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C.I.~~12. Radiation~~12 Radiation Protection

Chapter 12 of the ~~safety analysis report (SAR)~~FSAR should provide information on radiation protection methods and estimated occupational radiation exposures of operating and construction personnel during normal operation and ~~anticipated operational occurrences~~AOO. (In particular, ~~anticipated operational occurrences~~AOO may include refueling; purging; fuel handling and storage; radioactive material handling, processing, use, storage, and disposal; maintenance; routine operational surveillance; ~~inservice inspection~~ISI; and calibration.) Specifically, this chapter should provide information on facility and equipment design, planning and procedures programs, and techniques and practices employed by the applicant to meet the radiation protection standards set forth in 10 CFR Part 20, and to be consistent with the guidance given in the appropriate regulatory guides, where the practices set forth in such guides are used to implement NRC regulations. As warranted, this chapter should specifically reference needed information that appears in other chapters of the ~~SAR~~FSAR.

The information that ~~generic design control documents (DCDs)~~is typically present in Chapter 12, ~~"Radiation Protection,"~~ includes a discussion of how radiation practices ~~will be~~are incorporated into plant policy and design decisions; a general description of the radiation source terms; radiation protection design features, including a description of plant shielding, ventilation systems, and area radiation and airborne radioactivity monitoring instrumentation; a dose assessment for operating and construction personnel; and a discussion of the design of the health physics facilities. ~~The COL application may incorporate this information by reference.~~

C.I.12.1 Ensuring that Occupational Radiation Exposures Are As Low As Is Reasonably Achievable ~~(ALARA)~~

C.I.12.1.1 *Policy Considerations*

~~D~~The applicant should describe the management policy and organizational structure related to ensuring that occupational radiation exposures are ALARA. ~~D~~The applicant should describe the applicable responsibilities and related activities to be performed by management personnel who have responsibility for radiation protection and the policy of maintaining occupational exposures ALARA.

~~D~~The applicant should describe the ALARA policy with respect to designing and constructing the plant, as well as the ALARA policy as it ~~will be~~ applie~~d~~s to plant operations. Indicate whether and, if so, how the plant ~~will~~ follows the ALARA policy guidance given in ~~Regulatory Guides 1.8 and 8.10,~~RGs 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," and 8.10 as well as Section C.1 of ~~Regulatory Guide~~RG 8.8.[1] Conversely, if the plant ~~will~~does not follow th~~at~~e ALARA policy guidance, describe the specific alternative approaches to be used. In addition, indicate how the plant ~~will~~ meets the requirements of 10 CFR~~-~~ Part 20.

~~D~~The applicant should describe the implementation of policy, organization, training, and design review guidance provided in ~~Regulatory Guides~~RGs 1.8, 8.8, and 8.10, as well as any proposed alternatives to the guidance provided in those regulatory guides.

C.I.12.1.2 *Design Considerations*

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[1] See Section C.I.12.6 for all references cited in Section C.I.12 of this guide.

~~D~~The applicant should describe how experience from past designs and operating plants is used to develop an improved radiation protection design to ensure that occupational radiation exposures are ALARA. Describe the ALARA design guidance and training (both general and specific) that is given to the individual designers and engineers during initial plant design, and describe provisions for continuing ALARA facility design reviews once the plant is operational (e.g., for plant changes and/or modifications). Describe how the design is directed toward reducing the need for equipment maintenance and reducing radiation levels and time spent where maintenance and other operational activities are necessary. These descriptions should be detailed in the ~~SAR~~FSAR, including an indication of whether and, if so, how the plant ~~will~~ implements and follow the design consideration guidance provided in Section C.I of ~~Regulatory Guide 8.8, as well as other industry-developed design guidance that includes ALARA criteria~~RG 8.8. Conversely, if the plant ~~will~~does not follow such guidance, describe the specific alternative approaches to be used.

~~D~~The applicant should describe the design considerations implemented to minimize the production, distribution, and retention of activated corrosion products throughout the primary system. In accordance with the requirements in 10~~-~~ CFR 20.1406~~,~~ describe the design approaches implemented to minimize, to the extent practicable, contamination of the facility and the environment~~;~~, facilitate eventual decommissioning~~;~~, and minimize, to the extent practicable, the generation of radioactive waste. Also, describe the design considerations implemented to ensure that occupational radiation exposures during decommissioning will be ALARA.

~~Include a general discussion of the plant's approach to meeting the requirements by specifying the selected design concept and the supporting design bases and criteria. Demonstrate that the design concept is technically feasible and within the state-of-the-art, and that reasonable assurance exists that the requirements will be properly implemented prior to the issuance of operating licenses.~~

Section 12.3.1 of the ~~SAR~~FSAR should address the detailed facility design features for radiation protection and ensuring that occupational radiation exposures will be ALARA.

C.I.12.1.3 *Operational Considerations*

~~D~~The applicant should describe the methods to be used to develop the detailed operational plans, procedures, and policies for ensuring that occupational radiation exposures are ALARA. Describe how these operational plans, procedures, and policies ~~will~~ impact the design of the facility, and how such planning has incorporated information from operating plant experience, other designs, and so forth. Describe how the operational requirements ~~are~~ reflected in ~~the design~~the design considerations described in Section~~-~~ 12.1.2 of the ~~SAR~~FSAR, as well as ~~in~~ the radiation protection design features described in Section 12.3.1 of the ~~SAR~~FSAR, reflect operational requirements. Indicate the extent to which the plant ~~will~~ follows the guidance on operational considerations given in ~~Regulatory Guides~~RGs 8.8 and 8.10. Conversely, if the plant ~~will~~does not follow th~~at~~is guidance, describe the specific alternative approaches to be used.

~~P~~The applicant should provide the criteria and/or conditions under which the plant will implement various operating procedures and techniques for ensuring that occupational radiation exposures are ALARA for all systems that contain, collect, store, or transport radioactive liquids, gases, and solids ~~[including, for example~~(e.g., the turbine system for ~~boiling-water reactors (BWRs); the nuclear steam supply system; the residual heat removal~~

~~systems~~BWRs; the NSSS; the RHR; the spent fuel transfer, storage, and cleanup systems; and the radioactive waste treatment, handling, and storage systems~~]~~). Describe the implementation of specific exposure control techniques. Describe means for planning and developing procedures for such radiation exposure-related operations as maintenance, ~~inservice inspection~~ISI, radwaste handling, and refueling in a manner that ~~will~~ ensures that the exposures are ALARA. Describe the methods of planning and accomplishing work, including interfaces between radiation protection, operations, maintenance, planning, and scheduling. Describe any changes in operating procedures that result from the ALARA operational procedures review.

