APPENDIX B

CLOSED ITEMS

OPEN ITEMS IN THE DRAFT SAFETY EVALUATION REPORT (APRIL 30, 2002) THAT HAVE BEEN CLOSED BETWEEN APRIL 30, 2002, AND APRIL 30, 2003

ID #	ITEM DESCRIPTION
	1.1 INSTITUTIONAL INFORMATION
GI-1	Provide organizational changes and new foreign ownership, control, or influence determination after the upcoming sale to Framatome
	1.3 SITE DESCRIPTION
SD-1	Provide the sensitivity of field and laboratory radiation measurements used to determine the extent of existing soil radioactivity.
	5.0 SAFETY ANALYSIS OF THE DESIGN BASIS
SA-1	All functions presently listed under the Process I&C System are to be listed as either functions of the Safety Control Subsystem or Emergency Control System.
SA-2	DOE information is needed to verify the applicant’s assumptions regarding a potential explosion in F-Area.
SA-3	The aircraft hazard analysis provided is insufficient to exclude the consideration of aircraft impact load for Seismic Cat. I structures because the analysis provided did not consider projected flight information that could affect the site.
SA-4	The applicant needs to justify the mitigation strategy of the seismic event in regard to isolation of flammable gas lines. Seismic isolation valves were identified as PSSCs in CAR Chapter 11.9 but not in CAR Table 5.5-21 with respect to earthquakes. The applicant should explain why the seismic isolation valves were not included as PSSCs.
	6.0 NUCLEAR CRITICALITY SAFETY
NCS-1	The need for specific Pu/MOX experience for NCS staff involved in the design phase
NCS-2	Definition of NCS design basis controlled parameters for AP and MP process auxiliary systems (specifically including process ventilation, isotopic dilution, and high-alpha waste).

NCS-3	Justification for the bounding density values assumed in Tables 6-1 and 6-2.
NCS-5	The definition of "highly unlikely" for criticality hazards.
NCS-6	For ANSI/ANS-8.1-1983 (R1988): What is meant by "other justification" in the means for extending the code's area(s) of applicability beyond experimental data.
NCS-7	For ANSI/ANS-8.15-1981: The applicability of ANSI/ANS-8.1 limits to mixtures involving special actinide elements at the MFFF.
NCS-8	For ANSI/ANS-8.17-1984,: What is meant by "other justification" in the means for extending the code's area(s) of applicability beyond experimental data.
	7.0 FIRE SAFETY
FS-3	The applicant is evaluating the pneumatic transfer tubes to determine if PSSCs will be required to prevent propagation of hot gases through the tubes.
FS-4	The design basis criteria and qualification criteria and qualification standards for the glove boxes are not sufficient to ensure that gloveboxes will be used in their expected performance range. Additional information is needed to assure that the mechanical (including high temperature non-fire-related failure of glovebox windows) fire, and seismic properties, as provided by the applicant, are valid or bounding.
FS-5	The applicant is developing design bases for the "glovebox fire protection features PSSC.
	8.0 CHEMICAL SAFETY
CS-4	Chapter 8 of the CAR and supplemental information provided by the applicant identified pH control as serving a safety function (avoiding precipitation, such as azides) in the liquid waste unit. However, PSSCs and design bases for controlling pH have not been identified by the applicant.
CS-5a	Modeling of hazardous chemical releases. The applicant should identify any operator actions outside of the control room that are required for chemical safety. If such actions are identified, then information is needed on the modeling of potential chemical releases and any PSSCs and design bases. Also, staff review indicates that at least one chemical (N_2O_4) could meet the definition of hazardous chemicals produced from licensed materials in 10 CFR 70.4 and potentially impact the offsite public which also would require identification of PSSCs and their design bases.
CS-6	The potential controls for a facility worker from a laboratory explosion have not been identified.
CS-7	The safety functions for delivery of chemicals have not been adequately addressed.

