years of strong performance.

The WPTIP and EAIP would maintain Mr. Kilgore's discretion as the President and Chief Executive Officer ("CEO") to use the corporate modifier to adjust the amount of incentive awards based on his subjective assessment of TVA's performance during the year and consideration of factors that are significant to TVA but not easily quantifiable. In addition, the EAIP would also maintain the CEO's discretion to adjust individual incentive awards based on subjective assessments of individual performances during the year. Therefore, for 2012, Mr. Kilgore will continue to subjectively evaluate the performance of Mr. Thomas, Mr. McCollum, Ms. Greene, and Mr. Swafford during the year for purposes of determining whether to adjust any of their incentive awards under the EAIP. In addition, for 2012, the Chairman of the TVA Board, in consultation with the People and Performance Committee and with input from individual members of the TVA Board, will continue to subjectively evaluate the performance of Mr. Kilgore as CEO for purposes of determining whether to adjust Mr. Kilgore's incentive award under the EAIP.

TVA Corporate Scorecard

The TVA Board established three TVA corporate-level performance measures for the WPTIP and EAIP for 2012: Net Cash Flow, Nuclear Equivalent Availability Factor, and Critical Fossil Seasonal Equivalent Forced Outage Rate. These performance measures, along with their associated weights and goals, are as follows:

2012 TVA Corporate Scorecard

		Goals		
Performance Measure	**Weight**	**Threshold (50%)**	**Target (100%)**	**Maximum (150%)**
Net Cash Flow ($ Millions) (1)	50%	$0 (Budget less $200)	$200 (Budget includes $200 of cash reserves)	$400 (Budget plus $200)
Nuclear Equivalent Availability Factor (2)	25%	89.2%	90.1%	92.2%
Critical Fossil Seasonal Equivalent Forced Outage Rate (3)	25%	8.5%	6.8%	5.1%

Notes
(1) Net Cash Flow for this purpose is a non-GAAP measure that is derived from items in the Statement of Cash Flow as follows: Net Cash Flow = $200,000,000 cash reserves plus Cash Flow from Operations plus Cash Flow Used in Investing Activities minus Net Cash Flow from Change in Fuel Cost Adjustment Deferral Account.
(2) Nuclear Equivalent Availability Factor is a ratio of actual available generation from the nuclear generating assets in a given period compared to maximum availability.
(3) Critical Fossil Seasonal Equivalent Forced Outage Rate is the percentage of generation loss due to forced outages with respect to total generation capability for the peak periods of December-March and June-September. Forced outages are unplanned outages caused by equipment failures or problems. This calculation only includes critical low-cost coal-fired plants (Allen Fossil Plant, Cumberland, Gallatin, Paradise and Shawnee) and three combined-cycle plants (Caledonia, Lagoon Creek and Southaven).

ELTIP Performance Criteria

For the ELTIP performance cycle ending September 30, 2013, the TVA Board approved two amendments to the previously approved performance measures and goals: (i) changing the Retail Rates goals to reflect percent gap improvements to top quartile performance, and (ii) removing the Stakeholder Survey as a performance measure and shifting its 10 percent weighting to the Organizational Health Index. With these amendments, the performance measures, along with their associated weights and goals, for the 2011-2013 ELTIP performance cycle are as follows:

2011-2013 ELTIP Performance Cycle

Performance Measure	**Weight**	**Threshold (50%)**	**Target (100%)**	**Maximum (150%)**
Retail Rates (1)	40%	Improve to 10.75% gap vs. 2012 Top Quartile	Improve to 10% gap vs. 2012 Top Quartile	Improve to 9% gap vs. 2012 Top Quartile
System Reliability Load Not Served (2)	30%	7.8	5.9	3.8
Responsibility Organizational Health Index (3)	30%	61%	66%	71%

Notes
(1) Distributor reported retail power revenue and directly served power revenue divided by distributor reported retail sales and directly served power sales during this cycle. TVA compares its retail rates to the retail rates of the following peer regional holding company utilities: Southern Company, NextEra Energy Inc., American Electric Power Co., Inc., Duke Energy Corp., Progress Energy Inc., Entergy Corp., Dominion Resources Inc., Ameren Corp., and PPL.
(2) Load Not Served, which is measured in system minutes, is equal to the product of (i) the percentage of total load not served and (ii) the number of minutes in the period, and excludes events during declared major storms.
(3) The Organizational Health Index measures and tracks the organizational elements that drive TVA's performance culture. Threshold, target and maximum goals are based on a five-year plan (from 2009 to 2014) to achieve performance improvement. Threshold is based on incremental improvements leading to median performance in 2013. Target is based on incremental improvements leading to mid-second quartile performance in 2013. Maximum is based on incremental improvements leading to top quartile performance in 2013.

In addition to the above, the TVA Board approved ELTIP performance measures for the three-year performance cycle ending September 30, 2014. These performance measures, along with their associated weights and goals, are as follows:

2012-2014 ELTIP Performance Cycle

Performance Measure	Weight	Threshold (50%)	Target (100%)	Maximum (150%)
Retail Rates (1)	40%	Improve to 10% gap vs. 2013 Top Quartile	Improve to 9% gap vs. 2013 Top Quartile	Improve to 8% gap vs. 2013 Top Quartile
System Reliability Load Not Served (2)	30%	7.8	6.8	3.3
Responsibility Organizational Health Index (3)	30%	63%	68%	73%

Notes
(1) Distributor reported retail power revenue and directly served power revenue divided by distributor reported retail sales and directly served power sales during this cycle, compared to the same peer regional holding company utilities.
(2) Load Not Served, which is equal to the product of (i) the percentage of total load not served and (ii) the number of minutes in the period, and excludes events during declared major storms.
(3) Threshold, target and maximum goals are based on a four-year plan (from 2010 to 2014) to achieve top quartile performance. Threshold is based on incremental improvements leading to mid-second quartile performance in 2014. Target is based on incremental improvements leading to top quartile performance in 2014. Maximum is based on incremental improvements leading to mid-top quartile performance in 2014.

Named Executive Officer Compensation Adjustments

As discussed in the Compensation Discussion and Analysis in Item 11, Executive Compensation, the TVA Board has established a compensation plan with the goal of providing comparable and competitive total compensation for each position in TVA, including TVA's executives, using market pricing based on a level needed to attract, retain, and motivate employees critical to TVA's success in achieving its mission and vision. To this end, total compensation for most positions is targeted at the median level of compensation (50th percentile) provided to similar positions at peer utility companies in TVA's relevant labor market.

With this goal in mind, at the beginning of 2012, Mr. Kilgore evaluated the then-current compensation of his direct reports (which include Mr. Thomas, Mr. McCollum, and Ms. Greene) and Mr. Swafford relative to TVA's peer group to determine whether to make adjustments to their compensation for 2012. Although no adjustments could be made to salaries as a result of the federal salary freeze for calendar years 2011 and 2012, on November 15, 2011, Mr. Kilgore did approve adjustments to the compensation opportunity of Mr. Thomas, Mr. McCollum, and Ms. Greene in order to keep them at the median compensation for their positions or to bring them closer to the median compensation for their positions. Specifically, Mr. Kilgore approved adjustments to the target annual incentive opportunities for Mr. Thomas, Mr. McCollum, and Ms. Greene to more closely align these target opportunities to those for similar positions at companies in TVA's peer group. Mr. Kilgore also approved an adjustment to the compensation of Mr. Swafford in order to keep him at the 75th percentile of compensation for his position, which is targeted higher because his position as Executive Vice President and Chief Nuclear Officer, Nuclear Generation, is subject to high demand and scarcity and because of recruitment and retention issues within the nuclear industry.

The compensation adjustments approved by Mr. Kilgore for the Named Executive Officers for 2012 are as follows:

- For Mr. Thomas, his target annual incentive opportunity will increase from 65 percent of salary to 80 percent of salary, his target long-term incentive opportunity will decrease from 125 percent of salary to 120 percent of salary, and he will receive an additional long-term deferred compensation credit of $50,000 (which will give him total credits of $150,000 for 2012).

- For Mr. McCollum, his target annual incentive opportunity will increase from 70 percent of salary to 80 percent of salary and his target long-term incentive opportunity will increase from 100 percent of salary to 120 percent of salary.

- For Ms. Greene, her target annual incentive opportunity will increase from 60 percent of salary to 80 percent of salary, and she will receive an additional long-term deferred compensation credit of $100,000 (which will give her total credits of $250,000 for 2012).

- For Mr. Swafford, he will receive an additional long-term deferred compensation credit of $125,000 (which will give him total credits of $225,000 for 2012).

Except for the adjustments described above, all other compensation elements for these Named Executive Officers for 2012 are the same as in 2011.

The TVA Board made no change to Mr. Kilgore's compensation for 2012.

Extension of Term of Chairman

Also at the November 17, 2011 meeting, the TVA Board determined that the term of Director Sansom's service as Chairman of the Board, which will begin when Chairman Bottorff's term as director expires as expected next month, will continue until December 31, 2013.

Audit, Risk, and Regulation Committee Membership

Also at the November 17, 2011 meeting, the TVA Board determined to alter the composition of the Audit, Risk, and Regulation Committee to reflect that the service on the TVA Board of Dennis C. Bottorff, Robert M. Duncan, and Thomas C. Gilliland was coming to an end. At the end of the terms of these three directors, the Audit, Risk, and Regulation Committee will be comprised of Neil G. McBride, William B. Sansom, and Barbara S. Haskew.

People and Performance Committee Membership

Also at the November 17, 2011 meeting, the TVA Board determined to alter the composition of the People and Performance Committee to reflect that the service on the TVA Board of Dennis C. Bottorff was coming to an end. At the end of the term of this director, the People and Performance Committee will be comprised of Bishop William H. Graves, Barbara S. Haskew, and Richard C. Howorth.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Directors

TVA is administered by a board of nine part-time members appointed by the President of the United States with the advice and consent of the U.S. Senate. The Chairman of the TVA Board is selected by the members of the TVA Board. Under the TVA Act, to be eligible to be appointed as a member of the TVA Board, an individual (i) must be a United States citizen; (ii) must have management expertise relative to a large for-profit or nonprofit corporate, government, or academic structure; (iii) cannot be a TVA employee; (iv) must make a full disclosure to Congress of any investment or other financial interest that the individual holds in the energy industry; and (v) must affirm support for the objectives and missions of TVA, including being a national leader in technological innovation, low-cost power, and environmental stewardship. In addition, the President of the United States, in appointing members of the TVA Board, must (i) consider recommendations from other public officials such as the Governors of the States in TVA's service area; individual citizens; business, industrial, labor, electric power distribution, environmental, civic, and service organizations; and the Congressional delegations of the States in TVA's service area; and (ii) seek qualified members from among persons who reflect the diversity, including geographical diversity, and needs of TVA's service area. At least seven of the nine TVA Board members shall be legal residents of the TVA service area.

The TVA Board as of November 17, 2011, consisted of the following individuals with their ages and terms of office provided:

Directors	Age	Year Current Term Began	Year Term Expires
Dennis C. Bottorff, Chairman	67	2006	2011*
Robert M. Duncan	60	2006	2011*
Thomas C. Gilliland	63	2008	2011*
Bishop William H. Graves	75	2008	2012
Marilyn A. Brown	62	2010	2012
Neil G. McBride	65	2010	2013
Barbara S. Haskew	71	2010	2014
William B. Sansom, Vice Chairman	70	2010	2014
Richard C. Howorth	60	2011	2015

Note
* Although the terms of these directors expired in May 2011, they are permitted under the TVA Act to remain in office until the earlier of the end of the current session of Congress or the date a successor takes office.

Mr. Bottorff of Nashville, Tennessee, joined the TVA Board in March 2006 and became Chairman of the TVA Board in May 2010. Since January 2001, he has served as Partner of Council Ventures, a venture capital firm. He was Chairman of AmSouth Bancorporation until his retirement in 2001 and from 1991 to 1999 was Chief Executive Officer of First American Bank. He served as a director of Dollar General, a variety store company, from 1998 until its sale in 2007. In addition, he is a director of Ingram Industries, a privately held provider of wholesale distribution, inland marine transportation, and insurance services; a member of the Board of Trustees of Vanderbilt University; and a director of NuScriptRX, an institutional pharmacy.

Mr. Duncan of Inez, Kentucky, joined the TVA Board in March 2006 and served as Chairman of the TVA Board from May 2009 to May 2010. He is the Chairman, Chief Executive Officer, and Director of Inez Deposit Bank, FSB, in Louisa, Kentucky (since April 1984, with a one-year leave of absence from 1989 to 1990 to serve as Assistant Director of Public Liaison in the White House); Chairman, Chief Executive Officer, and Director of Inez Deposit Bank in Inez, Kentucky (since September 1974 with a one-year leave of absence); Chairman, Chief Executive Officer, and Director of Community Holding Company, a single bank holding company (since 1984 with a one-year leave of absence); Chairman, Chief Executive Officer, and Director of Community Thrift Holding Company, a unitary thrift holding company (since 1999). From 1998 to 2007, Mr. Duncan was the Chairman of the Big Sandy Regional Industrial Development Authority, which manages industrial parks in five eastern Kentucky counties, and he is also the Secretary for the Highlands Regional Medical Center in Prestonsburg, Kentucky, which manages a regional hospital. From January 2007 to January 2009, he was the Chairman of the Republican National Committee, and he became Chairman of American Crossroads during 2010. In August 2011, Mr. Duncan was elected founding Chairman of Data Trust, a Virginia business trust, owner of GOP Data Trust LLC.

Mr. Gilliland of Blairsville, Georgia, joined the TVA Board in March 2008. He retired in January 2008 as Executive Vice President, Secretary, General Counsel, and Director of United Community Banks, Inc., a bank holding company. He joined United Community Banks, Inc., in January 1992.

Bishop Graves of Memphis, Tennessee, served on the TVA Board from October 2006 to December 2007 and began a second term on the TVA Board in June 2008. He presided as Bishop of the Christian Methodist Episcopal Church in Memphis, Tennessee, from 2006 until his retirement in June 2010. Previously he was pastor of the Phillips Temple CME Church of Los Angeles, California. From September 1993 to July 2004, he was a member of the Board of Memphis Light, Gas and Water, a TVA distributor customer.

Dr. Brown of Atlanta, Georgia joined the TVA Board in October 2010. Dr. Brown has been a Professor in the School of Public Policy at Georgia Institute of Technology in Atlanta, Georgia, since August 2006. From 1984 to August 2006, Dr. Brown worked at the Oak Ridge National Laboratory ("ORNL") in Oak Ridge, Tennessee. At ORNL, she was Deputy Director and Acting Director of the Engineering Science and Technology Division (from 2005 to 2006), and Program Director of the Energy Efficiency and Renewable Energy Program (from 2000 to 2005). Dr. Brown served from 2006 until 2009 as a member of the Board of Directors of the Southeast Energy Efficiency Alliance, serving as Board Chair from 2006 until 2008. She served as a member of the Board of Directors of the American Council for an Energy-Efficient Economy from 2002 until 2009. From 2002 until 2009, Dr. Brown was a commissioner on the National Commission on Energy Policy. She served as a member of the Board of Directors of the Alliance to Save Energy from 2000 through 2009.

Mr. McBride of Oak Ridge, Tennessee, joined the TVA Board in October 2010. Mr. McBride is the General Counsel of Legal Aid Society of Middle Tennessee and the Cumberlands ("Legal Aid") and Managing Director of the Oak Ridge Office of Legal Aid, positions he has held since 2002. In 1978, he founded Rural Legal Services of Tennessee and served as its director until it was consolidated with Legal Aid in 2002. Mr. McBride became a director of the Tennessee Alliance for Legal Services in 1980 and currently serves as a member of its executive committee. He has been a member of the Tennessee Bar Association House of Delegates from 2001 to present. Mr. McBride was a director of the Highlander Research and Education Center from 2002 to 2008. He also works as an independent consultant for various legal services organization.

Dr. Haskew of Chattanooga, Tennessee, joined the TVA Board in October 2010. Dr. Haskew has been a Professor Emeritus at Middle Tennessee State University ("MTSU") since August 2010. She began working at MTSU in 1988 and served as Vice President and Provost from 1995 until 2002 and as Distinguished Professor of Economics from 2002 until her retirement in June 2010. From 1980 to 1988, Dr. Haskew served on the Rate Design Staff for TVA. In addition, she served as Director of the Tennessee Center for Labor-Management Relations from 2004 until August 2009, and has a consulting practice as a labor arbitrator.

Mr. Sansom of Knoxville, Tennessee, served on the TVA Board from March 2006 until December 2009, was Chairman of the TVA Board from March 2006 until May 2009, and began a second term on the TVA Board in October 2010. He was elected Vice Chairman of the TVA Board in April 2011. Mr. Sansom is Chairman and Chief Executive Officer of the H.T. Hackney Co., a diversified company involved in the wholesale grocery and furniture manufacturing businesses, and has held that position since 1983. Since 1995, Mr. Sansom has also been a director of Astec Industries, Inc., a corporation based in Chattanooga, Tennessee, that manufactures equipment and components used in road construction, and since 1984, he has been a director at First Horizon National Corporation, a Memphis, Tennessee, bank holding company. In 2006, he was named director of Mid-America Apartment Communities, Inc., a real estate investment trust with ownership interests in apartment homes. From 1994 to 2006, he was a director of Martin Marietta Materials, Inc., a company based in Raleigh, North Carolina, that is in the construction material business.

Mr. Howorth, of Oxford, Mississippi, is the owner of Square Books, an Oxford independent bookstore he founded in 1979. Mr. Howorth served two terms as the mayor of Oxford, from 2001 to 2009, during which time he was chairman of the authority overseeing the Oxford Electric Department. From 2001 to 2009, he also served as a director and officer of the North Mississippi Industrial Development Association, an economic development consortium made up of power association directors and mayors of cities in 29 Mississippi counties in the TVA service area.

Executive Officers

TVA's executive officers as of November 17, 2011, their titles, their ages, and the date their employment with TVA commenced are as follows:

Executive Officers	Title	Age	Employment Commenced
Tom Kilgore	President and Chief Executive Officer	63	2005
John M. Thomas, III	Chief Financial Officer	48	2005
Kimberly S. Greene	Group President, Strategy and External Relations	45	2007
Janet C. Herrin	Executive Vice President, People and Performance	57	1978
William R. McCollum, Jr.	Chief Operating Officer	60	2007
Ralph E. Rodgers	Executive Vice President and General Counsel	57	1979
Daniel A. Traynor	Vice President and Chief Information Officer	55	2010
Preston D. Swafford	Executive Vice President and Chief Nuclear Officer, Nuclear Generation	51	2006
Robin E. Manning	Executive Vice President, Power System Operations	55	2008
Kenneth R. Breeden	Executive Vice President, Performance Transition Office	63	2004
Van M. Wardlaw	Executive Vice President, Customer Relations	51	1982
Steve Byone	Vice President and Controller (Principal Accounting Officer)	52	2009

Mr. Kilgore was named Chief Executive Officer in October 2006 after having served as President and Chief Operating Officer since joining TVA in March 2005. He previously served as President and Chief Executive Officer of Progress Energy Ventures, a subsidiary of Progress Energy Company created to manage various operations of Progress Energy Company, including fuel extraction and energy marketing, from April 2000 to February 2005. Prior to taking that position, Mr. Kilgore had been Senior Vice President of Power Operations for Carolina Power & Light Company (which became Progress Energy) since August 1998. From 1991 to 1998, Mr. Kilgore was President and Chief Executive Officer of Oglethorpe Power Corporation in Atlanta, Georgia.

Mr. Thomas was named Chief Financial Officer in June 2010. Prior to this appointment, he served as Executive Vice President of People and Performance from January 2010 to June 2010, Senior Vice President, Corporate Governance and Compliance from July 2009 to January 2010, as Controller and Chief Accounting Officer from January 2008 to September 2009, and as the General Manager, Operations Business Services from November 2005 to January 2008, where he was responsible for financial and performance support to TVA's operating organizations. Prior to joining TVA, Mr. Thomas was Chief Financial Officer during 2005 for Benson Security Systems, a security system integrator located in Gilbert, Arizona, where he was responsible for strategic planning, accounting operations, treasury, and financial reporting. He was also the Controller of Progress Fuels Corporation (from 2003 to 2005) and Controller of Progress Ventures, Inc. (from 2001 to 2002), both subsidiaries of Progress Energy, where he was responsible for accounting operations, financial reporting, forecasting, and risk management.

Ms. Greene was named Group President of Strategy and External Relations in January 2010. She served as Chief Financial Officer and Executive Vice President, Financial Services from September 2007 to January 2010. Before joining TVA, Ms. Greene served as Senior Vice President, Finance, and Treasurer at Southern Company Services, an energy company, from July 2003 to September 2007, where she was responsible for financial planning and analysis, capital markets and leasing, treasury, and investor relations. From July 2002 to July 2003, Ms. Greene was director of portfolio management for Southern Company Generation and Energy Marketing. Ms. Greene also serves on the Board of the Electric Power Research Institute, an independent, non-profit company performing research, development, and demonstration in the electricity sector.

Ms. Herrin was named Executive Vice President, People and Performance in June 2010. Prior to this appointment, she was the Senior Vice President, River Operations, a position she had held since February 1999. In that position, Ms. Herrin was responsible for establishing river operations policies, procedures, and standards for TVA and served as TVA's Dam Safety Officer. She began her career at TVA in 1978 as a civil engineer. She has served on the TVA Retirement System Board since 2005.

Mr. McCollum joined TVA in May 2007 as Chief Operating Officer. Prior to joining TVA, Mr. McCollum was Executive Vice President and Chief Regulated Generation Officer at Duke Energy Corporation, an energy company, from October 2006 to May 2007. Mr. McCollum had been with Duke Energy Corporation (and its predecessor) since 1974 and held a variety of leadership positions there, including Group Vice President, Regulated Fossil-Hydro Generation (from April 2006 to October 2006), Vice President, Strategic Planning and Business Development (from January 2005 to April 2006), and Vice President, Nuclear Support (from November 2002 to December 2004).

Mr. Rodgers was named Executive Vice President and General Counsel in July 2011. He previously served as Acting General Counsel from April 2010 to July 2011, as Deputy General Counsel from January 2010 to April 2010, as Assistant

General Counsel from February 2001 to January 2010, and as an attorney from June 1979 to March 1986 and from June 1987 to February 2001.

Mr. Traynor was named Vice President and Chief Information Officer in April 2010. He previously served as Director of Infrastructure Services for Southern Company, an energy company, from 2003 to 2010, where he was responsible for managing one of the largest corporate computer networks in the southeast. He also served as Southern Company's Director of Application Services from 1999 to 2003 and as Southern Company's Client Services Director from 1996 to 1999.

Mr. Swafford was named Executive Vice President and Chief Nuclear Officer, Nuclear Generation in February 2009. From June 2007 to February 2009, he was Executive Vice President, Fossil Power Group, and from May 2006 to May 2007, he was Senior Vice President, Nuclear Support. From December 1995 to April 2006, Mr. Swafford held various positions at Exelon Corporation, an energy company based in Illinois, and its subsidiaries. From 2002 to 2006, he served as Senior Vice President, Exelon Energy Delivery, and was responsible for transmission and distribution of electricity. From 2002 to 2003, he was Vice President, Exelon Power, and was responsible for its fleet of gas, coal-fired, and hydroelectric generating facilities. From 2000 to 2002, he was Vice President, Dresden Nuclear Station.

