10.0 ENVIRONMENTAL PROTECTION

10.1 CONDUCT OF REVIEW

This chapter of the revised draft Safety Evaluation Report (DSER) contains the staff's review of environmental protection measures described by the applicant in Chapter 10 of the revised Construction Authorization Request (CAR). The objective of this review is to determine whether principle structures, systems, and components (PSSCs) and their design bases identified by the applicant provide reasonable assurance of protection of the public and the environment against natural phenomena and the consequences of potential accidents. The staff evaluated the information provided by the applicant for environmental protection by reviewing Chapter 10 of the revised CAR, other sections of the revised CAR, supplementary information provided by the applicant, and relevant documents available at the applicant's offices but not submitted by the applicant. In some cases, the staff also performed independent calculations. The review of environmental protection design bases and strategies was closely coordinated with the review of the accident sequences described in the Safety Assessment of the Design Bases (see Chapter 5.0 of this revised DSER).

As previously discussed in revised DSER Chapter 1 (see Section 1.1.1.1.1), the set of Nuclear Regulatory Commission (NRC) radiation safety requirements applicable to an individual depends on whether that individual is a worker exposed to radiation as part of his assigned employment duties, or is a member of the general public. The radiological safety of workers is discussed in revised DSER Chapter 9, and the radiation protection standards applicable to the general public is covered in this revised DSER Chapter.

The staff reviewed how the environmental protection information in the revised CAR addresses or relates to the following regulations:

- Section 20.1101(b) of 10 CFR states, in pertinent part, that a licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve doses to members of the public that are as low as is reasonably achievable (ALARA).

- Section 20.1301(b) of 10 CFR states: "If the licensee permits members of the public to have access to controlled areas, the limits for members of the public continue to apply to those individuals."

- Section 20.1302(c) of 10 CFR states: "Upon approval from the Commission, the licensee may adjust the effluent concentration values in appendix B to part 20, table 2, for members of the public, to take into account the actual physical and chemical characteristics of the effluents (e.g., aerosol size distribution, solubility, density, radioactive decay equilibrium, chemical form)."

- Section 70.23(b) of 10 CFR states, as a prerequisite to construction approval, that the design bases of the PSSCs and the quality assurance program be found to provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents.

- Pursuant to 10 CFR 70.61(b)(2), the risk of credible high-consequence events to any individual located outside the controlled area must be limited. For such individuals, a high consequence event is an internally or externally initiated event that results in an acute 25 rem total effective dose equivalent (TEDE). Controls must be used which either make the occurrence of such events highly unlikely, or make their consequences less severe than an acute 25 rem TEDE.

- Pursuant to 10 CFR 70.61(c)(2), the risk of credible intermediate-consequence events to any individual located outside the controlled area must be limited. For such individuals, an intermediate-consequence event is an internally or externally initiated event that is not a high consequence event, and that results in an acute 5 rem TEDE. Controls must be used which either make the occurrence of such intermediate consequence events unlikely, or make their consequences less severe than an acute 5 rem TEDE.

- For environmental protection purposes, an intermediate-consequence event is one which produces a 24-hour averaged release of radioactive material outside the restricted area in concentrations exceeding 5000 times the values in Table 2 of Appendix B to 10 CFR Part 20. Pursuant to 10 CFR 70.61(c)(3), controls must be used which either make the occurrence of such intermediate consequence events unlikely, or make their environmental consequences less severe than those described above.

In the revised CAR, the applicant described its commitment to environmental protection in three areas: (1) radiation safety (as low as reasonably achievable [ALARA]) goals for effluent control and waste minimization, (2) design of effluent and environmental monitoring for normal and off-normal operations, and (3) design bases for PSSCs derived from the safety assessment, as necessary to ensure environmental protection. The staff focused its review on the applicant's safety assessment of the design bases for environmental protection PSSCs, which is discussed below in revised DSER Section 10.1.3. The staff also evaluated preliminary information provided by the applicant on ALARA goals and effluent and environmental monitoring programs. In regards to the design bases for environmental and public protection, this revised DSER chapter addresses the applicant's consequence methodology and results used to identify PSSCs that are relied upon to meet the public health and environmental performance requirements of 10 CFR 70.61(b)(2) and 70.61(c)(2)-(3). The staff used Chapter 10.0 in NUREG-1718 as guidance in performing the review.