CS-8	The applicant has not analyzed the potential chemical toxicity impacts from events involving depleted uranium stored in the secured warehouse building. Potential PSSCs and design bases have not been identified.
	9.0 RADIATION SAFETY
RS-1	Means by which a worker becomes aware of the sintering furnace loss of confinement.
	10.0 ENVIRONMENTAL SYSTEMS
ES-1	The staff is continuing its review of the applicant's environmental consequence analysis.
ES-2	The applicant did not identify solvent wastes as a hazard requiring PSSCs to reduce the risk from spills.
	11.2 AQUEOUS POLISHING PROCESS DESCRIPTIONS
AP-1	With respect to the electrolyzer, the applicant has not provided sufficient justification for protecting the electrolyzer against the overtemperature event in the hazards analysis. This applies to the dissolution and silver recovery units.
AP-4	The design basis value of the corrosion function of the fluid transport system PSSC should address instrumentation and/or monitoring of lower alloy components (stainless steel) that could be exposed to aggressive species (silver II) in the dissolution and silver recovery units.
AP-5a	Confirm that the wastes generated will conform to the SRS WACs and that SRS will accept these wastes, based on the program redirection (DSER Section 11.2.1.12)
AP-5b	Identify any PSSCs and design bases for the waste unit, such as maximum inventories.
AP-6	The applicant identified the high alpha waste system as an IROF. The staff finds that the applicant should identify design basis safety functions and values for this unit.
AP-11	The design basis values of the corrosion function of the fluid transport system PSSC should address instrumentation and/or monitoring of components that could be exposed to aggressive species in the Offgas unit.
AP-12	Provide PSSC and design basis information on the sampling systems.

AP-13	The applicant has not proposed a safety strategy, and any needed PSSCs and design bases, for hazardous chemical releases resulting from the potential loss of confinement of radioactive materials in process cells. This affects the dissolver, oxalic precipitation and oxidation, acid recovery, oxalic mother liquor, and liquid waste reception units.
	11.3 MOX PROCESS DESCRIPTION
MP-2	PSSC and design basis information associated with the pyrophoric nature of some PuO_2 powders.)
MP-3	PSSC and design basis information associated with the sintering furnace regarding potential steam explosions.
MP-4	PSSC and design basis information associated with the sintering furnace regarding potential explosions in the room due to a hydrogen leak.
	11.8 FLUID TRANSPORT SYSTEM
FTS-1	The staff requires additional information on DCS's design basis for corrosion allowances for process equipment that will not be readily inspectable; such as fully welded process equipment located in process cells.
	11.9 FLUID SYSTEMS
FLS-1	The accident scenario of a hydrogen explosion in the glovebox outside of the sintering furnace airlock due to insufficient purging in the airlock needs to be developed.
FLS-2	DCS has stated that the purpose of the nitrogen blanket on the hydroxylamine and hydrazine tanks is to displace and prevent air from entering these tanks, thereby eliminating flammability concerns. The staff has continuing concerns that this is an apparent safety function and that no PSSCs have been identified for this system.
FLS-3	DCS has stated that the nitrogen system functions to cool the calciner bearing for containment of material. However, the N2 system has not been identified as a PSSC in Chapter 5.
FLS-4	Due to the possible impact of the non-safety related instrument air system on the PSSC seismic isolation system, and due to its similarity in function to similar systems in nuclear power plants, the staff requests DCS to address how the current instrument air system design may address Information Notices 95-53, 92-67, 88-214, and 87-28.

DESCRIPTION OF APRIL 30, 2003, DRAFT SAFETY EVALUATION REPORT OPEN ITEM RESOLUTION

Chapter 1.1

GI-1: In Section 1.2 of the revised CAR, DCS described the organizational changes and provided foreign ownership, control, or influence information. Staff review of this information is described in Section 1.2 of this revised DSER. In Section 1.2 of this revised DSER, the staff concluded that the institutional information provided by DCS in the revised CAR identifies the applicant's corporate structure and favorable FOCI determinations. The staff concluded that this information is complete and accurate, is consistent with the recommendations in NUREG-1718, and is, therefore, acceptable.