~~I~~The applicant should indicate how the plant ~~will~~ follows the guidance provided in ~~R~~the following regulatory ~~Guides 8.2, 8.7, 8.9, 8.13, 8.15, 8.20, 8.25, 8.26, 8.27, 8.28, 8.29, 8.34, 8.35, 8.36, and 8.38.~~ guides:

(1) RG 8.2, "Guide for Administrative Practices in Radiation Monitoring"

(2) RG 8.7, "Instructions for Recording and Reporting Occupational Radiation Exposure Data"

(3) RG 8.9, "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program"

(4) RG 8.13, "Instruction Concerning Prenatal Radiation Exposure"

(5) RG 8.15, "Acceptable Programs for Respiratory Protection"

(6) RG 8.20, "Applications of Bioassay for I-125 and I-131"

(7) RG 8.25, "Air Sampling in the Workplace"

(8) RG 8.26, "Applications of Bioassay for Fission and Activation Products"

(9) RG 8.27, "Radiation Protection Training for Personnel at Light-Water-Cooled Nuclear Power Plants"

(10) RG 8.28, "Audible-Alarm Dosimeters"

(11) RG 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure"

(12) RG 8.34, "Monitoring Criteria and Methods To Calculate Occupational Radiation Doses"

(13) RG 8.35, "Planned Special Exposures"

(14) RG 8.36, "Radiation Doses to the Embryo/Fetus"

(15) RG 8.38, "Control of Access to High and Very High Radiation Areas in Nuclear Power Plants"

Conversely, if the plant ~~will~~does not follow th~~at~~is guidance, the applicant should describe the specific alternative approaches to be used.

C.I.12.2 Radiation Sources

C.I.12.2.1 *Contained Sources*

~~D~~The applicant should describe the sources of radiation, during normal plant operations and accident conditions, that are the bases for the radiation protection design. These sources should be described in the manner needed for input to the shield design calculation. This description should include isotopic composition, source strength and source geometry, and the

bases for all values. ~~Those~~The application should also describe those sources that are contained in equipment of the radioactive waste management systems~~ should also be described~~. In this section, provide descriptions of other sources, such as the reactor core, spent fuel storage pool, and various auxiliary systems, equipment, and piping containing activation product sources. For BWRs, describe the sources of N16 during operation, including the ~~steam lines~~steamlines and turbine system (~~including~~e.g., reheaters, moisture separators~~, etc.~~). For the reactor core, describe the source as it is used to determine radiation levels external to the biological shield at locations where occupancy may be necessary. Describe the contribution of neutron and gamma streaming to radiation levels in these potentially occupied areas of containment. Relevant experience from operating reactors may be used. For other sources, tabulate sources by isotopic composition or gamma ray energy groups, strength (becquerel or curie content), and geometry, and provide the bases for all values. For all sources identified above, including activation product sources, provide the models and parameters used to calculate the source magnitudes. Indicate whether and, if so, how the applicant has followed the applicable guidance provided in ANSI/ANS 18.1-1999. Conversely, if the applicant has not followed th~~at~~is guidance, describe the specific alternative methods used. Describe any required radiation sources containing byproduct, source, and special nuclear material that may warrant shielding design consideration. Provide a listing of isotope, quantity, form, and use of all sources in this latter category that exceed 3.7 E+9 Bq (100 millicuries). Describe any additional contained radiation sources that are not identified above, including radiation sources used for instrument calibration or radiography.

C.I.12.2.2 *Airborne Radioactive Material Sources*

~~*Describe the*~~

The applicant should describe, and identify by location and magnitude, those airborne radioactive material sources in the plant that are considered in designing the ventilation systems and specifying appropriate monitoring systems. These sources should be described in the manner required for design of personal protective measures and for dose assessment. This description should include those sources of airborne radioactive material that are created by leakage in equipment cubicles, corridors, and operating areas that are normally occupied by operating personnel. ~~These sources should be described in a manner appropriate for use in designing protective measures and for performing dose assessments. Describe, and identify by location and magnitude, those airborne radioactive material sources in the plant that are considered in designing the ventilation systems and specifying appropriate monitoring systems. This description should include those airborne sources that are created by leakage, opening formerly closed containers, storage of leaking fuel elements, and so forth.~~ Those airborne radioactivity sources that have to be considered for their contributions to the plant's effluent releases through the radioactive waste management system or the plant's ventilation systems should be described in Chapter 11 of the ~~SAR~~FSAR. By contrast, Section 12.2.2 of the ~~SAR~~FSAR should include a listing and description of all other sources of airborne radioactivity in the areas mentioned (those not covered in Chapter 11). In ~~particular~~addition to sources from leakage, this section should include airborne sources resulting from reactor vessel head removal, relief valve venting, and movement of spent fuel. Tabulate the calculated concentrations of airborne radioactive material by nuclides expected during normal operation, ~~anticipated operational occurrences~~AOO, and accident conditions for equipment cubicles, corridors, and operating areas normally occupied by operating personnel. Provide the models and parameters used for calculating airborne radioactivity concentrations.

C.I.12.3 Radiation Protection Design Features

C.I.12.3.1 *Facility Design Features*

~~D~~The applicant should describe equipment and facility design features used to ensure that occupational radiation exposures are ALARA. Indicate whether and, if so, how the applicant has followed the design feature guidance given in Section C.2 of ~~Regulatory Guide~~RG 8.8. Conversely, if the applicant has not followed that guidance, describe the specific alternative approaches used. Also describe the design features provided to control access to radiologically restricted areas (including potentially very high radiation areas), such as the reactor cavity and the fuel transfer tube during refueling operations. Describe each very high radiation area and refer to its location on plant layout diagrams. Provide detailed drawings showing isometric views of each very high radiation area and indicate physical access controls and radiation monitor locations for each of these areas.