10.1.1 Radiation Safety

The staff evaluated the applicant's radiation safety measures for environmental protection on the applicant's methods to maintain public doses ALARA in accordance with 10 CFR 20.1101 and the applicant's waste minimization practices.

10.1.1.1 ALARA Design Goals for Effluent Control

The applicant defined ALARA design goals for effluent control in revised CAR Section 10.1.1.

The ALARA design goal is for airborne radioactive effluents released from the proposed Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF or the facility). This goal is 20 percent of the effluent concentration limits in 10 CFR Part 20, Appendix B, Table 2, Column 1, as determined at the restricted area boundary. The human dose corresponding to this goal, assuming an individual were present continuously over a year at the restricted area boundary, is 10 mrem TEDE. Therefore, this goal affords an initial level of protection for members of the public in the controlled area of 10 percent of the 100 mrem TEDE limit described in 10 CFR 20.1301(b). This fraction is consistent with staff expectations that an initial goal of 10 to 20 percent of

Appendix B values or less can be achieved by almost all materials facility licensees, as stated in Regulatory Guide 8.37 (Reference 10.3.10), and therefore, is acceptable to the staff.

The applicant has not defined liquid effluent ALARA goals because the proposed facility will not discharge liquid effluent directly to the environment. This is acceptable because the applicant's proposal is to transfer low-level waste containing NRC-licensed material to the U.S. Department of Energy (DOE) at the Savannah River Site (SRS). DOE would perform additional treatment prior to discharge of this material. Therefore, these discharges would be regulated by DOE and would be subject to DOE ALARA considerations.

10.1.1.2 Air Effluent Controls to Maintain Public Doses ALARA

The confinement ventilation systems are described in revised DSER Section 11.4. In summary, there are five major sources of ventilation exhaust that would contribute to air emissions from the facility stack. The following ventilation and air-conditioning systems are PSSCs or have individual components that are PSSCs:

- Process cell off-gas treatment system:
  - Final filters.
  - Pressure boundary downstream of the final filters.

- Process cell ventilation system:
  - Final filters.
  - Pressure boundary downstream of the final filters.
  - Tornado dampers.

- Medium depressurization exhaust system (which maintains the C2 confinement zone):
  - Final filters.
  - Pressure boundary downstream of the final filters.
  - Tornado dampers.

- High depressurization exhaust system (C3 confinement zone).

- Very high depressurization exhaust system (C4 confinement zone).

The applicant's proposed design bases for these systems relies on NRC Regulatory Guide 3.12 (see Reference 10.3.9) American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), "Design Guide for Department of Energy Nuclear Facilities" (see Reference 10.3.1), for guidance. Additional design bases are described in revised DSER section 11.4.

The staff conclude that a commitment to these codes and standards should ensure that engineered effluent controls will be designed and constructed to meet the requirements for capacity, compartmentalization, safe shutdown, corrosion resistance, and efficiency required during normal and likely facility conditions to maintain public doses ALARA. The staff will review the applicant's process controls and procedures that will augment these engineered controls and form the basis for a complete ALARA program during review of any application for a license to possess and use special nuclear material (SNM) that Duke, Cogema, Stone & Webster (DCS) may later submit.

10.1.1.3 Liquid Effluent Controls to Maintain Public Doses ALARA

The proposed facility would not have liquid effluents that discharge directly to the environment. There are, however, five categories of liquid waste that must be managed. These waste streams would be transferred to the SRS prior to final treatment and disposal. The five waste streams are the high alpha activity waste, stripped uranium waste, solvent wastes, low-level liquid waste (including chlorine wastes) and nonhazardous liquid waste. Estimated volumes of each waste type are provided in revised DSER Table 10.1-1. Waste minimization practices identified by the applicant are discussed in revised DSER Section 10.1.1.5. PSSCs required to safety handle, store and transfer liquid wastes are discussed in revised DSER Chapter 5.0 and revised DSER Section 11.8.