Chapter 1.3

SD-1: During site characterization activities, the applicant measured radioactivity levels of soils using Geiger-Mueller detector scans and gross alpha and beta measurements of soil samples. The applicant indicated that the sensitivity of the gross alpha and beta measurements were 200 nCi/gm and 100 pCi/gm, respectively. In a letter dated February 11, 2003 (Reference 1.3.3.39), DCS stated that soil radioactivity measurement sensitivity (MDC) in the Pre-construction Environmental Monitoring Report (June 26, 2002, SRS Doc. No. ESH-EMS-2002-1141) was much better than described in the CY2000 geotechnical investigations.

NRC staff compared the results. The CY2000 geotechnical value was 200 nCi/gram (200,000,000 pCi/kg) gross alpha. The 2002 Preconstruction Environmental Monitoring Report measured values of actinides in soil include a mean value of 12.5 pCi/kg Pu-239, and a maximum of 4380 pCi/kg Pu-239, for example. The SRS Radiological Soil Guides for SRS worker protection is 248,000 pCi/kg (Jannik 1995). Across the depth profile, the values are:

	Pu-239	
depth	mean	max (pCi/kg)
0-3"	137	690
3-6"	87.1	1590
6-9"	154	4380
9-12"	121	4280

These values correspond to a potential maximum exposure of 0.3 mrem to an exposed worker using the mean values, and a maximum exposure of 3.3 mrem using the maximum values (SRS, 2002). The 3.3 mrem annual projected dose is acceptable because the NRC annual limit for members of the public in the controlled area is 100 mrem. The higher 5000 mrem limit for workers does not apply until a restricted area is established or unless construction workers could receive an occupational dose.

Chapter 5

SA-1: Sections 5.5 and 5.6 of the revised CAR submitted 0n October 31, 2002, contained the PSSCs "Process Safety Control Subsystem" and "Emergency Control System" with various functions. These PSSCs and functions replaced the "Process I&C System" and its functions.

SA-2: The applicant's assumptions and calculations were reviewed by the NRC in the DCS Washington Office on March 19, 2003. The NRC found these calculations to be acceptable.

SA-3: The applicant's analysis of projected increases in air travel over the life of the plant was reviewed by the NRC in the DCS Washington Office on December 12, 2002. The NRC found these projections to be acceptable.

SA-4: Sections 5.5 and 5.6 of the revised CAR submitted 0n October 31, 2002, list the Seismic Monitoring System and associated Seismic Isolation Valves as a PSSC in Table 5.5-21 and Table 5.6-1.

Chapter 6

NCS-1: The applicant provided additional information (in DSER Reference 6.3.11) on the experience of its NCS staff involved in the design of the MFFF. This includes over 20 years experience with Pu and MOX operations at MELOX and LaHague, and in the domestic nuclear industry. The applicant has also committed to training the NCS staff in the processing of Pu and MOX as needed. This experience base and commitment to training is sufficient to provide reasonable assurance that the applicant's staff possesses the necessary knowledge and experience with these materials to design the facility.

NCS-2: In the revised CAR, the applicant added several new Criticality Control Units (CCUs) to Tables 6-1 and 6-2 and detail concerning the safety basis for process ventilation, high-alpha waste, and isotopic dilution of ^{235}U. The applicant also stated (in DSER Reference 6.3.11) that for other auxiliary systems connected to the process, an approach similar to that for process ventilation would be used. This approach includes IROFS such as passive design features and dual independent sampling, which will be addressed in a separate NCSE. This approach is designed to meet the performance requirements of 10 CFR 70.61 and is consistent with industry practice, and is therefore sufficient to resolve the open item.

NCS-3: For areas assuming a PuO_2 powder density of 7 g/cm^3, the staff accepts that this is likely to be very conservative, based on information gathered from domestic Pu facilities. For lower PuO_2 and MOX powder densities, the applicant has stated (in DSER Reference 6.3.11) that these values have been observed at MELOX and LaHague, and will be confirmed during start-up verification. In addition, wherever the physical form of the material changes, less than theoretical densities will be shown to be conservative by in-line measurement or other means. This approach represents an acceptable control strategy. The staff will review the justification for the bounding powder densities in NCSEs supporting an SNM possession and use license application.

