



SPECIAL EXCEPTIONS AND ASSUMPTIONS FOR CALCULATION OF DOSES AND DOSE RATES

1. Camp Conoy
 - a) Location
 - (1) Camp Conoy is located within the **SITE BOUNDARY**.
 - (2) Camp Conoy is located in the SE sector.
 - (3) Camp Conoy is approximately 3000 feet from the plant.
 - b) Occupancy
 - (1) Camp Conoy is frequently visited by **MEMBERS OF THE PUBLIC**.
 - (2) Maximum occupancy for **MEMBERS OF THE PUBLIC** at Camp Conoy is restricted to approximately 3380 hours per year.
 - c) Meteorology
 - (1) The highest historical annual average x/Q for Camp Conoy is 2.40E-6 seconds per cubic meter.¹
 - d) Dose calculation assumptions
 - (1) Based on sections (b) and (c) above, any actual exposure to a **MEMBER OF THE PUBLIC** at Camp Conoy will be less than the calculated exposure for a **MEMBER OF THE PUBLIC** at the **SITE BOUNDARY**.¹
 - (2) No special considerations are required for addressing potential exposure at Camp Conoy.
2. Visitor's Center
 - a) Location
 - (1) The Visitor's Center is located within the **SITE BOUNDARY**.
 - (2) The Visitor's Center is located in the WNW sector.
 - (3) The Visitor's Center is approximately 1000 feet from the plant.
 - b) Occupancy
 - (1) The Visitor's Center is frequently visited by **MEMBERS OF THE PUBLIC**.
 - (2) Maximum occupancy for **MEMBERS OF THE PUBLIC** at The Visitor's Center is restricted to daylight hours.

¹ See CP-607, Revision 2 page 24.



c) Meteorology

- (1) The highest historical annual average x/Q for the Visitor's Center is $8.68E-6$ seconds per cubic meter.¹
- (2) The wind frequency for the WNW sector, based on 1983 meteorological data, is four percent (4%).¹

d) Dose calculation assumptions

- (1) "Using a conservative basis of 10% wind frequency, and individual visiting the center for 330 hours/year during the periods of worst case meteorological conditions would be most highly exposed."¹
- (2) The dose calculated for the controlling **SITE BOUNDARY** is more conservative by a factor of 7.¹
- (3) Based on sections (b) and (c) above, any actual exposure to a MEMBER OF THE PUBLIC at The Visitor's Center will be less than the calculated exposure for a MEMBER OF THE PUBLIC at the **SITE BOUNDARY**.
- (4) No special considerations are required for addressing potential exposure at The Visitor's Center.

¹

See CP-607, Revision 2 page 24.



RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM¹

1. Introduction
 - a) 10 CFR 50, Appendix I, Section IV.B.2 requires licensees to establish an environmental surveillance and monitoring program for the purpose of evaluating the relationship between quantities of radioactive material released in effluents and resultant radiation doses to individuals.
 - b) Radiological environmental controls have been established to implement the requirements of 10 CFR 50, Appendix I, Section IV.B.2.
 - c) These radiological environmental controls are described below.
2. Controls on the Radiological Environmental Monitoring Program (REMP)
 - a) The REMP shall consist of environmental sample locations, analysis parameters, analysis frequencies, detection limits, and **ACTION** levels all of which conform to the requirements of Control 3.12.1. (See Attachment 13, 14, 15, 16, and 17).
 - b) The REMP shall maintain a map showing sample locations near the **SITE BOUNDARY** in accordance with Control 3.12.1. (See Attachment 18).
 - c) The REMP shall maintain a map showing sample locations within a 8 km. radius of the plant in accordance with Technical Specification 5.6.2. (See Attachment 19).
3. Surveillance Requirements
 - a) Surveillances for direct radiation
 - (1) Direct radiation dosimetry shall be collected from locations DR1-DR23 listed on Attachment 13.
 - (2) In the event any of the monitoring stations, DR1-DR23, described on Attachment 13 become unavailable, establish new monitoring stations (with new dosimetry) as described below:
 - (a) In lieu of any location DR1-DR9 described on Attachment 13, establish a new monitoring station in the same meteorological sector in the general area of the **SITE BOUNDARY**.
 - (b) In lieu of any location DR10-DR18 described on Attachment 13, establish a new monitoring station in the same meteorological sector in the 6-8 km range from the site.

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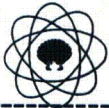
This portion of the environmental monitoring program is designed to monitor the environment surrounding the CCNPP. A separate environmental monitoring program designed to monitor the environment surrounding the Independent Spent Fuel Storage Installation is described elsewhere in the ODCM.



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- (c) In lieu of any location DR19-DR23 described on Attachment 13, establish a new monitoring station in either a special interest area (e.g., population center, nearby residence, school) or a control station whichever is applicable.
 - (3) In the event any dosimetry at an existing monitoring location DR1-DR23 becomes unavailable, place new dosimetry at the monitoring station.
 - (4) Analyze the dosimeters at the frequencies and for the parameters identified on Attachment 14.
 - (5) The sampling locations(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from the RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM after October 31 of the year in which the land use census was conducted in accordance with Control 3.12.2.b.
- b) Surveillances for airborne activity
- (1) Radioiodine and particulate samples shall be collected from locations A1-A5 listed on Attachment 13.
 - (2) In the event any of the monitoring stations, A1-A5, described on Attachment 13 become unavailable, establish new monitoring station(s) (fitted with new radioiodine and particulate samplers) as described below:
 - (a) In lieu of any location A1-A3 described on Attachment 13, establish a new monitoring station in the general area of the **SITE BOUNDARY**, such that the three monitoring stations are located in the meteorological sectors with the three highest calculated annual average ground level D/Q.
 - (b) In lieu location A4 described on Attachment 13, establish a new monitoring station near a community having the highest calculated annual average ground level D/Q.
 - (c) In lieu of location A5 described on Attachment 13 establish a new "control" location 15 to 30 kilometers from the plant in the least prevalent wind direction.



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- (3) In the event any radioiodine cartridge or particulate filter becomes unavailable from an existing monitoring location A1-A5 described on Attachment 13, place new radioiodine cartridge or particulate filter in the air sampler at the monitoring station.
 - (4) Analyze the samples at the frequencies and for the parameters identified on Attachment 15.
 - (5) The sampling locations(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from the RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM after October 31 of the year in which the land use census was conducted in accordance with Control 3.12.2.b.
- c) Surveillances of waterborne activity
- (1) Water and sediment samples shall be collected from the locations Wa1, Wa2, and Wb1 listed on Attachment 13.
 - (2) In the event any of the samples at Wa1, Wa2, or Wb1 are unavailable, collect substitute samples as described below:
 - (a) In lieu of a liquid sample at Wa1, collect a substitute sample of surface water from the intake area.
 - (b) In lieu of a liquid sample at Wa2, collect a substitute sample of surface water from the discharge area.
 - (c) In lieu of sample at Wb1, collect a substitute sample of sediment from a downstream shoreline with existing or potential recreational value.
 - (3) Analyze the samples at the frequencies and for the parameters identified on Attachment 16.
 - (4) The sampling locations(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from the RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM after October 31 of the year in which the land use census was conducted in accordance with Control 3.12.2.b.
- d) Surveillances for ingestible activity
- (1) Fish/invertebrate, milk, and food product samples shall be collected from the locations Ia1 thru Ia6 and Ib1 thru Ib9 listed on Attachment 13.
 - (2) In the event any of the samples at Ia1 thru Ia6 or Ib1 thru Ib9 are unavailable, collect substitute samples as described below:
 - (a) In lieu of samples at Ia1 thru Ia3, collect substitute three commercially and/or recreationally important species (two fish species and one invertebrate species) from the vicinity of the plant discharge area.



- (b) In lieu of samples at Ia4 thru Ia6, collect three commercially and/or recreationally important species (two fish species and one invertebrate species) from an area not influenced by plant discharges.
 - (c) In lieu of samples at Ib1 thru Ib6, collect three kinds of broad leaf vegetation grown near the **SITE BOUNDARY** at two different locations of highest average ground level D/Q¹.
 - (d) In lieu of samples at Ib7 thru Ib9, collect one sample each of the similar broad leaf vegetation grown 15-30 km distant in the least prevalent wind direction.
- (3) Analyze the samples at the frequencies and for the parameters identified on Attachment 17.
 - (4) The sampling locations(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from the Radiological Environmental Monitoring Program after October 31 of the year in which the land use census was conducted in accordance with Control 3.12.2.b.

4. Responsible Company Organizations

- a) The CHEMISTRY SECTION, CCNPPI is responsible for ensuring performance of the surveillances listed above.

5. Initiating conditions

- a) Collect samples in accordance with the frequencies specified on Attachments 14, 15, 16, and 17.
- b) Analyze samples in accordance with the frequencies specified on Attachments 15, 16, and 17.
- c) Calculate the potential annual doses in accordance with the methodology outlined below if any of the following conditions are true:
 - (1) any of the above surveillance results reveal levels of environmental activity greater than the **ACTION** Levels specified on Attachments 15, 16, 17 (per Control Table 3.12-2)
 - (2) any radionuclides other than those in Attachments 15, 16, and 17 are detected, and the radionuclides are the result of plant effluents.
- d) The REMP Manager is responsible for notifying the General Supervisor--Chemistry, CCNPP, if any of the following conditions are true:

¹ With fresh leafy vegetable samples unavailable from one or more of the sample locations listed on Attachment 13, perform corrective actions specified by Control 3.12.1.c.



- (1) any of the above surveillance results reveal levels of environmental activity greater than the **ACTION** Levels specified on Attachments 15, 16 17 (per Control Table 3.12-2)
- (2) any radionuclides other than those in Attachments 15, 16, and 17 are detected, and the radionuclides are the result of plant effluents, and the potential annual doses due to the radionuclides are greater than the calendar year limits of Controls 3.11.1.2, 3.11.2.2, and 3.11.2.3.

6. Calculation methodology

- a) If the correct initiating conditions, as described above, are present, calculate potential annual doses for the pathway of interest in accordance with the methodologies contained in ODCM, or
- b) if methodologies other than those listed in the ODCM are used to calculate potential annual doses, such methodologies shall be documented in the AREOR in accordance with Control 3.12.1.b.

7. Corrective **ACTIONS**

- a) If a sample is unobtainable due to sampling equipment malfunction, then attempt to restore equipment to operable status before the end of the next sampling period, and document in the AREOR (per Control 4.12.1, Table 3.12-1, notation "a").
- b) If the RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM is not being conducted in accordance with Attachments 13, 14, 15, 16, or 17 document deviations in the AREOR (per Control 3.12.1.a).
- c) With fresh leafy vegetable samples unavailable from one or more of the sample locations listed on Attachment 13, establish a new monitoring location and document applicable information in the AREOR (per Control 3.12.1.c).
- d) When the analysis result for any parameter exceeds the **ACTION** Level listed on Attachments 15, 16, or 17, submit a Special Report to the NRC (per Control 3.12.1.b).
- e) When radionuclides other than those listed on Attachments 15, 16, and 17 are detected; and if those radionuclides are the result of plant effluents; and if the potential annual doses due to the radionuclides are greater than the calendar year limits of Controls 3.11.1.2, 3.11.2.2, and 3.11.2.3; submit a Special Report in accordance with Control 3.12.1.b.



LAND USE CENSUS

1. Introduction
 - a) 10 CFR 50, Appendix I, Section IV.B.3 requires licensees to identify changes in the use of **UNRESTRICTED AREAS** in order to permit modifications in monitoring programs.
 - b) Radiological environmental controls have been established to implement the requirements of 10 CFR 50, Appendix I, Section IV.B.3.
 - c) These radiological environmental controls are described below.
2. Controls on the Land Use Census
 - a) Identify the location of the nearest milk animal, within a distance of 8 km of the plant site, in each of the 9 meteorological sectors (per Control 3.12.2).
 - b) Identify the location of the nearest residence, within a distance of 8 km of the plant site, in each of the 9 meteorological sectors (per Control 3.12.2).
 - c) Identify the location of the nearest garden, within a distance of 8 km of the plant site, in each of the 9 meteorological sectors; or if the garden census was not conducted, obtain samples of three different kinds of broad leaf vegetation from the **SITE BOUNDARY** in two different meteorological sectors which have the highest predicted **SITE BOUNDARY** D/Q (per Control 3.12.2).
3. Surveillance Requirement(s)
 - a) Perform a land use census that will provide the best results. Example methods may include, but are not limited to, the following:
 - (1) door-to-door surveys
 - (2) aerial views
 - (3) consult local agricultural authorities
 - b) Document the results of the land use census in the Annual Radiological Environmental Operating Report in accordance with Technical Specification 5.6.2.
 - c) Perform an Independent Technical Review of the land use census data.
4. Responsible Company Organizations
 - a) The Chemistry Section, CCNPPI, is responsible for ensuring the performance of the surveillances listed above.



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5. Initiating conditions
 - a) Conduct the land use census during the growing season, and conduct the land use census at least once per 12 months.
 6. Calculation methodology
 - a) Calculate doses for the pathways of interest in accordance with the methodologies contained in Regulatory Guide 1.109, or
 - b) if methodologies other than those listed in Regulatory Guide 1.109 are used to calculate doses, such methodologies should be documented in the Annual Radiological Environmental Operating Report.
 7. Corrective actions
 - a) The results of the land use census shall be used to determine the RADIOLOGICAL ENVIRONMENTAL MONITORING Programs sample locations identified on Attachment 13.
 - b) If the land use census has identified a location(s) that yields a calculated dose or dose commitment greater than the values currently being calculated in Control 4.11.2.3, perform the following activities.
 - (1) Document the new location(s) in the next Annual Radiological Environmental Operating Report in accordance with Technical Specification 5.6.2, and
 - (2) revise the figures and tables in the ODCM to reflect the new location(s).
 - c) If the land use census has identified a location(s) that yields a calculated dose or dose commitment (via the same exposure pathway) which is 20% greater than the equivalent location identified on Attachment 13, perform the following activities.
 - (1) Add the new location(s) to the RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM within 30 days,
 - (2) document the new location(s) in the next Annual Radiological Environmental Operating Report in accordance with Technical Specification 5.6.2, and
 - (3) revise the figures and tables in the ODCM to reflect the new location(s).



INTERLABORATORY COMPARISON PROGRAM

1. Introduction
 - a) 10 CFR 50, Appendix I, Section IV.B.2 requires licensees to establish an environmental surveillance and monitoring program for the purpose of evaluating the relationship between quantities of radioactive material released in effluents and resultant radiation doses to individuals.
 - b) Radiological environmental controls have been established to ensure that independent checks on the precision and accuracy of the measurements of radioactive material in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring.
 - c) These radiological environmental controls are described below.
2. Controls on the Interlaboratory Comparison Program
 - a) Analyze INTERLABORATORY COMPARISON PROGRAM samples supplied by either the Commission or a Commission approved laboratory for all parameters listed on Attachments 15, 16, and/or 17, as applicable¹ (per Control 3.12.3).
3. Surveillance Requirement(s)
 - a) A summary of the results obtained as part of the Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report pursuant to Technical Specification 5.6.2.
 - b) This section of the ODCM shall describe the Interlaboratory Comparison Program.
4. Responsible Company Organizations
 - a) The CHEMISTRY SECTION, CCNPPI, is responsible for ensuring performance of the surveillances listed above.
5. Initiating conditions
 - a) Analyze INTERLABORATORY COMPARISON PROGRAM samples whenever they are supplied by either the Commission or a Commission approved laboratory.
6. Calculation methodology
 - a) Analysis methods and calculational methodologies used to satisfy the above surveillances shall be documented in approved procedures.
7. Corrective actions
 - a) If analyses are not performed as required, document actions taken to prevent reoccurrence in the Annual Radiological Environmental Operating Report (AREOR) pursuant to Technical Specification 5.6.2.

¹ Since no Commission approved laboratory supplies TLDs as part of a comparison program, no TLDs are analyzed as part of the INTERLABORATORY COMPARISON PROGRAM.



ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

1. Introduction
 - a) 10 CFR 50, Appendix I, Section IV.B.2 requires licensees to provide data on measurable levels of radiation and radioactive materials in the environment.
 - b) Radiological environmental controls have been established to implement the requirements of 10 CFR 50, Appendix I, Section IV.B.2.
 - c) These radiological environmental controls are described below.
2. Controls on the Annual Radiological Environmental Operating Report (AREOR)
 - a) The AREOR shall include a summary description of the radiological environmental monitoring program (REMP).
 - b) The AREOR shall include a summary description of the Independent Spent Fuel Storage Installation Monitoring Program (ISFSIMP).
 - c) The AREOR shall include a table similar to Attachment 13 which states the distance and direction from the central point between the two containment buildings to each of the REMP sample points.
 - d) The AREOR shall include a table similar to Attachment 20 which states the distance and direction from the central point of the ISFSI to each of the ISFSIMP sample points.
 - e) The AREOR shall include summaries, interpretations, and an analysis of trends of the results of the radiological environmental surveillance activities for the report period.
 - f) The AREOR shall include a comparison between the annual REMP results and the Radiological Environmental Operating Report preoperational studies.
 - g) The AREOR shall include a comparison between the annual ISFSIMP results and Radiological Environmental Operating Report pre-fuel-load studies.
 - h) The AREOR shall include a comparison with operational controls as appropriate.
 - i) The AREOR shall include a comparison with the previous environmental surveillance reports.
 - j) The AREOR shall include an assessment of the observed impacts of plant operation on the environment.
 - k) The AREOR shall include an assessment of the observed impacts of ISFSI operation on the environment.
 - l) The AREOR shall include the results of the land use censuses required by Control 3.12.2.



- m) The AREOR shall include the results of analysis of all radiological environmental samples taken during the period pursuant to the locations specified on Attachments 13 and 20.
- n) The AREOR shall include the results of all environmental radiation measurements taken during the period pursuant to the locations specified on Attachments 13 and 20.
- o) The AREOR shall include summarized and tabulated results--in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979--of analysis of all radiological environmental samples taken during the period pursuant to the locations specified on Attachments 13 and 20.
- p) The AREOR shall include summarized and tabulated results--in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979--of all environmental radiation measurements taken during the period pursuant to the locations specified on Attachments 13 and 20.
- q) The AREOR shall include an explanation for missing results, if some individual results (as described in the above paragraph) are not available for inclusion with the report.
- r) The AREOR shall include any data which was missing from previous reports.
- s) The AREOR shall include at least two legible maps¹ covering all REMP sampling locations keyed to a table giving distances and directions from the central point between the two containment buildings.
- t) The AREOR shall include at least one legible map covering all ISFSIMP sampling locations keyed to a table giving distances and directions from the central point of the ISFSI.
- u) The AREOR shall include results of the licensee participation in the INTERLABORATORY COMPARISON PROGRAM required by Control 3.12.3.
- v) The AREOR shall include a discussion of all deviations from the sampling schedules listed on Attachments 14, 15, 16, and 17, and specify the reason(s) for the deviations, and the plan for preventing recurrence.
- w) The AREOR shall include a discussion of all analyses in which the LLD listed on Attachments 15, 16, and 17 (and required by Control Table 4.12-1) was not achievable.
- x) The AREOR shall include the identification of the cause of unavailability of samples (if any), and describe the locations used for replacement samples.
- y) The AREOR shall include any permanent changes in the sample locations in the monitoring program.

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One map shall cover stations near the SITE BOUNDARY; a second shall include the more distant stations.



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- z) The AREOR shall include revised figure(s) (e.g., like Attachments 18 and 19) and tables (e.g., like Attachment 13) for the ODCM which reflect any new REMP sample location(s).
 - aa) The AREOR shall include revised figure(s) (e.g., like Attachments 21 and 22) and table(s) (e.g., like Attachment 20) for the ODCM which reflect any new ISFSIMP sample location(s).
 - bb) The AREOR shall receive an independent review for technical content prior to submittal to the NRC.
 - cc) Material provided in the AREOR shall be consistent with the objectives outlined in the ODCM and 10 CFR 50, Appendix I, Section IV.3.2, IV.3.3 and IV.C.
3. Surveillance Requirement(s)
- a) Write the Annual Radiological Environmental Operating Report covering the previous calendar year's operation of the reactor units.
4. Responsible Company Organizations
- a) The Chemistry Section, CCNPPI, is responsible for ensuring the performance of the surveillances listed above¹.
5. Initiating conditions
- a) Submit the Routine AREOR (covering operation of the reactor units for the previous calendar year) of each year in accordance with Technical Specification 5.6.2.
6. Calculation methodology
- a) Calculational methodologies used to satisfy the above surveillances should be documented in approved procedures, or should be included in the AREOR.
7. Corrective actions
- a) If analyses are not performed as required, document actions taken to prevent reoccurrence in the AREOR pursuant to Technical Specification 5.6.2.

¹ A separate company may be contracted to complete the Routine AREOR.



INDEPENDENT SPENT FUEL STORAGE INSTALLATION MONITORING PROGRAM

1. Introduction
 - a) The Technical Specifications for the Independent Spent Fuel Storage Installation¹ (ISFSI), licensed under 10 CFR 72, require that monitoring for the ISFSI be added to the existing environmental monitoring program for CCNPP.
 - b) CCNPP has committed to additional monitoring for the ISFSI.²
 - c) Radiological environmental controls have been established to implement the requirements and commitments described above.
 - d) These radiological environmental controls are described below.
2. Controls on the ISFSI Monitoring Program
 - a) Environmental monitoring sites, as described in Attachment 20, shall be established to monitor the air, vegetation, and soil as well as direct radiation in the ISFSI environs.³
 - b) Analysis parameters, analysis frequencies, detection limits, and **ACTION** levels shall conform to the applicable requirements of Controls 3.12.1. (See attachment 14, 15, 16, and 17)
 - c) Map(s) shall be maintained and shall show the locations of the environmental monitoring sites with respect to plant facilities. (See attachment 21 and 22).
3. Surveillance Requirements
 - a) Surveillances for direct radiation
 - (1) Direct radiation dosimetry shall be collected from locations SFDR1-SFDR16, DR7, and DR30 listed in Attachment 20.
 - (2) In the event any dosimetry at an existing monitoring location SFDR1-SFDR16, DR7, or DR30 becomes unavailable, place new dosimetry at the monitoring station.
 - (3) Analyze the dosimeters at the frequencies and for the parameters identified on Attachment 14.

¹ The Technical Specifications For Calvert Cliffs Independent Spent Fuel Storage Installation is Appendix "A" to Materials License SNM-2505.

² See the letter titled "Response to NRC's Comments to Environmental Issues Regarding BGE's License Application for Calvert Cliffs Independent Spent Fuel Storage Installation (ISFSI)" from Mr. R. E. Denton (BGE) to Director, Office of Nuclear Material Safety and Safeguards (NRC), dated November 1, 1990.

³ Environmental monitoring sites and monitoring parameters specifically excluded from the ISFSIMP include airborne radioiodines, radioiodines in food products, surface water, and fish and invertebrates. Additionally, soil samples shall be collected in lieu of shoreline sediment. The sampling frequency for vegetation and soil shall be quarterly.



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- b) Surveillances for airborne particulate activity
- (1) Air particulate samples shall be collected from locations A1 and SFA1-SFA4 listed on Attachment 20.
 - (2) In the event any particulate filter becomes unavailable from an existing monitoring location A1 or SFA1-SFA4 described on Attachment 20, place a new particulate filter in the air sampler at the monitoring station.
 - (3) Analyze the samples at the frequencies and for the parameters identified under "Particulate Filters" on Attachment 15.
- c) Surveillances for deposition on vegetation
- (1) The vegetation samples SFb1-SFb5 shall be collected from the locations listed on Attachment 20.
 - (2) In the event any of the sampling sites SFb1-SFb5 described on Attachment 20 become unavailable, establish new sampling sites as described below:
 - (a) In lieu of sample SFb1, collect vegetation grown in the NW sector of the ISFSI.
 - (b) In lieu of sample SFb2, collect vegetation grown in the general vicinity of the CCNPP Visitor's Center.
 - (c) In lieu of sample SFb3, collect vegetation grown in the North North West sector of the ISFSI.
 - (d) In lieu of sample SFb4, collect vegetation grown in the South-Southeast sector of the ISFSI.
 - (e) In lieu of sample SFb5, collect vegetation grown in the East-Southeast sector of the ISFSI.
 - (3) Analyze the samples quarterly for the non-iodine parameters identified under "Food Products" on Attachment 17.



d) Surveillances for soil activity

- (1) The soil samples SFS1-SFS5 shall be collected from the locations listed on Attachment 20.
- (2) In the event any of the sampling sites SFS1-SFS5 described on Attachment 20 become unavailable, establish new sampling sites as described below:
 - (a) In lieu of sample SFS1, collect soil in the NW sector of the ISFSI.
 - (b) In lieu of sample SFS2, collect soil in the general vicinity of the CCNPP Visitor's Center.
 - (c) In lieu of sample SFS3, collect soil in the North North West sector of the ISFSI.
 - (d) In lieu of sample SFS4, collect soil in the South-Southeast sector of the ISFSI.
 - (e) In lieu of sample SFS5, collect soil in the East-Southeast sector of the ISFSI.
- (3) Analyze the samples quarterly for the parameters identified under "Shoreline Sediment Sample" on Attachment 16.

4. Responsible Company Organizations

- a) The CHEMISTRY SECTION, CCNPPI, is responsible for ensuring the performance of the surveillances listed above.

5. Initiating conditions

- a) Collect samples in accordance with the frequencies specified on Attachments 14, 15, 16, and 17. Soil and vegetation samples shall be collected quarterly.
- b) Analyze samples in accordance with the frequencies specified on Attachments 14, 15, 16, and 17. Soil and vegetation samples shall be analyzed quarterly.
- c) Calculate the potential annual doses in accordance with the methodology outlined elsewhere in this section if any of the following conditions are true:
 - (1) any of the above surveillance results reveal levels of environmental activity greater than the **ACTION** Levels specified on Attachments 14, 15, 16, and 17, as appropriate. (per Control Table 3.12-2), or
 - (2) any radionuclides other than those listed on Attachments 14, 15, 16, and 17 are detected, and the radionuclides are the result of plant effluents or radionuclide deposition from the ISFSI, and the potential annual doses due to the radionuclides are greater than the limits listed in Control 3.12.1.b.
- d) The Chemistry Section, CCNPPI, is responsible for notifying the General Supervisor-Chemistry, CCNPP, if any of the following conditions are true:



- (1) any of the above surveillance results reveal levels of environmental activity greater than the **ACTION** Levels specified on Attachments 14, 15, 16, and 17, as appropriate (per Control Table 3.12-2), or
- (2) any radionuclides other than those in Attachments 14, 15, 16, and 17 are detected, and the radionuclides are the result of plant effluents or radionuclide deposition from the ISFSI, and the potential annual doses due to the radionuclides are greater than the limits listed in Control 3.12.1.b.

