DUKE COGEMA
STONE & WEBSTER

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DCS-NRC-000083

Subject: Docket Number 070-03098
Duke Cogema Stone & Webster
Mixed Oxide Fuel Fabrication Facility
Construction Authorization Request
Clarification of Responses to NRC Request for Additional Information

As part of the review of Duke Cogema Stone & Webster's (DCS') Mixed Oxide Fuel Fabrication Facility (MFFF) Construction Authorization Request (CAR), NRC Staff requested clarifications of DCS' responses to NRC's Request for Additional Information (RAI). These clarifications were discussed during a series of teleconferences and on-site reviews between NRC Staff and DCS. The majority of the clarifications are noted in the NRC on-site review summaries from A. Persinko to E. Leeds dated 03 November 2001, 06 November 2001, and 18 December 2001, and from T. Johnson to E. Leeds dated 30 January 2002. DCS provided part of the requested information by letters DCS-NRC-000074 dated 05 December 2001 and DCS-NRC-000081 dated 07 January 2002.

Enclosure A to this letter, which contains non-proprietary information, provides additional responses to NRC clarification requests. The responses which include proprietary information are being provided by separate letter, DCS-NRC-000082. The responses address clarifications regarding material handling, nuclear criticality safety, confinement/ventilation, human factors, instrumentation and control, safety analysis and chemical safety, and fire protection. Additionally, the response clarifies a response related to the seismic qualification of mechanical equipment provided in the 07 January 2002 letter. A listing of remaining action items is provided in Enclosure B. If you have any questions, please contact me at (704) 373-7820.

Sincerely,

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Enclosures: A. Responses to NRC Clarification Requests
B. Remaining Clarification Items

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Enclosure A
Responses to NRC Clarification Requests

HEAVY LOADS/MATERIAL HANDLING

Clarification Requested:

DCS committed to provide clarification related to material transport systems on the release fraction for respirable plutonium {06 Nov 2001 item 1C}.

Response:

DCS provided a response related to equipment that may contain greater than 50 micrograms of respirable plutonium by letter dated 05 December 2001. The information related to the release fractions used in safety analyses was provided in the response to NRC's Request for Additional Information (RAI) 61 dated 31 August 2001. This was discussed with the reviewer in a teleconference call 23 January 2002 and no further information was required from DCS at this time.

Enclosure A
Responses to NRC Clarification Requests

ELECTRICAL/MECHANICAL

Clarification Requested:

RAI 159: Regulatory Guide 1.100 addresses seismic qualification of electric and mechanical equipment. DCS has committed to IEEE Standard 344-1987 for seismic qualification of electrical equipment. DCS will clarify its commitment to Regulatory Guide 1.100, including providing design basis information with respect to seismic qualification of mechanical equipment {03 Nov 2001 letter, item 8D}.

Response:

An addendum to the response provided by letter dated 07 January 2002 is provided below. In recent discussions with NRC staff, it was determined that the previous response did not specifically identify that the response applied to mechanical equipment. Therefore, DCS is providing a revised response as follows:

Seismic qualification of MFFF mechanical equipment meets the guidance of Regulatory Guide 1.100. The Basis of Design for mechanical equipment invokes IEEE 344 - 1987 and satisfies NRC additions to the 1987 IEEE standard stated in Regulatory Guide 1.100. Therefore, mechanical equipment seismic qualification must consider attached piping loads, thermal loads and live loads such as fluid sloshing, and in addition, applied loads are required to meet or exceed accelerations corresponding to their installed location.

Enclosure A
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NUCLEAR CRITICALITY SAFETY

Clarification Requested:

RAI 80/81: DCS stated that its response relating to the use of either reliance on geometry control or dual parameter control would be clarified. In the case where geometry is the sole controlled parameter, DCS will still meet double contingency by ensuring that no single credible change in process conditions can produce a criticality. DCS further asserted that if there is no credible means for geometry to change, there is no need for further controls. NRC agreed that this meets the wording and intent of the DCP {03 Nov 2001 item 3G}.

Response:

The response to RAI 80 is completed (bolded) as follows:

"...As shown in Tables 6-1 and 6-2, criticality control in many locations in the MFFF is by the preferred passive geometry control that is implemented by design.

This preference for passive geometry control meets the double contingency principle which states that process designs should incorporate sufficient factors of safety to require at least two unlikely, independent, and concurrent changes in process conditions before a criticality accident is possible. In the case of geometry control, there are no credible changes in process conditions which can occur causing a criticality. This type of criticality control is most often used in storage areas as well as throughout the aqueous polishing process where the geometry of the unit is fixed by design and therefore can not change. In those cases, the unit is safe for all credible combinations of fissile material mass, density, moderation, reflection, etc.

In other cases, such as shown in Table 6-2 in the powder area, geometry control is not practical due to the changing geometry that results from the process. That is, there exists a variety of hoppers, scales, conveyors, mixers, and locations of material containers each with a varying geometry. In those cases, both mass and moderation is each controlled such that no single failure will result in a criticality. However, it is obviously important to control both of these parameters. **In the MFFF design, dual independent, robust controls along with passive design features are used to perform criticality control.** "

In addition, the following information are provided as a clarification to the response to RAI 81:

"As shown in Table 6-1, criticality control in most locations of the AP process is by the preferred passive geometry control that is implemented by design.

This preference for passive geometry control meets the double contingency principle which states that process designs should incorporate sufficient factors of safety to require at least two unlikely, independent, and concurrent changes in process conditions before a criticality accident is possible. In the case of geometry control, there are no credible changes in

process conditions which can occur causing a criticality. This type of criticality control is used throughout the aqueous polishing process where the geometry of the unit is fixed by design and therefore can not change. In those cases, the unit is safe for all credible combinations of fissile material mass, density, moderation, reflection, etc.

In a few other cases in the AP process, where, for example significant quantities of Pu are not expected, other control methods, such as concentration control are used. In these few cases, dual independent, robust controls are used to perform criticality control.

Enclosure A
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CONFINEMENT/VENTILATION

Clarification Requested:

RAI 144 requested justification for not enclosing the furnaces in gloveboxes. The response provided by DCS was proprietary and not included in the redacted version of the DCS response to the RAI. During the meeting, DCS stated that the glovebox is not used because of maintenance reasons and because the environment in the glovebox does not make enclosing the furnace necessary. DCS agreed to evaluate this issue further and to provide justification in a letter to NRC {03 Nov 2001 item 6}.

Response:

The response to RAI 144 is revised as follows (bolded):

" A primary design function of the sintering furnace is to provide primary confinement during and after all design basis events, which includes earthquakes and maximum pressure events. In addition, events that could result in breaching the furnace will be prevented. Specific controls will be identified during final design and described in the ISA summary.

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CONFINEMENT/VENTILATION

The MFFF confinement concept for sintering furnaces is similar to the one used in MOX facilities such as MELOX, CFCa-Cadarache and Belgonucleaire Dessel.

The three MELOX sintering furnaces (most similar to MFFF) have not released any contamination. Minimal maintenance is needed on furnace modules that are external to gloveboxes, as no moving parts are involved in the hotter zone. If maintenance is needed, the furnace is cooled and set under negative pressure.

Infrequent maintenance operations, such as a sintering module replacement, (1m length by 1.1 m in diameter) need adequate space for the handling of each module. Due to the module's size, it is not compatible for this module to be located in a glovebox. Moreover, a significant part of the cooling is performed through the natural convection in the room, which would be difficult to guarantee inside a glovebox.

Finally, even if a seal failure did occur, it would be expected to result in a small leak, an initial evaluation of the potential dose consequences to a facility worker indicate that it is highly unlikely that a worker will receive a dose exceeding the performance requirements of 10CFR70.61.

HUMAN FACTORS

Clarification Requested:

RAI 225: (1) Clarify its response by more explicitly defining what is meant by "significant human-system interface" for the protective control system. (2) DCS agreed to consider and evaluate the potential for personnel errors of commission that might result in overriding or defeating safety systems. (3) DCS also agreed to provide a cross-reference(s) to appropriate parts of Chapter 11 of the CAR {03 Nov 2001 item 7B}.

Response:

The personnel and equipment protective (PEP) control subsystem is non-PSSC. It is designed to satisfy industrial safety requirements (29 CFR 1910) and to protect the equipment. The protective control subsystem has no human-system interface (HSI) that allows an operator to bypass its functionality, therefore, an evaluation of errors of omission or commission is not warranted. The operators are not required to interface with nor be cognizant of the protective control system except to perform maintenance or to monitor its sensors or resultant actions. The operators have no direct access to the controllers and cannot routinely intervene in their operation. Monitoring of the PEP control system's sensors and actions is performed through the normal control system HSI.

The protective control systems are intended to prevent incidents, other than nuclear, with the potential to cause:

- long shutdown periods
- damage to equipment involving extensive repair
- injuries to operating or maintenance personnel.

The protective control subsystems consist of programmable logic controllers (PLC) or hardwired controls. When protecting operators, the protective control subsystem looks at the human-machine interference zones and interlocks the operation of the equipment when it detects an obstruction within the zone or the release of a dead-man switch. When protecting equipment, the protective control subsystem monitors the equipment for such conditions as overspeed, overtorque, overtravel, sensors at machine interface to avoid collisions, or other conditions as necessary.

The operation of the personnel and equipment protective controllers is described in CAR Section 11.6.3.3.2.