NCS-5: The applicant has committed (in DSER References 6.3.11 and 6.3.13) to an acceptable method for demonstrating that the performance requirement of 10 CFR 70.61(b) has been met for nuclear criticality accident sequences. This approach relies upon compliance with the double contingency principle (DCP) combined with either failure detection within a specified time period or additional safety margin in the controlled parameters. In addition, for each control relied on to meet the DCP, the availability and reliability qualities discussed in Chapter 5 of NUREG-1718 will be considered. Failure of the controls must be at least unlikely, which the applicant has defined as "not expected to occur during the facility lifetime" (qualitatively on the order of once in 100 years). Because the described method incorporates the availability and reliability qualities described in NUREG-1718 and provides for a robust form of double contingency protection, this is sufficient to resolve the open item.

NCS-6: In the revised CAR, the applicant committed to use supplemental calculational methods, or increased margin, when extending the code's area(s) of applicability. The change is consistent with the wording of ANSI/ANS-8.1-1983 (R1988), which has been endorsed by the NRC in RG-3.71, and is, therefore, acceptable.

NCS-7: In the revised CAR, the applicant stated that ANSI/ANS-8.15-1981 would not be part of the design basis of the MFFF. Materials with special actinide nuclides will be explicitly evaluated in accordance with ANSI/ANS-8.1-1983 (R1988). This has been endorsed by the NRC in RG 3.71, and this is, therefore, acceptable.

NCS-8: In the revised CAR, the applicant committed to use supplemental calculational methods, or increased margin, when extending the code's area(s) of applicability. The change is consistent with the wording of ANSI/ANS-8.17-1984, which has been endorsed by the NRC in RG-3.71, and is, therefore, acceptable.

<u>Chapter 7</u>

FS-3: Where the hazard of hot gases poses a fire risk to the downstream fire area, the applicant will identify IROFS such as sliding valves to isolate the pneumatic tubes (revised CAR Section 5.5.2.2.6.6). Features such as valves can prevent hot gas and smoke from propagating between interconnected gloveboxes. The location and viability of such valves cannot be fully assessed until the hazard is properly evaluated in the ISA. Staff considered this issue to be adequately addressed in the revised CAR; therefore, NRC closed the open issue regarding the pneumatic transfer tubes.

FS-4: Based on the DCS Polycarbonate report (Reference 7.3.9.7), NRC considers polycarbonate to be a potential candidate material for use in glovebox window panels. The applicant states that under seismic inertia loading and seismic deflection, polycarbonate is superior to non-combustible materials that are allowed by code, such as glass. Also, polycarbonate provides superior neutron shielding and protection in load drop events. In revised CAR Section 11.4.7.1.3, DCS committed to evaluate conditions such as temperature, radiation and aging on material creep properties. For the ISA, when the glovebox designs are finalized, the applicant will determine whether the range of properties as provided in the Polycarbonate report are bounding for the expected use of the windows. The results of these DCS evaluations will be contained in its ISA summary, and the staff finds this deferral to be acceptable. In addition, DCS will account for the combustion of polycarbonate in the fire hazard analysis (revised CAR Section 7.4). After weighing competing safety concerns, reviewing protective features for the room and gloveboxes, and based on commitments from DCS to provide design basis criteria, the staff finds that the use of polycarbonate window materials is no longer an open item in the revised CAR review.

FS-5: In the April 2002 Draft Safety Evaluation Report, NRC reported glovebox fire protection features as a PSSC for events involving gloveboxes. After assessing the design bases of the PSSC, the applicant grouped the PSSC for glovebox fire protection features with the combustible loading controls PSSC and applied it to storage gloveboxes (revised CAR Section 5.5.2.2.6.2). Because combustible loading controls envelop the glovebox fire protection features, staff no longer regards FS-5 as an open item.