6. Calculation methodology

- a) If any (of the above) surveillance results reveal levels of environmental activity greater than the **ACTION** Levels specified on Attachments 14, 15, 16, or 17 (per Control Table 3.12-2), calculate potential annual doses for the pathway of interest, in accordance with the methodologies contained in Regulatory Guide 1.109.
- b) If methodologies other than those listed in Regulatory Guide 1.109 are used to calculate potential annual doses, such methodologies shall be documented in accordance with Control 3.12.1.b.

7. Corrective actions

- a) If a sample is unobtainable due to sampling equipment malfunction, then attempt to restore equipment to operable status before the end of the next sampling period, and document in the AREOR.
- b) If the ISFSIMP is not being conducted in accordance with the "Surveillance Requirements" listed elsewhere in this section, document deviations in the AREOR.
- c) When the analysis result for any parameter exceeds the **ACTION** Level listed on Attachments 15, 16, or 17, as appropriate, submit a Special Report to the NRC (per Control 3.12.1.b).
- d) When radionuclides other than those listed on Attachments 15, 16, and 17 are detected, and when those radionuclides are the result of plant effluents or radionuclide deposition from the ISFSI, submit a Special Report if required by and in accordance with Control 3.12.1.b.



RADIOACTIVE EFFLUENT RELEASE REPORT

INTRODUCTION

1. Technical Specification 5.6.3 requires submittal of a written report to the NRC every 12 months.
2. The report is described below.

RESPONSIBILITIES

1. The General Supervisor Chemistry is responsible for the timely and accurate completion of the report.

REPORT CONTENTS

1. The Radioactive Effluent Release Report (RERR) covering the operation of the unit shall be submitted every 12 months in accordance with 10 CFR 50.36a.
2. The RERR shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the units. The material provided shall be consistent with the objectives outlined in the ODCM and in conformance to 10CFR50.36a and 10CFR50, Appendix I, section IV.B.1. Principle Gamma Emitters from Batch Waste Releases and Turbine Building Sump shall be analyzed and included in this report pursuant to Table Notation c of Control Table 4.11-1, "Radioactive Liquid Waste Sampling and Analysis Program." In addition, Principal Gamma Emitters from the Waste Gas Storage Tank, Containment Purge and Vent, and the Main Vent shall be analyzed and included in this report pursuant to Table Notation b of Controls Table 4.11-2, "Radioactive Gaseous Waste Sampling and Analysis Program." Additional information which may be required in the report is contained in Controls 3.3.3.9.b, 3.3.3.10.b and Technical Specification 5.6.3.
3. The RERR shall include an annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing on magnetic tape of wind speed, wind direction, atmospheric stability, and precipitation (if measured), or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability.¹ This same report shall include an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year. The assessment of radiation doses shall be performed in accordance with the methodology and parameters in the **OFFSITE DOSE CALCULATION MANUAL** (ODCM).
4. The RERR shall also include an assessment of radiation doses to the likely most exposed **MEMBER OF THE PUBLIC** from reactor releases and other nearby uranium fuel cycle sources, including doses from primary effluent pathways and direct radiation, for the previous calendar year to show conformance with 40 CFR Part 190, Environmental Radiation Protection Standards for Nuclear Power Operation. Acceptable methods for calculating the dose contribution from liquid and gaseous effluents are given in Regulatory Guide 1.109, Rev. 1, October 1977, and NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants."

¹

In lieu of submission with the Radioactive Effluent Release Report, this summary of required meteorological data may be retained on site in a file that shall be provided to the NRC upon request.



5. The RERR shall include the following information for each class of solid waste (as defined by 10 CFR Part 61) shipped offsite during the report period:
 - a. Container volume,
 - b. Total curie quantity (specify whether determined by measurement or estimate),
 - c. Principal radionuclides (specify whether determined by measurement or estimate),
 - d. Source of waste and processing employed (e.g., dewatered spent resin, compacted dry waste, evaporator bottoms),
 - e. Solidification agent or absorbent (e.g., cement).
6. The RERR shall include a list and description of unplanned releases from the site to **UNRESTRICTED AREAS** of radioactive materials in gaseous and liquid effluents made during the reporting period.
7. The RERR shall include any changes made during the reporting period to the **OFFSITE DOSE CALCULATION MANUAL** (ODCM) and a listing of new locations for dose calculations identified by the annual land use census pursuant to Control 3.12.2.
8. The RERR shall include any changes made during the reporting period to the **PROCESS CONTROL PROGRAM** (PCP)¹. The report shall contain:
 - a. A description of the equipment, components and processes involved.
 - b. Documentation of the fact that the change, including the safety analysis, was reviewed and found acceptable by the POSRC.

REPORT SUBMITTAL

1. Prior to submittal a Independent Technical Review will be performed.
2. The RERR will be submitted every 12 months in accordance with 10 CFR 50.36a and 50.4.

¹ Licensee initiated changes to the PCP shall become effective upon review by the POSRC and approval of the Plant General Manager.



ADMINISTRATION OF THE ODCM

INTRODUCTION

1. Procedures covering the ODCM and the implementation of the ODCM shall be implemented.
2. Administrative controls have been established to implement controls on the ODCM.
3. These administrative controls are described below.

CONTROLS ON THE ODCM

1. The format, organization, content, and administration of the ODCM are controlled by CH-1-103.
2. Methodologies identified in the ODCM are implemented by various CCNNPI organizations in accordance with approved procedures. (See the "RESPONSIBILITIES" section of CH-1-103 for a list of those Sections of CCNNPI responsible for approving and maintaining procedures which implement the requirements of the ODCM.)
3. The main vent stack flow rates shall be verified in accordance with the surveillances described in the following section, "Surveillance Requirements".
4. Licensee initiated changes to the ODCM:
 - a) Shall be documented and records of reviews performed shall be retained. This documentation shall contain
 - (1) Sufficient information to support the change(s) together with the appropriate analyses or evaluations justifying the change(s);
 - (2) A determination that the change(s) maintain the levels of radioactive effluent control required by 10 CFR 20 (1990), 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and 10 CFR Part 50, Appendix I, and not adversely impact the accuracy or reliability of effluent dose, or setpoint calculations;
 - b) Shall become effective upon review by the onsite review function and approval of the plant manager; and
 - c) Shall be submitted to the NRC in the form of a complete, legible copy of the entire ODCM as part of or concurrent with the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. The copy submitted to the NRC shall include markings in the margin of the affected pages, clearly indicating the area of the page that was changed and shall indicate the date (for example, month and year) the change was implemented.

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Surveillance Requirements

1. Complete audits and PERIODIC REVIEWS of the ODCM in accordance with CH-1-103.
2. Determine main vent stack flow rates for both units as described below.
 - a) The main vent stack flow rate shall be determined, in accordance with approved procedures, at least once per 6 months ($\pm 25\%$).
 - b) The Electrical and Control Section shall be responsible for performing this test.
 - c) The results of the main vent flow rate test shall be evaluated to ensure the main vent flow rates used in the ODCM are an accurate reflection of the true main vent flow rates.
 - d) IF the main vent stack flow rate for either unit, as determined in accordance with approved Test and Equipment procedure(s), changes $\pm 10\%$ from the values referenced in Attachment 7 of the ODCM, a technical evaluation shall be initiated to determine if the ODCM should be revised.

RESPONSIBLE COMPANY ORGANIZATIONS

1. CH-1-103 identifies the responsibilities of various personnel and company organizations which administer and implement the ODCM. This section of the ODCM identifies company organizations which are assigned responsibility for implementing the surveillances described above.
2. The Electrical and Control Section is responsible for ensuring the main vent stack flow rate test procedure (e.g., STP-M-462-1, STP-M-462-2 or equivalent) is completed in accordance with the surveillances listed above.
3. The Electrical and Control Section is responsible for forwarding main vent stack flow rate test results to the General Supervisor - Chemistry.
4. The RETS Program Manager, CCNPPI CHEMISTRY SECTION, is responsible for evaluating main vent flow rate test results (e.g., STP-M-462-1, STP-M-462-2 or equivalent results) and for performing the technical evaluation described in the above surveillances.

INITIATING CONDITIONS

1. Main vent stack flow rates shall be determined at least once per 6 months ($\pm 25\%$), or more often if required by Controls.
2. Complete PERIODIC REVIEWS of the ODCM as specified in CH-1-103.



CALCULATION METHODOLOGIES

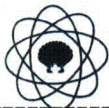
1. Computational methodologies used to satisfy the above surveillances should be documented in approved procedures.
2. Documents which serve as a basis for calculation methodologies used in the ODCM should be maintained in an accessible location.
 - (1) Supporting documents may be incorporated into the ODCM (e.g., as Attachments).
 - (2) Supporting documents may be maintained in a "procedure history file".
 - (3) Supporting documents may be identified in the "references" section of the ODCM.

CORRECTIVE ACTIONS

1. IF main vent stack flow rates, as determined in accordance with appropriate Test Equipment procedure(s), change $\pm 10\%$ from the values referenced in Attachment 7 of the ODCM, a technical evaluation shall be initiated to determine if the ODCM should be revised.

BASES

1. [B527], NRC Inspection Report INSR 91-30/30



Attachment 1 Final Grading And Drainage Plan

A reference diagram which depicts the grading for and the drainage from the Calvert Cliffs Nuclear Power Plant can be found in the following reference:

Final Grading And Drainage Plan
Calvert Cliffs Nuclear Power Plant Units 1 and 2,

BGE Document ID Number: 61517SH0001
BGE Document ID Number: 61514SH0002

The above referenced grading and drainage plan is intended for reference only. This drawing may not reflect the changes and modifications since March 1975.



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 224 of 318

Attachment 2 Sources of Liquid Radioactive Waste

Waste Stream	Radiation Monitor	Type of Release	Max. Discharge Flow Rate		Maximum Volume		Notes
			gal/min	liters/min	gal	liters	
Rx. Coolant Wst. Mon. Tk.	0-RE-2201	Batch	120	454	90000 ¹³	3.407E5 ¹³	
Rx. Coolant Wst. Rec. Tk.	0-RE-2201	Batch	120	454	90000 ¹³	3.407E5 ¹³	
Misc. Wst. Mon. Tk.	0-RE-2201	Batch	120	454	4000 ¹³	15140 ¹³	
Misc. Wst. Rec. Tk.	0-RE-2201	Batch	120	454	4000 ¹³	15140 ¹³	
Aux. Boiler Steam Drum	All releases are via Auxiliary Blowdown Tank						
Aux. Blowdown Tk.	Unmonitored	Continuous	200 ¹²	757	N/A	N/A	
Waste Neut. Tk. 11	Unmonitored	Batch	1000 ¹	3790 ¹	45988	1.74E5	
Waste Neut. Tk. 12	Unmonitored	Batch	1000 ¹	3790 ¹	47749	1.80E5	
Strm. Gen. Blowdown Tk.	1/2-RE-4014 ¹⁴	Continuous/ Batch ¹¹	225 ²	852 ²	2350 ³	8895 ³	
Component Cooling Water ⁴	Unmonitored	Continuous	variable ⁵	variable ⁵	44090 ⁶	1.669E5	
Condenser Hotwells	Unmonitored	Batch ¹⁰	4500 ⁷	17000 ⁷	1.05E5	3.97E5	
Salt Water System	Unmonitored	Continuous	15500	58670	N/A	N/A	
Condensate Storage Tank	Unmonitored	Batch	Variable ⁸	Variable ⁸	3.5E5 ⁹	1.3E6 ⁹	
Demin. Water Storage Tank	Unmonitored	Batch	Variable ⁸	Variable ⁸	3.5E5 ⁹	1.3E6 ⁹	
Precoat Sump	Unmonitored	Continuous	50	94.6	10305 ³	39004 ³	



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 225 of 318

Attachment 2 Sources of Liquid Radioactive Waste

Waste Stream	Radiation Monitor	Type of Release	Max. Discharge Flow Rate		Maximum Volume		Notes
			Gal/min	liters/min	gal	liters	
Aux. Building Roof Drains ¹⁹	Unmonitored	Continuous	Variable	Variable	N/A	N/A	
Sewage Treatment Plant	Unmonitored	Continuous	185	700	N/A	N/A	
Turbine Bldg. Sump No. 11	Unmonitored	Continuous	470	889	1950	7381	
Turbine Bldg. Sump No. 12	Unmonitored	Continuous	470	889	2415	9141	
Turbine Bldg. Sump No. 21	Unmonitored	Continuous	470	889	2490	9425	
Turbine Bldg. Sump No. 22	Unmonitored	Continuous	470	889	2182	8259	
Diesel Oil Interceptor Sump	Unmonitored	Continuous	100	378.5	5790	21920	
Yard Oil Interceptor	Unmonitored	Continuous	variable ¹⁵	variable ¹⁵	N/A	N/A	
Refueling Water Tank	Unmonitored	Batch/Cont. ¹⁷	variable ¹⁵	variable ¹⁵	4.2E5	1.6E6	
Condensate Storage Tank	Unmonitored	Batch/Cont. ¹⁷	variable ¹⁵	variable ¹⁵	3.5E5 ¹⁶	1.3E6 ¹⁶	
Service Water System	1/2-RE-1595	Continuous	variable ¹⁵	variable ¹⁵	31418	1.189E5	
Plant Heating System ¹⁸	Unmonitored	Continuous	variable ¹⁵	variable ¹⁵	N/A	N/A	



Attachment 2 Sources of Liquid Radioactive Waste

1. This flow rate is only an approximation. The motive force is gravity.
2. This is the maximum flow rate. The actual flow rate will be considerably less.
3. This is the maximum volume of the tank for a BATCH RELEASE. If the release is a **CONTINUOUS RELEASE**, the volume discharged would be calculated from the discharge flow rate and duration of the release.
4. There is no direct path by which radioactive liquid from the CCW System could enter outfall 001. Liquid from the CCW System may leak into either the Salt Water System (which drains to outfall 001) or the Liquid Waste Processing System (via Aux. Bldg. Drains).
5. Radioactive liquid is not normally released from the CCW system. Flow rate to outfall 001 may occur via Salt Water System. For this pathway, the flow rate will vary (e.g., depending on size of leak). See Safety Analysis No. 2, FCR 82-1053, Supplement 1.
6. System volume is 5894 cubic feet. Conversion constant is 0.13368 cubic feet per gallon.
7. The flow rate shown here is the flow rate for one condensate pump. Verify the number on condensate pumps in service, and modify this flow rate accordingly.
8. Flow rate should be calculated on a case-by-case basis.
9. Volume obtained from "Plant Data Book", BGE CCNPP Units 1 and 2, Bechtel Power Corporation, Volume 1, Job 6750.
10. May be a **CONTINUOUS RELEASE** if contaminated sealing steam is operated during the release.
11. Although steam generator releases may be either CONTINUOUS RELEASES or BATCH RELEASES. Verify type of release to be conducted prior to discharge.
12. This is the maximum rated discharge for two pumps in operation.
13. The volume specified is the design basis volume from Table 11-1 of the UFSAR.
14. The steam generator blowdown effluent radiation monitor, 1/2-RE-4095, may be equivalent to the 1/2-RE-4014 (see part 5, Liquid Effluent Radiation Monitor Alarm and Fixed Setpoints, para: 2)
15. Maximum discharge flow rate shall be determined on a case-by-case basis.
16. Volume obtained from "Plant Data Book", BGE CCNPP Units 1 and 2, Bechtel Power Corporation, Volume 1, Job 6750.
17. Releases via this pathway would be considered a **BATCH RELEASE** if a catastrophic tank failure occurred. In the event of a small leak, the release may be considered a **CONTINUOUS RELEASE**. The release mode should be determined on a case-by-case basis.
18. The plant heating system is a closed system and is not normally released to the environment. In the event of a leak, the effluent may be released to the environment via the turbine building sumps. In some cases, depending on the location of the leak, the effluent would be collected in the auxiliary building sump and subsequently released through the liquid radioactive waste processing system. The effluent pathway should be determined on a case-by-case basis.
19. Plant drawings indicate that these drains discharge to outfalls 003 and 004.



OFFSITE DOSE CALCULATION MANUAL

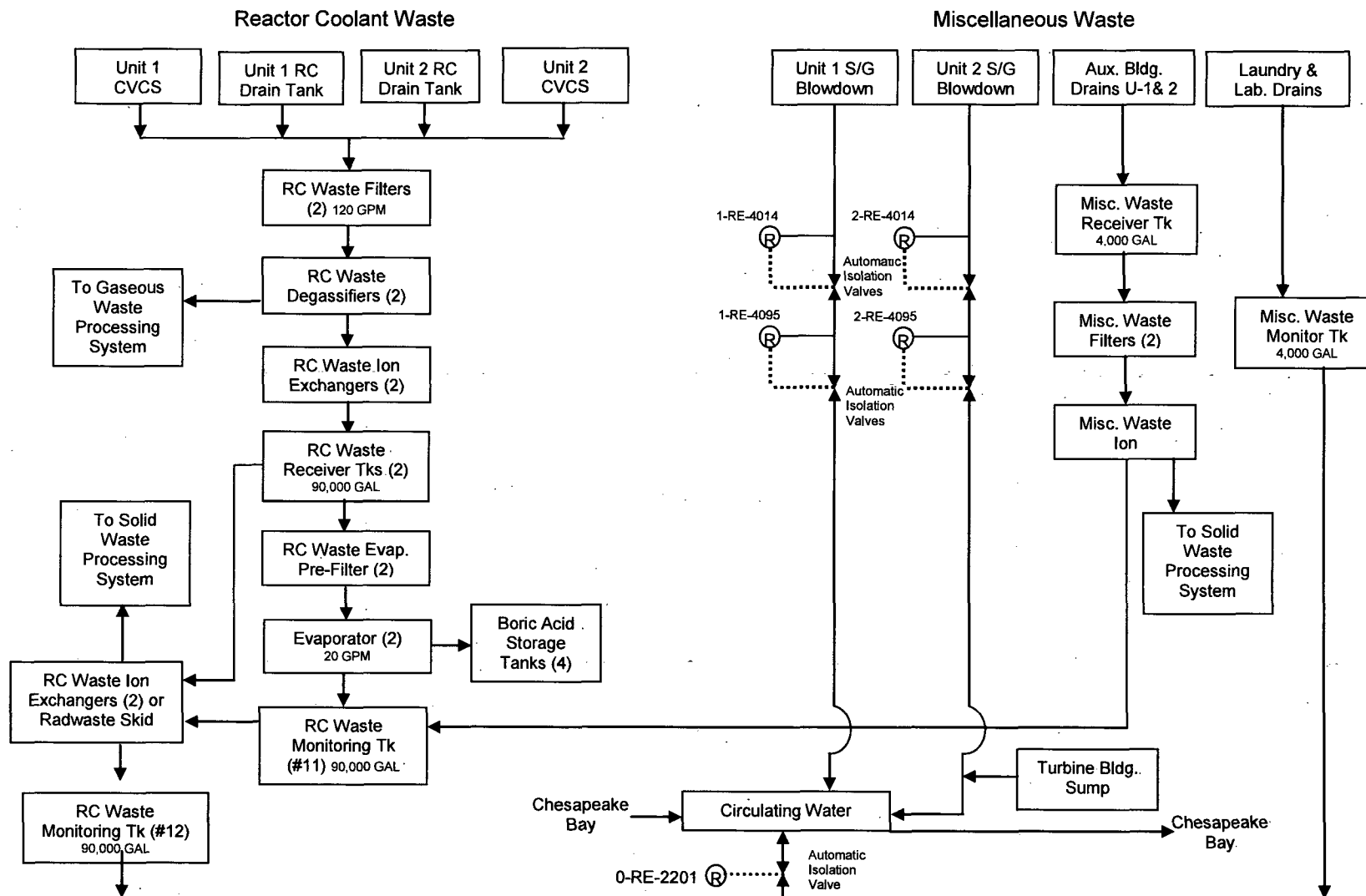
Rev. 00802
Page 227 of 318

Attachment 3

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Attachment 4
Block Diagram of Liquid Radioactive Waste Systems





Attachment 5
Radionuclides in Typical Radwaste Discharges

The term f_i -- a fraction which represents the relative activity contribution of nuclide i to the average total effluent activity -- is used in several equations in the ODCM (e.g., equations 2G, 5G, 3L, and 4L). This attachment provides guidance for calculating the values of f_i .

1. Select the calendar quarters which contain at least one "typical" liquid (or gas) release (see definition of TYPICAL RADWASTE RELEASE).
2. For each of the calendar quarters selected above, obtain a listing of the nuclides, nuclide activities, and release (end) dates.
 - a. This data may be obtained from the Radioactive Effluent Release Report(s) for the time periods of interest, or
 - b. This data may be obtained from a computer-based effluent management system (if available).
 - c. The values of nuclide activities and release end times may be close approximations of the true values.
3. Sum the quarterly activities (curies) for each individual radionuclide.

$A_{iT} = \sum A_{iQ}$	Eq. 1R
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4. Sum the quarterly activities for all radionuclides, i .

$A_T = \sum A_{iT}$	Eq. 2R
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5. Calculate the fraction of the total activity attributable to each radionuclide (i.e., the relative activity of nuclide i).

$f_i = A_{iT} / A_T$	Eq. 3R
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OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 230 of 318

Attachment 6 Liquid Effluent Dose Factors (mrem/hr per uCi/ml)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	2.820E-01	2.820E-01	2.820E-01	2.820E-01	2.820E-01	2.820E-01
BE-7	2.700E+01	1.100E+01	6.500E+01	1.300E+00	1.600E+01	3.100E+00	2.700E+02
C-14	1.450E+04	2.900E+03	2.900E+03	2.900E+03	2.900E+03	2.900E+03	2.900E+03
NA-24	4.570E-01	4.570E-01	4.570E-01	4.570E-01	4.570E-01	4.570E-01	4.570E-01
P-32	4.690E+06	2.910E+05	1.810E+05	0.000E+00	0.000E+00	0.000E+00	5.270E+05
CR-51	0.000E+00	0.000E+00	5.580E+00	3.340E+00	1.230E+00	7.400E+00	1.400E+03
MN-54	0.000E+00	7.060E+03	1.350E+03	0.000E+00	2.100E+03	0.000E+00	2.160E+04
MN-56	0.000E+00	1.780E+02	3.150E+01	0.000E+00	2.260E+02	0.000E+00	5.670E+03
FE-55	5.110E+04	3.530E+04	8.230E+03	0.000E+00	0.000E+00	1.970E+04	2.030E+04
FE-59	8.060E+04	1.900E+05	7.270E+04	0.000E+00	0.000E+00	5.300E+04	6.320E+05
CO-57	0.000E+00	1.420E+02	2.360E+02	0.000E+00	0.000E+00	0.000E+00	3.590E+03
CO-58	0.000E+00	6.030E+02	1.350E+03	0.000E+00	0.000E+00	0.000E+00	1.220E+04
CO-60	0.000E+00	1.730E+03	3.820E+03	0.000E+00	0.000E+00	0.000E+00	3.250E+04
NI-63	4.960E+04	3.440E+03	1.670E+03	0.000E+00	0.000E+00	0.000E+00	7.180E+02
NI-65	2.020E+02	2.620E+01	1.200E+01	0.000E+00	0.000E+00	0.000E+00	6.650E+02
CU-64	0.000E+00	2.140E+02	1.010E+02	0.000E+00	5.400E+02	0.000E+00	1.830E+04
ZN-65	1.610E+05	5.130E+05	2.320E+05	0.000E+00	3.430E+05	0.000E+00	3.230E+05
ZN-69	3.430E+02	6.560E+02	4.560E+01	0.000E+00	4.260E+02	0.000E+00	9.850E+01
BR-82	0.000E+00	0.000E+00	4.070E+00	0.000E+00	0.000E+00	0.000E+00	4.670E+00
BR-83	0.000E+00	0.000E+00	7.250E-02	0.000E+00	0.000E+00	0.000E+00	1.040E-01
BR-84	0.000E+00	0.000E+00	9.390E-02	0.000E+00	0.000E+00	0.000E+00	7.370E-07
BR-85	0.000E+00	0.000E+00	3.860E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	6.240E+02	2.910E+02	0.000E+00	0.000E+00	0.000E+00	1.230E+02
RB-88	0.000E+00	1.790E+00	9.490E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	1.190E+00	8.340E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	4.990E+03	0.000E+00	1.430E+02	0.000E+00	0.000E+00	0.000E+00	8.000E+02
SR-90	1.230E+05	0.000E+00	3.010E+04	0.000E+00	0.000E+00	0.000E+00	3.550E+03
SR-91	9.180E+01	0.000E+00	3.710E+00	0.000E+00	0.000E+00	0.000E+00	4.370E+02
SR-92	3.480E+01	0.000E+00	1.510E+00	0.000E+00	0.000E+00	0.000E+00	6.900E+02
Y-90	6.060E+00	0.000E+00	1.630E-01	0.000E+00	0.000E+00	0.000E+00	6.420E+04
Y-91M	5.730E-02	0.000E+00	2.220E-03	0.000E+00	0.000E+00	0.000E+00	1.680E-01
Y-91	8.880E+01	0.000E+00	2.370E+00	0.000E+00	0.000E+00	0.000E+00	4.890E+04
Y-92	5.320E-01	0.000E+00	1.560E-02	0.000E+00	0.000E+00	0.000E+00	9.320E+03
Y-93	1.690E+00	0.000E+00	4.660E-02	0.000E+00	0.000E+00	0.000E+00	5.350E+04
ZR-95	1.590E+01	5.110E+00	3.460E+00	0.000E+00	8.020E+00	0.000E+00	1.620E+04
ZR-97	8.810E-01	1.780E-01	8.130E-02	0.000E+00	2.680E-01	0.000E+00	5.510E+04
NB-95	4.470E+02	2.490E+02	1.340E+02	0.000E+00	2.460E+02	0.000E+00	1.510E+06
NB-97	3.750E+00	9.490E-01	3.460E-01	0.000E+00	1.110E+00	0.000E+00	3.500E+03



