Exelon Generation®

Byron Generating Station

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United States Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Byron Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: 2017 Annual Radioactive Effluent Release Report

Enclosed is the Annual Radioactive Effluent Release Report for Byron Station. This report is being submitted in accordance with 10 CFR 50.36 a(2), "Technical specifications on effluents from nuclear power reactors," and includes a summary of radiological liquid and gaseous effluents and solid waste released from the site from January 2017 through December 2017. We are enclosing Revision 13 of the Byron Station Offsite Dose Calculation Manual (ODCM), the ODCM Change Determination, ODCM Change Log and Engineering Calc BYR16-012 in accordance with ODCM Section 5.4.1.

If you have any questions regarding this information, please contact Douglas Spitzer, Regulatory Assurance Manager, at (815) 406-2800.

Respectfully,

Mark E. Kanavos
Site Vice President
Byron Nuclear Generating Station

MEK/JG/LZ/rm

Enclosures

cc: K. Steven West, Regional Administrator – NRC Region III

BYRON NUCLEAR POWER STATION

ANNUAL RADIOLOGICAL EFFLUENT RELEASE REPORT (ARERR)

2017

BYRON NUCLEAR POWER STATION
UNIT 1/2 DOCKET NUMBER STN-50-454/455
RADIOACTIVE EFFLUENT RELEASE REPORT
January 2017 - December 2017
Supplemental Information

1. Regulatory Limits

   a. Fission and activation products:

Tech Spec Whole Body	=	500 mrem/year
Skin	=	3000 mrem/year
10CFR50 Gamma	=	5 mrad/quarter; 10 mrad/year
Beta	=	10 mrad/quarter; 20 mrad/year

   b. Iodine: (summed with particulate, see below)

   c. Particulates with half-lives > 8 days:

Tech Spec Organ	=	1500 mrem/year
10CFR50 Organ	=	7.5 mrem/quarter; 15 mrem/year

   d. Liquid Effluents:

10CFR50 Whole Body	=	1.5 mrem/quarter; 3 mrem/year
Organ	=	5 mrem/quarter; 10 mrem/year

2. Maximum Permissible Concentration

   a. Fission and Activation Products: 10CFR20 Appendix B Table 2
   b. Iodine: 10CFR20 Appendix B Table 2
   c. Particulates: 10CFR20 Appendix B Table 2
   d. Liquid Effluents: 10 X 10CFR20 Appendix B Table 2

3. Average Energy: This item is not applicable. The ODCM limits the dose equivalent rates due to the release of noble gases to less than or equal to 500 mrem/year to the total body and less than or equal to 3000 mrem/year to the skin.

4. Measurements and Approximations of Total Radioactivity

   a. Fission and activation products: Prior to release, the isotopic content is determined. Released activity is calculated using volume of release, which is determined by the change in tank level, containment pressure, or containment purge fan flow rates.

   b. Particulate and iodine sampling media for the plant vent stacks are continuously collected and analyzed weekly. Tritium and noble gas analysis for the plant vent stacks are obtained and analyzed weekly.

   c. Liquid effluents: Isotopic analysis is performed on each batch liquid release tank prior to its release. Total release activity is calculated using volume of release. Total tritium activity

released is calculated from the highest of a monthly circulating water blowdown composite activity or a sum of the effluent input composite activities.

d. All positive results (i.e. higher than the lower limit of detection (LLD)) are reported in units of uCi/cc or uCi/ml unless otherwise noted. All LLD values and the associated LLD requirements are listed in Attachment A.

5. Batch Releases:

a. Liquid:

1. Number of batch releases = 99
2. Total time period for batch releases = 12,000 minutes
3. Maximum time period for a batch release = 287 minutes
4. Average time period for a batch release = 121 minutes
5. Minimum time period for a batch release = 25 minutes
6. Average Rock River stream flow during periods of release of effluent into a flowing stream = 277 m^3/sec, based on information from the U.S. Geological Survey Byron Gauging Station.

b. Gaseous:

1. Number of batch releases = 404
2. Total time period for batch releases = 78,905 minutes
3. Maximum time period for a batch release = 5,718 minutes
4. Average time period for batch releases = 195 minutes
5. Minimum time period for a batch release = 11 minutes

6. Abnormal Releases:

a. Liquid - None

b. Gaseous – None

7. There was one revision to the Off Site Dose Calculation Manual (ODCM), which was implemented in February 2017 under Revision 13. The revision included partial abandonment of U2 containment charcoal filtration, the bypass of U1 Steam Jet Air Ejector offgas filtration, and several administrative changes.

Partial abandonment of U2 Containment charcoal filtration was made under EC 405541. The U2 containment charcoal filtration unit is used to reduce the concentration of fission product activity inside containment prior to personnel access at power or in advance of a refuel outage. The containment mini-flow and post-LOCA purge systems remain available for use. Use of containment charcoal filtration is not credited in the ODCM or TRM as a means to reduce radiological effluents from containment releases, therefore the only required change to the ODCM is to Figure 2-1 to reflect removal of the charcoal filtration unit in the diagram.

The ability to route U1 SJAE offgas through a filter unit on a high radiation alarm was removed under EC 402667. Since the UFSAR and TRM credited a 10x removal of I-131 and I-133, Engineering Calc BYR16-012 was performed in order to demonstrate compliance with offsite dose limits without the benefit of filtration. The new dose calculations were performed and evaluated in accordance with Section 5.4.1 of the ODCM, Licensee-initiated major changes to the Radwaste Treatment Systems (liquid and gaseous). AT 1665949-88 was created to include the Engineering Calc in the submittal of the 2016 Annual Radiological Effluent Release Report (ARERR) in accordance with ODCM Section 5.4.1. The Engineering Calc was performed, reviewed, and approved prior to issuing the Engineering Change. The Engineering Change included revision of the applicable UFSAR and TRM sections. The

filter unit bypass increases the potential thyroid dose to a member of the public, however, the projected doses remain at a fraction of the 10CFR50 Appendix I dose limits, therefore the change is considered insignificant. The offgas filtration is not credited in the ODCM. Therefore, the only required change to the ODCM is to Figure 2-1 to reflect the U1 SJAE offgas filtration bypass.

8. Errata Data

There was no errata data to report for 2017.

9. 2017 Radiological Groundwater Protection Program (RGPP) Results Summary:

In 2017, fifteen (15) Radiological Groundwater Protection Program (RGPP) monitoring wells were sampled in total. Groundwater samples were obtained in March, June, August, and October and analyzed for tritium. In addition, a study of gamma, gross beta, and gross alpha radioisotopes was performed in accordance with Nuclear Energy Institute (NEI) 07-07, Groundwater Protection Initiative, for the samples obtained in May. None of the June samples showed concentrations of radionuclides above what is considered background levels. Three wells contained levels of tritium above the lower limit of detection (LLD) of 200 pCi/L. They were: AR-4 (443 pCi/L in March, 372 pCi/L in May, 239 pCi/L in September, 317 pCi/L in October) and AR-11 (785 pCi/L in March, 624 pCi/L in May, 603 pCi/L in September, 554 pCi/L in October) and AR-7 (298 pCi/L in March, 431 pCi/L in May, 230 pCi/L in September, <LLD in October. Wells AR-4 and AR-11 are near the Circulating Water Blowdown piping, where historical leakage through vacuum breakers was known to have occurred. Tritium in Well AR-7, located on-site just west of plant structures, has been measured in this well just above detectable limits on an intermittent basis since the well was first drilled in 2006. The tritium present in this well is at or below tritium levels that have been historically measured in rainwater as a result of precipitation recapture from permitted gaseous releases and is not believed to be the result of new leak(s). In August 2014, a break in the well piping was discovered about six feet below the surface that could have served as the entry point for tritium in the recapture water. Should the water in these aquifers migrate to off-site wells used for drinking, the off-site dose consequence from tritium present in any of these three wells would be negligible. There are no existing or new leaks evident at the site and all groundwater well sample results are well below the drinking water standard of 20,000 pCi/L tritium.

SUMMARY

Calculations based on gaseous and liquid effluents and meteorological data indicate that public dose due to radioactive material attributable to Byron Station during the period did not exceed any regulatory or Offsite Dose Calculation Manual (ODCM) limits.

The Total Effective Dose Equivalent (TEDE) due to licensed activities at Byron Station calculated for the maximum exposed individual for the period is 2.56E-01 mrem. The annual limit on TEDE is 100 mrem.

The assessment of radiation doses to the public is performed in accordance with the ODCM. The results of these analyses confirm that the station is operating in compliance with 10CFR50 Appendix I, 10CFR20 and 40CFR190.

There were no additional operational controls implemented in 2017 that affected radiological effluents.

There were no measurements which exceeded the reporting levels, including any that would not have been attributable to station effluents.

The results of the current radiological environmental monitoring program are approximately the same as those found during the pre-operational studies conducted at Byron Station.

RELEASES

Gaseous Effluents to the Atmosphere

A total of 8.90E-01 curies of fission and activation gases were released with a maximum average quarterly release rate of 3.87E-02 µCi/sec.

A total of 1.55E-06 curies of 1-131 were released during the year with a maximum average quarterly release rate of 1.99E-07 µCi/sec.

A total of 2.39E-06 curies were released as airborne particulate matter with a maximum average quarterly release rate of 3.01E-07 µCi/sec.

A total of 8.39E+00 curies of other (C-14) radioisotopes were released with a maximum average quarterly release rate of 2.87E-01 µCi/sec.

A total of 3.96E+01 curies of tritium were released with a maximum average quarterly release rate of 1.44E+00 µCi/sec.

Gross alpha-emitting radionuclides were below detectable limits.

Liquids Released to Rock River

A total of 2.82E+10 liters of radioactive liquid wastes containing 1.84E-02 curies of fission and activation products were discharged with a maximum quarterly average concentration of 1.20E-09 µCi/ml.

A total of 1.98E+03 curies of tritium were discharged with a maximum quarterly average concentration of 1.44E-04 uCi/ml.

A total of 6.58E-04 curies of dissolved and entrained gases were discharged with a maximum quarterly average concentration of 6.82E-11 uCi/ml.

Gross alpha-emitting radionuclides were below detectable limits.

DOSE TO MAN

GASEOUS EFFLUENT PATHWAYS

Noble Gas - Gamma Dose Rates

Offsite Gamma air and whole body dose rates for the period were calculated based on measured release rates, isotopic composition of the noble gases, and average meteorological data. The maximum gamma air dose was 3.72E-05 mrad based on measured effluents and average meteorological data, and 7.54E-06 mrad based on measured effluents and concurrent meteorological data.

Noble Gas - Beta Air and Skin Dose Rates

The range of beta particles in air is relatively small (on the order of a few meters or less). Consequently, plumes of gaseous effluents may be considered "semi-infinite" for the purpose of calculating the dose from beta radiation incident on the skin. However, the actual dose to sensitive skin tissues is difficult to calculate due to the effect of the beta particle energies, thickness of inert skin, and clothing covering sensitive tissues. For purposes of this report the skin is taken to have a thickness of 7.0 mg/cm^2 and an occupancy factor of 1.0 is used. The maximum skin dose was 1.83E-05 mrem based on measured effluents and average meteorological data, and 1.47E-05 mrem based on measured effluents and concurrent meteorological data.

The maximum offsite beta air dose for the year based on measured effluents and average meteorological data was 1.93E-05 mrad, and 1.61E-05 mrad based on measured effluents and concurrent meteorological data.

Radioactive Iodine & Particulate

The human thyroid exhibits a significant capacity to concentrate ingested or inhaled iodine. I-131 released during routine operation of the station may be made available to man resulting in dose to the thyroid. C-14 is also included in this category. C-14 exhibits a capacity to concentrate in bone. C-14 is released in gaseous form and is absorbed into vegetation through photosynthesis. The principal pathways of interest for C-14 are the consumption of vegetation by humans and milk from which animals have ingested C-14 through the consumption of vegetation. With the requirement to begin reporting C-14 dose in 2011 and the addition of C-14 to plant effluents, human dose in this category is primarily driven by the release of C-14 from the plant.

The hypothetical dose to the maximum exposed individual living near the station via ingestion of milk and vegetation was calculated. The source of milk and vegetation was assumed to be at the nearest site boundary with the cows pastured and vegetation grown from May through October. The maximum organ dose from radioactive iodine and particulate (including C-14) to any organ was 6.84E-01 mrem (child/bone) based on measured effluents and average meteorological data, and 7.30E-01 mrem (child/bone) based on measured effluents and concurrent meteorological data. The maximum dose from radioactive iodine and particulate (including C-14) to the whole body was 1.39E-01 mrem (child) based on measured effluents and average meteorological data, and 1.49E-01 mrem (child) based on measured effluents and concurrent meteorological data.

Gaseous Total Dose

The maximum total dose from gaseous releases to any organ was 6.84E-01 mrem (child/bone) based on measured effluents and average meteorological data, and 7.30E-01 mrem (child/bone) based on measured effluents and concurrent meteorological data. The maximum total dose from gaseous releases to the whole body was 1.39E-01 mrem (child) based on measured effluents and average meteorological data, and 1.49E-01 mrem (child) based on measured effluents and concurrent meteorological data.

LIQUID EFFLUENT PATHWAYS

The principal pathways through the aquatic environment for potential doses to man from liquid waste are ingestion of potable water and eating aquatic foods. Liquid dose was calculated based on the ingestion of potable water and sport fish. It should be noted, however, there are currently no communities within 10 km downstream of the plant using the Rock River for drinking water. NRC-developed equations are used to calculate the doses to the whole body, bone, liver, thyroid, kidney, lung, lower GI tract, and skin. Specific parameters for use in the equations are given in the Exelon Offsite Dose Calculation Manual (ODCM).

The maximum dose from liquid releases to any organ was 1.88E-01 mrem (adult/gilli). The maximum dose from liquid releases to the whole body was 1.38E-01 mrem (adult).

GASEOUS + LIQUID TOTAL DOSE

The maximum total dose to any organ via both gaseous and liquid effluents is 7.55E-01 mrem (child/bone). The maximum dose to the whole body via both gaseous and liquid effluents is 2.56E-01 mrem (child).

Dose Limits to Members of the Public

Byron Station did not exceed any of the dose limits as shown below based on concurrent or historical meteorological data.

- The limits on dose or dose commitment to a member of the public due to radioactive materials in liquid effluents from each reactor is 1.5 mrem to the whole body or 5 mrem to any organ during any calendar quarter and 3 mrem to the whole body or 10 mrem to any organ during a calendar year.

- The limits on air dose due to noble gases released in gaseous effluents to a member of the public from each reactor is 5 mrad for gamma radiation or 10 mrad for beta radiation during any calendar quarter and 10 mrad for gamma radiation or 20 mrad for beta radiation during a calendar year.

- The limits on dose to a member of the public due to radioactive iodine & particulate with half-lives greater than eight days in gaseous effluents released from each reactor is 7.5 mrem to any organ during any calendar quarter and 15 mrem to any organ during a calendar year.

- The annual 10CFR20 limit on Total Effective Dose Equivalent to individual members of the public is 100 mrem.

- The 40CFR190 limits on individual members of the public is 25 mrem to the whole body, 25 mrem to any organ (except thyroid), and 75 mrem to the thyroid.

SITE METEOROLOGY

Detailed records of the site meteorological measurements taken during each calendar quarter of the year are maintained by the meteorological vendor, retained on site, and are available upon request. The data are presented as cumulative joint frequency distributions of the wind direction for the 250' level and wind speed class by atmospheric stability class determined from the temperature difference between the 250' and 30' levels. Data recovery for all measurements on the meteorological tower was 99.9% during 2017.