Chapter 8

CS-04: The applicant has adopted a preventive safety strategy that incorporates two PSSCs and five safety functions, based upon standard chemical industry approaches (revised CAR Sections 5.5.2.4.6.11 and 8.5.1.9; revised DSER Sections 8.1.2 and 5.3.3). This approach minimizes azide formation, avoids their accumulation, and destroys the azides in the waste unit. For potentially reactive azides, such as silver azide, the process separates silver from hydrazoic acid containing vessels and does not recycle hydrazoic acid. In addition, silver concentration are estimated to be very low in vessels containing hydrazoic acid. Finally, the temperature design basis of 140^{B} C is below the decomposition temperature of silver azide. The staff review has found that the applicant has identified the potential hazards of metal azides, the process includes steps to reduce these hazards, and PSSCs and design bases have been proposed to reduce potential hazards and risks even further

CS-05a: The applicant used a modeling approach based upon NRC guidance. Control of the MFFF relies to a great extent on automated systems to ensure facility safety. The applicant also mentions that the emergency control room (ECR) operations staff is expected to monitor and confirm the status of confinement systems, fluid systems, and other facility systems; and to recover from off-normal conditions. The applicant has identified a PSSC to protect the ECR operators (revised CAR sections 5.5.2.10.6.1 and 11.4.11.16; revised DSER sections 8.1.2.6 and 8.1.2.3.2).

The applicant has identified control strategies to protect the facility worker from chlorine and nitrogen tetraoxide releases (revised CAR sections 5.5.2.10.6.2 and 5.5.2.10.6.3; revised DSER section 8.1.2.4.1). The identified PSSCs and design bases provide adequate assurances of safety. The applicant has also stated there are no operator or worker actions outside of the emergency control room that are required to perform safety-related actions and that affect radiological safety, during or after a chemical release (revised CAR Section5.5.2.10.6.1; revised DSER Section 8.1.2.3.2). As regards PSSCs that are administrative controls, the applicant indicates these are either permissive in nature (e.g., no action until a sample is analyzed) or fail safe (i.e., crane stops) (revised CAR Sections 5.5.2.10.6.1; revised DSER Section 8.1.2.3.2).

CS-06: The applicant has identified a PSSC that will be used to control the quantity of radiological and chemical materials in the laboratory revised CAR section 5.6.2.7; revised DSER Section 8.1.2.1.3). The safety function is to limit the extent of any potential explosion by limiting the quantity of hazardous chemicals that may be involved in any explosion and to limit the quantity of radiological/chemical material available for dispersion following a potential explosion. This type of mitigative approach is frequently used in laboratories and provides for adequate assurances of safety.

CS-07: The applicant has identified an administrative PSSC entitled "Hazardous Material Delivery Controls" (revised CAR section 5.5.2.4.6.15; revised DSER Section 8.1.2.1.4) which has the safety function of ensuring that the quantity of delivered hazardous material and its proximity to the MOX Fuel Fabrication Building structure, the Emergency Generator Building structure, and the waste transfer line are controlled to within the bounds of values shown in the safety analysis to produce acceptable results. Currently, this is expressed qualitatively because the designs are still evolving and actual numeric values may change.

CS-08: PSSCs and safety functions have been identified as part of a mitigative strategy for these UO_2 events (revised DSER section 8.1.2.3.3). These are capable of reducing uranium exposures to acceptable levels and address chemical toxicity concerns.

Chapter 9

RS-1: In the event of leakage from a sintering furnace seal, the staff calculated that a worker exposed to plutonium releases from a failed furnace seal would receive a dose less than 10 rem. This dose is less than the limit for intermediate consequence events in 10 CFR 70.61 for a facility worker (25 rem).

Chapter 10

ES-1: The staff has completed its review of the applicant's environmental consequence analysis. The applicant has used a methodology consistent with the NRC guidance in Reference 9.3.12. This methodology includes: (1) evaluation of consequences at the proposed facility's restricted area boundary, and; (2) no reduction in the potential source term to include only respirable particles. Unacceptable assumptions with regard to these two items were the basis for the staff's original open item. Further, the applicant has identified additional controls required to reduce environmental risks to acceptable levels. Based on staff's reviews of the applicant's revised safety assessment and supporting calculations, the staff finds that the safety assessment adequately addresses the protection of the environment from the consequences of potential accidents.