~~P~~The applicant should provide illustrative examples of the facility design features of the equipment and components associated with the systems listed in Section 12.1.3. The description should include those features that reduce the need for maintenance and other operations in radiation fields, reduce radiation sources in areas where operations may be performed, allow quick entry and easy access, provide remote operation capability, or reduce the time spent working in radiation fields, as well as any other features that reduce radiation exposure of personnel. Also, include descriptions of methods for reducing the production, distribution, and retention of activation products through design, material selection, water chemistry, decontamination procedures, and so forth. Provide an illustrative example of each of the following components (including equipment and piping layouts), when applicable, and describe any associated design features intended to minimize personnel dose during operation or maintenance of the component~~:~~ —liquid filters, demineralizers, absorber beds, particulate filters, recombiners, tanks, evaporators, pumps, steam generators, valve operating stations, and sampling stations. Describe how~~-~~
sampling ports, instrumentation, and control panels are located to facilitate ~~use~~access and minimize personnel exposure.

~~P~~The applicant should provide scaled layout and arrangement drawings of the facility. On these drawings, show the locations of all sources described in Section 12.2 of the ~~SAR~~FSAR and identify those sources in a manner that can easily be related to tables containing the pertinent and necessary quantitative source parameters. Accurately locate positions, indicating the approximate size and shape of each source. On the layout drawings, provide the radiation zone designations, including zone boundaries for normal operations, refueling outages, and post~~-~~accident conditions (based on the applicable guidance in ~~Regulatory Guides 1.3, 1.4, 1.7, and 1~~RG 1.3, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss-of-Coolant Accident for Boiling-Water Reactors," RG 1.4, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss-of-Coolant Accident for Pressurized-Water Reactors," RG 1.7 and RG 1.183). Reference other chapters of the ~~SAR~~FSAR, as appropriate. The layout drawings should show shield~~-~~-wall thicknesses~~;~~, traffic patterns (including post~~-~~accident access routes to and from vital areas)~~;~~, and locations of controlled access areas (including locked high and very high radiation areas), personnel and equipment decontamination areas, personnel locker and changeout rooms, contamination control areas, radiation protection facilities, airborne radioactivity, area and portal radiation monitors, the solid radwaste processing area and control panels for radwaste equipment and components, the onsite laboratory for analysis of chemical and radioactive samples, the independent spent fuel storage installation (where applicable), the counting room, and the control room and Technical Support Center (TSC). Specify the design-basis radiation level in the counting room during normal operation and ~~anticipated operational~~

~~occurrences~~AOO. Describe the facilities and equipment (~~such as hoods~~e.g., hoods, glove boxes, filters, special handling equipment,~~ and~~ special shields) related to the use of sealed and unsealed special nuclear, source, and byproduct material.

C.I.12.3.~~2 Shielding~~2 *Shielding*

~~P~~The applicant should provide information regarding the shielding for each radiation source identified in Chapter 11 and Section 12.2 of the ~~SAR~~FSAR, including the criteria for penetrations; shielding materials used; the method used to determine the shield parameters (e.g., cross-sections, buildup factors~~, etc.~~); and the assumptions, codes, and techniques used in the calculations. Describe special protective features that use shielding, geometric arrangement (including equipment separation), or remote handling to ensure that occupational radiation exposures will be ALARA. Include a description of the features/shielding used to preclude radiation streaming from the annulus between the reactor vessel and the biological shield into containment areas that may be occupied. Indicate whether and, if so, how the applicant has followed the guidance provided in ~~Regulatory Guide~~RG 1.69, "Concrete Radiation Shields for Nuclear Power Plants," as it relates to concrete radiation shields, and ~~Regulatory Guide~~RG 8.8, as it relates to special protective features. Conversely, if the applicant has not followed th~~at~~is guidance, describe the specific alternative methods used.

~~V~~The applicant should verify that the plant shielding is sufficient to ensure adequate access to all vital areas, following an accident, in accordance with the requirements in 10~~-~~ CFR 50.34(f)(2)(vii) and the criteria in Item~~-~~ II.B.2 of NUREG-0737.

C.I.12.3.~~3 Ventilation~~3 *Ventilation*

~~D~~Section 12.3.3 of the FSAR should describe ~~the personnel protection features incorporated in the~~any ventilation system ~~design. Note that~~ personnel protective features that are not addressed in Chapter 11 or described in Chapter 9. Section 12.3.3 should include those system aspects which relate to controlling the concentration of radioactivity in equipment cubicles, corridors, and operating areas normally occupied by operating personnel. By contrast, Chapter 11 of the ~~SAR~~FSAR should describe those aspects of the design that relate to removing airborne radioactivity from equipment cubicles, corridors, and operating areas normally occupied by operating personnel and transporting it into the effluent control systems. ~~By contrast, Section 12.3.3 of the SAR should describe any ventilation system protective features that are not addressed in Chapter 11 or described in Chapter 9. Include those system aspects which relate to controlling the concentration of radioactivity in the areas mentioned above.~~

~~Provide~~

The applicant should provide illustrative examples of the air~~-~~-cleaning system design, including a representative layout of an air~~-~~-cleaning system housing, showing filter mountings; access doors; aisle space; service galleries; and provisions for testing, isolation, and decontamination.

~~Also,~~In addition, the applicant should describe the radiation protection features incorporated for system maintenance and the change-out of air filters and adsorbers in the air~~-~~-cleaning system. In addition, the applicant should indicate whether and, if so, how the applicant has followed the applicable guidance in ~~Regulatory Guide~~RG 1.52. Conversely, if the applicant has not followed th~~at~~is guidance, describe the specific alternative methods used.

C.I.12.3.4 *Area Radiation and Airborne Radioactivity Monitoring Instrumentation*

~~D~~The applicant should describe the fixed area radiation monitoring instrumentation and the continuous airborne radioactivity monitoring instrumentation, as well as the criteria for selection and placement of the instrumentation in accordance with ANSI/ANS-HPSSC-6.8.~~1~~1-1981, "Location and Design Criteria for Area Radiation Monitoring Systems for Light-Water Nuclear Reactors." Provide information regarding the auxiliary and/or emergency power supply and the range, sensitivity, accuracy, precision, calibration methods and frequency~~,~~; alarm setpoints~~,~~; recording devices~~,~~; and locations of detectors, readouts, and alarms for the monitoring instrumentation. Consider normal operation, ~~anticipated operational occurrences~~AOO, accident conditions, and any other conditions with the potential need for high-range instrumentation. Provide the locations of airborne monitor sample collectors, and give details of sampling lines and pump locations.