SOLID RADIOACTIVE WASTE FOR BURIAL 1ST QUARTER 2017

DATE Shipment # Description	DISPOSITION OF MATERIAL (DESCRIPTION, CLASS, TYPE AND SOLIDIFYING AGENT)	MODE OF TRANSPORT/ CARRIER	DESTINATION	VOLUME (m^3) PER SHIPMENT	CURIES* PER SHIPMENT
2/15/17 RWS 17-001 DAW/Filters	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, 20' METAL BOX(1), CLASS A, NONE	Highway Landstar System EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	3.22E+01	3.49E-02
2/24/17 RWS 17-002 DAW/Filters	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, 20' METAL BOX(2), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	6.44E+01	6.13E-02
3/4/17 RWS 17-003 DAW	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, 20' METAL BOX(6), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Gallaher Rd. Kingston, TN	1.44E+01	6.14E-03
3/4/17 RWS 17-004 DAW	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, 20' METAL BOX(6), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Gallaher Rd. Kingston, TN	1.43E+01	6.05E-03
3/7/17 RWS 17-005 Sludge	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, CASK(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	1.98E+00	2.46E+00
3/11/17 RWS 17-006 DAW/Filters	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, FISSILE EXCEPTED, 20' METAL BOX(2), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	6.80E+01	4.17E-01
3/27/17 RWS 17-007 DAW/Filters	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, RQ - Asbestos, 20' METAL BOX(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	3.30E+01	2.64E-01
3/30/17 RWS 17-008 DAW/Bio Mat	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, 20' METAL BOX(2), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	6.62E+01	8.56E-02
3/31/17 RWS 17-009 DAW	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, 20' METAL BOX(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	3.16E+01	1.48E-01
Quarterly Totals		Number of Shipments:	9	3.26E+02	3.48E+00
*Calculated using measured ratios				CUBIC M	CURIES

SOLID RADIOACTIVE WASTE FOR BURIAL 2ND QUARTER 2017

DATE Shipment # Description	DISPOSITION OF MATERIAL (DESCRIPTION, CLASS, TYPE AND SOLIDIFYING AGENT)	MODE OF TRANSPORT/ CARRIER	DESTINATION	VOLUME (m^3) PER SHIPMENT	CURIES* PER SHIPMENT
4/4/17 RWS 17-010 DAW	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, 20' METAL BOX(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	3.06E+01	2.73E-02
4/25/17 RWS 17-011 Bead Resin	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, FISSILE EXCEPTED, CASK(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Energy Solutions Clive, UT	4.81E+00	5.18E+00
5/10/17 RWS 17-013 DAW (Oil)	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, 20' METAL BOX(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Bear CreeK Oak Ridge, TN	7.65E+00	7.54E+00
5/11/17 RWS 17-012 Bead Resin	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, FISSILE EXCEPTED, CASK(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Energy Solutions Clive, UT	4.39E+00	2.87E+00
Quarterly Totals		Number of Shipments:	4	4.75E+01	1.56E+01
* Calculated using measured ratios				CUBIC M	CURIES

SOLID RADIOACTIVE WASTE FOR BURIAL 3RD QUARTER 2017

DATE Shipment # Description	DISPOSITION OF MATERIAL (DESCRIPTION, CLASS, TYPE AND SOLIDIFYING AGENT)	MODE OF TRANSPORT/ CARRIER	DESTINATION	VOLUME (m^3) PER SHIPMENT	CURIES* PER SHIPMENT
8/24/17 RWS 17-014 Bead Resin	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, FISSILE EXCEPTED, 20' METAL BOX(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Energy Solutions Clive, UT	4.39E+00	3.71E+00
8/30/17 RWS 17-016 DAW/Oil/Sludge	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, 20' METAL BOX(1), CLASS A, NONE	Highway Landstar Systems EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	2.15E+01	3.45E-03
8/30/17 RWS 17-017 DAW/Oil/Sludge	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, 20' METAL BOX(1), CLASS A, NONE	Highway Specialty Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	2.15E+01	3.40E-03
8/31/17 RWS 17-018 DAW/Filters	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, 20' METAL BOX(2), CLASS A, NONE	Highway Visionary Solutions EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	6.44E+01	9.80E-02
9/14/17 RWS 17-015 Bead Resin	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, FISSILE EXCEPTED, CASK(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Energy Solutions Clive, UT	4.81E+00	1.89E+00
9/26/17 RWS 17-019 DAW/Sludge	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, FISSILE EXCEPTED, 20' METAL BOX(7), CLASS A, NONE	Highway Landstar Systems EXCLUSIVE-USE	Gallaher Road Kingston, TN	1.69E+01	2.41E-02
9/26/17 RWS 17-020 DAW/Sludge	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, FISSILE EXCEPTED, 20' METAL BOX(6), CLASS A, NONE	Highway Visionary Solutions EXCLUSIVE-USE	Gallaher Road Kingston, TN	1.51E+01	2.49E-02
9/27/17 RWS 17-021 DAW/Sludge	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, FISSILE EXCEPTED, 20' METAL BOX(5), CLASS A, NONE	Highway Visionary Solutions EXCLUSIVE-USE	Gallaher Road Kingston, TN	8.47E+00	1.73E-02
9/27/17 RWS 17-022 DAW/Sludge	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, FISSILE EXCEPTED, 20' METAL BOX(5), CLASS A, NONE	Highway Visionary Solutions EXCLUSIVE-USE	Gallaher Road Kingston, TN	1.17E+01	1.80E-02
9/28/17 RWS 17-023 DAW/Sludge	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, FISSILE EXCEPTED, 20' METAL BOX(5), CLASS A, NONE	Highway HIttman Transport EXCLUSIVE-USE	Gallaher Road Kingston, TN	1.13E+01	1.80E-02
9/28/17 RWS 17-024 DAW/Trash	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, 20' METAL BOX(1), CLASS A, NONE UN2910, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, FISSILE EXCEPTED, 20' METAL BOX(4), CLASS A, NONE	Highway HIttman Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	4.00E+01	2.04E-02
Quarterly Totals		Number of Shipments:	11	2.20E+02	5.83E+00
* Calculated using measured ratios				CUBIC M	CURIES

SOLID RADIOACTIVE WASTE FOR BURIAL 4TH QUARTER 2017

DATE Shipment # Description	DISPOSITION OF MATERIAL (DESCRIPTION, CLASS, TYPE AND SOLIDIFYING AGENT)	MODE OF TRANSPORT/ CARRIER	DESTINATION	VOLUME(m^3) PER SHIPMENT	CURIES* PER SHIPMENT
10/4/17 RWS 17-025 DAW/Sludge	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, FISSILE EXCEPTED, 20' METAL BOX(5), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Gallaher Road Kingston, TN	9.46E+00	1.44E-02
10/12/17 RWS 17-026 DAW/Bead Resin	UN2910, RADIOACTIVE MATERIAL EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, FISSILE EXCEPTED, 20' METAL BOX(8), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Gallaher Road Kingston, TN	1.86E+01	1.15E-02
10/15/17 RWS 17-028 Aqueous Liquid	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, METAL TANK(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Energy Solutions Clive, UT	1.70E+01	1.86E-04
10/17/17 RWS 17-027 DAW/Filters	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, FISSILE EXCEPTED, 20' METAL BOX(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	2.95E+01	2.78E+00
10/17/17 RWS 17-029 DAW/Filters	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, FISSILE EXCEPTED, 20' METAL BOX(1), RQ – ASBESTOS, CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	3.16E+01	8.81E-01
10/17/17 RWS 17-030 DAW/Trash	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, FISSILE EXCEPTED, 20' METAL BOX(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	1.79E+01	6.36E-03
10/17/17 RWS 17-031 DAW/Trash	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, FISSILE EXCEPTED, 20' METAL BOX(2), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	6.26E+01	1.39E-01
11/2/17 RWS 17-032 Aqueous Liquid	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, METAL TANK(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Energy Solutions Clive, UT	1.70E+01	1.85E-04
11/2/17 RWS 17-033 Aqueous Liquid	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, METAL TANK(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Energy Solutions Clive, UT	1.70E+01	1.85E-04
11/3/17 RWS 17-034 Aqueous Liquid	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, METAL TANK(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Energy Solutions Clive, UT	1.70E+01	1.85E-04
11/14/17 RWS 17-035 Aqueous Liquid	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, METAL TANK(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Energy Solutions Clive, UT	1.70E+01	1.85E-04
11/14/17 RWS 17-036 Aqueous Liquid	UN2910, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-LIMITED QUANTITY OF MATERIAL, 7, METAL TANK(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Energy Solutions Clive, UT	1.55E+01	1.68E-04
11/29/17 RWS 17-037 Bead Resin	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, FISSILE EXCEPTED, CASK(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Energy Solutions Clive, UT	4.53E+00	3.43E+00

12/13/17 RWS 17-038 Filters	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, FISSILE EXCEPTED, CASK(1), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Energy Solutions Clive, UT	1.57E+00	1.21E+00
12/15/17 RWS 17-039 DAW/Trash	UN3321, RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II), 7, FISSILE EXCEPTED, METAL BOX(2), CLASS A, NONE	Highway Hittman Transport EXCLUSIVE-USE	Bear Creek Oak Ridge, TN	6.62E+01	2.08E-02
Quarterly Totals		Number of Shipments:	15	3.42E+02	8.49E+00

SOLID RADIOACTIVE WASTE FOR BURIAL
Estimated Solid Waste Composition
2017

Resins, Filters, Evap Bottoms			
2017			
Volume (m3) 1.55E+02			
Class A			
Nuclide	% Abund	Curies	uCi/ml
H-3	34.79	7.74E+00	4.99E-02
Be-7	0.00	5.32E-04	3.43E-06
C-14	1.90	4.23E-01	2.73E-03
Cr-51	2.84	6.32E-01	4.08E-03
Mn-54	0.91	2.03E-01	1.31E-03
Fe-55	7.71	1.72E+00	1.11E-02
Fe-59	0.13	2.91E-02	1.88E-04
Co-57	0.24	5.39E-02	3.48E-04
Co-58	15.91	3.54E+00	2.28E-02
Co-60	15.95	3.55E+00	2.29E-02
Ni-59	0.17	3.89E-02	2.51E-04
Ni-63	12.22	2.72E+00	1.75E-02
Zn-65	0.19	4.28E-02	2.76E-04
Sr-90	0.00	1.32E-05	8.52E-08
Zr-95	0.40	8.90E-02	5.74E-04
Nb-95	0.70	1.56E-01	1.01E-03
Tc-99	0.01	3.05E-03	1.97E-05
Ag-110m	0.00	8.60E-04	5.55E-06
Sn-113	0.11	2.41E-02	1.55E-04
Sb-124	0.02	4.69E-03	3.03E-05
Sb-125	4.58	1.02E+00	6.58E-03
Te-123m	0.00	4.83E-04	3.12E-06
I-129	0.00	8.63E-07	5.57E-09
I-131	0.00	1.06E-09	6.84E-12
Xe-133	0.00	1.62E-14	1.05E-16
Cs-134	0.21	4.76E-02	3.07E-04
Cs-137	0.26	5.75E-02	3.71E-04
Ce-144	0.64	1.43E-01	9.23E-04
Pu-238	0.00	4.53E-06	2.92E-08
Pu-239	0.00	1.66E-06	1.07E-08
Pu-241	0.07	1.45E-02	9.35E-05
Am-241	0.00	2.80E-04	1.81E-06
Cm-242	0.00	4.06E-05	2.62E-07
Cm-243	0.00	9.29E-07	5.99E-09
Cm-244	0.00	2.48E-04	1.60E-06

Other Waste			
2017			
Volume (m3) 1.51E+02			
Class A			
Nuclide	% Abund	Curies	uCi/ml
H-3	99.83	7.53E+00	4.99E-02
Mn-54	0.00	2.16E-04	1.43E-06
Fe-55	0.04	3.04E-03	2.01E-05
Co-57	0.00	2.29E-05	1.52E-07
Co-58	0.05	3.55E-03	2.35E-05
Co-60	0.04	3.20E-03	2.12E-05
Ni-59	0.00	4.20E-05	2.78E-07
Ni-63	0.03	1.93E-03	1.28E-05
Zr-95	0.00	1.82E-04	1.21E-06
Nb-95	0.00	3.14E-04	2.08E-06
Sn-113	0.00	2.04E-05	1.35E-07
Sb-125	0.00	2.79E-04	1.85E-06
Cs-137	0.00	1.88E-05	1.25E-07
Ce-144	0.00	2.43E-05	1.61E-07

Dry Active Waste			
2017			
Volume (m3) 6.30E+02			
Class A			
Nuclide	% Abund	Curies	uCi/ml
H-3	56.01	2.04E+00	3.24E-03
Cr-51	0.18	6.44E-03	1.02E-05
Mn-54	0.64	2.34E-02	3.71E-05
Fe-55	11.89	4.33E-01	6.87E-04
Co-57	0.08	2.83E-03	4.49E-06
Co-58	9.65	3.51E-01	5.57E-04
Co-60	11.50	4.19E-01	6.65E-04
Ni-59	0.10	3.73E-03	5.92E-06
Ni-63	7.42	2.70E-01	4.29E-04
Zr-95	0.51	1.85E-02	2.94E-05
Nb-95	0.96	3.48E-02	5.52E-05
Sn-113	0.05	1.86E-03	2.95E-06
Sb-125	0.91	3.32E-02	5.27E-05
Cs-137	0.07	2.41E-03	3.83E-06
Ce-144	0.01	3.15E-04	5.00E-07
Pu-238	0.00	1.71E-05	2.71E-08
Pu-239	0.00	7.17E-06	1.14E-08
Pu-241	0.02	8.48E-04	1.35E-06
Am-241	0.00	2.35E-05	3.73E-08

Irradiated Components
2017
Volume (m3) 0.00E+00
Class N/A
No Shipments

SOLID RADIOACTIVE WASTE FOR BURIAL
Estimated Solid Waste Composition
2017

Sum of All Categories			
2017			
Volume (m3) 9.36E+02			
Class A			
Nuclide	% Abund	Curies	uCi/ml
H-3	51.79	1.73E+01	1.85E-02
Be-7	0.00	5.32E-04	5.68E-07
C-14	1.27	4.23E-01	4.52E-04
Cr-51	1.91	6.38E-01	6.82E-04
Mn-54	0.68	2.27E-01	2.43E-04
Fe-55	6.44	2.15E+00	2.30E-03
Fe-59	0.09	2.91E-02	3.11E-05
Co-57	0.17	5.67E-02	6.06E-05
Co-58	11.65	3.89E+00	4.16E-03
Co-60	11.88	3.97E+00	4.24E-03
Ni-59	0.13	4.27E-02	4.56E-05
Ni-63	8.94	2.99E+00	3.19E-03
Zn-65	0.13	4.28E-02	4.57E-05
Sr-90	0.00	1.32E-05	1.41E-08
Zr-95	0.32	1.08E-01	1.15E-04
Nb-95	0.57	1.91E-01	2.04E-04
Tc-99	0.01	3.05E-03	3.26E-06
Ag-110m	0.00	8.60E-04	9.19E-07
Sn-113	0.08	2.60E-02	2.78E-05
Sb-124	0.01	4.69E-03	5.01E-06
Sb-125	3.14	1.05E+00	1.12E-03
Te-123m	0.00	4.83E-04	5.16E-07
I-129	0.00	8.63E-07	9.22E-10
I-131	0.00	1.06E-09	1.13E-12
Xe-133	0.00	1.62E-14	1.73E-17
Cs-134	0.14	4.76E-02	5.09E-05
Cs-137	0.18	5.99E-02	6.40E-05
Ce-144	0.43	1.43E-01	1.53E-04
Pu-238	0.00	2.16E-05	2.31E-08
Pu-239	0.00	8.84E-06	9.44E-09
Pu-241	0.05	1.53E-02	1.63E-05
Am-241	0.00	3.03E-04	3.24E-07
Cm-242	0.00	4.06E-05	4.34E-08
Cm-243	0.00	9.29E-07	9.93E-10
Cm-244	0.00	2.48E-04	2.65E-07

Total Combined			
2017			
Volume (m3) 9.36E+02			
Class A			
Nuclide	% Abund	Curies	uCi/ml
H-3	51.79	1.73E+01	1.85E-02
Be-7	0.00	5.32E-04	5.68E-07
C-14	1.27	4.23E-01	4.52E-04
Cr-51	1.91	6.38E-01	6.82E-04
Mn-54	0.68	2.27E-01	2.43E-04
Fe-55	6.44	2.15E+00	2.30E-03
Fe-59	0.09	2.91E-02	3.11E-05
Co-57	0.17	5.67E-02	6.06E-05
Co-58	11.65	3.89E+00	4.16E-03
Co-60	11.88	3.97E+00	4.24E-03
Ni-59	0.13	4.27E-02	4.56E-05
Ni-63	8.94	2.99E+00	3.19E-03
Zn-65	0.13	4.28E-02	4.57E-05
Sr-90	0.00	1.32E-05	1.41E-08
Zr-95	0.32	1.08E-01	1.15E-04
Nb-95	0.57	1.91E-01	2.04E-04
Tc-99	0.01	3.05E-03	3.26E-06
Ag-110m	0.00	8.60E-04	9.19E-07
Sn-113	0.08	2.60E-02	2.78E-05
Sb-124	0.01	4.69E-03	5.01E-06
Sb-125	3.14	1.05E+00	1.12E-03
Te-123m	0.00	4.83E-04	5.16E-07
I-129	0.00	8.63E-07	9.22E-10
I-131	0.00	1.06E-09	1.13E-12
Xe-133	0.00	1.62E-14	1.73E-17
Cs-134	0.14	4.76E-02	5.09E-05
Cs-137	0.18	5.99E-02	6.40E-05
Ce-144	0.43	1.43E-01	1.53E-04
Pu-238	0.00	2.16E-05	2.31E-08
Pu-239	0.00	8.84E-06	9.44E-09
Pu-241	0.05	1.53E-02	1.63E-05
Am-241	0.00	3.03E-04	3.24E-07
Cm-242	0.00	4.06E-05	4.34E-08
Cm-243	0.00	9.29E-07	9.93E-10
Cm-244	0.00	2.48E-04	2.65E-07

Process Control Program (PCP) for Radioactive Wastes

In 2017, there was an administrative change to RW-AA-100, Process Control Program (PCP) for Radioactive Waste. The revision removed references to Ft. Calhoun and added references to Fitzpatrick.

There was a change made to the gaseous effluent system in 2017 under Engineering Change (EC) 402668 and Engineering Calc BYR16-012. The change removed the ability to filter radioiodines from the U2 Steam Jet Air Ejector (SJAE) offgas on a high radiation alarm. See Miscellaneous Information Section I for more details.

Error Analysis

The following is an estimate of the errors associated with effluent monitoring and analysis. The estimate is calculated using the square root of the sum of the squares methodology.

1. Gaseous Effluents

   Qme=3.33%
   RM=N/A
   ECe=5%
   Stdcse/Smplcse=5%
   qme=N/A
   Total error = 7.8%

2. Liquid Effluents

   Qme=3.33%
   RM=N/A
   ECe=N/A
   Stdcse/Smplcse=5%
   qme=2.22%

   Total error = 6.4%

3. Waste Resin

   Qme=10.0%
   RM=N/A
   ECe=5%
   Stdcse/Smplcse=5%
   qme=1.0%
   Total error = 12.3%

4. DAW, Mechanical Filters, and Contaminated Metal

   Qme=10.0%
   RM=N/A
   ECe=N/A
   Stdcse/Smplcse=5%
   qme=N/A

   Instrument calibration error = 10%
   Total error = 11.2%

Qme = the process quantity measurement error associated with the release point (e.g. flow, level measurements)

RM = error associated with the radiation monitor used in quantifying releases through the release point

ECe = error associated with the collection efficiency of the sample media

Stdcse = one-sigma counting error associated with the counting instrument of interest

Smplcse = one-sigma counting error associated with a sample of a given geometry that is used for the release point of interest

qme = sample quantity measurement error associated with the sample of interest

Miscellaneous Information

A. As required by Technical Specification 5.6.2, meteorological and environmental impact information is reported in the 2017 Annual Radiological Environmental Operating Report (AREOR) or is retained on file to be provided upon request.

B. No limits were exceeded during the 2017 reporting period in liquid hold up tanks or waste gas decay tanks as stated in Technical Specification 5.5.12.