ES-2: The staff has closed this unresolved open item based on additional information provided in the revised CAR. The applicant has addressed the hazard of spills of solvent wastes from carboys being transported outside the restricted area by committing to turn possession of the material over to DOE prior to allowing the material to leave the restricted area. Accordingly, safe handling and transport of this material outside the applicant's restricted area on the DOE's Savannah River Site would be subject to DOE regulation and are beyond the scope of the applicant's safety assessment.

Chapter 11.2

AP-01: A preventive safety strategy is used (revised CAR Section 5.5.2.1.6.1; revised DSER Section 11.2.1.3.2). The PSSC is the Process Safety Control Subsystem. The safety function is to shut down process equipment prior to exceeding a temperature safety limit, based upon consideration of all material limits associated with the glovebox and identification of specific temperature setpoints during final design. This will ensure that, subsequent to the shutdown of process equipment, normal convective cooling is sufficient. Setpoint design bases are based upon methodologies acceptable to the NRC and the setpoint analysis will consider electrolysis, potential exotherms from reactions, and natural cooling effects. The staff concludes this approach provides assurance that the design basis temperature of 70ß C will not be exceeded, provides margin (i.e., vis-a-vis the boiling point of the solution, around 110ß C), and will prevent the over-temperature event.

AP-04: A combined preventative and mitigative strategy is used (revised CAR Section 5.6.2.4; revised DSER Section 11.2.1.3.11). Two administrative PSSCs directly apply to corrosion with a preventative strategy. The first is Chemical Safety Control. One of its safety functions is to ensure control of the chemical makeup of the reagents and to ensure segregation/separation of vessels/components from incompatible chemicals, i.e., planned corrosion exposures. The second PSSC is entitled material maintenance and surveillance programs. The safety function of this PSSC is to detect and limit the damage resulting from corrosion. This PSSC can identify corrosion problems within the facility prior to catastrophic failures occurring (the "big" leaks). Additional PSSCs are identified to mitigate leaks in cells by confinement and filters in the ventilation systems. These approaches provide for reasonable assurances of safety.

AP-5a: Liquid and solid wastes produced at the proposed facility will be transferred to the SRS for processing and disposal. DCS has worked closely with SRS during the MFFF design phase and has provided SRS with waste characterization information. SRS has reviewed and evaluated the information in the context of the existing Waste Acceptance Criteria (WACs). DCS is committed to meeting the SRS WAC or providing a stream that qualifies for a WAC Deviation and Exemption. The MFFF waste streams meet the SRS WAC except for the chloride stream. Based upon an evaluation by SRS, the chloride concentration is sufficiently close to the WAC that a WAC Deviation and Exemption for the SRS Effluent Treatment Facility (ETF) will be issued. The WAC for the SRS Waste Solidification Building (WSB) has not been issued, but the applicant states the interface between them and SRS will ensure that the WSB is designed to manage the MFFF high alpha waste stream and the depleted uranium stream.

AP-05b: The staff notes that an explicit inventory limit is not specified. Currently, the facility is designed to accommodate up to 90 days equivalent of most waste solutions (e.g., of the values in Table 11.2-4; the storage of the LLW destined for the ETF will likely be less than 90 days equivalent), although the applicant anticipates there will be transfers of liquid wastes every two weeks. The applicant has indicated the facility will shut down before exceeding the liquid waste storage capacity. The staff interprets this to mean active waste generating operations would be curtailed at some setpoint before the tankage is completely full, until the potential backlog of waste at the MFFF is cleared. Actual setpoints would be defined at the ISA stage. The staff finds this approach acceptable for the construction permit application.

In revised CAR Table 5.5-3a, the applicant shows Unit KWD (liquid waste) tank inventories for americium (Am-241) of [**Text removed under 10 CFR 2.390**], for TK4020, TK4030, TK4040, and TK4050, respectively. This is a total of [**Text removed under 10 CFR 2.390**]. The amount of Am-241 removed by processing the maximum annual throughput of [**Text removed under 10 CFR 2.390**] Consequently, the waste inventories shown in Table 5.5-3a represent about one year's throughput. As noted above, [**Text removed under 10 CFR 2.390**] will provide approximately 90 days equivalent of storage (revised CAR pp. 11.3-35, 10-5). Therefore, these tanks would only be expected to have up to a maximum [**Text removed under 10 CFR 2.390**], based upon 90 days of storage. The largest single tank inventory is [**Text removed under 10 CFR 2.390**] This is the source term for the controlling event in the safety assessment. However, during normal operations, the waste would be transferred to the WSB for treatment at a rate of 25 transfers per year; if the 90 day storage equivalent is used, this would be 4 transfers annually. Both are bounded by the safety assessment, and, thus, the staff finds this acceptable for the construction authorization.