~~D~~The applicant should describe the criteria and methods for obtaining representative in-plant airborne radioactivity concentrations, including airborne radioiodines and other radioactive materials, from the work areas being sampled. Describe the use of portable instruments, and the associated training and procedures, to accurately determine the airborne iodine concentration in areas within the facility where plant personnel may be present during an accident, in accordance with the requirements of 10~~-~~ CFR~~-~~ 50.34(f)(2)(xxvii) and the criteria in Item III.D.3.3 of NUREG-0737. Describe procedures for locating suspected high~~-~~-activity areas.

If complying with the requirements of ~~10 CFR 70.24 in lieu of 10 CFR 50.68(b),~~10 CFR 70.24, "Criticality accident requirements," in lieu of 10 CFR 50.68(b), the applicant should describe the radiation instrumentation that will be used to meet the criticality accident monitoring requirements of 10~~-~~ CFR~~-~~ 70.24 for the new fuel storage area. Describe the in-containment high-range radiation monitoring capability following an accident, in accordance with the requirements of 10 CFR~~-~~ 50.34(f)(2)(xvii)~~,~~ and the criteria in Attachment 3 to Item II.F.1 of NUREG~~-~~-0737 ~~and Regulatory Guide~~and RG 1.97.

~~I~~The applicant should indicate whether and, if so, how the applicant has followed the guidance provided in ~~Regulatory Guides~~RGs 1.21~~,~~ 1.97, 8.2, and 8.8, as well as ANSI N13.1-1999. Conversely, if the applicant has not followed th~~at~~is guidance, describe the specific alternative methods used.

C.I.12.3.5 *Dose Assessment*

~~P~~The applicant should provide the objectives and criteria for the design dose rates in the various plant areas. In accordance with the provisions of ~~Regulatory Guide~~RG 8.19, "Occupational Radiation Dose Assessment in Light-Water Reactor Power Plants—Design Stage Man-Rem Estimates," provide an estimate of the annual person-Sievert (person-rem) doses associated with operation, normal maintenance, radwaste handling, refueling, ~~inservice inspection~~ISI, and special maintenance (e.g., maintenance that goes beyond routine scheduled maintenance, modification of equipment to upgrade the plant, repairs to failed components). For each of these work categories, provide a listing of typical job activities that would normally be performed under this work category, along with the associated annual collective dose estimate. Include listings of the expected numbers of personnel, occupancy times, and average dose rates used to determine the annual collective dose estimate for each of these job categories.

When applicable, actual exposure and occupancy data from similar operating plants may be used for the dose assessment. When used, operating data from other plants should be modified to account for any improvements in plant design and operating procedures. For areas with expected airborne radioactivity concentrations (discussed in Section 12.2.2) during normal operation and ~~anticipated operational occurrences~~AOO, provide estimated person-hours of occupancy and estimated personnel inhalation exposures. Also, provide the bases, models, and assumptions for the above values.

~~P~~The applicant should perform a review of all plant vital areas (areas that may require occupancy to enable an operator to aid in mitigating or recovering from an accident), subject to the requirements of 10 CFR~~-~~ 50.34(f)(2)(vii), and the criteria in Item II.B.2 of NUREG-0737. For each vital area, provide the mission dose (dose to access the area, perform the necessary function(s), and exit the area), and verify that the dose guidelines of ~~General Design Criterion (~~GDC~~)~~ 19~~, "Control Room,"~~ are not exceeded during the course of an accident. Specifically, GDC 19 requires that adequate radiation protection must be provided, to allow access and occupancy of the control room such that the dose to personnel should not exceed 0.05~~-~~ Sievert (5 rem) total effective dose equivalent (TEDE) for the duration of the accident. Provide the bases, models, and assumptions for the above vital area mission doses, including the occupancy time spent in each vital area and the post~~-~~accident dose rates for the vital area and access route at time of access.

~~P~~The applicant should provide the estimated annual whole body dose and maximum organ dose to a member of the public, in accordance with the dose requirements of the U.S. EPA's regulations in 40~~-~~ CFR~~-~~ Part 190. Provide the bases, models, and assumptions for each of those values, including the estimated dose from each applicable radioactive gaseous and liquid effluent and any contributions to the whole body dose from direct radiation (including "sky shine") from contained radioactive sources within the facility. For each contained source that contributes to the direct radiation dose component of this annual dose estimate, provide a description of the source along with its associated direct dose contribution.

For multi~~-~~unit plants, the applicant should provide estimated annual doses to construction workers in a new unit construction area, as a result of radiation from onsite radiation sources from the existing operating plant(s). Examples of typical onsite radiation sources include the turbine systems (for BWRs), stored radioactive wastes, the independent spent fuel storage facility, auxiliary and reactor buildings, and radioactive effluents (direct radiation from the gaseous radioactive effluent plume). Provide the annual person-Sievert (person-rem) doses associated with such construction areas. Include bases, models, assumptions, and input data. Describe any additional dose-reducing measures taken as a result of the dose assessment process for specific functions or activities. Indicate whether and, if so, how the applicant has followed the guidance in ~~Regulatory Guide~~RG 8.19. Conversely, if the applicant has not followed th~~at~~is guidance, describe the specific alternative methods used.

C.I.12.4 Dose Assessment

Dose assessment is discussed above in Section C.I.12.3.5.

C.I.12.~~4 *Operational*~~5 Operational Radiation Protection Program

Because the Radiation Protection Program is an operational program, as discussed in SECY-05-0197, the program and its implementation milestones should be fully described and reference any applicable standards. Fully described should be understood to mean that the

program is clearly and sufficiently described in terms of the scope and level of detail to allow for a reasonable assurance finding of acceptability.

To achieve the goal of maintaining occupational and public doses both below regulatory limits and ALARA, the radiation protection program should include the following components:

(1) a documented management commitment to keep exposures ALARA

(2) a trained and qualified organization with sufficient authority and well-defined responsibilities

(3) adequate facilities, equipment, and procedures to effectively implement the program

~~D~~The applicant should demonstrate the development, organization, and implementation of these components.