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HUMAN FACTORS

Clarification Requested:

RAI 227: Clarify its response by more explicitly defining what is meant by "other deterministic design basis accident assumptions and scenarios," and also to consider and evaluate the potential for personnel errors of commission that might result in overriding or defeating safety systems {03 Nov 2001 item 7C}.

RAI 230: Clarify its response by including both human errors of omission and commission in their evaluation of the probability of human error {03 Nov 2001 item 7E}.

Response:

The design basis hazards are identified in section 5.4.1.1 of the CAR.

No scenario has been identified where omission of an operator action results in adverse conditions, and errors in operator actions have been anticipated in the system design while considering other deterministic design basis accident assumptions and scenarios. That is, in the analysis of design basis accident sequences, the initiating events internal to the facilities take into account the credible worker errors of commission if they are not a part of an enhanced administrative control used as IROFS. Such accident event sequences look at the operator actions that would normally be expected to occur given the type and amount of information received as a result of the event. Event sequences may be propagated as a result of a determination that the operator is likely to make an error of commission. Event sequences are stopped when the consequences of the actions are known and the event is not further propagated as a result of a consequence.

The possibility of overriding or defeating any of the safety functions due to a personnel error of commission is analyzed during the LA/ISA analyses.

The safety controller has direct control over its own actuators and devices so that its safety functions cannot be bypassed or circumvented by the normal control system. The operators are generally not required to initiate and cannot intervene in the action of the safety controllers. If the process requires human interaction, the related personnel actions (acts of commission) are covered by enhanced administrative procedures. In all these cases, the worker does not have to be cognizant of the safety control system in order for the safety controller to perform a safety function. The operator is informed of the status of the safety controller's actions by signals sent to the normal PLC.

In addition to the above dispositions, if a personnel error of commission could lead to a condition that exceeds 10 CFR 70.61 criteria, these personnel errors of commission are covered by enhanced administrative procedures and:

- suitable worker qualification and worker training,
- using checklists, two-party verification, placards and markings,

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- management of change during operations and maintenance (e.g., operating work sheet validation, maintenance preparation and validation, continuous validation of the safety responsibility chain),
- human-system interface design,
- Quality Assurance related to the administrative procedures for operations and maintenance,
- management staff and safety staff (and regulator) audits and inspections

The operation of the safety controllers is described in CAR Section 11.6.3.3.3.

Clarification Requested:

RAI 231, 233: Summarize significant events involving human performance as part of the review of operating experience at the MELOX and La Hague that were discussed at the meeting {03 Nov 2001 item 7F}.

Response:

1. Summary of significant improvements related to human error/lessons learned

As presented in the CAR chapter 12, the operational lessons learned from the references facilities were incorporated into the preliminary design of the process units. The following significant improvements are specially related to Human-System Interface.

Process control system – Architecture principle

- Improved in 1993 during the start-up: UF, GEPF, re-start cycle, ... ;
  The facility is broken down into Functional Units (FU). A functional unit is a set of technological resources that fulfill a production function (manufacturing, ...). Each FU has a dedicated monitor located in process workshop control room. Each FU is functionally made up of one or more mechanical sub-assemblies operated independently of each other. They are called 'Group Elementary Process Functions' GEPF. Each GEPF can be operated in a different mode; one GEPF can be in automatic mode and the other in manual maintenance mode.

Process control system – Mechanism level

- In order to improve the reliability and availability of the production system, the architecture trend was to simplify I&C (i.e. limitation of the number of sensors and actuators) according to the results from systematic methods.

Process control system – Information treatment

- The arrangement of control rooms and electronics equipment rooms with respect to the location of mechanical equipment was evaluated against the required tasks of the operators. The resultant design for MFFF integrates operations facilities and tasks into the layout of the

process spaces. In addition, control rooms are distributed throughout the facility in close proximity to the processes controlled.

- The architecture using the separation of the different process in elementary actions driven by control cycles (algorithms) was unsuitable to the cartography control, the traceability control, to register quality or process parameters and to treat measures from the process. So the control system was improved at MELOX by means of the use of process computers for instance;
  In some units the use of process computers (PC) must be implemented. They are of two types:
  - Product quality control
  - Operating PC

  Their main functions are:
  - acquisition and processing of specific process measures;
  - archiving and editing of data and parameters;
  - processing of quality control and manufacturing control data;
  - transmission of data to the Normal Control System
  - synchronization with the unit PLC

  These functions are taken into account in the I&C design of MFFF.
- In order to perform a primary diagnostic when a production unit breaks down, MELOX implemented a Computer-Aided Diagnosis System. This system is also implemented in the I&C design of MFFF (see CAR 11.6.3.9).

Utilities control system (ventilation and electricity) – Information treatment

- The arrangement of the plant principal control room was evaluated for MFFF based on lessons learned, against the required tasks of the operators. Also, alternate redundant control locations for plant utilities and emergency systems are provided on MFFF.
- Improvement of the views on the workstation screen. These improved views are the basis of design, before detailed Americanization studies.
- Improvement of the organization and hierarchisation of the alarms in order to show, as a priority, the safety default.
- For MFFF, simplification of the normal PLCs: renunciation of the 155H architecture and the redundant architecture (for the Normal PLC);
  Normal controllers are used by the normal control system. Programmable Logic Controllers (PLC) with non-redundant architecture are being used (i.e. non-redundant input and non-redundant programs with output comparison). Each functional unit has one or more PLC. Also, on the MFFF design some safety function supported by a normal channel will be lead by a safety controller[1].

[1] Note: For the facility control system (e.g. ventilation, electricity supply), "safety" is used on MELOX for the stand-by and back-up control system (e.g. safety Programmable Logic Controller, safety sensor). The safety IROFS functions are supported by the redundant emergency control system.

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- When a process parameter is required for a nuclear safety function (Note: in general, we try to choose different parameters for the normal and the safety controls[1]), the safety sensor is different from the operating sensor; these sensors are not redundant. However, the safety controllers[1] send a status of the safety sensor to the normal controller to check that it is consistent.

2. Summary of a significant event involving human error

2.1. Event description

This event occurred on August 6, 1997. It was classified level 1 on the International Nuclear Event Scale (INES) rating, due to the stop of the VHD exhaust.

This event had no consequence on worker and no impact on the environment.

The event sequences could be summarized as follow:

- Human error during programmed maintenance on a ventilation system electrical sensors cabinet,
- Loss of the 24 V supply of the information (ventilation sensors) separator cabinet. This cabinet was used to share the information of the safety sensors with the normal PLC.
- Partial loss of the information on the screens on the Normal and the Safety PLCs.
- Stop of the VHD fans.
- Difficulty to restart in local one VDH fan.

2.2. Lessons learned taken into account in the preliminary design

The improvements made on MELOX, which are taken into account in the MFFF bases of design, are:

- MFFF will have four (4) VHD systems (vs. 3 on MELOX)
- To improve the process of analyzing the performance of programmed maintenance activities (DCS is aware of the importance of this process regarding the operator commission error).
- To completely separate the safety information from the normal information. The information from the safety sensors is sent directly from the safety PLC to the normal PLC (with electrical isolation device).
- To separate and provide redundant power supplies for safety sensors and actuators (to be evaluated during the detail design of MFFF).
- To add a manual hard wired start command of each VHD fans in the principal control room actuators (to be evaluated during the detail design of MFFF).

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INSTRUMENTATION AND CONTROLS

Clarification Requested:

RAI 66: DCS will provide clarification that criticality prevention related to material inventory control is the only safety function that has been allocated to software. A list will be provided if there is more than one safety function allocated to software {03 Nov 2001 item 9, 3rd paragraph}

Response:

At the time of the CAR, the inventory control safety functions were the only safety functions allocated to software control. As the designs were further analyzed, a number of non-inventory safety functions have been identified. Depending on the complexity of these functions, DCS may decide to allocate these safety functions to software control. This work is currently in progress and no decisions have been made at this time. DCS has developed an initial list of sensors that have been designated as IROFS and the safety function associated with the sensor. This list is available for onsite review by NRC staff. The design basis for any PSSCs that include software is described in CAR 11.6.7.

Clarification Requested:

A list of functional units showing non-PSSCs PLCs and PSSCs PLCs will be submitted {18 Dec 2001 item B2}.

Response:

The list of functional units showing non-PSSCs and PSSCs is provided in Table 1. This list is based on evolving detailed design drawings and is subject to change as work on final detailed design progresses.