AP-06: The applicant has subsequently removed the IROFS designation for the entire High Alpha Waste System. Instead, the applicant has identified the High Alpha Activity and Stripped Uranium waste transfer lines as PSSCs (revised CAR sections 5.5.2.3.6.5 and 10.5.2). These are double walled stainless steel pipes seismically qualified and designed with leak detection. The lines will be designed to accommodate mechanical and seismic loads. For load handling events, the safety strategy relies upon prevention. The PSSCs are the waste transfer lines. The safety function is to protect the lines from activities taking place outside the MFFF building. For external events (e.g., external fires, explosions, extreme winds, tornadoes, missiles, rain, and snow/ice loadings), the safety function is to prevent damage to the line. The design basis for both functions is ASME B31.3 for process piping. ASME B31.3 is a section of the code that requires consideration of loads in the design of piping. The staff analysis notes the code, the proposed approach with the waste transfer lines (i.e., double walled with leak detection), and the prevention strategy provide reasonable assurance that the design will not be damaged and release radionuclides outside of the MFFF building.

The applicant has also identified a safety strategy and PSSCs for azides in the waste unit. This is discussed and closed as CS-04.

AP-11: Acceptable strategies, PSSCs, and design bases have been proposed. See AP-04 for more information.

AP-12: DCS has indicated all sampling, with the exception of samples with very low levels of radioactivity, will be conducted within gloveboxes and that there will be no bag-in/bag-out operations because the sample containers would be pneumatically transferred (flown) from stations within the gloveboxes to the laboratory. The revised CAR identifies gloveboxes as PSSCs, with the safety function of maintaining confinement integrity for design basis impacts (Section 11.4.11.2). Laboratory material controls addressed the handing of the samples within the laboratory. Only the low level waste samples would not be handled within gloveboxes and, qualitatively, the staff concludes this does not present a challenge to the performance requirements of 70.61. This approach provides for adequate assurances of safety.

AP-13: The applicant has proposed safety strategies, PSSCs, and design bases for chlorine and nitrogen tetraoxide releases (revised CAR Sections 5.5.2.10.6.2 and 5.5.2.10.6.3; revised DSER Section 8.1.2.4.1). These reduce potential exposures from these chemicals to acceptable levels. However, the staff is also concerned about a liquid phase leak. The staff found the distance from the point of one of these in-cell releases to the worker is approximately equal to the 100 meter distance to the site worker, and, hence, consequence estimates of such releases for the site worker should bound any consequences for the facility worker

Chapter 11.3

MP-02: The applicant identified an additional safety function of the Material Handling Controls PSSC to prevent potential over-pressurization of the reusable plutonium oxide cans, due to radiolysis or oxidation of plutonium(III) oxalate, and its subsequent impact to the glovebox revised CAR Section 5.5.2.6.3.2; revised DSER Section 11.3.1.2.3). The associated design basis is to ensure that the reusable can is designed to the maximum internal pressure calculated for these events, plus an additional 10% as the margin. This provides an approach with a defined margin, and is consistent with the safety approach for fluid transport system components.

MP-03: The applicant has identified a prevention strategy to address potential steam explosions, based upon three main approaches (revised CAR Sections 5.5.2.4.6.2, 11.2.2.1.6, and 11.4.11.8; revised DSER Section 11.3.1.2.4). First, to prevent internal water intrusion into the furnace. the PSSC is the process safety control subsystem with the safety function of isolation of humidifier water flow on high water level. Thus, the water supply to the humidifier would be terminated prior to the humidifier overflowing and potentially allowing liquid water to enter the sintering furnace via the gas supply side. This would be an active, engineered control.