C. There were no irradiated fuel shipments during the 2017 reporting period. An Independent Spent Fuel Storage Installation (ISFSI) campaign began in 2010 when used fuel was removed from the Spent Fuel Pool (SFP), placed into six (6) casks, each containing 32 fuel bundles, and transferred to an outdoor storage pad. No additional casks were placed on the pad in 2011. In 2012, eight (8) additional casks were placed on the pad for a total of fourteen (14) casks. No additional casks were placed on the pad in 2013 or 2014. In 2015, six (6) additional casks were placed on the pad for a total of twenty (20) casks. In 2016, six (6) additional casks were placed on the pad for a total of twenty (26) casks. No additional casks were placed on the pad in 2017. Prior to the first ISFSI campaign, additional dosimeters were placed at the site boundary nearest to the storage pad (in between the pad and the nearest resident) for the purpose of measuring any potential offsite dose to the public from the storage pad. Since the dosimeters were placed, data from the dosimeters, when compared to the existing environmental dosimeters in the surrounding area, have shown no statistical difference. As a result, there is currently no offsite dose contribution from the ISFSI facility or any other on-site storage facility, including the Dry Active Waste (DAW) Building and the Old Steam Generator (OSG) Storage Building, as evidenced by dosimetry data that is indistinguishable from the existing environmental dosimeters.

D. There were no REMP sample results that exceeded any technical specification or TRM limits during the 2017 reporting period. There was one REMP sample result that exceeded an analytical result investigation level. REMP composite surface water sample composite from point BY-12, Rock River downstream of the plant liquid effluent discharge, detected tritium results of 6110 pCi/L in the first quarter. This sample result can be attributed to one or more weekly samples being obtained during or shortly after permitted liquid discharges, and is not unexpected due to the large number of liquid releases required during outage time frames. The third quarter BY-12 surface water composite sample detected tritium results of 293 pCi/L and were also a result samples obtained during or shortly after permitted liquid discharges. These results are well below the Technical Requirements Manual (TRM) reportable limit of 30,000 pCi/L. There are no communities using the Rock River for drinking water within 10 km downstream of the station. In May, the semi-annual sediment sample from point BY-12, Rock River downstream of the plant liquid effluent discharge, measured a Cs-137 result of 202 pCi/L against a lower detection limit of 180 pCi/L. There was no Cs-137 present in any of the liquid release tanks discharged in 2017. Cs-137 can be present in local sediment/soil samples as a result of fallout from weapons testing and/or the Chernobyl and Fukushima nuclear accidents and this measured Cs-137 is not attributed to Byron plant effluents. No radionuclides that were a result of plant effluents were detected in any of the other REMP samples.

E. There were no elevated releases during the 2017 reporting period. All planned gaseous releases were discharged by way of the plant vent stacks and are considered to be mixed mode releases.

F. There were no gaseous or liquid effluent monitors that exceeded their respective inoperability time limits in 2017 as stated in TRM TLCO 3.11.b.

G. There were no unplanned gaseous or liquid releases to unrestricted areas during the 2017 reporting period.

H. All Rock River flow measurements during liquid effluent discharges were obtained from the U.S. Geological Survey Byron Gauging Station for the Rock River with the following exceptions. Due to icing conditions near the Byron, Rockton, and Dixon gauging stations on 1/10/17 and 1/12/17, flow was obtained from the Como flow gauge, located approximately 47 miles downstream of the Byron flow gauge. Due to icing conditions near the Byron gauging station on 1/19/17 and 1/21/17, flow was obtained from the Rockton flow gauge, located approximately 30 miles upstream of the Byron flow gauge.

I. In 2017, the ability to route U2 Steam Jet Air Ejector (SJAE) offgas through a filter unit on a high radiation alarm was removed under Engineering Change (EC) 402668. Since the UFSAR and TRM credited a 10x removal of I-131 and I-133, Engineering Calculation BYR16-012 was performed in order to demonstrate compliance with offsite dose limits without the benefit of filtration. The new dose calculations were performed and evaluated in accordance with Section 5.4.1 of the ODCM, Licensee-initiated major changes to the Radwaste Treatment Systems (liquid and gaseous). The Engineering Calculation was performed, reviewed, and approved prior to issuing the Engineering Change. The Engineering Change included revision of the applicable UFSAR and TRM sections. The filter unit bypass increases the potential thyroid dose to a member of the public, however, the projected doses remain at a fraction of the 10CFR50 Appendix I dose limits. Since the offgas filtration is not credited in the ODCM, calculation of actual offsite dose is unaffected. Figure 2-1 of the ODCM was updated to reflect the U2 SJAE offgas filtration bypass. A copy of Engineering Calculation BYR16-012 was included in the submittal of this report to the NRC in accordance with ODCM Section 5.4.1. An identical Engineering change was performed on Unit 1 in 2016 under EC 402668 using the same Engineering Calculation.

J. The Instrument Maintenance Department (IMD) did not complete 0BISR 11.a.4-003, a TRM-required functional surveillance on the Turbine Building Fire & Oil Sump rad monitor 0PR05J by the required critical date of 5/1/17. A different Tech Spec required PM for a full loop calibration was completed on 4/28/17 and should have been immediately followed by the functional surveillance. However, the supervisor assumed that the full loop calibration was the only work that needed to be performed on the monitor. Upon discovery, the functional surveillance was completed on 5/2/17. The cause of the issue was a failure to self-check the work orders on the schedule against the actual work in the field by the supervisor directing the full calibration. The late completion of the functional surveillance did not compromise the ability of the rad monitor to perform its intended function. The issue (IR 4005441) was discussed with all IMD Supervisors to ensure understanding of the importance of checking the work on the schedule against the actual status of the field work.

K. In June 2017, gamma counting equipment caves were replaced with a different and smaller design that requires the detector caves to close from the side rather than from the top. For a period of approximately six weeks after the caves were replaced, technicians were, in some cases, tilting the sample bomb for Gas Decay Tank (GDT) samples on the detector to allow the caves to fully close. At the time, this change in counting geometry was not adequately communicated and it was not fully understood that changing the orientation of the sample bomb on the detector could affect the sample results. During the six-week period, two (2) GDT releases and six (6) weekly gas storage tank total curie content (0BRSR 5.5.12-2) surveillances were performed during which some or all of the sample results may have been misrepresented due to the uncalibrated geometry. Upon discovery, a study was performed that determined sample results were underreported, on average, by approximately 75% as a result from the improper orientation of the sample bomb on the detector. Corrective actions under IR 4041165 included a department briefing describing the event, changing the GDT sample apparatus from a sample bomb to a Marinelli container that allows the new detector caves to fully close, and a modification to the six (6) surveillances and two (2) GDT release reports to account for a 75% increase in activity from the original sample results. The overall increase in gaseous effluent activity and associated offsite dose calculations was negligible, and none of the corrected surveillances or release reports resulted in exceedance of any effluent release or offsite dose limits.

L. Attached are offsite dose calculation reports for January through December of 2017.

The following are the maximum annual calculated cumulative offsite doses resulting from Byron airborne releases in 2017 based on concurrent meteorological data:

Unit 1:

Dose	*Maximum Value*		*Sector Affected*
gamma air (1)	4.36×10^{-6}	mrad	North-Northwest
beta air (2)	6.02×10^{-6}	mrad	North-Northwest
whole body (3)	7.33×10^{-2}	mrem	North-Northwest
skin (4)	6.35×10^{-6}	mrem	North-Northwest
organ (5) (child-bone)	3.63×10^{-1}	mrem	North-Northwest

Unit 1 Compliance Status

10 CFR 50 Appendix I	**Yearly Objective**		**% of Appendix I**
gamma air	10.0	mrad	0.00
beta air	20.0	mrad	0.00
whole body	5.0	mrem	1.47
skin	15.0	mrem	0.00
organ	15.0	mrem	2.42

Unit 2:

Dose	*Maximum Value*		*Sector Affected*
gamma air (1)	3.18×10^{-6}	mrad	North-Northwest
beta air (2)	1.01×10^{-5}	mrad	North-Northwest
whole body (3)	7.55×10^{-2}	mrem	North-Northwest
skin (4)	8.37×10^{-6}	mrem	North-Northwest
organ (5) (child-bone)	3.67×10^{-1}	mrem	North-Northwest

Unit 2 Compliance Status

10 CFR 50 Appendix I	**Yearly Objective**		**% of Appendix I**
gamma air	10.0	mrad	0.00
beta air	20.0	mrad	0.00
whole body	5.0	mrem	1.51
skin	15.0	mrem	0.00
organ	15.0	mrem	2.45

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(1) Gamma Air Dose - GASPAR II, NUREG-0597
(2) Beta Air Dose - GASPAR II, NUREG-0597
(3) Whole Body Dose - GASPAR II, NUREG-0597
(4) Skin Dose - GASPAR II, NUREG-0597
(5) Inhalation and Food Pathways Dose - GASPAR II, NUREG-0597

Data recovery: 99.9%

Attachment A, 2017 Radioactive Effluent Release Report
2017 Lower Limits of Detection (LLD's)

Nuclide	Gaseous LLD (uCi/cc)	Required Gaseous LLD (uCi/cc)
H3	4.56E-08	1.00E-07
Ar41	5.97E-07	
Cr51	3.37E-12	
Mn54	7.04E-13	1.00E-11
Co58	6.03E-13	1.00E-11
Fe59	1.40E-12	1.00E-11
Co60	1.27E-12	1.00E-11
Ni63	4.89E-15	
Zn65	1.50E-12	1.00E-11
Br82	7.07E-13	
Kr85m	2.16E-07	
Kr87	4.47E-07	1.00E-04
Kr88	5.97E-07	1.00E-04
Sr89	1.96E-14	1.00E-11
Sr-90	2.39E-15	1.00E-11
Mo99	2.39E-13	1.00E-11
I131	6.69E-13	1.00E-12
Xe131m	8.60E-06	
I133	8.53E-13	1.00E-10
Xe133	3.70E-07	1.00E-04
Xe133m	1.60E-06	1.00E-04
Cs134	7.34E-13	1.00E-11
I135	3.32E-12	
Xe135	1.93E-07	1.00E-04
Cs137	6.50E-13	1.00E-11
Xe138	1.02E-06	1.00E-04
Ba140	1.97E-12	
La140	7.28E-13	
Ce141	4.89E-13	1.00E-11
Ce144	1.98E-12	1.00E-11
Gross Alpha	3.16E-15	1.00E-11

Nuclide	Liquid LLD (uCi/ml)	Required Liquid LLD (uCi/cc)
H3	1.67E-06	1.00E-05
Na24	3.27E-08	
Cr51	2.73E-07	
Mn54	4.34E-08	5.00E-07
Fe55	7.74E-07	1.00E-06
Co57	2.33E-08	
Co58	5.11E-08	5.00E-07
Fe59	9.08E-08	5.00E-07
Co60	8.59E-08	5.00E-07
Ni63	4.39E-07	
Zn65	9.01E-08	5.00E-07
Sr85	3.33E-08	
Kr85m	6.54E-08	1.00E-05
Kr87	6.96E-08	1.00E-05
Kr88	8.60E-08	1.00E-05
Sr89	3.16E-08	5.00E-08
Sr90	8.05E-09	5.00E-08
Sr92	5.58E-08	
Nb95	3.94E-08	
Zr95	6.76E-08	
Mo99	2.08E-08	5.00E-07
Ag110m	3.51E-08	
Sb122	4.69E-08	
Te123m	2.67E-08	
Sb124	1.10E-07	
Sb125	1.10E-07	
Te125m	7.44E-06	
Sb126	4.01E-08	
Xe131m	9.72E-07	1.00E-05
I131	2.84E-08	1.00E-06
I132	4.83E-08	
Te132	2.61E-08	
I133	3.89E-08	
Xe133	6.21E-08	1.00E-05
Xe133m	1.96E-07	1.00E-05
Cs134	5.13E-08	5.00E-07
Xe135	2.69E-08	1.00E-05
Cs137	3.95E-08	5.00E-07
Xe138	2.21E-07	1.00E-05
Ba140	1.45E-07	
La140	5.67E-08	
Ce141	4.09E-08	5.00E-07
Ce144	1.67E-07	5.00E-06
Gross Alpha	7.46E-08	1.00E-07
Gross Beta	2.58E-07	

EFFLUENT AND WASTE DISPOSAL REPORT
SUPPLEMENTAL INFORMATION
GASEOUS EFFLUENTS - BATCH MODE
Unit 1

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Number of releases		72	59	65	69	265
Total release time	minutes	3.74E+04	4.43E+03	9.16E+03	7.23E+03	5.82E+04
Maximum release time	minutes	5.72E+03	1.97E+02	1.12E+03	8.21E+02	5.72E+03
Average release time	minutes	5.19E+02	7.50E+01	1.41E+02	1.05E+02	2.20E+02
Minimum release time	minutes	1.10E+01	5.30E+01	5.10E+01	3.90E+01	1.10E+01

Note: Waste Gas Decay Tank releases are included with Unit 1 data

EFFLUENT AND WASTE DISPOSAL REPORT
SUPPLEMENTAL INFORMATION
GASEOUS EFFLUENTS - BATCH MODE
Unit 2

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Number of releases		30	33	32	44	139
Total release time	minutes	3.02E+03	2.43E+03	1.95E+03	1.33E+04	2.07E+04
Maximum release time	minutes	1.58E+02	1.32E+02	8.50E+01	2.50E+03	2.50E+03
Average release time	minutes	1.01E+02	7.35E+01	6.10E+01	3.02E+02	1.49E+02
Minimum release time	minutes	4.40E+01	4.90E+01	4.60E+01	2.30E+01	2.30E+01

EFFLUENT AND WASTE DISPOSAL REPORT
SUPPLEMENTAL INFORMATION
LIQUID EFFLUENTS - BATCH MODE
Unit 1 & Unit 2

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Number of releases		38	16	26	19	99
Total release time	minutes	5.29E+03	1.43E+03	4.01E+03	1.28E+03	1.20E+04
Maximum release time	minutes	2.87E+02	2.02E+02	2.55E+02	1.61E+02	2.87E+02
Average release time	minutes	1.39E+02	8.93E+01	1.54E+02	6.73E+01	1.21E+02
Minimum release time	minutes	2.50E+01	4.70E+01	4.50E+01	4.60E+01	2.50E+01
Average dilution flow	gpm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Note: Liquid Releases are divided evenly between units

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 1A
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES
Unit 1

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Gases						
1. Total Release	Ci	8.64E-02	9.98E-02	1.49E-01	2.54E-02	3.61E-01
2. Avg. Release Rate	uCi/sec	1.11E-02	1.27E-02	1.87E-02	3.20E-03	1.14E-02
Iodine-131						
1. Total Release	Ci	2.83E-07	(1)	(1)	(1)	2.83E-07
2. Avg. Release Rate	uCi/sec	3.64E-08	(1)	(1)	(1)	8.98E-09
Particulates Half Life >= 8 days						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
2. Avg. Release Rate	uCi/sec	(1)	(1)	(1)	(1)	(1)
Others						
1. Total Release	Ci	7.42E-01	1.15E+00	1.12E+00	1.16E+00	4.17E+00
2. Avg. Release Rate	uCi/sec	9.55E-02	1.46E-01	1.40E-01	1.46E-01	1.32E-01
Tritium						
1. Total Release	Ci	2.82E+00	2.20E+00	2.42E+00	1.92E+00	9.37E+00
2. Avg. Release Rate	uCi/sec	3.63E-01	2.80E-01	3.05E-01	2.42E-01	2.97E-01
Gross Alpha Radioactivity						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
2. Avg. Release Rate	uCi/sec	(1)	(1)	(1)	(1)	(1)

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 1C
GASEOUS EFFLUENTS - MIXED MODE - CONTINUOUS RELEASES
Unit 1

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Gases						
XE-133	Ci	(1)	8.25E-02	1.24E-01	2.00E-02	2.27E-01
Totals for Period...	Ci	(1)	8.25E-02	1.24E-01	2.00E-02	2.27E-01
Iodines						
I-131	Ci	2.83E-07	(1)	(1)	(1)	2.83E-07
Totals for Period...	Ci	2.83E-07	(1)	(1)	(1)	2.83E-07
Particulates Half Life >= 8 days						
** No Nuclide Activities **		(1)	(1)	(1)	(1)	(1)
Others						
C-14	Ci	7.42E-01	1.15E+00	1.12E+00	1.16E+00	4.17E+00
Totals for Period...	Ci	7.42E-01	1.15E+00	1.12E+00	1.16E+00	4.17E+00
Tritium						
H-3	Ci	2.42E+00	2.16E+00	2.36E+00	1.87E+00	8.80E+00
Totals for Period...	Ci	2.42E+00	2.16E+00	2.36E+00	1.87E+00	8.80E+00
Gross Alpha Radioactivity						
** No Nuclide Activities **		(1)	(1)	(1)	(1)	(1)

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 1C
GASEOUS EFFLUENTS - MIXED MODE - BATCH RELEASES
Unit 1

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Gases						
AR-41	Ci	2.47E-03	1.31E-02	(1)	(1)	1.56E-02
KR-85M	Ci	8.77E-06	(1)	2.47E-06	(1)	1.12E-05
XE-133	Ci	1.82E-02	4.19E-03	2.47E-02	5.04E-03	5.21E-02
XE-133M	Ci	3.40E-04	6.03E-06	5.97E-05	7.80E-05	4.84E-04
XE-135	Ci	6.54E-02	1.04E-05	2.31E-04	2.70E-04	6.59E-02
Totals for Period...	Ci	8.64E-02	1.73E-02	2.50E-02	5.39E-03	1.34E-01
Iodines						
** No Nuclide Activities **		(1)	(1)	(1)	(1)	(1)
Particulates Half Life >= 8 days						
** No Nuclide Activities **		(1)	(1)	(1)	(1)	(1)
Others						
** No Nuclide Activities **		(1)	(1)	(1)	(1)	(1)
Tritium						
H-3	Ci	4.04E-01	3.99E-02	6.33E-02	5.78E-02	5.66E-01
Totals for Period...	Ci	4.04E-01	3.99E-02	6.33E-02	5.78E-02	5.66E-01
Gross Alpha Radioactivity						
** No Nuclide Activities **		(1)	(1)	(1)	(1)	(1)