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INSTRUMENTATION AND CONTROLS

TABLE 1: PRELIMINARY LIST OF FUNCTIONAL UNITS AND THEIR PLC'S

Functional Unit	Unit ID	Number of PLCs	
		Non-PSSC	PSSC
SHIPPING AND RECEIVING POWDERS			
U02 Drum Receiving/Storage/Emptying	DDP/DRS	1	0
PU02 Receiving and Storage Unit	DCP/DCM	1	0
PU02 Buffer Storage/Pneumatic Transfer for powder	DCE/NTP	1	0
Subtotal		**3**	**0**
POWDERS			
Sample Pneumatic Transfer	LTP	1	0
Jar Storage Handling	NTM	1	0
3 PU02 Can Receiving and Emptying	NDD	1	0
Primary Dosing	NDP	1	1
Ball Milling No. 1	NBX	1	0
Ball Milling No. 2	NBY	1	0
Scrap Processing	NCR	1	0
Final Dosing	NDS	1	1
Auxiliary Powder	NXR	1	0
Homogenizing & Pelletizing No. 1	NPE	1	0
Homogenizing & Pelletizing No. 2	NPF	1	0
Subtotal		**11**	**2**
PELLETS			
#1 Sintering Furnace/Gas treatment/cooling/heating	PFE 1	1	0
#1 Furnace Entry/Exit/Conveyer/inspection/boat thruster	PFE 2	1	0
#2 Sintering Furnace/Gas treatment/cooling/heating	PFF 1	1	0
#2 Furnace Entry/Exit/Conveyer/inspection/boat thruster	PFF 2	1	0
#1 Pellet Grinding	PRE	1	0
#2 Pellet Grinding	PRF	1	0
#1 Basket Entry – Tray Loading	PTE 1	1	0
#1 Pellet Inspection and Sorting	PTE 2	1	0
#2 Basket Entry – Tray Loading	PTF 1	1	0
#2 Pellet Inspection and Sorting	PTF 2	1	0
Quality Control Manual Sorting	PQE	1	0
Pellet Repackaging	PAD	1	0
Scrap Box Loading	PAR	1	0
Handling and Green Pellet Storage	PSE	1	0
Handling and sintered Storage	PSF	1	0
Handling and Scrap Storage	PSI	1	0
Handling and Ground/Sorted Pellet Storage	PSJ	1	0
Subtotal		**17**	**0**
CLADDING – ROD INSPECTION			
Inspection/Repair/Welding/Seal Welding/Decontamination/Rod Handling	GME 1	1	0
Rod Filling	GME 2	1	0
TWLP Entry/ TWLP Rod Handling/ Seal and Circular Welding	GMF 1	1	0
Basket Entry/Length Adjustment/Rod Filling/Cleaning/Plug Inspection/Decontamination	GMF 2	1	0
Rod De-cladding	GDE	1	0

INSTRUMENTATION AND CONTROLS

Functional Unit	Unit ID	Number of PLCs	
		Non-PSSC	PSSC
Rod Tray Loading	GMK	1	0
X-Ray Test	SXE	1	0
Helium Leak Test	SEK	1	0
Rod Inspection and Sorting	SDK	1	0
Rod Scanning Test	SCE	1	0
Handling and Rod Storage	SMK	1	0
Subtotal		**11**	**0**
ASSEMBLY - WASTE			
Assembly Mockup Loading	TGM	1	0
Assembly Fabrication	TGV	1	0
Hoist/Shielding Doors/Crane	TAS	1	0
Assembly Dry Cleaning	TCK	1	0
Assembly Dimensional Inspection	TCP	1	0
Assembly Final Inspection	TCL	1	0
Assembly Final Inspection	TXE	1	0
Waste Storage	VDQ	1	0
Handling Crane/Fire detection	VDT	2	0
Filter Dismantling/Mechanical Dismantling	VDR/VDU	1	0
Waste Compaction	VDC	1	0
Subtotal		**12**	**0**
Aqueous Polishing System			
De-canning Air locks/inner-outer can opening/pneumatic transfer	KDA	3	2
Dissolution	KDB	1	0
Purification	KPA	2	0
Solvent Recovery	KPB	1	0
Acid Recovery	KPC	1	0
Oxalic Mother Liquors recovery	KCD	1	0
Oxalic Precipitation/ Oxidation	KCA	1	0
Homogenization	KCB	1	1
Canning	KCC	1	1
Off Gas Treatment	KWG	1	0
Liquid Waste Treatment	KWD	1	0
Silver Recovery	KPF	1	0
Sampling processes	KPG	2	0
Subtotal		**17**	**4**
Utility Systems			
Reagents	KRA	2	0
Steam, Hot Water, Cooling Water, Demineralized Water	KUA/KUB/ KUD/KUG/ KUH	1	0
Fluids/Effluents	-	4	0
HVAC	-	5	0
Electrical distribution	-	3	0
Subtotal		**15**	**0**

INSTRUMENTATION AND CONTROLS

Clarification Requested:

Identify the requirements for the fire detection system interface with the PSSC safety controller VDT {18 Dec 2001 item B6}.

Response:

Any fire detection system signals or electrical interface with other systems must do so in accordance with the requirements of NFPA 72. The VDT fire safety controller is not a PSSC and is classified as a quality level 1b device and is not credited in the safety analysis. As such, it has been graded out of compliance with IEEE 603. The details of the fire safety system will be provided as part of the license application.

Clarification Requested:

RAI 151: DCS staff will further describe the basis for not classifying the communications system as an IROFS {18 Dec 2001 item B7}.

Response:

The communications system is not classified as an IROF because there are no design basis events that require the communications system to perform a safety function.

SAFETY ANALYSIS AND CHEMICAL SAFETY

Clarification Requested:

Calculations for three load drop type events were requested by NRC because it was not clear that the development of the accident left sufficient time for worker protective action {06 Nov 2001 item 2}.

Calculations for facility worker dose from the fuel rod/fuel bundle drop event, the waste container drop event, and breach of container outside gloveboxes (confinement event). Alternatives to calculations may be proposed by DCS {06 Nov 2001 item 2E}.

Response:

As requested by the NRC, DCS is performing additional evaluations of the potential dose consequences to a facility worker associated with selected events. During these ongoing analyses, DCS has evaluated several scenarios involving the following events; a waste drum drop event in the waste drum storage area, an assembly drop in the assembly storage and shipping area, a transfer container drop during transfer, and a furnace seal leak in the MP furnace room. Initial conclusions of the evaluation indicate that it is highly unlikely that a worker will receive a dose exceeding the performance requirements of 10CFR70.61. For event sequences where consequence analysis is utilized to form the basis of this conclusion, workers are assumed to be in the impacted area for at least 30 seconds and do not use their personnel protection equipment.

Clarification Requested:

Review of the pyrophoric nature of plutonium and uranium oxides; clarification or justification of adequate control of potential hazards from UO_2 and PuO_2 {18 Dec 2001 item A1}.

Response:

Pyrophoricity of UO_2 and PuO_2 is not a concern in the MFFF since both uranium and plutonium powder are maintained in a dioxide form during processing in the MOX processing area. Although plutonium metal and several plutonium compounds are pyrophoric, PuO_2 is stable and unreactive in air.[2] The characteristics of uranium are similar to those of plutonium and is not considered pyrophoric. Correct material receipt is verified prior to use of the material in MFFF processes.

Although UO_2 is stable, it can undergo spontaneous oxidation in air during heating when it is in the form of a finely divided powder. This chemical reaction is typically called "burnback". The products of this oxidation reaction are higher oxides of uranium, including the most stable form,

[2] DOE-HDBK-1081-94, "DOE Handbook: Primer on Spontaneous Heating and Pyrophoricity", US DOE, December 1994, pg. 33.

U_3O_8[3]. The consequences of burnback, in addition to the impurities added to the bulk PuO_2 powder, include heat addition to the surrounding air or material. At the MFFF, the UO_2 is processed as a fine powder at low temperatures and within inert atmospheres, thus burnback does not occur during normal operations. Burnback could occur during offnormal conditions if the inert atmosphere has been replaced by air. The burnback of UO_2 to U_3O_8 has been taken into consideration in the thermal analyses of the MFFF during these offnormal conditions. See the response to CAR RAI#49 for additional information related to the burnback of UO_2. Burnback of PuO_2 does not occur because it is the most thermodynamically stable oxide state.

Clarification Requested:

RAI 57: Basis (*i.e.*, correspondence from DOE) for explosion potential in F area {18 Dec 2001 item A2}.

Response:

Tank sizes, location, and contents for the CAR hazard screening were obtained by reviewing a number of documents, provided by DOE. The references utilized for the CAR hazard screening are available for onsite review. Calculations in support of the ISA are currently being developed based on updated values and references. The preliminary results of the calculation have not identified any changes in the design basis information provided in the CAR. The references and calculations, when completed, will be available for onsite review by NRC staff.

Clarification Requested:

Provide an analysis of the potential for steam explosion in the MFFF {18 Dec 2001 item A3}.

Response:

Steam explosions within the sintering furnace have been identified during the MFFF safety analysis as a credible event. The safety strategy proposed in the CAR is to prevent explosions that involve radioactive material within the MFFF primary processes. Although steam explosions were not explicitly identified in the CAR as a specific cause of an explosion in the sintering furnace, an explosion in the sintering furnace was identified in the CAR and described in event PT-4. As described in the CAR methodology, no attempt was made to identify all causes of events in the PHA for prevented events such as a furnace explosion. However, all causes of the event will be identified and evaluated during the detailed analysis performed to support the ISA.

Process safety hazards analysis currently being prepared for the ISA have identified three types of scenarios that have the potential to lead to a steam explosion in the sintering furnace or it's

[3] Y/ES-014/R4, "Assessment of Enriched Uranium Storage Safety Issues at the Oak Ridge Y-12 Plant", US DOE, Uranium Storage Assessment Team - Oak Ridge Y-12 Plant, August 1996, pgs. 15-16.

interconnected support systems. These event types are discussed below along with a discussion of the associated controls.

1) Direct entry of cooling water to the furnace from the cooling loop.

Water cooling to the furnace travels through external cooling coils wrapped around the furnace welded stainless steel outer shell. Water entry into the furnace from the cooling loop is prevented by two barriers; the boundary of the cooling coils, and the furnace shell. This event sequence involving the simultaneous leak in the cooling coil and a leak in the furnace shell will be demonstrated to be highly unlikely.

Although a steam explosion involving a water cooled furnace has previously occurred at LANL, the furnace involved was cooled by an internal cooling loop. Thus, a leak in the cooling loop resulted in water being released directly inside the hot furnace. As previously described, the sintering furnace used at the MFFF is cooled by an external loop. Thus, a leak in the cooling loop will not result in water entering the furnace.