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 231 of 318

Attachment 6 Liquid Effluent Dose Factors (mrem/hr per uCi/ml)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
MO-99	0.000E+00	1.280E+02	2.430E+01	0.000E+00	2.890E+02	0.000E+00	2.960E+02
TC-99M	1.300E-02	3.660E-02	4.660E-01	0.000E+00	5.560E-01	1.790E-02	2.170E+01
TC-101	1.330E-02	1.920E-02	1.880E-01	0.000E+00	3.460E-01	9.810E-03	0.000E+00
RU-103	1.070E+02	0.000E+00	4.600E+01	0.000E+00	4.070E+02	0.000E+00	1.250E+04
RU-105	8.890E+00	0.000E+00	3.510E+00	0.000E+00	1.150E+02	0.000E+00	5.440E+03
RU-106	1.590E+03	0.000E+00	2.010E+02	0.000E+00	3.060E+03	0.000E+00	1.030E+05
RH-103M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH-106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD-109	2.100E+05	4.000E+06	1.600E+06	1.500E+05	2.200E+07	1.800E+05	2.500E+06
AG-110M	1.560E+03	1.450E+03	8.600E+02	0.000E+00	2.850E+03	0.000E+00	5.910E+05
SN-113	6.700E+03	1.200E+03	2.100E+04	6.200E+02	1.600E+03	7.300E+02	2.200E+05
SB-122	5.300E+01	5.520E+01	6.690E+02	8.780E+00	2.610E+01	1.140E+01	6.580E+03
SB-124	2.770E+02	5.230E+00	1.100E+02	6.710E-01	0.000E+00	2.150E+02	7.860E+03
SB-125	1.770E+02	1.980E+00	4.210E+01	1.800E-01	0.000E+00	1.360E+02	1.950E+03
TE-125M	2.170E+02	7.860E+01	2.910E+01	6.520E+01	8.820E+02	0.000E+00	8.660E+02
TE-127M	5.480E+02	1.960E+02	6.680E+01	1.400E+02	2.230E+03	0.000E+00	1.840E+03
TE-127	8.900E+00	3.200E+00	1.930E+00	6.600E+00	3.630E+01	0.000E+00	7.030E+02
TE-129M	9.310E+02	3.470E+02	1.470E+02	3.200E+02	3.890E+03	0.000E+00	4.690E+03
TE-129	2.540E+00	9.550E-01	6.190E-01	1.950E+00	1.070E+01	0.000E+00	1.920E+00
TE-131M	1.400E+02	6.850E+01	5.710E+01	1.080E+02	6.940E+02	0.000E+00	6.800E+03
TE-131	1.590E+00	6.660E-01	5.030E-01	1.310E+00	6.990E+00	0.000E+00	2.260E-01
TE-132	2.040E+02	1.320E+02	1.240E+02	1.460E+02	1.270E+03	0.000E+00	6.240E+03
I-130	3.960E+01	1.170E+02	4.610E+01	9.910E+03	1.820E+02	0.000E+00	1.010E+02
I-131	2.180E+02	3.120E+02	1.790E+02	1.020E+05	5.350E+02	0.000E+00	8.230E+01
I-132	1.060E+01	2.850E+01	9.960E+00	9.960E+02	4.540E+01	0.000E+00	5.350E+00
I-133	7.450E+01	1.300E+02	3.950E+01	1.900E+04	2.260E+02	0.000E+00	1.160E+02
I-134	5.560E+00	1.510E+01	5.400E+00	2.620E+02	2.400E+01	0.000E+00	1.320E-02
I-135	2.320E+01	6.080E+01	2.240E+01	4.010E+03	9.750E+01	0.000E+00	6.870E+01
CS-134	6.840E+03	1.630E+04	1.330E+04	0.000E+00	5.270E+03	1.750E+03	2.850E+02
CS-136	7.160E+02	2.830E+03	2.040E+03	0.000E+00	1.570E+03	2.160E+02	3.210E+02
CS-137	8.770E+03	1.200E+04	7.850E+03	0.000E+00	4.070E+03	1.350E+03	2.320E+02
CS-138	6.070E+00	1.200E+01	5.940E+00	0.000E+00	8.810E+00	8.700E-01	5.120E-05
BA-139	7.850E+00	5.590E-03	2.300E-01	0.000E+00	5.230E-03	3.170E-03	1.390E+01
BA-140	1.640E+03	2.060E+00	1.080E+02	0.000E+00	7.020E-01	1.180E+00	3.380E+03
BA-141	3.810E+00	2.880E-03	1.290E-01	0.000E+00	2.680E-03	1.630E-03	1.800E-09



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 232 of 318

Attachment 6

Liquid Effluent Dose Factors (mrem/hr per uCi/ml)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GItract
BA-142	1.720E+00	1.770E-03	1.080E-01	0.000E+00	1.500E-03	1.000E-03	0.000E+00
LA-140	1.570E+00	7.940E-01	2.100E-01	0.000E+00	0.000E+00	0.000E+00	5.830E+04
CE-139	1.000E+02	4.800E+01	3.700E+02	6.200E-01	3.400E+01	4.800E+00	3.200E+03
LA-142	8.060E-02	3.670E-02	9.130E-03	0.000E+00	0.000E+00	0.000E+00	2.680E+02
CE-141	3.430E+00	2.320E+00	2.630E-01	0.000E+00	1.080E+00	0.000E+00	8.860E+03
CE-143	6.040E-01	4.460E+02	4.940E-02	0.000E+00	1.970E-01	0.000E+00	1.670E+04
CE-144	1.790E+02	7.470E+01	9.590E+00	0.000E+00	4.430E+01	0.000E+00	6.040E+04
PR-143	5.790E+00	2.320E+00	2.870E-01	0.000E+00	1.340E+00	0.000E+00	2.540E+04
PR-144	1.900E-02	7.870E-03	9.640E-04	0.000E+00	4.440E-03	0.000E+00	2.730E-09
ND-147	3.960E+00	4.580E+00	2.740E-01	0.000E+00	2.680E+00	0.000E+00	2.200E+04
EU-154	3.870E+02	4.760E+01	3.390E+01	0.000E+00	2.280E+02	0.000E+00	3.450E+04
EU-155	5.420E+01	7.68E+00	4.960E+00	0.000E+00	3.550E+01	0.000E+00	6.050E+03
W-187	9.160E+00	7.660E+00	2.680E+00	0.000E+00	0.000E+00	0.000E+00	2.510E+03
NP-239	3.530E-02	3.470E-03	1.910E-03	0.000E+00	1.080E-02	0.000E+00	7.110E+02
HG-203	1.400E+05	0.000E+00	1.600E+05	0.000E+00	1.600E+06	1.000E+05	3.200E+05



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 233 of 318

Attachment 7

General Information Related to Gaseous Releases via the Main Vents

Waste Stream	Radiation Monitor	Type of release	Nominal Discharge Flow Rate		Maximum Discharge Flow Rate		Note
			m ³ / sec	SCFM	m ³ /sec	SCFM	
Waste Gas System (WGDT)	0-RE-2191 ¹	Batch	N/A	N/A	2.36E-2	50	
Cntmt. Vent (via H2 Purge)	1/2-RE-5415 ²	Batch ³	2.36E-2	50	2.93E-1	620	
Unit 1 Cntmt. Purge (100%)	1-RE-5415 ⁴	Continuous ⁵	N/A	N/A	22.4 ⁶	47,387 ⁶	
Unit 2 Cntmt. Purge (100%)	2-RE-5415 ⁷	Continuous ⁵	N/A	N/A	20.9 ⁸	44,320 ⁸	
Unit 1 Main Vent Release	1-RE-5415 ⁴	Continuous	56.3 ⁹	119339 ⁹	62.0 ¹⁰	131273 ¹⁰	
Unit 2 Main Vent Release	2-RE-5415 ⁷	Continuous	42.7 ⁹	90500 ⁹	47.0 ¹⁰	99550 ¹⁰	

¹ Since the WGDT is released to the plant vent stack, 1/2-RE-5415 and 1/2-RE-5416 may also be used to monitor releases from a WGDT.

² The WRGM, 1/2-RE-5416, may also monitor these releases.

³ A containment vent is considered a "batch" release (even though inleakage of radioactive gases into the containment atmosphere may occur during the time the vent is in progress).

⁴ The WRGM, 1-RE-5416, may also monitor these releases.

⁵ A purge is considered to be a CONTINUOUS RELEASE due to potential introduction of radioactive gases to the containment atmosphere during containment maintenance activities.

⁶ This is the purge flow rate as determined by approved test procedure (i.e., TE-006) in April 1998.

⁷ The WRGM, 2-RE-5416, may also monitor these releases.

⁸ This is the purge flow rate as determined by approved test procedure (i.e., TE-006) in March 2001.

⁹ This is the mean main vent stack flow rate as determined by approved test procedure (i.e., TE-001 from 8/1990-3/1996 for Unit 1 and TE-001 from 8/1990-3/2000 for Unit 2 or STP-M-462-1 for Unit 1 and STP-M-462-2 for Unit 2 beginning in May 2002).

¹⁰ This is the maximum vent stack flow rate which is equal to 110% of the Nominal Discharge Flow rate.



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 234 of 318

Attachment 8

General Information Related to Gaseous Releases via Pathways other than the Main Vents

Waste Streams	Radiation Monitor	Type of Release	Nominal Discharge Flow Rate	Notes
Aux. Boiler Deaerator	Unmonitored	See Footnote ¹		See Footnote ²
Stm. Gen. Atm. Stm. Dumps	Unmonitored	See Footnote ¹		See Footnote ²
Plant Nitrogen System	Unmonitored	See Footnote ¹		See Footnote ²
Turbine Bldg. Vent. Exh ³	Unmonitored	See Footnote ¹		See Footnote ²
Emergency Air Lock	Unmonitored	See Footnote ¹		See Footnote ²
Plant Compressed Air	Unmonitored	See Footnote ¹		See Footnote ²
Main Steam Line Penetrations	Unmonitored	See Footnote ¹		See Footnote ²
Steam Driven Auxiliary Feed Pumps	Unmonitored	See Footnote ¹		See Footnote ²
Containment Equipment Hatch	Unmonitored	See Footnote ¹		See Footnote ²

¹ Since radioactive gaseous waste is not normally vented via this pathway, the determination of release type (i.e., continuous or batch) will be evaluated on a case-by-case basis.

² Since radioactive gaseous waste is not normally vented via this pathway, the determination of discharge flow rate will be evaluated on a case-by-case basis.

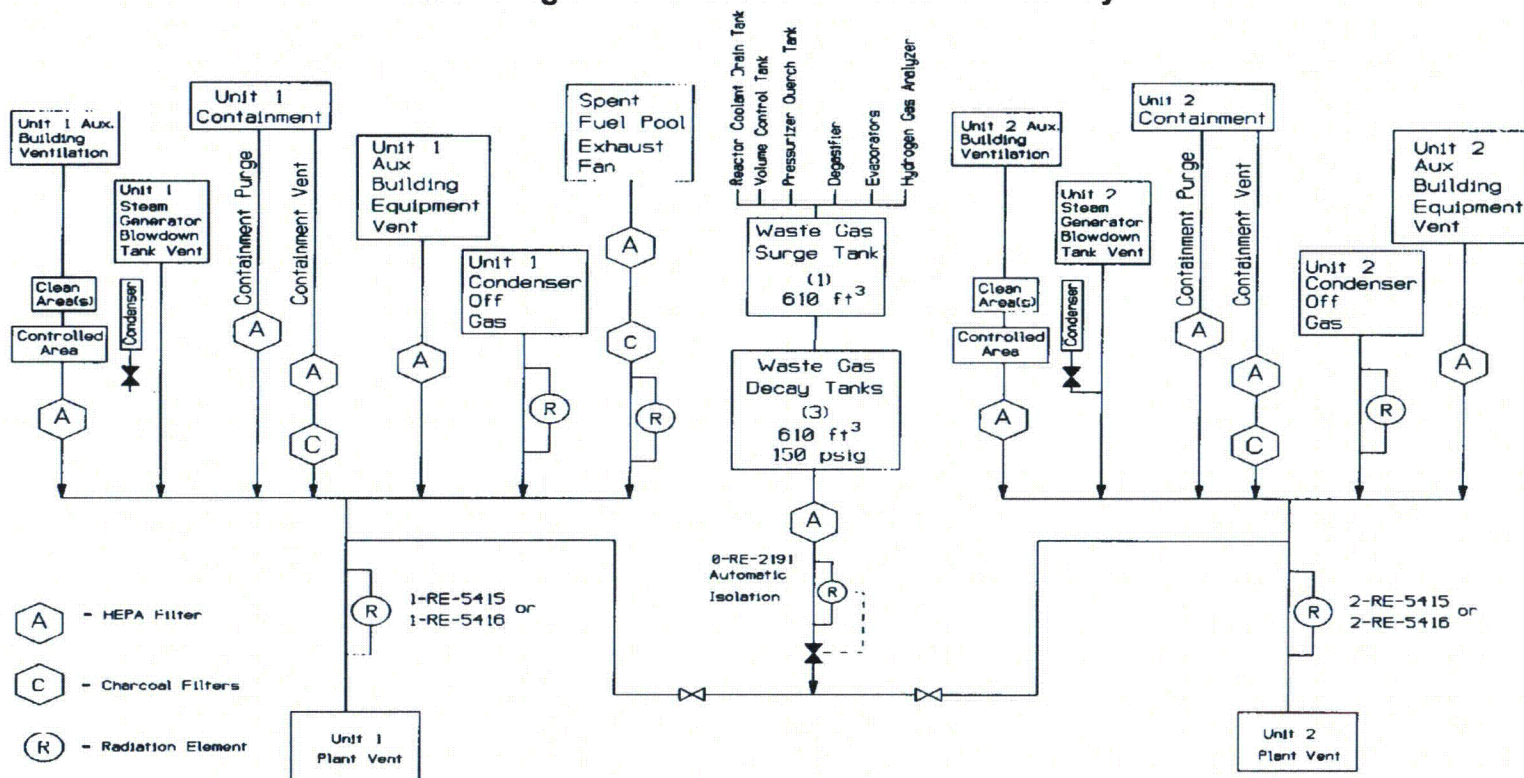
³ Includes sources such as Gland Seal Exhaust.



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 235 of 318

Attachment 9 Block Diagram of Gaseous Radioactive Waste Systems





OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 236 of 318

Attachment 10 Noble Gas Dose Factors

NUCLIDE	GAMMA BODY DOSE K_i (mrem/yr)/(μCi/m ³)	BETA SKIN DOSE L_i (mrem/yr)/(μCi/m ³)	GAMMA AIR DOSE M_i (mrad/yr)/(μCi/m ³)	BETA AIR DOSE N_j (mrad/yr)/(μCi/m ³)
Ar-41	8.84E+03	2.69E+03	9.30E+03	3.28E+03
Kr-85	1.61E+01	1.34E+03	1.72E+01	1.95E+03
Kr-85m	1.17E+03	1.46E+03	1.23E+03	1.97E+03
Kr-87	5.92E+03	9.73E+03	6.17E+03	1.03E+04
Kr-88	1.47E+04	2.37E+03	1.52E+04	2.93E+03
Xe-131m	9.15E+01	4.76E+02	1.56E+02	1.11E+03
Xe-133	2.94E+02	3.06E+02	3.53E+02	1.05E+03
Xe-133m	2.51E+02	9.94E+02	3.27E+02	1.48E+03
Xe-135	1.81E+03	1.86E+03	1.92E+03	2.46E+03
Xe-135m	3.12E+03	7.11E+02	3.36E+03	7.39E+02
Xe-138	8.83E+03	4.13E+03	9.21E+03	4.75E+03



Attachment 11**Empirical Derivation Of Site-Specific Dose Factors**

The total body dose, the skin dose, and the air doses--resulting from gamma and beta emitting radionuclides in discharges of gaseous radwaste--are normally calculated using nuclide specific dose factors. However, these same doses may be estimated using empirically derived, site specific, dose factors as shown below.

TOTAL-BODY, GAMMA-DOSE FACTOR

A site-specific, total-body, gamma-dose factor has been derived from historical data in accordance with the following equation.

$K_{avg} = \sum (K_i) (f_i)$	Eq. 1F
------------------------------	---------------

K_{avg} = the empirically derived, site-specific, total-body, gamma-dose factor due to all noble gases released during a specified time period

Values of K_{avg} have been calculated using gaseous radwaste discharge data collected over several years.

The results of the calculations appear in the Table on page 5 of this attachment.

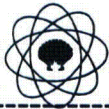
K_i = the total body dose factor due to gamma emissions for each identified noble gas radionuclide, i (mrem/yr per microcurie/cubic meter)

The total-body dose factors for gamma rays from noble gas radionuclides were obtained from Regulatory Guide 1.109, Appendix B, Table B-1.

The total-body dose factors for various noble gas radionuclides are tabulated in Attachment 10.

f_i = a fraction which represents the relative activity contribution of noble gas radionuclide i to the total noble gas activity for TYPICAL GASEOUS EFFLUENTS (unitless)

This value has been calculated for all gaseous radwaste discharges for the years 1986, 1987, and 1988 in accordance with equation 3R on Attachment 5.



Attachment 11

Empirical Derivation of Site-Specific Dose Factors

SKIN, BETA-DOSE FACTOR

A site-specific, skin, beta-dose factor has been derived from historical data in accordance with the following equation.

$L_{avg} = \sum (L_i) (f_i)$	Eq. 2F
------------------------------	---------------

L_{avg} = the empirically derived, site-specific, skin, beta-dose factor due to all noble gases released during a specified time period

Values of L_{avg} have been calculated using gaseous radwaste discharge data collected over several years.

The results of the calculations appear in the Table on page 5 of this attachment.

L_i = the skin dose factor due to beta emissions for each identified noble gas radionuclide, i (mrem/yr per microcurie/cubic meter)

The beta skin dose factors have been obtained from Regulatory Guide 1.109, Appendix B, Table B-1.

The beta skin dose factors for various noble gas radionuclides are tabulated in Attachment 10.

f_i = a fraction which represents the relative activity contribution of noble gas radionuclide i to the total noble gas activity for TYPICAL GASEOUS EFFLUENTS (unitless)

This value has been calculated for all gaseous radwaste discharges for the years 1986, 1987, and 1988 in accordance with equation 3R on Attachment 5.

**Attachment 11****Empirical Derivation of Site-Specific Dose Factors****GAMMA-AIR-DOSE FACTOR**

A site-specific, gamma-air-dose factor has been derived from historical data in accordance with the following equation.

$M_{avg} = \sum (M_i) (f_i)$	Eq. 3F
------------------------------	---------------

M_{avg} = the empirically derived, site-specific, gamma-air-dose factor due to all noble gases released during a specified time period

Values of M_{avg} have been calculated using gaseous radwaste discharge data collected over several years.

The results of the calculations appear in the Table on page 5 of this attachment.

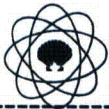
M_i = the air dose factor due to gamma emissions for each identified noble gas radionuclide, i (mrad/yr per microcurie/cubic meter)

The gamma air dose factors have been obtained from Regulatory Guide 1.109, Appendix B, Table B-1.

The gamma air dose factors for various noble gas radionuclides are tabulated in Attachment 10.

f_i = a fraction which represents the relative activity contribution of noble gas radionuclide i to the total noble gas activity for TYPICAL GASEOUS EFFLUENTS (unitless)

This value has been calculated for all gaseous radwaste discharges for the years 1986, 1987, and 1988 in accordance with equation 3R on Attachment 5.



Attachment 11

Empirical Derivation of Site-Specific Dose Factors

BETA-AIR-DOSE FACTOR

A site-specific, beta-air-dose factor has been derived from historical data in accordance with the following equation.

$$N_{avg} = \sum (N_i) (f_i) \quad \text{Eq. 4F}$$

N_{avg} = the empirically derived, site-specific, beta-air-dose factor due to all noble gases released during a specified time period

Values of N_{avg} have been calculated using gaseous radwaste discharge data collected over several years.

The results of the calculations appear in the Table on page 5 of this attachment.

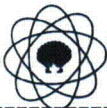
N_i = the air dose factor due to beta emissions for each identified noble gas radionuclide, i (mrad/yr per microcurie/cubic meter)

The beta air dose factors have been obtained from Regulatory Guide 1.109, Appendix B, Table B-1.

The beta air dose factors for various noble gas radionuclides are tabulated in Attachment 10 (Attachment 1 of old ODCM).

f_i = a fraction which represents the relative activity contribution of noble gas radionuclide i to the total noble gas activity for TYPICAL GASEOUS EFFLUENTS (unitless)

This value has been calculated for all gaseous radwaste discharges for the years 1986, 1987, and 1988 in accordance with equation 3R on Attachment 5.



Attachment 11
Empirical Derivation of Site-Specific Dose Factors**SITE-SPECIFIC, AVERAGE DOSE FACTORS**

Year	K_{avg}	L_{avg}	M_{avg}	N_{avg}
1986	330	790	390	1100
1987	340	810	400	1100
1988	390	960	450	1200
Average	350	850	410	1100
Maximum % difference	11%	13%	10%	9%

As can be seen from the above table, the percent difference between the yearly dose factors and the 3-year average dose factors range from 9% to 13%. This variability is minor considering other areas of uncertainty inherent in the environmental dose calculation models.

It should be noted that the empirically-derived, site-specific, average dose factors listed in the above table shall only rarely be used. In those rare instances where empirically-derived, site-specific, average dose factors are used, the results shall be carefully evaluated by qualified members of the facility staff to ensure the estimated doses are only a small fraction of the Control limits. Additionally, the doses shall be recalculated using the RIGOROUS METHODS prior to submitting the Radioactive Effluent Release Report.

Rev. 00802
Page 242 of 318

Attachment 12
Gaseous Effluent Pathway Dose Factors

GRASS-COW-MEAT DOSE FACTORS ADULT

(m²*mrem/yr per uCi/sec)

[illegible]



Attachment 12
Gaseous Effluent Pathway Dose Factors**GRASS-COW-MEAT DOSE FACTORS**
ADULT

(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-140	2.880E+07	3.610E+04	1.890E+06	0.000E+00	1.230E+04	2.070E+04	5.920E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	3.600E-02	1.810E-02	4.790E-03	0.000E+00	0.000E+00	0.000E+00	1.330E+03
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE-141	1.400E+04	9.480E+03	1.080E+03	0.000E+00	4.400E+03	0.000E+00	3.620E+07
CE-143	2.090E-02	1.550E+01	1.710E-03	0.000E+00	6.800E-03	0.000E+00	5.780E+02
CE-144	1.460E+06	6.090E+05	7.830E+04	0.000E+00	3.610E+05	0.000E+00	4.930E+08
PR-143	2.130E+04	8.540E+03	1.060E+03	0.000E+00	4.930E+03	0.000E+00	9.330E+07
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	7.080E+03	8.180E+03	4.900E+02	0.000E+00	4.780E+03	0.000E+00	3.930E+07
EU-154	8.030E+06	9.870E+08	7.020E+05	0.000E+00	4.720E+06	0.000E+00	7.150E+08
EU-155	1.110E+06	1.580E+05	1.020E+05	0.000E+00	7.300E+05	0.000E+00	1.240E+08
W-187	2.160E-02	1.810E-02	6.320E-03	0.000E+00	0.000E+00	0.000E+00	5.920E+00
NP-239	2.560E-01	2.510E-02	1.390E-02	0.000E+00	7.840E-02	0.000E+00	5.150E+03

Attachment 12
Gaseous Effluent Pathway Dose Factors

GRASS-COW-MEAT DOSE FACTORS

(m²*mrem/yr per uCi/sec)

[illegible]

Rev. 00802
Page 246 of 318



Attachment 12
Gaseous Effluent Pathway Dose Factors**GRASS-COW-MEAT DOSE FACTORS**
TEEN

(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-140	2.380E+07	2.910E+04	1.530E+06	0.000E+00	9.880E+03	1.960E+04	3.670E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	2.960E-02	1.450E-02	3.870E-03	0.000E+00	0.000E+00	0.000E+00	8.350E+02
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE-141	1.180E+04	7.860E+03	9.030E+02	0.000E+00	3.700E+03	0.000E+00	2.250E+07
CE-143	1.760E-02	1.280E+01	1.430E-03	0.000E+00	5.740E-03	0.000E+00	3.850E+02
CE-144	1.230E+06	5.080E+05	6.600E+04	0.000E+00	3.040E+05	0.000E+00	3.090E+08
PR-143	1.790E+04	7.150E+03	8.920E+02	0.000E+00	4.160E+03	0.000E+00	5.900E+07
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	6.240E+03	6.790E+03	4.060E+02	0.000E+00	3.980E+03	0.000E+00	2.450E+07
EU-154	6.090E+06	7.870E+05	5.540E+05	0.000E+00	3.520E+06	0.000E+00	4.160E+08
EU-155	1.330E+06	1.290E+05	7.970E+04	0.000E+00	5.030E+05	0.000E+00	7.380E+08
W-187	1.810E-02	1.480E-02	5.170E-03	0.000E+00	0.000E+00	0.000E+00	3.990E+00
NP-239	2.230E-01	2.110E-02	1.170E-02	0.000E+00	6.610E-02	0.000E+00	3.390E+03

Attachment 12
Gaseous Effluent Pathway Dose Factors

GRASS-COW-MEAT DOSE FACTORS CHILD

(m²*mrem/yr per uCi/sec)[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors

GRASS-COW-MEAT DOSE FACTORS CHILD

(m²*mrem/yr per uCi/sec)

[illegible]



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 250 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

GRASS-COW-MEAT DOSE FACTORS
CHILD
(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-140	4.390E+07	3.850E+04	2.560E+06	0.000E+00	1.250E+04	2.290E+04	2.220E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	5.410E-02	1.890E-02	6.380E-03	0.000E+00	0.000E+00	0.000E+00	5.270E+02
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE-141	2.220E+04	1.110E+04	1.640E+03	0.000E+00	4.840E+03	0.000E+00	1.380E+07
CE-143	3.300E-02	1.790E+01	2.590E-03	0.000E+00	7.510E-03	0.000E+00	2.620E+02
CE-144	2.320E+06	7.260E+05	1.240E+05	0.000E+00	4.020E+05	0.000E+00	1.890E+08
PR-143	3.390E+04	1.020E+04	1.680E+03	0.000E+00	5.510E+03	0.000E+00	3.660E+07
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	1.170E+04	9.480E+03	7.340E+02	0.000E+00	5.200E+03	0.000E+00	1.500E+07
EU-154	1.120E+07	1.010E+06	9.190E+05	0.000E+00	4.420E+06	0.000E+00	2.340E+08
EU-155	2.330E+06	1.680E+05	1.310E+05	0.000E+00	6.280E+05	0.000E+00	4.200E+08
W-187	3.360E-02	1.990E-02	8.920E-03	0.000E+00	0.000E+00	0.000E+00	2.790E+00
NP-239	4.200E-01	3.020E-02	2.120E-02	0.000E+00	8.730E-02	0.000E+00	2.230E+03



Attachment 12 Gaseous Effluent Pathway Dose Factors

GRASS-COW-MEAT DOSE FACTORS

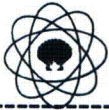
INFANT

(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GItract
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THIS PATHWAY IS NOT APPLICABLE

TABLE INTENTIONALLY LEFT BLANK



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 252 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