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 1A
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES
Unit 2

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Gases						
1. Total Release	Ci	1.88E-02	8.84E-02	1.40E-01	2.82E-01	5.29E-01
2. Avg. Release Rate	uCi/sec	2.42E-03	1.12E-02	1.76E-02	3.55E-02	1.68E-02
Iodine-131						
1. Total Release	Ci	1.27E-06	(1)	(1)	(1)	1.27E-06
2. Avg. Release Rate	uCi/sec	1.63E-07	(1)	(1)	(1)	4.02E-08
Particulates Half Life >= 8 days						
1. Total Release	Ci	(1)	(1)	(1)	2.39E-06	2.39E-06
2. Avg. Release Rate	uCi/sec	(1)	(1)	(1)	3.01E-07	7.59E-08
Others						
1. Total Release	Ci	1.11E+00	1.11E+00	1.11E+00	8.83E-01	4.22E+00
2. Avg. Release Rate	uCi/sec	1.43E-01	1.41E-01	1.40E-01	1.11E-01	1.34E-01
Tritium						
1. Total Release	Ci	8.37E+00	7.09E+00	8.24E+00	6.52E+00	3.02E+01
2. Avg. Release Rate	uCi/sec	1.08E+00	9.02E-01	1.04E+00	8.21E-01	9.58E-01
Gross Alpha Radioactivity						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
2. Avg. Release Rate	uCi/sec	(1)	(1)	(1)	(1)	(1)

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 1C
GASEOUS EFFLUENTS - MIXED MODE - CONTINUOUS RELEASES
Unit 2

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Gases						
XE-133	Ci	(1)	8.25E-02	1.24E-01	(1)	2.07E-01
Totals for Period...	Ci	(1)	8.25E-02	1.24E-01	(1)	2.07E-01
Iodines						
I-131	Ci	1.27E-06	(1)	(1)	(1)	1.27E-06
I-132	Ci	1.12E-04	(1)	(1)	(1)	1.12E-04
Totals for Period...	Ci	1.13E-04	(1)	(1)	(1)	1.13E-04
Particulates Half Life >= 8 days						
CO-58	Ci	(1)	(1)	(1)	2.39E-06	2.39E-06
Totals for Period...	Ci	(1)	(1)	(1)	2.39E-06	2.39E-06
Others						
C-14	Ci	1.11E+00	1.11E+00	1.11E+00	8.83E-01	4.22E+00
Totals for Period...	Ci	1.11E+00	1.11E+00	1.11E+00	8.83E-01	4.22E+00
Tritium						
H-3	Ci	8.32E+00	7.05E+00	8.21E+00	6.40E+00	3.00E+01
Totals for Period...	Ci	8.32E+00	7.05E+00	8.21E+00	6.40E+00	3.00E+01
Gross Alpha Radioactivity						
** No Nuclide Activities **		(1)	(1)	(1)	(1)	(1)

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 1C
GASEOUS EFFLUENTS - MIXED MODE - BATCH RELEASES
Unit 2

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Gases						
AR-41	Ci	2.40E-03	5.00E-03	7.91E-03	4.03E-03	1.93E-02
KR-85	Ci	(1)	(1)	(1)	2.74E-01	2.74E-01
KR-85M	Ci	8.73E-06	(1)	2.46E-06	(1)	1.12E-05
XE-133M	Ci	3.39E-04	6.07E-06	5.93E-05	7.80E-05	4.82E-04
XE-133	Ci	1.38E-02	9.26E-04	7.28E-03	3.59E-03	2.56E-02
XE-135	Ci	2.27E-03	1.05E-05	2.30E-04	2.70E-04	2.78E-03
Totals for Period...	Ci	1.88E-02	5.94E-03	1.55E-02	2.82E-01	3.22E-01
Iodines						
** No Nuclide Activities **		(1)	(1)	(1)	(1)	(1)
Particulates Half Life >= 8 days						
** No Nuclide Activities **		(1)	(1)	(1)	(1)	(1)
Others						
** No Nuclide Activities **		(1)	(1)	(1)	(1)	(1)
Tritium						
H-3	Ci	4.58E-02	4.43E-02	3.65E-02	1.23E-01	2.49E-01
Totals for Period...	Ci	4.58E-02	4.43E-02	3.65E-02	1.23E-01	2.49E-01
Gross Alpha Radioactivity						
** No Nuclide Activities **		(1)	(1)	(1)	(1)	(1)

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 2A
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES
Unit 1

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
1. Total Release	Ci	3.74E-03	1.88E-03	1.52E-03	2.71E-03	9.20E-03
2. Avg. Diluted Conc.	uCi/ml	1.20E-09	5.12E-10	3.91E-10	7.82E-10	6.51E-10
Tritium						
1. Total Release	Ci	4.49E+02	9.77E+01	3.40E+02	1.01E+02	9.88E+02
2. Avg. Diluted Conc.	uCi/ml	1.44E-04	2.67E-05	8.73E-05	2.93E-05	6.99E-05
Dissolved and Entrained Gases						
1. Total Release	Ci	2.12E-04	(1)	1.04E-04	1.21E-05	3.29E-04
2. Avg. Diluted Conc.	uCi/ml	6.82E-11	(1)	2.68E-11	3.50E-12	2.32E-11
Gross Alpha Radioactivity						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
Volume of liquid waste	liters	3.11E+09	3.66E+09	3.89E+09	3.47E+09	1.41E+10

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 2A - Release Tank
LIQUID EFFLUENTS - SUMMATION BY RELEASE POINT
Unit 1

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
1. Total Release	Ci	3.74E-03	1.88E-03	1.52E-03	2.71E-03	9.20E-03
2. Avg. Diluted Conc.	uCi/ml	2.37E-06	2.84E-06	1.39E-06	3.56E-06	2.25E-06
Tritium						
1. Total Release	Ci	3.99E+02	9.02E+01	3.13E+02	9.72E+01	9.00E+02
2. Avg. Diluted Conc.	uCi/ml	2.53E-01	1.37E-01	2.86E-01	1.28E-01	2.20E-01
Dissolved and Entrained Gases						
1. Total Release	Ci	2.12E-04	(1)	1.04E-04	1.21E-05	3.29E-04
2. Avg. Diluted Conc.	uCi/ml	1.35E-07	(1)	9.52E-08	1.59E-08	8.03E-08
Gross Alpha Radioactivity						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
Volume of liquid waste	liters	1.58E+06	6.61E+05	1.09E+06	7.62E+05	4.09E+06

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 2A - Circulating Water Blowdown
LIQUID EFFLUENTS - SUMMATION BY RELEASE POINT
Unit 1

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
2. Avg. Diluted Conc.	uCi/ml	(1)	(1)	(1)	(1)	(1)
Tritium						
1. Total Release	Ci	4.93E+01	7.49E+00	2.72E+01	4.26E+00	8.82E+01
2. Avg. Diluted Conc.	uCi/ml	1.58E-05	2.05E-06	6.99E-06	1.23E-06	6.24E-06
Dissolved and Entrained Gases						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
2. Avg. Diluted Conc.	uCi/ml	(1)	(1)	(1)	(1)	(1)
Gross Alpha Radioactivity						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
Volume of liquid waste	liters	3.11E+09	3.66E+09	3.89E+09	3.47E+09	1.41E+10

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 2B
LIQUID EFFLUENTS - CONTINUOUS MODE
Unit 1

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
No Nuclide Activities	Ci	(1)	(1)	(1)	(1)	(1)
Totals for Period...	Ci	(1)	(1)	(1)	(1)	(1)
Tritium						
H-3	Ci	4.93E+01	7.49E+00	2.72E+01	4.26E+00	8.82E+01
Totals for Period...	Ci	4.93E+01	7.49E+00	2.72E+01	4.26E+00	8.82E+01
Dissolved and Entrained Gases						
No Nuclide Activities	Ci	(1)	(1)	(1)	(1)	(1)
Totals for Period...	Ci	(1)	(1)	(1)	(1)	(1)
Gross Alpha Radioactivity						
No Nuclide Activities	Ci	(1)	(1)	(1)	(1)	(1)
Totals for Period...	Ci	(1)	(1)	(1)	(1)	(1)

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 2B
LIQUID EFFLUENTS - BATCH MODE
Unit 1

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
AG-110M	Ci	1.23E-05	6.67E-06	(1)	(1)	1.89E-05
CO-57	Ci	1.81E-05	3.43E-06	1.13E-06	4.55E-06	2.72E-05
CO-58	Ci	1.19E-03	5.95E-04	2.30E-04	2.03E-03	4.06E-03
CO-60	Ci	7.08E-04	2.66E-04	7.71E-04	2.36E-04	1.98E-03
CR-51	Ci	5.11E-04	2.33E-04	(1)	2.77E-04	1.02E-03
FE-59	Ci	5.14E-06	(1)	(1)	3.08E-05	3.59E-05
MN-54	Ci	1.14E-05	1.53E-06	2.43E-05	1.11E-06	3.84E-05
MO-99	Ci	1.18E-06	(1)	(1)	(1)	1.18E-06
NB-95	Ci	1.19E-05	2.84E-06	6.40E-06	8.02E-06	2.92E-05
NI-63	Ci	1.24E-03	6.31E-04	(1)	(1)	1.87E-03
SB-124	Ci	(1)	(1)	4.58E-06	(1)	4.58E-06
SB-125	Ci	4.43E-06	(1)	9.17E-05	(1)	9.61E-05
TE-123M	Ci	1.01E-05	(1)	(1)	(1)	1.01E-05
TE-132	Ci	2.18E-06	(1)	(1)	(1)	2.18E-06
ZR-95	Ci	2.38E-06	(1)	(1)	(1)	2.38E-06
ZR-97	Ci	1.45E-06	(1)	(1)	(1)	1.45E-06
Totals for Period...	Ci	3.74E-03	1.74E-03	1.13E-03	2.59E-03	9.20E-03
Tritium						
H-3	Ci	3.99E+02	9.02E+01	3.13E+02	9.72E+01	9.00E+02
Totals for Period...	Ci	3.99E+02	9.02E+01	3.13E+02	9.72E+01	9.00E+02
Dissolved and Entrained Gases						
XE-131M	Ci	(1)	(1)	4.96E-05	(1)	4.96E-05
XE-133	Ci	1.97E-04	(1)	5.46E-05	1.03E-05	2.62E-04
XE-135	Ci	3.61E-06	(1)	(1)	1.86E-06	5.47E-06
XE-135M	Ci	1.14E-05	(1)	(1)	(1)	1.14E-05
Totals for Period...	Ci	2.12E-04	(1)	1.04E-04	1.21E-05	3.29E-04
Gross Alpha Radioactivity						
No Nuclide Activities	Ci	(1)	(1)	(1)	(1)	(1)
Totals for Period...	Ci	(1)	(1)	(1)	(1)	(1)

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 2A
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES
Unit 2

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
1. Total Release	Ci	3.74E-03	1.88E-03	1.52E-03	2.71E-03	9.20E-03
2. Avg. Diluted Conc.	uCi/ml	1.20E-09	5.12E-10	3.91E-10	7.82E-10	6.51E-10
Tritium						
1. Total Release	Ci	4.49E+02	9.77E+01	3.40E+02	1.01E+02	9.88E+02
2. Avg. Diluted Conc.	uCi/ml	1.44E-04	2.67E-05	8.73E-05	2.93E-05	6.99E-05
Dissolved and Entrained Gases						
1. Total Release	Ci	2.12E-04	(1)	1.04E-04	1.21E-05	3.29E-04
2. Avg. Diluted Conc.	uCi/ml	6.82E-11	(1)	2.68E-11	3.50E-12	2.32E-11
Gross Alpha Radioactivity						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
Volume of liquid waste	liters	3.11E+09	3.66E+09	3.89E+09	3.47E+09	1.41E+10

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 2A - Release Tank
LIQUID EFFLUENTS - SUMMATION BY RELEASE POINT
Unit 2

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
1. Total Release	Ci	3.74E-03	1.88E-03	1.52E-03	2.71E-03	9.20E-03
2. Avg. Diluted Conc.	uCi/ml	2.37E-06	2.84E-06	1.39E-06	3.56E-06	2.25E-06
Tritium						
1. Total Release	Ci	3.99E+02	9.02E+01	3.13E+02	9.72E+01	9.00E+02
2. Avg. Diluted Conc.	uCi/ml	2.53E-01	1.37E-01	2.86E-01	1.28E-01	2.20E-01
Dissolved and Entrained Gases						
1. Total Release	Ci	2.12E-04	(1)	1.04E-04	1.21E-05	3.29E-04
2. Avg. Diluted Conc.	uCi/ml	1.35E-07	(1)	9.52E-08	1.59E-08	8.03E-08
Gross Alpha Radioactivity						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
Volume of liquid waste	liters	1.58E+06	6.61E+05	1.09E+06	7.62E+05	4.09E+06

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 2A - Circulating Water Blowdown
LIQUID EFFLUENTS - SUMMATION BY RELEASE POINT
Unit 2

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
2. Avg. Diluted Conc.	uCi/ml	(1)	(1)	(1)	(1)	(1)
Tritium						
1. Total Release	Ci	4.93E+01	7.49E+00	2.72E+01	4.26E+00	8.82E+01
2. Avg. Diluted Conc.	uCi/ml	1.58E-05	2.05E-06	6.99E-06	1.23E-06	6.24E-06
Dissolved and Entrained Gases						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
2. Avg. Diluted Conc.	uCi/ml	(1)	(1)	(1)	(1)	(1)
Gross Alpha Radioactivity						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
Volume of liquid waste	liters	3.11E+09	3.66E+09	3.89E+09	3.47E+09	1.41E+10

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 2B
LIQUID EFFLUENTS - CONTINUOUS MODE
Unit 2

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
No Nuclide Activities	Ci	(1)	(1)	(1)	(1)	(1)
Totals for Period...	Ci	(1)	(1)	(1)	(1)	(1)
Tritium						
H-3	Ci	4.93E+01	7.49E+00	2.72E+01	4.26E+00	8.82E+01
Totals for Period...	Ci	4.93E+01	7.49E+00	2.72E+01	4.26E+00	8.82E+01
Dissolved and Entrained Gases						
No Nuclide Activities	Ci	(1)	(1)	(1)	(1)	(1)
Totals for Period...	Ci	(1)	(1)	(1)	(1)	(1)
Gross Alpha Radioactivity						
No Nuclide Activities	Ci	(1)	(1)	(1)	(1)	(1)
Totals for Period...	Ci	(1)	(1)	(1)	(1)	(1)

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

EFFLUENT AND WASTE DISPOSAL REPORT
TABLE 2B
LIQUID EFFLUENTS - BATCH MODE
Unit 2

REPORT FOR 2017	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
AG-110M	Ci	1.23E-05	6.67E-06	(1)	(1)	1.89E-05
CO-57	Ci	1.81E-05	3.43E-06	1.13E-06	4.55E-06	2.72E-05
CO-58	Ci	1.19E-03	5.95E-04	2.30E-04	2.03E-03	4.06E-03
CO-60	Ci	7.08E-04	2.66E-04	7.71E-04	2.36E-04	1.98E-03
CR-51	Ci	5.11E-04	2.33E-04	(1)	2.77E-04	1.02E-03
FE-59	Ci	5.14E-06	(1)	(1)	3.08E-05	3.59E-05
MN-54	Ci	1.14E-05	1.53E-06	2.43E-05	1.11E-06	3.84E-05
MO-99	Ci	1.18E-06	(1)	(1)	(1)	1.18E-06
NB-95	Ci	1.19E-05	2.84E-06	6.40E-06	8.02E-06	2.92E-05
NI-63	Ci	1.24E-03	6.31E-04	(1)	(1)	1.87E-03
SB-124	Ci	(1)	(1)	4.58E-06	(1)	4.58E-06
SB-125	Ci	4.43E-06	(1)	9.17E-05	(1)	9.61E-05
TE-123M	Ci	1.01E-05	(1)	(1)	(1)	1.01E-05
TE-132	Ci	2.18E-06	(1)	(1)	(1)	2.18E-06
ZR-95	Ci	2.38E-06	(1)	(1)	(1)	2.38E-06
ZR-97	Ci	1.45E-06	(1)	(1)	(1)	1.45E-06
Totals for Period...	Ci	3.74E-03	1.74E-03	1.13E-03	2.59E-03	9.20E-03
Tritium						
H-3	Ci	3.99E+02	9.02E+01	3.13E+02	9.72E+01	9.00E+02
Totals for Period...	Ci	3.99E+02	9.02E+01	3.13E+02	9.72E+01	9.00E+02
Dissolved and Entrained Gases						
XE-131M	Ci	(1)	(1)	4.96E-05	(1)	4.96E-05
XE-133	Ci	1.97E-04	(1)	5.46E-05	1.03E-05	2.62E-04
XE-135	Ci	3.61E-06	(1)	(1)	1.86E-06	5.47E-06
XE-135M	Ci	1.14E-05	(1)	(1)	(1)	1.14E-05
Totals for Period...	Ci	2.12E-04	(1)	1.04E-04	1.21E-05	3.29E-04
Gross Alpha Radioactivity						
No Nuclide Activities	Ci	(1)	(1)	(1)	(1)	(1)
Totals for Period...	Ci	(1)	(1)	(1)	(1)	(1)

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

LIQUID DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2
Liquid Receptor

=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem) ========== QUARTER 1 ==========