~~D~~The applicant should discuss how the radiation protection program ~~will be~~is implemented on a phased basis, prior to each of the following implementation milestones:

(1) Prior to initial receipt of by-product, source, or special nuclear materials (excluding Exempt Quantities as described in 10 CFR 30.18, "Exempt quantities"), and thereafter, when such radioactive materials are possessed under this license, the following radiation protection program elements will be in place:

(a) Organization. A radiation protection supervisor and at least one ~~(1)~~ radiation protection technician, each selected, trained and qualified consistent with the guidance in ~~Regulatory Guide~~RG 1.8. Conversely, if the applicant has not followed th~~at~~is guidance, describe the specific alternative methods used.

(b) Facilities. A facility or facilities to support the receipt, storage and control of non-exempt radioactive sources in accordance with ~~10 CFR 20.1801, 20.1802, and 20.1906.~~10 CFR 20.1801, "Security of stored material," 10 CFR 20.1802, "Control of material not in storage," and 10 CFR 20.1906, "Procedures for receiving and opening packages."

(c) Instrumentation and Equipment. Adequate types and quantities of instrumentation and equipment ~~will be~~is selected, maintained, and used to provide for the appropriate detection capabilities, ranges, sensitivities, and accuracies to conduct radiation surveys and monitoring (in accordance with 10 CFR 20.1501, "General," and 10 CFR 20.1502, "Conditions requiring individual monitoring of external and internal occupational dose") for the types and levels of radiation anticipated for the non-exempt sources possessed under this license.

(d) Procedures. Procedures ~~will be~~ established, implemented, and maintained sufficient to maintain adequate control over the receipt, storage, and use of radioactive materials possessed under this license and as necessary to assure compliance with 10 CFR 19.11 ~~and 19.12 and 10 CFR~~, "Posting of notices to workers," 10 CFR 19.12, "Instructions to workers," and 10 CFR Part 20, commensurate with the types and quantities of radioactive materials received and possessed under this license.

(e) Training. Initial and periodic training ~~will be~~ provided to individuals responsible for the receipt, control or use of non-exempt radioactive sources possessed under this license in accordance with 10 CFR 19.12 and consistent with the guidance in ~~Regulatory Guides~~RGs 1.8, 8.13, 8.27, and 8.29. Conversely, if the

applicant has not followed th~~at~~is guidance, describe the specific alternative methods used.

(2) Prior to receiving reactor fuel under this license, and thereafter, when reactor fuel is possessed under this license, radiation monitoring ~~will be~~ provided in accordance with 10~~-~~ CFR~~-~~ 50.68, "Criticality accident requirements," in addition to the radiation protection program elements specified under item 1, above.

(3) Prior to initial loading of fuel in the reactor, the balance of the radiation protection program elements described in this section ~~will be~~ fully implemented, with the exception of the organization, facilities, equipment, instrumentation, and procedures associated with and necessary for transferring, transporting or disposing of radioactive materials in accordance with 10 CFR Part 20, Subpart K, and applicable requirements in 10 CFR Part 71. In addition, at least one (1) ~~radiation~~ radiation protection technician, selected, trained and qualified consistent with the guidance in ~~Regulatory Guide~~RG 1.8, ~~will be~~ onsite and on duty when fuel is initially loaded in the reactor, and thereafter, whenever fuel is in the reactor. If the applicant has not followed the guidance in ~~Regulatory Guide~~RG 1.8, describe the specific alternative methods used.

(4) Prior to initial transfer, transport or disposal of radioactive materials, the organization, facilities, equipment, instrumentation, and procedures will be in place as necessary to assure compliance with ~~10 CFR Part 20,~~ Subpart K~~,~~ of 10 CFR Part 20 and applicable requirements in 10 CFR Part 71.

~~I~~Prior to each of the four implementation milestones listed above, the applicant should identify the staffing levels, instrumentation and equipment, facilities, procedures, and training necessary to ensure radiation safety of workers and the public ~~for each phase of implementation~~.

C.I.12.~~4~~5.~~1 Organization~~1 *Organization*

~~D~~The applicant should describe the administrative organization of the radiation protection program, including the authority and responsibility of each identified position.[2] Indicate whether and, if so, how the applicant has followed the guidance in ~~Regulatory Guides~~RGs 1.8, 8.2, 8.8, and 8.10. Conversely, if the applicant has not followed th~~at~~is guidance, describe the specific alternative approaches used. Describe the experience and qualification of the personnel responsible for various aspects of the radiation protection program and for handling and monitoring radioactive materials, including special nuclear, source, and byproduct materials. Also, describe management and staff authorities and responsibilities for implementing and documenting radiation protection program reviews, as required by ~~10 CFR 20.1101 and 20.2102.~~10 CFR 20.1101, "Radiation protection programs," and 20.2102, "Records of radiation protection programs." Reference Chapter 13 of the ~~SAR~~FSAR as appropriate.

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[2] Key positions include the plant manager, plant organization managers and supervisors, radiation protection manager, radiation protection technicians, and radiation protection supervisory and technical staff. Provide equivalent information ~~regarding~~for those personnel ~~with~~who do not work in the radiation protection department but who may be assigned radiation protection responsibility ~~who are assigned outside~~for one or more of the ~~radiation protection department (e.g.,~~following functional areas: respiratory protection, personnel dosimetry, bioassay, instrument calibration and maintenance, radioactive source control, effluents and environmental monitoring and assessment, radioactive waste shipping, radiation work permits, job coverage, and radiation monitoring and surveys~~)~~.

C.I.12.~~4~~5.2 *Equipment, Instrumentation, and Facilities*

~~*Equipment*~~C.I.12.5.2.1 *Equipment and Instrumentation*

~~P~~The applicant should provide the criteria for selecting portable and laboratory technical equipment and instrumentation for use in performing radiation and contamination surveys, monitoring and sampling in-plant airborne radioactivity, area radiation monitoring, and ~~for~~ personnel monitoring (including audible alarming and electronic dosimeters) during normal operation, ~~anticipated operational occurrences~~AOO, and accident conditions. Include the locations and quantity of each type of instrument, considering the amount of instrumentation and the fact that equipment may be unavailable at any given time as a result of periodic testing and calibration, maintenance, and repair. The equipment and instrumentation should provide detection capabilities, ranges, sensitivities, and accuracies appropriate for the types and levels of radiation anticipated at the plant and in its environs during routine operations, major outages, abnormal occurrences, and postulated accident conditions.