10.1.1.4 ALARA Review and Reports to Management

The applicant has committed to a program of measuring trends in environmental monitoring and surveillance data against the effluent ALARA goals on a quarterly basis. The goals will be reevaluated and new goals will be established for the following year.

The staff has reviewed the applicant's brief description of the operational ALARA program, and its related safety assessment of the design bases, in which the applicant did not identify PSSCs or management measures within the purview of this program. The staff finds that, at the construction authorization stage, no such PSSCs or management measures are required. However, the regulations in 10 CFR Parts 20 and 70 contain specific requirements for such a program that would have to be fully and adequately addressed in any subsequent application for an SNM possession and use license.

10.1.1.5 Waste Minimization

The applicant has provided an overview of their commitment to waste minimization practices in Section 10.1.4 of the revised CAR. The applicant's proposal for incorporating waste minimization practices into the design process focuses on recycling and reuse of materials. During operations, the applicant proposes to rely on waste management procedures to separate and segregate solid and liquid wastes and remove packaging and shipping materials prior to entry into contaminated areas.

The applicant would use active and passive confinement systems and vacuum systems inside gloveboxes. These systems are designed to allow recycling of materials from the secondary waste streams in the aqueous polishing (AP) process and mixed oxide process (MP) scraps back to the main processes. Specific AP process waste minimization steps include acid recovery, silver recovery, and solvent regeneration.

The applicant's safety assessment of the design basis has considered hazards in these areas. However, specific waste minimization practices and program commitments are not relied upon in the safety assessment to reduce the risk of these hazards. PSSCs relied upon to reduce the risks of hazards in the acid recovery, silver recovery, and solvent regeneration systems are described in Chapter 5, 8 and 11 of this revised DSER.

10.1.2 Effluent and Environmental Monitoring

The staff has reviewed the applicant's brief description of the Effluent and Environmental Monitoring Programs and its related safety assessment of the design bases, in which the applicant did not identify PSSCs or management measures within the purview of these programs.The staff finds that, at the construction authorization stage, no such PSSCs or management measures are required. However, the regulations in 10 CFR Part 20 contain specific requirements for such a program that would have to be fully and adequately addressed in any subsequent application for an SNM possession and use license.

The following sections describe the staff's evaluation of the Effluent and Environmental Monitoring Programs, to the extent that such information was provided by the applicant in the Environmental Report (see Reference 10.3.2) and revised CAR.

10.1.2.1 Concentrations of Radionuclides in Air Effluents and Public Doses

The applicant provided an estimate of maximum controlled area radionuclide concentrations (Reference 10.3.12, Section 10.1.1), which is based on annual releases described in their Environmental Report (Reference 10.3.2, Table D-7), a 50 percent atmospheric dispersion parameter value (X/Q) of 2.5 x 10^{-4} seconds per cubic meter, a distance to a receptor from the plant stack of 52 meters, and the assumption that releases occur from ground level. This calculation demonstrates that the average controlled area concentration immediately outside the restricted area would be less than 34 percent of their ALARA goal. The staff performed an independent calculation using the methodology described in National Council on Radiation Protection and Measurements, Report 123, as described in NUREG-1718. The staff assumed a 28 meter stack height, no plume rise and a site-specific 3.6 meter per second annual average windspeed (see Reference 10.3.2), and that the wind blows downwind toward a receptor 100 percent of the time. The staff's estimate of the X/Q is 5 x 10^{-5} s m^{-3} at a distance of 400 meters. The staff's calculation demonstrates that the controlled area concentration would be less than 7 percent of the applicant's ALARA goal. The staff's analysis is summarized in revised DSER Table 10.1-2.

The applicant's estimate of the maximum potential dose to an individual member of the public in the unrestricted area is 1.5 x 10^{-3} mrem per year. The staff performed an independent analyses using GENII, the Hanford Environmental Radiation Dosimetry software system. The staff's result is 5.2 x 10^{-4} mrem per year, which is in good agreement with the applicant's value, given the uncertainties inherent in the assumptions related to environmental dosimetry analyses. The staff's value is 0.00052% of the NRC's 10 CFR Part 20 100 mrem standard for members of the public.