Agegrp	Bone	Liver	Thyroid	Kidney	Lung	GI-LLI	Skin	TB
ADULT	2.04E-02	3.92E-02	3.76E-02	3.76E-02	3.76E-02	5.05E-02	0.00E+00	3.86E-02
TEEN	2.11E-02	2.99E-02	2.82E-02	2.82E-02	2.82E-02	3.73E-02	0.00E+00	2.93E-02
CHILD	2.78E-02	3.31E-02	3.15E-02	3.15E-02	3.15E-02	3.47E-02	0.00E+00	3.28E-02
INFANT	1.56E-04	1.40E-02	1.40E-02	1.40E-02	1.40E-02	1.40E-02	0.00E+00	1.40E-02

=== SITE DOSE LIMIT ANALYSIS ========== QUARTER 1 ==========

Quarter - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 1 - Admin. Any Organ	ADULT	GILLI	5.05E-02	3.75E+00	1.35E+00
Qtr 1 - Admin. Total Body	ADULT	TBODY	3.86E-02	1.13E+00	3.43E+00
Qtr 1 - T.Spc. Any Organ	ADULT	GILLI	5.05E-02	5.00E+00	1.01E+00

Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	7.44E+01
CR-51	1.70E-01
MN-54	1.60E-01
FE-59	4.37E-02
CO-58	2.26E+00
CO-60	3.56E+00
NI-63	5.83E-01
ZR-95	6.67E-04
ZR-97	1.38E-03
NB-95	1.87E+01
MO-99	3.03E-04
AG-110M	4.88E-03
SB-125	2.93E-04
TE-132	1.67E-01

Qtr 1 - T.Spc. Total Body	ADULT	TBODY	3.86E-02	1.50E+00	2.58E+00

Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	9.73E+01
CR-51	8.86E-04
MN-54	1.30E-02
FE-59	6.57E-03

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Nuclide	Percentage
CO-58	3.27E-01
CO-60	5.47E-01
NI-63	1.77E+00
ZR-95	1.86E-07
ZR-97	2.67E-09
NB-95	2.16E-03
MO-99	3.25E-05
AG-110M	9.29E-06
SB-125	8.28E-06
TE-132	4.35E-03

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

LIQUID DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2
Liquid Receptor

=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem) ========== QUARTER 2 ==========

Agegrp	Bone	Liver	Thyroid	Kidney	Lung	GI-LLI	Skin	TB
ADULT	3.31E-02	2.97E-02	2.72E-02	2.72E-02	2.72E-02	3.90E-02	0.00E+00	2.87E-02
TEEN	3.44E-02	2.30E-02	2.04E-02	2.04E-02	2.04E-02	2.87E-02	0.00E+00	2.20E-02
CHILD	4.52E-02	2.53E-02	2.27E-02	2.27E-02	2.27E-02	2.57E-02	0.00E+00	2.47E-02
INFANT	2.53E-04	1.01E-02	1.01E-02	1.01E-02	1.01E-02	1.01E-02	0.00E+00	1.01E-02

=== SITE DOSE LIMIT ANALYSIS ========== QUARTER 2 ==========

Quarter - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 2 - Admin. Any Organ	CHILD	BONE	4.52E-02	3.75E+00	1.21E+00
Qtr 2 - Admin. Total Body	ADULT	TBODY	2.87E-02	1.13E+00	2.55E+00
Qtr 2 - T.Spc. Any Organ	CHILD	BONE	4.52E-02	5.00E+00	9.05E-01

Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
NI-63	1.00E+02
NB-95	5.60E-03
AG-110M	3.19E-05

Qtr 2 - T.Spc. Total Body	ADULT	TBODY	2.87E-02	1.50E+00	1.91E+00

Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	9.45E+01
CR-51	1.74E-03
MN-54	7.50E-03
CO-58	7.01E-01
CO-60	8.87E-01
NI-63	3.87E+00
NB-95	2.22E-03
AG-110M	2.17E-05

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

LIQUID DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2
Liquid Receptor

=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem) ========== QUARTER 3 ==========

Agegrp	Bone	Liver	Thyroid	Kidney	Lung	GI-LLI	Skin	TB
ADULT	2.38E-03	3.28E-02	3.25E-02	3.26E-02	3.26E-02	4.09E-02	0.00E+00	3.29E-02
TEEN	2.17E-03	2.47E-02	2.44E-02	2.44E-02	2.45E-02	3.03E-02	0.00E+00	2.48E-02
CHILD	2.45E-03	2.75E-02	2.72E-02	2.72E-02	2.73E-02	2.93E-02	0.00E+00	2.76E-02
INFANT	4.29E-05	1.21E-02	1.21E-02	1.21E-02	1.21E-02	1.21E-02	0.00E+00	1.21E-02

=== SITE DOSE LIMIT ANALYSIS ========== QUARTER 3 ==========

Quarter - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 3 - Admin. Any Organ	ADULT	GILLI	4.09E-02	3.75E+00	1.09E+00
Qtr 3 - Admin. Total Body	ADULT	TBODY	3.29E-02	1.13E+00	2.92E+00
Qtr 3 - T.Spc. Any Organ	ADULT	GILLI	4.09E-02	5.00E+00	8.18E-01

Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	7.96E+01
MN-54	4.64E-01
FE-55	1.39E-01
CO-58	5.96E-01
CO-60	5.31E+00
SR-89	6.21E-02
SR-90	1.27E-01
NB-95	1.37E+01
SB-124	1.67E-03
SB-125	8.28E-03

Qtr 3 - T.Spc. Total Body	ADULT	TBODY	3.29E-02	1.50E+00	2.19E+00

Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	9.89E+01
MN-54	3.59E-02
FE-55	7.02E-02
CO-58	8.19E-02
CO-60	7.75E-01
SR-89	1.38E-02
SR-90	1.26E-01
NB-95	1.51E-03

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Nuclide	Percentage
SB-124	2.90E-05
SB-125	2.23E-04

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LIQUID DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2
Liquid Receptor

=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem) ========== QUARTER 4 ==========

Agegrp	Bone	Liver	Thyroid	Kidney	Lung	GI-LLI	Skin	TB
ADULT	2.59E-03	3.59E-02	3.51E-02	3.51E-02	3.52E-02	7.01E-02	0.00E+00	3.63E-02
TEEN	2.38E-03	2.71E-02	2.63E-02	2.63E-02	2.65E-02	5.09E-02	0.00E+00	2.76E-02
CHILD	2.69E-03	3.00E-02	2.93E-02	2.93E-02	2.94E-02	3.80E-02	0.00E+00	3.07E-02
INFANT	4.60E-05	1.30E-02	1.30E-02	1.30E-02	1.30E-02	1.30E-02	0.00E+00	1.30E-02

=== SITE DOSE LIMIT ANALYSIS ========== QUARTER 4 ==========

Quarter - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 4 - Admin. Any Organ	ADULT	GILLI	7.01E-02	3.75E+00	1.87E+00
Qtr 4 - Admin. Total Body	ADULT	TBODY	3.63E-02	1.13E+00	3.23E+00
Qtr 4 - T.Spc. Any Organ	ADULT	GILLI	7.01E-02	5.00E+00	1.40E+00

Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	5.00E+01
CR-51	2.56E-01
MN-54	4.28E-02
FE-55	8.61E-02
FE-59	7.23E-01
CO-58	1.06E+01
CO-60	3.28E+00
SR-89	3.84E-02
SR-90	7.89E-02
NB-95	3.48E+01

Qtr 4 - T.Spc. Total Body	ADULT	TBODY	3.63E-02	1.50E+00	2.42E+00

Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	9.66E+01
CR-51	1.97E-03
MN-54	5.14E-03
FE-55	6.76E-02
FE-59	1.61E-01
CO-58	2.27E+00
CO-60	7.44E-01
SR-89	1.33E-02

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Nuclide	Percentage
SR-90	1.22E-01
NB-95	5.95E-03

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LIQUID DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2
Liquid Receptor

=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem) ========== ANNUAL 2017 =========

Agegrp	Bone	Liver	Thyroid	Kidney	Lung	GI-LLI	Skin	TB
ADULT	5.35E-02	1.39E-01	1.35E-01	1.35E-01	1.35E-01	1.88E-01	0.00E+00	1.38E-01
TEEN	5.50E-02	1.06E-01	1.01E-01	1.01E-01	1.01E-01	1.39E-01	0.00E+00	1.05E-01
CHILD	7.16E-02	1.17E-01	1.13E-01	1.13E-01	1.13E-01	1.26E-01	0.00E+00	1.17E-01
INFANT	4.55E-04	5.00E-02	5.00E-02	5.00E-02	5.00E-02	5.00E-02	0.00E+00	5.00E-02

=== SITE DOSE LIMIT ANALYSIS ============================== ANNUAL 2017 =========

Annual - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
2017 - Admin. Any Organ	ADULT	GILLI	1.88E-01	7.50E+00	2.51E+00
2017 - Admin. Total Body	ADULT	TBODY	1.38E-01	2.25E+00	6.15E+00
2017 - T.Spc. Any Organ	ADULT	GILLI	1.88E-01	1.00E+01	1.88E+00

Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	7.18E+01
CR-51	1.46E-01
MN-54	2.30E-01
FE-55	5.69E-02
FE-59	1.31E-01
CO-58	3.29E+00
CO-60	4.27E+00
NI-63	3.77E-01
SR-89	2.54E-02
SR-90	5.21E-02
ZR-95	2.86E-04
ZR-97	5.92E-04
NB-95	1.96E+01
MO-99	1.30E-04
AG-110M	3.23E-03
SB-124	5.25E-04
SB-125	2.72E-03
TE-132	7.18E-02

2017 - T.Spc. Total Body	ADULT	TBODY	1.38E-01	3.00E+00	4.61E+00

Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage

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Nuclide	Percentage
H-3	9.75E+01
CR-51	7.89E-04
MN-54	1.94E-02
FE-55	3.14E-02
FE-59	2.04E-02
CO-58	4.94E-01
CO-60	6.82E-01
NI-63	1.19E+00
SR-89	6.18E-03
SR-90	5.66E-02
ZR-95	8.30E-08
ZR-97	1.19E-09
NB-95	2.36E-03
MO-99	1.45E-05
AG-110M	6.39E-06
SB-124	9.93E-06
SB-125	8.00E-05
TE-132	1.94E-03

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GASEOUS DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2

=== I&P DOSE LIMIT ANALYSIS ========== QUARTER 1 ==========

Quarter - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 1 - Admin. Any Organ	CHILD	BONE	1.51E-01	5.63E+00	2.68E+00
Qtr 1 - Admin. Total Body	CHILD	TBODY	3.08E-02	5.25E+00	5.87E-01
Qtr 1 - T.Spc. Any Organ	CHILD	BONE	1.51E-01	7.50E+00	2.01E+00

Receptor: Composite Crit. Receptor - IP
Distance: 800 (meters) Compass Point: SSE
Critical Pathway: Vegetation
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	0.00E+00
C-14	1.00E+02
I-131	1.82E-04
I-132	1.32E-05

Qtr 1 - T.Spc. Total Body	CHILD	TBODY	3.08E-02	7.50E+00	4.11E-01

Receptor: Composite Crit. Receptor - IP
Distance: 800 (meters) Compass Point: SSE
Critical Pathway: Vegetation
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	2.05E+00
C-14	9.80E+01
I-131	5.13E-04
I-132	6.34E-05

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GASEOUS DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2

=== NG DOSE LIMIT ANALYSIS ========== QUARTER 1 ==========

Quarter - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
Qtr 1 - Admin. Gamma	1.08E-05	3.75E+00	2.89E-04
Qtr 1 - Admin. Beta	3.09E-06	7.50E+00	4.13E-05
Qtr 1 - T.Spc. Gamma	1.08E-05	5.00E+00	2.17E-04

Receptor: Composite Crit. Receptor - NG
Distance: 800 (meters) Compass Point: SSE

Nuclide	Percentage
AR-41	2.43E+01
KR-85M	1.15E-02
XE-135	6.96E+01
XE-133M	1.19E-01
XE-133	6.04E+00

Qtr 1 - T.Spc. Beta	3.09E-06	1.00E+01	3.09E-05

Receptor: Composite Crit. Receptor - NG
Distance: 800 (meters) Compass Point: SSE

Nuclide	Percentage
AR-41	7.36E+00
KR-85M	1.58E-02
XE-135	7.67E+01
XE-133M	4.63E-01
XE-133	1.55E+01

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2

=== I&P DOSE LIMIT ANALYSIS ========== QUARTER 2 ==========

Quarter - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 2 - Admin. Any Organ	CHILD	BONE	1.84E-01	5.63E+00	3.28E+00
Qtr 2 - Admin. Total Body	CHILD	TBODY	3.74E-02	5.25E+00	7.12E-01
Qtr 2 - T.Spc. Any Organ	CHILD	BONE	1.84E-01	7.50E+00	2.46E+00

Receptor: Composite Crit. Receptor - IP
Distance: 800 (meters) Compass Point: SSE
Critical Pathway: Vegetation
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	0.00E+00
C-14	1.00E+02

Qtr 2 - T.Spc. Total Body	CHILD	TBODY	3.74E-02	7.50E+00	4.98E-01

Receptor: Composite Crit. Receptor - IP
Distance: 800 (meters) Compass Point: SSE
Critical Pathway: Vegetation
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	1.40E+00
C-14	9.86E+01

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2

=== NG DOSE LIMIT ANALYSIS ========== QUARTER 2 ==========

Quarter - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
Qtr 2 - Admin. Gamma	1.32E-05	3.75E+00	3.53E-04
Qtr 2 - Admin. Beta	3.39E-06	7.50E+00	4.52E-05
Qtr 2 - T.Spc. Gamma	1.32E-05	5.00E+00	2.65E-04

Receptor: Composite Crit. Receptor - NG
Distance: 800 (meters) Compass Point: SSE

Nuclide	Percentage
AR-41	7.37E+01
XE-135	1.76E-02
XE-133M	1.74E-03
XE-133	2.63E+01

Qtr 2 - T.Spc. Beta	3.39E-06	1.00E+01	3.39E-05

Receptor: Composite Crit. Receptor - NG
Distance: 800 (meters) Compass Point: SSE

Nuclide	Percentage
AR-41	2.49E+01
XE-135	2.16E-02
XE-133M	7.55E-03
XE-133	7.51E+01

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2

=== I&P DOSE LIMIT ANALYSIS ========== QUARTER 3 ==========

Quarter - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 3 - Admin. Any Organ	CHILD	BONE	1.82E-01	5.63E+00	3.23E+00
Qtr 3 - Admin. Total Body	CHILD	TBODY	3.69E-02	5.25E+00	7.03E-01
Qtr 3 - T.Spc. Any Organ	CHILD	BONE	1.82E-01	7.50E+00	2.42E+00

Receptor: Composite Crit. Receptor - IP
Distance: 800 (meters) Compass Point: SSE
Critical Pathway: Vegetation
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	0.00E+00
C-14	1.00E+02

Qtr 3 - T.Spc. Total Body	CHILD	TBODY	3.69E-02	7.50E+00	4.92E-01

Receptor: Composite Crit. Receptor - IP
Distance: 800 (meters) Compass Point: SSE
Critical Pathway: Vegetation
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	1.63E+00
C-14	9.84E+01

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2

=== NG DOSE LIMIT ANALYSIS ========== QUARTER 3 ==========

Quarter - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
Qtr 3 - Admin. Gamma	1.01E-05	3.75E+00	2.68E-04
Qtr 3 - Admin. Beta	4.59E-06	7.50E+00	6.12E-05
Qtr 3 - T.Spc. Gamma	1.01E-05	5.00E+00	2.01E-04

Receptor: Composite Crit. Receptor - NG
Distance: 800 (meters) Compass Point: SSE

Nuclide	Percentage
AR-41	4.24E+01
KR-85M	3.49E-03
XE-135	5.10E-01
XE-133M	2.23E-02
XE-133	5.71E+01

Qtr 3 - T.Spc. Beta	4.59E-06	1.00E+01	4.59E-05

Receptor: Composite Crit. Receptor - NG
Distance: 800 (meters) Compass Point: SSE

Nuclide	Percentage
AR-41	8.06E+00
KR-85M	3.02E-03
XE-135	3.52E-01
XE-133M	5.45E-02
XE-133	9.15E+01

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2

=== I&P DOSE LIMIT ANALYSIS ========== QUARTER 4 ==========

Quarter - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Qtr 4 - Admin. Any Organ	CHILD	BONE	1.67E-01	5.63E+00	2.96E+00
Qtr 4 - Admin. Total Body	CHILD	TBODY	3.38E-02	5.25E+00	6.44E-01
Qtr 4 - T.Spc. Any Organ	CHILD	BONE	1.67E-01	7.50E+00	2.22E+00

Receptor: Composite Crit. Receptor - IP
Distance: 800 (meters) Compass Point: SSE
Critical Pathway: Vegetation
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	0.00E+00
C-14	1.00E+02
CO-58	6.50E-05

Qtr 4 - T.Spc. Total Body	CHILD	TBODY	3.38E-02	7.50E+00	4.51E-01

Receptor: Composite Crit. Receptor - IP
Distance: 800 (meters) Compass Point: SSE
Critical Pathway: Vegetation
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	1.41E+00
C-14	9.86E+01
CO-58	5.61E-04

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2

=== NG DOSE LIMIT ANALYSIS ========== QUARTER 4 ==========

Quartr - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
Qtr 4 - Admin. Gamma	3.10E-06	3.75E+00	8.25E-05
Qtr 4 - Admin. Beta	8.25E-06	7.50E+00	1.10E-04
Qtr 4 - T.Spc. Gamma	3.10E-06	5.00E+00	6.19E-05

Receptor: Composite Crit. Receptor - NG
Distance: 800 (meters) Compass Point: SSE

Nuclide	Percentage
AR-41	7.02E+01
KR-85	8.83E+00
XE-135	1.94E+00
XE-133M	9.56E-02
XE-133	1.89E+01

Qtr 4 - T.Spc. Beta	8.25E-06	1.00E+01	8.25E-05

Receptor: Composite Crit. Receptor - NG
Distance: 800 (meters) Compass Point: SSE

Nuclide	Percentage
AR-41	2.28E+00
KR-85	9.23E+01
XE-135	2.29E-01
XE-133M	3.99E-02
XE-133	5.19E+00