Mr. Manning joined TVA in August 2008 as Executive Vice President, Power System Operations. From April 2006 to August 2008, Mr. Manning served as Vice President of Field Operations for Duke Energy Corporation, an energy company, where he was responsible for the operation of all transmission and distribution system activity in Duke Energy Corporation's Carolinas Region. Mr. Manning joined Duke Energy Corporation in 1978 and held a variety of leadership positions there, including Vice President, Central Region for Duke Energy Power Delivery (from January 2004 to April 2006), Vice President of Engineering Standards and Process Management for Duke Energy Electric Transmission (from May 2003 to January 2004), and Vice President of Engineering for Duke Energy Gas Transmission (now Spectra Corporation) (from September 2000 to June 2003).

Mr. Breeden was named Executive Vice President, Performance Transition Office in June 2011. Mr. Breeden served as Executive Vice President, Customer Relations from January 2010 to June 2011, Executive Vice President, Customer Resources from September 2006 to January 2010, and as Executive Vice President, Customer Service and Marketing from August 2004 until September 2006. From March 2002 to August 2004, he was the Program Executive for Executive Conversation, Inc., where he was responsible for executive training programs. From September 1997 to March 2002, he was President of TXU Energy Services, Enterprise Division, in Dallas, Texas, where he was responsible for a new venture created to address customers' changing energy needs. Mr. Breeden had joined TXU Corporation in May 1995 as Senior Vice President of TXU Electric & Gas, where he was responsible for marketing and sales.

Mr. Wardlaw was named Executive Vice President, Customer Relations in June 2011. Mr. Wardlaw served as Executive Vice President, Enterprise Relations, from October 2010 to June 2011, as Acting Executive Vice President of Strategy and Planning from January 2010 until September 2010, as Executive Vice President of Power Supply and Fuels from July 2008 to August 2010, as Senior Vice President, Commercial Operations and Fuels from January 2007 to June 2008, as Vice President, Bulk Power Trading from September 2006 to December 2006, and as Vice President of Transmission and Reliability from December 2000 to September 2006. Mr. Wardlaw began his career with TVA in January 1982 as an electrical engineer, and has also worked in customer service, marketing, and field services.

Mr. Byone joined TVA in September 2009 as Vice President and Controller and was Chief Risk Officer from January 2010 until November 2010. Before joining TVA, he served as the Vice President and Chief Financial Officer of the Electric Reliability Council of Texas ("ERCOT"), an independent system operator located in Austin, Texas, from September 2005 to September 2009. Mr. Byone first came to ERCOT in May 2005 in a consulting role to launch ERCOT's internal control management and enterprise risk management programs. Previously, Mr. Byone served as the Vice President and Chief Risk Officer for Progress Energy (from May 2002 to May 2005). In that position, Mr. Byone designed an enterprise-wide risk management framework to support review and alignment of corporate strategy, capital investments, and risk appetite.

Disclosure and Financial Code of Ethics

TVA has a Disclosure and Financial Ethics Code ("Financial Ethics Code") that applies to all executive officers (including the Chief Executive Officer, Chief Financial Officer, and Controller) and directors of TVA as well as to all employees who certify information contained in quarterly reports or annual reports or who have responsibility for internal control self-assessments. The Financial Ethics Code includes provisions covering conflicts of interest, ethical conduct, compliance with applicable laws, rules, and regulations, responsibility for full, fair, accurate, timely, and understandable disclosures, and accountability for adherence to the Financial Ethics Code. TVA will provide a current copy of the Financial Ethics Code to any person, without charge, upon request. Requests may be made by calling 888-882-4975 or by sending an e-mail to: investor@tva.com. Any waivers of or changes to provisions of the Financial Ethics Code that require disclosure pursuant to applicable SEC requirements will be promptly disclosed to the public, subject to limitations imposed by law, on TVA's website at: www.tva.gov. Information contained on TVA's website shall not be deemed incorporated into, or to be a part of, this Annual Report.

Committees of the TVA Board

The TVA Board has an Audit, Risk, and Regulation Committee established in accordance with the TVA Act. TVA's Audit, Risk and Regulation Committee consists of Thomas C. Gilliland (chair), Robert M. Duncan, Dennis C. Bottorff, and Neil G. McBride. Director Gilliland and Director Bottorff are each an "audit committee financial expert" as defined in Item 407(d)(5) of Regulation S-K under the Exchange Act. Unless they serve another term, both Director Gilliland and Director Bottorff will leave the TVA Board when the current session of Congress ends. Accordingly, the TVA Audit, Risk, and Regulation Committee may not have an audit committee financial expert on it thereafter.

TVA is exempted by section 37 of the Exchange Act from complying with section 10A(m)(3) of the Exchange Act, which requires each member of a listed issuer's audit committee to be an independent member of the board of directors of the issuer. The TVA Act contains certain provisions that are similar to the considerations for independence under section 10A(m)(3) of the Exchange Act, including, as described above, that to be eligible for appointment to the TVA Board, an individual shall not be an employee of TVA and shall make full disclosure to Congress of any investment or other financial interest that the individual holds in the energy industry.

Under section 10A(m)(2) of the Exchange Act, which applies to TVA, the audit committee is directly responsible for the appointment, compensation, and oversight of the external auditor; however, the TVA Act assigns the responsibility for engaging the ser vices of the external auditor to the TVA Board.

The TVA Board has also established the following committees in addition to the Audit, Risk and Regulation Committee:

- Finance, Rates, and Portfolio Committee
- Customer and External Relations Committee
- People and Performance Committee
- Nuclear Oversight Committee

ITEM 11. EXECUTIVE COMPENSATION

COMPENSATION DISCUSSION AND ANALYSIS

This Compensation Discussion and Analysis provides information about TVA's compensation philosophy and strategy, as well as the policies and decisions that guided TVA in 2011 in establishing the level and nature of the compensation provided to the named executive officers ("Named Executive Officers" or "NEOs"). The 2011 Named Executive Officers are: Tom Kilgore, the President and Chief Executive Officer ("CEO"), John M. Thomas, III, the Chief Financial Officer ("CFO"), William R. McCollum, Jr., Kimberly S. Greene, and Preston D. Swafford. Detailed information about the compensation of each of the NEOs is listed in the Summary Compensation Table.

Executive Summary

The TVA Act places significant authority and responsibility in the TVA Board for matters associated with the compensation of TVA employees, including the Named Executive Officers. The TVA Board exercised this authority when it approved the compensation plan for all TVA employees (the "Compensation Plan") and when it delegated certain bounded authority to the Chairman of the TVA Board and to the CEO. Despite these delegations, the TVA Board, the People and Performance Committee of the TVA Board (the "Committee"), and individual TVA Board members maintain an active involvement in compensation matters. The TVA Board-level involvement with the compensation of the Named Executive Officers is an annual process. This involvement includes the consideration of benchmarking and other information provided by the TVA Board's compensation consultant, as well as consultation with TVA management regarding its recommendations for compensation programs and actions. In addition, TVA Board-level involvement occurs with respect to those items that have been reserved to the TVA Board for approval, with respect to the review, oversight, or consultation by the Committee, as required, and with respect to the consultation with individual TVA Board members, as required. These matters are discussed in greater detail below.

The TVA Board established the Compensation Plan based on the requirements of the TVA Act. The Compensation Plan is designed to support TVA's mission and to fulfill the following purposes:

- *Provide a competitive level of compensation that enables TVA to attract, retain, and motivate highly competent employees.* Total target compensation for each position in TVA is determined by market pricing based on a level needed to attract, retain, and motivate employees critical to TVA's success in achieving its mission and vision. Accordingly, total compensation levels typically are targeted at the median (50^{th} percentile) of the relevant labor market for most positions. However, total compensation levels for some positions are targeted at a higher level (typically between the 50^{th} and 75^{th} percentile) or a lower level (typically between the 25^{th} and 50^{th} percentile). Higher total compensation levels are targeted for positions subject to market scarcity, recruitment and retention issues, and other business reasons. Lower total compensation levels are targeted for positions for which TVA does not compete exclusively with the energy and utility services industry or which are not subject to competitive pressures.

- *Encourage and reward executives for their performance and contributions to the successful achievement of financial and operational goals.* A key tenet of the Compensation Plan is to pay for performance by rewarding all employees for improvement in TVA's overall performance, as well as that of individual business units. The TVA Board believes that the portion of total direct compensation delivered through structured incentive compensation should increase as an employee's position and level of responsibility within TVA increases. Accordingly, executives have the highest percentage of their compensation tied to TVA and business unit performance. For the Named Executive Officers, 57 percent to 68 percent of their total target direct compensation opportunity is performance-based incentive compensation.

- *Provide executives with the focus to achieve short-term and long-term business goals that are important to TVA, TVA's customers, and the people TVA serves.* TVA seeks to hire and retain executives who are focused on both TVA's short-term and long-term success. The Compensation Plan is designed to achieve this goal by providing a mix of salary and performance-based annual and long-term incentive compensation.

- *Improve overall company performance through productivity enhancement.* An executive cannot help meet TVA's goals and improve performance without the work of others. For this reason, the performance goals set at the corporate level are the same for both executives and all non-executive employees. This generally translates into all TVA employees receiving compensation in a manner that aligns their work with the same goals and encourages and rewards them for the successful achievement of TVA's goals.

Under the Compensation Plan, the compensation programs for the Named Executive Officers consist of the components identified in the following table:

Compensation Program Components for Named Executive Officers

Compensation Component	Objective	Key Features
Annual Salary	Fixed and paid biweekly to executives	Annual salary is targeted at the median (50 th percentile) for similar positions at other companies in TVA's peer group, above the median (50 th to 75 th percentile) for positions affected by market scarcity, recruitment and retention issues, and other business reasons, or below the median (25 th to 50 th percentile) for positions for which TVA does not compete exclusively with the energy and utility services industry or which are not subject to competitive pressures Typically reviewed annually to consider changes in peer group benchmark salaries and/or exceptional individual merit performances in past years
Annual Incentive Compensation	Not-guaranteed, variable, performance-based, and based on the attainment of pre-established performance goals for the fiscal year	Target annual incentive opportunities increase with position and responsibility and are based on the opportunities other companies in TVA's peer group provided to those in similar positions Annual incentive payouts are based on the results of performance goals at the TVA level, as determined from year to year by the TVA Board, and may be adjusted by the TVA Board or CEO, as appropriate, based on the evaluation of performance during the year Annual incentive opportunities are reviewed annually to consider changes in peer group benchmark short-term incentives
Long-Term Incentive Compensation	Not-guaranteed, variable, and based on the attainment of pre-established performance goals for a performance cycle, typically three fiscal years	Target long-term incentive opportunities are limited to executives in critical positions who make decisions that significantly influence developing and attaining TVA's long-term strategic objectives Target long-term incentive payouts are based on achieving performance goals established for a specific performance cycle and may be adjusted by the TVA Board based on the evaluation of performance during the cycle Long-term incentive opportunities are reviewed annually to consider changes made in the long-term incentives by companies in TVA's peer group
Long-Term Deferred Compensation	Awarded in the form of annual credits that vest after a specified period of time, typically three to five years	Awarded to provide retention incentives to executives similar to the retention incentive provided by restricted stock or restricted stock units in publicly-traded companies Executives generally must remain at TVA for the entire length of the agreement in order to receive compensation credits The amount of the annual long-term deferred compensation credit is targeted to approximately 20 percent of total long-term compensation (including the long-term incentive compensation described above)
Total Direct Compensation	Annual Salary plus Annual Incentive Compensation plus Long-term Incentive Compensation plus Long-Term Deferred Compensation	Total direct compensation (salary plus annual and long-term incentive compensation plus long-term deferred compensation) is targeted at the median (50 th percentile) for similar positions at other companies in TVA's peer group, above the median (50 th to 75 th percentile) for positions affected by market scarcity, recruitment and retention issues, and other business reasons, or below the median (25 th to 50 th percentile) for positions for which TVA does not compete exclusively with the energy and utility services industry or which are not subject to competitive pressures
Pension Plans	Both qualified and supplemental, which provide compensation beginning with retirement or termination of employment	Broad-based plans available to full-time employees of TVA that are qualified under IRS rules and that are similar to the qualified plans provided by other companies in TVA's peer group Certain executives in critical positions also participate in a non-qualified pension plan that provides supplemental pension benefits at compensation levels that exceed the limits permitted by the IRS regulations applicable to qualified plans; these supplemental benefits are comparable to those provided by other companies in TVA's peer group

TVA's Chief Risk Officer and the Enterprise Risk Management organization have a process to assess potential risks to TVA that could arise from the Compensation Plan and TVA's policies and practices of compensating its employees, both executive and non-executive. Based on this review, for 2011, TVA's Chief Risk Officer and Enterprise Risk Management organization have concluded that the Compensation Plan, TVA's compensation policies and practices, and TVA's executive and non-executive incentive-pay plans are not reasonably likely to have a material adverse effect on TVA.

Authority for the Executive Compensation Program

The TVA Act is the authority for establishing the compensation of all TVA employees, including the Named Executive Officers, and places responsibility for doing so with the TVA Board. Under section 2 of the TVA Act, the TVA Board is directed to establish a compensation plan for all TVA employees which:

- Specifies all compensation (such as salary or any other pay, benefits, incentives, and any other form of remuneration) for the CEO and TVA employees;
- Is based on an annual survey of the prevailing compensation for similar positions in private industry, including engineering and electric utility companies, publicly owned electric utilities, and federal, state, and local governments; and
- Provides that education, experience, level of responsibility, geographic differences, and retention and recruitment needs will be taken into account in determining compensation of employees.

The TVA Act also provides that:

- The TVA Board will annually approve all compensation (such as salary or any other pay, benefits, incentives, and other form of remuneration) of all managers and technical personnel who report directly to the CEO (including any adjustment to compensation);
- On the recommendation of the CEO, the TVA Board will approve the salaries of employees whose salaries would be in excess of Level IV of the Executive Schedule ($155,500 in 2011); and
- The CEO will determine the salary and benefits of employees whose annual salary is not greater than Level IV of the Executive Schedule ($155,500 in 2011).

The philosophy of the Compensation Plan around the market competitiveness for TVA's employees is based on the TVA Act. The philosophy recognizes that many employees, including executives, are called on to accomplish specialized aspects of TVA's mission safely, reliably, and efficiently, and must have the requisite education, experience, and professional qualifications. These requirements make it necessary for TVA to offer compensation to its specialized employees that makes it possible for TVA to attract highly qualified candidates for positions similar to those in relevant industries and motivates them to stay with TVA.

In establishing the Compensation Plan, the TVA Board delegated to the CEO the authority to approve, or delegate to others the authority to approve, all personnel and compensation actions for which the TVA Board is responsible but has not reserved for itself to approve. The TVA Board has taken various additional actions to delegate authority with respect to executive compensation as follows:

- The TVA Board has approved compensation ranges for the direct reports to the CEO of 80 percent to 110 percent of the median total direct compensation for comparable positions, as established by benchmarking sources outside of TVA, and authorized the CEO to set or adjust compensation for the CEO's present or future direct reports within such compensation ranges, as well as to approve the parameters under which such executives may participate in certain supplemental benefit plans such as the SERP, provided that the CEO may not finally set or adjust such compensation until the Committee, or the full TVA Board, has had the opportunity to review the proposed compensation.

- The TVA Board delegated to the Chairman of the TVA Board, in consultation with the Committee and with input from individual members of the TVA Board, the authority to evaluate and rate the performance of the CEO during the year, and the authority to approve any payout to the CEO under the Executive Annual Incentive Plan ("EAIP") based on, among other things, the CEO's evaluated performance during the year, and delegated to the CEO, in consultation with the Committee and with input from individual members of the TVA Board, the authority to approve the individual performance goals for the CEO's direct reports and the authority to evaluate and rate the performance of the CEO's direct reports during the year.

TVA Board Committee Oversight

The Committee was responsible for oversight of executive compensation pursuant to the Compensation Plan, review of this Compensation Discussion and Analysis, and review of performance goal achievement for 2011. As delegated by the TVA Board, the Committee also (1) reviews proposed actions of the CEO to set or adjust the compensation of the CEO's present and future direct reports within the 80 percent to 110 percent compensation range of the median total direct compensation for comparable positions, as well as to approve the parameters under which such executives may participate in certain supplemental benefit plans such as the SERP, (2) consults with the Chairman of the TVA Board about the Chairman of the TVA Board's proposed evaluation and rating of the performance of the CEO during the year and about the proposed payout to the CEO under the EAIP based on, among other things, the CEO's evaluated performance during the year, and (3) consults with the CEO about the CEO's proposed individual performance goals for the CEO's direct reports and the CEO's proposed evaluation and rating of the performance of the CEO's direct reports during the year. To assist in evaluating competitive levels of compensation for executives, the Committee has selected and uses Towers Watson as its independent compensation consultant.

Use of Market Data and Benchmarking

Except to the extent discussed above, TVA generally seeks to target total compensation for executives at a competitive level with respect to the relevant labor market. Market information for total compensation, as well as each element of compensation, for the Named Executive Officers for 2011 was obtained from:

- Published and customized compensation surveys reflecting the relevant labor markets identified for designated positions; and
- Publicly disclosed information from the proxy statements and annual reports on Form 10-K of energy services companies with revenues ranging from one-half to two times TVA's revenue.

After the competitive market compensation was compiled for the positions at the beginning of 2011, the Committee, with the assistance of its compensation consultant, Towers Watson, used this information to:

- Test target compensation level and incentive opportunity competitiveness; and
- Determine appropriate target compensation levels and incentive opportunities to maintain the desired degree of market competitiveness.

TVA's relevant labor market for most executives, including the Named Executive Officers, was comprised of both private and publicly owned companies in the energy services industry of similar revenue and scope to TVA. For the survey-based analysis, TVA looked at the following energy services companies with annual revenues of $3.0 billion and greater from the 2010 Towers Watson Energy Services Executive Compensation Database:

Allegheny Energy, Inc.	Edison International*	Pacific Gas and Electric Co.*
Alliant Energy Corp.	El Paso Corp.	Pepco Holdings, Inc.*
Ameren Corp.*	Energy Future Holdings Corp.	Pinnacle West Capital Corp.
American Electric Power Co., Inc.*	Entergy Corp.*	PPL Corp.*
Atmos Energy Corporation	Exelon Corp.*	Progress Energy, Inc.*
Calpine Corp.	FirstEnergy Corp.*	Public Service Enterprise Group, Inc.*
CenterPoint Energy, Inc.	GDF SUEZ Energy North America	Puget Energy, Inc.
CMS Energy Corp.*	Integrys Energy Group, Inc.*	SCANA Corp.
Consolidated Edison, Inc.*	NextEra Energy, Inc.* (formerly FPL Group, Inc.)	Sempra Energy*
Constellation Energy Group, Inc.*	Northeast Utilities System*	The Southern Company*
Dominion Resources, Inc.*	NRG Energy, Inc.	Wisconsin Energy Corp.
Duke Energy Corp.*	NSTAR Electric Co.	Xcel Energy, Inc.*
DTE Energy Co. *	NV Energy	

For the analysis of proxy statements and annual reports on Form 10-K, TVA looked at a subset of the peer group above, identified with asterisks, as well as two additional companies in the energy services industry (AES Corp. and NiSource Inc.), as recommended by Towers Watson. These two companies were added to the subset analysis because they are energy services firms with annual revenues of $6.0 billion or higher that did not participate in the 2010 Towers Watson Energy Survey. Dynegy, Inc., Mirant Corporation, OGE Energy Corp., and Reliant Energy, Inc., which were in last year's survey peer group, were not included in this year's survey peer group because they did not participate in the 2010 Towers Perrin Energy Services Survey. Atmos Energy Corporation and DTE Energy Co. were added to this year's survey peer group because they are energy services firms with annual revenues of $3.0 billion or higher and participated in the 2010 Towers Watson Energy Services Survey. In addition, the following government entities were informally considered by the Committee: Colorado Springs Utilities, CPS Energy, Energy Northwest, Lower Colorado River Authority, New York Power Authority, Omaha Public Power, Salt River Project, and Santee Cooper. Each of these government entities has revenue of less than $3.0 billion annually.

Executive Compensation Program Components

Federal Salary Freeze. In December 2010, Congress passed the Continuing Appropriations and Surface Transportation Extensions Act, 2011, which included a two-year freeze on statutory pay adjustments for all executive branch pay schedules and a two-year freeze by executive agencies on base salary increases to all senior executives. These two-year freezes apply to calendar years 2011 and 2012. The directors of the TVA Board are covered by the first freeze and TVA's officers (Vice President and above), including the Named Executive Officers, are covered by the second freeze. TVA will comply with these legislative freezes. Accordingly, TVA's officers, including the Named Executive Officers, will not receive any salary increases, including performance-based salary increases, during calendar years 2011 and 2012. Any salary increases that TVA's officers received for 2011 based on performance during 2010, including Mr. Swafford's salary increase discussed below, were effective October 1, 2010, prior to the effective date of the salary freeze legislation and were not affected by the two-year freeze requirement.

Following the passage of the legislation described above, the President of the United States issued a memorandum to federal agencies not directly covered by the legislation, which includes TVA, requesting that these agencies also comply with the terms of the salary freeze. In response, TVA has chosen to voluntarily implement a salary freeze for manager, specialist and excluded employees during calendar years 2011 and 2012 in accordance with the spirit in which the President and Congress approved the salary freeze. The federal salary freeze does not apply to TVA's represented employees, whose salary increases are governed by the terms of collective bargaining agreements, certain promotions and changes in positions, and other forms of non-salary compensation such as lump-sum and incentive-based awards.

Salary. The salaries of the Named Executive Officers for 2011 were as follows: $850,000 for Mr. Kilgore, $520,000 for Mr. Thomas, $745,514 for Mr. McCollum, $650,000 for Ms. Greene, and $545,000 for Mr. Swafford. The 2011 salaries for Mr. Thomas and Ms. Greene were the same as in 2010. The 2011 salaries for Mr. Kilgore and Mr. McCollum were the same as in 2009 and 2010.

Ms. Greene was appointed Group President, Strategy and External Relations, by TVA in January 2010, and at that time, the TVA Board approved her salary of $650,000. Mr. Thomas was appointed CFO by TVA in June 2010, and at that time, Mr. Kilgore approved his salary of $520,000. Given the fact that the salaries of Ms. Greene and Mr. Thomas were established during 2010 concurrent with their appointment to new positions and that those salaries were appropriate relative to salary benchmark comparisons at that time, Mr. Kilgore determined that no salary increases would be awarded for 2011 for Ms. Greene and Mr. Thomas. Following annual performance reviews and comparisons of salaries with salary benchmark information, Mr. Kilgore did not increase Mr. McCollum's salary from 2010 to 2011 but did increase Mr. Swafford's salary 3.81 percent from $525,000 to $545,000 from 2010 to 2011.

The comparison of the Named Executive Officers' salaries for 2011 relative to 2011 salary benchmark information is as follows: The 2011 salary for Mr. Kilgore continued to place him well below the 50 th percentile of the benchmark salaries for CEOs in TVA's peer group. The 2011 salaries for Mr. Thomas, Ms. Greene, and Mr. McCollum placed them near the 50 th percentile of the benchmark salaries for similar positions in TVA's peer group. The 2011 salary for Mr. Swafford placed him near the 75 th percentile of the benchmark salaries for similar positions in TVA's peer group. The 2011 salary for Mr. Swafford was targeted at a higher percentile because his position as Executive Vice President and Chief Nuclear Officer, Nuclear Generation, is subject to high demand and scarcity and because of recruitment and retention issues within the nuclear industry. More information about the approval of Mr. Kilgore's compensation for 2011 is provided below. See *Considerations Specific to Mr. Kilgore* .

Annual Incentive Compensation. All executives, including the Named Executive Officers, participate in the Executive Annual Incentive Plan (“EAIP”). The EAIP is designed to encourage and reward executives for their contributions to successfully achieving annual financial and operational goals. For 2011, the EAIP focused on achieving corporate level goals. The specific metrics and associated goals are described below.