VEGETATION DOSE FACTORS ADULT (m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	2.260E+03	2.260E+03	2.260E+03	2.260E+03	2.260E+03	2.260E+03
C-14	8.970E+05	1.790E+05	1.790E+05	1.790E+05	1.790E+05	1.790E+05	1.790E+05
NA-24	2.760E+05	2.760E+05	2.760E+05	2.760E+05	2.760E+05	2.760E+05	2.760E+05
P-32	1.400E+09	8.730E+07	5.420E+07	0.000E+00	0.000E+00	0.000E+00	1.580E+08
CR-51	0.000E+00	0.000E+00	4.660E+04	2.790E+04	1.030E+04	6.190E+04	1.170E+07
MN-54	0.000E+00	3.110E+08	5.940E+07	0.000E+00	9.270E+07	0.000E+00	9.540E+08
MN-56	0.000E+00	1.610E+01	2.850E+00	0.000E+00	2.040E+01	0.000E+00	5.130E+02
FE-55	2.090E+08	1.450E+08	3.370E+07	0.000E+00	0.000E+00	8.060E+07	8.290E+07
FE-59	1.270E+08	2.990E+08	1.140E+08	0.000E+00	0.000E+00	8.350E+07	9.960E+08
CO-57	0.000E+00	1.170E+07	1.950E+07	0.000E+00	0.000E+00	0.000E+00	2.970E+08
CO-58	0.000E+00	3.090E+07	6.920E+07	0.000E+00	0.000E+00	0.000E+00	6.260E+08
CO-60	0.000E+00	1.670E+08	3.690E+08	0.000E+00	0.000E+00	0.000E+00	3.140E+09
NI-63	1.040E+10	7.210E+08	3.490E+08	0.000E+00	0.000E+00	0.000E+00	1.500E+08
NI-65	6.150E+01	7.990E+00	3.650E+00	0.000E+00	0.000E+00	0.000E+00	2.030E+02
CU-64	0.000E+00	9.270E+03	4.350E+03	0.000E+00	2.340E+04	0.000E+00	7.900E+05
ZN-65	3.170E+08	1.010E+09	4.560E+08	0.000E+00	6.750E+08	0.000E+00	6.360E+08
ZN-69	8.750E-06	1.670E-05	1.160E-06	0.000E+00	1.090E-05	0.000E+00	2.510E-06
BR-82	0.000E+00	0.000E+00	1.510E+06	0.000E+00	0.000E+00	0.000E+00	1.730E+06
BR-83	0.000E+00	0.000E+00	3.210E+00	0.000E+00	0.000E+00	0.000E+00	4.630E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	2.190E+08	1.020E+08	0.000E+00	0.000E+00	0.000E+00	4.320E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	9.960E+09	0.000E+00	2.860E+08	0.000E+00	0.000E+00	0.000E+00	1.600E+09
SR-90	6.050E+11	0.000E+00	1.480E+11	0.000E+00	0.000E+00	0.000E+00	1.750E+10
SR-91	3.200E+05	0.000E+00	1.290E+04	0.000E+00	0.000E+00	0.000E+00	1.520E+06
SR-92	4.270E+02	0.000E+00	1.850E+01	0.000E+00	0.000E+00	0.000E+00	8.460E+03
Y-90	1.330E+04	0.000E+00	3.560E+02	0.000E+00	0.000E+00	0.000E+00	1.410E+08
Y-91M	5.830E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.710E-08
Y-91	5.130E+06	0.000E+00	1.370E+05	0.000E+00	0.000E+00	0.000E+00	2.820E+09
Y-92	9.010E-01	0.000E+00	2.630E-02	0.000E+00	0.000E+00	0.000E+00	1.580E+04
Y-93	1.740E+02	0.000E+00	4.800E+00	0.000E+00	0.000E+00	0.000E+00	5.520E+06

Attachment 12
Gaseous Effluent Pathway Dose Factors

VEGETATION DOSE FACTORS

ADULT

(m²*mrem/yr per uCi/sec)

[illegible]



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 254 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

VEGETATION DOSE FACTORS

ADULT

(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	2.950E-02	2.100E-05	8.640E-04	0.000E+00	1.960E-05	1.190E-05	5.230E-02
BA-140	1.290E+08	1.620E+05	8.430E+06	0.000E+00	5.490E+04	9.250E+04	2.650E+08
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	1.970E+03	9.920E+02	2.620E+02	0.000E+00	0.000E+00	0.000E+00	7.280E+07
LA-142	1.400E-04	6.350E-05	1.580E-05	0.000E+00	0.000E+00	0.000E+00	4.640E-01
CE-141	1.960E+05	1.330E+05	1.510E+04	0.000E+00	6.170E+04	0.000E+00	5.080E+08
CE-143	1.000E+03	7.420E+05	8.210E+01	0.000E+00	3.260E+02	0.000E+00	2.770E+07
CE-144	3.290E+07	1.380E+07	1.770E+06	0.000E+00	8.160E+06	0.000E+00	1.110E+10
PR-143	6.340E+04	2.540E+04	3.140E+03	0.000E+00	1.470E+04	0.000E+00	2.780E+08
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	3.340E+04	3.860E+04	2.310E+03	0.000E+00	2.250E+04	0.000E+00	1.850E+08
EU-154	4.850E+07	5.970E+06	4.250E+06	0.000E+00	2.860E+07	0.000E+00	4.320E+09
EU-155	6.710E+06	9.510E+05	6.140E+05	0.000E+00	4.390E+06	0.000E+00	7.490E+08
W-187	3.820E+04	3.190E+04	1.120E+04	0.000E+00	0.000E+00	0.000E+00	1.050E+07
NP-239	1.420E+03	1.400E+02	7.720E+01	0.000E+00	4.370E+02	0.000E+00	2.870E+07



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 255 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

VEGETATION DOSE FACTORS TEEN (m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	2.590E+03	2.590E+03	2.590E+03	2.590E+03	2.590E+03	2.590E+03
C-14	1.450E+06	2.910E+05	2.910E+05	2.910E+05	2.910E+05	2.910E+05	2.910E+05
NA-24	2.450E+05	2.450E+05	2.450E+05	2.450E+05	2.450E+05	2.450E+05	2.450E+05
P-32	1.610E+09	9.960E+07	6.230E+07	0.000E+00	0.000E+00	0.000E+00	1.350E+08
CR-51	0.000E+00	0.000E+00	6.200E+04	3.440E+04	1.360E+04	8.850E+04	1.040E+07
MN-54	0.000E+00	4.520E+08	8.970E+07	0.000E+00	1.350E+08	0.000E+00	9.270E+08
MN-56	0.000E+00	1.450E+01	2.580E+00	0.000E+00	1.830E+01	0.000E+00	9.540E+02
FE-55	3.250E+08	2.310E+08	5.380E+07	0.000E+00	0.000E+00	1.460E+08	9.980E+07
FE-59	1.810E+08	4.220E+08	1.630E+08	0.000E+00	0.000E+00	1.330E+08	9.980E+08
CO-57	0.000E+00	1.790E+07	3.000E+07	0.000E+00	0.000E+00	0.000E+00	3.340E+08
CO-58	0.000E+00	4.380E+07	1.010E+08	0.000E+00	0.000E+00	0.000E+00	6.040E+08
CO-60	0.000E+00	2.490E+08	5.600E+08	0.000E+00	0.000E+00	0.000E+00	3.240E+09
NI-63	1.610E+10	1.130E+09	5.450E+08	0.000E+00	0.000E+00	0.000E+00	1.810E+08
NI-65	5.730E+01	7.320E+00	3.330E+00	0.000E+00	0.000E+00	0.000E+00	3.970E+02
CU-64	0.000E+00	8.400E+03	3.950E+03	0.000E+00	2.120E+04	0.000E+00	6.510E+05
ZN-65	4.240E+08	1.470E+09	6.860E+08	0.000E+00	9.410E+08	0.000E+00	6.230E+08
ZN-69	8.190E-06	1.560E-05	1.090E-06	0.000E+00	1.020E-05	0.000E+00	2.880E-05
BR-82	0.000E+00	0.000E+00	1.330E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	3.010E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	2.730E+08	1.280E+08	0.000E+00	0.000E+00	0.000E+00	4.050E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	1.510E+10	0.000E+00	4.330E+08	0.000E+00	0.000E+00	0.000E+00	1.800E+09
SR-90	7.510E+11	0.000E+00	1.850E+11	0.000E+00	0.000E+00	0.000E+00	2.110E+10
SR-91	2.990E+05	0.000E+00	1.190E+04	0.000E+00	0.000E+00	0.000E+00	1.360E+06
SR-92	3.970E+02	0.000E+00	1.690E+01	0.000E+00	0.000E+00	0.000E+00	1.010E+04
Y-90	1.240E+04	0.000E+00	3.340E+02	0.000E+00	0.000E+00	0.000E+00	1.020E+08
Y-91M	5.430E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.560E-07
Y-91	7.870E+06	0.000E+00	2.110E+05	0.000E+00	0.000E+00	0.000E+00	3.230E+09
Y-92	8.470E-01	0.000E+00	2.450E-02	0.000E+00	0.000E+00	0.000E+00	2.320E+04
Y-93	1.630E+02	0.000E+00	4.470E+00	0.000E+00	0.000E+00	0.000E+00	4.980E+06

Attachment 12
Gaseous Effluent Pathway Dose Factors

VEGETATION DOSE FACTORS

TEEN

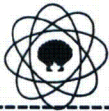
(m²*mrem/yr per uCi/sec)

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Attachment 12
Gaseous Effluent Pathway Dose Factors**VEGETATION DOSE FACTORS****TEEN****(m2*mrem/yr per uCi/sec)**

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	2.770E-02	1.950E-05	8.080E-04	0.000E+00	1.840E-05	1.340E-05	2.470E-01
BA-140	1.380E+08	1.690E+05	8.910E+06	0.000E+00	5.750E+04	1.140E+05	2.130E+08
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	1.800E+03	8.840E+02	2.350E+02	0.000E+00	0.000E+00	0.000E+00	5.080E+07
LA-142	1.280E-04	5.690E-05	1.420E-05	0.000E+00	0.000E+00	0.000E+00	1.730E+00
CE-141	2.820E+05	1.880E+05	2.160E+04	0.000E+00	8.860E+04	0.000E+00	5.380E+08
CE-143	9.370E+02	6.820E+05	7.620E+01	0.000E+00	3.060E+02	0.000E+00	2.050E+07
CE-144	5.270E+07	2.180E+07	2.830E+06	0.000E+00	1.300E+07	0.000E+00	1.330E+10
PR-143	7.120E+04	2.840E+04	3.550E+03	0.000E+00	1.650E+04	0.000E+00	2.340E+08
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	3.630E+04	3.940E+04	2.360E+03	0.000E+00	2.320E+04	0.000E+00	1.420E+08
EU-154	7.060E+07	9.120E+06	6.430E+06	0.000E+00	4.080E+07	0.000E+00	4.820E+09
EU-155	1.540E+07	1.480E+06	9.190E+05	0.000E+00	5.800E+06	0.000E+00	8.510E+09
W-187	3.550E+04	2.900E+04	1.020E+04	0.000E+00	0.000E+00	0.000E+00	7.840E+06
NP-239	1.380E+03	1.300E+02	7.240E+01	0.000E+00	4.090E+02	0.000E+00	2.100E+07



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 258 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

VEGETATION DOSE FACTORS CHILD

(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	4.010E+03	4.010E+03	4.010E+03	4.010E+03	4.010E+03	4.010E+03
C-14	3.500E+06	7.010E+05	7.010E+05	7.010E+05	7.010E+05	7.010E+05	7.010E+05
NA-24	3.830E+05	3.830E+05	3.830E+05	3.830E+05	3.830E+05	3.830E+05	3.830E+05
P-32	3.370E+09	1.580E+08	1.300E+08	0.000E+00	0.000E+00	0.000E+00	9.300E+07
CR-51	0.000E+00	0.000E+00	1.180E+05	6.540E+04	1.790E+04	1.190E+05	6.250E+06
MN-54	0.000E+00	6.610E+08	1.760E+08	0.000E+00	1.850E+08	0.000E+00	5.550E+08
MN-56	0.000E+00	1.900E+01	4.280E+00	0.000E+00	2.290E+01	0.000E+00	2.750E+03
FE-55	8.000E+08	4.240E+08	1.310E+08	0.000E+00	0.000E+00	2.400E+08	7.860E+07
FE-59	4.010E+08	6.490E+08	3.230E+08	0.000E+00	0.000E+00	1.880E+08	6.760E+08
CO-57	0.000E+00	2.990E+07	6.040E+07	0.000E+00	0.000E+00	0.000E+00	2.450E+08
CO-58	0.000E+00	6.470E+07	1.980E+08	0.000E+00	0.000E+00	0.000E+00	3.770E+08
CO-60	0.000E+00	3.780E+08	1.120E+09	0.000E+00	0.000E+00	0.000E+00	2.100E+09
NI-63	3.950E+10	2.110E+09	1.340E+09	0.000E+00	0.000E+00	0.000E+00	1.420E+08
NI-65	1.050E+02	9.890E+00	5.770E+00	0.000E+00	0.000E+00	0.000E+00	1.210E+03
CU-64	0.000E+00	1.110E+04	6.690E+03	0.000E+00	2.680E+04	0.000E+00	5.200E+05
ZN-65	8.120E+08	2.160E+09	1.350E+09	0.000E+00	1.360E+09	0.000E+00	3.800E+08
ZN-69	1.510E-05	2.180E-05	2.020E-06	0.000E+00	1.320E-05	0.000E+00	1.380E-03
BR-82	0.000E+00	0.000E+00	2.040E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	5.550E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	4.520E+08	2.780E+08	0.000E+00	0.000E+00	0.000E+00	2.910E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	3.590E+10	0.000E+00	1.030E+09	0.000E+00	0.000E+00	0.000E+00	1.390E+09
SR-90	1.240E+12	0.000E+00	3.150E+11	0.000E+00	0.000E+00	0.000E+00	1.670E+10
SR-91	5.500E+05	0.000E+00	2.080E+04	0.000E+00	0.000E+00	0.000E+00	1.210E+06
SR-92	7.280E+02	0.000E+00	2.920E+01	0.000E+00	0.000E+00	0.000E+00	1.380E+04
Y-90	2.300E+04	0.000E+00	6.170E+02	0.000E+00	0.000E+00	0.000E+00	6.560E+07
Y-91M	9.940E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.950E-05
Y-91	1.870E+07	0.000E+00	5.010E+05	0.000E+00	0.000E+00	0.000E+00	2.490E+09
Y-92	1.560E+00	0.000E+00	4.460E-02	0.000E+00	0.000E+00	0.000E+00	4.510E+04
Y-93	3.010E+02	0.000E+00	8.250E+00	0.000E+00	0.000E+00	0.000E+00	4.480E+06

Attachment 12
Gaseous Effluent Pathway Dose Factors

VEGETATION DOSE FACTORS

CHILD

(m²*mrem/yr per uCi/sec)

[illegible]



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 260 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

VEGETATION DOSE FACTORS CHILD

(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	5.110E-02	2.730E-05	1.480E-03	0.000E+00	2.380E-05	1.610E-05	2.950E+00
BA-140	2.770E+08	2.430E+05	1.620E+07	0.000E+00	7.900E+04	1.450E+05	1.400E+08
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	3.230E+03	1.130E+03	3.810E+02	0.000E+00	0.000E+00	0.000E+00	3.150E+07
LA-142	2.320E-04	7.400E-05	2.320E-05	0.000E+00	0.000E+00	0.000E+00	1.470E+01
CE-141	6.350E+05	3.260E+05	4.840E+04	0.000E+00	1.430E+05	0.000E+00	4.070E+08
CE-143	1.730E+03	9.360E+05	1.360E+02	0.000E+00	3.930E+02	0.000E+00	1.370E+07
CE-144	1.270E+08	3.980E+07	6.780E+06	0.000E+00	2.210E+07	0.000E+00	1.040E+10
PR-143	1.480E+05	4.460E+04	7.370E+03	0.000E+00	2.410E+04	0.000E+00	1.600E+08
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	7.160E+04	5.800E+04	4.490E+03	0.000E+00	3.180E+04	0.000E+00	9.180E+07
EU-154	1.660E+08	1.500E+07	1.370E+07	0.000E+00	6.570E+07	0.000E+00	3.480E+09
EU-155	3.440E+07	2.480E+06	1.940E+06	0.000E+00	9.280E+06	0.000E+00	6.200E+09
W-187	6.470E+04	3.830E+04	1.720E+04	0.000E+00	0.000E+00	0.000E+00	5.380E+06
NP-239	2.550E+03	1.830E+02	1.290E+02	0.000E+00	5.300E+02	0.000E+00	1.360E+07



Attachment 12 Gaseous Effluent Pathway Dose Factors

VEGETATION DOSE FACTORS INFANT

(m2*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
---------	------	-------	-------	---------	--------	------	----------

THIS PATHWAY IS NOT APPLICABLE

TABLE INTENTIONALLY LEFT BLANK



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 262 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

GROUND PLANE DOSE FACTORS ADULT

(m²*mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
---------	------	-------	-------	---------	--------	------	----------

THIS PATHWAY IS NOT APPLICABLE

TABLE INTENTIONALLY LEFT BLANK

Attachment 12
Gaseous Effluent Pathway Dose Factors

GROUND PLANE DOSE FACTORS

TEEN

(m²*mrem/yr per uCi/sec)

[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors

GROUND PLANE DOSE FACTORS

(m²*mrem/yr per uCi/sec)

[illegible]

[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors

GROUND PLANE DOSE FACTORS

CHILD

(m²*mrem/yr per uCi/sec)[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors

GROUND PLANE DOSE FACTORS CHILD

(m²*mrem/yr per μ Ci/sec)

[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors

GROUND PLANE DOSE FACTORS CHILD

(m²*mrem/yr per uCi/sec)

[illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors

GROUND PLANE DOSE FACTORS

 $(m^2 \cdot mrem/yr \text{ per } \mu Ci/sec)$ [illegible]

Attachment 12
Gaseous Effluent Pathway Dose Factors

GROUND PLANE DOSE FACTORS

INFANT

 $(\text{m}^2 \cdot \text{mrem}/\text{yr per uCi}/\text{sec})$ [illegible]

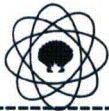
Attachment 12

Gaseous Effluent Pathway Dose Factors

GROUND PLANE DOSE FACTORS INFANT

(m²*mrem/yr per uCi/sec)

[illegible]



OFFSITE DOSE CALCULATION MANUAL

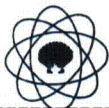
Rev. 00802
Page 272 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

INHALATION DOSE FACTORS ADULT

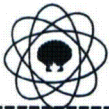
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	1.260E+03	1.260E+03	1.260E+03	1.260E+03	1.260E+03	1.260E+03
C-14	1.820E+04	3.410E+03	3.410E+03	3.410E+03	3.410E+03	3.410E+03	3.410E+03
NA-24	1.020E+04	1.020E+04	1.020E+04	1.020E+04	1.020E+04	1.020E+04	1.020E+04
P-32	1.320E+06	7.710E+04	5.010E+04	0.000E+00	0.000E+00	0.000E+00	8.640E+04
CR-51	0.000E+00	0.000E+00	1.000E+02	5.950E+01	2.280E+01	1.440E+04	3.320E+03
MN-54	0.000E+00	3.960E+04	6.300E+03	0.000E+00	9.840E+03	1.400E+06	7.740E+04
MN-56	0.000E+00	1.240E+00	1.830E-01	0.000E+00	1.300E+00	9.440E+03	2.020E+04
FE-55	2.460E+04	1.700E+04	3.940E+03	0.000E+00	0.000E+00	7.210E+04	6.030E+03
FE-59	1.180E+04	2.780E+04	1.060E+04	0.000E+00	0.000E+00	1.020E+06	1.880E+05
CO-57	0.000E+00	6.920E+02	6.710E+02	0.000E+00	0.000E+00	3.700E+05	3.140E+04
CO-58	0.000E+00	1.580E+03	2.070E+03	0.000E+00	0.000E+00	9.280E+05	1.060E+05
CO-60	0.000E+00	1.150E+04	1.480E+04	0.000E+00	0.000E+00	5.970E+06	2.850E+05
NI-63	4.320E+05	3.140E+04	1.450E+04	0.000E+00	0.000E+00	1.780E+05	1.340E+04
NI-65	1.540E+00	2.100E-01	9.120E-02	0.000E+00	0.000E+00	5.600E+03	1.230E+04
CU-64	0.000E+00	1.460E+00	6.150E-01	0.000E+00	4.620E+00	6.780E+03	4.900E+04
ZN-65	3.240E+04	1.030E+05	4.660E+04	0.000E+00	6.900E+04	8.640E+05	5.340E+04
ZN-69	3.380E-02	6.510E-02	4.520E-03	0.000E+00	4.220E-02	9.200E+02	1.630E+01
BR-82	0.000E+00	0.000E+00	1.350E+04	0.000E+00	0.000E+00	0.000E+00	1.040E+04
BR-83	0.000E+00	0.000E+00	2.410E+02	0.000E+00	0.000E+00	0.000E+00	2.320E+02
BR-84	0.000E+00	0.000E+00	3.130E+02	0.000E+00	0.000E+00	0.000E+00	1.640E-03
BR-85	0.000E+00	0.000E+00	1.280E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	1.350E+05	5.900E+04	0.000E+00	0.000E+00	0.000E+00	1.660E+04
RB-88	0.000E+00	3.870E+02	1.930E+02	0.000E+00	0.000E+00	0.000E+00	3.340E-09
RB-89	0.000E+00	2.560E+02	1.700E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	3.040E+05	0.000E+00	8.720E+03	0.000E+00	0.000E+00	1.400E+06	3.500E+05
SR-90	9.920E+07	0.000E+00	6.100E+06	0.000E+00	0.000E+00	9.600E+06	7.220E+05
SR-91	6.190E+01	0.000E+00	2.500E+00	0.000E+00	0.000E+00	3.650E+04	1.910E+05
SR-92	6.740E+00	0.000E+00	2.910E-01	0.000E+00	0.000E+00	1.650E+04	4.300E+04
Y-90	2.090E+03	0.000E+00	5.610E+01	0.000E+00	0.000E+00	1.700E+05	5.060E+05
Y-91M	2.610E-01	0.000E+00	1.020E-02	0.000E+00	0.000E+00	1.920E+03	1.330E+00
Y-91	4.620E+05	0.000E+00	1.240E+04	0.000E+00	0.000E+00	1.700E+06	3.850E+05
Y-92	1.030E+01	0.000E+00	3.020E-01	0.000E+00	0.000E+00	1.570E+04	7.350E+04
Y-93	9.440E+01	0.000E+00	2.610E+00	0.000E+00	0.000E+00	4.850E+04	4.220E+05



Attachment 12
Gaseous Effluent Pathway Dose Factors**INHALATION DOSE FACTORS**
ADULT
(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
ZR-95	1.070E+05	3.440E+04	2.330E+04	0.000E+00	5.420E+04	1.770E+06	1.500E+05
ZR-97	9.680E+01	1.960E+01	9.040E+00	0.000E+00	2.970E+01	7.870E+04	5.230E+05
NB-95	1.410E+04	7.820E+03	4.210E+03	0.000E+00	7.740E+03	5.050E+05	1.040E+05
NB-97	2.220E-01	5.620E-02	2.050E-02	0.000E+00	6.540E-02	2.400E+03	2.420E+02
MO-99	0.000E+00	1.210E+02	2.300E+01	0.000E+00	2.910E+02	9.120E+04	2.480E+05
TC-99M	1.030E-03	2.910E-03	3.700E-02	0.000E+00	4.420E-02	7.640E+02	4.160E+03
TC-101	4.180E-05	6.020E-05	5.900E-04	0.000E+00	1.080E-03	3.990E+02	0.000E+00
RU-103	1.530E+03	0.000E+00	6.580E+02	0.000E+00	5.830E+03	5.050E+05	1.100E+05
RU-105	7.900E-01	0.000E+00	3.110E-01	0.000E+00	1.020E+00	1.100E+04	4.820E+04
RU-106	6.910E+04	0.000E+00	8.720E+03	0.000E+00	1.340E+05	9.360E+06	9.120E+05
RH-103M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH-106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG-110M	1.080E+04	1.000E+04	5.940E+03	0.000E+00	1.970E+04	4.630E+06	3.020E+05
SB-122	3.100E+03	4.110E+03	4.110E+04	1.070E+03	1.550E+03	1.670E+05	2.020E+05
SB-124	3.120E+04	5.890E+02	1.240E+04	7.550E+01	0.000E+00	2.480E+06	4.060E+05
SB-125	5.340E+04	5.950E+02	1.260E+04	5.400E+01	0.000E+00	1.740E+06	1.010E+05
TE-125M	3.420E+03	1.580E+03	4.670E+02	1.050E+03	1.240E+04	3.140E+05	7.060E+04
TE-127M	1.260E+04	5.770E+03	1.570E+03	3.290E+03	4.580E+04	9.600E+05	1.500E+05
TE-127	1.400E+00	6.420E-01	3.100E-01	1.060E+00	5.100E+00	6.510E+03	5.740E+04
TE-129M	9.760E+03	4.670E+03	1.580E+03	3.440E+03	3.660E+04	1.160E+06	3.830E+05
TE-129	4.980E-02	2.390E-02	1.240E-02	3.900E-02	1.870E-01	1.940E+03	1.570E+02
TE-131M	6.990E+01	4.360E+01	2.900E+01	5.500E+01	3.090E+02	1.460E+05	5.560E+05
TE-131	1.110E-02	5.950E-03	3.590E-03	9.360E-03	4.370E-02	1.390E+03	1.840E+01
TE-132	2.600E+02	2.150E+02	1.620E+02	1.900E+02	1.460E+03	2.880E+05	5.100E+05
I-130	4.580E+03	1.340E+04	5.280E+03	1.140E+06	2.090E+04	7.690E+03	0.000E+00
I-131	2.520E+04	3.580E+04	2.050E+04	1.190E+07	6.130E+04	0.000E+00	6.280E+03
I-132	1.160E+03	3.260E+03	1.160E+03	1.140E+05	5.180E+03	0.000E+00	4.060E+02
I-133	8.640E+03	1.480E+04	4.520E+03	2.150E+06	2.580E+04	0.000E+00	8.880E+03
I-134	6.440E+02	1.730E+03	6.150E+02	2.980E+04	2.750E+03	0.000E+00	1.010E+00
I-135	2.680E+03	6.980E+03	2.570E+03	4.480E+05	1.110E+04	0.000E+00	5.250E+03
CS-134	3.730E+05	8.480E+05	7.280E+05	0.000E+00	2.870E+05	9.760E+04	1.040E+04
CS-136	3.900E+04	1.460E+05	1.100E+05	0.000E+00	8.560E+04	1.200E+04	1.170E+04
CS-137	4.780E+05	6.210E+05	4.280E+05	0.000E+00	2.220E+05	7.520E+04	8.400E+03
CS-138	3.310E+02	6.210E+02	3.240E+02	0.000E+00	4.800E+02	4.860E+01	1.860E-03



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 274 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