2) Direct Entry of Humidifying Water into furnace

The argon hydrogen mixture entering the furnace is humidified by passing the gas mixture through a bubbler before entering the furnace. Overfill of the bubbler could lead to excessive water intake into the sintering furnace and excessive steam generation. IROFS are currently being identified to ensure that the water level within the bubbler is maintained within a safe range. Specific IROFS features such as a passive hydraulic device or level controllers will be incorporated into the design to meet the single failure criteria to ensure that this scenario for a steam explosion is highly unlikely.

3) Steam generation within the cooling water systems

Loss of secondary cooling or loss of cooling flow within the primary loop can lead to heat-up and steam generation within the cooling loops. Even though the furnace heating power will be automatically shutdown by hard wired logic (on loss of cooling water flow, high furnace internal temperature, or high furnace shell temperature), the furnace is still hot and may generate steam within the cooling coils. Relief valves are provided on the cooling loops to prevent rapid overpressurzation of system piping due to the steam generation. Thus, a steam explosion in the cooling coils is highly unlikely. Note that upon loss of cooling shutoff of the furnace heating power, the furnace will cooldown by natural convection without any safety implications associated with the furnace itself as the seals are designed to maintain their functions in these temperature conditions.

In addition, the CAR identified explosions in the laboratory as a potential event. Steam explosions involving a small laboratory size furnace will be prevented as necessary. Specific features to accomplish this will be identified in the ISA. The ISA will also demonstrate that any potential explosion in the laboratory will not impact the MFFF processes.

SAFETY ANALYSIS AND CHEMICAL SAFETY

Clarification Requested:

Clarification/explanation of sintering furnace sensors, controls, and PSSCs related to hydrogen explosions {18 Dec 2001 item C1}.

Response:

Description of Ar/H2 controls related to the sintering furnace:

[redacted]

SAFETY ANALYSIS AND CHEMICAL SAFETY

SAFETY ANALYSIS AND CHEMICAL SAFETY

Clarification Requested:

RAI 143: Update the response to the RAI to include analytical results showing low consequences from low-level radioactive waste and spent solvent streams, and identification of upstream PSSCs {18 Dec 2001 item CC2*}.

Response:

The analysis performed for the CAR evaluated MFFF waste streams including the low level radioactive waste and spent solvent streams described in the response to RAI 143. Due to low radioactive material content of these waste streams, events involving these waste streams are bounded by other waste related events. The unmitigated consequences of events involving these waste streams is low as defined by 10CFR70.61. Thus, no principal SSCs are required to prevent or mitigate events involving these waste streams.

Enclosure A
Responses to NRC Clarification Requests

SAFETY ANALYSIS AND CHEMICAL SAFETY

Clarification Requested:

RAI 122: Respond to NRC concerns about the approach for inerting hydrazine and solvent {18 Dec 2001 item CC4*}.

Response:

The purpose of nitrogen blanketing on aqueous hydrazine is to exclude oxygen that may react with the hydrazine under storage conditions, thereby decreasing the effectiveness of the hydrazine. The concentration of aqueous hydrazine as supplied and used in the reagent building (BRP) is 35% and does not have a flash or fire point at this concentration per ASTM Method D92 (COC) as found in Table 2 below.

The blanketing is not used to prevent fire or explosion. The 35% hydrazine solution is only used in the reagents building BRP; however, a dilute 0.14 M solution with 0.15 M hydroxylamine nitrate in 0.1 N HNO_3 is used in the BAP and it is also blanketed. HAN has no flash point and is considered not flammable. Continuous purging is therefore not required.

Table 2: Physical Properties of Aqueous Hydrazine Solutions (Ref: www.hydrazine.com)[c]

	Weight % N_2H_4					
	35%	35%	35%	51.2%	54.4%	64%
Property	Scan-Ox[b]	Scan-Ox Plus	Scan-Ox II			
Density @ 25°C (g/ml).(lb/gal)	1.02 (8.52)	1.01 (8.504)	1.02 (8.51)	1.028 (8.58)	1.031 (8.59)	1.032 (8.61)
Viscosity @ 25°C (cp)	1.02	1.40	-	1.44	.45	1.5
Boiling Point @ 760 mm Hg(°C)	109.4	109.5	109.4	119.0	119.8	120.1
Freezing Point (°C)	-65	-65	-65	-57	-57	-51
Flash Point, COC[a] (°C)	**None**	None	None	93	89	72
Fire Point, COC[a] (°C)	**None**	None	None	102	96	74
Heat of Formation, Liq. (kcal/mole)	-	-	-	-	8.140	10.300
Specific Heat @ 130°F(Btu/lb/°F) @ 54°C(cal/g/°C)	- -	- -	- -	- -	- -	.0838 .0838
Solubility in Water	Completely miscible	Completely miscible	Completely miscible	Completely miscible	Completely miscible	Completely miscible
Vapor Pressure @ 25°C(mm Hg)	22	22	22	2-5	2-5	2-5

a Cleveland Open Cup (ASTM Method D92)

b Scan-Ox contains no catalyst

c Data from Arch Chemical (successor to Olin Corporation Specialty Chemicals)

SAFETY ANALYSIS AND CHEMICAL SAFETY

Equipment and piping used at MFFF for handling hydrazine will be Type 304L stainless steel based on data as shown in Table 3 below.

Table 3: Compatibility of Materials with Hydrazine Solutions (Ref: www.hydrazine.com)[d]

	HYDRAZINE CONCENTRATION IN AQUEOUS SOLUTION				
Material	**< 10%**	**35%[a]**	**51.2%**	**54.5%**	**64%**
Stainless Steels **304L** 347 316	 S S S[b]	 **S** S S[b]	 S S S[b]	 S S S[b]	 S S S[b]
Cold Rolled Steel	S	NR	NR	NR	NR
Copper	NS	NS	NS	NS	NS
Brass	NS	NS	NS	NS	NS
Teflon[c]	S	S	S	S	S
Polyethylene	S	S	S	S	S
Aluminum	NS	NS	NS	NS	NS

[a] Scav-Ox®, Scav-Ox® II and Scav-Ox® Plus are 35% solutions.

[b] Up to 150°F

[c] Trademark of E.I. dupont de Nemours, Inc.

[d] Data from Arch Chemical (successor to Olin Corporation Specialty Chemicals)

S Generally Satisfactory.

NS Not suitable (due either to decomposition of the Hydrazine or to adverse effects of the solution on the materials of construction).

NR Not recommended.

Solvent is a 30% mixture of TBP in dodecane that is used for extraction in the purification (KPA) step of aqueous polishing. TBP is the active component in the Solvent with the dodecane serving only as a diluent carrier.

Solvent and its components are vented to the outside atmosphere in accordance with NFPA 30 requirements for NFPA Class II (dodecane) and NFPA Class IIIB* (TBP) materials within storage tank buildings, such as the BRP. In the BRP, the vents are direct to the outside; however, for the BAP, the vents are sent to the Off-Gas Treatment System that then discharges to the outside atmosphere through the main stack. Fire protection systems are provided in the BRP and BAP to meet the intent of NFPA 30. Further, the vents are sized to prevent pressure build-up inside the vessels. The Solvent and its components are used only in all-welded and grounded vessels and piping, eliminating ignition sources during storage and use.

According to the technical data in the MSDS (Mallinckrodt Baker MSDS T4706/CAS Ref 126-73-8), tributylphosphate (TBP) has a flash point of > 120° C (250° F), well above the operating conditions to be found in both the BRP and BAP.

SAFETY ANALYSIS AND CHEMICAL SAFETY

Dodecane (CPChem MSDS 707430/CAS Ref. 68551-17-7) is a stable C-12 petroleum fractional "cut" and consists of a range of aliphatic hydrocarbons from C-10 to C-13. The vapor pressure is 1.5 mm Hg at 100° F (38° C) and the flash point is > 135° F (> 57° C).

Discussions with Cogema's La Hague (France) plant indicate that the flash point increases to more than 150° F (> 66° C) when the solvent mixture is exposed to water as it is during the aqueous/organic extraction/purification step (KPA) in MFFF.

Based on this information, blanket or purging is not required for the solvent or its components in storage and in use.

* Because TBP is a Class IIIB combustible liquid and Section 2-5 of NFPA 30-1996 states in part that tanks "storing Class IIIB liquids shall not be required to the provisions of this section," it is not necessary for TBP vessels to be in this configuration.

Clarification Requested:

RAI 204: Estimate the number of high pressure cylinders in the facility and the annual usage {18 Dec 2001 item CC9*}.

Response:

Tables 4 and 5 provide the estimates for high pressure cylinders and annual usage for MFFF. These estimates are based on data obtained from Cogema facilities in France.