Annual incentive opportunities for participants in the EAIP generally increase with position and responsibility. Target annual incentive opportunities of the Named Executive Officers for 2011 were the same as in 2010:

NEO	Target Annual Incentive Opportunity*
Mr. Kilgore	100%
Mr. Thomas	65%
Mr. McCollum	70%
Ms. Greene	60%
Mr. Swafford	80%
* Represents a percent of each NEO’s salary.	

The annual incentive opportunity approved by the TVA Board for Mr. Kilgore for 2011 was at a level such that a full target payout (together with salary, full target payout of long-term incentive opportunities, and long-term deferred compensation credits) would place his total compensation well below the 50 th percentile of the benchmark total compensation for similar positions in TVA's peer group. The annual incentive opportunities approved by Mr. Kilgore for Mr. Thomas, Mr. McCollum, and Ms. Greene for 2011 were at a level such that a full target payout (together with salary, full target payout of long-term incentive opportunities, and long-term deferred compensation credits) would place their total compensation near the 50 th percentile of the benchmark total compensation for similar positions in TVA's peer group. The annual incentive opportunity approved by Mr. Kilgore for Mr. Swafford for 2011 was at a level such that a full target payout (together with salary, full target payout of long-term incentive opportunities, and long-term deferred compensation credits) would place his total compensation near the 75 th percentile of the benchmark total compensation for similar positions in TVA's peer group. The 2011 total compensation for Mr.

Swafford was targeted at a higher percentile because his position as Executive Vice President and Chief Nuclear Officer, Nuclear Generation, is subject to high demand and scarcity and because of recruitment and retention issues within the nuclear industry.

The TVA Board established two corporate performance measures for the EAIP for 2011: Equivalent Availability Factor and Net Cash Flow. These are the same corporate performance measures used in determining annual incentive payouts for all non-executive TVA employees who participate in TVA's Winning Performance Team Incentive Plan. The weight and targets associated with these performance measures, as well as the results for 2011, were as follows:

2011 TVA Corporate Scorecard

			Goals		
Performance Measure	**Weight**	**Results Achieved**	**Threshold (50%)**	**Target (100%)**	**Maximum (150%)**
Rates					
Net Cash Flow ($ Millions) [(1)]	50%	$161 More Than Budget	$150 Less Than Budget	Budget	$150 More Than Budget
Reliability					
Equivalent Availability Factor [(2)]	50%	85.1%	84.1%	86.0%	87.9%

Notes
(1) Net Cash Flow is a non-GAAP measure that is derived from the Statement of Cash Flow. Net Cash Flow is derived from Net Cash Provided by Operating Activities plus Net Cash Used in Investing Activities less Net Cash Flow from Change in Fuel Cost Adjustment Deferral Account. For a reconciliation of this measure to the most comparable GAAP measure, see Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations.
(2) Equivalent Availability Factor is a ratio of actual available generation from all TVA coal, combined cycle, and nuclear generating assets in a given period compared to maximum availability.

Under the methodology for determining payments under the EAIP in 2011, a pool was established that represented the total amount of funds available to pay all EAIP participants, including the Named Executive Officers, except Mr. Kilgore, whose EAIP payout was determined individually.

The amount of the EAIP award pool was determined by (i) calculating an amount for each EAIP participant in accordance with the formula set forth below, and (ii) adding these amounts together:

EAIP Amount	=	Annual Salary	X	Annual Target Incentive Opportunity	X	Percent of Corporate Goal Achievement (0% to 150%)	X	Corporate Modifier (-20% to +10%)

Based on the results for the corporate performance measures described above for 2011, the corporate goal achievement was equal to 113.16 percent for purposes of calculating the EAIP award pool for 2011.

In 2011, the corporate modifier ranged from -20 percent to +10 percent and allowed Mr. Kilgore the discretion in adjusting the amount of the EAIP pool based on a subjective assessment and consideration of factors that are significant to TVA but are not easily quantifiable. Mr. Kilgore did not apply a corporate modifier to reduce or increase the size of the EAIP award pool for the EAIP participants, including the other Named Executive Officers.

Once the pool was determined, each EAIP participant's individual performance during 2011 was evaluated and used to determine whether any adjustment upwards or downwards should be made to the final annual incentive awards of each EAIP participant, including each participating Named Executive Officer. The individual performance evaluation was conducted by each participant's supervisor after the end of the year based on a purely subjective review by the supervisor of how the participant performed during the year and/or how the business unit over which the participant had responsibility performed during the year. Any adjustment to an EAIP pool participant's final annual incentive award was coordinated across all participants to ensure that the total of all the final annual incentive awards did not exceed the EAIP award pool for 2011.

Following the end of 2011, pursuant to TVA Board delegations described above, Mr. Kilgore as CEO, in consultation with the Committee and with input from individual members of the TVA Board, subjectively evaluated the performance of Mr. Thomas, Mr. McCollum, and Ms. Greene as his direct reports during 2011. Based on his review of Mr. Thomas, Mr. Kilgore decided that Mr. Thomas's individual annual incentive award should not be adjusted. Based on his review of Mr. McCollum, Mr. Kilgore decided that Mr. McCollum's individual annual incentive award should be adjusted downwards by 13 percent because of overall nuclear performance, including the following: Nuclear Regulatory Commission (“NRC”) “red” or “high safety significance” rating in connection with a valve failure at Browns Ferry Nuclear Plant (“Browns Ferry”), delay in completion of the Browns Ferry cooling tower project, reduced availability due to outage planning and execution, and delay in the Watts Bar Nuclear Plant (“Watts Bar”) Unit 2 schedule. Based on his review of Ms. Greene, Mr. Kilgore decided that Ms. Greene's individual annual incentive award should not be adjusted.

Mr. Kilgore and Mr. McCollum (to whom Mr. Swafford directly reports) subjectively evaluated the performance of Mr. Swafford during 2011. Based on this review, Mr. Kilgore and Mr. McCollum decided that Mr. Swafford's annual incentive award should be adjusted downwards by 18 percent because of overall nuclear performance, including the following: NRC “red” or “high safety significance” rating in connection with a valve failure at Browns Ferry, delay in completion of the Browns Ferry cooling tower project, and reduced availability due to outage planning and execution.

As set forth above, Mr. Kilgore was not a part of the EAIP award pool. However, as a participant in the EAIP, the performance measures applicable to the EAIP were also applicable to Mr. Kilgore, and the 113.16 percent achievement of these performance measures formed a baseline for his EAIP award. Following the end of 2011, the Chairman of the TVA Board, in consultation with the Committee and with input from individual members of the TVA Board, subjectively evaluated the performance of Mr. Kilgore as CEO during 2011. Based on this review, the Chairman of the TVA Board rated Mr. Kilgore's performance for 2011 as being between “meets expectations” and “exceeds expectations” but decided that Mr. Kilgore's final annual incentive award should be adjusted downwards by 7.21 percent because of overall nuclear performance, including the following: NRC “red” or “high safety significance” rating in connection with a valve failure at Browns Ferry, delay in completion of the Browns Ferry cooling tower project, reduced availability due to outage planning and execution, and delay in the Watts Bar Unit 2 schedule.

As a result of the process described above, the Named Executive Officers were awarded the following EAIP payouts for 2011 in comparison to the 2011 target payouts:

2011 EAIP Payouts

NEO	Salary	EAIP Incentive Opportunity	Target EAIP Payout	% Corporate Goal Achievement (with Corporate Modifier)	Individual Performance Adjustment	Final EAIP Payout
Tom Kilgore	$850,000	100%	$850,000	113.16% (1)	(7.21)%	$892,510
John M. Thomas, III	$520,000	65%	$338,000	113.16% (2)	0.00%	$382,481 (3)
William R. McCollum, Jr.	$745,514	70%	$521,860	113.16% (2)	(13.00)%	$513,767 (3)
Kimberly S. Greene	$650,000	60%	$390,000	113.16% (2)	0.00%	$441,324 (3)
Preston D. Swafford	$545,000	80%	$436,000	113.16% (2)	(18.00)%	$404,570 (3)

Notes
(1) A corporate modifier was not included in the award calculation for Mr. Kilgore. Mr. Kilgore was not included in the EAIP award pool in 2011.
(2) For 2011, the CEO did not apply a corporate modifier for EAIP participants.
(3) Calibrated along with payouts to all other EAIP participants to ensure that the total of all awards did not exceed the EAIP award pool.

Awards to the Named Executive Officers under the EAIP for 2011 are reported in the “Non-Equity Incentive Plan Compensation” column in the Summary Compensation Table.

Long-Term Incentive Compensation. In addition to the EAIP, certain executives in critical positions, including the Named Executive Officers, participate in the Executive Long-Term Incentive Plan (“ELTIP”). Executives in critical positions are those who make decisions that significantly influence the development and execution of TVA's long-term strategic objectives. The ELTIP has been purposefully designed to properly and competitively reward executives for helping TVA improve in important areas directly related to TVA's long-term success by:

- Using corporate-level performance criteria that are directly aligned with TVA's mission;
- Using a “cumulative” performance approach to measure performance achieved for three-year performance cycles;
- Targeting award opportunities in the final year of each performance cycle at levels that approximate median levels of competitiveness with TVA's peer group and incorporating the Committee's policy of targeting that (i) approximately 80 percent of each executive's total long-term incentive opportunity be performance based (under the ELTIP) and (ii) approximately 20 percent of each executive's total long-term incentive opportunity be retention and security-oriented (under the Long-Term Deferred Compensation Plan (“LTDCP”) as described below under the heading “Long-Term Deferred Compensation”); and
- Utilizing an award opportunity range of 50 percent to 150 percent of salary to enable payment of awards that are commensurate with performance achievements.

Under the ELTIP, an executive's incentive payment is calculated as follows:

ELTIP Payout	=	Salary	X	Target ELTIP Incentive Opportunity	X	Percent of Opportunity Achieved

As discussed above, the objective of the ELTIP is to establish incentive opportunities for each of the Named Executive Officers that approximate 80 percent of each Named Executive Officer's total long-term compensation based on a percentage of his or her base salary rate at the end of the performance cycle. Target long-term incentive opportunities of the Named Executive Officers for 2011 were the same as in 2010:

NEO	Target Long-Term Incentive Opportunity*
Mr. Kilgore	150%
Mr. Thomas	125%
Mr. McCollum	100%
Ms. Greene	120%
Mr. Swafford	100%
* Represents a percent of each NEO's salary.	

The long-term incentive opportunities for 2011 were approved by the TVA Board for Mr. Kilgore and by Mr. Kilgore for Mr. Thomas, Mr. McCollum, Ms. Greene, and Mr. Swafford. In each case, the objective for having target ELTIP awards composing approximately 80 percent of total long-term compensation was achieved by keeping these target levels of long-term incentive opportunity for 2011 the same as 2010. In addition, these same target levels of long-term incentive opportunity kept the total compensation of each Named Executive Officer at the percentage of TVA's peer group described above. See *Annual Incentive Compensation* .

2009 - 2011 Performance Cycle

For the three-year cycle ended September 30, 2011, the TVA Board approved three overall measures of TVA performance to be applied to all participants in the ELTIP:

- retail rates (distributor reported retail power revenue and directly served power revenue divided by distributor reported retail sales and directly served power sales);
- connection point interruptions (the number of interruptions of power at connection points caused by TVA's transmission system); and
- non-fuel operations and maintenance ("O&M") costs per MWh sales (total operating and maintenance costs excluding costs included in the fuel cost adjustment formula, reagents expense, emissions allowance expense, net nuclear outage amortization/deferral expense, and energy efficiency and demand reduction spending).

Retail rates was chosen as a long-term incentive measure because it is the primary measure for TVA to evaluate and compare the final cost to TVA's retail customers. Connection point interruptions was chosen as a long-term incentive measure because TVA's customers rank reliability as the most critical in importance and are requesting improved performance in all aspects of reliability, including momentary interruptions. Non-fuel O&M costs per MWh sales was chosen as a long-term incentive measure because a continued awareness and emphasis on monitoring and controlling non-fuel O&M expenses is an important measure of competitiveness and allows TVA to position itself for future success.

The goals associated with the retails rates and non-fuel O&M costs performance measures for the cycle ended September 30, 2011, were based on a comparison of TVA's performance to the performance of surveyed regional utilities and transmission providers, respectively, and rolling three-year target comparisons for the surveyed groups were utilized.

The goals approved for the retail rates performance measure for the three-year performance cycle ended September 30, 2011, were as follows:

- The threshold goal was based on improvement over the last performance cycle;
- The target goal was TVA's performance ranking in the top 25 percent of a comparison group of regional utilities composed of 23 utilities, which are subsidiaries of 15 holding companies with annual revenues greater than $3.0 billion, in the regional proximity of the TVA service territory (the "ELTIP Retail Rates Comparison Group"); and
- The maximum goal was TVA's performance ranking in the top 10 percent of the ELTIP Retail Rates Comparison Group's performance.

Retail rate data (retail sales and retail revenue) for the ELTIP Retail Rates Comparison Group was obtained from the

EIA-826 Monthly Electric Utility Database.

Connection point interruptions performance was calculated as the number of interruptions of power at connection points caused by TVA's transmission system measured by the number of interruptions divided by the number of connection points of the three-year cycle ended September 30, 2011, with a target goal (which also served as the threshold goal) of 1.12 and a maximum goal of 0.78.

The goals approved for the non-fuel O&M costs per MWh sales performance measure for the three-year performance cycle ended September 30, 2011, were as follows:

- The threshold goal was based on improvement over the last performance cycle;
- The target goal was established based on the 50 th percentile of the performance of a comparison group of surveyed transmission providers composed of 18 utilities, which are subsidiaries of 10 holding companies with annual revenues greater than $3.0 billion, in the regional proximity of the TVA service territory (the "ELTIP Non-Fuel O&M Comparison Group"); and
- The maximum goal was established at the 25 th percentile of the ELTIP Non-Fuel O&M Comparison Group's performance.

Non-fuel O&M cost data for the ELTIP Non-Fuel O&M Comparison Group was obtained from FERC Form 1 Data as reported in the Energy Velocity Database.

The following table shows the performance goals and weighting and percent of opportunity achieved for the ELTIP for the three-year cycle ended September 30, 2011:

ELTIP Performance Goals, Weighting, and Percent of Opportunity

	Goals				Performance Achievement				
Performance Measure	Threshold (50%)	Target (100%)	Maximum (150%)	Performance Results	Actual (%)	X	Weight (%)	=	Result (%)
Retail Rate	Improvement Over Last Performance Cycle	Top 25% of Comparison Companies	Top 10% of Comparison Companies	Below Threshold	0%		33.33%		0%
Connection Point Interruption	N/A	1.12	0.78	Maximum	150%		33.33%		50%
Non-Fuel Operations and Maintenance	Improvement Over Last Performance Cycle	Top 50% of Comparison Companies	Top 25% of Comparison Companies	Below Threshold	0%		33.33%		0%
				Overall Percent of Opportunity Achieved					50%

As a part of the ELTIP, the TVA Board reserves discretion to review results and peer group comparisons and to approve adjustments in payouts, if appropriate, given the circumstances. The TVA Board did not adjust any payout for 2011.

As a result, the Named Executive Officers were awarded the following ELTIP payouts for 2011 in comparison to the 2011 target payouts:

2011 ELTIP Payouts

NEO	Salary	Target ELTIP Incentive Opportunity	Target ELTIP Payout	Percent of Opportunity Achieved	ELTIP Payout
Tom Kilgore	$850,000	150%	$1,275,000	50%	$637,500
John M. Thomas, III	$520,000	125%	$650,000	50%	$325,000
William R. McCollum, Jr.	$745,514	100%	$745,514	50%	$372,757
Kimberly S. Greene	$650,000	120%	$780,000	50%	$390,000
Preston D. Swafford	$545,000	100%	$545,000	50%	$272,500

Awards to the Named Executive Officers under the ELTIP for the performance cycle that ended on September 30, 2011, are reported in the "Non-Equity Incentive Plan Compensation" column in the Summary Compensation Table.

2010 - 2012 Performance Cycle

For the three-year cycle ending September 30, 2012, the TVA Board has approved the following overall measures of TVA performance to be applied to all participants in the ELTIP:

Performance Measure	Weight	Threshold (50%)	Target (100%)	Maximum (150%)
Retail Rates Relative Position (1)	50%	12 th	8 th	6 th
System Reliability Load Not Served (2)	30%	7.8	5.9	3.8
Responsibility Organizational Health Index (3)	10%	55.0	58.0	61.0
Stakeholder Survey (4)	10%	78.0	80.0	82.0

Notes
(1) Distributor reported retail power revenue and directly served power revenue divided by distributor reported retail sales and directly served power sales during this cycle. TVA compares its retail rates to the retail rates of 23 peer regional utilities, which are subsidiaries of 15 holding companies with annual revenues greater than $3.0 billion, in the regional proximity of the TVA service territory.
(2) Load Not Served, which is measured in system minutes, is equal to the product of (1) the percentage of total load not served and (2) the number of minutes in the period, and excludes events during declared major storms.
(3) The Organizational Health Index measures and tracks the organizational elements that drive TVA's performance culture. The performance targets are based upon an improvement plan that would result in improvement from the 2009 Organizational Health Index survey (threshold), second quartile performance in 2012 (target), and mid-second quartile performance in 2012 (maximum).
(4) The Stakeholder Survey is conducted among residents, public officials, economic development leaders, and business and community leaders in the Tennessee Valley and measures the external reputation and perception of TVA in how it responds to its strategic objectives. Threshold is equal to an increase in performance by one point per year. Target is equal to a return to 2008 levels by 2012. Maximum is equal to a return to 2008 levels by 2011 and an increase over 2008 levels by 2012.

2011 - 2013 Performance Cycle

For the three-year cycle ending September 30, 2013, the TVA Board has approved the following overall measures of TVA performance to be applied to all participants in the ELTIP, as revised by the TVA Board at its November 17, 2011 meeting, and described in Item 9B, Other Information:

Performance Measure	Weight	Threshold (50%)	Target (100%)	Maximum (150%)
Retail Rates (1)	40%	Improve to 10.75% gap vs. 2012 Top Quartile	Improve to 10% gap vs. 2012 Top Quartile	Improve to 9% gap vs. 2012 Top Quartile
System Reliability Load Not Served (2)	30%	7.8	5.9	3.8
Responsibility Organizational Health Index (3)	30%	61.0	66.0	71.0

Notes

(1) Distributor reported retail power revenue and directly served power revenue divided by distributor reported retail sales and directly served power sales during this cycle. TVA compares its retail rates to the retail rates of the following peer regional holding company utilities: Southern Company, NextEra Energy Inc., American Electric Power Co. Inc., Duke Energy Corp., Progress Energy Inc., Entergy Corp., Dominion Resources Inc., Ameren Corp., and PPL.

(2) Load Not Served, which is measured in system minutes, is equal to the product of (1) the percentage of total load not served and (2) the number of minutes in the period, and excludes events during declared major storms.

(3) The Organizational Health Index measures and tracks the organizational elements that drive TVA's performance culture. Threshold, target and maximum are based on a five-year plan (from 2009 to 2014) to achieve performance improvement. Threshold is based on incremental improvements leading to median performance in 2013. Target is based on incremental improvements leading to mid-second quartile performance in 2013. Maximum is based on incremental improvements leading to top quartile performance in 2013.

Long-Term Deferred Compensation. Unlike private sector companies in the energy services industry, TVA is a corporate agency and instrumentality of the United States and thus does not have equity securities to provide stock awards, options, or other equity-based awards as a form of compensation for its employees. Although TVA cannot and does not seek to replicate the type of equity-based compensation available at companies in TVA's peer group, TVA does enter into agreements with certain executives, including the Named Executive Officers, that are administered under TVA's long-term deferred compensation plan ("LTDCP") and provide a retention incentive similar to restricted stock or restricted stock units. The LTDCP agreements are designed to provide retention incentives to executives to encourage them to remain with TVA and to provide, in combination with salary and EAIP and ELTIP incentive awards, a competitive level of total compensation. Under the LTDCP, credits (which may be vested or unvested) are made to an account in an executive's name (typically on an annual basis) for a predetermined period. If the executive remains employed at TVA until the end of this period (typically three to five years), the executive becomes vested in the balance of the account, including any return on investment on the credits in the account, and receives a distribution in accordance with a deferral election made at the time the LTDCP agreement was entered into. The default return on investment on the credits in executives' accounts is interest calculated based on the composite rate of all marketable U.S. Treasury issues, which is credited daily to the balance reflected in the executives' accounts. In the alternative, executives may choose to have their balances adjusted based on the return on certain mutual funds.

Annual LTDCP credits are awarded to the Named Executive Officers in amounts targeted to constitute approximately 20 percent of each Named Executive Officer's total long-term compensation in conjunction with targeted ELTIP compensation described above. Annual credits provided to the Named Executive Officers under LTDCP agreements in 2011 are reported in the "All Other Compensation" column in the Summary Compensation Table. These credits are also reported in the "Registrant Contributions in Last FY" column in the Nonqualified Deferred Compensation Table since the credits were placed in deferred compensation accounts in the Named Executives Officers' names.

Descriptions of all current LTDCP agreements with the Named Executive Officers are found following the Grants of Plan-Based Awards Table.

Considerations Specific to Mr. Kilgore. At the beginning of 2011, the Committee, in consultation with its independent executive compensation consultant, Towers Watson, evaluated Mr. Kilgore's overall performance and then-current compensation relative to TVA's peer group to determine whether to recommend adjustments to Mr. Kilgore's compensation to the TVA Board for 2011. After a thorough review, including the consideration of chief executive officer median compensation data provided to the Committee by Towers Watson based on TVA's peer group, the Committee recommended that the TVA Board approve the same compensation and incentive opportunities for Mr. Kilgore for 2011 as for 2010 with one adjustment consisting of an additional incentive-based long-term deferred compensation arrangement under which credits of up to $325,000 per year may be awarded based upon Mr. Kilgore's achievement of specific long-term goals. At its November 4, 2010, meeting, the TVA Board approved the following compensation and incentive opportunities for Mr. Kilgore for 2011 recommended by the Committee: annual salary of $850,000, a target EAIP incentive opportunity of 100 percent of salary, a target ELTIP incentive opportunity of 150 percent of salary, a $300,000 credit under an LTDCP agreement, and a credit of up to $325,000 under an incentive-based long-term deferred compensation arrangement (which is described in *Other Agreements* below). The deferred compensation credit is reported in both the "Non-Equity Incentive Plan Compensation" column of the Summary Compensation Table and the "Registrant Contributions in Last FY" column of the Nonqualified Deferred Compensation Table.

Below is a chart comparing the following: (i) total compensation earned by Mr. Kilgore for 2010; (ii) total compensation earned by Mr. Kilgore for 2011; (iii) the 2011 compensation opportunity approved by the TVA Board for Mr. Kilgore at the beginning of 2011; and (iv) the chief executive officer median compensation data provided to the Committee by Towers Watson based on TVA's peer group as discussed above.

CEO Peer Group Compensation Comparison

Compensation Component	TVA CEO Compensation Earned for 2010	TVA CEO Compensation Earned for 2011	TVA CEO Compensation Opportunity for 2011	Towers Watson Chief Executive Officer Median Market Data Range (TVA Peer Group)
Base Salary	$853,269	$853,269	$850,000	$1,150,000
Total Annual Incentive (% of salary)	105%	105%	100%	100% - 105%
Total Cash Compensation	$1,735,161	$1,745,779	$1,700,000	$2,300,000
Total Long-Term Incentive Compensation	75%	50%	150%	290% - 365%
Total Direct Compensation	$2,991,411 (1)	$3,008,279 (2)	$3,600,000 (2)	$6,095,000

Notes
(1) Includes an annual credit of $300,000 provided under a November 2009 LTDCP agreement.
(2) Includes an annual credit of $300,000 provided under a November 2009 LTDCP agreement and the credit opportunity of up to $325,000 under an additional incentive-based long-term deferred compensation arrangement. See information regarding the details of the LTDCP agreement following the Grants of Plan-Based Awards Table.