Based on the staff's independent calculation, the known or expected concentrations of radioactive material in airborne effluents from the proposed facility would be below the limits in 10 CFR Part 20, Appendix B, Table 2, and forms an acceptable basis for future ALARA evaluations as required by 10 CFR 20.1101(b).

10.1.2.2 Physical and Chemical Characteristics of Radionuclides in Discharges

With regard to the provisions of 10 CFR 20.1302(c), the applicant does not propose to adjust the effluent concentration values that appear in Appendix B to 10 CFR Part 20, Table 2, for members of the public by taking into account the actual physical and chemical characteristics of the effluents (e.g., aerosol size distribution, solubility, density, radioactive decay equilibrium, chemical form). This is because the applicant intends to demonstrate compliance with the annual dose limit of 10 CFR 20.1301 using the dose methodology provided for in 10 CFR 20.1302(b)(1), and not the concentration-based methodology provided for in 10 CFR 20.1302(b)(2).

Table 10.1-1
Potential for Intermediate Consequence Events Involving Liquid Waste Streams

Waste Category	Maximum Volume (gallons/ year)	Normal Volume (gallons/ year)	Radionuclide	Maximum Concen-tration [µCi/mL]	5000 times Table2, Appendix B, to Part 20 [µCi/mL]	Potential to Exceed Environmental Performance Requirement?	Disposition (5)
High Alpha Activity Waste	21,841	14,301	Am-241	1,550 (1)	1×10^{-4}	Yes (6)	WSB
Stripped Uranium	46,000	42,530	U-238	0.01 (2)	1.5×10^{-3}	Yes (7)	WSB
Solvent LLW	3,075	2,700	Pu-239	1.2×10^{-4} (3)	1×10^{-4}	Yes (8)	SRS Solvent Storage
Low-Level Aqueous Waste	385,800	338,230	alpha	3×10^{-6} (4)	1×10^{-4}	No	ETF
Non-hazardous Liquid Waste	4,389,710	4,389,710	*Radionuclide concentrations in nonhazardous liquid waste are far below levels that could cause an intermediate consequence event.*				CSWTF

(1) Based on 84,000 Ci of americium-241 per year (Reference 10.3.2, Table 3-3) and normal volume
(2) Based on 5,000 kg of uranium per year (Reference 10.3.2, Table 3-3) and normal volume
(3) Based on 17.2 mg per year of plutonium (Reference 10.3.2, Table 3-3) and normal volume
(4) Based on 1.12×10^{8} Bq alpha-emitting radioactivity per year (Reference 10.3.2, Table 3-3) and normal volume
(5) WSB - Waste Solidification Building; CSWTF - Central Sanitary Waste Treatment Facility; ETF - Effluent Treatment Facility
(6) Waste transfer line is a PSSC for this waste
(7) Waste transfer line is a PSSC for this waste
(8) PSSCs are applied to ensure safe transfer of this waste to DOE without spillage