Enclosure A
Responses to NRC Clarification Requests

SAFETY ANALYSIS AND CHEMICAL SAFETY

TABLE 4
MFFF High Pressure Cylinders and Usage Rates in BAP and BRP[a]

Building Loc.	Contents of Cylinder	State	Pressure, (psig)	No. of Cylinders	Dimensions (Inches)	Capacity	Location, Room No	Annual Usage[b]	Remarks
BMP	Ansul Inergen® 52 % N_2, 40 % Ar, 8 % CO_2	Gas	2175 (150 bar)	340	11"X 74"	429 FT^3 at 2175 psig	B-360	Exceptional[c]	Fire Suppression Gas (Model LC-425)
BAP	Air (Breathing Air)	Gas	6000	6	9 5/16 " X 55"	509 SCF	C-433	Exceptional[c]	
BAP	Air (Scavenging Air)	Gas	6000	2	9 5/16 " X 55"	509 SCF	C-433	Exceptional[c]	
BAP	Ansul Inergen® 52 % N_2, 40 % Ar, 8 % CO_2	Gas	2175	74	11"X 74"	429 FT^3 at 2175 psig	C-502	Exceptional[c]	Fire Suppression Gas (Model LC-425)
BRP	Oxygen (O_2)	Liquid	175	2	24" X 61.5 "	6450 SCF	On Loading Dock	28,000 SCF (802 NM^3) 5 CYL/YR	
BRP	Nitrogen Tetroxide (N_2O_4)$_l$	Liquid	50	3	30" X 82"	192 Gal	1 --E-214; 2 -- E-206	1,040 gal (3,950 liters) 7 CYL/YR	1 Ton each cylinder

NOTES:
a The table does not include portable fire extinguishers that will be located and installed (per NFPA 10) prior to operations.
b The cylinder usage rate includes a 1.25 safety factor.
c "Exceptional" usage indicates that these gases are normally not consumed and are used only in emergency situations.

SAFETY ANALYSIS AND CHEMICAL SAFETY

TABLE 5: High Pressure Cylinders and Usage Rates in the MOX and AFS Laboratory

Service Acronym	Function	Contents of Cylinder	Purity Level (%)	State	Usage Pressure (psig)	No. of Cylinder	Dimensions (Dia X Ht, mm.)	Capacity	Location, Room No	Annual Usage
MOX LABORATORY										
LAC	O/M Determination	Argon/Hydrogen 5% < H_2 < 7%	Ar - 99.995 (O_2 < 5 ppm, H_2O < 5 ppm N_2 < 20 ppm) Hydrogen - 99.995 ($O_2 + H_2O + C_nH_m$ < 10 ppm)	GAS	30 (2 BAR)	2	90 x 661 mm	1.77 ft^3 (50 l) at 2900 psi (200 BAR)	**B-361**	TBD
LBT	Specific Surface Analysis	Nitrogen/Helium He = 30%		GAS	90 (6 BAR)	2	90 x 661 mm	1.77 ft^3 (50 l) at 2900 psi (200 BAR)	**B-361**	18
LBT	Specific Surface Analysis	NITROGEN	99.9999	GAS	90 (6 BAR)	2	90 x 661 mm	1.77 ft^3 (50 l) at 2900 psi (200 BAR)	**B-361**	78
LPG	Gas Analysis	NITROGEN	99.9999	GAS	60 (4 BAR)	(*)			**B-361**	(*)
LPG	Gas Analysis/Nitrogen	HELIUM	99.9999	GAS	30 (2 BAR)	2	90 x 661 mm	1.77 ft^3 (50 l) at 2900 psi (200 BAR)	**B-361**	32
LPG	Gas Analysis/Carbon	OXYGEN	99.9999	GAS	72 (5 BAR)	2	90 x 661 mm	1.77 ft^3 (50 l) at 2900 psi (200 BAR)	**B-361**	7
LSR	Alpha Spectrometry	Argon/Methane		GAS		1	55 x 244 mm	0.177 ft^3 (5 l) at 2900 psi (200 BAR)	**Spectrometer Room**	13

* Cylinders supply both LBT and LPG

FIRE PROTECTION

Table 5 MFFF Fire Features Summary

Clarification Requested:

Provide additional info about process cell fire prevention features {verbal information request}.

Response:

Process cell fire prevention features are used to ensure that fires in the process cells are highly unlikely. This is accomplished through the control of ignition sources within the process cells.

Associated with the AP process, ignition sources may arise due to electrical equipment, static electricity, and as a result of some chemical reactions. The presence of these three sources of ignition sources within the AP Process Cells are prevented through the following features:

1. No use of electrical equipment within the process cells
2. Grounding of equipment within process cells
3. The use of controls to ensure that potential chemical reactions that may result in a fire are made highly unlikely.

During normal operations, process cell design precludes the entry of personnel which could introduce ignition sources. Provisions exist in the design for removal of process material in the event of entry of personnel into process cells (*e.g.*, for maintenance), and additional administrative controls (such as fire watch, etc.) will be applied as necessary.

Finally, fire barriers are designed to limit the effect of fires such that a fire external to the process cells will not affect the process cells.

Clarification Requested:

NRC staff requested that DCS provide a summary table/spreadsheet from the FHA; DCS will consider providing this table/spreadsheet with fire area information such as principal SSCs/IROFS, additional protective features, and fire barrier rating {06 Nov 2001 item 3}.

Response:

The attached Table 6 provides a summary of the fire areas, fire barrier ratings, automatic suppression systems, and IROFS located within fire areas. This table summarizes information from the fire hazards analysis (FHA) which is currently being developed and based on current design information which is evolving. Therefore, the summary information is subject to change, however, the information is consistent with the draft of the FHA reviewed by NRC during the onsite visit 24 January 2001. The complete list of IROFS will be developed as part of the ISA.

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-MP-101	B-101	Personnel and Material Corridor	Preaction sprinkler	Smoke	Two hours	Fire barriers	
	B-102	Personnel and Material Corridor					
	B-103	Personnel and Material Corridor					
	B-104	Personnel and Material Corridor					
	B-108	Air Lock					
	B-188	Personnel and Material Corridor					
	B-192	Non Monitored Air Lock					
	B-193	Corridor					
	B-109	Air Lock	None				
	B-111	Air Lock					
	B-114	Air Lock					
	B-125	Air Lock					
	B-127	Air Lock					
	B-128	Air Lock					
	B-133	Air Lock					
	B-144	Air Lock					
	B-148	Air Lock					
	B-151	Air Lock					
	B-154	Air Lock					
	B-155a	Air Lock					
	B-176	Air Lock					
FA-MP-102	B-105	Edgar Vacuum Pump	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-MP-103	B-106	Utilities Auxiliaries	Clean agent	Smoke	Two hours	Fire barriers	
	B-107	Furnace Auxiliaries					
	B-197	Access Stairs					
	B-197a	Cooling for Furnace Auxiliaries (Mezzanine level)					
	B-197b	Air Lock (Mezzanine level)					
FA-MP-104	B-110	Hydraulic Pump Room	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-MP-105	B-122	Trolley Parking Area 1	Clean agent	Smoke	Two hours	Fire barriers Fire detection Gloveboxes (shells) Clean agent system	Fire detectors provided in gloveboxes.
	B-123	Jar Storage and Transfer					
	B-146	Trolley Parking Area 2					
FA-MP-106	B-112	Service Elevator	Preaction sprinkler	Smoke	Two hours	Fire barriers	Fire detectors used to shutdown elevator.
FA-MP-107	B-113	Staircase	Preaction sprinkler	Smoke	Two hours	Fire barriers	

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-MP-108	B-115 B-115b	Sintering Furnaces Electrical, Gas, and Humidification for Sintering Furnaces	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system Gloveboxes (shells) Sintering furnaces	Fire detectors provided in gloveboxes.
FA-MP-109	B-116 B-117	Access to 117 Green Pellet Storage	Clean agent	Smoke	Two hours	Fire barriers Fire detection Gloveboxes (shells) Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-110	B-119	Homogenization - Pelletizing 1	Clean agent	Smoke	Two hours	Fire barriers Fire detection Gloveboxes (shells) Jar scale Boat scale Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-111	B-121	Homogenization - Pelletizing 2	Clean agent	Smoke	Two hours	Fire barriers Fire detection Gloveboxes (shells) Jar scale Boat scale Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-112	B-124	Primary Dosing	Clean agent	Smoke	Two hours	Gloveboxes (shells) Dosing Unit dosing scale Additive product incorporation funnel Jar balance Criticality load cells Receiving and Emptying Unit scales Receiving and Emptying Unit bar code readers Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-113	B-126 B-225 B-276	Scraps Melting, Blend Milling, and Final Dosing B-126 Maintenance Room UO2 Receiving Hopper Room For NDS	Clean agent	Smoke	Two hours	Gloveboxes (shells) Final Dosing Unit dosing scale Final Dosing Unit dosing jar balance Final Dosing Unit dosing criticality load cells Primary Blend Milling Unit collected dust pot scale Primary Blend Milling Unit jar scale Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-MP-114	B-129	Sintered Pellet Storage	Clean agent	Smoke	Two hours	Fire barriers Fire detection Gloveboxes (shells) Clean agent system	Fire detectors provided in gloveboxes.
	B-129b	Access to 129					
FA-MP-115	B-132	Grinding	Clean agent	Smoke	Two hours	Gloveboxes (shells) Grinding Unit Mo-boats identifying station Grinding Unit Mo-boats weighing station Stainless Steel (SS) box identifying station SS box weighing station Container identifying station Container weighing station Scrap Box Loading Unit identifying station Scrap Box Loading Unit weighing station Pellet Repackaging Unit bar code reader Pellet Repackaging Unit scale Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
	B-140	Grinding and Scraps Box Loading					
	B-112a	Air Lock					
	B-132b	Cartrac to/from Grinding					
	B-140b	Cartrac to/from Grinding and Scraps Box Loading					
FA-MP-116	B-134	Access to 135	Clean agent	Smoke	Two hours	Fire barriers Fire detection Gloveboxes (shells) Clean agent system	Fire detectors provided in gloveboxes.
	B-135	Scrap Storage					
FA-MP-117	B-136	Material Corridor and Transfer Tunnels	Clean agent	Smoke	Two hours	Fire barriers Gloveboxes (shells)	Fire detectors provided in gloveboxes.
	B-118	Air Lock					
	B-120	Air Lock					
	B-120a	Air Lock					
	B-131	Air Lock					
	B-138	Air Lock					
FA-MP-118	B-137	Future Homogenization - Pelletizing 2	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-MP-119	B-114a	Rad Monitoring	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-MP-120	B-139	Scrap Processing	Clean agent	Smoke	Two hours	Gloveboxes (shells) Scrap Processing Unit dirty powder line dosing scale SS box scale Scale for pot Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-MP-121	B-141	Pneumatic Transfer, Auxiliary Powder	Clean agent	Smoke	Two hours	Gloveboxes (shells) Powder Auxiliary Unit sample vial scale Connection module jar balance Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-122	B-142	Powder and Pellet Control Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
	B-196	Engineer Office					
FA-MP-123	B-143	Staircase	Preaction sprinkler	Smoke	Two hours	Fire barriers	
FA-MP-124	B-147	Fuel Structure Storage	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-125	B-149	Receiving Control Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
	B-150	Engineer Office					
FA-MP-126	B-152	PuO2 Buffer Storage	Clean agent	Smoke	Two hours	Gloveboxes (shells) Buffer storage scale Buffer storage barcode reader Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-127	B-153	Inner Can Opening Room	Clean agent	Smoke	Two hours	Outer can opening bar code reader KDA-GB-2100 Air Lock Glovebox (shell) KDA-GB-2100 ventilation system KDA-GB-2200 Air Lock Glovebox (shell) KDA-GB-2200 ventilation system KDA-GB-3000 Inner Can (Opening) Glovebox (shell) KDA-GB-3000 bar code reader KDA-GB-3000 ventilation system KDA-GB-4000 Transport Pneumatic Start Glovebox (shell) KDA-GB-4000 scale KDA-GB-4000 bar code reader KDA-GB-4000 pneumatic tube KDA-GB-4000 suction chamber KDA-GB-4000 removable tube section KDA-GB-4000 gas transfer tube KDA-GB-4000 ventilation system Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
	B-155	Outer Can Opening Room					
FA-MP-128	B-156	Pallet Preparation	Clean agent	Smoke	Two hours	Strongback unloader/upender Strongback loading station 3013 canisters Fire barriers	