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2

=== I&P DOSE LIMIT ANALYSIS ========== ANNUAL 2017 =========

Annual - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
2017 - Admin. Any Organ	CHILD	BONE	6.84E-01	1.13E+01	6.08E+00
2017 - Admin. Total Body	CHILD	TBODY	1.39E-01	1.05E+01	1.32E+00
2017 - T.Spc. Any Organ	CHILD	BONE	6.84E-01	1.50E+01	4.56E+00

Receptor: Composite Crit. Receptor - IP
Distance: 800 (meters) Compass Point: SSE
Critical Pathway: Vegetation
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	0.00E+00
C-14	1.00E+02
CO-58	1.59E-05
I-131	4.01E-05
I-132	2.91E-06

2017 - T.Spc. Total Body	CHILD	TBODY	1.39E-01	1.50E+01	9.26E-01

Receptor: Composite Crit. Receptor - IP
Distance: 800 (meters) Compass Point: SSE
Critical Pathway: Vegetation
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	1.61E+00
C-14	9.84E+01
CO-58	1.37E-04
I-131	1.14E-04
I-132	1.41E-05

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2

=== NG DOSE LIMIT ANALYSIS ========== ANNUAL 2017 =========

Annual - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
2017 - Admin. Gamma	3.72E-05	7.50E+00	4.97E-04
2017 - Admin. Beta	1.93E-05	1.50E+01	1.29E-04
2017 - T.Spc. Gamma	3.72E-05	1.00E+01	3.72E-04

Receptor: Composite Crit. Receptor - NG
Distance: 800 (meters) Compass Point: SSE

Nuclide	Percentage
AR-41	5.05E+01
KR-85	7.34E-01
KR-85M	4.29E-03
XE-135	2.06E+01
XE-133M	4.92E-02
XE-133	2.81E+01

2017 - T.Spc. Beta	1.93E-05	2.00E+01	9.66E-05

Receptor: Composite Crit. Receptor - NG
Distance: 800 (meters) Compass Point: SSE

Nuclide	Percentage
AR-41	8.44E+00
KR-85	3.94E+01
KR-85M	3.25E-03
XE-135	1.25E+01
XE-133M	1.05E-01
XE-133	3.96E+01

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

Units 1 & 2

Report for: 2017
Unit Range - From: 1 To: 2

=== MAXIMUM DOSE ANALYSIS ANNUAL 2017 =========

Dose Type	Age Group	Organ	Dose (mrem)
Any Organ	CHILD	BONE	7.55E-01

Liquid Receptor: Liquid Receptor
Gaseous Receptor: Composite Crit. Receptor - IP
Distance: 800 (meters) Compass Point: SSE

Liquid Dose: 7.16E-02 % of Total: 9.48E+00
Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	0.00E+00
CR-51	0.00E+00
MN-54	0.00E+00
FE-55	5.20E-01
FE-59	5.50E-02
CO-58	0.00E+00
CO-60	0.00E+00
NI-63	9.35E+01
SR-89	5.94E-01
SR-90	5.33E+00
ZR-95	1.03E-06
ZR-97	3.77E-08
NB-95	1.81E-02
MO-99	0.00E+00
AG-110M	2.86E-05
SB-124	8.14E-05
SB-125	1.10E-03
TE-132	8.13E-03

Gaseous Dose: 6.84E-01 % of Total: 9.06E+01
Critical Pathway: Vegetation (VEG)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	0.00E+00
C-14	1.00E+02
CO-58	1.59E-05
I-131	4.01E-05
I-132	2.91E-06

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

=== MAXIMUM DOSE ANALYSIS ========== ANNUAL 2017 =========

Dose Type	Age Group	Organ	Dose (mrem)
Total Body	CHILD	TBODY	2.56E-01

Liquid Receptor: Liquid Receptor
Gaseous Receptor: Composite Crit. Receptor - IP
Distance: 800 (meters) Compass Point: SSE

Liquid Dose: 1.17E-01 % of Total: 4.57E+01
Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	9.64E+01
CR-51	1.03E-03
MN-54	2.47E-02
FE-55	5.23E-02
FE-59	2.71E-02
CO-58	6.38E-01
CO-60	8.82E-01
NI-63	1.94E+00
SR-89	1.04E-02
SR-90	6.55E-02
ZR-95	1.23E-07
ZR-97	1.96E-09
NB-95	3.08E-03
MO-99	2.34E-05
AG-110M	9.43E-06
SB-124	1.74E-05
SB-125	1.41E-04
TE-132	2.66E-03

Gaseous Dose: 1.39E-01 % of Total: 5.43E+01
Critical Pathway: Vegetation (VEG)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	1.61E+00
C-14	9.84E+01
CO-58	1.37E-04
I-131	1.14E-04
I-132	1.41E-05

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types
Period Start Date....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (min): 5.256E+05
Coefficient Type.....: Historical
Unit.....: 1

=== RELEASE DATA ==========

Total Release Duration (minutes)	5.950E+05
Total Release Volume (cf)	5.615E+10
Average Release Flowrate (cfm)	9.436E+04
Average Period Flowrate (cfm)	1.068E+05

=== NUCLIDE DATA ==========

Nuclide	uCi	Average uCi/cc	EC Ratio	EC
AR-41	1.56E+04	9.78E-12	9.78E-04	1.00E-08
KR-85M	1.12E+01	7.04E-15	7.04E-08	1.00E-07
XE-133M	4.83E+02	3.04E-13	5.06E-07	6.00E-07
XE-133	2.79E+05	1.75E-10	3.51E-04	5.00E-07
XE-135	6.59E+04	4.15E-11	5.92E-04	7.00E-08
F&AG	3.61E+05	2.27E-10	1.92E-03	
I-131	2.83E-01	1.78E-16	8.91E-07	2.00E-10
Iodine	2.83E-01	1.78E-16	8.91E-07	
C-14	4.17E+06	2.62E-09	8.75E-01	3.00E-09
Other	4.17E+06	2.62E-09	8.75E-01	
H-3	9.37E+06	5.89E-09	5.89E-02	1.00E-07
H-3	9.37E+06	5.89E-09	5.89E-02	
Total	1.39E+07	8.74E-09	9.36E-01	

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types
Period Start Date....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (min): 5.256E+05
Coefficient Type.....: Historical
Unit.....: 1

=== MAXIMUM I&P DOSE FOR PERIOD ===

Limit Type	Organ Type	Age Group	Organ	Dose (mrem)	Limit Period	Limit (mrem)	Percent of Limit
Admin	Any Organ	CHILD	BONE	3.40E-01	31-day	2.25E-01	1.51E+02
					Quarter	5.63E+00	6.04E+00
					Annual	1.13E+01	3.02E+00
T.Spec	Any Organ	CHILD	BONE	3.40E-01	31-day	3.00E-01	1.13E+02
					Quarter	7.50E+00	4.53E+00
					Annual	1.50E+01	2.27E+00

Receptor.....: 5 Composite Crit. Receptor - IP
Distance (meters).....: 0.0
Compass Point.....: 0.0
Critical Pathway.....: 2 Vegetation (VEG)
Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
H-3	0.00E+00
C-14	1.00E+02
I-131	1.48E-05

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types
Period Start Date....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (min): 5.256E+05
Coefficient Type.....: Historical
Unit.....: 1

=== PERIOD ORGAN DOSE BY AGE GROUP AND PATHWAY (mrem) ==========

Age/Path	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
AGPD	5.81E-10	5.81E-10	5.81E-10	5.81E-10	5.81E-10	5.81E-10	0.00E+00	5.81E-10
AINHL	1.08E-03	2.99E-04	2.99E-04	2.99E-04	2.99E-04	2.99E-04	0.00E+00	2.99E-04
AVEG	5.34E-02	1.08E-02	1.08E-02	1.08E-02	1.08E-02	1.08E-02	0.00E+00	1.08E-02
ACMEAT	1.98E-02	3.99E-03	3.99E-03	3.99E-03	3.99E-03	3.99E-03	0.00E+00	3.99E-03
ACMILK	2.16E-02	4.38E-03	4.38E-03	4.38E-03	4.38E-03	4.38E-03	0.00E+00	4.38E-03
TGPD	5.81E-10	5.81E-10	5.81E-10	5.81E-10	5.81E-10	5.81E-10	0.00E+00	5.81E-10
TINHL	1.55E-03	3.86E-04	3.87E-04	3.86E-04	3.86E-04	3.86E-04	0.00E+00	3.86E-04
TVEG	8.62E-02	1.75E-02	1.75E-02	1.75E-02	1.75E-02	1.75E-02	0.00E+00	1.75E-02
TCMEAT	1.67E-02	3.36E-03	3.36E-03	3.36E-03	3.36E-03	3.36E-03	0.00E+00	3.36E-03
TCMILK	3.99E-02	8.05E-03	8.05E-03	8.05E-03	8.05E-03	8.05E-03	0.00E+00	8.05E-03
CGPD	5.81E-10	5.81E-10	5.81E-10	5.81E-10	5.81E-10	5.81E-10	0.00E+00	5.81E-10
CINHL	2.14E-03	4.86E-04	4.86E-04	4.86E-04	4.86E-04	4.86E-04	0.00E+00	4.86E-04
CVEG	2.08E-01	4.20E-02	4.20E-02	4.20E-02	4.20E-02	4.20E-02	0.00E+00	4.20E-02
CCMEAT	3.15E-02	6.32E-03	6.32E-03	6.32E-03	6.32E-03	6.32E-03	0.00E+00	6.32E-03
CCMILK	9.81E-02	1.97E-02	1.97E-02	1.97E-02	1.97E-02	1.97E-02	0.00E+00	1.97E-02
IGPD	5.81E-10	5.81E-10	5.81E-10	5.81E-10	5.81E-10	5.81E-10	0.00E+00	5.81E-10
IINHL	1.58E-03	3.65E-04	3.65E-04	3.65E-04	3.65E-04	3.65E-04	0.00E+00	3.65E-04
ICMILK	1.92E-01	4.12E-02	4.12E-02	4.12E-02	4.12E-02	4.12E-02	0.00E+00	4.12E-02
TOTALS								
ADULT	9.58E-02	1.95E-02	1.95E-02	1.95E-02	1.95E-02	1.95E-02	0.00E+00	1.95E-02
TEEN	1.44E-01	2.93E-02	2.93E-02	2.93E-02	2.93E-02	2.93E-02	0.00E+00	2.93E-02
CHILD	3.40E-01	6.85E-02	6.85E-02	6.85E-02	6.85E-02	6.85E-02	0.00E+00	6.85E-02
INFANT	1.94E-01	4.15E-02	4.16E-02	4.15E-02	4.15E-02	4.15E-02	0.00E+00	4.15E-02

=== AGE GROUP / PATHWAY DESCRIPTIONS ==========

Abbreviation	Age Group	Pathway
AGPD	ADULT	Ground Plane Deposition (GPD)
AINHL	ADULT	Inhalation (INHL)
AVEG	ADULT	Vegetation (VEG)
ACMEAT	ADULT	Grs/Cow/Meat (CMEAT)
ACMILK	ADULT	Grs/Cow/Milk (CMILK)
TGPD	TEEN	Ground Plane Deposition (GPD)
TINHL	TEEN	Inhalation (INHL)
TVEG	TEEN	Vegetation (VEG)
TCMEAT	TEEN	Grs/Cow/Meat (CMEAT)
TCMILK	TEEN	Grs/Cow/Milk (CMILK)
CGPD	CHILD	Ground Plane Deposition (GPD)
CINHL	CHILD	Inhalation (INHL)

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT
(Composite Critical Receptor - Limited Analysis)

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Release ID.....: 1  All Gas Release Types
Period Start Date....: 01/01/2017 00:00
Period End Date......: 01/01/2018 00:00
Period Duration (min): 5.256E+05
Coefficient Type.....: Historical
Unit.................:  1
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=== AGE GROUP / PATHWAY DESCRIPTIONS ==========

Abbreviation	Age Group	Pathway
CVEG	CHILD	Vegetation (VEG)
CCMEAT	CHILD	Grs/Cow/Meat (CMEAT)
CCMILK	CHILD	Grs/Cow/Milk (CMILK)
IGPD	INFANT	Ground Plane Deposition (GPD)
IINHL	INFANT	Inhalation (INHL)
ICMILK	INFANT	Grs/Cow/Milk (CMILK)

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types
Period Start Date....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (min): 5.256E+05
Coefficient Type.....: Historical
Unit.....: 1

=== MAXIMUM NG DOSE FOR PERIOD ===

Limit Type	Dose Type	Dose (mrad)	Limit Period	Limit (mrad)	Percent of Limit
Admin	Gamma	2.15E-05	31-day	1.50E-01	1.43E-02
			Quarter	3.75E+00	5.72E-04
			Annual	7.50E+00	2.86E-04
Admin	Beta	7.22E-06	31-day	3.00E-01	2.41E-03
			Quarter	7.50E+00	9.63E-05
			Annual	1.50E+01	4.82E-05
T.Spec	Gamma	2.15E-05	31-day	2.00E-01	1.07E-02
			Quarter	5.00E+00	4.29E-04
			Annual	1.00E+01	2.15E-04

Receptor.....: 4 Composite Crit. Receptor - NG
Distance (meters).....: 0.0
Compass Point.....: 0.0
Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
AR-41	3.91E+01
KR-85M	3.72E-03
XE-133M	4.27E-02
XE-133	2.66E+01
XE-135	3.42E+01

T.Spec	Beta	7.22E-06	31-day	4.00E-01	1.81E-03
			Quarter	1.00E+01	7.22E-05
			Annual	2.00E+01	3.61E-05

Receptor.....: 4 Composite Crit. Receptor - NG
Distance (meters).....: 0.0
Compass Point.....: 0.0
Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
AR-41	1.01E+01
KR-85M	4.35E-03
XE-133M	1.41E-01
XE-133	5.78E+01

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types
Period Start Date....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (min): 5.256E+05
Coefficient Type.....: Historical
Unit.....: 1

Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
XE-135	3.20E+01

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types
Period Start Date....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (min): 5.256E+05
Coefficient Type.....: Historical
Unit.....: 2

=== RELEASE DATA ==========

Total Release Duration (minutes)	5.605E+05
Total Release Volume (cf)	8.679E+10
Average Release Flowrate (cfm)	1.549E+05
Average Period Flowrate (cfm)	1.651E+05

=== NUCLIDE DATA ==========

Nuclide	uCi	Average uCi/cc	EC Ratio	EC
AR-41	1.93E+04	7.87E-12	7.87E-04	1.00E-08
KR-85M	1.12E+01	4.55E-15	4.55E-08	1.00E-07
KR-85	2.74E+05	1.11E-10	1.59E-04	7.00E-07
XE-133M	4.83E+02	1.96E-13	3.27E-07	6.00E-07
XE-133	2.32E+05	9.46E-11	1.89E-04	5.00E-07
XE-135	2.78E+03	1.13E-12	1.61E-05	7.00E-08
F&AG	5.29E+05	2.15E-10	1.15E-03	
I-131	1.27E+00	5.15E-16	2.58E-06	2.00E-10
I-132	1.12E+02	4.54E-14	2.27E-06	2.00E-08
Iodine	1.13E+02	4.59E-14	4.84E-06	
C-14	4.22E+06	1.72E-09	5.72E-01	3.00E-09
Other	4.22E+06	1.72E-09	5.72E-01	
H-3	3.02E+07	1.23E-08	1.23E-01	1.00E-07
H-3	3.02E+07	1.23E-08	1.23E-01	
CO-58	2.39E+00	9.74E-16	9.74E-07	1.00E-09
P>=8	2.39E+00	9.74E-16	9.74E-07	
Total	3.50E+07	1.42E-08	6.96E-01	

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Period Duration (min): 5.256E+05
Coefficient Type.....: Historical
Unit.....: 2

=== MAXIMUM I&P DOSE FOR PERIOD ===

Limit Type	Organ Type	Age Group	Organ	Dose (mrem)	Limit Period	Limit (mrem)	Percent of Limit
Admin	Any Organ	CHILD	BONE	3.44E-01	31-day	2.25E-01	1.53E+02
					Quarter	5.63E+00	6.11E+00
					Annual	1.13E+01	3.06E+00
T.Spec	Any Organ	CHILD	BONE	3.44E-01	31-day	3.00E-01	1.15E+02
					Quarter	7.50E+00	4.58E+00
					Annual	1.50E+01	2.29E+00

Receptor.....: 5 Composite Crit. Receptor - IP
Distance (meters).....: 0.0
Compass Point.....: 0.0
Critical Pathway.....: 2 Vegetation (VEG)
Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
H-3	0.00E+00
C-14	1.00E+02
CO-58	3.15E-05
I-131	6.52E-05
I-132	5.79E-06

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Release ID.....: 1 All Gas Release Types
Period Start Date....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (min): 5.256E+05
Coefficient Type.....: Historical
Unit.....: 2