Table 10.1-2, Air Effluent Concentrations from the MFFF

Radionuclide	Annual Releases [1]	NRC Average RABC [2]	DCS Average RABC[3]	20% of Part 20, App. B	NRC Ratio	DCS Ratio
Pu-236	1.3×10^{-8}	2.1×10^{-26}	1.0×10^{-25}	1×10^{-14}	1.7×10^{-12}	1.0×10^{-11}
Pu-238	8.5×10^{0}	$1.3 \times 10\text{-}^{17}$	6.8×10^{-17}	4×10^{-15}	3.4×10^{-3}	1.7×10^{-2}
Pu-239	9.1×10^{1}	1.4×10^{-16}	7.6×10^{-16}	4×10^{-15}	3.6×10^{-2}	1.8×10^{-1}
Pu-240	2.3×10^{1}	3.6×10^{-17}	1.8×10^{-16}	4×10^{-15}	9.1×10^{-3}	4.6×10^{-2}
Pu-241	1.01×10^{2}	1.6×10^{-16}	8.1×10^{-16}	2×10^{-13}	8.0×10^{-4}	5.0×10^{-3}
Pu-242	6.1×10^{-3}	9.7×10^{-21}	4.9×10^{-20}	4×10^{-15}	2.4×10^{-6}	1.2×10^{-5}
Am-241	4.8×10^{1}	7.6×10^{-17}	3.8×10^{-16}	4×10^{-15}	1.9×10^{-2}	9.6×10^{-2}
U-234	5.1×10^{-3}	8.1×10^{-21}	4.1×10^{-20}	1×10^{-14}	8.1×10^{-7}	4.1×10^{-6}
U-235	2.1×10^{-4}	3.3×10^{-22}	1.7×10^{-21}	1×10^{-14}	2.8×10^{-8}	1.4×10^{-7}
U-238	1.2×10^{-2}	1.9×10^{-20}	9.6×10^{-20}	1×10^{-14}	1.6×10^{-6}	8.0×10^{-6}
				Totals	**0.07**	**0.34**

1. Reference 10.3.2.

2. RABC = Restricted Area Boundary Concentration. The atmospheric dispersion factor (X/Q) estimated by the staff for this table is based on a 28 meter stack height, no plume rise, and a site-specific 3.6 meter per second annual average windspeed (Reference 10.3.1). The maximum value is 5×10^{-5} seconds per cubic meter at a distance of 400 meters.

3. The atmospheric dispersion factor (X/Q) estimated by the applicant is based on 50% meteorology and a distance to the receptor of 52 meters (Reference 10.3.2). The maximum value is 2.5×10^{-4} seconds per cubic meter.

This approach is consistent with the requirements of 10 CFR Part 20, and therefore, is acceptable to the staff.

10.1.2.3 Air Effluent Discharge Location and Effluent Monitoring

Revised CAR Section 10.2.1.4 indicates that the discharge location for radioactive air effluents from the proposed facility would be the facility stack located on the roof of the MP process building. This stack would be 36.3 meters tall and would discharge up to 191,360 cubic feet per minute (CFM) during normal operations. The applicant has committed to use two redundant continuous air monitors (CAMs) and two fixed airborne particulate matter samplers to monitor facility air effluent. The applicant has also committed to separately quantify the contributions from the AP and MP processes using two additional CAMs before the two streams are commingled prior to discharge from the single stack. The applicant also proposes to sample air effluent contributions from areas not used for processing SNM.

The applicant will be expected to provide additional information, including, for example, sample collection and analysis procedures, a description of action levels, pathway analyses for public doses and recording and reporting procedures, in any subsequent application it may submit for an SNM possession and use license.

10.1.2.4 Environmental Monitoring Program

The applicant has performed preconstruction environmental monitoring measurements, as described in revised CAR Section 10.3. These measurements were conducted in accordance with DOE Order 5400.1 and established a baseline of existing radiological, chemical, physical, and biological conditions in the area of the site. These measurements were used to evaluate whether contaminants could pose a potential safety concern for construction personnel. The data may also be used by the applicant and/or DOE to apply for environmental permits.

To accomplish these goals, the applicant made use of the data provided from the extensive SRS environmental monitoring program and augmented the SRS environmental studies with additional sample collections.

With regard to expected impacts, the nonradiological impacts to the environment from the construction of the facility, if authorized, are expected to be minimal. The applicant expects that nonradiological monitoring prescribed through various environmental permits will be sufficient through construction and operation of the facility.

The staff reviewed the Plutonium Disposition Program (PDP) Preconstruction Environmental Monitoring Report (Reference 10.3.13), and find that the report is consistent with the guidance in Reference 10.3.6 and is, therefore, acceptable to the staff.

10.1.3 Safety Assessment of the Design Bases

The staff's evaluation of the applicant's environmental protection measures at the construction authorization stage focuses on the potential accident sequences that result in radiological releases to the environment, and the PSSCs relied upon for safety that are specified by the applicant to reduce the risk of these accidents.