As was the case in 2010, the Committee's recommendation was lower than the chief executive officer peer group benchmarking compensation data provided by Towers Watson. The Committee made its recommendation taking into account Mr. Kilgore's overall responsibility for TVA as President and CEO, his good overall individual performance in 2010, and several challenges he oversaw at TVA during 2010, which the Committee evaluated in adjusting his final individual annual incentive award downwards by 10 percent for 2010. In addition, the Committee made its recommendation acknowledging the following: the special place and mission of TVA, the belief that Mr. Kilgore's total compensation should be lower than the median market compensation for chief executive officers in TVA's peer group, and the belief that Mr. Kilgore's compensation should be placed at greater risk than any other TVA executive (68 percent of overall target compensation).

As a part of the TVA Board's approval of the compensation and incentive opportunities for Mr. Kilgore for 2011, as recommended by the Committee, the TVA Board delegated to its Chairman, in consultation with the Committee and with input from individual TVA Board members, the authority to set and approve the goals and the periods of performance for such goals under the additional incentive-based long-term deferred compensation arrangement added to Mr. Kilgore's compensation, assess the performance of Mr. Kilgore with respect to the goals, and approve any awards to Mr. Kilgore under this long-term deferred compensation arrangement based on such performance.

Pension Benefits. All of the Named Executive Officers are eligible to participate in the following qualified plans available to, and on the same terms and conditions applicable to, all annual TVA employees:

- Defined benefit plan
  - Cash Balance Benefit Structure (“CBBS”) for employees first hired on or after January 1, 1996, with a pension based on an account that receives pay credits equal to six percent of compensation plus interest.
- 401(k) plan
  - For CBBS members, TVA provides matching contributions of 75 cents on every dollar up to 4.5 percent of annual salary.

The availability of, and level of benefits provided by, these qualified plans are comparable to similar qualified plans provided by other companies in TVA's peer group.

In addition, certain executives in critical positions, including each of the Named Executive Officers, as determined by TVA on an individual basis (pursuant to delegations previously described), are eligible to participate in TVA's SERP. The SERP is a non-qualified pension plan that provides supplemental pension benefits tied to compensation levels that exceed limits imposed by IRS regulations applicable to TVA's qualified plans. TVA provides the SERP to certain executives in critical positions, including the Named Executive Officers, under the belief that these executives should receive an appropriate total retirement benefit based on a similar level of compensation credited under TVA's qualified plans regardless of IRS qualified plan limits. The availability of, and level of benefit provided by, this supplemental pension plan is comparable to similar non-qualified pension plans provided by other companies in TVA's peer group and helps TVA to remain competitive in attracting and retaining top-level executives. Because "compensation" for purposes of SERP includes EAIP, any discretionary action by Mr. Kilgore to eliminate or reduce EAIP payouts by application of the corporate modifier, or by the Chairman of the TVA Board, Mr. Kilgore or Mr. McCollum, as the case may be, based on discretionary action in respect of the Named Executive Officers could reduce SERP benefits to the Named Executive Officers in certain circumstances.

More information regarding these retirement and pension plans is found following the Pension Benefits Table.

Perquisites. In 2011, TVA provided certain executives, including Mr. Thomas, Mr. McCollum, Ms. Greene, and Mr. Swafford, a flat-dollar biweekly vehicle allowance that may be applied toward the purchase or lease of a vehicle, operating fees, excess mileage, maintenance, repairs, and insurance. Vehicle allowances are granted on a "business need" basis to a very limited number of executives. The amount of the vehicle allowances granted to the Named Executive Officers is reported in the "All Other Compensation" column in the Summary Compensation Table.

In 2011, TVA offered a Financial Counseling Services Program for a limited number of executives approved by the CEO. Under the program, participants are eligible to receive personal financial counseling services, such as estate planning, investment planning, income tax planning, income tax preparation, and retirement planning. TVA pays the cost of the program for each participant and also pays each participant a gross-up amount that reasonably approximates the additional income and employment taxes estimated to be payable as a result of TVA's payments pursuant to the program. Mr. Thomas and Mr. Swafford are the only Named Executive Officers eligible to participate in the Financial Counseling Services Program. The amount of any cost incurred by TVA on behalf of Mr. Thomas and Mr. Swafford pursuant to this program, including any gross-up amount, is reported in the "All Other Compensation" column in the Summary Compensation Table. The Financial Counseling Services Program will end on December 31, 2011, and TVA will no longer pay the cost of personal financial counseling services for executives following that date.

TVA did not provide any other perquisites to the Named Executive Officers in 2011.

Health and Other Benefits. TVA offers a group of health and other benefits (medical, dental, vision, life and accidental death and disability insurance, and long-term disability insurance) that are available to a broad group of employees. The Named Executive Officers are eligible to participate in TVA's health benefit plans and other non-retirement benefit plans on the same terms and at the same contribution rates as other TVA employees.

Other Agreements. As discussed in "Considerations Specific to Mr. Kilgore" above, the TVA Board approved for Mr. Kilgore for 2011 an additional incentive-based long-term deferred compensation arrangement under which credits of up to $325,000 per year may be awarded based upon Mr. Kilgore's achievement of specific long-term goals. As a part of this approval, the TVA Board delegated to its Chairman, in consultation with the Committee and with input from individual members of the TVA Board, the authority to set and approve the goals and the periods of performance for such goals under this incentive-based long-term deferred compensation arrangement, rate the performance of Mr. Kilgore with respect to the goals, and approve any awards to Mr. Kilgore under this long-term deferred compensation arrangement based on such performance. While no new specific goals were established for Mr. Kilgore, the Chairman of the TVA Board subjectively evaluated Mr. Kilgore's performance as CEO for purposes of establishing an award under the arrangement for 2011 by considering the following factors: (i) the TVA Board's rating that Mr. Kilgore's overall performance during the year fully met the TVA Board's expectations, (ii) TVA's financial performance during 2011, (iii) TVA's response to the April storms, (iv) the improvement TVA has made in its organizational health, and (v) the progress TVA has made toward achieving financial flexibility. Based on the consideration of all of these factors, the Chairman of the TVA Board decided to award Mr. Kilgore the maximum credit of $325,000 for 2011 under this long-term deferred compensation arrangement, which will be credited to Mr. Kilgore's deferred compensation plan account and paid to him in a lump-sum upon his separation from service from TVA.

In September 2009, Mr. Kilgore approved a performance arrangement that will provide Mr. Swafford, as long as he remains responsible for managing and directing TVA's Nuclear Generation Group, the opportunity to receive annual performance awards for improvements in the overall performance of any of TVA's nuclear plants based on nuclear power industry peer evaluations. Under the arrangement, Mr. Swafford will receive a lump-sum performance award of $100,000 following each fiscal year in which at least one nuclear plant in TVA's generation portfolio achieves an improved performance evaluation. In the event the performance of any plant drops below that achieved in the most recent evaluation of the plant, no award will be made. All awards will be recommended by the Chief Operating Officer and approved by the CEO at the end of each fiscal year. Based on an overall peer evaluation, Mr. Swafford did not receive an annual performance award under this arrangement for 2011.

Executive Compensation Tables and Narrative Disclosures

Summary Compensation and Grants of Plan-Based Awards

The following table sets forth information regarding compensation earned by each of the Named Executive Officers in 2011 (and 2010 and 2009 as applicable).

Summary Compensation Table

Name and Principal Position	Year	Salary ($)	Bonus ($)	Stock Awards ($)	Option Awards ($)	Non-Equity Incentive Plan Compensation ($)	Change in Pension Value and Nonqualified Deferred Compensation Earnings ($)	All Other Compensation ($)	Total ($)
Tom Kilgore	2011	$853,269	—	—	—	$1,855,010 [(1)]	$931,256 [(2)]	$311,025 [(3)]	$3,950,560
President and Chief	2010	$853,269	—	—	—	$1,838,142 [(4)]	$595,643 [(5)]	$311,025	$3,598,079
Executive Officer	2009	$853,270	—	—	—	$0	$0 [(6)]	$310,350	$1,163,620
John M. Thomas, III	2011	$522,000	—	—	—	$707,481 [(7)]	$303,019 [(8)]	$145,394 [(9)]	$1,677,894
Chief Financial Officer	2010	$410,000	—	—	—	$859,376 [(10)]	$177,260 [(11)]	$91,381	$1,538,017
	2009	—	—	—	—	—	—	—	—
William R. McCollum,	2011	$748,381	—	—	—	$886,524 [(12)]	$704,063 [(13)]	$222,770 [(14)]	$2,561,738
Jr.	2010	$748,381	—	—	—	$1,078,617 [(15)]	$335,712 [(16)]	$222,770	$2,385,480
Chief Operating Officer	2009	$748,381	—	—	—	$559,136 [(17)]	$265,870 [(18)]	$222,082	$1,795,469
Kimberly S. Greene	2011	$652,500	—	—	—	$831,324 [(19)]	$619,721 [(20)]	$272,770 [(21)]	$2,376,315
Group President,	2010	$603,942	—	—	—	$1,014,088 [(22)]	$536,376 [(23)]	$172,770	$2,327,176
Strategy and External Relations	2009	$527,020	—	—	—	$393,750 [(24)]	$135,091 [(25)]	$172,082	$1,227,943
Preston D. Swafford	2011	$547,865	—	—	—	$677,070 [(26)]	$530,467 [(27)]	$195,394 [(28)]	$1,950,796
Executive Vice	2010	$527,019	—	—	—	$833,840 [(29)]	$325,208 [(30)]	$167,711	$1,853,778
President and Chief Nuclear Officer, Nuclear Generation	2009	$499,877	$100,000 [(31)]	—	—	$558,390 [(32)]	$201,516 [(33)]	$147,082	$1,506,865

Notes
(1) Represents $892,510 awarded under the EAIP, $637,500 awarded under the ELTIP, and a deferred compensation credit of $325,000 provided under an incentive-based long-term deferred compensation arrangement. See information regarding the description of the arrangement under “Other Agreements.”
(2) Reflects increases of $23,379 under the CBBS and $907,877 under the SERP.
(3) Represents a credit in the amount of $300,000 that vests on November 30, 2011, which was provided under a LTDCP agreement with Mr. Kilgore, and $11,025 in 401(k) employer matching contributions. See information regarding the details of the LTDCP agreement under “Long-Term Deferred Compensation Plan.”
(4) Represents $881,892 awarded under the EAIP and $956,250 awarded under the ELTIP.
(5) Reflects increases of $18,637 under the CBBS and $577,006 under the SERP.
(6) Reflects an increase of $16,929 under the CBBS and a decrease of $133,752 under the SERP.
(7) Represents $382,481 awarded under the EAIP and $325,000 awarded under the ELTIP.
(8) Reflects increases of $37,077 under the CBBS and $265,942 under the SERP.
(9) Represents credits totaling $100,000, $50,000 of which vested on September 30, 2011, and $50,000 of which vests on September 30, 2013, provided under two separate LTDCP agreements with Mr. Thomas, $11,745 in vehicle allowance payments, $11,025 in 401(k) employer matching contributions, $16,640 in estimated costs TVA paid for financial consulting services, and $5,984 in estimated gross-up amounts that reasonably approximate additional income and employment taxes payable as a result of TVA's payments pursuant to the Financial Counseling Services Program. See information regarding the details of the LTDCP agreements under “Long-Term Deferred Compensation Plan.”
(10) Represents $371,876 awarded under the EAIP and $487,500 awarded under the ELTIP.
(11) Reflects increases of $30,848 under the CBBS and $146,412 under the SERP.
(12) Represents $513,767 awarded under the EAIP and $372,757 awarded under the ELTIP.
(13) Represents increases of $22,704 under the CBBS and $681,359 under the SERP.
(14) Represents a credit in the amount of $200,000 provided under a LTDCP agreement with Mr. McCollum that vested on September 30, 2011, $11,745 in vehicle allowance payments, and $11,025 in 401(k) employer matching contributions. See information regarding the details of the LTDCP agreement under “Long-Term Deferred Compensation Plan.”
(15) Represents $519,481 awarded under the EAIP and $559,136 awarded under the ELTIP.
(16) Represents increases of $18,404 under the CBBS and $317,308 under the SERP.
(17) Represents $559,136 awarded under the ELTIP.
(18) Represents increases of $15,789 under the CBBS and $250,081 under the SERP.
(19) Represents $441,324 awarded under the EAIP and $390,000 awarded under the ELTIP.
(20) Represents increases of $35,152 under the CBBS and $584,569 under the SERP.
(21) Represents credits totaling $250,000, $100,000 of which vested on September 30, 2011, and $150,000 of which vests on September 30, 2012, provided under two separate LTDCP agreements with Ms. Greene, $11,745 in vehicle allowance payments, and $11,025 in 401(k) employer matching contributions. See information regarding the details of the LTDCP agreements under “Long-Term Deferred Compensation Plan.”
(22) Represents $429,088 awarded under the EAIP and $585,000 awarded under the ELTIP.
(23) Represents increases of $27,331 under the CBBS and $509,045 under the SERP.
(24) Represents $393,750 awarded under the ELTIP.

(25) Represents increases of $20,754 under the CBBS and $114,337 under the SERP.
(26) Represents $404,570 awarded under the EAIP and $272,500 awarded under the ELTIP.
(27) Represents increases of $34,027 under the CBBS and $496,440 under the SERP.
(28) Represents an annual credit in the amount of $150,000 provided under a LTDCP agreement with Mr. Swafford that vests on September 30, 2013, $11,745 in vehicle allowance payments, $11,025 in 401(k) employer matching contributions, $16,640 in estimated costs TVA paid for financial consulting services, and $5,984 in estimated gross-up amounts that reasonably approximate additional income and employment taxes payable as a result of TVA's payments pursuant to the Financial Counseling Services Program. See information regarding the details of the LTDCP agreement under "Long-Term Deferred Compensation Plan."
(29) Represents $440,090 awarded under the EAIP and $393,750 awarded under the ELTIP.
(30) Represents increases of $28,526 under the CBBS and $296,682 under the SERP.
(31) Represents a lump sum performance payment awarded for an improved nuclear power industry peer evaluation of Watts Bar Nuclear Plant in 2009.
(32) Represents $164,640 awarded under the EAIP and $393,750 awarded under the ELTIP.
(33) Represents increases of $27,674 under the CBBS and $173,842 under the SERP.

The following table provides information regarding non-equity incentive plan awards and the possible range of payouts associated with incentives the Named Executive Officers were eligible to receive for performance in the performance cycle ended in 2011.

Grants of Plan-Based Awards Table

		Estimated Possible Payouts Under Non-Equity Incentive Plan Awards (1)		
Name	**Plan**	**Threshold (2) ($)**	**Target (2) ($)**	**Maximum (2) ($)**
Tom Kilgore	EAIP (3)	$425,000	$850,000	$1,275,000
	ELTIP (4)	$637,500	$1,275,000	$1,912,500
	LTDC (5)			$325,000
John M. Thomas, III	EAIP (3)	$169,000	$338,000	$507,000
	ELTIP (4)	$325,000	$650,000	$975,000
William R. McCollum, Jr.	EAIP (3)	$260,930	$521,860	$782,790
	ELTIP (4)	$372,757	$745,514	$1,118,271
Kimberly S. Greene	EAIP (3)	$195,000	$390,000	$585,000
	ELTIP (4)	$390,000	$780,000	$1,170,000
Preston D. Swafford	EAIP (3)	$218,000	$436,000	$654,000
	ELTIP (4)	$272,500	$545,000	$817,500

Notes
(1) TVA does not have any equity securities and therefore has no equity-based awards.
(2) Threshold, Target, and Maximum represent amounts that could be earned by an NEO based on 2011 performance.
(3) Target incentive opportunities as a percentage of salaries were as follows: Mr. Kilgore, 100%; Mr. Thomas, 65%; Mr. McCollum, 70%; Ms. Greene, 60%; and Mr. Swafford, 80%. EAIP performance measures for 2011 were Net Cash Flow and Equivalent Availability Factor. Actual EAIP awards earned for performance in 2011 are reported for each of the Named Executive Officers under "Non-Equity Incentive Plan Compensation" in the Summary Compensation Table. See *Compensation Discussion and Analysis* for a discussion of how each award was determined.
(4) Target incentive opportunities for the three-year performance cycle ended September 30, 2011 as a percentage of salaries were as follows: Mr. Kilgore, 150%; Mr. Thomas, 125%; Mr. McCollum, 100%; Ms. Greene, 120%; and Mr. Swafford, 100%. ELTIP performance measures for the three-year cycle ended September 30, 2011, were Retail Rates, Connection Point Interruption, and Non-Fuel Operations and Maintenance Costs. Actual ELTIP awards earned for the performance cycle ended on September 30, 2011, are reported for each of the Named Executive Officers under "Non-Equity Incentive Plan Compensation" in the Summary Compensation Table. See *Compensation Discussion and Analysis* for a discussion of how each award was determined.
(5) Reflects the maximum credit Mr. Kilgore was eligible to receive under an incentive-based long-term deferred compensation arrangement described in *Other Agreements* . The actual credit to be awarded to Mr. Kilgore is reported under "Non-Equity Incentive Plan Compensation" in the Summary Compensation Table.

Awards under the EAIP and ELTIP will be paid in cash during the first quarter of 2012 with a deferral option. Mr. McCollum elected to defer 50 percent of his EAIP award earned for 2011. In addition, Mr. McCollum and Mr. Swafford elected to defer 100 percent and 25 percent, respectively, of their ELTIP awards earned for the performance cycle ended on September 30, 2011.

Long-Term Deferred Compensation Plan

The TVA Long-Term Deferred Compensation Plan is designed to provide long-term incentives to executives to encourage them to stay with TVA and to provide competitive levels of total compensation to such executives. Participating executives enter into deferral agreements with TVA under which deferred compensation credits are made to an account in the participant's name. Credits are made on an annual basis for an established period of time. Interest is credited daily to the balance reflected in the participant's deferral account. Interest is calculated based on the composite rate of all marketable U.S. Treasury issues. In the alternative, participants may choose to have their balance adjusted based on the return on certain mutual funds. Credits vest after a period fixed in the agreement and are distributed to the participant either at vesting or following termination as provided in the particular agreement. Set forth below are descriptions of the LTDCP agreements that are reflected in the Summary Compensation Table for the Named Executive Officers. See also the "Nonqualified Deferred Compensation Table" below, which also includes information with respect to amounts credited under these and prior LTDCP agreements.

In November 2009, TVA entered into a LTDCP agreement with Mr. Kilgore. Under the terms of the agreement, Mr. Kilgore received deferred compensation credits of $300,000 each on December 1, 2009, and December 1, 2010, and these credits, as well as any earnings on these amounts, vested and will vest on November 30, 2010, and November 30, 2011, respectively. Mr. Kilgore will also receive deferred compensation credits of $300,000 each on December 1, 2011, and December 1, 2012, if he remains employed by TVA on these dates, and these credits, as well as any earnings on these amounts, will vest on November 30, 2012, and November 30, 2013, respectively. Each credit, and earnings on such credit, will be distributed to Mr. Kilgore in a lump sum at the time of vesting. In the event TVA terminates Mr. Kilgore's employment during the term of the LTDCP agreement through no act or delinquency of his own, any credit, and earnings on such credit, in Mr. Kilgore's account that is not vested at the time of termination will become vested and distributed to him in a lump sum. If Mr. Kilgore voluntarily terminates his employment or TVA terminates Mr. Kilgore's employment for cause prior to the expiration of the agreement, any credit, and earnings on such credit, in Mr. Kilgore's account that is not vested will be forfeited.

In September 2009, TVA entered into a LTDCP agreement with Mr. Thomas. Under the terms of the agreement, Mr. Thomas received deferred compensation credits of $50,000 on October 1, 2009, and October 1, 2010. Mr. Thomas has vested in his account because he remained employed by TVA until the expiration of the agreement on September 30, 2011. All credits, and earnings on such credits, in his account were distributed to him in a lump sum following the expiration of the agreement.

In September 2010, TVA entered into a second LTDCP agreement with Mr. Thomas. Under the terms of the agreement, Mr. Thomas received a deferred compensation credit of $50,000 on October 1, 2010, and a deferred compensation credit of $100,000 on October 1, 2011. Mr. Thomas will also receive a deferred compensation credit in the amount of $100,000 on October 1, 2012, if he remains employed by TVA on that date. Mr. Thomas will vest in his account only if he remains employed by TVA until the expiration of the agreement on September 30, 2013. All vested credits, and earnings on such credits, in his account will be distributed to him in a lump sum following the expiration of the agreement. In the event TVA terminates Mr. Thomas's employment during the term of the LTDCP agreement through no act or delinquency of his own, any credits and earnings on those credits in Mr. Thomas's account at the time of termination will become vested and distributed to him in a lump sum. If Mr. Thomas voluntarily terminates his employment or TVA terminates Mr. Thomas's employment for cause prior to the expiration of the agreement, all credits, and earnings on such credits, in Mr. Thomas's account will be forfeited.

In May 2007, TVA entered into a LTDCP agreement with Mr. McCollum. Under the terms of the agreement, Mr. McCollum received a deferred compensation credit of $350,000 on May 1, 2007, and deferred compensation credits of $200,000 on October 1, 2007, October 1, 2008, October 1, 2009, and October 1, 2010. Pursuant to the agreement, Mr. McCollum was vested in the first credit of $350,000 at the time the credit was made and vested in any earnings on this amount. Mr. McCollum has vested in the remaining balance of his account because he remained employed by TVA until the expiration of the agreement on September 30, 2011. All credits, and earnings on such credits, in his account will be distributed to him in five annual installments following the termination of his employment with TVA.

In September 2007, TVA entered into a LTDCP agreement with Ms. Greene. Under the terms of the agreement, Ms. Greene received a deferred compensation credit of $280,000 on September 4, 2007, and deferred compensation credits of $100,000 on October 1, 2008, October 1, 2009, and October 1, 2010. Pursuant to the agreement, Ms. Greene was vested in the first credit of $280,000 at the time the credit was made and vested in any earnings on this amount. Ms. Greene has vested in the remaining balance of her account because she remained employed by TVA until the expiration of the agreement on September 30, 2011. All credits, and earnings on such credits, in her account will be distributed to her in five annual installments following the termination of her employment with TVA.

In December 2008, TVA entered into a second LTDCP agreement with Ms. Greene. Under the terms of the agreement, Ms. Greene received deferred compensation credits of $50,000 on December 1, 2008, and October 1, 2009, and deferred compensation credits of $150,000 on October 1, 2010, and October 1, 2011 . Ms. Greene will vest in her account only if she remains employed by TVA until the expiration of the agreement on September 30, 2012. All vested credits, and earnings on such credits, in her account will be distributed to her in a lump sum following the expiration of the agreement. In the event TVA terminates Ms. Greene's employment during the term of the LTDCP agreement through no act or delinquency of her own, any credits and earnings on those credits in Ms. Greene's account at the time of termination will become vested and distributed to her in a lump sum. If Ms. Greene voluntarily terminates her employment or TVA terminates Ms. Greene's employment for cause prior to the expiration of the agreement, all credits, and earnings on such credits, in Ms. Greene's account will be forfeited.

In December 2010, TVA entered into a LTDCP agreement with Mr. Swafford. Under the terms of the agreement, Mr.