Secondly, for prevention of cooling water boiling, an additional function of the process safety control subsystem is to shut down the sintering furnace (by electrical cut-off) upon loss of cooling water flow, and to shut down zone heating if the related surface temperature is excessive (over 60° C - this is identified as the design basis). There is also a backup cooling water supply and the cooling water coils are on the outside of the furnace.

Third, for addressing cooling water boiling and leaks, the cooling water coils are outside the sintering furnace shell, the shell is thicker than the cooling water tube thickness, and the coils are not confined within additional metal shells. Thus, any leak or steam event from the cooling water coils is unlikely to penetrate the significantly thicker sintering furnace shell.

This three-pronged approach provides for adequate assurances of safety.

MP-4: Potential specific controls for meeting hydrogen flammability limits (such as limiting the hydrogen content in the hydrogen-argon mixture, monitoring for oxygen within the sintering furnace, monitoring for hydrogen outside of the furnace, and crediting dilution air flow associated with the confinement ventilation system) were already identified as PSSCs in other safety strategies and, thus, there would be little or no impact of the specific control selection upon the design at the Integrated Safety Analysis phase. Therefore, the safety strategy aspect of this item is closed. The hydrogen limits aspect of this issue has been subsumed by issue AP-2.

Chapter 11.8

FTS-1: This open item was closed in conjunction with resolving open item AP-4. The applicant provided, as additional information in revised CAR section 5.5.2.1.6.4, an evaluation of a leak in a process cell due to corrosion. This evaluation showed that the unmitigated consequences to the site worker and public of such a leak are low, so no PSSCs are required to satisfy the requirements of 10 CFR 70.61 for these groups. Additionally, process cells (designated as PSSCs) protect facility workers, and the process cell ventilation system (also a PSSC) protects the environment, from the consequences of these types of events. As a result, corrosion allowances for piping systems within process cells are not required for safety, and this item is closed.

Chapter 11.9

FLS-1: As additional information in revised CAR Section 5.5.2.4.6.1, the applicant states that it is performing detailed analyses of the hydrogen-argon system and associated furnace design and operations as part of the final design (and ISA) to determine specific scenarios that could lead to the formation of an explosive mixture of hydrogen. As necessary, specific controls to prevent the formation of an explosive mixture of hydrogen will be designated as IROFS and identified in the ISA summary as part of any DCS application for a special nuclear materials possession and use license. The staff finds that DCS's proposed approach to address the concerns outlined in FLS-1 addresses the staff's concern, and this item is closed.

FLS-2: In revised CAR Section 5.5.2, the applicant discusses chemical events, including consequences, safety strategies and PSSCs. In parallel with this revised discussion, DCS stated, as additional information in Section 11.9.2.1.1 of the revised CAR, that the use of the nitrogen system to maintain nitrogen blankets on the hydroxylamine and hydrazine tanks is not credited in the MFFF safety analysis to satisfy the requirements of 10 CFR 70.61. Therefore, the staff's concerns in FLS-2 have been addressed, and this item is closed.

FLS-3: DCS stated, as additional information in Section 7.2.5 of the revised CAR, that the nitrogen system is not a PSSC relied on for fire prevention in gloveboxes. In revised CAR Section 5.5.2.2, DCS discusses its safety analysis of fires, including consequences, safety strategies, and PSSCs; these events and PSSCs are evaluated in the appropriate sections of this DSER. Also, as additional information in revised CAR section 11.9.2.1, DCS states that none of the functions of the nitrogen system are credited in the MFFF safety analysis to satisfy the requirements of 10 CFR 70.61. Therefore, the staff's concerns expressed in open item FLS-3 have been resolved, and this item is closed.

FLS-4: As additional information in Section 11.9.1.10.1 of the revised CAR, the applicant has considered related industry experience, such as NRC Information Notices 87-28, 88-24, 88-43, 92-67 and 95-53, in developing the design bases of non-safety related air systems that support safety related equipment at the MFFF. This showing by the applicant addresses the staff's concerns, and this item is closed.