INHALATION DOSE FACTORS ADULT

(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	9.360E-01	6.660E-04	2.740E-02	0.000E+00	6.220E-04	3.760E+03	8.960E+02
BA-140	3.900E+04	4.900E+01	2.570E+03	0.000E+00	1.670E+01	1.270E+06	2.180E+05
BA-141	1.000E-01	7.530E-05	3.360E-03	0.000E+00	7.000E-05	1.940E+03	1.160E-07
BA-142	2.630E-02	2.700E-05	1.660E-03	0.000E+00	2.290E-05	1.190E+03	0.000E+00
LA-140	3.440E+02	1.740E+02	4.580E+01	0.000E+00	0.000E+00	1.360E+05	4.580E+05
LA-142	6.830E-01	3.100E-01	7.720E-02	0.000E+00	0.000E+00	6.330E+03	2.110E+03
CE-141	1.990E+04	1.350E+04	1.530E+03	0.000E+00	6.260E+03	3.620E+05	1.200E+05
CE-143	1.860E+02	1.380E+02	1.530E+01	0.000E+00	6.080E+01	7.980E+04	2.260E+05
CE-144	3.430E+06	1.430E+06	1.840E+05	0.000E+00	8.480E+05	7.780E+06	8.160E+05
PR-143	9.360E+03	3.750E+03	4.640E+02	0.000E+00	2.160E+03	2.810E+05	2.000E+05
PR-144	3.010E-02	1.250E-02	1.530E-03	0.000E+00	7.050E-03	1.020E+03	2.150E-08
ND-147	5.270E+03	6.100E+03	3.650E+02	0.000E+00	3.560E+03	2.210E+05	1.730E+05
EU-154	5.920E+06	7.280E+05	5.180E+05	0.000E+00	3.490E+06	4.670E+06	2.720E+05
EU-155	8.080E+05	1.140E+05	7.370E+04	0.000E+00	5.270E+05	7.570E+05	4.760E+04
W-187	8.480E+00	7.080E+00	2.480E+00	0.000E+00	0.000E+00	2.900E+04	1.550E+05
NP-239	2.300E+02	2.260E+01	1.240E+01	0.000E+00	7.000E+01	3.760E+04	1.190E+05



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 275 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

INHALATION DOSE FACTORS TEEN

(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	1.270E+03	1.270E+03	1.270E+03	1.270E+03	1.270E+03	1.270E+03
C-14	2.600E+04	4.870E+03	4.870E+03	4.870E+03	4.870E+03	4.870E+03	4.870E+03
NA-24	1.380E+04	1.380E+04	1.380E+04	1.380E+04	1.380E+04	1.380E+04	1.380E+04
P-32	1.890E+06	1.100E+05	7.160E+04	0.000E+00	0.000E+00	0.000E+00	9.280E+04
CR-51	0.000E+00	0.000E+00	1.350E+02	7.500E+01	3.070E+01	2.100E+04	3.000E+03
MN-54	0.000E+00	5.110E+04	8.400E+03	0.000E+00	1.270E+04	1.980E+06	6.680E+04
MN-56	0.000E+00	1.700E+00	2.520E-01	0.000E+00	1.790E+00	1.520E+04	5.740E+04
FE-55	3.340E+04	2.380E+04	5.540E+03	0.000E+00	0.000E+00	1.240E+05	6.390E+03
FE-59	1.590E+04	3.700E+04	1.430E+04	0.000E+00	0.000E+00	1.530E+06	1.780E+05
CO-57	0.000E+00	6.920E+02	9.200E+02	0.000E+00	0.000E+00	5.860E+05	3.140E+04
CO-58	0.000E+00	2.070E+03	2.780E+03	0.000E+00	0.000E+00	1.340E+06	9.520E+04
CO-60	0.000E+00	1.510E+04	1.980E+04	0.000E+00	0.000E+00	8.720E+06	2.590E+05
NI-63	5.800E+05	4.340E+04	1.980E+04	0.000E+00	0.000E+00	3.070E+05	1.420E+04
NI-65	2.180E+00	2.930E-01	1.270E-01	0.000E+00	0.000E+00	9.360E+03	3.670E+04
CU-64	0.000E+00	2.030E+00	8.480E-01	0.000E+00	6.410E+00	1.110E+04	6.140E+04
ZN-65	3.860E+04	1.340E+05	6.240E+04	0.000E+00	8.640E+04	1.240E+06	4.660E+04
ZN-69	4.830E-02	9.200E-02	6.460E-03	0.000E+00	6.020E-02	1.580E+03	2.850E+02
BR-82	0.000E+00	0.000E+00	1.820E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	3.440E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	4.330E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	1.830E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	1.900E+05	8.400E+04	0.000E+00	0.000E+00	0.000E+00	1.770E+04
RB-88	0.000E+00	5.460E+02	2.720E+02	0.000E+00	0.000E+00	0.000E+00	2.920E-05
RB-89	0.000E+00	3.520E+02	2.330E+02	0.000E+00	0.000E+00	0.000E+00	3.380E-07
SR-89	4.340E+05	0.000E+00	1.250E+04	0.000E+00	0.000E+00	2.420E+06	3.710E+05
SR-90	1.080E+08	0.000E+00	6.680E+06	0.000E+00	0.000E+00	1.650E+07	7.650E+05
SR-91	8.800E+01	0.000E+00	3.510E+00	0.000E+00	0.000E+00	6.070E+04	2.590E+05
SR-92	9.520E+00	0.000E+00	4.060E-01	0.000E+00	0.000E+00	2.740E+04	1.190E+05
Y-90	2.980E+03	0.000E+00	8.000E+01	0.000E+00	0.000E+00	2.930E+05	5.590E+05
Y-91M	3.700E-01	0.000E+00	1.420E-02	0.000E+00	0.000E+00	3.200E+03	3.020E+01
Y-91	6.610E+05	0.000E+00	1.770E+04	0.000E+00	0.000E+00	2.940E+06	4.090E+05
Y-92	1.470E+01	0.000E+00	4.290E-01	0.000E+00	0.000E+00	2.680E+04	1.650E+05
Y-93	1.350E+02	0.000E+00	3.720E+00	0.000E+00	0.000E+00	8.320E+04	5.790E+05



Attachment 12
Gaseous Effluent Pathway Dose Factors**INHALATION DOSE FACTORS**
TEEN(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
ZR-95	1.460E+05	4.580E+04	3.150E+04	0.000E+00	6.740E+04	2.690E+06	1.490E+05
ZR-97	1.380E+02	2.720E+01	1.260E+01	0.000E+00	4.120E+01	1.300E+05	6.300E+05
NB-95	1.860E+04	1.030E+04	5.660E+03	0.000E+00	1.000E+04	7.510E+05	9.680E+04
NB-97	3.140E-01	7.780E-02	2.840E-02	0.000E+00	9.120E-02	3.930E+03	2.170E+03
MO-99	0.000E+00	1.690E+02	3.220E+01	0.000E+00	4.110E+02	1.540E+05	2.690E+05
TC-99M	1.380E-03	3.860E-03	4.990E-02	0.000E+00	5.760E-02	1.150E+03	6.130E+03
TC-101	5.920E-05	8.400E-05	8.240E-04	0.000E+00	1.520E-03	6.670E+02	8.720E-07
RU-103	2.100E+03	0.000E+00	8.960E+02	0.000E+00	7.430E+03	7.830E+05	1.090E+05
RU-105	1.120E+00	0.000E+00	4.340E-01	0.000E+00	1.410E+00	1.820E+04	9.040E+04
RU-106	9.840E+04	0.000E+00	1.240E+04	0.000E+00	1.900E+05	1.610E+07	9.600E+05
RH-103M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH-106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG-110M	1.380E+04	1.310E+04	7.990E+03	0.000E+00	2.500E+04	6.750E+06	2.730E+05
SB-122	3.100E+03	4.110E+03	4.110E+04	1.070E+03	1.550E+03	1.670E+05	2.020E+05
SB-124	4.300E+04	7.940E+02	1.680E+04	9.760E+01	0.000E+00	3.850E+06	3.980E+05
SB-125	7.380E+04	8.080E+02	1.720E+04	7.040E+01	0.000E+00	2.740E+06	9.920E+04
TE-125M	4.880E+03	2.240E+03	6.670E+02	1.400E+03	0.000E+00	5.360E+05	7.500E+04
TE-127M	1.800E+04	8.160E+03	2.180E+03	4.380E+03	6.540E+04	1.660E+06	1.590E+05
TE-127	2.010E+00	9.120E-01	4.420E-01	1.420E+00	7.280E+00	1.120E+04	8.080E+04
TE-129M	1.390E+04	6.580E+03	2.250E+03	4.580E+03	5.190E+04	1.980E+06	4.050E+05
TE-129	7.100E-02	3.380E-02	1.760E-02	5.180E-02	2.660E-01	3.300E+03	1.620E+03
TE-131M	9.840E+01	6.010E+01	4.020E+01	7.250E+01	4.390E+02	2.380E+05	6.210E+05
TE-131	1.580E-02	8.320E-03	5.040E-03	1.240E-02	6.180E-02	2.340E+03	1.510E+01
TE-132	3.600E+02	2.900E+02	2.190E+02	2.460E+02	1.950E+03	4.490E+05	4.630E+05
I-130	6.240E+03	1.790E+04	7.170E+03	1.490E+06	2.750E+04	0.000E+00	9.120E+03
I-131	3.540E+04	4.910E+04	2.640E+04	1.460E+07	8.400E+04	0.000E+00	6.490E+03
I-132	1.590E+03	4.380E+03	1.580E+03	1.510E+05	6.920E+03	0.000E+00	1.270E+03
I-133	1.220E+04	2.050E+04	6.220E+03	2.920E+06	3.590E+04	0.000E+00	1.030E+04
I-134	8.880E+02	2.320E+03	8.400E+02	3.950E+04	3.660E+03	0.000E+00	2.040E+01
I-135	3.700E+03	9.440E+03	3.490E+03	6.210E+05	1.490E+04	0.000E+00	6.950E+03
CS-134	5.020E+05	1.130E+06	5.490E+05	0.000E+00	3.750E+05	1.460E+05	9.760E+03
CS-136	5.150E+04	1.940E+05	1.370E+05	0.000E+00	1.100E+05	1.780E+04	1.090E+04
CS-137	6.700E+05	8.480E+05	3.110E+05	0.000E+00	3.040E+05	1.210E+05	8.480E+03
CS-138	4.660E+02	8.560E+02	4.460E+02	0.000E+00	6.620E+02	7.870E+01	2.700E-01



Attachment 12
Gaseous Effluent Pathway Dose Factors**INHALATION DOSE FACTORS****TEEN****(mrem/yr per uCi/m³)**

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GItract
BA-139	1.340E+00	9.440E-04	3.900E-02	0.000E+00	8.880E-04	6.460E+03	6.450E+03
BA-140	5.470E+04	6.700E+01	3.520E+03	0.000E+00	2.280E+01	2.030E+06	2.290E+05
BA-141	1.420E-01	1.060E-04	4.740E-03	0.000E+00	9.840E-05	3.290E+03	7.460E-04
BA-142	3.700E-02	3.700E-05	2.270E-03	0.000E+00	3.140E-05	1.910E+03	0.000E+00
LA-140	4.790E+02	2.360E+02	6.260E+01	0.000E+00	0.000E+00	2.140E+05	4.870E+05
LA-142	9.600E-01	4.250E-01	1.060E-01	0.000E+00	0.000E+00	1.020E+04	1.200E+04
CE-141	2.840E+04	1.900E+04	2.170E+03	0.000E+00	8.880E+03	6.140E+05	1.260E+05
CE-143	2.660E+02	1.940E+02	2.160E+01	0.000E+00	8.640E+01	1.300E+05	2.550E+05
CE-144	4.890E+06	2.020E+06	2.620E+05	0.000E+00	1.210E+06	1.340E+07	8.640E+05
PR-143	1.340E+04	5.310E+03	6.620E+02	0.000E+00	3.090E+03	4.830E+05	2.140E+05
PR-144	4.300E-02	1.760E-02	2.180E-03	0.000E+00	1.010E-02	1.750E+03	2.350E-04
ND-147	7.860E+03	8.560E+03	5.130E+02	0.000E+00	5.020E+03	3.720E+05	1.820E+05
EU-154	7.540E+06	9.840E+05	6.880E+05	0.000E+00	4.350E+06	7.300E+06	2.670E+05
EU-155	1.600E+06	1.570E+05	9.680E+04	0.000E+00	6.120E+05	1.210E+07	4.780E+05
W-187	1.200E+01	9.760E+00	3.430E+00	0.000E+00	0.000E+00	4.740E+04	1.770E+05
NP-239	3.380E+02	3.190E+01	1.770E+01	0.000E+00	1.000E+02	6.490E+04	1.320E+05



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 278 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

INHALATION DOSE FACTORS CHILD

(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	1.120E+03	1.120E+03	1.120E+03	1.120E+03	1.120E+03	1.120E+03
C-14	3.590E+04	6.730E+03	6.730E+03	6.730E+03	6.730E+03	6.730E+03	6.730E+03
NA-24	1.610E+04	1.610E+04	1.610E+04	1.610E+04	1.610E+04	1.610E+04	1.610E+04
P-32	2.600E+06	1.140E+05	9.880E+04	0.000E+00	0.000E+00	0.000E+00	4.220E+04
CR-51	0.000E+00	0.000E+00	1.540E+02	8.550E+01	2.430E+01	1.700E+04	1.080E+03
MN-54	0.000E+00	4.290E+04	9.510E+03	0.000E+00	1.000E+04	1.580E+06	2.290E+04
MN-56	0.000E+00	1.660E+00	3.120E-01	0.000E+00	1.670E+00	1.310E+04	1.230E+05
FE-55	4.740E+04	2.520E+04	7.770E+03	0.000E+00	0.000E+00	1.110E+05	2.870E+03
FE-59	2.070E+04	3.340E+04	1.670E+04	0.000E+00	0.000E+00	1.270E+06	7.070E+04
CO-57	0.000E+00	9.030E+02	1.070E+03	0.000E+00	0.000E+00	5.070E+05	1.320E+04
CO-58	0.000E+00	1.770E+03	3.160E+03	0.000E+00	0.000E+00	1.110E+06	3.440E+04
CO-60	0.000E+00	1.310E+04	2.260E+04	0.000E+00	0.000E+00	7.070E+06	9.620E+04
NI-63	8.210E+05	4.630E+04	2.800E+04	0.000E+00	0.000E+00	2.750E+05	6.330E+03
NI-65	2.990E+00	2.960E-01	1.640E-01	0.000E+00	0.000E+00	8.180E+03	8.400E+04
CU-64	0.000E+00	1.990E+00	1.070E+00	0.000E+00	6.030E+00	9.580E+03	3.670E+04
ZN-65	4.260E+04	1.130E+05	7.030E+04	0.000E+00	7.140E+04	9.950E+05	1.630E+04
ZN-69	6.700E-02	9.660E-02	8.920E-03	0.000E+00	5.850E-02	1.420E+03	9.510E+03
BR-82	0.000E+00	0.000E+00	2.090E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	4.740E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	5.480E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	2.530E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	1.980E+05	1.140E+05	0.000E+00	0.000E+00	0.000E+00	7.990E+03
RB-88	0.000E+00	5.620E+02	3.660E+02	0.000E+00	0.000E+00	0.000E+00	1.720E+01
RB-89	0.000E+00	3.450E+02	2.900E+02	0.000E+00	0.000E+00	0.000E+00	1.890E+00
SR-89	5.990E+05	0.000E+00	1.720E+04	0.000E+00	0.000E+00	2.160E+06	1.670E+05
SR-90	1.010E+08	0.000E+00	6.440E+06	0.000E+00	0.000E+00	1.480E+07	3.430E+05
SR-91	1.210E+02	0.000E+00	4.590E+00	0.000E+00	0.000E+00	5.330E+04	1.740E+05
SR-92	1.310E+01	0.000E+00	5.250E-01	0.000E+00	0.000E+00	2.400E+04	2.420E+05
Y-90	4.110E+03	0.000E+00	1.110E+02	0.000E+00	0.000E+00	2.620E+05	2.680E+05
Y-91M	5.070E-01	0.000E+00	1.840E-02	0.000E+00	0.000E+00	2.810E+03	1.720E+03
Y-91	9.140E+05	0.000E+00	2.440E+04	0.000E+00	0.000E+00	2.630E+06	1.840E+05
Y-92	2.040E+01	0.000E+00	5.810E-01	0.000E+00	0.000E+00	2.390E+04	2.390E+05
Y-93	1.860E+02	0.000E+00	5.110E+00	0.000E+00	0.000E+00	7.440E+04	3.890E+05
ZR-95	1.900E+05	4.180E+04	3.700E+04	0.000E+00	5.960E+04	2.230E+06	6.110E+04



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 279 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

INHALATION DOSE FACTORS CHILD

(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
ZR-97	1.880E+02	2.720E+01	1.600E+01	0.000E+00	3.890E+01	1.130E+05	3.510E+05
NB-95	2.350E+04	9.180E+03	6.550E+03	0.000E+00	8.620E+03	6.140E+05	3.700E+04
NB-97	4.290E-01	7.700E-02	3.600E-02	0.000E+00	8.550E-02	3.420E+03	2.780E+04
MO-99	0.000E+00	1.720E+02	4.260E+01	0.000E+00	3.920E+02	1.350E+05	1.270E+05
TC-99M	1.780E-03	3.480E-03	5.770E-02	0.000E+00	5.070E-02	9.510E+02	4.810E+03
TC-101	8.100E-05	8.510E-05	1.080E-03	0.000E+00	1.450E-03	5.850E+02	1.630E+01
RU-103	2.790E+03	0.000E+00	1.070E+03	0.000E+00	7.030E+03	6.620E+05	4.480E+04
RU-105	1.530E+00	0.000E+00	5.550E-01	0.000E+00	1.340E+00	1.590E+04	9.950E+04
RU-106	1.360E+05	0.000E+00	1.690E+04	0.000E+00	1.840E+05	1.430E+07	4.290E+05
RH-103M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH-106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG-110M	1.690E+04	1.140E+04	9.140E+03	0.000E+00	2.120E+04	5.480E+06	1.000E+05
SB-122	1.440E+03	1.980E+03	1.900E+04	4.960E+02	7.180E+02	7.730E+04	9.360E+04
SB-124	5.740E+04	7.400E+02	2.000E+04	1.260E+02	0.000E+00	3.240E+06	1.640E+05
SB-125	9.840E+04	7.590E+02	2.070E+04	9.100E+01	0.000E+00	2.320E+06	4.030E+04
TE-125M	6.730E+03	2.330E+03	9.140E+02	1.920E+03	0.000E+00	4.770E+05	3.380E+04
TE-127M	2.490E+04	8.550E+03	3.020E+03	6.070E+03	6.360E+04	1.480E+06	7.140E+04
TE-127	2.770E+00	9.510E-01	6.110E-01	1.960E+00	7.070E+00	1.000E+04	5.620E+04
TE-129M	1.920E+04	6.850E+03	3.040E+03	6.330E+03	5.030E+04	1.760E+06	1.820E+05
TE-129	9.770E-02	3.500E-02	2.380E-02	7.140E-02	2.570E-01	2.930E+03	2.550E+04
TE-131M	1.340E+02	5.920E+01	5.070E+01	9.770E+01	4.000E+02	2.060E+05	3.080E+05
TE-131	2.170E-02	8.440E-03	6.590E-03	1.700E-02	5.880E-02	2.050E+03	1.330E+03
TE-132	4.810E+02	2.720E+02	2.630E+02	3.170E+02	1.840E+03	3.770E+05	1.380E+05
I-130	8.180E+03	1.640E+04	8.440E+03	1.850E+06	2.450E+04	0.000E+00	5.110E+03
I-131	4.810E+04	4.810E+04	2.730E+04	1.620E+07	7.880E+04	0.000E+00	2.840E+03
I-132	2.120E+03	4.070E+03	1.880E+03	1.940E+05	6.250E+03	0.000E+00	3.200E+03
I-133	1.660E+04	2.030E+04	7.700E+03	3.850E+06	3.380E+04	0.000E+00	5.480E+03
I-134	1.170E+03	2.160E+03	9.950E+02	5.070E+04	3.300E+03	0.000E+00	9.550E+02
I-135	4.920E+03	8.730E+03	4.140E+03	7.920E+05	1.340E+04	0.000E+00	4.440E+03
CS-134	6.510E+05	1.010E+06	2.250E+05	0.000E+00	3.300E+05	1.210E+05	3.850E+03
CS-136	6.510E+04	1.710E+05	1.160E+05	0.000E+00	9.550E+04	1.450E+04	4.180E+03
CS-137	9.070E+05	8.250E+05	1.280E+05	0.000E+00	2.820E+05	1.040E+05	3.620E+03
CS-138	6.330E+02	8.400E+02	5.550E+02	0.000E+00	6.220E+02	6.810E+01	2.700E+02



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 280 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

INHALATION DOSE FACTORS CHILD

(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	1.840E+00	9.840E-04	5.370E-02	0.000E+00	8.620E-04	5.770E+03	5.770E+04
BA-140	7.400E+04	6.480E+01	4.330E+03	0.000E+00	2.110E+01	1.740E+06	1.020E+05
BA-141	1.960E-01	1.090E-04	6.360E-03	0.000E+00	9.470E-05	2.920E+03	2.750E+02
BA-142	5.000E-02	3.600E-05	2.790E-03	0.000E+00	2.910E-05	1.640E+03	2.740E+00
LA-140	6.440E+02	2.250E+02	7.550E+01	0.000E+00	0.000E+00	1.830E+05	2.260E+05
LA-142	1.300E+00	4.110E-01	1.290E-01	0.000E+00	0.000E+00	8.700E+03	7.590E+04
CE-141	3.920E+04	1.950E+04	2.900E+03	0.000E+00	8.550E+03	5.440E+05	5.660E+04
CE-143	3.660E+02	1.990E+02	2.870E+01	0.000E+00	8.360E+01	1.150E+05	1.270E+05
CE-144	6.770E+06	2.120E+06	3.610E+05	0.000E+00	1.170E+06	1.200E+07	3.890E+05
PR-143	1.850E+04	5.550E+03	9.140E+02	0.000E+00	3.000E+03	4.330E+05	9.730E+04
PR-144	5.960E-02	1.850E-02	3.000E-03	0.000E+00	9.770E-03	1.570E+03	1.970E+02
ND-147	1.080E+04	8.730E+03	6.810E+02	0.000E+00	4.810E+03	3.280E+05	8.210E+04
EU-154	1.010E+07	9.210E+05	8.400E+05	0.000E+00	4.030E+06	6.140E+06	1.100E+05
EU-155	2.070E+06	1.500E+05	1.180E+05	0.000E+00	5.590E+05	1.030E+06	1.990E+05
W-187	1.630E+01	9.660E+00	4.330E+00	0.000E+00	0.000E+00	4.110E+04	9.100E+04
NP-239	4.700E+02	3.340E+01	2.350E+01	0.000E+00	9.730E+01	5.810E+04	6.400E+04



OFFSITE DOSE CALCULATION MANUAL

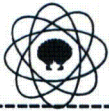
Rev. 00802
Page 281 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

INHALATION DOSE FACTORS INFANT

(mrem/yr per $\mu\text{Ci}/\text{m}^3$)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	6.470E+02	6.470E+02	6.470E+02	6.470E+02	6.470E+02	6.470E+02
C-14	2.650E+04	5.310E+03	5.310E+03	5.310E+03	5.310E+03	5.310E+03	5.310E+03
NA-24	1.060E+04	1.060E+04	1.060E+04	1.060E+04	1.060E+04	1.060E+04	1.060E+04
P-32	2.030E+06	1.120E+05	7.740E+04	0.000E+00	0.000E+00	0.000E+00	1.610E+04
CR-51	0.000E+00	0.000E+00	8.950E+01	5.750E+01	1.320E+01	1.280E+04	3.570E+02
MN-54	0.000E+00	2.530E+04	4.980E+03	0.000E+00	4.980E+03	1.000E+06	7.060E+03
MN-56	0.000E+00	1.540E+00	2.210E-01	0.000E+00	1.100E+00	1.250E+04	7.170E+04
FE-55	1.970E+04	1.170E+04	3.330E+03	0.000E+00	0.000E+00	8.690E+04	1.090E+03
FE-59	1.360E+04	2.350E+04	9.480E+03	0.000E+00	0.000E+00	1.020E+06	2.480E+04
CO-57	0.000E+00	6.510E+02	6.410E+02	0.000E+00	0.000E+00	3.790E+05	4.860E+03
CO-58	0.000E+00	1.220E+03	1.820E+03	0.000E+00	0.000E+00	7.770E+05	1.110E+04
CO-60	0.000E+00	8.020E+03	1.180E+04	0.000E+00	0.000E+00	4.510E+06	3.190E+04
NI-63	3.390E+05	2.040E+04	1.160E+04	0.000E+00	0.000E+00	2.090E+05	2.420E+03
NI-65	2.390E+00	2.840E-01	1.230E-01	0.000E+00	0.000E+00	8.120E+03	5.010E+04
CU-64	0.000E+00	1.880E+00	7.740E-01	0.000E+00	3.980E+00	9.300E+03	1.500E+04
ZN-65	1.930E+04	6.260E+04	3.110E+04	0.000E+00	3.250E+04	6.470E+05	5.140E+04
ZN-69	5.390E-02	9.670E-02	7.180E-03	0.000E+00	4.020E-02	1.470E+03	1.320E+04
BR-82	0.000E+00	0.000E+00	1.330E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	3.810E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	4.000E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	2.040E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	1.900E+05	8.820E+04	0.000E+00	0.000E+00	0.000E+00	3.040E+03
RB-88	0.000E+00	5.570E+02	2.870E+02	0.000E+00	0.000E+00	0.000E+00	3.390E+02
RB-89	0.000E+00	3.210E+02	2.060E+02	0.000E+00	0.000E+00	0.000E+00	6.820E+01
SR-89	3.980E+05	0.000E+00	1.140E+04	0.000E+00	0.000E+00	2.030E+06	6.400E+04
SR-90	4.090E+07	0.000E+00	2.590E+06	0.000E+00	0.000E+00	1.120E+07	1.310E+05
SR-91	9.560E+01	0.000E+00	3.460E+00	0.000E+00	0.000E+00	5.260E+04	7.340E+04
SR-92	1.050E+01	0.000E+00	3.910E-01	0.000E+00	0.000E+00	2.380E+04	1.400E+05
Y-90	3.290E+03	0.000E+00	8.820E+01	0.000E+00	0.000E+00	2.690E+05	1.040E+05
Y-91M	4.070E-01	0.000E+00	1.390E-02	0.000E+00	0.000E+00	2.790E+03	2.350E+03
Y-91	5.880E+05	0.000E+00	1.570E+04	0.000E+00	0.000E+00	2.450E+06	7.030E+04
Y-92	1.640E+01	0.000E+00	4.610E-01	0.000E+00	0.000E+00	2.450E+04	1.270E+05
Y-93	1.500E+02	0.000E+00	4.070E+00	0.000E+00	0.000E+00	7.640E+04	1.670E+05



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 282 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