Swafford received a deferred compensation credit of $150,000 on December 1, 2010, and a deferred compensation credit of $100,000 on October 1, 2011. Mr. Swafford will also receive a deferred compensation credit in the amount of $100,000 on October 1, 2012, if he remains employed by TVA on that date. Mr. Swafford will vest in his account only if he remains employed by TVA until the expiration of the agreement on September 30, 2013. All vested credits , and earnings on such credits, in his account will be distributed to him in a lump sum following the expiration of the agreement. In the event TVA terminates Mr. Swafford's employment during the term of the LTDCP agreement through no act or delinquency of his own, any credits and earnings on those credits in Mr. Swafford's account at the time of termination will become vested and distributed to him in a lump sum. If Mr. Swafford voluntarily terminates his employment or TVA terminates Mr. Swafford's employment for cause prior to the expiration of the agreement, all credits, and earnings on such credits, in Mr. Swafford's account will be forfeited.

Retirement and Pension Plans

The following table provides the actuarial present value of the Named Executive Officers' accumulated benefits, including the number of years of credited service, under TVA's retirement and pension plans as of September 30, 2011, determined using a methodology and interest rate and mortality rate assumptions that are consistent with those used in the financial statements contained in this Annual Report as set forth in Note 18.

Pension Benefits Table

Name	Plan Name	Number of Years of Credited Service (1) (#)	Present Value of Accumulated Benefit ($)	Payments During Last Year ($)
Tom Kilgore	(1) Qualified Plan – CBBS (2) Non-Qualified – SERP Tier 1	6.58 9.58 (2)	$95,745 $3,329,935	$0 $0
John M. Thomas, III	(1) Qualified Plan – CBBS (2) Non-Qualified – SERP Tier 1	5.83 5.83	$126,734 $453,793	$0 $0
William R. McCollum, Jr.	(1) Qualified Plan – CBBS (2) Non-Qualified – SERP Tier 1	4.42 14.42 (3)	$73,103 $3,385,399	$0 $0
Kimberly S. Greene	(1) Qualified Plan – CBBS (2) Non-Qualified – SERP Tier 1	4.08 19.08 (4)	$98,364 $1,659,283	$0 $0
Preston D. Swafford	(1) Qualified Plan – CBBS (2) Non-Qualified – SERP Tier 1	5.42 10.42 (5)	$119,442 $1,335,973	$0 $0

Notes
(1) Limited to 24 years when determining supplemental benefits available under SERP Tier 1, described below.
(2) Mr. Kilgore has been granted three additional years of credited service for pre-TVA employment and the offset for prior employer pension benefits associated with the additional three years of credited service has been waived. In addition, the offset for benefits provided under TVA's defined benefit plan will be calculated based on the actual pension benefit he will receive as a participant in the CBBS.
(3) Mr. McCollum has been granted 10 additional years of credited service for pre-TVA employment and the offset for prior employer pension benefits has been waived. The additional years of credited service will be used for SERP benefit calculation purposes only and will not count toward the minimum five-year vesting requirement. In the event Mr. McCollum voluntarily terminates his employment with TVA or is terminated for cause prior to satisfying the minimum five-year vesting requirement, no benefits will be provided under the SERP. In the event of termination for any other reason, prior to five years of employment, the five-year vesting requirement will be waived as long as the termination is considered acceptable to TVA, and Mr. McCollum will be eligible to receive benefits payable in five annual installments following termination. The present value of this benefit as of September 30, 2011, is $3,385,399. Without waiving the vesting requirement and granting the additional years of credited service, the present value of Mr. McCollum's accumulated benefit would be $0.
(4) Ms. Greene has been granted 15 additional years of credited service for pre-TVA employment and the offset for prior employer pension benefits has been waived. The offset for benefits provided under TVA's defined benefit plan will be calculated based on the benefit she will be eligible to receive as a participant in the CBBS taking into account the additional years of credited service being used for SERP benefit calculation purposes. In the event that Ms. Greene voluntarily terminates her employment with TVA or is terminated for cause prior to satisfying the minimum five-year vesting requirement, no benefits will be provided under the SERP. In the event of termination for any other reason, prior to five years of employment, the five-year vesting requirement will be waived and the benefit Ms. Greene will be eligible to receive will be payable no earlier than age 55. As of September 30, 2011, the present value of this benefit is $1,659,283. Without the additional years of credited service, the present value of Ms. Greene's accumulated benefit would be $0.
(5) Mr. Swafford has been granted five additional years of credited service for pre-TVA employment and the offset for prior employer pension benefits has been waived. The additional years of credited service will be used for SERP benefit calculation purposes. In addition, the offset for benefits provided under TVA's defined benefit plan will be calculated based on the benefit he would be eligible to receive as a participant in the CBBS taking into account the additional years of credited service being used for SERP benefit calculation purposes. The present value of this benefit as of September 30, 2011, is $1,335,973.

Qualified Defined Benefit Plan. TVA sponsors a qualified defined benefit plan with two structures for employees, including the Named Executive Officers, which is administered by the TVA Retirement System. The structures are the Original Benefit Structure ("OBS") and the CBBS. Participation in the OBS is limited to employees who were covered under the plan prior to January 1, 1996. All employees first hired by TVA on or after January 1, 1996, participate in the CBBS. As with any other qualified retirement plan, there are limits on employee and employer contributions and compensation that can be counted for benefit calculations set by the TVA Retirement System rules and IRS regulations.

All of the Named Executive Officers are members of the CBBS. Under the CBBS, each member has a cash balance account that receives pay credits equal to six percent of his/her compensation each pay period (every two weeks). For executives who are members of the CBBS, compensation is defined as annual salary only for benefit calculation purposes and is shown under the column titled "Salary" in the Summary Compensation Table, although compensation could not exceed $245,000 in 2011 pursuant to the IRS annual compensation limit applicable to qualified plans. The account is credited with interest each month, and interest is compounded on an annual basis. The annual interest rate used for interest credits is determined each January 1. The interest rate is three percent greater than the percentage increase in the 12-month average of the Consumer Price Index for the period ending on the previous October 31. The minimum interest rate is six percent and the maximum interest rate is 10 percent unless the TVARS Board, with TVA's approval, selects a higher interest rate. When a member elects to begin receiving retirement benefits, the cash balance account is converted to a monthly pension payment by dividing the ending value of the cash balance account by a conversion factor set forth in the plan based on the member's actual age in years and months.

Members with at least five years of CBBS service are eligible to receive an immediate benefit. CBBS service is the length of time spent as a member of the TVA Retirement System and does not include credit for unused sick leave, forfeited annual leave, or pre-TVA employment military service. The CBBS does not provide for early retirement benefits to any Named Executive Officer or any other member in the CBBS.

Supplemental Executive Retirement Plan. The SERP is a non-qualified defined benefit pension plan similar to those typically found in other companies in TVA's peer group and is provided to a limited number of executives, including the Named Executive Officers. TVA's SERP was created to recruit and retain key executives. The plan is designed to provide a competitive level of retirement benefits in excess of the limitations on contributions and benefits imposed by TVA's qualified defined benefit plan and IRS code section 415 limits on qualified retirement plans.

The SERP provides two distinct levels of participation, Tier 1 and Tier 2. Each employee is assigned to one of the two tiers at the time he or she is approved to participate in the SERP. The level of participation ("Tier") defines the level of retirement benefits provided under the SERP at the time of retirement.

Under the SERP, normal retirement eligibility is age 62 with five years of vesting service. No vested and accrued benefits are payable prior to age 55, and benefits are reduced for retirements prior to age 62. The level of reduction in benefits for retirements prior to age 62 depends on whether a participant's termination is "approved" or "unapproved." In the event of an approved termination of TVA employment, any vested and accrued benefits are reduced by 5/12 percent for each month that the date of benefit commencement precedes the participant's 62nd birthday up to a maximum reduction of 35 percent. In the event of an unapproved termination of TVA employment, the participant's accrued benefits are first subject to a reduced percentage of vesting if the participant's years of service are between five and ten. At five years of vesting service, the vested percentage of retirement benefits is 50 percent and increases thereafter by 10 percent for each full additional year of service, reaching 100 percent vesting for ten or more years of vesting service. Thereafter, any vested and accrued benefits are reduced by 10/12 percent for each month that the date of benefit commencement precedes the participant's 62nd birthday up to a maximum reduction of 70 percent.

For purposes of the SERP, an "approved" termination means termination of employment with TVA due to (i) retirement on or after the participant's 62nd birthday, (ii) retirement on or after attainment of actual age 55, if such retirement has the approval of the TVA Board or its delegate, (iii) death in service as an employee, (iv) disability (as such term is defined under TVA's long-term disability plan), or (v) any other circumstances approved by the TVA Board or its delegate. For purposes of the SERP, an "unapproved" termination means a termination of employment with TVA when such termination does not constitute an "approved" termination as defined in the preceding sentence.

SERP Tier 1 . All of the Named Executive Officers are participants in Tier 1. The Tier 1 structure is designed to replace 60 percent of the amount of a participant's compensation at the time the participant reaches age 62 and has accrued 24 years of service at TVA.

Tier 1 benefits are based on a participant's highest average compensation during three consecutive SERP years and a pension multiple of 2.5 percent for each year of credited service up to a maximum of 24 years. Compensation is defined as salary and EAIP for benefit calculation purposes. Tier 1 benefits are offset by Social Security benefits, benefits provided under TVA's defined benefit plan, and prior employer pension benefits when applicable.

The TVA Sponsored 401(k) Plan. Members of the TVA Retirement System, including the Named Executive Officers, may elect to participate in the TVA Retirement System's 401(k) plan on a before-tax, after-tax and/or Roth basis. For CBBS members, TVA provides a matching contribution of 75 cents on every dollar contributed on a before-tax, after-tax and/or Roth basis up to 4.5 percent of the participant's annual salary.

Nonqualified Deferred Compensation

The following table provides information regarding deferred contributions, earnings, and balances for each of the Named Executive Officers. The amounts reported under this table do not represent compensation in addition to the compensation that was earned in 2011 and already reported in the Summary Compensation Table but rather the amounts of compensation earned by the Named Executive Officers in 2011 or prior years that was or has been deferred.

Nonqualified Deferred Compensation Table

Name	Executive Contributions in Last FY ($)	Registrant Contributions in Last FY ($)	Aggregate Earnings in Last FY [(1)] ($)	Aggregate Withdrawals/ Distributions ($)	Aggregate Balance at Last FYE [(2)] ($)
Tom Kilgore	$0	$625,000 [(3)]	$90,141	$0	$3,970,387 [(4)]
John M. Thomas, III	$0	$100,000 [(5)]	$3,669	$0	$51,179 [(6)]
William R. McCollum, Jr.	$629,641 [(7)]	$200,000 [(8)]	$(145,200)	$0	$3,807,203 [(9)]
Kimberly S. Greene	$0	$250,000 [(10)]	$21,322	$0	$898,766 [(11)]
Preston D. Swafford	$68,125 [(12)]	$150,000 [(13)]	$14,808	$0	$655,056 [(14)]

Notes
(1) Includes vested and unvested earnings. Because none of the amounts is above market earnings under SEC rules, none of these amounts is included in the Summary Compensation Table.
(2) Includes vested and unvested contributions and earnings.
(3) Represents an unvested annual credit in the amount of $300,000 provided under a LTDCP agreement with Mr. Kilgore (reported in the “All Other Compensation” column in the Summary Compensation Table) and a credit of $325,000 to be awarded under an additional incentive-based long-term deferred compensation agreement (reported in the "Non-Equity Incentive Plan Compensation" column in the Summary Compensation Table).
(4) The $325,000 amount reported in "Registrant Contributions in Last FY" column will be credited to his account in the first quarter of 2012 and is not included in the balance. A total of $2,911,522 was reported as compensation to Mr. Kilgore in the Summary Compensation Tables in previous years.
(5) Represents credits totaling $100,000, $50,000 of which vested on September 30, 2011, and $50,000 of which vests on September 30, 2013, provided under two separate LTDCP agreements with Mr. Thomas (reported in the “All Other Compensation” column in the Summary Compensation Table).
(6) Includes a total of $51,179 of contributions and earnings that were not vested as of September 30, 2011.
(7) Mr. McCollum elected to defer 50 percent of the $513,767 to be awarded under the EAIP for the performance period that ended on September 30, 2011 and 100 percent of the $372,757 to be awarded under the ELTIP for the performance cycle that ended on September 30, 2011 (reported in the “Non-Equity Incentive Plan Compensation” column in the Summary Compensation Table).
(8) Represents an annual credit in the amount of $200,000 that vested on September 30, 2011, which was provided under an agreement with Mr. McCollum (reported in the “All Other Compensation” column in the Summary Compensation Table).
(9) The amount reported in “Executive Contributions in Last FY” column will be credited to his account in the first quarter of 2012 and is not included in the balance. A total of $3,601,622 was reported as compensation to Mr. McCollum in the Summary Compensation Tables in previous years.
(10) Represents credits totaling $250,000, $100,000 of which vested on September 30, 2011, and $150,000 of which vests on September 30, 2012, provided under two separate LTDCP agreements with Ms. Greene (reported in the “All Other Compensation” column in the Summary Compensation Table).
(11) Includes a total of $260,256 of contributions and earnings that were not vested as of September 30, 2011. A total of $580,000 was reported as compensation to Ms. Greene in the Summary Compensation Tables in previous years.
(12) Mr. Swafford elected to defer 25 percent of the $272,500 to be awarded under the ELTIP for the performance cycle that ended on September 30, 2011 (reported in the “Non-Equity Incentive Plan Compensation” column in the Summary Table).
(13) Represents an unvested annual credit in the amount of $150,000 provided under a LTDCP agreement with Mr. Swafford (reported in the “All Other Compensation” column in the Summary Compensation Table).
(14) Includes a total of $153,073 of contributions and earnings that were not vested as of September 30, 2011. The amount reported in “Executive Contributions in Last FY” column will be credited to his account in the first quarter of 2012 and is not included in the balance. A total of $446,876 was reported as compensation to Mr. Swafford in the Summary Compensation Tables in previous years.

TVA normally allows participants in the EAIP, ELTIP, and LTDCP to elect to defer all or a portion of the compensation earned under those plans that is eligible for deferral under the terms of each plan and applicable IRS regulations. All deferrals are credited to each participant in a deferred compensation account, and the deferral amounts are then funded into a rabbi trust. Each participant may elect one or more of several notional investment options made available by TVA or allow some or all funds to accrue interest at the rate established by the beginning of each fiscal year equal to the composite rate of all Treasury issues. Participants may elect to change from either one notional investment option or the TVA interest bearing option to another at any time. Upon termination, funds are distributed pursuant to elections made in accordance with applicable IRS regulations.

Participants in the EAIP and ELTIP, including the Named Executive Officers, were permitted to elect to defer all or a portion of their awards (25, 50, 75, or 100 percent) received under the plans for 2011. Participants in the LTDCP, including the Named Executive Officers, may be eligible to defer credits awarded under their LTDCP agreements by making an election at the time they enter into the LTDCP agreements.

Potential Payments on Account of Retirement/Resignation, Termination without Cause, Termination with Cause, or Death/Disability

The tables below show certain potential payments that would have been made to each Named Executive Officer if his or her employment had been terminated on September 30, 2011, under various scenarios. All of the Named Executive Officers would also be entitled to payments from plans generally available to TVA employees under the specific circumstances of termination of employment, including the health and welfare and pension plans and amounts in the 401(k) plan.

Tom Kilgore	Retirement/Resignation	Termination without Cause	Termination with Cause	Death/ Disability
Severance Agreement (1)	$0	$2,975,000	$0	$0
LTDCP	$0	$305,953	$0	$305,953
SERP	$3,329,935 (2)	$3,329,935 (2)	$0	$3,329,935 (3)
Deferred Compensation (4)	$3,664,434	$3,664,434	$3,664,434	$3,664,434
Total Value of Potential Payments	$6,994,369	$10,275,322	$3,664,434	$7,300,322

Notes
(1) In January 2005, TVA entered into an agreement with Mr. Kilgore that provides a lump-sum payment equal to one year's annual compensation if (1) his duties, responsibilities, or compensation is substantially reduced, and he terminates his employment with TVA, or (2) his employment is terminated for any reason other than "for cause." For purposes of this agreement, "annual compensation" is defined as annual salary plus the amount of the annual and long-term incentive awards he would have been eligible to receive based on 100 percent achievement of target performance goals.
(2) Represents the present value of the accumulated benefit. Actual benefit would be paid in five annual installments.
(3) Represents the present value of the accumulated benefit. In the event of death while employed by TVA, the beneficiary will receive a lump sum payment equal to the actuarial equivalent of the benefit that would have been paid had the participant terminated employment on the date of death and elected a joint and 50 percent survivors benefit.
(4) Amounts that Mr. Kilgore earned in past years but elected to defer, which are payable pursuant to elections he made and applicable IRS rules.

John M. Thomas, III	Retirement/Resignation	Termination without Cause	Termination with Cause	Death/ Disability
Severance Agreement (1)	$0	$0	$0	$0
LTDCP	$0	$51,179	$0	$51,179
SERP	$453,793 (2)	$453,793 (2)	$0	$453,793 (3)
Deferred Compensation	$0	$0	$0	$0
Total Value of Potential Payments	$453,793	$504,972	$0	$504,972

Notes
(1) Mr. Thomas does not have a severance agreement with TVA.
(2) Represents the present value of the accumulated benefit and assumes the termination is an approved termination under SERP. If the termination had taken place on September 30, 2011, the benefit would, however, have been reduced by 5/12 percent for each month from November 15, 2018 (age 55) to November 15, 2025 (age 62). Actual benefit would be paid in five annual installments.
(3) Represents the present value of the accumulated benefit. In the event of death while employed by TVA, the beneficiary will receive a lump sum payment equal to the actuarial equivalent of the benefit that would have been paid had the participant terminated employment on the date of death and elected a joint and 50 percent survivors benefit.

William R. McCollum, Jr.	Retirement/Resignation	Termination without Cause	Termination with Cause	Death/ Disability
Severance Agreement (1)	$0	$0	$0	$0
LTDCP	$0	$0	$0	$0
SERP	$0 (2)	$0 (2)	$0	$3,385,399 (3)
Deferred Compensation (4)	$3,807,203	$3,807,203	$3,807,203	$3,807,203
Total Value of Potential Payments	$3,807,203	$3,807,203	$3,807,203	$7,192,602

Notes
(1) Mr. McCollum does not have a severance agreement with TVA.
(2) Mr. McCollum has not yet vested in SERP.
(3) Represents the present value of the accumulated benefit. In the event of death while employed by TVA, the beneficiary will receive a lump sum payment equal to the actuarial equivalent of the benefit that would have been paid had the participant terminated employment on the date of death and elected a joint and 50 percent survivors benefit.
(4) Amounts that Mr. McCollum earned in past years but elected to defer, which are payable pursuant to elections he made and applicable IRS rules.

Kimberly S. Greene	Retirement/Resignation	Termination without Cause	Termination with Cause	Death/ Disability
Severance Agreement (1)	$0	$2,080,000	$0	$0
LTDCP	$0	$260,257	$0	$260,257
SERP	$0	$1,659,283 (2)	$0	$1,659,283 (3)
Deferred Compensation (4)	$638,510	$638,510	$638,510	$638,510
Total Value of Potential Payments	$638,510	$4,638,050	$638,510	$2,558,050

Notes

(1) In August 2007, TVA entered into an agreement with Ms. Greene that provides a lump-sum payment in an amount equal to two years' annual compensation in the event that TVA's current Chief Executive Officer no longer occupies that position and Ms. Greene is asked to leave TVA employment for any reason other than for cause. For purposes of this agreement, "annual compensation" is defined as annual salary plus the amount of the annual incentive award based on 100 percent achievement of target performance goals.

(2) Represents the present value of the accumulated benefit and assumes the termination is an approved termination under SERP. If the termination had taken place on September 30, 2011, the benefit would, however, have been reduced by 5/12 percent for each month from October 5, 2021 (age 55) to October 5, 2028 (age 62). Actual benefit would be paid in five annual installments.

(3) Represents the present value of the accumulated benefit. In the event of death while employed by TVA, the beneficiary will receive a lump sum payment equal to the actuarial equivalent of the benefit that would have been paid had the participant terminated employment on the date of death and elected a joint and 50 percent survivors benefit.

(4) Amounts that Ms. Greene earned in past years but elected to defer, which are payable pursuant to elections she made and applicable IRS rules.

Preston D. Swafford	Retirement/Resignation	Termination without Cause	Termination with Cause	Death/ Disability
Severance Agreement (1)	$0	$0	$0	$0
LTDCP	$0	$153,073	$0	$153,073
SERP	$1,335,973 (2)	$1,335,973 (2)	$0	$1,335,973 (3)
Deferred Compensation (4)	$501,983	$501,983	$501,983	$501,983
Total Value of Potential Payments	$1,837,956	$1,991,029	$501,983	$1,991,029

Notes

(1) Mr. Swafford does not have a severance agreement with TVA.

(2) Represents the present value of the accumulated benefit and assumes the termination is an approved termination under SERP. If the termination had taken place on September 30, 2011, the benefit would, however, have been reduced by 5/12 percent for each month from January 24, 2015 (age 55) to January 24, 2022 (age 62). Actual benefit would be paid in five annual installments.

(3) Represents the present value of the accumulated benefit. In the event of death while employed by TVA, the beneficiary will receive a lump sum payment equal to the actuarial equivalent of the benefit that would have been paid had the participant terminated employment on the date of death and elected a joint and 50 percent survivors benefit.

(4) Amounts that Mr. Swafford earned in past years but elected to defer, which are payable pursuant to elections he made and applicable IRS rules.

Other Agreements

Except as described above and in the Compensation Discussion and Analysis, there are no other agreements between TVA and any of the Named Executive Officers.

Director Compensation

The TVA Act provides for up to nine directors on the TVA Board. Under the TVA Act, each of TVA's directors receives certain stipends that are increased annually by the same percentage increase applicable to adjustments under 5 U.S.C. § 5318, which provides for adjustments in the annual rates of pay of employees on the Executive Schedule of the United States Government. As discussed under "Federal Salary Freeze," pursuant to federal legislation, there will be a two-year freeze on these statutory pay adjustments to TVA director stipends, which applies to calendar years 2011 and 2012. Accordingly, as of September 30, 2011, the base stipend for TVA directors was and remains $48,900 per year unless (1) the director is the chair of a TVA Board committee, in which case the stipend is and remains $50,000 per year, or (2) the director is the Chairman of the TVA Board, in which case the stipend is and remains $54,500 per year. Directors are also reimbursed under federal law for travel, lodging, and related expenses that they incur in attending meetings and for other official TVA business in the same manner as other persons employed intermittently in federal government service.

The annual stipends provided by the TVA Act for each director and to the Chairman of the TVA Board as of November 17, 2011, were as follows:

TVA Board Annual Stipends

Name	Annual Stipend ($)
Dennis C. Bottorff	$54,500
Marilyn A. Brown	$50,000
Robert M. Duncan	$50,000
Thomas C. Gilliland	$50,000
Bishop William H. Graves	$50,000
Barbara S. Haskew	$48,900
Richard C. Howorth	$48,900
Neil G. McBride	$48,900
William B. Sansom	$50,000

The following table set outs the compensation received by TVA's directors during 2011.