=== PERIOD ORGAN DOSE BY AGE GROUP AND PATHWAY (mrem) ==========

Age/Path	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
AGPD	1.28E-07	1.28E-07	1.28E-07	1.28E-07	1.28E-07	1.28E-07	0.00E+00	1.28E-07
AINHL	1.09E-03	5.15E-04	5.15E-04	5.15E-04	5.15E-04	5.15E-04	0.00E+00	5.15E-04
AVEG	5.40E-02	1.13E-02	1.13E-02	1.13E-02	1.13E-02	1.13E-02	0.00E+00	1.13E-02
ACMEAT	2.00E-02	4.09E-03	4.09E-03	4.09E-03	4.09E-03	4.09E-03	0.00E+00	4.09E-03
ACMILK	2.18E-02	4.55E-03	4.58E-03	4.55E-03	4.55E-03	4.55E-03	0.00E+00	4.55E-03
TGPD	1.28E-07	1.28E-07	1.28E-07	1.28E-07	1.28E-07	1.28E-07	0.00E+00	1.28E-07
TINHL	1.56E-03	6.05E-04	6.06E-04	6.05E-04	6.05E-04	6.05E-04	0.00E+00	6.05E-04
TVEG	8.72E-02	1.81E-02	1.81E-02	1.81E-02	1.81E-02	1.81E-02	0.00E+00	1.81E-02
TCMEAT	1.69E-02	3.43E-03	3.43E-03	3.43E-03	3.43E-03	3.43E-03	0.00E+00	3.43E-03
TCMILK	4.03E-02	8.30E-03	8.34E-03	8.30E-03	8.30E-03	8.30E-03	0.00E+00	8.30E-03
CGPD	1.28E-07	1.28E-07	1.28E-07	1.28E-07	1.28E-07	1.28E-07	0.00E+00	1.28E-07
CINHL	2.16E-03	6.81E-04	6.81E-04	6.81E-04	6.81E-04	6.81E-04	0.00E+00	6.81E-04
CVEG	2.11E-01	4.32E-02	4.32E-02	4.32E-02	4.32E-02	4.32E-02	0.00E+00	4.32E-02
CCMEAT	3.18E-02	6.43E-03	6.43E-03	6.43E-03	6.43E-03	6.43E-03	0.00E+00	6.43E-03
CCMILK	9.93E-02	2.02E-02	2.02E-02	2.02E-02	2.02E-02	2.02E-02	0.00E+00	2.02E-02
IGPD	1.28E-07	1.28E-07	1.28E-07	1.28E-07	1.28E-07	1.28E-07	0.00E+00	1.28E-07
IINHL	1.59E-03	4.78E-04	4.79E-04	4.78E-04	4.78E-04	4.78E-04	0.00E+00	4.78E-04
ICMILK	1.94E-01	4.20E-02	4.22E-02	4.20E-02	4.20E-02	4.20E-02	0.00E+00	4.20E-02
TOTALS								
ADULT	9.69E-02	2.05E-02	2.05E-02	2.05E-02	2.05E-02	2.05E-02	0.00E+00	2.05E-02
TEEN	1.46E-01	3.05E-02	3.05E-02	3.05E-02	3.05E-02	3.05E-02	0.00E+00	3.05E-02
CHILD	3.44E-01	7.04E-02	7.05E-02	7.04E-02	7.04E-02	7.04E-02	0.00E+00	7.04E-02
INFANT	1.96E-01	4.25E-02	4.27E-02	4.25E-02	4.25E-02	4.25E-02	0.00E+00	4.25E-02

=== AGE GROUP / PATHWAY DESCRIPTIONS ==========

Abbreviation	Age Group	Pathway
AGPD	ADULT	Ground Plane Deposition (GPD)
AINHL	ADULT	Inhalation (INHL)
AVEG	ADULT	Vegetation (VEG)
ACMEAT	ADULT	Grs/Cow/Meat (CMEAT)
ACMILK	ADULT	Grs/Cow/Milk (CMILK)
TGPD	TEEN	Ground Plane Deposition (GPD)
TINHL	TEEN	Inhalation (INHL)
TVEG	TEEN	Vegetation (VEG)
TCMEAT	TEEN	Grs/Cow/Meat (CMEAT)
TCMILK	TEEN	Grs/Cow/Milk (CMILK)
CGPD	CHILD	Ground Plane Deposition (GPD)
CINHL	CHILD	Inhalation (INHL)

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(Composite Critical Receptor - Limited Analysis)

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Period Start Date....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (min): 5.256E+05
Coefficient Type.....: Historical
Unit.....: 2

=== AGE GROUP / PATHWAY DESCRIPTIONS ==========

Abbreviation	Age Group	Pathway
CVEG	CHILD	Vegetation (VEG)
CCMEAT	CHILD	Grs/Cow/Meat (CMEAT)
CCMILK	CHILD	Grs/Cow/Milk (CMILK)
IGPD	INFANT	Ground Plane Deposition (GPD)
IINHL	INFANT	Inhalation (INHL)
ICMILK	INFANT	Grs/Cow/Milk (CMILK)

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types
Period Start Date....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (min): 5.256E+05
Coefficient Type.....: Historical
Unit.....: 2

=== MAXIMUM NG DOSE FOR PERIOD ==========

Limit Type	Dose Type	Dose (mrad)	Limit Period	Limit (mrad)	Percent of Limit
Admin	Gamma	1.58E-05	31-day	1.50E-01	1.05E-02
			Quarter	3.75E+00	4.21E-04
			Annual	7.50E+00	2.10E-04
Admin	Beta	1.21E-05	31-day	3.00E-01	4.04E-03
			Quarter	7.50E+00	1.61E-04
			Annual	1.50E+01	8.07E-05
T.Spec	Gamma	1.58E-05	31-day	2.00E-01	7.89E-03
			Quarter	5.00E+00	3.16E-04
			Annual	1.00E+01	1.58E-04

Receptor.....: 4 Composite Crit. Receptor - NG
Distance (meters).....: 0.0
Compass Point.....: 0.0
Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
AR-41	6.61E+01
KR-85M	5.06E-03
KR-85	1.73E+00
XE-133M	5.80E-02
XE-133	3.02E+01
XE-135	1.96E+00

T.Spec	Beta	1.21E-05	31-day	4.00E-01	3.03E-03
			Quarter	1.00E+01	1.21E-04
			Annual	2.00E+01	6.05E-05

Receptor.....: 4 Composite Crit. Receptor - NG
Distance (meters).....: 0.0
Compass Point.....: 0.0
Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
AR-41	7.47E+00
KR-85M	2.60E-03
KR-85	6.29E+01

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types
Period Start Date....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (min): 5.256E+05
Coefficient Type.....: Historical
Unit.....: 2

Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
XE-133M	8.41E-02
XE-133	2.87E+01
XE-135	8.04E-01

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05
Unit.....: 1

=== MULTIPLE RELEASE POINT MESSAGE ==========
Undiluted and Diluted Flowrate(s) and Concentration(s) cannot be combined.

=== RELEASE DATA ==========
Total Release Duration (minutes)..... 5.376E+05
Total Undiluted Volume Released (gallons)..... NA
Average Undiluted Flowrate (gpm)..... NA

Total Dilution Volume (gallons)..... NA
Average Dilution Flowrate (gpm)..... NA

=== NUCLIDE DATA ==========

Nuclide	uCi
CO-57	2.72E+01
SB-124	4.58E+00
SB-125	9.61E+01
TE-123M	1.01E+01
CR-51	1.02E+03
MN-54	3.84E+01
FE-59	3.59E+01
CO-58	4.06E+03
CO-60	1.98E+03
ZR-95	2.38E+00
ZR-97	1.45E+00
NB-95	2.92E+01
MO-99	1.18E+00
AG-110M	1.89E+01
TE-132	2.18E+00
Gamma	7.32E+03
XE-131M	4.96E+01
XE-133	2.62E+02
XE-135M	1.14E+01
XE-135	5.47E+00
D&EG	3.29E+02
H-3	9.88E+08
NI-63	1.87E+03
Beta	9.88E+08

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05

=== NUCLIDE DATA ==========

Nuclide	uCi
---	---
Total	9.88E+08

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05
Unit.....: 1
Receptor.....: 0 Liquid Receptor

=== PERMIT ORGAN DOSE BY AGE GROUP AND PATHWAY (mrem) ==========

Age/Path	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
APWtr	8.50E-05	1.88E-02	1.88E-02	1.88E-02	1.88E-02	1.89E-02	0.00E+00	1.88E-02
AFWFSp	2.44E-02	5.08E-02	4.87E-02	4.87E-02	4.87E-02	7.50E-02	0.00E+00	5.03E-02
TPWtr	8.09E-05	1.33E-02	1.33E-02	1.33E-02	1.33E-02	1.33E-02	0.00E+00	1.33E-02
TFWFSp	2.54E-02	3.96E-02	3.74E-02	3.74E-02	3.74E-02	5.59E-02	0.00E+00	3.91E-02
CPWtr	2.46E-04	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	0.00E+00	2.55E-02
CFWFSp	3.32E-02	3.31E-02	3.10E-02	3.10E-02	3.10E-02	3.75E-02	0.00E+00	3.30E-02
IPWtr	1.88E-04	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	0.00E+00	2.50E-02
TOTALS								
ADULT	2.45E-02	6.97E-02	6.75E-02	6.75E-02	6.75E-02	9.39E-02	0.00E+00	6.91E-02
TEEN	2.54E-02	5.29E-02	5.06E-02	5.07E-02	5.06E-02	6.92E-02	0.00E+00	5.24E-02
CHILD	3.35E-02	5.86E-02	5.64E-02	5.64E-02	5.64E-02	6.30E-02	0.00E+00	5.85E-02
INFANT	1.88E-04	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	0.00E+00	2.50E-02

=== AGE GROUP / PATHWAY DESCRIPTIONS ==========

Abbreviation	Age Group	Pathway
APWtr	ADULT	Potable Water (PWtr)
AFWFSp	ADULT	Fresh Water Fish - Sport (FFSP)
TPWtr	TEEN	Potable Water (PWtr)
TFWFSp	TEEN	Fresh Water Fish - Sport (FFSP)
CPWtr	CHILD	Potable Water (PWtr)
CFWFSp	CHILD	Fresh Water Fish - Sport (FFSP)
IPWtr	INFANT	Potable Water (PWtr)

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05
Unit.....: 1
Receptor.....: 0 Liquid Receptor

=== PERMIT ORGAN DOSE BY AGE GROUP AND NUCLIDE (mrem) ==========

Agegroup	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
ADULT								
H-3	0.00E+00	6.75E-02	6.75E-02	6.75E-02	6.75E-02	6.75E-02	0.00E+00	6.75E-02
CR-51	0.00E+00	0.00E+00	3.26E-07	1.20E-07	7.24E-07	1.37E-04	0.00E+00	5.46E-07
MN-54	0.00E+00	7.04E-05	0.00E+00	2.10E-05	0.00E+00	2.16E-04	0.00E+00	1.34E-05
FE-59	1.57E-05	3.69E-05	0.00E+00	0.00E+00	1.03E-05	1.23E-04	0.00E+00	1.41E-05
CO-58	0.00E+00	1.53E-04	0.00E+00	0.00E+00	0.00E+00	3.09E-03	0.00E+00	3.42E-04
CO-60	0.00E+00	2.14E-04	0.00E+00	0.00E+00	0.00E+00	4.02E-03	0.00E+00	4.72E-04
NI-63	2.45E-02	1.70E-03	0.00E+00	0.00E+00	0.00E+00	3.54E-04	0.00E+00	8.22E-04
ZR-95	2.64E-10	8.48E-11	0.00E+00	1.33E-10	0.00E+00	2.69E-07	0.00E+00	5.74E-11
ZR-97	8.91E-12	1.80E-12	0.00E+00	2.72E-12	0.00E+00	5.57E-07	0.00E+00	8.22E-13
NB-95	5.46E-06	3.04E-06	0.00E+00	3.00E-06	0.00E+00	1.84E-02	0.00E+00	1.63E-06
MO-99	0.00E+00	5.26E-08	0.00E+00	1.19E-07	0.00E+00	1.22E-07	0.00E+00	1.00E-08
AG-110M	8.05E-09	7.44E-09	0.00E+00	1.46E-08	0.00E+00	3.04E-06	0.00E+00	4.42E-09
SB-124	1.73E-08	3.28E-10	1.09E-07	0.00E+00	1.35E-08	4.93E-07	0.00E+00	6.87E-09
SB-125	2.33E-07	2.60E-09	2.37E-10	0.00E+00	1.80E-07	2.56E-06	0.00E+00	5.54E-08
TE-132	2.21E-06	1.43E-06	1.58E-06	1.37E-05	0.00E+00	6.75E-05	0.00E+00	1.34E-06
TEEN								
H-3	0.00E+00	5.06E-02	5.06E-02	5.06E-02	5.06E-02	5.06E-02	0.00E+00	5.06E-02
CR-51	0.00E+00	0.00E+00	3.13E-07	1.23E-07	8.03E-07	9.45E-05	0.00E+00	5.62E-07
MN-54	0.00E+00	6.93E-05	0.00E+00	2.07E-05	0.00E+00	1.42E-04	0.00E+00	1.37E-05
FE-59	1.62E-05	3.77E-05	0.00E+00	0.00E+00	1.19E-05	8.92E-05	0.00E+00	1.46E-05
CO-58	0.00E+00	1.52E-04	0.00E+00	0.00E+00	0.00E+00	2.09E-03	0.00E+00	3.49E-04
CO-60	0.00E+00	2.14E-04	0.00E+00	0.00E+00	0.00E+00	2.79E-03	0.00E+00	4.82E-04
NI-63	2.54E-02	1.79E-03	0.00E+00	0.00E+00	0.00E+00	2.86E-04	0.00E+00	8.61E-04
ZR-95	2.71E-10	8.55E-11	0.00E+00	1.26E-10	0.00E+00	1.97E-07	0.00E+00	5.88E-11
ZR-97	9.51E-12	1.88E-12	0.00E+00	2.85E-12	0.00E+00	5.09E-07	0.00E+00	8.66E-13
NB-95	5.50E-06	3.05E-06	0.00E+00	2.96E-06	0.00E+00	1.30E-02	0.00E+00	1.68E-06
MO-99	0.00E+00	5.59E-08	0.00E+00	1.28E-07	0.00E+00	1.00E-07	0.00E+00	1.07E-08
AG-110M	7.77E-09	7.35E-09	0.00E+00	1.40E-08	0.00E+00	2.06E-06	0.00E+00	4.47E-09
SB-124	1.79E-08	3.29E-10	4.05E-11	0.00E+00	1.56E-08	3.61E-07	0.00E+00	6.98E-09
SB-125	2.40E-07	2.63E-09	2.30E-10	0.00E+00	2.11E-07	1.87E-06	0.00E+00	5.63E-08
TE-132	2.33E-06	1.47E-06	1.55E-06	1.41E-05	0.00E+00	4.67E-05	0.00E+00	1.39E-06
CHILD								
H-3	0.00E+00	5.64E-02	5.64E-02	5.64E-02	5.64E-02	5.64E-02	0.00E+00	5.64E-02
CR-51	0.00E+00	0.00E+00	3.34E-07	9.12E-08	6.09E-07	3.19E-05	0.00E+00	6.01E-07
MN-54	0.00E+00	5.43E-05	0.00E+00	1.52E-05	0.00E+00	4.55E-05	0.00E+00	1.44E-05
FE-59	1.97E-05	3.18E-05	0.00E+00	0.00E+00	9.23E-06	3.31E-05	0.00E+00	1.59E-05
CO-58	0.00E+00	1.22E-04	0.00E+00	0.00E+00	0.00E+00	7.12E-04	0.00E+00	3.74E-04

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05

=== PERMIT ORGAN DOSE BY AGE GROUP AND NUCLIDE (mrem) ==========

Agegroup	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
CO-60	0.00E+00	1.75E-04	0.00E+00	0.00E+00	0.00E+00	9.70E-04	0.00E+00	5.17E-04
NI-63	3.35E-02	1.79E-03	0.00E+00	0.00E+00	0.00E+00	1.21E-04	0.00E+00	1.14E-03
ZR-95	3.67E-10	8.07E-11	0.00E+00	1.16E-10	0.00E+00	8.42E-08	0.00E+00	7.18E-11
ZR-97	1.35E-11	1.95E-12	0.00E+00	2.80E-12	0.00E+00	2.95E-07	0.00E+00	1.15E-12
NB-95	6.49E-06	2.53E-06	0.00E+00	2.37E-06	0.00E+00	4.67E-03	0.00E+00	1.80E-06
MO-99	0.00E+00	5.53E-08	0.00E+00	1.18E-07	0.00E+00	4.58E-08	0.00E+00	1.37E-08
AG-110M	1.02E-08	6.90E-09	0.00E+00	1.29E-08	0.00E+00	8.21E-07	0.00E+00	5.52E-09
SB-124	2.91E-08	3.77E-10	6.44E-11	0.00E+00	1.62E-08	1.82E-07	0.00E+00	1.02E-08
SB-125	3.95E-07	3.04E-09	3.66E-10	0.00E+00	2.20E-07	9.45E-07	0.00E+00	8.27E-08
TE-132	2.91E-06	1.29E-06	1.87E-06	1.20E-05	0.00E+00	1.30E-05	0.00E+00	1.56E-06
INFANT								
H-3	0.00E+00	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	0.00E+00	2.50E-02
CR-51	0.00E+00	0.00E+00	1.48E-09	3.23E-10	2.88E-09	6.61E-08	0.00E+00	2.27E-09
MN-54	0.00E+00	1.20E-07	0.00E+00	2.67E-08	0.00E+00	4.42E-08	0.00E+00	2.73E-08
FE-59	1.74E-07	3.05E-07	0.00E+00	0.00E+00	9.00E-08	1.45E-07	0.00E+00	1.20E-07
CO-58	0.00E+00	2.30E-06	0.00E+00	0.00E+00	0.00E+00	5.73E-06	0.00E+00	5.74E-06
CO-60	0.00E+00	3.37E-06	0.00E+00	0.00E+00	0.00E+00	8.02E-06	0.00E+00	7.96E-06
NI-63	1.87E-04	1.16E-05	0.00E+00	0.00E+00	0.00E+00	5.76E-07	0.00E+00	6.49E-06
ZR-95	7.72E-11	1.88E-11	0.00E+00	2.03E-11	0.00E+00	9.37E-09	0.00E+00	1.33E-11
ZR-97	3.38E-12	5.80E-13	0.00E+00	5.85E-13	0.00E+00	3.70E-08	0.00E+00	2.65E-13
NB-95	1.93E-10	7.95E-11	0.00E+00	5.70E-11	0.00E+00	6.71E-08	0.00E+00	4.60E-11
MO-99	0.00E+00	6.30E-09	0.00E+00	9.42E-09	0.00E+00	2.08E-09	0.00E+00	1.23E-09
AG-110M	2.97E-09	2.17E-09	0.00E+00	3.10E-09	0.00E+00	1.12E-07	0.00E+00	1.44E-09
SB-124	1.55E-08	2.28E-10	4.10E-11	0.00E+00	9.68E-09	4.77E-08	0.00E+00	4.79E-09
SB-125	1.86E-07	1.80E-09	2.34E-10	0.00E+00	1.08E-07	2.49E-07	0.00E+00	3.84E-08
TE-132	7.15E-09	3.54E-09	5.22E-09	2.21E-08	0.00E+00	1.31E-08	0.00E+00	3.30E-09