INHALATION DOSE FACTORS INFANT (mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
ZR-95	1.150E+05	2.790E+04	2.030E+04	0.000E+00	3.110E+04	1.750E+06	2.170E+04
ZR-97	1.500E+02	2.560E+01	1.170E+01	0.000E+00	2.590E+01	1.100E+05	1.400E+05
NB-95	1.570E+04	6.430E+03	3.780E+03	0.000E+00	4.720E+03	4.790E+05	1.270E+04
NB-97	3.420E-01	7.290E-02	2.630E-02	0.000E+00	5.700E-02	3.320E+03	2.690E+04
MO-99	0.000E+00	1.650E+02	3.230E+01	0.000E+00	2.650E+02	1.350E+05	4.870E+04
TC-99M	1.400E-03	2.880E-03	3.720E-02	0.000E+00	3.110E-02	8.110E+02	2.030E+03
TC-101	6.510E-05	8.230E-05	8.120E-04	0.000E+00	9.790E-04	5.840E+02	8.440E+02
RU-103	2.020E+03	0.000E+00	6.790E+02	0.000E+00	4.240E+03	5.520E+05	1.610E+04
RU-105	1.220E+00	0.000E+00	4.100E-01	0.000E+00	8.990E-01	1.570E+04	4.840E+04
RU-106	8.680E+04	0.000E+00	1.090E+04	0.000E+00	1.070E+05	1.160E+07	1.640E+05
RH-103M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH-106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG-110M	9.980E+03	7.220E+03	5.000E+03	0.000E+00	1.090E+04	3.670E+06	3.300E+04
SB-122	5.430E+02	7.200E+02	7.200E+03	1.880E+02	2.720E+02	2.930E+04	3.540E+04
SB-124	3.790E+04	5.560E+02	1.200E+04	1.010E+02	0.000E+00	2.650E+06	5.910E+04
SB-125	5.170E+04	4.770E+02	1.090E+04	6.230E+01	0.000E+00	1.640E+06	1.470E+04
TE-125M	4.760E+03	1.990E+03	6.580E+02	1.620E+03	0.000E+00	4.470E+05	1.290E+04
TE-127M	1.670E+04	6.900E+03	2.070E+03	4.870E+03	3.750E+04	1.310E+06	2.730E+04
TE-127	2.230E+00	9.530E-01	4.890E-01	1.850E+00	4.860E+00	1.030E+04	2.440E+04
TE-129M	1.410E+04	6.090E+03	2.230E+03	5.470E+03	3.180E+04	1.680E+06	6.900E+04
TE-129	7.880E-02	3.470E-02	1.880E-02	6.750E-02	1.750E-01	3.000E+03	2.630E+04
TE-131M	1.070E+02	5.500E+01	3.630E+01	8.930E+01	2.650E+02	1.990E+05	1.190E+05
TE-131	1.740E-02	8.220E-03	5.000E-03	1.580E-02	3.990E-02	2.060E+03	8.220E+03
TE-132	3.720E+02	2.370E+02	1.760E+02	2.790E+02	1.030E+03	3.400E+05	4.410E+04
I-130	6.360E+03	1.390E+04	5.570E+03	1.600E+06	1.530E+04	0.000E+00	1.990E+03
I-131	3.790E+04	4.440E+04	1.960E+04	1.480E+07	5.180E+04	0.000E+00	1.060E+03
I-132	1.690E+03	3.540E+03	1.260E+03	1.690E+05	3.950E+03	0.000E+00	1.900E+03
I-133	1.320E+04	1.920E+04	5.600E+03	3.560E+06	2.240E+04	0.000E+00	2.160E+03
I-134	9.210E+02	1.880E+03	6.650E+02	4.450E+04	2.090E+03	0.000E+00	1.290E+03
I-135	3.860E+03	7.600E+03	2.770E+03	6.960E+05	8.470E+03	0.000E+00	1.830E+03
CS-134	3.960E+05	7.030E+05	7.450E+04	0.000E+00	1.900E+05	7.970E+04	1.330E+03
CS-136	4.830E+04	1.350E+05	5.290E+04	0.000E+00	5.640E+04	1.180E+04	1.430E+03
CS-137	5.490E+05	6.120E+05	4.550E+04	0.000E+00	1.720E+05	7.130E+04	1.330E+03
CS-138	5.050E+02	7.810E+02	3.980E+02	0.000E+00	4.100E+02	6.540E+01	8.760E+02



Attachment 12
Gaseous Effluent Pathway Dose Factors**INHALATION DOSE FACTORS**
INFANT(mrem/yr per uCi/m³)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	1.480E+00	9.840E-04	4.300E-02	0.000E+00	5.920E-04	5.950E+03	5.100E+04
BA-140	5.600E+04	5.600E+01	2.900E+03	0.000E+00	1.340E+01	1.600E+06	3.840E+04
BA-141	1.570E-01	1.080E-04	4.970E-03	0.000E+00	6.500E-05	2.970E+03	4.750E+03
BA-142	3.980E-02	3.300E-05	1.960E-03	0.000E+00	1.900E-05	1.550E+03	6.930E+02
LA-140	5.050E+02	2.000E+02	5.150E+01	0.000E+00	0.000E+00	1.680E+05	8.480E+04
LA-142	1.030E+00	3.770E-01	9.040E-02	0.000E+00	0.000E+00	8.220E+03	5.950E+04
CE-141	2.770E+04	1.670E+04	1.990E+03	0.000E+00	5.250E+03	5.170E+05	2.160E+04
CE-143	2.930E+02	1.930E+02	2.210E+01	0.000E+00	5.640E+01	1.160E+05	4.970E+04
CE-144	3.190E+06	1.210E+06	1.760E+05	0.000E+00	5.380E+05	9.840E+06	1.480E+05
PR-143	1.400E+04	5.240E+03	6.990E+02	0.000E+00	1.970E+03	4.330E+05	3.720E+04
PR-144	4.790E-02	1.850E-02	2.410E-03	0.000E+00	6.720E-03	1.610E+03	4.280E+03
ND-147	7.940E+03	8.130E+03	5.000E+02	0.000E+00	3.150E+03	3.220E+05	3.120E+04
EU-154	4.140E+06	4.840E+05	3.430E+05	0.000E+00	1.540E+06	4.270E+06	3.980E+04
EU-155	8.360E+05	8.010E+04	4.840E+04	0.000E+00	2.210E+05	7.280E+05	7.270E+04
W-187	1.300E+01	9.020E+00	3.120E+00	0.000E+00	0.000E+00	3.960E+04	3.560E+04
NP-239	3.710E+02	3.320E+01	1.880E+01	0.000E+00	6.620E+01	5.950E+04	2.490E+04



Attachment 12
Gaseous Effluent Pathway Dose Factors**GRASS-COW-MILK DOSE FACTORS**
ADULT(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	7.630E+02	7.630E+02	7.630E+02	7.630E+02	7.630E+02	7.630E+02
C-14	3.630E+05	7.260E+04	7.260E+04	7.260E+04	7.260E+04	7.260E+04	7.260E+04
NA-24	2.540E+06	2.540E+06	2.540E+06	2.540E+06	2.540E+06	2.540E+06	2.540E+06
P-32	1.710E+10	1.060E+09	6.600E+08	0.000E+00	0.000E+00	0.000E+00	1.920E+09
CR-51	0.000E+00	0.000E+00	2.860E+04	1.710E+04	6.300E+03	3.800E+04	7.200E+06
MN-54	0.000E+00	8.400E+06	1.600E+06	0.000E+00	2.500E+06	0.000E+00	2.570E+07
MN-56	0.000E+00	4.230E-03	7.510E-04	0.000E+00	5.380E-03	0.000E+00	1.350E-01
FE-55	2.510E+07	1.730E+07	4.040E+06	0.000E+00	0.000E+00	9.670E+06	9.950E+06
FE-59	2.980E+07	7.000E+07	2.680E+07	0.000E+00	0.000E+00	1.950E+07	2.330E+08
CO-57	0.000E+00	1.280E+06	2.130E+06	0.000E+00	0.000E+00	0.000E+00	3.250E+07
CO-58	0.000E+00	4.720E+06	1.060E+07	0.000E+00	0.000E+00	0.000E+00	9.570E+07
CO-60	0.000E+00	1.640E+07	3.620E+07	0.000E+00	0.000E+00	0.000E+00	3.080E+08
NI-63	6.730E+09	4.660E+08	2.260E+08	0.000E+00	0.000E+00	0.000E+00	9.730E+07
NI-65	3.700E-01	4.810E-02	2.190E-02	0.000E+00	0.000E+00	0.000E+00	1.220E+00
CU-64	0.000E+00	2.410E+04	1.130E+04	0.000E+00	6.080E+04	0.000E+00	2.050E+06
ZN-65	1.370E+09	4.360E+09	1.970E+09	0.000E+00	2.920E+09	0.000E+00	2.750E+09
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	2.590E+09	1.210E+09	0.000E+00	0.000E+00	0.000E+00	5.110E+08
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	1.450E+09	0.000E+00	4.160E+07	0.000E+00	0.000E+00	0.000E+00	2.330E+08
SR-90	4.680E+10	0.000E+00	1.150E+10	0.000E+00	0.000E+00	0.000E+00	1.350E+09
SR-91	3.130E+04	0.000E+00	1.270E+03	0.000E+00	0.000E+00	0.000E+00	1.490E+05
SR-92	4.890E-01	0.000E+00	2.110E-02	0.000E+00	0.000E+00	0.000E+00	9.680E+00



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 285 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

GRASS-COW-MILK DOSE FACTORS ADULT

(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
Y-90	7.070E+01	0.000E+00	1.900E+00	0.000E+00	0.000E+00	0.000E+00	7.500E+05
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	8.600E+03	0.000E+00	2.300E+02	0.000E+00	0.000E+00	0.000E+00	4.730E+06
Y-92	5.420E-05	0.000E+00	1.580E-06	0.000E+00	0.000E+00	0.000E+00	9.490E-01
Y-93	2.330E-01	0.000E+00	6.430E-03	0.000E+00	0.000E+00	0.000E+00	7.390E+03
ZR-95	9.460E+02	3.030E+02	2.050E+02	0.000E+00	4.760E+02	0.000E+00	9.620E+05
ZR-97	4.260E-01	8.590E-02	3.930E-02	0.000E+00	1.300E-01	0.000E+00	2.660E+04
NB-95	8.250E+04	4.590E+04	2.470E+04	0.000E+00	4.540E+04	0.000E+00	2.790E+08
NB-97	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.470E-09
MO-99	0.000E+00	2.520E+07	4.800E+06	0.000E+00	5.720E+07	0.000E+00	5.850E+07
TC-99M	3.250E+00	9.190E+00	1.170E+02	0.000E+00	1.400E+02	4.500E+00	5.440E+03
TC-101	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU-103	1.020E+03	0.000E+00	4.390E+02	0.000E+00	3.890E+03	0.000E+00	1.190E+05
RU-105	8.570E-04	0.000E+00	3.380E-04	0.000E+00	1.110E-02	0.000E+00	5.240E-01
RU-106	2.040E+04	0.000E+00	2.580E+03	0.000E+00	3.940E+04	0.000E+00	1.320E+06
RH-103M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH-106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG-110M	5.830E+07	5.390E+07	3.200E+07	0.000E+00	1.060E+08	0.000E+00	2.200E+10
SB-122	6.010E+05	6.270E+05	7.590E+06	9.960E+04	2.960E+05	1.290E+05	7.470E+07
SB-124	8.580E+08	1.620E+07	3.400E+08	2.080E+06	0.000E+00	6.680E+08	2.440E+10
SB-125	6.810E+08	7.610E+06	1.620E+08	6.930E+05	0.000E+00	5.250E+08	7.500E+09
TE-125M	1.630E+07	5.900E+06	2.180E+06	4.900E+06	6.630E+07	0.000E+00	6.500E+07
TE-127M	4.580E+07	1.640E+07	5.580E+06	1.170E+07	1.860E+08	0.000E+00	1.540E+08
TE-127	6.720E+02	2.410E+02	1.450E+02	4.980E+02	2.740E+03	0.000E+00	5.300E+04
TE-129M	6.040E+07	2.250E+07	9.570E+06	2.080E+07	2.520E+08	0.000E+00	3.040E+08
TE-129	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE-131M	3.610E+05	1.770E+05	1.470E+05	2.800E+05	1.790E+06	0.000E+00	1.750E+07
TE-131	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE-132	2.390E+06	1.550E+06	1.450E+06	1.710E+06	1.490E+07	0.000E+00	7.320E+07
I-130	4.260E+05	1.260E+06	4.960E+05	1.070E+08	1.960E+06	0.000E+00	1.080E+06
I-131	2.960E+08	4.240E+08	2.430E+08	1.390E+11	7.270E+08	0.000E+00	1.120E+08
I-132	1.640E-01	4.370E-01	1.530E-01	1.530E+01	6.970E-01	0.000E+00	8.220E-02
I-133	3.970E+06	6.900E+06	2.100E+06	1.010E+09	1.200E+07	0.000E+00	6.200E+06



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 286 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

GRASS-COW-MILK DOSE FACTORS ADULT

(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
I-134	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I-135	1.390E+04	3.630E+04	1.340E+04	2.400E+06	5.830E+04	0.000E+00	4.100E+04
CS-134	5.650E+09	1.340E+10	1.100E+10	0.000E+00	4.350E+09	1.440E+09	2.350E+08
CS-136	2.610E+08	1.030E+09	7.420E+08	0.000E+00	5.740E+08	7.870E+07	1.170E+08
CS-137	7.380E+09	1.010E+10	6.610E+09	0.000E+00	3.430E+09	1.140E+09	1.950E+08
CS-138	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-139	4.700E-08	0.000E+00	1.380E-09	0.000E+00	0.000E+00	0.000E+00	8.340E-08
BA-140	2.690E+07	3.380E+04	1.760E+06	0.000E+00	1.150E+04	1.930E+04	5.540E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	4.490E+00	2.260E+00	5.970E-01	0.000E+00	0.000E+00	0.000E+00	1.660E+05
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.030E-08
CE-141	4.840E+03	3.270E+03	3.710E+02	0.000E+00	1.520E+03	0.000E+00	1.250E+07
CE-143	4.190E+01	3.090E+04	3.420E+00	0.000E+00	1.360E+01	0.000E+00	1.160E+06
CE-144	3.580E+05	1.500E+05	1.920E+04	0.000E+00	8.870E+04	0.000E+00	1.210E+08
PR-143	1.590E+02	6.370E+01	7.880E+00	0.000E+00	3.680E+01	0.000E+00	6.960E+05
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	9.420E+01	1.090E+02	6.520E+00	0.000E+00	6.370E+01	0.000E+00	5.230E+05
EU-154	2.370E+04	2.910E+03	2.070E+03	0.000E+00	1.390E+04	0.000E+00	2.110E+06
EU-155	3.300E+03	4.680E+02	3.020E+02	0.000E+00	2.160E+03	0.000E+00	3.680E+05
W-187	6.560E+03	5.480E+03	1.920E+03	0.000E+00	0.000E+00	0.000E+00	1.800E+06
NP-239	3.660E+00	3.600E-01	1.980E-01	0.000E+00	1.120E+00	0.000E+00	7.390E+04



Attachment 12
Gaseous Effluent Pathway Dose Factors**GRASS-COW-MILK DOSE FACTORS****TEEN****(m² *mrem/yr per uCi/sec)**

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	9.940E+02	9.940E+02	9.940E+02	9.940E+02	9.940E+02	9.940E+02
C-14	6.700E+05	1.340E+05	1.340E+05	1.340E+05	1.340E+05	1.340E+05	1.340E+05
NA-24	4.440E+06	4.440E+06	4.440E+06	4.440E+06	4.440E+06	4.440E+06	4.440E+06
P-32	3.150E+10	1.950E+09	1.220E+09	0.000E+00	0.000E+00	0.000E+00	2.650E+09
CR-51	0.000E+00	0.000E+00	5.000E+04	2.780E+04	1.100E+04	7.130E+04	8.400E+06
MN-54	0.000E+00	1.400E+07	2.780E+06	0.000E+00	4.170E+06	0.000E+00	2.870E+07
MN-56	0.000E+00	7.510E-03	1.330E-03	0.000E+00	9.500E-03	0.000E+00	4.940E-01
FE-55	4.450E+07	3.160E+07	7.360E+06	0.000E+00	0.000E+00	2.000E+07	1.370E+07
FE-59	5.200E+07	1.210E+08	4.680E+07	0.000E+00	0.000E+00	3.820E+07	2.870E+08
CO-57	0.000E+00	2.250E+06	3.760E+06	0.000E+00	0.000E+00	0.000E+00	4.190E+07
CO-58	0.000E+00	7.950E+06	1.830E+07	0.000E+00	0.000E+00	0.000E+00	1.100E+08
CO-60	0.000E+00	2.780E+07	6.260E+07	0.000E+00	0.000E+00	0.000E+00	3.620E+08
NI-63	1.180E+10	8.350E+08	4.010E+08	0.000E+00	0.000E+00	0.000E+00	1.330E+08
NI-65	6.780E-01	8.660E-02	3.940E-02	0.000E+00	0.000E+00	0.000E+00	4.700E+00
CU-64	0.000E+00	4.290E+04	2.020E+04	0.000E+00	1.090E+05	0.000E+00	3.330E+06
ZN-65	2.110E+09	7.310E+09	3.410E+09	0.000E+00	4.680E+09	0.000E+00	3.100E+09
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	4.730E+09	2.220E+09	0.000E+00	0.000E+00	0.000E+00	7.000E+08
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	2.670E+09	0.000E+00	7.660E+07	0.000E+00	0.000E+00	0.000E+00	3.180E+08
SR-90	6.610E+10	0.000E+00	1.630E+10	0.000E+00	0.000E+00	0.000E+00	1.860E+09
SR-91	5.750E+04	0.000E+00	2.290E+03	0.000E+00	0.000E+00	0.000E+00	2.610E+05
SR-92	8.950E-01	0.000E+00	3.810E-02	0.000E+00	0.000E+00	0.000E+00	2.280E+01
Y-90	1.300E+02	0.000E+00	3.500E+00	0.000E+00	0.000E+00	0.000E+00	1.070E+06
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	1.580E+04	0.000E+00	4.240E+02	0.000E+00	0.000E+00	0.000E+00	6.480E+06
Y-92	1.000E-04	0.000E+00	2.900E-06	0.000E+00	0.000E+00	0.000E+00	2.750E+00
Y-93	4.300E-01	0.000E+00	1.180E-02	0.000E+00	0.000E+00	0.000E+00	1.310E+04

Attachment 12
Gaseous Effluent Pathway Dose Factors

GRASS-COW-MILK DOSE FACTORS

 $(\text{m}^2 \cdot \text{mrem}/\text{yr per uCi}/\text{sec})$ [illegible]



Attachment 12
Gaseous Effluent Pathway Dose Factors**GRASS-COW-MILK DOSE FACTORS**
TEEN $(m^2 \cdot mrem/yr \text{ per } \mu Ci/sec)$

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	8.690E-08	0.000E+00	2.530E-09	0.000E+00	0.000E+00	0.000E+00	7.750E-07
BA-140	4.850E+07	5.950E+04	3.130E+06	0.000E+00	2.020E+04	4.000E+04	7.490E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	8.060E+00	3.960E+00	1.050E+00	0.000E+00	0.000E+00	0.000E+00	2.270E+05
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.230E-07
CE-141	8.870E+03	5.920E+03	6.810E+02	0.000E+00	2.790E+03	0.000E+00	1.690E+07
CE-143	7.690E+01	5.600E+04	6.250E+00	0.000E+00	2.510E+01	0.000E+00	1.680E+06
CE-144	6.580E+05	2.720E+05	3.540E+04	0.000E+00	1.630E+05	0.000E+00	1.660E+08
PR-143	2.920E+02	1.170E+02	1.450E+01	0.000E+00	6.770E+01	0.000E+00	9.610E+05
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	1.810E+02	1.970E+02	1.180E+01	0.000E+00	1.160E+02	0.000E+00	7.110E+05
EU-154	3.920E+04	5.060E+03	3.570E+03	0.000E+00	2.260E+04	0.000E+00	2.670E+06
EU-155	8.600E+03	8.310E+02	5.140E+02	0.000E+00	3.250E+03	0.000E+00	4.760E+06
W-187	1.200E+04	9.780E+03	3.430E+03	0.000E+00	0.000E+00	0.000E+00	2.650E+06
NP-239	6.990E+00	6.590E-01	3.660E-01	0.000E+00	2.070E+00	0.000E+00	1.060E+05



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 290 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

GRASS-COW-MILK DOSE FACTORS

CHILD

(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	1.570E+03	1.570E+03	1.570E+03	1.570E+03	1.570E+03	1.570E+03
C-14	1.650E+06	3.290E+05	3.290E+05	3.290E+05	3.290E+05	3.290E+05	3.290E+05
NA-24	9.230E+06	9.230E+06	9.230E+06	9.230E+06	9.230E+06	9.230E+06	9.230E+06
P-32	7.770E+10	3.640E+09	3.000E+09	0.000E+00	0.000E+00	0.000E+00	2.150E+09
CR-51	0.000E+00	0.000E+00	1.020E+05	5.660E+04	1.550E+04	1.030E+05	5.410E+06
MN-54	0.000E+00	2.090E+07	5.580E+06	0.000E+00	5.870E+06	0.000E+00	1.760E+07
MN-56	0.000E+00	1.310E-02	2.950E-03	0.000E+00	1.580E-02	0.000E+00	1.900E+00
FE-55	1.120E+08	5.930E+07	1.840E+07	0.000E+00	0.000E+00	3.350E+07	1.100E+07
FE-59	1.200E+08	1.950E+08	9.710E+07	0.000E+00	0.000E+00	5.650E+07	2.030E+08
CO-57	0.000E+00	3.840E+06	7.770E+06	0.000E+00	0.000E+00	0.000E+00	3.140E+07
CO-58	0.000E+00	1.210E+07	3.720E+07	0.000E+00	0.000E+00	0.000E+00	7.080E+07
CO-60	0.000E+00	4.320E+07	1.270E+08	0.000E+00	0.000E+00	0.000E+00	2.390E+08
NI-63	2.960E+10	1.590E+09	1.010E+09	0.000E+00	0.000E+00	0.000E+00	1.070E+08
NI-65	1.660E+00	1.560E-01	9.110E-02	0.000E+00	0.000E+00	0.000E+00	1.910E+01
CU-64	0.000E+00	7.550E+04	4.560E+04	0.000E+00	1.820E+05	0.000E+00	3.540E+06
ZN-65	4.130E+09	1.100E+10	6.850E+09	0.000E+00	6.940E+09	0.000E+00	1.930E+09
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.140E-09
BR-82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	8.770E+09	5.390E+09	0.000E+00	0.000E+00	0.000E+00	5.640E+08
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	6.620E+09	0.000E+00	1.890E+08	0.000E+00	0.000E+00	0.000E+00	2.560E+08
SR-90	1.120E+11	0.000E+00	2.830E+10	0.000E+00	0.000E+00	0.000E+00	1.510E+09
SR-91	1.410E+05	0.000E+00	5.330E+03	0.000E+00	0.000E+00	0.000E+00	3.120E+05
SR-92	2.190E+00	0.000E+00	8.760E-02	0.000E+00	0.000E+00	0.000E+00	4.140E+01
Y-90	3.220E+02	0.000E+00	8.610E+00	0.000E+00	0.000E+00	0.000E+00	9.150E+05
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	3.910E+04	0.000E+00	1.040E+03	0.000E+00	0.000E+00	0.000E+00	5.210E+06
Y-92	2.460E-04	0.000E+00	7.030E-06	0.000E+00	0.000E+00	0.000E+00	7.100E+00
Y-93	1.060E+00	0.000E+00	2.900E-02	0.000E+00	0.000E+00	0.000E+00	1.570E+04

Attachment 12
Gaseous Effluent Pathway Dose Factors

GRASS-COW-MILK DOSE FACTORS

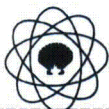
CHILD

$$(\text{m}^2 \cdot \text{mrem}/\text{yr per } \mu\text{Ci}/\text{sec})$$
[illegible]



Attachment 12
Gaseous Effluent Pathway Dose Factors**GRASS-COW-MILK DOSE FACTORS****CHILD****(m² *mrem/yr per uCi/sec)**

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	2.140E-07	0.000E+00	6.190E-09	0.000E+00	0.000E+00	0.000E+00	1.230E-05
BA-140	1.170E+08	1.030E+05	6.840E+06	0.000E+00	3.340E+04	6.120E+04	5.940E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	1.930E+01	6.740E+00	2.270E+00	0.000E+00	0.000E+00	0.000E+00	1.880E+05
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.510E-06
CE-141	2.190E+04	1.090E+04	1.620E+03	0.000E+00	4.780E+03	0.000E+00	1.360E+07
CE-143	1.890E+02	1.020E+05	1.480E+01	0.000E+00	4.290E+01	0.000E+00	1.500E+06
CE-144	1.620E+06	5.090E+05	8.660E+04	0.000E+00	2.820E+05	0.000E+00	1.330E+08
PR-143	7.230E+02	2.170E+02	3.590E+01	0.000E+00	1.170E+02	0.000E+00	7.800E+05
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	4.450E+02	3.600E+02	2.790E+01	0.000E+00	1.980E+02	0.000E+00	5.710E+05
EU-154	9.420E+04	8.470E+03	7.740E+03	0.000E+00	3.720E+04	0.000E+00	1.970E+06
EU-155	1.970E+04	1.420E+03	1.110E+03	0.000E+00	5.300E+03	0.000E+00	3.540E+06
W-187	2.910E+04	1.720E+04	7.730E+03	0.000E+00	0.000E+00	0.000E+00	2.420E+06
NP-239	1.720E+01	1.230E+00	8.680E-01	0.000E+00	3.570E+00	0.000E+00	9.140E+04



Attachment 12
Gaseous Effluent Pathway Dose Factors**GRASS-COW-MILK DOSE FACTORS**
INFANT $(\text{m}^2 \cdot \text{mrem/yr per uCi/sec})$