~~D~~The applicant should describe the ~~types~~typical of detectors and monitors, as well as the minimum quantities, sensitivities, ranges, alarms, and calibration frequencies and methods for all portable and laboratory technical equipment and instrumentation mentioned above. Include a description of the portable air sampling and analysis system to determine airborne radionuclide concentrations during and following an accident, in accordance with the requirements of 10~~-~~ CFR~~-~~ 50.34(f)(2)(xxvii) and the criteria in Item III.D.3.3 of NUREG-0737. Types of equipment and instrumentation to be described include the following:

(1) laboratory~~ and fixed~~ instrumentation
(2) portable monitoring instrumentation and equipment
(3) personnel monitoring instrumentation and equipment
(4) personnel protective equipment and clothing

~~*Facilities*~~C.I.12.5.2.2 *Facilities*

On the basis of company and site-specific information, this section may be modified to indicate offsite facilities and functions that may be carried out at another location or through a vendor.

This section of the ~~SAR~~FSAR need not include facilities that were previously described and reviewed in an applicable ~~design control document~~DCD. In addition, on the basis of company and site-specific information, this section may be modified to indicate offsite facilities and functions that may be carried out at another location or through a vendor.

~~D~~The applicant should describe the instrument storage, calibration, and maintenance facilities. These facilities should be able to support program implementation during routine operations, refueling and other outages, abnormal occurrences, and accident conditions.

~~D~~The applicant should describe and identify the location of radiation protection facilities (including men's and women's locker and shower rooms, offices, and access control stations); laboratory facilities for radioactivity analyses; decontamination facilities (for both equipment and personnel); portable instrument calibration facility; facility for issuing and storing protective clothing; facility for issuing, storing, and maintaining respiratory protection equipment; machine shop for work on activated or contaminated components and equipment; area for storing and issuing contaminated tools and equipment; area for storing radioactive materials; facility for

dosimetry processing and bioassay; laundry facility; and other contamination control equipment and areas.

~~I~~The applicant should indicate whether and, if so, how the applicant has followed the guidance provided in ~~Regulatory Guides 1.97, 8.4, 8.6,~~RGs 1.97, 8.4, "Direct-Reading and Indirect-Reading Pocket Dosimeters," 8.6, "Standard Test Procedure for Geiger-Mueller Counters," 8.8, 8.9, 8.15, 8.20, 8.26, and 8.28. Conversely, if the applicant has not followed th~~at~~is guidance, the applicant should describe the specific alternative methods used.

C.I.12.~~4~~5.~~3 Procedures~~3 Procedures

For each of the categories listed below, the applicant should describe the radiation protection procedures and methods of operation that have been developed to ensure that occupational radiation exposures are ALARA. Radiation protection procedures should provide means for adequate control over the receipt, handling, possession, use, transfer, storage, and disposal of sealed and unsealed byproduct, source, and special nuclear material, and should ensure compliance with applicable requirements in ~~10 CFR Parts 19, 20, 50, 70 and 71. Regulatory Guides~~10 CFR Part 19, "Notices, Instructions, and Reports to Workers: Inspection and Investigations," 10 CFR Part 20, 10 CFR Part 50, 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," and 10 CFR Part 71. RGs 1.8, 1.33, 8.2, 8.7, 8.8, and 8.10 and the applicable portions of NUREG-1736, "Consolidated Guidance: 10 CFR Part 20—Standards for Protection Against Radiation," provide guidance for use in developing procedures for radiation protection. Indicate whether and, if so, how the plant will follow th~~at~~is guidance. Conversely, if the plant ~~will~~does not follow th~~at~~is guidance, describe the specific alternative approaches to be used. Reference Chapter 13 of the FSAR as appropriate.

C.I.12.5.3.1 *Radiological Surveillance*

~~D~~The applicant should describe the policy, methods, frequencies, and procedures for conducting radiation surveys. Describe the procedures that provide for use of portable monitoring systems to sample and analyze for radioiodine in plant areas during and following an accident, in accordance with the requirements of 10 CFR 50.34(f)(2)(xxvii) and the criteria in Item III.D.3.3 of NUREG-0737. Also, indicate compliance with 10 CFR 20.1501~~,~~ and consistency with ~~Regulatory Guides~~RGs 8.2, 8.8 and 8.10.

C.I.12.5.3.2 *Access Control*

~~D~~The applicant should describe the physical and administrative measures for controlling access to and work within radiation areas, high-radiation areas, and very-high-radiation areas. This discussion may reference Section 12.1 of the ~~SAR~~FSAR, as appropriate. Include a description of the additional administrative controls for restricting access to each very-high-radiation area, as required by 10 CFR 20.1902, "Posting Requirements." Also, describe how these measures comply with 10 CFR 19.12, Subpart G, "Control of Exposure from External Sources in Restricted Areas," of 10 CFR Part 20, and 10 CFR 20.1903, "Exceptions to posting requirements," as well as how they are consistent with the guidance of ~~Regulatory Guides~~RGs 8.13, 8.27, 8.29 and 8.38. Conversely, if the plant ~~will~~does not follow such guidance, describe the specific alternative approaches to be used.

C.I.12.5.3.3 *Radiation Work Permits*

~~D~~The applicant should describe the information included in radiation work permits, as well as the criteria for their issuance. Also, indicate whether the permit contents and issuance criteria are consistent with ~~Regulatory Guide~~RG 8.8. Conversely, if the plant ~~will~~does not follow such guidance, the applicant should describe the specific alternative approaches to be used.

C.I.12.5.3.4 *Contamination Control*

~~D~~The applicant should describe the bases and methods for monitoring and controlling surface contamination (including loose discrete radioactive particles) for personnel, equipment, and surfaces. This description should include the surveillance program to ~~ensure that~~preclude the inadvertent release of licensed materials~~ will not inadvertently be released~~ from the controlled area. Describe decontamination procedures for personnel and areas, as well as decontamination and/or ~~disposal~~disposition procedures for equipment.

In accordance with the requirements of 10~~-~~ CFR~~-~~ 20.1406, the applicant should describe how operating procedures will minimize, to the extent practicable, contamination of the facility and the environment, facilitate eventual decommissioning, and minimize, to the extent practicable, the generation of radioactive waste.