Director Compensation

Name	Fees Earned or Paid in Cash ($)	Stock Awards ($)	Option Awards ($)	Non-Equity Incentive Plan Compensation ($)	Change in Pension Value and Nonqualified Deferred Compensation Earnings (1) ($)	All Other Compensation ($)	Total ($)
Dennis C. Bottorff (2)	$54,711	—	—	—	—	$547	$55,258
Marilyn A. Brown (3)	$48,629	—	—	—	—	$1,603	$50,232
Robert M. Duncan (2)	$50,190	—	—	—	—	$502	$50,692
Thomas C. Gilliland (2)	$50,190	—	—	—	—	$502	$50,692
Bishop William H. Graves	$50,190	—	—	—	—	$502	$50,692
Barbara S. Haskew (4)	$48,186	—	—	—	—	$1,549	$49,735
Richard C. Howorth (5)	$10,909	—	—	—	—	$54	$10,963
Neil G. McBride (6)	$48,186	—	—	—	—	$2,029	$50,215
William B. Sansom (7)	$48,629	—	—	—	—	$1,647	$50,276
Howard A. Thrailkill (8)	$11,538	—	—	—	—	$481	$12,019

Notes
(1) TVA directors do not participate in the TVA Retirement System, TVA's SERP, or any non-qualified deferred compensation plan available to TVA employees. However, as appointed officers of the United States government, the directors are members of the Federal Employees Retirement System ("FERS"). FERS is administered by the federal Office of Personnel Management, and information regarding the value of FERS pension benefits is not available to TVA.
(2) Messrs. Bottorff, Duncan and Gilliland's terms as a director expired on May 18, 2011, but they are authorized to remain in office until the end of the current session of Congress or until a successor takes office.
(3) Ms. Brown was appointed to the TVA Board on October 7, 2010.
(4) Ms. Haskew was appointed to the TVA Board on October 7, 2010.
(5) Mr. Howorth was appointed to the TVA Board on July 13, 2011.
(6) Mr. McBride was appointed to the TVA Board on October 7, 2010.
(7) Mr. Sansom was reappointed to the TVA Board on October 7, 2010. Mr. Sansom previously served as a director until his previous term ended on December 24, 2009.
(8) Mr. Thrailkill's term as a director expired on May 19, 2010, but he was entitled to remain in office until December 24, 2010, the end of the then-current session of Congress, because a successor was not appointed during that period.

The directors are not eligible to participate in any incentive programs available to TVA employees. The directors do not participate in the TVA Retirement System and do not participate in TVA's SERP. However, as appointed officers of the United States government, the directors are members of the Federal Employees Retirement System ("FERS"). FERS is a tiered retirement plan that includes three components: (1) Social Security benefits, (2) the Basic Benefit Plan, and (3) the Thrift Savings Plan ("TSP"). As members of FERS, each director is required to make a mandatory small contribution of 0.8 percent of his or her stipend to the Basic Benefit Plan.

The FERS Basic Benefit Plan is a qualified defined benefit plan that provides a retirement benefit based on a final average pay formula that includes age, highest average salary during any three consecutive years of service, and years of creditable service. A director must have at least five years of creditable service in order to be eligible to receive retirement benefits. Directors are eligible for immediate, unreduced retirement benefits once (1) they reach age 62 and have five years of FERS creditable service, (2) they reach age 60 and have 20 years of FERS creditable service, or (3) they attain the minimum retirement age and accumulate the specified years of service as set forth in the FERS regulations. Generally, benefits are calculated by multiplying 1.0 percent of the highest average salary during any three consecutive years of service by the number of years of creditable service. Directors who retire at age 62 or later with at least 20 years of FERS creditable service receive an enhanced benefit (a factor of 1.1 percent is used rather than 1.0 percent).

Directors may also retire with an immediate benefit under FERS if they reach their minimum retirement age based on type of retirement and years of service and have accumulated at least 10 years of FERS creditable service. For directors who reach the minimum retirement age and have at least 10 years of FERS creditable service, the annuity will be reduced by five percent for each year the director is under age 62.

Each director is also eligible to participate in the TSP. The TSP is a tax-deferred retirement savings and investment plan that offers the same type of savings and tax benefits offered under 401(k) plans. Once a director becomes eligible, TVA contributes an amount equal to one percent of the director's stipend into a TSP account for the director. These contributions are made automatically every two weeks regardless of whether the director makes a contribution of his or her own money. Directors are eligible to contribute up to the IRS elective deferral limit. Directors receive matching contributions of 100 percent of each dollar for the first three percent of the director's stipend and 50 percent of each dollar for the next two percent of the director's stipend.

TVA offers a group of health and other benefits (medical, dental, vision, life and accidental death and disability insurance, and long-term disability insurance) that are available to a broad group of employees. Directors are eligible to participate in TVA's health benefit plans and other non-retirement benefit plans on the same terms and at the same contribution rates as other TVA employees.

Compensation Committee Interlocks and Insider Participation

The People and Performance Committee of the TVA Board currently consists of the following three directors: Bishop William H. Graves, Chair, Dennis C. Bottorff, and Barbara S. Haskew.

No executive officer of TVA serves on the board of an entity which in turn has an executive officer of the entity serving as a director of TVA.

Compensation Committee Report

The People and Performance Committee has reviewed and discussed the Compensation Discussion and Analysis with management, and based on the review and discussions, the Committee recommended to the TVA Board that the Compensation Discussion and Analysis be included in this Annual Report.

PEOPLE AND PERFORMANCE COMMITTEE

Bishop William H. Graves, Chair
Dennis C. Bottorff
Barbara S. Haskew

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

Not applicable.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

Director Independence

The composition of the TVA Board is governed by the TVA Act. The TVA Act contains certain provisions that are similar to the considerations for independence under section 10A(m)(3) of the Exchange Act, including that to be eligible for appointment to the TVA Board, an individual shall not be an employee of TVA and shall make full disclosure to Congress of any investment or other financial interest that the individual holds in the energy industry.

Related Party Transactions

Conflict of Interest Provisions

All TVA employees, including directors and executive officers, are subject to the conflict of interest laws and regulations applicable to employees of the federal government. Accordingly, the general federal conflict of interest statute (18 U.S.C. § 208) and the Standards of Ethical Conduct for Employees of the Executive Branch (5 C.F.R. part 2635) ("Standards of Ethical Conduct") form the basis of TVA's policies and procedures for the review, approval, or ratification of related party transactions. The general federal conflict of interest statute, subject to certain exceptions, prohibits each government employee, including TVA's directors and executive officers, from participating personally and substantially (by advice, decision, or otherwise) as a government employee in any contract, controversy, proceeding, request for determination, or other official particular matter in which, to his or her knowledge, he or she (or his or her spouse, minor child, general partner, organization with which he or she serves as officer, director, employee, trustee, or general partner, or any person or organization with which he or she is negotiating, or has an arrangement, for future employment) has a financial interest. Exceptions to the statutory prohibition relevant to TVA employees are (1) financial interests which have been deemed by the Office of Government Ethics, in published regulations, to be too remote or inconsequential to affect the integrity of the employee's services, or (2) interests which are determined in writing, after full disclosure and on a case by case basis, to be not so substantial as to be deemed likely to affect the integrity of the employee's services for TVA. In accordance with the statute, individual waiver determinations are made by the official responsible for the employee's appointment. In the case of TVA directors, the determination may be made by the Chairman of the TVA Board, and in the case of the Chairman of the TVA Board, the determination may be made by the Counsel to the President of the United States.

More broadly, Subpart E of the Standards of Ethical Conduct provides that where an employee (1) knows that a particular matter involving specific parties is likely to have a direct and predictable effect on the financial interests of a member of his or her household, or that a person with whom the employee has a "covered relationship" (which includes, but is not limited to, persons with whom the employee has a close family relationship and organizations in which the employee is an active participant) is or represents a party to the matter, and (2) determines that the circumstances would cause a reasonable person with knowledge of relevant facts to question his or her impartiality in the matter, the employee should not participate in the matter absent agency authorization. This authorization may be given by the employee's supervising officer, as agency designee, in consultation with the TVA Designated Agency Ethics Official, upon the determination that TVA's interest in the employee's participation in the matter outweighs the concern that a reasonable person may question the integrity of TVA's programs and operations.

The previously described restrictions are reflected in TVA's Standard Programs and Processes 11.8.1, *Business Ethics* , which requires employees, including TVA's directors and executive officers, to comply with the guidelines outlined in the Standards of Ethical Conduct and which restates the standard of the conflict of interest statute.

Additionally, the TVA Board approved a written conflict of interest policy that applies to all TVA employees, including TVA's directors and executive officers. The conflict of interest policy reaffirms the requirement that all TVA employees must comply with applicable federal conflict of interest laws, regulations, and policies. It also establishes an additional policy that is applicable to TVA's directors and Chief Executive Officer, which provides as follows:

In addition to the law and policy applicable to all TVA employees, TVA Directors and the Chief Executive Officer shall comply with the following additional policy restricting the holding of certain financial interests:

1. For purposes of this policy, "financial interest" means an interest of a person, or of a person's spouse or minor child, arising by virtue of investment or credit relationship, ownership, employment, consultancy, or fiduciary relationship such as director, trustee, or partner. However, financial interest does not include an interest in TVA or any interest:

- comprised solely of a right to payment of retirement benefits resulting from former employment or fiduciary relationship;
- arising solely by virtue of cooperative membership or similar interest as a consumer in a distributor of TVA power; or
- arising by virtue of ownership of publicly traded securities in any single entity with a value of $25,000 or less, or within a diversified mutual fund investment in any amount.

2. Directors and the Chief Executive Officer shall not hold a financial interest in any distributor of TVA power.

3. Directors and the Chief Executive Officer shall not hold a financial interest in any entity engaged in the wholesale or retail generation, transmission, or sale of electricity.

4. Directors and the Chief Executive Officer shall not hold a financial interest in any entity that may reasonably be perceived as likely to be adversely affected by the success of TVA as a producer or transmitter of electric power.

5. Any action taken or interest held that creates, or may reasonably be perceived as creating, a conflict of interest restricted by this additional policy applicable to TVA Directors and the Chief Executive Officer should immediately be disclosed to the Chairman of Board of Directors and the Chairman of the Audit, Governance, and Ethics Committee (now the Audit, Risk, and Regulation Committee). The Audit, Governance, and Ethics Committee (now the Audit, Risk, and Regulation Committee) shall b e responsible for initially reviewing all such disclosures and making recommendations to the entire Board on what action, if any, should be taken. The entire Board, without the vote of any Director(s) involved, shall determine the appropriate action to be taken.

6. Any waiver of this additional policy applicable to TVA Directors and the Chief Executive Officer may be made only by the Board, and will be disclosed promptly to the public, subject to the limitations on disclosure imposed by law.

TVA also has a protocol titled the "Obtaining Things of Value From TVA Protocol" (the "Protocol"). The Protocol describes what a TVA employee or a member of the TVA Board should do if a person covered by the Protocol asks for assistance in obtaining something of value from TVA.

TVA relies on the policies, practices, laws, and regulations discussed above to regulate conflicts of interest involving employees, including directors and executive officers. TVA has no other written or unwritten policy for the approval or ratification of any transactions in which TVA was or is to be a participant and in which any director or executive officer of TVA (or any child, stepchild, parent, stepparent, spouse, sibling, mother-in-law, father-in-law, son-in-law, daughter-in-law, brother-in-law, or sister-in-law of any director or executive officer of TVA) had or will have a direct or indirect material interest.

Other Relationships

TVA is engaged in any number of transactions with other agencies of the U.S. government, although such agencies do not fall within the definition of "related parties" for purposes of Item 404(a) of Regulation S-K. These include, among other things, supplying electricity to other federal agencies, purchasing electricity from the Southeastern Power Administration, and engaging in various arrangements involving nuclear materials with the DOE. See Item 1, Business.

TVA also has access to a financing arrangement with the U.S. Treasury. TVA and the U.S. Treasury have a memorandum of understanding under which the U.S. Treasury provides TVA with a $150 million credit facility. TVA did not borrow under the facility during 2011. This credit facility matures on September 30, 2012 and is expected to be renewed. This arrangement is pursuant to the TVA Act. Access to this credit facility or other similar financing arrangements was made possible by the 1959 amendments to the TVA Act. See Note 11 — *Credit Facility Agreements* .

In addition, TVA makes payments to the U.S. Treasury as a repayment of and a return on the the government's appropriation investment in TVA's power facilities ("Power Program Appropriation Investment"). Under the TVA Act, TVA is required to repay $1.0 billion of the Power Program Appropriation Investment, and $50 million of this amount remained unpaid as of September 30, 2011. Once TVA repays this $50 million, there will still be an outstanding balance on the Power Program Appropriation Investment, and TVA is obligated under the TVA Act to pay the U.S. Treasury a return on this remaining balance indefinitely. See Note 15 — *Appropriation Investment* .

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The following table shows the fees of Ernst & Young LLP for the audit and audit-related services for the years ended September 30, 2011 and 2010.

Principal Accountant Fees and Services
(in actual dollars)

Year	Principal Accountant	Audit Fees [1]	Audit-Related Fees	All Other Fees	Total
2011	Ernst & Young LLP	$ 2,472,853	$ —	—	$ 2,472,853
2010	Ernst & Young LLP	$ 2,090,325	$ —	—	$ 2,090,325

Notes
(1) Audit fees consist of payments for professional services rendered in connection with the audit of TVA's annual financial statements, including the annual attestation on internal control over financial reporting and the review of interim financial statements included in TVA's quarterly reports; audit of TVA's fuel cost adjustment; audit of TVA's special purpose financial statements for the preparation and audit of the FY 2011 federal consolidated financial statements of which TVA is a component; and Bond offering comfort letters.

The TVA Board has an Audit, Risk, and Regulation Committee. Under the TVA Act, the Audit, Risk, and Regulation Committee, in consultation with the Inspector General, recommends to the TVA Board the selection of an external auditor. TVA's Audit, Risk, and Regulation Committee, in consultation with the Inspector General, recommended that the TVA Board select Ernst & Young LLP as TVA's external auditor for the 2009, 2010, and 2011 audits and other related services, and the TVA Board approved these recommendations.

TVA has a policy (the "Policy") that provides that all auditing services and permissible non-audit services shall be pre-approved by the Audit, Risk, and Regulation Committee unless:

- The aggregate amount of all such non-audit services provided to TVA does not exceed five percent of the total amount TVA pays the external auditor during the fiscal year in which the non-audit services are provided;
- Such services were not recognized by TVA at the time of the engagement to be non-audit services or non-audit related services; and
- Such services are promptly brought to the attention of the Audit, Risk, and Regulation Committee and approved at the next scheduled Audit, Risk, and Regulation Committee meeting or by one or more members of the Audit, Risk, and Regulation Committee to whom the authority to grant such approvals has been delegated.

The Policy also lists the following services as ones the external auditor is not permitted to perform. The prohibited non-audit services are:

- Bookkeeping or other services related to the accounting records or financial statements of TVA;
- Financial information system design and implementation;
- Appraisal or valuation services, fairness opinions, and contribution-in-kind reports;
- Actuarial services;
- Internal audit outsourcing services;
- Management functions or human resources;
- Broker or dealer, investment adviser, or investment banking services;
- Legal services and expert services unrelated to the audit; and
- Any other services that the Public Company Accounting Oversight Board determines, by regulation, is impermissible.

The Policy also delegates to the Chairman of the Audit, Risk, and Regulation Committee the authority to pre-approve a permissible service so long as the amount of the service does not exceed $100,000 and the Chairman reports for informational purposes the services pre-approved at the Audit, Risk, and Regulation Committee's next meeting.

The Audit, Risk, and Regulation Committee pre-approved all audit and audit-related services for 2010 and 2011.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

(a) The following documents have been filed as part of this Annual Report:

(1) Financial Statements. The following documents are provided in Item 8, Financial Statements and Supplementary Data herein.

Statements of Operations
Balance Sheets
Statements of Cash Flow
Statements of Changes in Proprietary Capital
Notes to Financial Statements
Report of Independent Registered Public Accounting Firm (Ernst and Young LLP)

(2) Financial Statement Schedules.

Schedules not included are omitted because they are not required or because the required information is provided in the financial statements, including the notes thereto.

Schedule II — Valuation and Qualifying Accounts
(in millions)

Description	Balance at beginning of year	Additions charged to expense	Deductions	Balance at end of year
For the year ended September 30, 2011				
Allowance for doubtful accounts				
Receivables	$ 2	$ —	$ (1)	$ 1
Loans	13	—	(2)	11
Total allowances deducted from assets	$ 15	$ —	$ (3)	$ 12
For the year ended September 30, 2010				
Allowance for doubtful accounts				
Receivables	$ 2	$ —	$ —	$ 2
Loans	13	1	(1)	13
Total allowances deducted from assets	$ 15	$ 1	$ (1)	$ 15
For the year ended September 30, 2009				
Allowance for doubtful accounts				
Receivables	$ 2	$ —	$ —	$ 2
Loans	13	1	(1)	13
Total allowances deducted from assets	$ 15	$ 1	$ (1)	$ 15

(3) List of Exhibits.

Exhibit No.	Description
3.1	Tennessee Valley Authority Act of 1933, *as amended,* 16 U.S.C. §§ 831-831ee (Incorporated by reference to Exhibit 3.1 to TVA's Quarterly Report on Form 10-Q for the quarter ended December 31, 2007, File No. 000-52313)
3.2	Bylaws of Tennessee Valley Authority, *as amended* (Incorporated by reference to Exhibit 3.1 to TVA's Quarterly Report on Form 10-Q for the quarter ended June 30, 2010, File No. 000-52313)
4.1	Basic Tennessee Valley Authority Power Bond Resolution Adopted by the TVA Board of Directors on October 6, 1960, as Amended on September 28, 1976, October 17, 1989, and March 25, 1992 (Incorporated by reference to Exhibit 4.1 to TVA's Annual Report on Form 10-K for the year ended September 30, 2006, File No. 000-52313)
10.1	Spring Maturity Credit Agreement Dated as of July 22, 2010, Among TVA, Bank of America, N.A., as Administrative Agent and Letter of Credit Issuer, Bank of America, N.A., as a Lender, and the Other Lenders Party Thereto (Incorporated by reference to Exhibit 10.5 to TVA's Quarterly Report on Form 10-Q for the quarter ended June 30, 2010, File No. 000-52313)
10.2	Amendment Dated as of May 9, 2011, to $1,000,000,000 Spring Maturity Credit Agreement Dated as of July 22, 2010, Among TVA, Bank of America, N.A., as Administrative Agent, Letter of Credit Issuer, and a Lender, and Morgan Stanley Bank, N.A., Toronto Dominion (New York) LLC, The Bank of New York Mellon, and First Tennessee Bank, N.A., as Lenders (Incorporated by reference to Exhibit 99.1 to TVA's Current Report on Form 8-K filed on May 11, 2011, File No. 000-52313)
10.3	Amended and Restated Fall Maturity Credit Agreement Dated as of January 14, 2011, Among TVA, Bank of America, N.A., as Administrative Agent and Letter of Credit Issuer, Bank of America, N.A., as a Lender, and the Other Lenders Party Thereto (Incorporated by reference to Exhibit 10.2 to TVA's Quarterly Report on Form 10-Q for the quarter ended December 31, 2010, File No. 000-52313)
10.4	Winter Maturity Credit Agreement Dated as of January 14, 2011, Among TVA, The Royal Bank of Scotland plc, as Administrative Agent and Letter of Credit Issuer, The Royal Bank of Scotland plc, as a Lender, and the Other Lenders Party Thereto (Incorporated by reference to Exhibit 10.3 to TVA's Quarterly Report on Form 10-Q for the quarter ended December 31, 2010, File No. 000-52313)
10.5	TVA Discount Notes Selling Group Agreement (Incorporated by reference to Exhibit 10.2 to TVA's Quarterly Report on Form 10-Q for the quarter ended June 30, 2008, File No. 000-52313)
10.6	Electronotes® Selling Agent Agreement Dated as of June 1, 2006, Among TVA, LaSalle Financial Services, Inc., A.G. Edwards & Sons, Inc., Citigroup Global Markets Inc., Edward D. Jones & Co., L.P., First Tennessee Bank National Association, J.J.B. Hilliard, W.L. Lyons, Inc., Merrill Lynch, Pierce, Fenner & Smith Incorporated, Morgan Stanley & Co. Incorporated, and Wachovia Securities, LLC (Incorporated by reference to Exhibit 10.4 to TVA's Annual Report on Form 10-K for the year ended September 30, 2006, File No. 000-52313)
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10.47†	First Deferral Agreement Between TVA and Preston D. Swafford Dated as of May 10, 2006 (Incorporated by reference to Exhibit 10.44 to TVA's Annual Report on Form 10-K for the year ended September 30, 2009, File No. 000-52313)
10.48†	Second Deferral Agreement Between TVA and Preston D. Swafford Dated as of December 23, 2010 (Incorporated by reference to Exhibit 10.4 to TVA's Quarterly Report on Form 10-Q for the quarter ended December 31, 2010, File No. 000-52313)
14	Disclosure and Financial Ethics Code (Incorporated by reference to Exhibit 14 to TVA's Annual Report on Form 10-K for the year ended September 30, 2006, File No. 000-52313)
31.1	Rule 13a-14(a)/15d-14(a) Certification Executed by the Chief Executive Officer
31.2	Rule 13a-14(a)/15d-14(a) Certification Executed by the Chief Financial Officer
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101.INS**	TVA XBRL Instance Document

101.SCH **	TVA XBRL Taxonomy Extension Schema
101.CAL **	TVA XBRL Taxonomy Extension Calculation Linkbase
101.DEF **	TVA XBRL Taxonomy Extension Definition Linkbase
101.LAB **	TVA XBRL Taxonomy Extension Label Linkbase
101.PRE **	TVA XBRL Taxonomy Extension Presentation Linkbase

† Management contract or compensatory arrangement.

* Certain schedule(s) and/or exhibit(s) have been omitted. The Tennessee Valley Authority hereby undertakes to furnish supplementally copies of any of the omitted schedules and/or exhibits upon request by the Securities and Exchange Commission.

** In accordance with Rule 406T of Regulation S-T, these XBRL (eXtensible Business Reporting Language) documents are furnished and not filed for purposes of Section 18 of the Securities Exchange Act of 1934 and otherwise are not subject to liablity under this section.