10.1.3.1 Consequence Assessment Methodologies

In their safety assessment, the applicant calculated committed doses to individuals outside the controlled area (i.e., the public) and concentrations of radioactive material in the environment outside the restricted area from each accident to demonstrate risks from event consequences were reduced to acceptable levels. The consequence assessment methodology used by the applicant for dose consequences at the controlled area boundary is the same methodology used for the site worker, as described in Chapter 9.0 of this revised DSER, with the exception of the value of the atmospheric dispersion factor. The atmospheric dispersion factor that the applicant derived for the distance from the facility to the controlled area boundary is 3.7×10^{-6} seconds per cubic meter. This value was confirmed by the staff using MACCS2 (see Reference 10.3.7) and site-specific meteorological data.

The consequence assessment methodology used to comply with the 10 CFR 70.61(c)(3) performance requirement is also similar to the methodology presented for site workers in Chapter 9.0 of this revised DSER. The principal difference is that the applicant did not use the respirable fraction (RF) as a reduction factor in calculations demonstrating that concentrations fall below the 10 CFR 70.61(c)(3) intermediate consequence threshold. This is because the 10 CFR 70.61(c)(3) concentration pertains to total concentrations in the environment, and not doses to human receptors resulting from intake of respirable particles. This approach is acceptable to the staff.

The proposed restricted area boundary for the facility would be approximately 52 meters from the facility discharge stack (Reference 10.3.12). The atmospheric dispersion factor that the applicant derived for this location is 2.79 x 10^{-4} seconds per cubic meter.

As a result, the equation used to calculate environmental consequences is:

$$[EC]_x = \{[\text{Source Term} / RF] \times [X/Q]^{RA} \times [f]_x\} / (3600 \text{ s hr}^{-1} \times 24 \text{ hr})$$

where Source Term is the same as described in Chapter 9.0 of this revised DSER, RF is the respirable fraction (which is divided back into the source term to negate the reduction applied for human consequence source terms), the f_x is the specific activity and the fraction of the total quantity of the material at risk (MAR) that is the radionuclide X, and $[X/Q]^{RA}$ is the value of the atmospheric dispersion factor for the facility stack, as described above.

The use of this equation is consistent with the staff's guidance in NUREG/CR-6410 and the regulations in 10 CFR 70.61(c)(3), and therefore, is acceptable to the staff.

10.1.3.2 Radiation Doses to Members of the Public from Accidents

In Chapter 5 of the revised CAR, the applicant presents the mitigated bounding event consequences for the five major categories of events: fire, explosion, loss of confinement, load handling events and criticality. The staff performed independent calculations for these bounding events and the bounding events within each event group from which the overall event type bounding event was selected.

Staff used MACCS2 to verify the value of the dispersion factor used by the applicant for members of the public. In addition, the staff used GENII (Reference 10.3.14) and SRS H-area meteorological data collected from 1992 through 1996 to verify the applicant's estimates of accident doses to members of the public. These estimates are presented in Table 10.1-3.

Table 10.1-3 Bounding Consequences from Event Groups and Categories

Bounding Event	Public, rem		Environmental Consequences, Ratio	
	Applicant	NRC	Applicant	NRC
Loss of Confinement[a]	< 1 x 10^{-3}	3.0 x 10^{-3}	< 0.2	0.02
Internal Fire [c]	< 5 x 10^{-4}	7.9 x 10^{-2}	< 0.2	5.1
Load Handling	< 1 x 10^{-3}	3.0 x 10^{-3}	< 0.2	0.02
Criticality [b]	< 1.2 x 10^{-2}	9.8 x 10^{-3}	N/A	1.4
Explosion [b,c]	< 5 x 10^{-3}	2.0	N/A	5,450

[a] The bounding loss of confinement event evaluated by the applicant would be caused by a load handling event in the Jar Storage and Handling Unit.

[b] The applicant commits to PSSCs to render the likelihood of explosions and inadvertent criticality highly unlikely. Staff evaluated the environmental consequences for completeness.