~~D~~The applicant should describe how contamination control measures comply with 10 ~~CFR 20.1406, 20.1701, and 20.1801.~~

CFR 20.1406, 10 CFR 20.1701, "Use of process or other engineering controls," and 10 CFR 20.1801.

C.I.12.5.3.5 *Personnel Monitoring and Dose Control*

~~D~~The applicant should describe the methods and procedures for internal and external personnel monitoring, including methods to record, report, and analyze results. Describe the program for assessing internal radiation exposure (whole body counting and bioassay), including the bases for selecting personnel ~~who will be~~ included in the program, the frequency of their whole-body counts and bioassays, and the basis for any non-routine bioassays~~ that will be~~ performed.

~~D~~The applicant should describe the methods and procedures to ensure that personnel doses are maintained within the dose limits established in 10~~-~~ CFR~~-~~ 20.1201, "Occupational dose limits for adults," for adult workers; ~~10 CFR 20.1207 and 20.1208~~10 CFR 20.1207, "Occupational dose limits for minors," and 10 CFR 20.1208, "Dose equivalent to an embryo/fetus," for minors and declared pregnant workers, respectively; and 10~~-~~ CFR~~-~~ 20.1301 for members of the public. Describe the procedures for permitting an individual to participate in a planned special exposure, in accordance with the requirements of ~~10 CFR 20.1206 and 20.2104,~~10 CFR 20.1206, "Planned special exposures," and 10 CFR 20.2104, "Determination of prior occupational dose," and consistent with the guidance in ~~Regulatory Guide~~RG 8.35.

~~D~~The applicant should describe the procedures and methods of operation that have been developed to ensure that occupational radiation exposures will be ALARA. Include a description of the ALARA aspects of the radiation protection procedures used in refueling, ~~inservice inspection~~ISI, radwaste handling, spent fuel handling, loading and shipping, normal operation, routine maintenance, and sampling and calibration, where such procedures are specifically related to ensuring that radiation exposures will be ALARA.

~~D~~The applicant should describe how personnel monitoring and dose control measures comply with 10~~-~~ CFR~~-~~ Part~~s~~ 19 and 10 CFR Part 20, and are consistent with ~~Regulatory Guides~~RGs 8.2, 8.7, 8.8, 8.9, 8.10, 8.13, 8.20, 8.26, 8.32, "Criteria for Establishing a Tritium Bioassay Program," 8.34, 8.35, and 8.36. Conversely, if the plant ~~will~~does not follow such guidance, the applicant should describe the specific alternative approaches to be used.

C.I.12.5.3.6 *Respiratory Protection*

~~D~~The applicant should describe the engineering controls to limit airborne radioactivity. Describe the methods and procedures for evaluating and controlling potential airborne radioactivity concentrations. Discuss any provisions for special air sampling, and the issuance, selection, use, and maintenance of respiratory protection devices, including training and retraining programs and programs for fitting respiratory protection equipment. Discuss the use of process and engineering controls in lieu of respirator use to limit intakes.

~~D~~The applicant should describe the methods and procedures for the following activities:

- monitoring, including air sampling~~ and bioassays~~
- supervision and training of respirator users
- fit-testing
- respirator selection, including provisions for vision correction, adequate communications, extreme temperature conditions, and concurrent use of other safety or radiological protection equipment
- breathing air quality
- inventory, control, storage, issuance, use, maintenance, repair, testing, and ~~quality assurance~~QA of respiratory protection equipment, including self-contained breathing apparatuses
- recordkeeping
- limitations on periods of use and relief from respirator use

~~D~~The applicant should describe how respiratory protection measures comply with Subpart H ~~of~~to 10~~-~~ CFR~~-~~ Part~~-~~ 20, as well as how they are consistent with ~~Regulatory Guides~~RGs 8.15 and 8.25 and NUREG/CR-0041, "Manual of Respiratory Protection Against Airborne Radioactive Materials," issued January 2001. Conversely, if the plant ~~will~~does not follow such guidance, describe the specific alternative approaches to be used.

C.I.12.5.3.7 *Radioactive Material Control*

~~D~~The applicant should describe the procedures governing the accountability and storage of radioactive sources that are not affixed to, or installed in, plant systems. Describe the procedures governing the packaging and transportation of licensed radioactive materials

and the transfer of low-level radioactive waste. Describe the procedures to ensure positi~~on~~ve control of licensed radioactive material so that unnecessary or inadvertent exposures do not occur and such material is not released into uncontrolled areas in a manner that is not authorized by NRC regulations or the license.

~~D~~The applicant should describe how radioactive material control measures comply with 10~~ CFR §§~~ CFR 20.~~1801-1802~~1801, 10 CFR 20.1802, ~~20.1902, 20.1904–1906, 20.2001, and 20.2005–2007, and 10 CFR Part 71, Subpart G and 10 CFR 71.5.~~

10 CFR 20.1902, 10 CFR 20.1904, "Labeling containers," 10 CFR 20.1905, "Exemptions to labeling requirements," 10 CFR 20.1906, 10 CFR 20.2001, "General requirements," 10 CFR 20.2005, "Disposal of specific wastes," 10 CFR 20.2006, "Transfer for disposal and manifests," 10 CFR 20.2007, "Compliance with environmental and health protection regulations," Subpart G, "Operating controls and procedures," to 10 CFR Part 71, and 10 CFR 71.5, "Transportation of licensed material."

C.I.12.5.3.8 *Posting and Labeling*

~~D~~The applicant should describe the criteria and procedures for posting areas and marking items (e.g., tools and equipment) to indicate the presence of fixed or removable surface contamination.

~~D~~The applicant should describe how posting and labeling ~~will comply~~complies with 10 CFR ~~§§ 20.1901–20~~20.1903~~,~~ and ~~20~~10 CFR 20.1905.

C.I.12.5.3.9 *Radiation Protection Training*

~~D~~The applicant should describe the procedures that ensure the selection, qualification, training, and periodic retraining of radiation protection staff and radiation workers.