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-MP-129	B-157	Safekeg Opening and 3013 Counting	Clean agent	Smoke	Two hours	PuO2 storage compartments 3013 canisters Fire barriers	
	B-158	PuO2 Storage	None				
	B-199a	Plenum					
	B-199b	Plenum					
FA-MP-130	B-159	Utility Chase	None	Smoke	Two hours	Fire barriers	
	B-160	Utility Chase					
	B-161	Utility Chase					
FA-MP-131	B-162	Staircase	Preaction sprinkler	Smoke	Two hours	Fire barriers	
FA-MP-132	B-163	PuO2 Receiving	Clean agent	Smoke	Two hours	Fire barriers 3013 canisters that pass through this area 3013 Transport Casks that pass through this area	
FA-MP-133	B-164	Material Transfer	Clean agent	Smoke	Two hours	Fire barriers	
	B-251	Material Air Lock/Storage Additive Preparation					
	B-339	Material Transfer					
FA-MP-134	B-165	Cask Transfer/Air Lock	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-135	B-166	Storage	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-136	B-167	Engineer Office	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
	B-168	Rod Area Control Room					
FA-MP-137	B-169	Rod Inspection	None	Smoke	Two hours	Fire barriers	
	B-171	Contamination Checkpoint					
	B-173	Visual and Dimensional, Inspection and Sorting					
FA-MP-138	B-170	X-Ray Utilities and Generator	Clean agent	Smoke	Three hours	Fire barriers	
FA-MP-139	B-172	Tray Delivery/Air Lock	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-140	B-174a	Fuel Assembly and Inspection	None	Smoke	Two hours	Water level detector in final inspection pit Fuel rods Fire barriers	
	B-174b	Mockup Loading					
FA-MP-141	B-175	Service Elevator	Preaction sprinkler	Smoke	Two hours	Fire barriers	Fire detectors used to shutdown elevator.
FA-MP-142	B-178	Assembly Area Control Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
	B-179	Engineering Office					
FA-MP-143	B-177	Corridor	Preaction sprinkler	Smoke	Two hours	Fire barriers	
	B-180	Corridor					
FA-MP-144	B-181	Electrical Way 1, HVAC	Wet pipe	Smoke	Three hours	Fire barriers	
FA-MP-145	B-182	Electrical Way 2	Wet pipe	Smoke	Three hours	Fire barriers	
FA-MP-146	B-185	Handling Area	Clean agent	Smoke	Two hours	Fuel cask handling area bridge crane Fire barriers	
	B-189	Air Lock	None				
	B-183	Assembly Storage					
	B-199	Plenum					
FA-MP-147	B-142b	Intermediate Filter Room	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-MP-148	B-186	Rod Storage and Handling	None	Smoke	Two hours	Fire barriers	

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-MP-149	B-168b	Intermediate Filter Room	Clean Agent	Smoke	Three hours	Fire barriers Fire detection Clean agent system	
	B-168c	Stairs					
FA-MP-150	B-190	Air Lock	Preaction sprinkler	Smoke	Two hours	Fire barriers	
FA-MP-151	B-191	Staircase	Preaction sprinkler	Smoke	Two hours	Fire barriers	
	B-187	Egress Corridor					
FA-MP-152	B-194	Pallet Storage	Clean agent	Smoke	Two hours	3013 canisters that pass through this area 3013 Transport Casks that pass through this area Fire barriers	
	B-184	3013 Unloading, Staging Area					
FA-MP-153	B-195	NDA Equipment	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-154	B-145	Maintenance GB Room	Clean agent	Smoke	Two hours	Gloveboxes (shells) Filter Dismantling Unit SS box scale Bar code readers Transfer Port Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
	B-198	Air Lock					
FA-MP-155	B-130	Telephone Closet	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-201	B-201	Personnel and Material Corridor	Preaction sprinkler	Smoke	Two hours	Fire barriers	Clean agent suppression is provided below the raised floor in B-207 and B-208.
	B-202	Personnel and Material Corridor					
	B-203	Personnel and Material Corridor					
	B-204	Personnel and Material Corridor					
	B-205	Personnel and Material Corridor					
	B-207	Personnel and Material Corridor					
	B-208	Personnel and Material Corridor					
	B-229	Personnel and Material Corridor					
	B-234	Air Lock					
	B-236	Air Lock					
	B-206	Air Lock	None				
	B-220	Air Lock					
	B-221	Air Lock					
	B-223	Air Lock					
	B-228	Air Lock					
	B-264a	Air Lock					
	B-271	Air Lock					
	B-272	Air Lock					
	B-273	Air Lock					
FA-MP-202	B-209	MD Filter Room	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	B-214 is not provided with an automatic suppression system
	B-210	MD Filter Room					
	B-214	MD Plenum					
	B-314	MD Fan Room					
	B-384	MD Filters					

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-MP-203	B-277	Filter Room	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-MP-204	B-211	HD Filter Room	Clean agent	Smoke	Two hours	HDE fans Filter housing, and associated valves and dampers Fire barriers Fire detection Clean agent system	B-215 is not provided with an automatic suppression system
	B-215	HD Plenum					
	B-315	HD Fan Room					
	B-391	HD Fan Room					
	B-387	HD Filters					
FA-MP-205	B-212	Intermediate Filter Room	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-MP-206	B-213	PO Filter Room	Clean agent	Smoke	Two hours	Fire barriers POE fan Filter housing, and associated valves and dampers	
FA-MP-207	B-218	Electrical Room	Clean agent	Smoke	Two hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-209	B-216	Electrical Equipment Room Train B	Clean agent	Smoke	Two hours	Electrical panels Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-210	B-217	Electrical Equipment Room Train A	Clean agent	Smoke	Two hours	Electrical panels Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-212	B-222	Spare	Clean agent	Smoke	Two hours	Fire barriers	
	B-232	Telephone Closet					
FA-MP-213	B-224a	Spare	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-214	B-225a	B-126 Maintenance Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-215	B-226	IAEA Equipment Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-216	B-227	Spare	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-218	B-255	Air Lock	Clean agent	Smoke	Three hours	Nuclear counting equipment Fire barriers	
FA-MP-219	B-230	B-139 Maintenance Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-220	B-241	Electronic Equipment	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-221	B-235	Personnel and Material Corridor	Clean agent	Smoke	Two hours	Fire barriers Transfer conveyors	
	B-237	Personnel and Material Corridor					
	B-238	Personnel and Material Corridor					
FA-MP-222	B-239	Access to 240	Clean agent	Smoke	Two hours	Gloveboxes (shells) Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
	B-240	Ground and Sorted Pellet Storage					
FA-MP-223	B-242	Quality Control	Clean agent	Smoke	Two hours	Quality Control Glovebox (shell) Quality Control Glovebox scale Quality Control Glovebox bar code reader Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-MP-224	B-243	Sorting	Clean agent	Smoke	Two hours	Sorting gloveboxes (shells) Sorting gloveboxes weighing and identification scale Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-225	B-244	Electronic Equipment	Clean agent	Smoke	Two hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-226	B-245	Electronic Equipment	Clean agent	Smoke	Two hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-227	B-246	Telephone Closet	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-228	B-247	HVAC Nitrogen	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-229	B-248	Telephone Closet	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-230	B-249	Powder Receiving Electronic Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-231	B-250	Powder Receiving MCC Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-233	B-252	B-141 Maintenance Room/Filter Room	Clean agent	Smoke	Two hours	Fire barriers	
	B-259	Air Lock					
FA-MP-234	B-253	Counting Room	Clean agent	Smoke	Three hours	Overhead crane for drum handling Fire barriers Fire detection Clean agent system	
FA-MP-235	B-254	Waste Drum Storage	Clean agent	Smoke	Three hours	Waste racks Fire barriers Fire detection Clean agent system	
FA-MP-236	B-256	Waste Control Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
	B-257	Engineer Office					
FA-MP-237	B-258	Cladding Control Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-238	B-219	Measuring Computer Room	Clean agent	Smoke	Two hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-239	B-260	Cladding and Rod Control MCC Room Way 1	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-240	B-261	Cladding and Rod Control MCC Room Way 2	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-241	B-262	Assembly Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-242	B-263	Assembling MCC Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-MP-243	B-264	Cladding	Clean agent	Smoke	Two hours	Cladding gloveboxes (shells) Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes. Metal extinguishers (Class D) are provided in this area and inside gloveboxes.
FA-MP-244	B-265	Plenum	None	Smoke	Two hours	Fire barriers	
FA-MP-245	B-266	Waste Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-246	B-267	Waste MCC Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-248	B-269	Utility Chase	None	Smoke	Two hours	Fire barriers	
FA-MP-251	B-276a	UO2 Receiving Hopper Room For NDS	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
	B-275a	UO2 Receiving Hopper for NDP					
	B-323	UO2 Receiving Room					
	B-393	Material Air Lock					
FA-MP-252	B-231	Personnel and Material Corridor	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-253	B-270	Future VDU Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-254	B-278	Decladding	Clean agent	Smoke	Two hours	Decladding Glovebox (shell) Decladding Glovebox scale Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes. Metal extinguishers (Class D) are provided in this area and inside gloveboxes.
	B-233	Material Transfer					