[c] In general, staff's estimates of fire and explosion consequences exceed the applicant's estimates by a factor of 100. This is because staff assumed the final two-stage HEPA filters operate at 99% efficiency, not 99.99% efficiency, for these severe conditions. This is an open item in the staff's review (DSER Chapter 11.4).

The staff has not accepted the applicant's use of a leak path factor equal to 10^{-4} for the final two high efficiency particulate air (HEPA) filters for events in which the performance of the final filters would be challenged by conditions posed by the event. For these events, which include fires and explosions, the staff used a value of 10^{-2}, which corresponds to a removal efficiency of 99 percent across the two stage HEPA filters system, as described in Section 11.4 of this revised DSER.

With the exception of fire and explosion events, the staff's values are in agreement with the applicant's values. Therefore, with the exception of the leak path factors used by the applicant for fires and explosions, the staff find that the applicant's estimates of public accident consequences are acceptable. The adequacy of the fire and explosions leak path factors is identified as an open item in revised DSER Section 11.4.

10.1.3.3 Environmental Consequences

Staff reviewed the applicant's estimates of environmental consequences of bounding events provided in the revised CAR. The staff's evaluation of consequences for bounding events using the revised DSER Section 10.1.3.1 methodology is provided in revised DSER Table 10.1-3.

10.1.3.4 PSSCs for Protection of the Public and the Environment

The PSSCs required for protection of the public and the environment for each of the controlling events within event groups shown in revised DSER Table 10.1-3 are discussed in Chapter 5.0 of this revised DSER and in other sections as referenced in revised DSER Table 5.1. As discussed above, the applicant used acceptable methods for estimating consequences from accident sequences that result in radiological releases to the environment. A comparison of the applicant's and the staff's analysis of bounding consequences from hazard event groups and categories is presented in Table 10.1-3

10.2 EVALUATION FINDINGS

In Section 10 of the revised CAR, DCS provided information on public and environmental protection ALARA goals and methodologies to demonstrate compliance with NRC standards for radiation safety applicable to members of the public in accordance with sections 20.1101(b), 20.1301(b), and 20.1302(c) of 10 CFR. Based on the staff's review of this information, the staff finds that the applicant has established acceptable ALARA goals and methodologies to ensure public and environmental radiation safety.

In Section 10.5 of the revised CAR, DCS provided design basis information for public and environmental protection PSSCs that it identified for the proposed facility. Based on the staff's review of the revised CAR and supporting information provided by the applicant relevant to environmental protection, the staff finds that the design bases of the PSSCs identified by the applicant will provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents, in accordance with 10 CFR 70.23(b).

Further, pursuant to 10 CFR 70.61(b)(2), 10 CFR 70.61(c)(2) and 10 CFR 70.61(c)(3), and based on staff's review of the safety assessment methodology presented in the revised CAR, the staff finds that the design bases of the PSSCs identified by the applicant will reduce public dose and environmental contamination consequences to acceptable levels.

The following open items in the April 2002 DSER have been closed and are discussed in Appendix B: ES-1, ES-2.

10.3 REFERENCES

10.3.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), “Design Guide for Department of Energy Nuclear Facilities,” DOE: Washington, D.C., 1993.

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10.3.3 Hastings, P., Duke Cogema Stone & Webster, letter to U.S. Nuclear Regulatory Commission, Clarification of Responses to NRC Request for Additional Information, DCS-NRC-000083, February 11, 2002.

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10.3.5 National Council on Radiation Protection and Measurements (NCRP). No. 123, "Screening Models for Releases of Radionuclides to Atmosphere, Surface Water and Ground, Recommendations of the National Council on Radiation Protection and Measurements." NCRP: Bethesda, Maryland. January 22, 1996.

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10.3.11 Hastings, P., Duke Cogema Stone & Webster, letter to U.S. Nuclear Regulatory Commission, RE Clarification of Responses to NRC Request for Additional Information, April 23, 2002.

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10.3.14 Napier, B. A. et al. GENII - The Hanford Environmental Radiation Dosimetry Software System. PNL-6584. Prepared by Pacific Northwest Laboratory, Richland, WA, for U.S. Department of Energy, Washington, DC., December 1988.