~~D~~The applicant should describe how radiation protection training ~~will comply~~complies with 10~~-~~ CFR~~-~~ Part~~s~~ 19, 10 CFR Part 20, and ~~50 (10 CFR 50.120), and will be~~10 CFR Part 50 (in particular, 10 CFR 50.120, "Training and qualification of nuclear power plant personnel"), and consistent with the guidance of ~~Regulatory Guides~~RGs 1.8, 8.13, 8.15, 8.27, and 8.29. Conversely, if the plant will not follow such guidance, the applicant should describe the specific alternative approaches to be used.

C.I.12.5.3.10 *Quality Assurance*

~~D~~The applicant should describe the ~~quality assurance~~QA procedures that implement the applicable requirements of 10 CFR~~-~~ 20.1101, Appendix B to 10~~-~~ CFR~~-~~ Part 50, Subpart H, "Quality Assurance," of 10~~-~~ CFR~~-~~ Part 71, and the guidance in ~~Regulatory Guide~~RG 1.33. Reference Chapter 17 of the ~~SAR~~FSAR as appropriate.

~~C.I.12.5 *References*~~

~~1. Regulatory Guide 1.3, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss-of-Coolant Accident for Boiling-Water Reactors," available in ADAMS under Accession #ML003739601.[3]~~

~~2. Regulatory Guide 1.4, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss-of-Coolant Accident for Pressurized-Water Reactors," available in ADAMS under Accession #ML003739614.~~
~~3. Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant Accident," available in ADAMS under Accession #ML003739927.~~
~~4. Regulatory Guide 1.8, "Qualification and Training of Personnel for Nuclear Power Plants."~~
~~5. Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," available in ADAMS under Accession #ML003739960.~~
~~6. Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)."~~
~~7. Regulatory Guide 1.52, "Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants."~~
~~8. Regulatory Guide 1.69, "Concrete Radiation Shields for Nuclear Power Plants," available in ADAMS under Accession #ML003740235.~~
~~9. Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants To Assess Plant and Environs Conditions During and Following an Accident," available in ADAMS under Accession #ML003740282.~~
~~10. Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design-Basis Accidents at Nuclear Power Reactors."~~
~~11. Regulatory Guide 8.2, "Guide for Administrative Practices in Radiation Monitoring."~~
~~12. Regulatory Guide 8.4, "Direct-Reading and Indirect-Reading Pocket Dosimeters."~~
~~13. Regulatory Guide 8.6, "Standard Test Procedure for Geiger-Mueller Counters."~~
~~14. Regulatory Guide 8.7, "Instructions for Recording and Reporting Occupational Radiation Exposure Data."~~
~~15. Regulatory Guide 8.8, "Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Power Stations Will Be as Low as Is Reasonably Achievable."~~
~~16. Regulatory Guide 8.9, "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program."~~
~~17. Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as Is Reasonably Achievable."~~
~~18. Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure."~~
~~19. Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection."~~
~~20. Regulatory Guide 8.19, "Occupational Radiation Dose Assessment in Light-Water Reactor Power Plants — Design Stage Man-Rem Estimates."~~
~~21. Regulatory Guide 8.20, "Applications of Bioassay for I-125 and I-131," available in ADAMS under Accession #ML003739555]~~
~~22. Regulatory Guide 8.25, "Air Sampling in the Workplace."~~
~~23. Regulatory Guide 8.26, "Applications of Bioassay for Fission and Activation Products," available in ADAMS under Accession #ML003739617]~~
~~24. Regulatory Guide 8.27, "Radiation Protection Training for Personnel at Light-Water-Cooled Nuclear Power Plants," available in ADAMS under Accession #ML003739628]~~
~~25. Regulatory Guide 8.28, "Audible-Alarm Dosimeters."~~
~~26. Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure."~~
~~27. Regulatory Guide 8.32, "Criteria for Establishing a Tritium Bioassay Program," available in ADAMS under Accession #ML003739479]~~

28. ~~Regulatory Guide 8.34, "Monitoring Criteria and Methods To Calculate Occupational Radiation Doses."~~
29. ~~Regulatory Guide 8.35, "Planned Special Exposures."~~
30. ~~Regulatory Guide 8.36, "Radiation Doses to the Embryo/Fetus."~~
31. ~~Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas in Nuclear Power Plants."~~
32. ~~10 CFR Part 19, "Notices, Instructions, and Reports to Workers: Inspection and Investigations," available electronically through the NRC's public Web site, at http://www.nrc.gov/reading-rm/doc-collections/cfr/part019/.~~
33. ~~10 CFR Part 20, "Standards for Protection Against Radiation," available electronically through the NRC's public Web site, at http://www.nrc.gov/reading-rm/doc-collections/cfr/part020/.~~
34. ~~10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," available electronically through the NRC's public Web site, at http://www.nrc.gov/reading-rm/doc-collections/cfr/part030/.~~
35. ~~10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," available electronically through the NRC's public Web site, at http://www.nrc.gov/reading-rm/doc-collections/cfr/part050/.~~
36. ~~10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," available electronically through the NRC's public Web site, at http://www.nrc.gov/reading-rm/doc-collections/cfr/part070/.~~
37. ~~10 CFR Part 71, "Packaging and Transportation of Radioactive Material," available electronically through the NRC's public Web site, at http://www.nrc.gov/reading-rm/doc-collections/cfr/part071/.~~
38. ~~40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations," issued by the U.S. Environmental Protection Agency, available electronically through the GPOAccess Web site maintained by the U.S. Government Printing Office, at http://www.gpoaccess.gov/cfr/index.html.~~
39. ~~General Design Criterion 19, "Control Room," as specified in Appendix A to 10 CFR Part 50," available electronically through the NRC's public Web site, at http://www.nrc.gov/reading-rm/doc-collections/cfr/part050/part050-appa.html/.~~
40. ~~NUREG/CR-0041, "Manual of Respiratory Protection Against Airborne Radioactive Materials," January 2001, available in ADAMS under Accession #ML010310331.~~
41. ~~NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980.[4]~~
42. ~~NUREG-1736, "Consolidated Guidance: 10 CFR Part 20 — Standards for Protection Against Radiation," October 2001.~~
43. ~~ANSI/ANS 18.1-1999, "Radioactive Source Term for Normal Operation for Light-Water Reactors."[5]~~
44. ~~ANSI N13.1-1999, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities."~~
45. ~~ANSI/ANS-HPSSC-6.8.1-1981, "Location and Design Criteria for Area Radiation Monitoring Systems for Light-Water Nuclear Reactors."[6]~~