SIGNATURES

Pursuant to the requirements of Section 13, 15(d), or 37 of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Date: November 17, 2011		TENNESSEE VALLEY AUTHORITY
		(Registrant)
	By:	/s/ Tom Kilgore
		Tom Kilgore
		President and Chief Executive Officer

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ Tom Kilgore Tom Kilgore	President and Chief Executive Officer (Principal Executive Officer)	November 17, 2011
/s/ John M. Thomas, III John M. Thomas, III	Chief Financial Officer (Principal Financial Officer)	November 17, 2011
/s/ Steve Byone Steve Byone	Vice President and Controller (Principal Accounting Officer)	November 17, 2011
/s/ Dennis C. Bottorff Dennis C. Bottorff	Chairman and Director	November 17, 2011
/s/ Marilyn A. Brown Marilyn A. Brown	Director	November 17, 2011
/s/ Robert M. Duncan Robert M. Duncan	Director	November 17, 2011
/s/ Thomas C. Gilliland Thomas C. Gilliland	Director	November 17, 2011
/s/ Richard C. Howorth Richard C. Howorth	Director	November 17, 2011
/s/ Bishop William H. Graves Bishop William H. Graves	Director	November 17, 2011
/s/ Barbara S. Haskew Barbara S. Haskew	Director	November 17, 2011
/s/ Neil G. McBride Neil G. McBride	Director	November 17, 2011
/s/ William B. Sansom William B. Sansom	Director	November 17, 2011

EXHIBIT INDEX

Exhibit No.	Description
3.1	Tennessee Valley Authority Act of 1933, *as amended* , 16 U.S.C. §§ 831-831ee (Incorporated by reference to Exhibit 3.1 to TVA's Quarterly Report on Form 10-Q for the quarter ended December 31, 2007, File No. 000-52313)
3.2	Bylaws of Tennessee Valley Authority, *as amended* (Incorporated by reference to Exhibit 3.1 to TVA's Quarterly Report on Form 10-Q for the quarter ended June 30, 2010, File No. 000-52313)
4.1	Basic Tennessee Valley Authority Power Bond Resolution Adopted by the TVA Board of Directors on October 6, 1960, as Amended on September 28, 1976, October 17, 1989, and March 25, 1992 (Incorporated by reference to Exhibit 4.1 to TVA's Annual Report on Form 10-K for the year ended September 30, 2006, File No. 000-52313)
10.1	Spring Maturity Credit Agreement Dated as of July 22, 2010, Among TVA, Bank of America, N.A., as Administrative Agent and Letter of Credit Issuer, Bank of America, N.A., as a Lender, and the Other Lenders Party Thereto (Incorporated by reference to Exhibit 10.5 to TVA's Quarterly Report on Form 10-Q for the quarter ended June 30, 2010, File No. 000-52313)
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10.3	Amended and Restated Fall Maturity Credit Agreement Dated as of January 14, 2011, Among TVA, Bank of America, N.A., as Administrative Agent and Letter of Credit Issuer, Bank of America, N.A., as a Lender, and the Other Lenders Party Thereto (Incorporated by reference to Exhibit 10.2 to TVA's Quarterly Report on Form 10-Q for the quarter ended December 31, 2010, File No. 000-52313)
10.4	Winter Maturity Credit Agreement Dated as of January 14, 2011, Among TVA, The Royal Bank of Scotland plc, as Administrative Agent and Letter of Credit Issuer, The Royal Bank of Scotland plc, as a Lender, and the Other Lenders Party Thereto (Incorporated by reference to Exhibit 10.3 to TVA's Quarterly Report on Form 10-Q for the quarter ended December 31, 2010, File No. 000-52313)
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10.47†	First Deferral Agreement Between TVA and Preston D. Swafford Dated as of May 10, 2006 (Incorporated by reference to Exhibit 10.44 to TVA's Annual Report on Form 10-K for the year ended September 30, 2009, File No. 000-52313)
10.48†	Second Deferral Agreement Between TVA and Preston D. Swafford Dated as of December 23, 2010 (Incorporated by reference to Exhibit 10.4 to TVA's Quarterly Report on Form 10-Q for the quarter ended December 31, 2010, File No. 000-52313)
14	Disclosure and Financial Ethics Code (Incorporated by reference to Exhibit 14 to TVA's Annual Report on Form 10-K for the year ended September 30, 2006, File No. 000-52313)
31.1	Rule 13a-14(a)/15d-14(a) Certification Executed by the Chief Executive Officer
31.2	Rule 13a-14(a)/15d-14(a) Certification Executed by the Chief Financial Officer
32.1	Section 1350 Certification Executed by the Chief Executive Officer
32.2	Section 1350 Certification Executed by the Chief Financial Officer
101.INS**	TVA XBRL Instance Document

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101.SCH **	TVA XBRL Taxonomy Extension Schema
101.CAL **	TVA XBRL Taxonomy Extension Calculation Linkbase
101.DEF **	TVA XBRL Taxonomy Extension Definition Linkbase
101.LAB **	TVA XBRL Taxonomy Extension Label Linkbase
101.PRE **	TVA XBRL Taxonomy Extension Presentation Linkbase

† Management contract or compensatory arrangement.

* Certain schedule(s) and/or exhibit(s) have been omitted. The Tennessee Valley Authority hereby undertakes to furnish supplementally copies of any of the omitted schedules and/or exhibits upon request by the Securities and Exchange Commission.

** In accordance with Rule 406T of Regulation S-T, these XBRL (eXtensible Business Reporting Language) documents are furnished and not filed for purposes of Section 18 of the Securities Exchange Act of 1934 and otherwise are not subject to liablity under this section.

EXHIBIT 31.1

RULE 13a-14(a)/15d-14(a) CERTIFICATION

I, Tom Kilgore, certify that:

1. I have reviewed this Annual Report on Form 10-K of the Tennessee Valley Authority;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and we have:

   a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent function):

   a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 17, 2011

By: /s/ Tom Kilgore

Tom Kilgore
President and Chief Executive Officer

EXHIBIT 31.2

RULE 13a-14(a)/15d-14(a) CERTIFICATION

I, John M. Thomas, III, certify that:

1. I have reviewed this Annual Report on Form 10-K of the Tennessee Valley Authority;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant’s other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and we have:

    a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

    b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

    c) Evaluated the effectiveness of the registrant’s disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

    d) Disclosed in this report any change in the registrant’s internal control over financial reporting that occurred during the registrant’s most recent fiscal quarter (the registrant’s fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant’s internal control over financial reporting; and

5. The registrant’s other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant’s auditors and the audit committee of the registrant’s board of directors (or persons performing the equivalent function):

    a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant’s ability to record, process, summarize and report financial information; and

    b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant’s internal control over financial reporting.

Date: November 17, 2011

By: /s/ John M. Thomas, III

John M. Thomas, III
Chief Financial Officer

EXHIBIT 32.1

**CERTIFICATION FURNISHED PURSUANT TO
SECURITIES EXCHANGE ACT RULE 13a-14(b)
OR RULE 15d-14(b) AND 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report on Form 10-K of the Tennessee Valley Authority (the “Company”) for the year ended September 30, 2010, as filed with the Securities and Exchange Commission on the date hereof (the “Report”), I, Tom Kilgore, President and Chief Executive Officer of the Company, certify, for the purposes of complying with Rule 13a-14(b) or Rule 15d-14(b) of the Securities Exchange Act of 1934, as amended, and Section 1350 of Chapter 63 of Title 18 of the United States Code, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

(1) the Report fully complies with the requirements of section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ Tom Kilgore

Tom Kilgore
President and Chief Executive Officer
November 17, 2011

EXHIBIT 32.2

**CERTIFICATION FURNISHED PURSUANT TO
SECURITIES EXCHANGE ACT RULE 13a-14(b)
OR RULE 15d-14(b) AND 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report on Form 10-K of the Tennessee Valley Authority (the "Company") for the year ended September 30, 2010, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Tom Kilgore, President and Chief Executive Officer of the Company, certify, for the purposes of complying with Rule 13a-14(b) or Rule 15d-14(b) of the Securities Exchange Act of 1934, as amended, and Section 1350 of Chapter 63 of Title 18 of the United States Code, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

(1) the Report fully complies with the requirements of section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ John M. Thomas, III

John M. Thomas, III
Chief Financial Officer
November 17, 2011

Enclosure 6

TVA Organizational Topical Report
TVA-NPOD89-A

L44 120123 001

TENNESSEE VALLEY AUTHORITY

ORGANIZATION TOPICAL REPORT, TVA-NPOD89-A
(GENERAL REVISION)
REVISION 19

AUGUST 2011

ORGANIZATION DESCRIPTION

LIST OF REVISIONS

TVA NUCLEAR POWER GROUP ORGANIZATION DESCRIPTION

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Abstract

This Topical Report (TVA-NPOD89-A) includes the organizational descriptions for the Nuclear Power Group (NPG) including Browns Ferry (BFN), Sequoyah (SQN), Watts Bar (WBN) Nuclear Plants, the Corporate Nuclear Power Group organization and TVA's Nuclear Generation Development and Construction (NGDC). This report contains the senior management, technical support and operating organization descriptions, and organization charts that meet the "content" guidance of Nuclear Regulatory Commission's (NRC's) Regulatory Guide 1.70, Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants - LWR Edition, Rev. 3 (November 1978).

Qualification requirements and training descriptions specified in the standard format document will continue to be addressed in each plant's Final Safety Analysis Report. The detailed TVA Quality Assurance organization and program description is contained in the NPG Quality Assurance Plan (TVA-NQA-PLN89-A) and is not repeated herein.

The original purpose of the NPG Organization Description (TVA-NPOD89-A) was to establish a controlled, single-source document and a disciplined process for communicating organization structure and position descriptions to the NRC. TVA-NPOD89-A will be referenced in future revisions of our license applications including the Safety Analysis Reports, Technical Specifications, the Nuclear Quality Assurance Plan, and other documents that may refer to the NPG and NGDC organizations. This topical report is updated as necessary to reflect major organizational changes. Since this topical report encompasses multiple plants, subsequent updates to the Topical Report will be provided on a biennial basis to ensure that TVA meets the refuel cycle criterion of 10 CFR 50.71(e) for each unit at each site.

Introduction

TVA Corporate Organization

TVA is an agency of the federal government whose major policies, programs, and organization are determined by a part-time, nine member Board of Directors (BOD) structure pursuant to the TVA Governance Restructuring provisions of the Consolidated Appropriations Act, 2005. The BOD members are appointed by the President of the United States and confirmed by the Senate for five-year terms. The BOD selects a Chief Executive Officer (CEO) who also serves as President to manage TVA's day-to-day business. The BOD shapes the long-term business strategies, recommends major program initiatives, and guides TVA's day-to-day operations.

The CEO is responsible for managing all aspects of TVA, including power production, transmission, power trading, resource management programs, and economic development, as well as TVA's corporate functions. The CEO heads TVA's Executive Committee and chairs its Business Council.

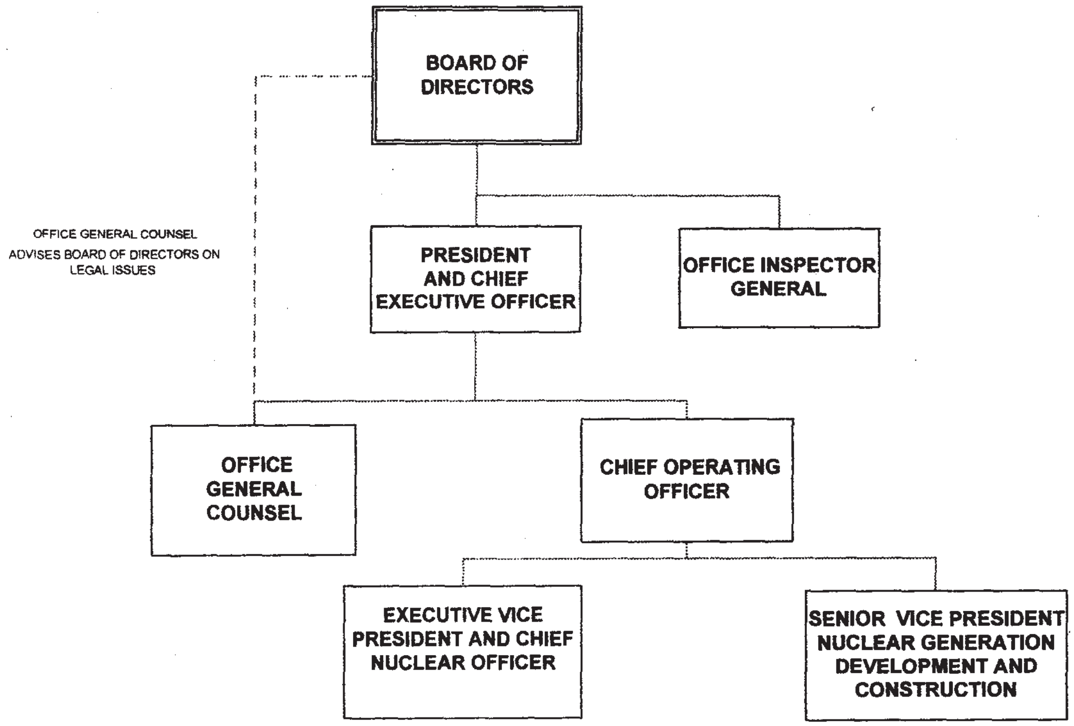
The Chief Operating Officer (COO) is responsible for pulling together all the operational elements of TVA with a clear focus on the operational excellence of the organization. This organization is faced with the challenges of meeting environmental pressures, growing power demand, and stakeholder expectations.

The Executive Vice President and Chief Nuclear Officer (CNO) is responsible for the overall safety, efficiency, and economy of TVA's Nuclear Power Program and the overall Nuclear Power Group (NPG) organization.

The Senior (Sr.) Vice President (VP) Nuclear Generation Development and Construction is accountable for the development and construction of additional nuclear generation assets and technologies to meet demands for safe, clean, reliable and low cost power.

The Corporate Organization leadership and reporting relationships are shown in Figure 1-0.

CORPORATE ORGANIZATION
FIGURE 1-0



I. Chief Operating Officer (COO)

The COO has the primary responsibility for directing and managing the operations of all of TVA's generating plants, Power System Operations and the Commercial Operations and Fuels Group. This position directs, administers, and coordinates the activities of these organizations in accordance with the goals, vision, and values established by the CEO and the Board of Directors. The incumbent is accountable for the operational results of TVA that ensure achievement of goals and objectives as well as establishing operating short-term and long-term objectives, plans and policies subject to the approval of the CEO. The Organizations with Nuclear responsibilities are described below.

The Nuclear Power Group (NPG) is responsible for nuclear plant engineering and design, operation, quality assurance, and compliance with regulatory requirements. NPG plans and manages the Nuclear Program to meet the requirements of TVA's Power Program consistent with safety, environmental, quality, and economic objectives.

The general organization of NPG is shown in Figure 2-0.

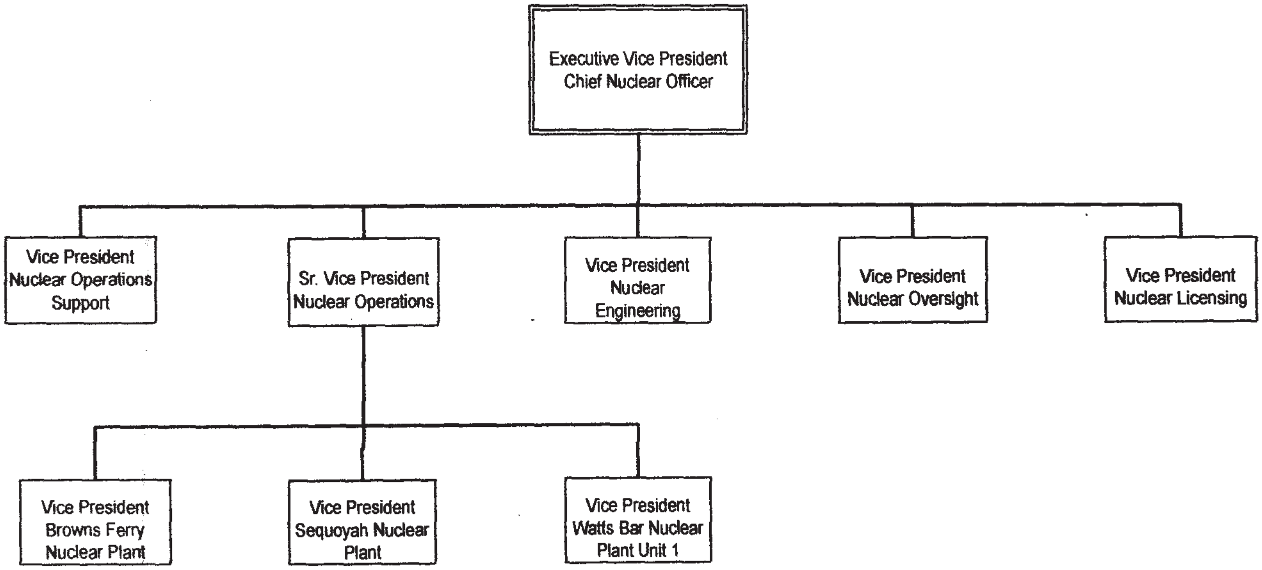
A. Executive Vice President and Chief Nuclear Officer (CNO)

The Executive Vice President and CNO is the senior nuclear manager with direct authority and responsibility for the management, control, and supervision of TVA's Nuclear Power Program and for the execution of nuclear programs, policies, and decisions that the Board of Directors approves or adopts. The Executive Vice President and CNO has corporate responsibility for overall plant nuclear safety and shall take measures needed to ensure acceptable performance of the staff in operating, maintaining, and providing technical support in the plant so that continued nuclear safety is assured. The Executive Vice President and CNO reports directly to the Chief Operating Officer (COO). The COO reports directly to the Chief Executive Officer. The Executive Vice President and CNO is responsible for the overall safety, efficiency, and economy of nuclear operations. The Executive Vice President and CNO establishes management and operating policies and procedure's related to TVA's Nuclear Program and is responsible for personnel, planning, scheduling, licensing, engineering and design, construction, operation, quality assurance, training, maintenance, and technical and administrative matters related to these programs. The Executive Vice President and CNO coordinates activities and functions of the NPG with other TVA organizations in order to carry out TVA's corporate policy and to meet corporate goals and objectives. This position is responsible for all aspects of TVA's interface and relations with the NRC and other entities with jurisdiction over or interest in TVA's Nuclear Program. Other responsibilities include: development and implementation of an effective radiological Emergency Preparedness Program; directing shutdown of nuclear facilities when deemed appropriate; and development of long-range, strategic plans for all NPG programs, activities, and facilities. Quality

Assurance reports directly to the Vice President, Nuclear Oversight, but has direct access to the Executive Vice President and CNO. This provides independence and freedom to effectively ensure conformance to Quality Assurance Program requirements. The Senior Vice President, Nuclear Generation Development and Construction works with the Executive Vice President and CNO to ensure that future nuclear generation is coordinated with the existing fleet.

The Executive Vice President and CNO's direct reports are provided in Figure 2-0. These functions are described in more detail in subsequent sections of this Topical Report.

CHIEF NUCLEAR OFFICER
FIGURE 2-0



A. Executive Vice President and Chief Nuclear Officer (CNO) (continued)

1.0 Vice President Nuclear Operations Support
This position provides technical support for the NPG. Responsibilities include Security Operations, Emergency Preparedness Services, Nuclear Outages & Scheduling, Functional Area Oversight and Governance. The VP Nuclear Operations Support advises the CNO and other corporate and site management on a wide range of Nuclear Support issues.

2.0 Vice President Nuclear Engineering
This position is responsible for establishing and directing engineering functions within the NPG. This includes Corporate Design Engineering, Equipment Reliability & Components Engineering, Engineering Programs, Reactor Engineering & Fuels, Corporate System Engineering, and Probabilistic Risk assessment. Responsibilities include governance and oversight of Site Engineering functions and policy compliance for NPG's fleet in regard to engineering functions. In addition, this position advises NPG executives on technical issues affecting the sites and provides direction to the Site Engineering Directors.

3.0 Vice President Nuclear Oversight
The Vice President, Nuclear Oversight reports directly to the CNO and is responsible for directing and managing the Nuclear Power Group Oversight organization, including Quality Assurance, Performance Analysis and Assessment, Corrective Action Program, Performance Improvement and Corporate Nuclear Training. The responsibility for Quality Assurance includes oversight to ensure implementation of NPG's QA Programs for evaluating program effectiveness for design, construction, safety and reliability, and operation of TVA's nuclear plants. This includes review of the Nuclear Quality Assurance Plan and Quality Assurance internal procedures. Quality Assurance has an indirect reporting structure to the CNO to provide independence and freedom to effectively ensure conformance to Quality Assurance Program requirements.

4.0 Vice President Nuclear Licensing
This position provides oversight and direction of the NPG Licensing functions in support of the operations of TVA's licensed nuclear plants. This position is responsible for the development of regulatory vision and strategy for regulatory issues for both Corporate and Sites and providing policy recommendations. This position provides governance and oversight of the site licensing organizations.

5.0 Senior Vice President Nuclear Operations

This position reports directly to the CNO and provides oversight of the NPG operating nuclear plants. The Senior Vice President Nuclear Operations direct reports are the Nuclear Plant Site Vice Presidents.

5.1 Site Vice President (Typical for the operating nuclear plants)

This position is responsible and accountable for activities at the site including operations, modifications, maintenance, support, training, and engineering services. The Site Vice President's direct reports and functional reporting relationships are provided in Figure 2-1.

5.1.1 Director Site Engineering

This position is responsible for management and execution of site projects to provide overall management of the Engineering Design, Systems Engineering, Engineering Support, Technical Support, and Components Test and Inspection functions at the site. This function specifically includes managing activities necessary for capital work in support of the operating units and refueling outages.

5.1.1.1 Manager System Engineering

Responsible for integrated management and execution of site projects to provide overall management of the engineering functions at the site, including both outage and on-line support. This responsibility specifically includes managing activities necessary for system health and capital work in support of the operating unit(s), refueling outages, and to recover units from unplanned outages safely, within budget, on schedule, in accordance with applicable requirements.

5.1.1.2 Manager Design Engineering

Responsible for integrated management and execution of site projects to provide overall management of the engineering functions at the site, including both outage and on-line support. This responsibility specifically includes managing activities necessary for capital work in support of the operating unit(s), refueling outages, and to recover units from unplanned outages safely, within budget, on schedule, in accordance with applicable requirements.

5.1.1.3 Manager Reactor Engineering

Plans and directs the Reactor Engineering section functions to ensure the reliable and efficient performance of assigned plant equipment in accordance with applicable requirements.

5.1.1.4 Manager Component Engineering
Manage the Component Engineering functions to ensure the reliable and efficient performance of assigned plant equipment and components, in accordance with applicable requirements.

5.1.2. Director Site Training
This position directs the planning, development, implementation, and evaluation of Training Programs to ensure sufficient qualified personnel to operate, maintain, and modify the nuclear power plant.

5.1.3 Director Project Management
This position is responsible for cost engineering functions including estimating, forecasting, trending/scope control, data analysis, and reporting. Other responsibilities include ensuring technical and programmatic cost requirements of the site organizations and for planning and scheduling of major modifications and projects.

5.1.4 Director Safety and Licensing
This position is responsible for the Site Performance Improvement, Emergency Planning, and Site Licensing functions.

5.1.5 Manager Site Quality Assurance
This position provides oversight of quality activities associated with the operation of the plant. Responsibilities are described in detail in TVA's Nuclear Quality Assurance Plan (TVA-NQA-PLN89-A). This position reports to the General Manager, Quality Assurance (Corporate) and has a reporting relationship (dotted line) to the Site Vice President.

5.1.6 Plant Manager (General Manager at Browns Ferry)
This position is responsible for ensuring that plant operations and support activities are conducted in accordance with applicable requirements. Responsible for overall plant safe operation and has control over those resources necessary for safe operation and maintenance of the plant. This position's direct reports and areas of administrative responsibilities are provided in Figure 2-2.

5.1.6.1 Manager Maintenance
This position is responsible for planning, directing, and managing the plant's Maintenance Program to ensure

that equipment and systems are maintained in accordance with operability and reliability engineering practices and requirements.

5.1.6.1.1 <u>Superintendent Instrumentation and Controls</u>
Manage the activities of the Instrumentation and Controls Maintenance business unit. Provides long-range business unit planning that meets site financial objectives and technical requirements. Management of the Corrective, Preventive, and Outage Maintenance Programs for all plant instrumentation equipment to ensure that equipment functions properly and meet desired performance objectives.

5.1.6.1.2 <u>Superintendent Electrical</u>
Manage the activities of the Electrical Maintenance business unit. Provides long-range business unit planning that meets site financial objectives and technical requirements. Management of the Corrective, Preventive, and Outage Maintenance Programs for all plant electrical equipment to ensure that equipment functions properly and meet desired performance objectives.

5.1.6.1.3 <u>Superintendent Mechanical</u>
Manage the activities of the Mechanical Maintenance business unit. Provides long-range business unit planning that meets site financial objectives and technical requirements. Management of the Corrective, Preventive, and Outage Maintenance Programs for all plant mechanical equipment to ensure that equipment functions properly and meet desired performance objectives.

5.1.6.2 <u>Manager Radiation Protection</u>
This position guides programs and activities at the plant ensuring that all operations, maintenance, modifications and engineering activities are conducted in a radiological safe manner and protect plant personnel, systems and equipment.

5.1.6.3 <u>Manager Chemistry and Environmental</u>
This position guides programs and activities at the plant ensuring that all operations, maintenance, modifications, and engineering activities that potentially impact plant chemistry/environmental are conducted in a manner consistent with applicable requirements.