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-MP-301	B-301	Personnel and Material Corridor	Preaction sprinkler	Smoke	Two hours	Fire barriers	
	B-302	Personnel and Material Corridor					
	B-303	Personnel and Material Corridor					
	B-304	Personnel and Material Corridor					
	B-305	Personnel and Material Corridor					
	B-306	Personnel and Material Corridor					
	B-307	Personnel and Material Corridor					
	B-309	Personnel and Material Corridor					
	B-311	Personnel and Material Corridor					
	B-316	Air Lock					
	B-329	Personnel and Material Corridor					
	B-330	Air Lock					
	B-331	Air Lock					
	B-340	Air Lock					
	B-346	Personnel and Material Corridor					
	B-370	Air Lock					
	B-377	Air Lock for Pressure Differential					
	B-386	Personnel and Material Corridor					
	B-394	Personnel and Material Corridor					
	B-347	Air Lock	None				
	B-368a	Air Lock					
	B-378	Air Lock					
	B-385	Air Lock					
	B-395	Air Lock					
FA-MP-302	B-343	Calibration	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-MP-303	B-310	HVAC/Utility	None	Smoke	Two hours	Fire barriers	
FA-MP-304	B-312	Personnel and Material Corridor	Preaction sprinkler	Smoke	Two hours	Fire barriers	
FA-MP-305	B-313	Utility Corridor	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-306	B-388	PO Filter Room	Clean agent	Smoke	Two hours	Fire barriers POE fan Filter housing and associated valves and dampers	
FA-MP-307	B-317	Utilities MCC Room Way 2	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-308	B-318	Utilities MCC Room Way 1	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-309	B-319	Utilities Control Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-310	B-320	Utilities Security Electronic Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-MP-311	B-321	Utilities Normal Electronic Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-312	B-322	Pellet MCC Room Way 1	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-313	B-324	Powder MCC Room Way 1	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-314	B-325	Pellet Area Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-315	B-326	Powder MCC Room Way 2	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-316	B-327	Pellet MCC Room Way 2	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-317	B-328	Powder Area Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-319	B-333	Liquid Sample Storage	Clean agent	Smoke	Two hours	Glovebox (shell) Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-320	B-334	Chemical Product Storage	Clean agent	Smoke	Three hours	Fire barriers	
FA-MP-321	B-335	Polishing Laboratory	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-322	B-336	Reception and Gamma-FX	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-323	B-337	ICP-MS	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-324	B-338	Plenum	None	Smoke	Two hours	Fire barriers	
FA-MP-326	B-341	Mass Spectrometry Preparations	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
	B-371	Mass Spectrometry Analysis					
FA-MP-327	B-342	Gas Physics	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-328	B-344	Reagent Preparation	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-329	B-345	Liquid Waste Processing and IAEA	Clean agent	Smoke	Two hours	Liquid waste tank # 1 Liquid waste tank # 2 Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-MP-330	B-348	Dissolution and Chemical	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-331	B-349	Test Line	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-MP-332	B-350	Ceramography and Metallography	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
	B-332	Autoclaves					
FA-MP-333	B-352	Rad Control Lab	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-334	B-353	Electrical Room	Clean agent	Smoke	Three hours	Fire barriers	
FA-MP-335	B-354	Weak Currents and Rad Control Electrical Rm	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-336	B-355	Computer Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-MP-337	B-356	Intermediate Filter Room	Clean agent	Smoke	Three hours	Fire barriers Fire detection Clean agent system	
FA-MP-338	B-357	X-Ray Reading	Clean agent	Smoke	Two hours	Fire barriers	
	B-358	Dark Room					
FA-MP-339	B-359	Utility Chase	None	Smoke	Two hours	Fire barriers	
FA-MP-340	B-360	Clean Agent Bottle Storage	Clean agent	Smoke	Two hours	Fire barriers Portions of clean agent suppression system supplying clean agent to QL-1b clean agent systems	
	B-361	Laboratory Gas Storage					
FA-MP-341	B-362	Emergency Train A Electronics Room	Clean agent	Smoke	Three hours	Electronic equipment for the emergency electrical train Fire barriers	
FA-MP-342	B-363	Office	Preaction sprinkler	Smoke	Two hours	Fire barriers	
FA-MP-343	B-364	HVAC Utility Chase	None	Smoke	Two hours	Fire barriers	
FA-MP-344	B-365	Chemical Product Storage	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-345	B-366	Mechanical and Electrical Facility	Clean agent	Smoke	Three hours	Fire barriers	
	B-366a	Air Lock					
FA-MP-346	B-367	Air Room	None	Smoke	Three hours	Fire barriers	
FA-MP-347	B-368	Chilled Water Pump Room	Clean agent	Smoke	Two hours	Fire barriers	
	B-369	Chilled Water					
FA-MP-348	B-372	Prefilters	None	Smoke	Two hours	Fire barriers	
	B-373	Coils (Pre-Heating and Cooling)					
	B-374	Fine Filters and Heating Coils					
	B-375	Plenum "A"					
	B-376	Fan 1 and 2					
	B-379	Supply Plenum "B"					
	B-380	Cooling Cools					
	B-381	Post Heating Coils					
	B-382	PO Supply Plenum					
	B-383	Plenum "B"					

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-MP-351	B-389	VHD Fan	None	Smoke	Two hours	Fire barriers VHD fan Filter housing and associated valves and dampers	
FA-MP-352	B-390	VHD Fan	None	Smoke	Two hours	Fire barriers VHD fan Filter housing and associated valves and dampers	
FA-MP-361	B-392	UO2 Intermediate Storage	Clean agent	Smoke	Two hours	Fire barriers	
FA-MP-362	B-351	Emergency Train B Electronics Room	Clean agent	Smoke	Three hours	Electronic equipment for the emergency electrical train Fire barriers	
FA-MP-363	B-308	HVAC/Utility	None	Smoke	Two hours	Fire barriers	
FA-MP-364	N/A	Electrical Cable Way (above B-350)	Clean agent	Smoke	Three hours	Fire barriers	
FA-MP-365	N/A	Electrical Cable Way (above B-349)	Clean agent	Smoke	Three hours	Fire barriers	
FA-MP-401	N/A	Secondary Alarm Station	Clean agent	Smoke	Three hours	Fire barriers	