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05
Unit.....: 1
Receptor.....: 0 Liquid Receptor

=== MAXIMUM DOSE FOR PERIOD ===

Limit Type	Organ Type	Age Group	Organ	Dose (mrem)	Limit Period	Limit (mrem)	Percent of Limit
Admin	Any Organ	ADULT	GILLI	9.39E-02	31-day	1.50E-01	6.26E+01
					Quarter	3.75E+00	2.50E+00
					Annual	7.50E+00	1.25E+00
Admin	Tot Body	ADULT	TBODY	6.91E-02	31-day	4.50E-02	1.54E+02
					Quarter	1.13E+00	6.15E+00
					Annual	2.25E+00	3.07E+00
T.Spec	Any Organ	ADULT	GILLI	9.39E-02	31-day	2.00E-01	4.70E+01
					Quarter	5.00E+00	1.88E+00
					Annual	1.00E+01	9.39E-01

Critical Pathway.....: 1 Fresh Water Fish - Sport (FFSP
Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
SB-125	2.73E-03
SB-124	5.25E-04
H-3	7.18E+01
CR-51	1.46E-01
MN-54	2.30E-01
FE-59	1.31E-01
CO-58	3.29E+00
CO-60	4.28E+00
NI-63	3.77E-01
ZR-95	2.86E-04
ZR-97	5.93E-04
NB-95	1.96E+01
MO-99	1.30E-04
AG-110M	3.23E-03
TE-132	7.19E-02

T.Spec	Tot Body	ADULT	TBODY	6.91E-02	31-day	6.00E-02	1.15E+02
					Quarter	1.50E+00	4.61E+00
					Annual	3.00E+00	2.30E+00

Critical Pathway.....: 1 Fresh Water Fish - Sport (FFSP

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05

Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
SB-125	8.01E-05
SB-124	9.94E-06
H-3	9.76E+01
CR-51	7.89E-04
MN-54	1.94E-02
FE-59	2.04E-02
CO-58	4.94E-01
CO-60	6.83E-01
NI-63	1.19E+00
ZR-95	8.30E-08
ZR-97	1.19E-09
NB-95	2.36E-03
MO-99	1.45E-05
AG-110M	6.39E-06
TE-132	1.94E-03

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05
Unit.....: 2

=== MULTIPLE RELEASE POINT MESSAGE ==========
Undiluted and Diluted Flowrate(s) and Concentration(s) cannot be combined.

=== RELEASE DATA ==========
Total Release Duration (minutes)..... 5.376E+05
Total Undiluted Volume Released (gallons)..... NA
Average Undiluted Flowrate (gpm)..... NA

Total Dilution Volume (gallons)..... NA
Average Dilution Flowrate (gpm)..... NA

=== NUCLIDE DATA ==========

Nuclide	uCi
CO-57	2.72E+01
SB-124	4.58E+00
SB-125	9.61E+01
TE-123M	1.01E+01
CR-51	1.02E+03
MN-54	3.84E+01
FE-59	3.59E+01
CO-58	4.06E+03
CO-60	1.98E+03
ZR-95	2.38E+00
ZR-97	1.45E+00
NB-95	2.92E+01
MO-99	1.18E+00
AG-110M	1.89E+01
TE-132	2.18E+00
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Gamma	7.32E+03
XE-131M	4.96E+01
XE-133	2.62E+02
XE-135M	1.14E+01
XE-135	5.47E+00
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D&EG	3.29E+02
H-3	9.88E+08
NI-63	1.87E+03
---	---
Beta	9.88E+08

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05

=== NUCLIDE DATA ==========

Nuclide	uCi
---	---
Total	9.88E+08

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05
Unit.....: 2
Receptor.....: 0 Liquid Receptor

=== PERMIT ORGAN DOSE BY AGE GROUP AND PATHWAY (mrem) ==========

Age/Path	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
APWtr	8.50E-05	1.88E-02	1.88E-02	1.88E-02	1.88E-02	1.89E-02	0.00E+00	1.88E-02
AFWFSp	2.44E-02	5.08E-02	4.87E-02	4.87E-02	4.87E-02	7.50E-02	0.00E+00	5.03E-02
TPWtr	8.09E-05	1.33E-02	1.33E-02	1.33E-02	1.33E-02	1.33E-02	0.00E+00	1.33E-02
TFWFSp	2.54E-02	3.96E-02	3.74E-02	3.74E-02	3.74E-02	5.59E-02	0.00E+00	3.91E-02
CPWtr	2.46E-04	2.55E-02	2.55E-02	2.55E-02	2.55E-02	2.55E-02	0.00E+00	2.55E-02
CFWFSp	3.32E-02	3.31E-02	3.10E-02	3.10E-02	3.10E-02	3.75E-02	0.00E+00	3.30E-02
IPWtr	1.88E-04	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	0.00E+00	2.50E-02
TOTALS								
ADULT	2.45E-02	6.97E-02	6.75E-02	6.75E-02	6.75E-02	9.39E-02	0.00E+00	6.91E-02
TEEN	2.54E-02	5.29E-02	5.06E-02	5.07E-02	5.06E-02	6.92E-02	0.00E+00	5.24E-02
CHILD	3.35E-02	5.86E-02	5.64E-02	5.64E-02	5.64E-02	6.30E-02	0.00E+00	5.85E-02
INFANT	1.88E-04	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	0.00E+00	2.50E-02

=== AGE GROUP / PATHWAY DESCRIPTIONS ==========

Abbreviation	Age Group	Pathway
APWtr	ADULT	Potable Water (PWtr)
AFWFSp	ADULT	Fresh Water Fish - Sport (FFSP)
TPWtr	TEEN	Potable Water (PWtr)
TFWFSp	TEEN	Fresh Water Fish - Sport (FFSP)
CPWtr	CHILD	Potable Water (PWtr)
CFWFSp	CHILD	Fresh Water Fish - Sport (FFSP)
IPWtr	INFANT	Potable Water (PWtr)

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05
Unit.....: 2
Receptor.....: 0 Liquid Receptor

=== PERMIT ORGAN DOSE BY AGE GROUP AND NUCLIDE (mrem) ==========

Agegroup	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
ADULT								
H-3	0.00E+00	6.75E-02	6.75E-02	6.75E-02	6.75E-02	6.75E-02	0.00E+00	6.75E-02
CR-51	0.00E+00	0.00E+00	3.26E-07	1.20E-07	7.24E-07	1.37E-04	0.00E+00	5.46E-07
MN-54	0.00E+00	7.04E-05	0.00E+00	2.10E-05	0.00E+00	2.16E-04	0.00E+00	1.34E-05
FE-59	1.57E-05	3.69E-05	0.00E+00	0.00E+00	1.03E-05	1.23E-04	0.00E+00	1.41E-05
CO-58	0.00E+00	1.53E-04	0.00E+00	0.00E+00	0.00E+00	3.09E-03	0.00E+00	3.42E-04
CO-60	0.00E+00	2.14E-04	0.00E+00	0.00E+00	0.00E+00	4.02E-03	0.00E+00	4.72E-04
NI-63	2.45E-02	1.70E-03	0.00E+00	0.00E+00	0.00E+00	3.54E-04	0.00E+00	8.22E-04
ZR-95	2.64E-10	8.48E-11	0.00E+00	1.33E-10	0.00E+00	2.69E-07	0.00E+00	5.74E-11
ZR-97	8.91E-12	1.80E-12	0.00E+00	2.72E-12	0.00E+00	5.57E-07	0.00E+00	8.22E-13
NB-95	5.46E-06	3.04E-06	0.00E+00	3.00E-06	0.00E+00	1.84E-02	0.00E+00	1.63E-06
MO-99	0.00E+00	5.26E-08	0.00E+00	1.19E-07	0.00E+00	1.22E-07	0.00E+00	1.00E-08
AG-110M	8.05E-09	7.44E-09	0.00E+00	1.46E-08	0.00E+00	3.04E-06	0.00E+00	4.42E-09
SB-124	1.73E-08	3.28E-10	1.09E-07	0.00E+00	1.35E-08	4.93E-07	0.00E+00	6.87E-09
SB-125	2.33E-07	2.60E-09	2.37E-10	0.00E+00	1.80E-07	2.56E-06	0.00E+00	5.54E-08
TE-132	2.21E-06	1.43E-06	1.58E-06	1.37E-05	0.00E+00	6.75E-05	0.00E+00	1.34E-06
TEEN								
H-3	0.00E+00	5.06E-02	5.06E-02	5.06E-02	5.06E-02	5.06E-02	0.00E+00	5.06E-02
CR-51	0.00E+00	0.00E+00	3.13E-07	1.23E-07	8.03E-07	9.45E-05	0.00E+00	5.62E-07
MN-54	0.00E+00	6.93E-05	0.00E+00	2.07E-05	0.00E+00	1.42E-04	0.00E+00	1.37E-05
FE-59	1.62E-05	3.77E-05	0.00E+00	0.00E+00	1.19E-05	8.92E-05	0.00E+00	1.46E-05
CO-58	0.00E+00	1.52E-04	0.00E+00	0.00E+00	0.00E+00	2.09E-03	0.00E+00	3.49E-04
CO-60	0.00E+00	2.14E-04	0.00E+00	0.00E+00	0.00E+00	2.79E-03	0.00E+00	4.82E-04
NI-63	2.54E-02	1.79E-03	0.00E+00	0.00E+00	0.00E+00	2.86E-04	0.00E+00	8.61E-04
ZR-95	2.71E-10	8.55E-11	0.00E+00	1.26E-10	0.00E+00	1.97E-07	0.00E+00	5.88E-11
ZR-97	9.51E-12	1.88E-12	0.00E+00	2.85E-12	0.00E+00	5.09E-07	0.00E+00	8.66E-13
NB-95	5.50E-06	3.05E-06	0.00E+00	2.96E-06	0.00E+00	1.30E-02	0.00E+00	1.68E-06
MO-99	0.00E+00	5.59E-08	0.00E+00	1.28E-07	0.00E+00	1.00E-07	0.00E+00	1.07E-08
AG-110M	7.77E-09	7.35E-09	0.00E+00	1.40E-08	0.00E+00	2.06E-06	0.00E+00	4.47E-09
SB-124	1.79E-08	3.29E-10	4.05E-11	0.00E+00	1.56E-08	3.61E-07	0.00E+00	6.98E-09
SB-125	2.40E-07	2.63E-09	2.30E-10	0.00E+00	2.11E-07	1.87E-06	0.00E+00	5.63E-08
TE-132	2.33E-06	1.47E-06	1.55E-06	1.41E-05	0.00E+00	4.67E-05	0.00E+00	1.39E-06
CHILD								
H-3	0.00E+00	5.64E-02	5.64E-02	5.64E-02	5.64E-02	5.64E-02	0.00E+00	5.64E-02
CR-51	0.00E+00	0.00E+00	3.34E-07	9.12E-08	6.09E-07	3.19E-05	0.00E+00	6.01E-07
MN-54	0.00E+00	5.43E-05	0.00E+00	1.52E-05	0.00E+00	4.55E-05	0.00E+00	1.44E-05
FE-59	1.97E-05	3.18E-05	0.00E+00	0.00E+00	9.23E-06	3.31E-05	0.00E+00	1.59E-05
CO-58	0.00E+00	1.22E-04	0.00E+00	0.00E+00	0.00E+00	7.12E-04	0.00E+00	3.74E-04

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05

=== PERMIT ORGAN DOSE BY AGE GROUP AND NUCLIDE (mrem) ==========

Agegroup	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
CO-60	0.00E+00	1.75E-04	0.00E+00	0.00E+00	0.00E+00	9.70E-04	0.00E+00	5.17E-04
NI-63	3.35E-02	1.79E-03	0.00E+00	0.00E+00	0.00E+00	1.21E-04	0.00E+00	1.14E-03
ZR-95	3.67E-10	8.07E-11	0.00E+00	1.16E-10	0.00E+00	8.42E-08	0.00E+00	7.18E-11
ZR-97	1.35E-11	1.95E-12	0.00E+00	2.80E-12	0.00E+00	2.95E-07	0.00E+00	1.15E-12
NB-95	6.49E-06	2.53E-06	0.00E+00	2.37E-06	0.00E+00	4.67E-03	0.00E+00	1.80E-06
MO-99	0.00E+00	5.53E-08	0.00E+00	1.18E-07	0.00E+00	4.58E-08	0.00E+00	1.37E-08
AG-110M	1.02E-08	6.90E-09	0.00E+00	1.29E-08	0.00E+00	8.21E-07	0.00E+00	5.52E-09
SB-124	2.91E-08	3.77E-10	6.44E-11	0.00E+00	1.62E-08	1.82E-07	0.00E+00	1.02E-08
SB-125	3.95E-07	3.04E-09	3.66E-10	0.00E+00	2.20E-07	9.45E-07	0.00E+00	8.27E-08
TE-132	2.91E-06	1.29E-06	1.87E-06	1.20E-05	0.00E+00	1.30E-05	0.00E+00	1.56E-06
INFANT								
H-3	0.00E+00	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	0.00E+00	2.50E-02
CR-51	0.00E+00	0.00E+00	1.48E-09	3.23E-10	2.88E-09	6.61E-08	0.00E+00	2.27E-09
MN-54	0.00E+00	1.20E-07	0.00E+00	2.67E-08	0.00E+00	4.42E-08	0.00E+00	2.73E-08
FE-59	1.74E-07	3.05E-07	0.00E+00	0.00E+00	9.00E-08	1.45E-07	0.00E+00	1.20E-07
CO-58	0.00E+00	2.30E-06	0.00E+00	0.00E+00	0.00E+00	5.73E-06	0.00E+00	5.74E-06
CO-60	0.00E+00	3.37E-06	0.00E+00	0.00E+00	0.00E+00	8.02E-06	0.00E+00	7.96E-06
NI-63	1.87E-04	1.16E-05	0.00E+00	0.00E+00	0.00E+00	5.76E-07	0.00E+00	6.49E-06
ZR-95	7.72E-11	1.88E-11	0.00E+00	2.03E-11	0.00E+00	9.37E-09	0.00E+00	1.33E-11
ZR-97	3.38E-12	5.80E-13	0.00E+00	5.85E-13	0.00E+00	3.70E-08	0.00E+00	2.65E-13
NB-95	1.93E-10	7.95E-11	0.00E+00	5.70E-11	0.00E+00	6.71E-08	0.00E+00	4.60E-11
MO-99	0.00E+00	6.30E-09	0.00E+00	9.42E-09	0.00E+00	2.08E-09	0.00E+00	1.23E-09
AG-110M	2.97E-09	2.17E-09	0.00E+00	3.10E-09	0.00E+00	1.12E-07	0.00E+00	1.44E-09
SB-124	1.55E-08	2.28E-10	4.10E-11	0.00E+00	9.68E-09	4.77E-08	0.00E+00	4.79E-09
SB-125	1.86E-07	1.80E-09	2.34E-10	0.00E+00	1.08E-07	2.49E-07	0.00E+00	3.84E-08
TE-132	7.15E-09	3.54E-09	5.22E-09	2.21E-08	0.00E+00	1.31E-08	0.00E+00	3.30E-09

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05
Unit.....: 2
Receptor.....: 0 Liquid Receptor

=== MAXIMUM DOSE FOR PERIOD ==========

Limit Type	Organ Type	Age Group	Organ	Dose (mrem)	Limit Period	Limit (mrem)	Percent of Limit
Admin	Any Organ	ADULT	GILLI	9.39E-02	31-day	1.50E-01	6.26E+01
					Quarter	3.75E+00	2.50E+00
					Annual	7.50E+00	1.25E+00
Admin	Tot Body	ADULT	TBODY	6.91E-02	31-day	4.50E-02	1.54E+02
					Quarter	1.13E+00	6.15E+00
					Annual	2.25E+00	3.07E+00
T.Spec	Any Organ	ADULT	GILLI	9.39E-02	31-day	2.00E-01	4.70E+01
					Quarter	5.00E+00	1.88E+00
					Annual	1.00E+01	9.39E-01

Critical Pathway.....: 1 Fresh Water Fish - Sport (FFSP
Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
SB-125	2.73E-03
SB-124	5.25E-04
H-3	7.18E+01
CR-51	1.46E-01
MN-54	2.30E-01
FE-59	1.31E-01
CO-58	3.29E+00
CO-60	4.28E+00
NI-63	3.77E-01
ZR-95	2.86E-04
ZR-97	5.93E-04
NB-95	1.96E+01
MO-99	1.30E-04
AG-110M	3.23E-03
TE-132	7.19E-02

T.Spec	Tot Body	ADULT	TBODY	6.91E-02	31-day	6.00E-02	1.15E+02
					Quarter	1.50E+00	4.61E+00
					Annual	3.00E+00	2.30E+00

Critical Pathway.....: 1 Fresh Water Fish - Sport (FFSP

LIQUID RELEASE AND DOSE SUMMARY REPORT
------ (PERIOD BASIS - BY UNIT) ------

Release ID.....: 1 All Liquid Releases
Period Start Date.....: 01/01/2017 00:00
Period End Date.....: 01/01/2018 00:00
Period Duration (mins): 5.256E+05

Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
SB-125	8.01E-05
SB-124	9.94E-06
H-3	9.76E+01
CR-51	7.89E-04
MN-54	1.94E-02
FE-59	2.04E-02
CO-58	4.94E-01
CO-60	6.83E-01
NI-63	1.19E+00
ZR-95	8.30E-08
ZR-97	1.19E-09
NB-95	2.36E-03
MO-99	1.45E-05
AG-110M	6.39E-06
TE-132	1.94E-03