5.1.6.4 Manager Work Control

This position provides overall responsibility for planning, coordination, scheduling and monitoring of all on line and outage work. Responsible for establishing work priorities and coordinating shift turnover; managing the plant scheduling processes; and ensuring efficient and effective management of the work control function.

5.1.6.5 Manager Operations

This position provides responsibility for planning, organizing, and setting policy, and support activities. These activities include operational strategies for generation, water and waste usage, approval authority for system enhancements, and prioritization of maintenance activities.

5.1.6.5.1 Superintendent Operations

This position is responsible for plant operations. The superintendent, through the Shift Manager, manages the day-to-day operation of the facility, refueling operations, start-up, operational testing, water and waste processing, and plant operations. The shift crew for an operating unit normally consists of the Shift Manager, Unit Supervisor, Nuclear Unit Operators, and Assistant Unit Operators.

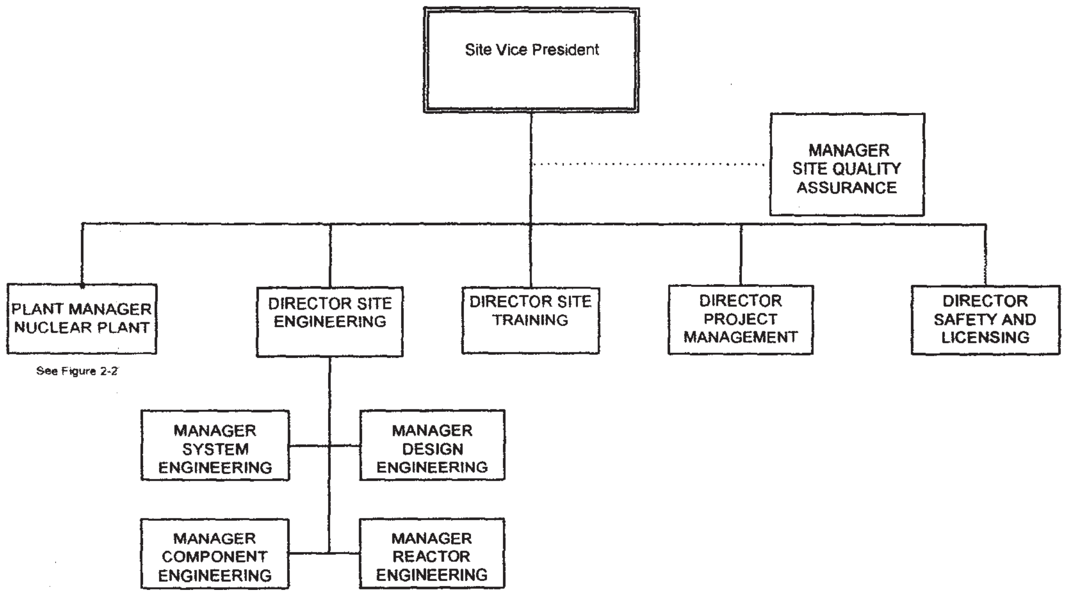
5.1.6.5.2 Superintendent Operations Support

This position is responsible for budget preparation, training oversight, performance monitoring, the Fire Protection Program and assists the Manager, Operations, in overall program direction for operations.

5.1.6.5.3 Superintendent Operations Outage Support

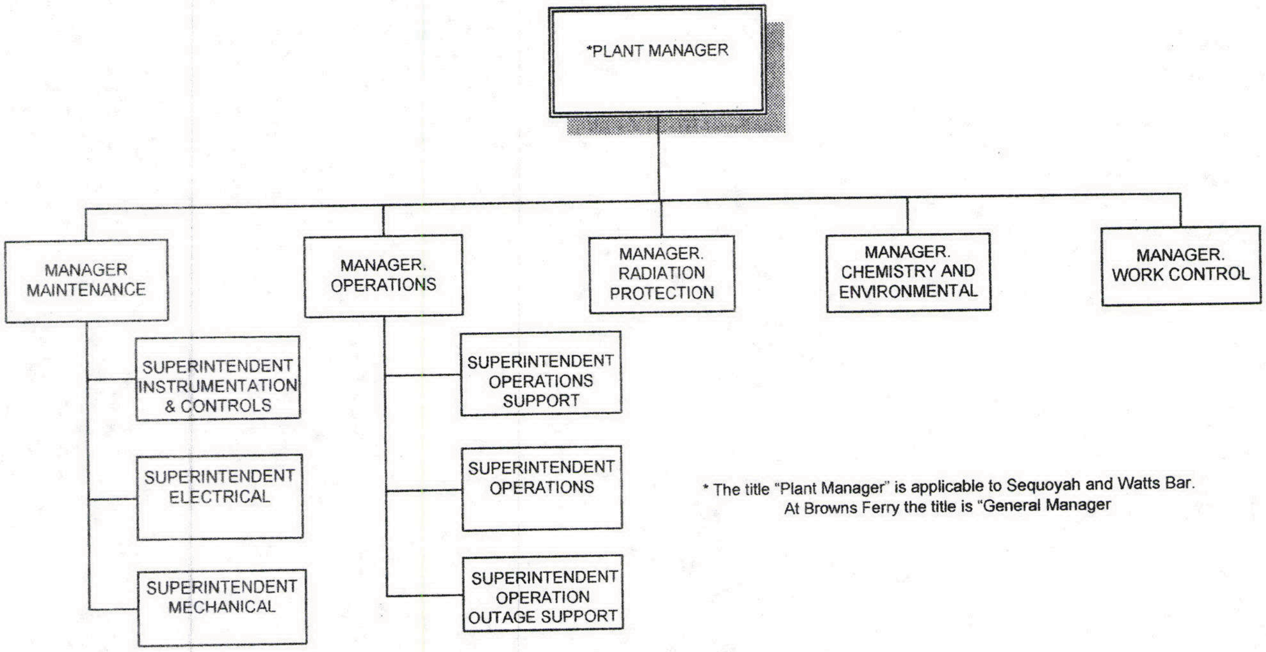
This position is responsible for all operations outage execution and preparation.

Site Vice President
Typical for Browns Ferry, Sequoyah, and Watts Bar Nuclear Plants
Figure 2-1



* The title "Plant Manager" is applicable to Sequoyah and Watts Bar. At Browns Ferry, the title for this position is "General Manager"

Plant Manager
Figure 2-2



* The title "Plant Manager" is applicable to Sequoyah and Watts Bar.
At Browns Ferry the title is "General Manager

B. Senior Vice President Nuclear Generation Development and Construction (NGDC)

This position is accountable for the development and construction of additional nuclear generation assets and technologies to meet demand for safe, clean, reliable and low cost power. Responsibilities also include major projects supporting NPG facilities (e.g. steam generator replacement, dry cask storage, etc.). This position's direct reports and administrative areas of responsibility are provided in Figure 3-0.

1.0 Vice President Nuclear Generation Development

This position provides oversight and directs the Nuclear Generation Development organization which is responsible for the development of new nuclear generation. Responsibilities include: developing and communicating strategies and plans for how TVA's nuclear related assets can best be used to meet future needs, managing the Tritium Production Program, advising executives on new nuclear generation assets and ensuring all managed activities are conducted in accordance with appropriate TVA policies, procedures and external regulations.

2.0 General Manager Quality Assurance

This position has direct access to the Senior Vice President, Nuclear Generation Development and Construction to provide for the independence and organizational freedom to effectively ensure conformance with the TVA Nuclear Quality Assurance Plan (TVA-NQA-PLN89-A). Direct reports include the Manager Quality Assurance Watts Bar Unit 2 and Manager Quality Assurance Bellefonte.

2.1 Manager Quality Assurance Watts Bar Unit 2

This position is a direct report to the NGDC General Manager Quality Assurance. This position provides oversight of quality activities associated with the conduct of Watts Bar Unit 2 project activities to oversee and ensure that we comply with NQAP Program. This position has direct access to the Senior Vice President of Nuclear Generation Development and Construction to allow for the independence and organizational freedom to execute the TVA NQAP to ensure nuclear safety and quality.

2.2 Manager Quality Assurance Bellefonte

This position is a direct report to the NGDC General Manager Quality Assurance. This position provides oversight of quality activities associated with the conduct of Bellefonte project activities to oversee and ensure that we comply with Nuclear Quality Assurance Program (NQAP). This position has direct access to the Senior Vice President of Nuclear Generation Development and Construction to allow for the independence and organizational freedom to execute the TVA NQAP to ensure nuclear safety and quality.

2.3 Manager Quality Assurance Corporate
This position manages the development, review, and maintenance of the quality assurance programs to ensure compliance with regulations, commitments, and policies. These include the internal audit and assessment, training and trending/analysis programs. This position manages the Quality Assurance oversight of the adequacy of the technical requirements, organizational performance and overall implementation of the Quality Assurance/Quality Control programs related to the corporate and site construction organizations.

3.0 General Manager Training and Performance Improvement
This position provides corporate governance and oversight of the planning, development, implementation, and evaluation of training programs to ensure sufficient qualified personnel to engineer and construct new nuclear generation assets.

4.0 General Manager Project Management
This position is responsible for directing management of major NGDC projects, including steam generator replacements, Dry Cask Storage Program, life extensions and ensuring that managed activities are conducted in accordance with appropriate regulations and TVA policies, programs, and procedures, and federal, state and local regulations. Additionally, this position provides governance and oversight of training programs and certifications.

5.0 General Manager Bellefonte Project
This position is responsible for directing project management functions on the Bellefonte Detailed Scoping, Estimating Project as well as site asset preservation functions. This includes determining the nature and extent of onsite and offsite support services required to support project operations. This also includes quality of work activities. This position's direct and indirect reports and administrative areas of responsibility are provided in Figure 3-1.

5.1 Senior Manager Site Projects
Responsible for implementation of NGDC Project Management policy and practices and overall coordination of major projects associated with the Bellefonte completion project. The scope includes Facilities Construction, Switchyard Upgrades, Site Security System, and other site projects.

5.2 Senior Manager Construction Plant Manager
Bellefonte Construction Plant Manager will manage the operations, facilities & maintenance contractor, pre-construction preventative and corrective maintenance programs and site security. Provide overall management of the maintenance functions, ensuring that managed

activities are conducted in accordance with appropriate regulations and TVA policies, programs, and procedures.

5.3 Senior Manager Plant Projects

Directs and/or coordinates work activities of multiple organizations within and external to TVA to develop integrated plans and meet cost and schedules. This position integrates multiple varied project support specialty areas including: finance, contracts, legal, customer contracts, negotiation, environmental reviews, engineering, and project controls. This position may also be responsible for managing system-wide, TVA Nuclear projects that implement physical changes or licenses to existing facilities or construction facilities, or programmatically resolve commitments to meet requirements.

5.4 Senior Manager Construction

The Senior Manager Construction is responsible for detailed planning and contracting to ensure major nuclear projects/contracts are ready for deployment once authorized. This position is responsible for preparing detailed execution plans, schedules, procedures, specifications for contract formation, cost estimates, resource allocation requirements, and contract bid evaluations; and negotiations for projects of all sizes including site specific modification projects to support Bellefonte Unit 1 completion.

5.5 Senior Manager Engineering

Responsible for management of engineering scope for the Bellefonte completion project including the establishment of the design basis, analytical methods, Engineering Design, Systems Engineering, Start up test, Technical Support, Components Test and Inspection functions on the project. This responsibility includes managing activities necessary for design basis reconciliation, design criteria development, analytical basis/start up programs developed and worked to closure, within budget, on schedule, in accordance with regulations and TVA policies and procedures. Also manages the project engineering activities, including management of multiple engineering (A/E) contractors, and coordinate engineering priorities with Licensing, Construction and Project Controls Managers to meet project objectives.

5.5.1 Manager Electrical Engineering

The Electrical Engineering Manager is responsible for management of electrical engineering scope for the Bellefonte completion project including the establishment of the design basis, analytical methods, Engineering Design, Systems Engineering, Start up test, Technical Support, Components Test and Inspection functions on the project. This responsibility includes managing activities necessary for design basis reconciliation, design criteria development, analytical basis/start up programs developed and worked to closure, within budget, on schedule, in accordance regulations and TVA policies and procedures. Also manages the electrical project engineering activities, including management of multiple engineering (A/E) contractors, and coordinate engineering priorities with Licensing, Construction and Project Controls Managers to meet project objectives.

5.5.2 Manager Mechanical Engineering

The Mechanical Engineering Manager is responsible for management of mechanical engineering scope for the Bellefonte completion project including the establishment of the design basis, analytical methods, Engineering Design, Systems Engineering, Start up test, Technical Support, Components Test and Inspection functions on the project. This responsibility includes managing activities necessary for design basis reconciliation, design criteria development, analytical basis/start up programs developed and worked to closure, within budget, on schedule, in accordance with regulations and TVA policies and procedures. Also manages the Mechanical project engineering activities, including management of multiple engineering (A/E) contractors, and coordinate engineering priorities with Licensing, Construction and Project Controls Managers to meet project objectives.

5.5.3 Manager NSSS Engineering

The Nuclear Steam Supply System (NSSS) Engineering Manager is responsible for management of NSSS engineering scope for the Bellefonte completion project including the establishment of the design basis, analytical methods, Engineering Design, Systems Engineering, Start up test, Technical Support, Components Test and Inspection functions on the project. This responsibility includes managing activities necessary for design basis reconciliation, design criteria development, analytical basis/start up programs developed and worked to closure, within budget, on schedule, in accordance with regulations and TVA policies and procedures. This position manages the NSSS project engineering activities, including management of multiple engineering (A/E) contractors, and coordinate engineering priorities with Licensing, Construction and Project Controls Managers to meet project objectives.

5.5.4 Manager I&C Engineering

The Instrumentation and Controls (I&C) Engineering Manager is responsible for management of I&C engineering scope for the Bellefonte completion project including the establishment of the design basis, analytical methods, Engineering Design, Systems Engineering, Start up test, Technical Support, Components Test and Inspection functions on the project. This responsibility includes managing activities necessary for design basis reconciliation, design criteria development, analytical basis/start up programs developed and worked to closure, within budget, on schedule, in accordance with regulations and TVA policies and procedures. This position manages the I&C project engineering activities, including management of multiple engineering (A/E) contractors, and coordinate engineering priorities with Licensing, Construction and Project Controls Managers to meet project objectives.

6.0 Vice President Watts Bar Unit 2

This position provides management and oversight of activities to ensure safe and efficient completion of Watts Bar (WBN) Unit 2 including construction, operations, engineering, maintenance, cost scheduling, and pre-operational startup testing. This position, in conjunction with the WBN Unit 1 Site Vice President, is also responsible for thorough coordination and integration of activities with the operating unit in compliance with Applicable requirements. This position's direct reports and administrative areas of responsibility are provided in Figure 3-2.

6.1 Senior Manager Operations

This position directs Unit 2 Operations, Unit 2 Fire Protection, and Unit 2 Work Control functions in order to ensure no impact to reliable and efficient generation to meet operations safety requirements; provide for sufficient qualified and licensed personnel to satisfy regulatory requirements; and design and implement process improvements to increase efficiency, effectiveness, and productivity while minimizing associated costs to improve competitiveness.

6.2 Senior Manager Pre-Op Startup & Test

This position provides technical support and management of the Start-up and Test organization of the completion of Watts Bar Unit 2. Responsible for the development, coordination, and implementation of the pre-operational test program for the WBN Unit 2, per Regulatory Guide 1.68 "Initial Test Programs for Water-Cooled Nuclear Power Plants."

6.3 Senior Manager Maintenance & Modification

This position directs the Construction, Maintenance and Modifications, planning, Field engineering and Turbine Generator activities in support of the WBN Unit 2 construction project ensuring the managed activities are conducted in accordance with all applicable TVA policies, programs, and procedures; plant Technical Specifications; and applicable regulations.

6.4 Senior Manager Construction
This position directs the Construction, Maintenance and Modifications, Planning, field engineering and Turbine Generator activities in support of the WBN Unit 2 construction project ensuring the managed activities are conducted in accordance with all applicable TVA policies, programs, and procedures; plant Technical Specifications; and regulations.

6.5 Senior Manager Construction Projects
This position is responsible for NGDC construction projects. It involves all aspects of planning, initiation, controlling, oversight and reporting. This position directs and/or coordinates work activities of multiple organizations within and external to TVA to develop integrated plans and meet cost and schedules.

6.6 Senior Manager Engineering
This position is responsible for management of engineering scope for the Watts Bar Unit 2 completion project including the establishment of the design basis, analytical methods, Engineering Design, Systems Engineering, Start up test, Technical Support, Components Test and Inspection functions on the project. This responsibility includes managing activities necessary for design basis reconciliation, design criteria development, analytical basis/start up programs developed and worked to closure, within budget, on schedule, in accordance with regulations and TVA policies and procedures. Also manages the project engineering activities, including management of multiple engineering (A/E) contractors, and coordinate engineering priorities with Licensing, Construction and Project Controls Managers to meet project objectives.

6.6.1 Manager Electrical/I&C Engineering
This position is responsible for management of electrical/I&C engineering scope for the Watts Bar Unit 2 completion project including the establishment of the design basis, analytical methods, Engineering Design, Systems Engineering, Start up test, Technical Support, Components Test and Inspection functions on the project. This responsibility includes managing activities necessary for design basis reconciliation, design criteria development, analytical basis/start up programs developed and worked to closure, within budget, on schedule, in accordance regulations and TVA policies and procedures. Also manages the electrical/I&C project engineering activities, including management of multiple engineering (A/E)

contractors, and coordinate engineering priorities with Licensing, Construction and Project Controls Managers to meet project objectives.

6.6.2 Manager Mechanical Design Engineering

This position is responsible for management of mechanical engineering scope for the Watts Bar Unit 2 completion project including the establishment of the design basis, analytical methods, Engineering Design, Systems Engineering, Start up test, Technical Support, Components Test and Inspection functions on the project. This responsibility includes managing activities necessary for design basis reconciliation, design criteria development, analytical basis/start up programs developed and worked to closure, within budget, on schedule, in accordance with regulations and TVA policies and procedures. Also manages the Mechanical project engineering activities, including management of multiple engineering (A/E) contractors, and coordinate engineering priorities with Licensing, Construction and Project Controls Managers to meet project objectives.

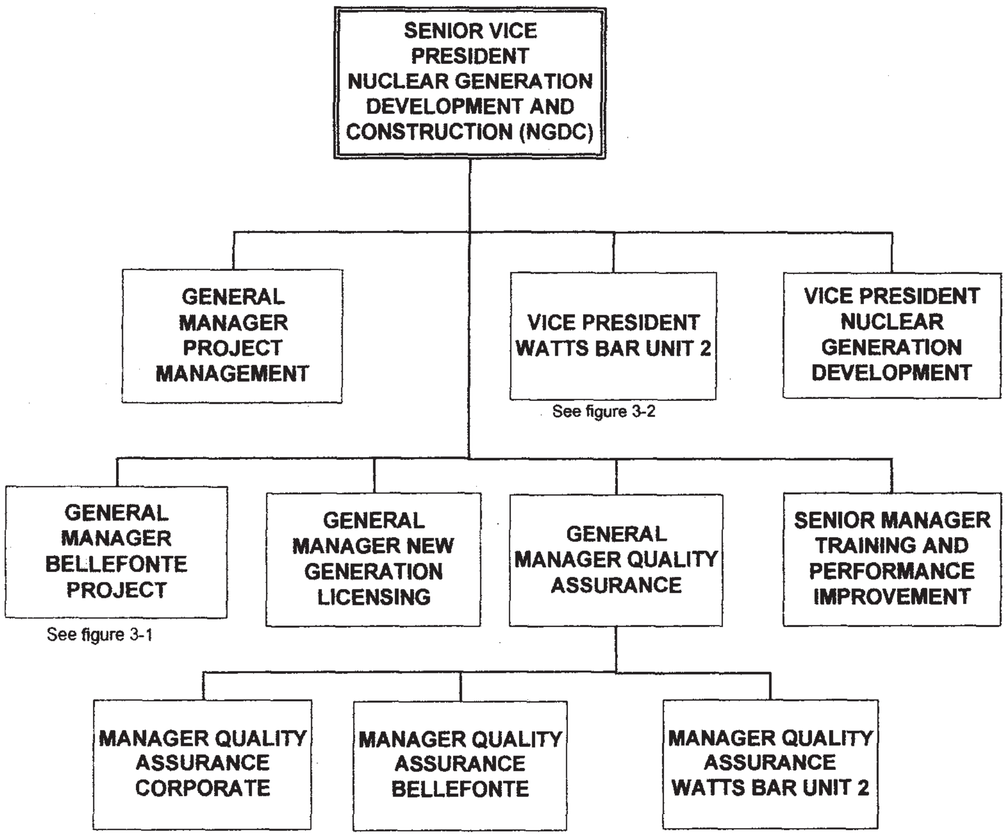
6.7 Completion Manager

This position reports directly to the Vice President WBN Unit 2. This position's assigned duties are established in procedures approved by the Vice President WBN Unit 2. This position assumes the authority of the Vice President WBN 2 as his designee.

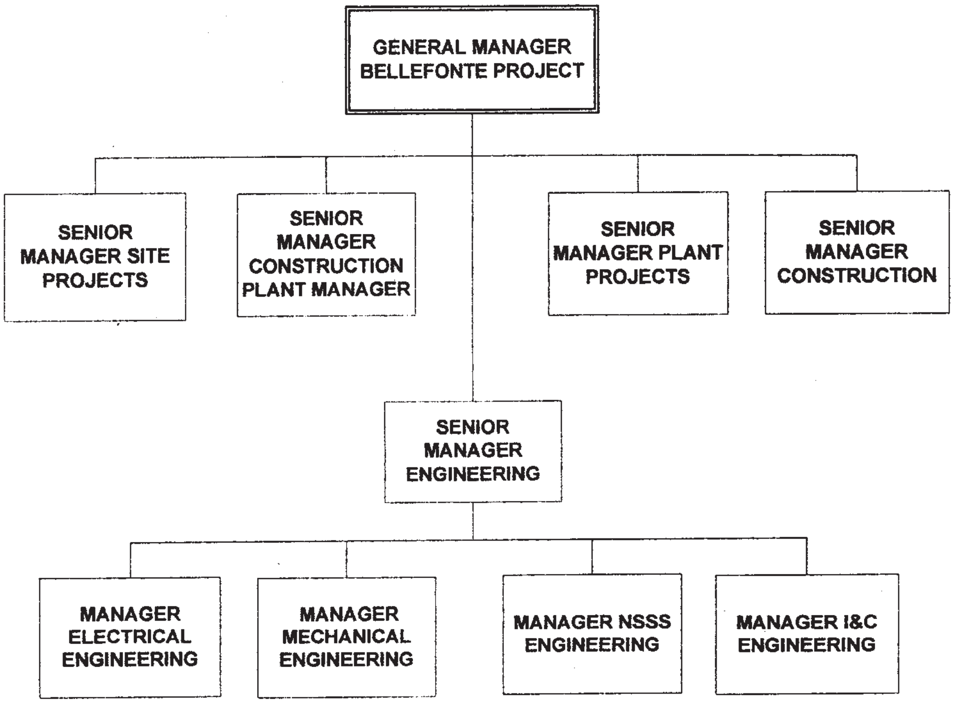
7.0 General Manager New Generation Licensing

This position provides oversight and direction of the Licensing functions in support of both short and long term NGDC projects. This position is responsible for the development of regulatory vision and strategy for regulatory issues for both Corporate and Project Sites and providing policy recommendations. This position provides governance and oversight of the project licensing organizations as well as Security and Employee Concerns.

Senior VP Nuclear Generation Development and Construction
Figure 3-0



General Manager Bellefonte Project
Figure 3-1



Vice President Watts Bar Unit 2
Figure 3-2