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	2.380E+03	2.380E+03	2.380E+03	2.380E+03	2.380E+03	2.380E+03
C-14	3.230E+06	6.890E+05	6.890E+05	6.890E+05	6.890E+05	6.890E+05	6.890E+05
NA-24	1.610E+07	1.610E+07	1.610E+07	1.610E+07	1.610E+07	1.610E+07	1.610E+07
P-32	1.600E+11	9.420E+09	6.210E+09	0.000E+00	0.000E+00	0.000E+00	2.170E+09
CR-51	0.000E+00	0.000E+00	1.610E+05	1.050E+05	2.300E+04	2.050E+05	4.710E+06
MN-54	0.000E+00	3.890E+07	8.830E+06	0.000E+00	8.630E+06	0.000E+00	1.430E+07
MN-56	0.000E+00	3.210E-02	5.530E-03	0.000E+00	2.760E-02	0.000E+00	2.910E+00
FE-55	1.350E+08	8.720E+07	2.330E+07	0.000E+00	0.000E+00	4.270E+07	1.110E+07
FE-59	2.250E+08	3.930E+08	1.550E+08	0.000E+00	0.000E+00	1.160E+08	1.880E+08
CO-57	0.000E+00	8.950E+06	1.460E+07	0.000E+00	0.000E+00	0.000E+00	3.050E+07
CO-58	0.000E+00	2.430E+07	6.060E+07	0.000E+00	0.000E+00	0.000E+00	6.050E+07
CO-60	0.000E+00	8.810E+07	2.080E+08	0.000E+00	0.000E+00	0.000E+00	2.100E+08
NI-63	3.490E+10	2.160E+09	1.210E+09	0.000E+00	0.000E+00	0.000E+00	1.070E+08
NI-65	3.510E+00	3.970E-01	1.810E-01	0.000E+00	0.000E+00	0.000E+00	3.020E+01
CU-64	0.000E+00	1.880E+05	8.690E+04	0.000E+00	3.170E+05	0.000E+00	3.850E+06
ZN-65	5.550E+09	1.900E+10	8.780E+09	0.000E+00	9.230E+09	0.000E+00	1.610E+10
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.360E-09
BR-82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	2.220E+10	1.100E+10	0.000E+00	0.000E+00	0.000E+00	5.690E+08
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	1.260E+10	0.000E+00	3.610E+08	0.000E+00	0.000E+00	0.000E+00	2.590E+08
SR-90	1.220E+11	0.000E+00	3.100E+10	0.000E+00	0.000E+00	0.000E+00	1.520E+09
SR-91	2.940E+05	0.000E+00	1.060E+04	0.000E+00	0.000E+00	0.000E+00	3.480E+05
SR-92	4.650E+00	0.000E+00	1.730E-01	0.000E+00	0.000E+00	0.000E+00	5.010E+01
Y-90	6.800E+02	0.000E+00	1.820E+01	0.000E+00	0.000E+00	0.000E+00	9.390E+05
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	7.330E+04	0.000E+00	1.950E+03	0.000E+00	0.000E+00	0.000E+00	5.260E+06
Y-92	5.220E-04	0.000E+00	1.470E-05	0.000E+00	0.000E+00	0.000E+00	9.970E+00
Y-93	2.250E+00	0.000E+00	6.130E-02	0.000E+00	0.000E+00	0.000E+00	1.780E+04

Attachment 12

Gaseous Effluent Pathway Dose Factors

GRASS-COW-MILK DOSE FACTORS INFANT

 $(\text{m}^2 \cdot \text{mrem}/\text{yr per uCi}/\text{sec})$ [illegible]



Attachment 12
Gaseous Effluent Pathway Dose Factors**GRASS-COW-MILK DOSE FACTORS**
INFANT $(m^2 \cdot mrem/yr \text{ per } \mu Ci/sec)$

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	4.550E-07	0.000E+00	1.320E-08	0.000E+00	0.000E+00	0.000E+00	2.880E-05
BA-140	2.410E+08	2.410E+05	1.240E+07	0.000E+00	5.730E+04	1.480E+05	5.920E+07
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	4.030E+01	1.590E+01	4.090E+00	0.000E+00	0.000E+00	0.000E+00	1.870E+05
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.210E-06
CE-141	4.330E+04	2.640E+04	3.110E+03	0.000E+00	8.150E+03	0.000E+00	1.370E+07
CE-143	4.000E+02	2.650E+05	3.020E+01	0.000E+00	7.720E+01	0.000E+00	1.550E+06
CE-144	2.330E+06	9.520E+05	1.300E+05	0.000E+00	3.850E+05	0.000E+00	1.330E+08
PR-143	1.490E+03	5.590E+02	7.410E+01	0.000E+00	2.080E+02	0.000E+00	7.890E+05
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	8.820E+02	9.060E+02	5.550E+01	0.000E+00	3.490E+02	0.000E+00	5.740E+05
EU-154	1.080E+05	1.500E+04	9.010E+03	0.000E+00	4.070E+04	0.000E+00	1.880E+06
EU-155	2.210E+04	2.550E+03	1.320E+03	0.000E+00	5.710E+03	0.000E+00	3.410E+06
W-187	6.120E+04	4.260E+04	1.470E+04	0.000E+00	0.000E+00	0.000E+00	2.500E+06
NP-239	3.640E+01	3.250E+00	1.840E+00	0.000E+00	6.490E+00	0.000E+00	9.400E+04

**Attachment 12**
Gaseous Effluent Pathway Dose Factors**GRASS-GOAT-MILK DOSE FACTORS**
ADULT(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	1.560E+03	1.560E+03	1.560E+03	1.560E+03	1.560E+03	1.560E+03
C-14	3.630E+05	7.260E+04	7.260E+04	7.260E+04	7.260E+04	7.260E+04	7.260E+04
NA-24	3.050E+05	3.050E+05	3.050E+05	3.050E+05	3.050E+05	3.050E+05	3.050E+05
P-32	2.050E+10	1.270E+09	7.930E+08	0.000E+00	0.000E+00	0.000E+00	2.310E+09
CR-51	0.000E+00	0.000E+00	3.430E+03	2.050E+03	7.560E+02	4.560E+03	8.640E+05
MN-54	0.000E+00	1.010E+06	1.920E+05	0.000E+00	3.000E+05	0.000E+00	3.090E+06
MN-56	0.000E+00	5.080E-04	9.010E-05	0.000E+00	6.450E-04	0.000E+00	1.620E-02
FE-55	3.260E+05	2.250E+05	5.260E+04	0.000E+00	0.000E+00	1.260E+05	1.290E+05
FE-59	3.870E+05	9.090E+05	3.490E+05	0.000E+00	0.000E+00	2.540E+05	3.030E+06
CO-57	0.000E+00	1.540E+05	2.550E+05	0.000E+00	0.000E+00	0.000E+00	3.900E+06
CO-58	0.000E+00	5.660E+05	1.270E+06	0.000E+00	0.000E+00	0.000E+00	1.150E+07
CO-60	0.000E+00	1.970E+06	4.340E+06	0.000E+00	0.000E+00	0.000E+00	3.700E+07
NI-63	8.070E+08	5.600E+07	2.710E+07	0.000E+00	0.000E+00	0.000E+00	1.170E+07
NI-65	4.440E-02	5.770E-03	2.630E-03	0.000E+00	0.000E+00	0.000E+00	1.460E-01
CU-64	0.000E+00	2.690E+03	1.260E+03	0.000E+00	6.770E+03	0.000E+00	2.290E+05
ZN-65	1.650E+08	5.240E+08	2.370E+08	0.000E+00	3.500E+08	0.000E+00	3.300E+08
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-82	0.000E+00	0.000E+00	3.900E+06	0.000E+00	0.000E+00	0.000E+00	4.470E+06
BR-83	0.000E+00	0.000E+00	1.240E-02	0.000E+00	0.000E+00	0.000E+00	1.790E-02
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	3.110E+08	1.450E+08	0.000E+00	0.000E+00	0.000E+00	6.140E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	3.050E+09	0.000E+00	8.740E+07	0.000E+00	0.000E+00	0.000E+00	4.890E+08
SR-90	9.830E+10	0.000E+00	2.410E+10	0.000E+00	0.000E+00	0.000E+00	2.840E+09
SR-91	6.580E+04	0.000E+00	2.660E+03	0.000E+00	0.000E+00	0.000E+00	3.130E+05
SR-92	1.030E+00	0.000E+00	4.440E-02	0.000E+00	0.000E+00	0.000E+00	2.030E+01
Y-90	8.480E+00	0.000E+00	2.280E-01	0.000E+00	0.000E+00	0.000E+00	8.990E+04
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	1.030E+03	0.000E+00	2.760E+01	0.000E+00	0.000E+00	0.000E+00	5.680E+05
Y-92	6.510E-06	0.000E+00	1.900E-07	0.000E+00	0.000E+00	0.000E+00	1.140E-01
Y-93	2.800E-02	0.000E+00	7.720E-04	0.000E+00	0.000E+00	0.000E+00	8.870E+02
ZR-95	1.140E+02	3.640E+01	2.470E+01	0.000E+00	5.710E+01	0.000E+00	1.150E+05

Attachment 12
Gaseous Effluent Pathway Dose Factors

GRASS-GOAT-MILK DOSE FACTORS ADULT

 $(m^2 \cdot mrem/yr \text{ per } \mu Ci/sec)$ [illegible]



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 298 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

GRASS-GOAT-MILK DOSE FACTORS ADULT

(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	5.640E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E-08
BA-140	3.230E+06	4.050E+03	2.110E+05	0.000E+00	1.380E+03	2.320E+03	6.650E+06
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	5.380E-01	2.710E-01	1.990E+04	0.000E+00	0.000E+00	0.000E+00	1.990E+04
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.640E-09
CE-141	5.810E+02	3.930E+02	4.450E+01	0.000E+00	1.820E+02	0.000E+00	1.500E+06
CE-143	5.020E+00	3.710E+03	4.110E-01	0.000E+00	1.630E+00	0.000E+00	1.390E+05
CE-144	4.290E+04	1.790E+04	2.300E+03	0.000E+00	1.060E+04	0.000E+00	1.450E+07
PR-143	1.910E+01	7.650E+00	9.450E-01	0.000E+00	4.410E+00	0.000E+00	8.350E+04
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	1.130E+01	1.310E+01	7.820E-01	0.000E+00	7.640E+00	0.000E+00	6.270E+04
EU-154	2.840E+03	3.490E+02	2.480E+02	0.000E+00	1.670E+03	0.000E+00	2.530E+05
EU-155	3.950E+02	5.610E+01	3.620E+01	0.000E+00	2.590E+02	0.000E+00	4.410E+04
W-187	7.870E+02	6.580E+02	2.300E+02	0.000E+00	0.000E+00	0.000E+00	2.160E+05
NP-239	4.390E-01	4.320E-02	2.380E-02	0.000E+00	1.350E-01	0.000E+00	8.860E+03



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 299 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

GRASS-GOAT-MILK DOSE FACTORS TEEN

(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	2.030E+03	2.030E+03	2.030E+03	2.030E+03	2.030E+03	2.030E+03
C-14	6.700E+05	1.340E+05	1.340E+05	1.340E+05	1.340E+05	1.340E+05	1.340E+05
NA-24	5.330E+05	5.330E+05	5.330E+05	5.330E+05	5.330E+05	5.330E+05	5.330E+05
P-32	3.780E+10	2.340E+09	1.470E+09	0.000E+00	0.000E+00	0.000E+00	3.180E+09
CR-51	0.000E+00	0.000E+00	6.000E+03	3.330E+03	1.310E+03	8.560E+03	1.010E+06
MN-54	0.000E+00	1.680E+06	3.330E+05	0.000E+00	5.010E+05	0.000E+00	3.440E+06
MN-56	0.000E+00	9.010E-04	1.600E-04	0.000E+00	1.140E-03	0.000E+00	5.930E-02
FE-55	5.790E+05	4.100E+05	9.570E+04	0.000E+00	0.000E+00	2.600E+05	1.780E+05
FE-59	6.750E+05	1.580E+06	6.090E+05	0.000E+00	0.000E+00	4.970E+05	3.730E+06
CO-57	0.000E+00	2.690E+05	4.520E+05	0.000E+00	0.000E+00	0.000E+00	5.030E+06
CO-58	0.000E+00	9.540E+05	2.200E+06	0.000E+00	0.000E+00	0.000E+00	1.310E+07
CO-60	0.000E+00	3.340E+06	7.510E+06	0.000E+00	0.000E+00	0.000E+00	4.350E+07
NI-63	1.420E+09	1.000E+08	4.810E+07	0.000E+00	0.000E+00	0.000E+00	1.590E+07
NI-65	8.130E-02	1.040E-02	4.730E-03	0.000E+00	0.000E+00	0.000E+00	5.640E-01
CU-64	0.000E+00	4.790E+03	2.250E+03	0.000E+00	1.210E+04	0.000E+00	3.710E+05
ZN-65	2.530E+08	8.780E+08	4.090E+08	0.000E+00	5.620E+08	0.000E+00	3.720E+08
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-82	0.000E+00	0.000E+00	6.670E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	2.290E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	5.670E+08	2.670E+08	0.000E+00	0.000E+00	0.000E+00	8.400E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	5.620E+09	0.000E+00	1.160E+08	0.000E+00	0.000E+00	0.000E+00	6.690E+08
SR-90	1.390E+11	0.000E+00	3.430E+11	0.000E+00	0.000E+00	0.000E+00	3.900E+09
SR-91	1.210E+05	0.000E+00	4.810E+03	0.000E+00	0.000E+00	0.000E+00	5.480E+05
SR-92	1.880E+00	0.000E+00	8.010E-02	0.000E+00	0.000E+00	0.000E+00	4.790E+01
Y-90	1.560E+01	0.000E+00	4.200E-01	0.000E+00	0.000E+00	0.000E+00	1.290E+05
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	1.900E+03	0.000E+00	5.090E+01	0.000E+00	0.000E+00	0.000E+00	7.780E+05
Y-92	1.200E-05	0.000E+00	3.480E-07	0.000E+00	0.000E+00	0.000E+00	3.300E-01
Y-93	5.160E-02	0.000E+00	1.410E-03	0.000E+00	0.000E+00	0.000E+00	1.580E+03

Attachment 12
Gaseous Effluent Pathway Dose Factors

GRASS-GOAT-MILK DOSE FACTORS TEEN

 $(\text{m}^2 \cdot \text{mrem}/\text{yr per uCi}/\text{sec})$ [illegible]



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 301 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

GRASS-GOAT-MILK DOSE FACTORS TEEN

(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	Gttract
BA-139	1.040E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.310E-08
BA-140	5.830E+06	7.140E+03	3.750E+05	0.000E+00	2.420E+03	4.800E+03	8.980E+06
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	9.760E-01	4.750E-01	1.260E-01	0.000E+00	0.000E+00	0.000E+00	2.730E+04
LA-142	1.980E-12	8.780E-13	2.190E-13	0.000E+00	0.000E+00	0.000E+00	2.670E-08
CE-141	1.060E+03	7.110E+02	8.170E+01	0.000E+00	3.350E+02	0.000E+00	2.030E+06
CE-143	9.230E+00	6.720E+03	7.500E-01	0.000E+00	3.010E+00	0.000E+00	2.020E+05
CE-144	7.900E+04	3.270E+04	4.240E+03	0.000E+00	1.950E+04	0.000E+00	1.990E+07
PR-143	3.500E+01	1.400E+01	1.740E+00	0.000E+00	8.130E+00	0.000E+00	1.150E+05
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	2.180E+01	2.370E+01	1.420E+00	0.000E+00	1.390E+01	0.000E+00	8.530E+04
EU-154	4.700E+03	6.070E+02	4.280E+02	0.000E+00	2.720E+03	0.000E+00	3.210E+05
EU-155	1.030E+03	9.970E+01	6.170E+01	0.000E+00	3.900E+02	0.000E+00	5.710E+05
W-187	1.440E+03	1.170E+03	4.110E+02	0.000E+00	0.000E+00	0.000E+00	3.180E+05
NP-239	8.390E-01	7.910E-02	4.390E-02	0.000E+00	2.480E-01	0.000E+00	1.270E+04



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 302 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

GRASS-GOAT-MILK DOSE FACTORS CHILD

(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	3.200E+03	3.200E+03	3.200E+03	3.200E+03	3.200E+03	3.200E+03
C-14	1.650E+06	3.290E+05	3.290E+05	3.290E+05	3.290E+05	3.290E+05	3.290E+05
NA-24	1.110E+06	1.110E+06	1.110E+06	1.110E+06	1.110E+06	1.110E+06	1.110E+06
P-32	9.330E+10	4.370E+09	3.600E+09	0.000E+00	0.000E+00	0.000E+00	2.580E+09
CR-51	0.000E+00	0.000E+00	1.220E+04	6.790E+03	1.860E+03	1.240E+04	6.490E+05
MN-54	0.000E+00	2.510E+06	6.690E+05	0.000E+00	7.050E+05	0.000E+00	2.110E+06
MN-56	0.000E+00	1.570E-03	3.550E-04	0.000E+00	1.900E-03	0.000E+00	2.280E-01
FE-55	1.450E+06	7.700E+05	2.390E+05	0.000E+00	0.000E+00	4.360E+05	1.430E+05
FE-59	1.570E+06	2.530E+06	1.260E+06	0.000E+00	0.000E+00	7.350E+05	2.640E+06
CO-57	0.000E+00	4.600E+05	9.320E+05	0.000E+00	0.000E+00	0.000E+00	3.770E+06
CO-58	0.000E+00	1.460E+06	4.460E+06	0.000E+00	0.000E+00	0.000E+00	8.500E+06
CO-60	0.000E+00	5.180E+06	1.530E+07	0.000E+00	0.000E+00	0.000E+00	2.870E+07
NI-63	3.560E+09	1.900E+08	1.210E+08	0.000E+00	0.000E+00	0.000E+00	1.280E+07
NI-65	1.990E-01	1.870E-02	1.090E-02	0.000E+00	0.000E+00	0.000E+00	2.290E+00
CU-64	0.000E+00	8.410E+03	5.080E+03	0.000E+00	2.030E+04	0.000E+00	3.950E+05
ZN-65	4.960E+08	1.320E+09	8.220E+08	0.000E+00	8.330E+08	0.000E+00	2.320E+08
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-82	0.000E+00	0.000E+00	1.390E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	5.620E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	1.050E+09	6.470E+08	0.000E+00	0.000E+00	0.000E+00	6.770E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	1.390E+10	0.000E+00	3.970E+08	0.000E+00	0.000E+00	0.000E+00	5.380E+08
SR-90	2.350E+11	0.000E+00	5.950E+10	0.000E+00	0.000E+00	0.000E+00	3.190E+09
SR-91	2.970E+05	0.000E+00	1.120E+04	0.000E+00	0.000E+00	0.000E+00	6.550E+05
SR-92	4.590E+10	0.000E+00	1.840E-01	0.000E+00	0.000E+00	0.000E+00	8.690E+01
Y-90	3.860E+01	0.000E+00	1.030E+00	0.000E+00	0.000E+00	0.000E+00	1.100E+05
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	4.690E+03	0.000E+00	1.250E+02	0.000E+00	0.000E+00	0.000E+00	6.250E+05
Y-92	2.950E-05	0.000E+00	8.440E-07	0.000E+00	0.000E+00	0.000E+00	8.520E-01
Y-93	1.270E-01	0.000E+00	3.480E-03	0.000E+00	0.000E+00	0.000E+00	1.890E+03
ZR-95	4.610E+02	1.010E+02	9.030E+01	0.000E+00	1.450E+02	0.000E+00	1.060E+05

Attachment 12

Gaseous Effluent Pathway Dose Factors

GRASS-GOAT-MILK DOSE FACTORS CHILD

 $(\text{m}^2 \cdot \text{mrem}/\text{yr per uCi}/\text{sec})$ [illegible]



Attachment 12
Gaseous Effluent Pathway Dose Factors**GRASS-GOAT-MILK DOSE FACTORS**
CHILD $(m^2 \cdot mrem/yr \text{ per } \mu Ci/sec)$

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	2.560E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.480E-06
BA-140	1.410E+07	1.230E+04	8.210E+05	0.000E+00	4.010E+03	7.340E+03	7.120E+06
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	2.310E+00	8.090E-01	2.730E-01	0.000E+00	0.000E+00	0.000E+00	2.260E+04
LA-142	4.770E-12	1.520E-12	4.770E-13	0.000E+00	0.000E+00	0.000E+00	3.020E-07
CE-141	2.620E+03	1.310E+03	1.940E+02	0.000E+00	5.730E+02	0.000E+00	1.630E+06
CE-143	2.270E+01	1.230E+04	1.780E+00	0.000E+00	5.150E+00	0.000E+00	1.800E+05
CE-144	1.950E+05	6.100E+04	1.040E+04	0.000E+00	3.380E+04	0.000E+00	1.590E+07
PR-143	8.670E+01	2.600E+01	4.300E+00	0.000E+00	1.410E+01	0.000E+00	9.350E+04
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	5.340E+01	4.320E+01	3.350E+00	0.000E+00	2.370E+01	0.000E+00	6.850E+04
EU-154	1.130E+04	1.020E+03	9.290E+02	0.000E+00	4.470E+03	0.000E+00	2.360E+05
EU-155	2.360E+03	1.700E+02	1.330E+02	0.000E+00	6.630E+02	0.000E+00	4.250E+05
W-187	3.490E+03	2.070E+03	9.270E+02	0.000E+00	0.000E+00	0.000E+00	2.900E+05
NP-239	2.060E+00	1.480E-01	1.040E-01	0.000E+00	4.280E-01	0.000E+00	1.100E+04



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 305 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

GRASS-GOAT-MILK DOSE FACTORS INFANT

(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
H-3	0.000E+00	4.860E+03	4.860E+03	4.860E+03	4.860E+03	4.860E+03	4.860E+03
C-14	3.230E+06	6.890E+05	6.890E+05	6.890E+05	6.890E+05	6.890E+05	6.890E+05
NA-24	1.930E+06	1.930E+06	1.930E+06	1.930E+06	1.930E+06	1.930E+06	1.930E+06
P-32	1.920E+11	1.130E+10	7.450E+09	0.000E+00	0.000E+00	0.000E+00	2.600E+09
CR-51	0.000E+00	0.000E+00	1.940E+04	1.260E+04	2.760E+03	2.460E+04	5.650E+05
MN-54	0.000E+00	4.670E+06	1.060E+06	0.000E+00	1.040E+06	0.000E+00	1.720E+06
MN-56	0.000E+00	3.850E-03	6.630E-04	0.000E+00	3.310E-03	0.000E+00	3.490E-01
FE-55	1.760E+06	1.130E+06	3.030E+05	0.000E+00	0.000E+00	5.540E+05	1.440E+05
FE-59	2.920E+06	5.110E+06	2.010E+06	0.000E+00	0.000E+00	1.510E+06	2.440E+06
CO-57	0.000E+00	1.070E+06	1.750E+06	0.000E+00	0.000E+00	0.000E+00	3.660E+06
CO-58	0.000E+00	2.910E+06	7.270E+06	0.000E+00	0.000E+00	0.000E+00	7.260E+06
CO-60	0.000E+00	1.060E+07	2.500E+07	0.000E+00	0.000E+00	0.000E+00	2.520E+07
NI-63	4.190E+09	2.590E+08	1.450E+08	0.000E+00	0.000E+00	0.000E+00	1.290E+07
NI-65	4.210E-01	4.770E-02	2.170E-02	0.000E+00	0.000E+00	0.000E+00	3.630E+00
CU-64	0.000E+00	2.090E+04	9.680E+03	0.000E+00	3.540E+04	0.000E+00	4.290E+05
ZN-65	6.660E+08	2.280E+09	1.050E+09	0.000E+00	1.110E+09	0.000E+00	1.930E+09
ZN-69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-82	0.000E+00	0.000E+00	2.330E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-83	0.000E+00	0.000E+00	1.190E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR-85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-86	0.000E+00	2.670E+09	1.320E+09	0.000E+00	0.000E+00	0.000E+00	6.830E+07
RB-88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB-89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR-89	2.640E+10	0.000E+00	7.580E+08	0.000E+00	0.000E+00	0.000E+00	5.430E+08
SR-90	2.550E+11	0.000E+00	6.500E+10	0.000E+00	0.000E+00	0.000E+00	3.190E+09
SR-91	6.180E+05	0.000E+00	2.240E+04	0.000E+00	0.000E+00	0.000E+00	7.310E+05
SR-92	9.760E+00	0.000E+00	3.620E-01	0.000E+00	0.000E+00	0.000E+00	1.050E+02
Y-90	8.160E+01	0.000E+00	2.190E+00	0.000E+00	0.000E+00	0.000E+00	1.130E+05
Y-91M	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y-91	8.800E+03	0.000E+00	2.340E+02	0.000E+00	0.000E+00	0.000E+00	6.310E+05
Y-92	6.270E-05	0.000E+00	1.760E-06	0.000E+00	0.000E+00	0.000E+00	1.200E+10
Y-93	2.700E-01	0.000E+00	7.350E-03	0.000E+00	0.000E+00	0.000E+00	2.130E+03
ZR-95	8.190E+02	2.000E+02	1.420E+02	0.000E+00	2.150E+02	0.000E+00	9.940E+00

Attachment 12
Gaseous Effluent Pathway Dose Factors

GRASS-GOAT-MILK DOSE FACTORS INFANT

 $(\text{m}^2 \cdot \text{mrem}/\text{yr per uCi}/\text{sec})$ [illegible]



OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 307 of 318

Attachment 12 Gaseous Effluent Pathway Dose Factors

GRASS-GOAT-MILK DOSE FACTORS INFANT

(m² *mrem/yr per uCi/sec)

Nuclide	Bone	Liver	Tbody	Thyroid	Kidney	Lung	GIttract
BA-139	5.450E-08	0.000E+00	1.580E-09	0.000E+00	0.000E+00	0.000E+00	3.450E-06
BA-140	2.890E+07	2.890E+04	1.490E+06	0.000E+00	6.870E+03	1.780E+04	7.110E+06
BA-141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA-140	4.840E+00	1.910E+00	4.900E-01	0.000E+00	0.000E+00	0.000E+00	2.240E+04
LA-142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE-141	5.200E+03	3.170E+03	3.730E+02	0.000E+00	9.780E+02	0.000E+00	1.640E+06
CE-143	4.800E+01	3.180E+04	3.630E+00	0.000E+00	9.270E+00	0.000E+00	1.860E+05
CE-144	2.790E+05	1.140E+05	1.560E+04	0.000E+00	4.620E+04	0.000E+00	1.600E+07
PR-143	1.790E+02	6.710E+01	8.890E+00	0.000E+00	2.490E+01	0.000E+00	9.470E+04
PR-144	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND-147	1.060E+02	1.090E+02	6.660E+00	0.000E+00	4.190E+01	0.000E+00	6.890E+04
EU-154	1.300E+04	1.800E+03	1.080E+03	0.000E+00	4.890E+03	0.000E+00	2.250E+05
EU-155	2.650E+03	3.060E+02	1.580E+02	0.000E+00	6.850E+02	0.000E+00	4.100E+05
W-187	7.350E+03	5.110E+03	1.770E+03	0.000E+00	0.000E+00	0.000E+00	3.000E+05
NP-239	4.360E+00	3.900E-01	2.210E-01	0.000E+00	7.780E-01	0.000E+00	1.130E+04



Attachment 13 Environmental Monitoring Sites for REMP

SAMPLE SITE	SECTOR	DISTANCE ¹		DESCRIPTION
		km	mi	
DR1	NW	0.6	0.4	Onsite, Along Cliffs
DR2	WNW	2.7	1.7	Rt. 765, Auto Dump
DR3	W	2.3	1.4	Rt. 765, Giovanni's Tavern (Knotty Pine)
DR4	WSW	2.0	1.2	Rt. 765, Across from White Sand Drive
DR5	SW	2.4	1.5	Rt. 765 at Johns Creek
DR6, A4	SSW	2.9	1.8	Rt. 765 at Lusby, Frank's Garage
DR7, A1, lb4, lb5, lb6	S	0.7	0.5	Onsite, before entrance to Camp Conoy
DR8, A2	SSE	2.5	1.5	Camp Conoy Road at Emergency Siren
DR9, A3	SE	2.6	1.6	Bay Breeze Road
DR10	NW	6.4	4.0	Calvert Beach Rd & Decatur St
DR11	WNW	6.6	4.1	Dirt Road off Mackall Rd & Parran Rd
DR12	W	6.7	4.2	Bowen Rd & Mackall Rd
DR13	WSW	6.1	3.8	Mackall Rd near Wallville
DR14	SW	6.4	4.0	Rodney Point
DR15	SSW	6.2	3.9	Mill Bridge Rd & Turner Rd
DR16	S	6.5	4.1	Across from Appeal School
DR17	SSE	5.9	3.7	Cove Point Rd & Little Cove Point Rd
DR18	SE	7.1	4.5	Cove Point
DR19	NW	4.4	2.8	Long Beach
DR20	NNW	0.4	0.3	Onsite, near shore
DR21, A5, lb7, lb8, lb9	WNW	19.3	12.1	Emergency Operations Facility
DR22	S	12.5	7.8	Solomons Island
DR23	ENE	12.4	7.7	Taylors Island, Anderson's Property
Wa1	NNE	0.2	0.1	Intake Area
Wa2, la1, la2	N	0.3	0.2	Discharge Area
Wb1	ESE	0.6	0.4	Shoreline at Barge Road
lb1, lb2, lb3, la4, la5	SSE	2.6	1.6	Garden Plot off Bay Breeze Rd
	(Area not influenced by Plant Discharge)			Patuxent River
la3	E	0.9	0.6	Camp Conoy
la6	NNW	10.7	6.7	Kenwood Beach

¹ Distance and direction from the central point of the two containment buildings.

Dec 2011



Attachment 14 Radiological Environmental Monitoring Program Surveillances for Direct Radiation

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL
GAMMA DOSE ⁽¹⁾	mR	at least quarterly	⁽²⁾	N/A

- (1) Each sample point shall be monitored using two or more dosimeters **OR** one instrument for measuring and recording dose rate continuously.
- (2) LLD for TLDs used for environmental measurements shall be in accordance with the recommendations of Regulatory Guide 4.13.



Attachment 15
Radiological Environmental Monitoring Program
Surveillances for Airborne Activity

RADIOIODINE CANNISTER

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽⁵⁾
I-131	pCi/m ³	at least weekly	0.07	0.9

PARTICULATE FILTER (1)

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽⁵⁾
Gross Beta Activity	pCi/m ³	at least weekly ⁽²⁾	0.01	N/A ⁽³⁾
Cs-134	pCi/m ³	at least quarterly ⁽⁴⁾	0.05	10.0
Cs-137	pCi/m ³	at least quarterly ⁽⁴⁾	0.06	20.0

- (1) All samples consist of continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.
- (2) Analyze for gross beta activity 24 hours or more after sampling to allow for radon and thoron daughter decay.
- (3) Although there is not an **ACTION** Level for gross beta activity, if this parameter is greater than ten times the yearly mean of the control sample, perform **GAMMA ISOTOPIC ANALYSIS** on the individual sample.
- (4) Perform a **GAMMA ISOTOPIC ANALYSIS** of a quarterly **COMPOSITE SAMPLE**. A separate **COMPOSITE SAMPLE** shall be prepared for each sample location, A1 thru A5. Each **COMPOSITE SAMPLE** shall be prepared from individual particulate filter samples collected during the applicable calendar quarter and from a single location.
- (5) If an **ACTION** Level is exceeded, check the initiating conditions listed in Radiological Environmental Monitoring Program section 5.c and Radiological Environmental Monitoring Program section 5.d, and perform the corrective actions specified in Radiological Environmental Monitoring Program section 7.d and/or Radiological Environmental Monitoring Program section 7.e.



Attachment 16
Radiological Environmental Monitoring Program
Surveillances for Waterborne Activity**SURFACE WATER SAMPLE ⁽¹⁾**

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽²⁾
H-3	pCi/l	at least quarterly	2000 ⁽³⁾	20,000 ⁽⁴⁾
Mn-54	pCi/l	at least monthly	15	1000
Fe-59	pCi/l	at least monthly	30	400
Co-58	pCi/l	at least monthly	15	1000
Co-60	pCi/l	at least monthly	15	300
Zn-65	pCi/l	at least monthly	30	300
Zr-95 / Nb-95	pCi/l	at least monthly	15	400
I-131	pCi/l	at least monthly	1 ⁽⁵⁾	2
Cs-134	pCi/l	at least monthly	15	30
Cs-137	pCi/l	at least monthly	18	50
Ba-140 / La-140	pCi/l	at least monthly	15	200

SHORELINE SEDIMENT SAMPLE

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽²⁾
Cs-134	pCi/kg, dry	at least semiannually	150	N/A
Cs-137	pCi/kg, dry	at least semiannually	180	N/A

- (1) The water sample shall be a composite of individual samples collected over a 1 month period.
- (2) If an **ACTION** Level is exceeded, check the initiating conditions listed in sections REMP SECTION 5.c and REMP SECTION 5.d, and perform the corrective actions specified in section REMP SECTION 7.d and/or REMP SECTION 7.e.
- (3) If a drinking water pathway does not exist, a value of 3000 pCi/l may be used.
- (4) If a drinking water pathway does not exist, a value of 30,000 pCi/l may be used.
- (5) LLD for drinking water samples. If no drinking water pathway exists, the LLD of the gamma isotopic analysis may be used.



Attachment 17
Radiological Environmental Monitoring Program
Surveillances for Ingestible Activity

FISH AND INVERTEBRATES ⁽¹⁾

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽⁵⁾
Mn-54	pCi/kg, wet	⁽²⁾	130	30,000
Fe-59	pCi/kg, wet	⁽²⁾	260	10,000
Co-58	pCi/kg, wet	⁽²⁾	130	30,000
Co-60	pCi/kg, wet	⁽²⁾	130	10,000
Zn-65	pCi/kg, wet	⁽²⁾	260	20,000
Cs-134	pCi/kg, wet	⁽²⁾	130	1000
Cs-137	pCi/kg, wet	⁽²⁾	150	2000

MILK

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽⁵⁾
I-131	pCi/l, wet	at least monthly ⁽⁴⁾	1	3
Cs-134	pCi/l, wet	at least monthly ⁽⁴⁾	15	60
Cs-137	pCi/l, wet	at least monthly ⁽⁴⁾	18	70
Ba-140 / La-140	pCi/l, wet	at least monthly ⁽⁴⁾	15	300

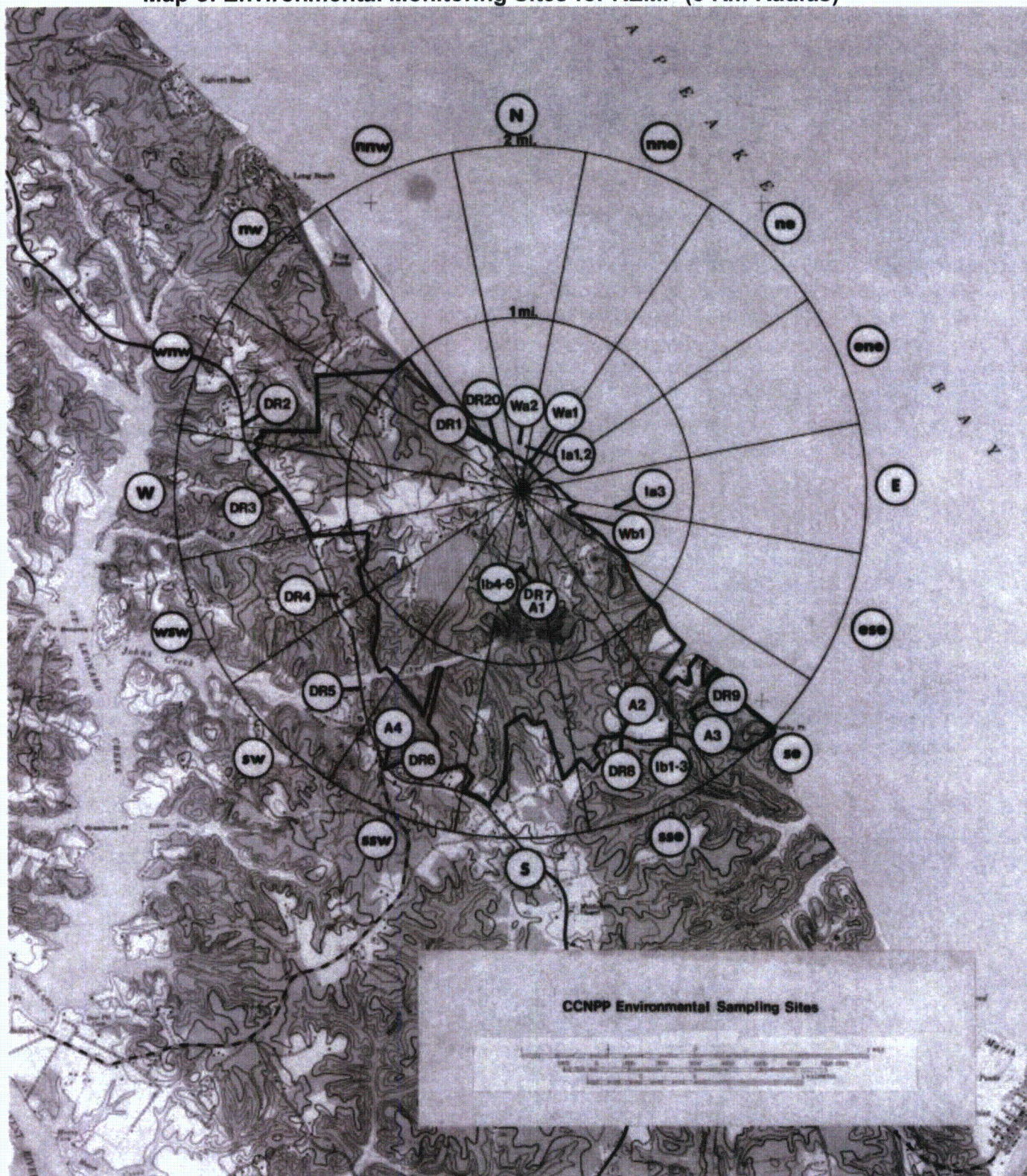
FOOD PRODUCTS

PARAMETER	UNITS	FREQUENCY	LLD	ACTION LEVEL ⁽⁵⁾
I-131	pCi/kg, wet	at least monthly ⁽³⁾	60	100
Cs-134	pCi/kg, wet	at least monthly ⁽³⁾	60	1000
Cs-137	pCi/kg, wet	at least monthly ⁽³⁾	80	2000

- (1) Edible portions of the fish and invertebrates shall be used for analysis.
- (2) The fish and invertebrates shall be sampled at least once per year in season, or semiannually if they are not seasonal.
- (3) The food products shall be sampled during the growing season.
- (4) The milk samples need be collected and analyzed only if the milk is commercially available in quantities greater than 310 liters per year (see NUREG-0133, 5.3.1.1).
- (5) If an **ACTION** Level is exceeded, check the initiating conditions listed in Radiological Environmental Monitoring Program section 5.c and Radiological Environmental Monitoring Program section 5.d, and perform the corrective actions specified in Radiological Environmental Monitoring Program section 7.d and/or Radiological Environmental Monitoring Program section 7.e.



Attachment 18
Map of Environmental Monitoring Sites for REMP (5 Km Radius)

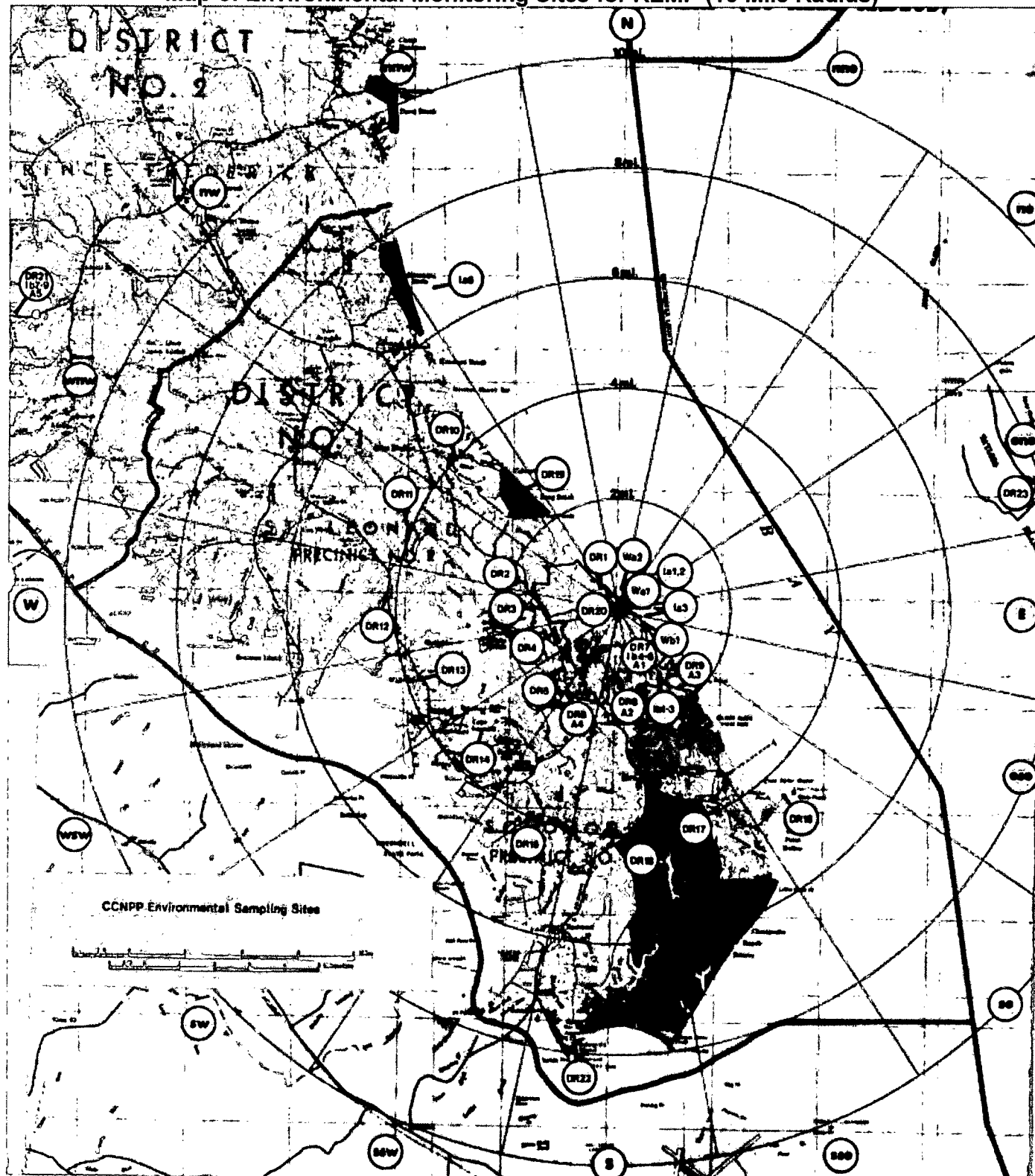




OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 314 of 318

Attachment 19
Map of Environmental Monitoring Sites for REMP (10 Mile Radius)





OFFSITE DOSE CALCULATION MANUAL

Rev. 00802
Page 315 of 318

Attachment 20 Environmental Monitoring Sites for ISFSI

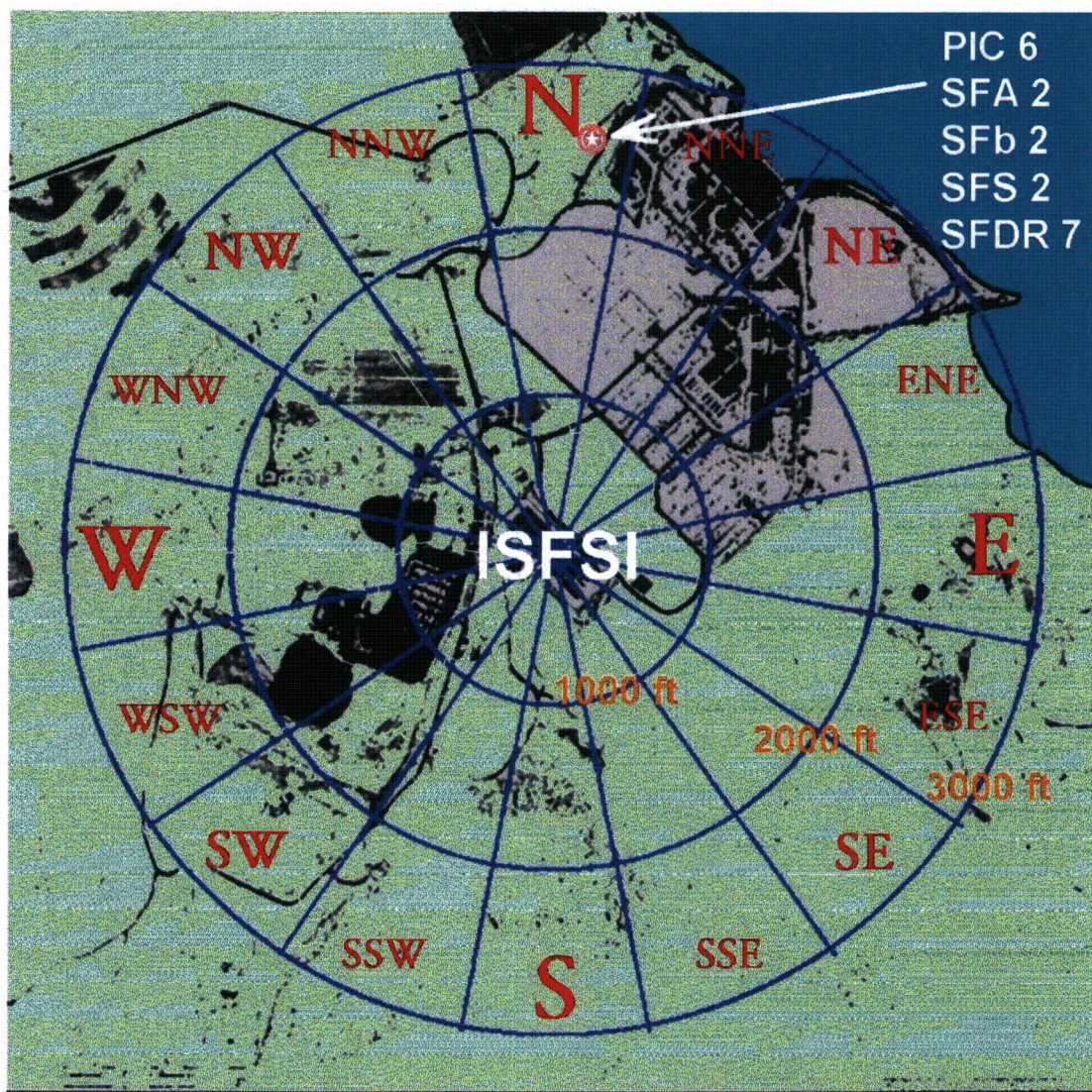
STATION	DESCRIPTION	DISTANCE ¹ (Kilometers)	DIRECTION ¹ (Sector)
AIR SAMPLERS			
A1 ²	On Site Before Entrance to Camp Conoy	0.3	ESE
SFA1	Meteorological Station	0.3	NW
SFA2	CCNPP Visitor's Center	0.8	N
SFA3	North Northwest of ISFSI	0.1	NNW
SFA4	SSE of ISFSI	0.1	SSE
TLD LOCATIONS			
SFDR1	Southwest of ISFSI	0.2	SW
SFDR2	North of ISFSI	0.2	N
SFDR3	North of ISFSI	0.1	N
SFDR4	Northeast of ISFSI	<0.1	NE
SFDR5	East of ISFSI	<0.1	E
SFDR6	East Southeast of ISFSI	0.1	ESE
SFDR7	CCNPP Visitor's Center	0.8	N
SFDR8	North Northwest of ISFSI	0.1	NNW
SFDR9	SSE of ISFSI	0.1	SSE
SFDR10	Northwest of ISFSI	0.1	NW
SFDR11	West Northwest of ISFSI	0.1	WNW
SFDR12	WSW of ISFSI	<0.1	WSW
SFDR13	South of ISFSI	<0.1	S
SFDR14	Southeast of ISFSI	0.1	SE
SFDR15	East Northeast of ISFSI	<0.1	ENE
SFDR16	Southwest of ISFSI	<0.1	SW
DR7 ²	On Site Before Entrance to Camp Conoy	0.3	ESE
DR30	Meteorological Station	0.3	NW
SFDR17	NNE OF ISFSI	0.1	NNE
SFDR18	West OF ISFSI	0.04	W
VEGETATION			
SFb1	Meteorological Station	0.3	NW
SFb2	CCNPP Visitor's Center	0.8	N
SFb3	North Northwest of ISFSI	0.1	NNW
SFb4	SSE of ISFSI	0.1	SSE
SFb5	On Site Before Entrance to Camp Conoy	0.3	ESE
SOIL			
SFS1	Meteorological Station	0.3	NW
SFS2	CCNPP Visitor's Center	0.8	N
SFS3	North Northwest of ISFSI	0.1	NNW
SFS4	SSE of ISFSI	0.1	SSE
SFS5	On Site Before Entrance to Camp Conoy	0.3	ESE

¹ Distance and direction from the Central Point of the ISFSI.

² Common to both the REMP and the ISFSIMP.

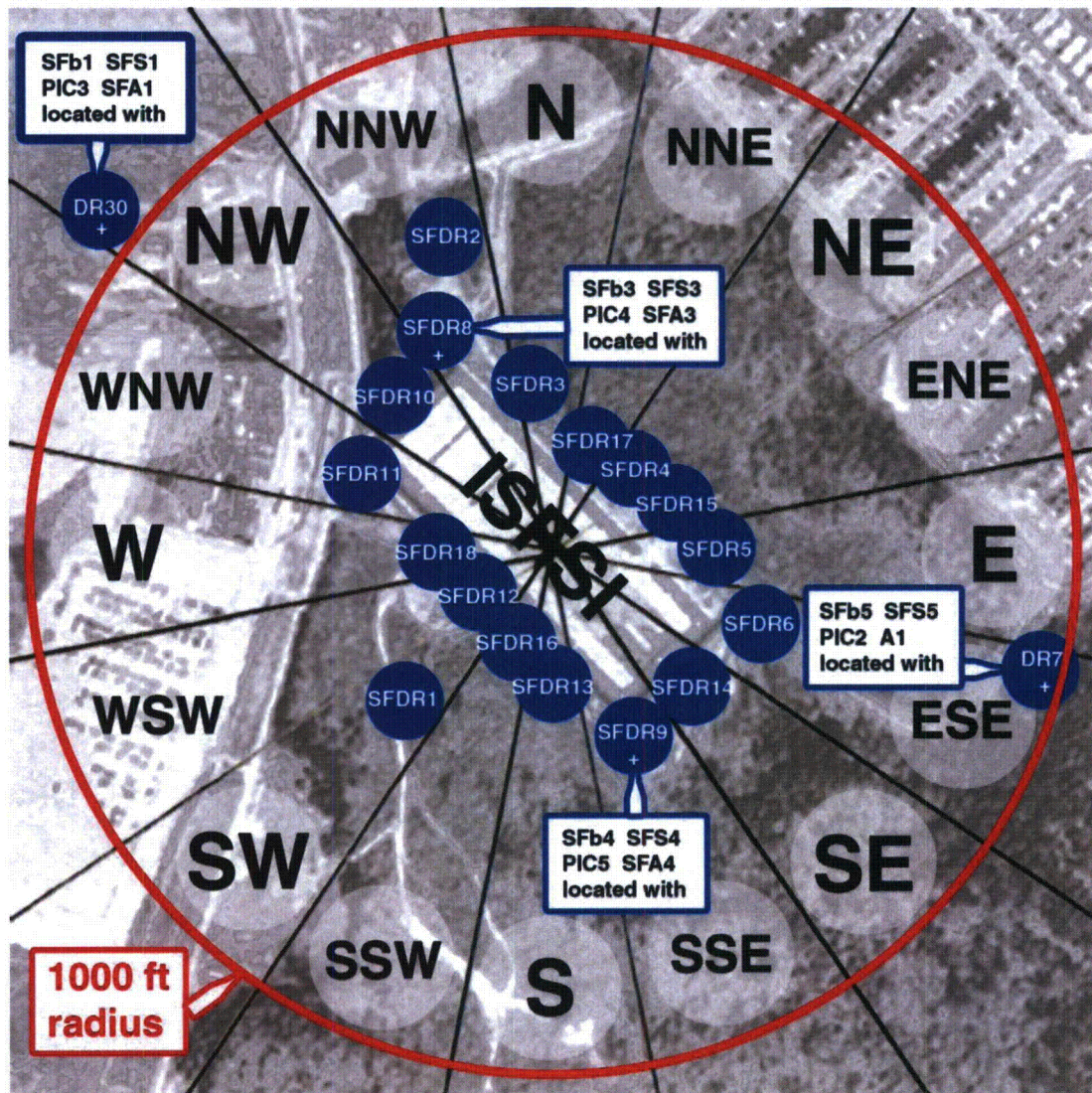


Attachment 21
Map of Environmental Monitoring Sites for ISFSI





Attachment 22
Map of Environmental Monitoring Sites for ISFSI
(ENLARGED)



A = Air Sampler (Plant)
DR = Direct Radiation (Plant)
SFDR = Direct Radiation (Spent Fuel)
SFA = Air Sampler (Spent Fuel)
PIC = Pressurized Ion Chamber
SFS = Soil (Spent Fuel)
SFb = Vegetation (Spent Fuel)



Attachment 23
Effluent Radiation Monitors

Description	Radiation Element	Radiation Indicator
Liquid Waste Discharge Radiation Monitor	0-RE-2201	0-RI-2201
Steam Generator Blowdown Effluent Radiation Monitor	1-RE-4095	1-RI-4095
Steam Generator Blowdown Effluent Radiation Monitor	2-RE-4095	2-RI-4095
Steam Generator Blowdown Tank Radiation Monitor	1-RE-4014	1-RI-4014
Steam Generator Blowdown Tank Radiation Monitor	2-RE-4014	2-RI-4014
Wide Range Gas Monitor, Low Range	1-RE-5416	1-RIC-5415
Wide Range Gas Monitor, Low Range	2-RE-5416	2-RIC-5415
Westinghouse Plant Vent Stack Monitor	1-RE-5415	1-RI-5415
Westinghouse Plant Vent Stack Monitor	2-RE-5415	2-RI-5415
GASEOUS RADWASTE PROCESSING SYSTEM Radiation Monitor	0-RE-2191	0-RE-2191

Accident Monitors Not Addressed By The ODCM

Wide Range Gas Monitor, Mid Range	1-RE-5417
Wide Range Gas Monitor, High Range	1-RE-5418
Wide Range Gas Monitor, Mid Range	2-RE-5417
Wide Range Gas Monitor, High Range	2-RE-5418