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-SR-001	D-001	Cable Spread Room	Wet pipe	Smoke	Three hours	Fire barriers	
FA-SR-101	D-101	Fuel Truck Bay	Deluge	Smoke	Three hours	Fire barriers	
	D-123	Sally Port Maintenance	Wet pipe			Truck bay fuel cask loading racks	
FA-SR-102	D-102	PuO2 Truck Bay	Deluge	Smoke	Three hours	Fire barriers	
	D-125	Sally Port Maintenance	Wet pipe				
FA-SR-104	D-104	Main Electrical Room Way 1	Clean agent	Smoke	Three hours	Fire barriers	
FA-SR-105	D-106	Main Electrical Room Way 2	Clean agent	Smoke	Three hours	Fire barriers	
FA-SR-106	D-107	Personnel & Material Corridor	Wet pipe	Smoke	Two hours	Fire barriers	
	D-108	Personnel & Material Corridor					
	D-117	Personnel & Material Corridor					
	D-124	Personnel & Material Corridor					
	D-126	Personnel & Material Corridor					
	D-103	Sally Port					
	D-105	Sally Port Maintenance					
	D-113	Sally Port					
	D-114	Sally Port Maintenance					
	D-127	Sally Port					
FA-SR-107	D-109	Way 1 Electrical Room	Clean agent	Smoke	Three hours	Fire barriers	
FA-SR-108	D-110	Staircase	Wet pipe	Smoke	Two hours	Fire barriers	
FA-SR-109	D-111	Service Elevator	Wet pipe	Smoke	Two hours	Fire barriers	Fire detectors used to shutdown elevator.
FA-SR-110	D-112	Plenum	None	Smoke	Two hours	Fire barriers	
FA-SR-112	D-115	Staircase	Wet pipe	Smoke	Two hours	Fire barriers	
FA-SR-113	D-116	Telephone Closet	Clean agent	Smoke	Two hours	Fire barriers	
FA-SR-114	D-118	Sally Port Maintenance	Wet pipe	Smoke	Two hours	Fire barriers	
FA-SR-115	D-119	Way One Electric Room	Clean agent	Smoke	Three hours	Fire barriers	
FA-SR-116	D-120	Power Supply - Safety Electronic Room	Clean agent	Smoke	Three hours	Electronic equipment Fire barriers	Suppression is provided above and below the raised floor.
FA-SR-117	D-121	Power Supply - Normal Electronic Room	Clean agent	Smoke	Three hours	Electronic equipment Fire barriers	Suppression is provided above and below the raised floor.
FA-SR-118	D-122	Way 2 Electrical Room	Clean agent	Smoke	Three hours	Fire barriers	
FA-SR-201	D-201	Utilities Auxiliaries	Clean agent	Smoke	Three hours	Fire barriers	
FA-SR-202	D-202	Batteries Room Way 1	Clean agent	Smoke	Three hours	Fire barriers	
FA-SR-203	D-203	Personnel and Material Corridor	Wet pipe	Smoke	Two hours	Fire barriers	
	D-204	Personnel and Material Corridor					
	D-205	Personnel and Material Corridor					
	D-206	Personnel and Material Corridor					
	D-207	Personnel and Material Corridor					
	D-208	Personnel and Material Corridor					
FA-SR-204	D-209	Plenum	None	Smoke	Two hours	Fire barriers	
FA-SR-205	D-210	Batteries Room Way 2	Clean agent	Smoke	Three hours	Fire barriers	
FA-SR-206	D-211	Weak Currents	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-SR-207	D-212	Telephone Closet	Clean agent	Smoke	Two hours	Fire barriers	
FA-SR-208	D-213	Emergency HVAC Room Train A	Clean agent	Smoke	Three hours	HVAC equipment Fire barriers	
FA-SR-209	D-214	Emergency Batteries Room Train A	Clean agent	Smoke	Three hours	Electrical equipment Fire barriers	
FA-SR-210	D-215	Emergency Electrical Room Train A	Clean agent	Smoke	Three hours	Electrical switchgear Fire barriers	
FA-SR-211	D-216	Emergency HVAC Room Train B	Clean agent	Smoke	Three hours	HVAC equipment Fire barriers	
FA-SR-212	D-217	Emergency Batteries Room Train B	Clean agent	Smoke	Three hours	Electrical equipment Fire barriers	
FA-SR-213	D-218	Emergency Electrical Room Train B	Clean agent	Smoke	Three hours	Electrical switchgear Fire barriers	
FA-SR-301	D-301	Polishing and Utilities Control Room	Clean agent	Smoke	Three hours	Fire barriers	
FA-SR-302	D-303	Personnel and Material Corridor	Wet pipe	Smoke	Two hours	Fire barriers	
	D-304	Personnel and Material Corridor					
	D-305	Personnel and Material Corridor					
	D-306	Personnel and Material Corridor					
	D-314	Corridor/Air Lock					
	D-315	Personnel and Material Corridor					
	D-331	Air Lock					
	D-313	Restrooms					
FA-SR-303	D-302	Office	Wet pipe	Smoke	Two hours	Fire barriers	
FA-SR-304	D-307	Telephone Closet	Clean agent	Smoke	Two hours	Fire barriers	
FA-SR-305	D-309	Emergency HVAC Control Room Train A	Clean agent	Smoke	Three hours	HVAC control equipment Fire barriers	
FA-SR-306	D-310	Emergency HVAC Control Room Train B	Clean agent	Smoke	Three hours	HVAC control equipment Fire barriers	
FA-SR-308	D-330	HVAC Utility Chase	None	Smoke	Two hours	Fire barriers	
FA-SR-309	D-316	Rad Monitors/Air Lock	Wet pipe	Smoke	Two hours	Fire barriers	
	D-324	Contaminated First Aid/Air Lock					
	D-325	Rad Monitors/Air Lock					
FA-SR-310	D-317	Computer Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
	D-327	Engineer Office					
FA-SR-311	D-318	Emergency Train A - Control Room	Clean agent	Smoke	Three hours	Control components Fire barriers	
FA-SR-312	D-319	Emergency Train B - Control Room	Clean agent	Smoke	Three hours	Control components Fire barriers	
FA-SR-313	D-320	Emergency Train A - Electronics Room Relay	Clean agent	Smoke	Three hours	Electronic components Fire barriers	Suppression is provided above and below the raised floor.
FA-SR-314	D-321	Emergency Train B - Electronics Room Relay	Clean agent	Smoke	Three hours	Electronic components Fire barriers	Suppression is provided above and below the raised floor.

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-SR-315	D-322	Weak Currents - Fire Protection	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-SR-316	D-323	Weak Currents - Safeguard	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-SR-317	D-308	Office	Wet pipe	Smoke	Two hours	Fire barriers	
FA-SR-318	D-326	Central Alarm Station	Clean agent	Smoke	Three hours	Fire barriers	
FA-SR-319	D-329	Storage	Wet pipe	Smoke	Two hours	Fire barriers	
FA-SR-320	D-328	Clean Agent Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-SR-321	D-326a	CAS Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	

Table 6 - MFFF Fire Area Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-AP-101	C-101	Stairs	Preaction sprinkler	Smoke	Two hours	Fire barriers	
FA-AP-102	C-102	KCD Cooling Loop Room	Clean agent	Smoke	Two hours	Fire barriers KCD-E-5600 Heat Exchanger KCD-EV-5000 Vaporizer	
FA-AP-103	C-103	Utilities Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-104	C-104	Pipe Chase	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-105	C-105	Vessels Room, Reagents	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-106	C-106	Elevator Lobby	Preaction sprinkler	Smoke	Two hours	Fire barriers	Fire detectors used to shutdown elevator.
	C-107	Service Elevator					
	C-215	Elevator Lobby					
	C-307	Elevator Lobby					
	C-434	Elevator Lobby					
	C-509	Service Elevator Maintenance					
	C-510	Elevator Lobby					
FA-AP-107	C-108	Pipe Chase	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-108	C-109	Personnel and Materials Corridor	Preaction sprinkler	Smoke	Two hours	Fire barriers	
	C-111	Personnel and Materials Corridor					
	C-113	Personnel and Materials Corridor					
	C-114	Personnel and Materials Corridor					
	C-127	Air Lock					
	C-142	Air Lock	None				
FA-AP-109	C-112	Stairs	Preaction sprinkler	Smoke	Two hours	Fire barriers	
FA-AP-110	C-145	Pulsed Column Room, KPA	Clean agent	Smoke	Two hours	KPA-PULS-2000 Extraction Pulsed Column KPA-PULS-2100 Diluent Washing Pulsed Column KPA-PULS-2200 Scrubbing Pulsed Column KPA-PULS-3000 Pu Stripping Pulsed Column KPA-PULS-3100 Diluent Washing Pulsed Column Fire barriers Fire detection Clean agent system	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-111	C-116	Utility Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-112	C-118	Heating Loop Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-113	C-121	KCD Vessel Room	None	Smoke	Two hours	KCD-TK-7000 Buffer Tank KCD-TK-7500 Sampling Tank Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-114	C-120	Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-115	C-119	Tank Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-116	C-122	Stairs	Preaction sprinkler	Smoke	Two hours	Fire barriers	
FA-AP-117	C-123	Vessels Room, KWD	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-118	C-124	KPC Steam Generator	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-119	C-126	Cooling Loop Room	Clean agent	Smoke	Two hours	Fire barriers	

Table 6 - MFFF Fire Area Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-AP-120	C-129	Service Elevator	Preaction sprinkler	Smoke	Two hours	Fire barriers	Fire detectors used to shutdown elevator.
	C-115	Elevator Lobby					
	C-203	Elevator Lobby					
	C-240	Elevator Lobby					
	C-315	Elevator Lobby					
	C-326	Elevator Lobby					
	C-425	Elevator Lobby					
	C-506	Elevator Lobby					
	C-524	Service Elevator Maintenance					
FA-AP-121	C-131	Filter Room	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-AP-122	C-132	Canning Device Room, KCC	Clean agent	Smoke	Two hours	KCC-GB-1000 Packaging Glovebox (shell) KCC-GB-1000 Packaging Glovebox feeding head KCC-GB-1000 Packaging Glovebox uncloggable filter KCC-GB-1000 Packaging Glovebox bagport KCC-GB-1000 Packaging Glovebox load cell KCC-GB-1000 process HEPA filter KCC-GB-1000 reusable can KCC-GB-1000 process HEPA filter (outside glovebox) KCC-GB-2000 Pneumatic Can Transfer Glovebox (shell) KCC-GB-2000 scale KCC-GB-2000 identification system Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-123	C-133	KWD Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-124	C-134	Vessels Room, KCD	None	Smoke	Two hours	KCD-DMST-2010 Drain to Tank 2000 Demister KCD-DMST-2020 Drain to Tank 2000 Demister KCD-TK-1000 Reception Annular Tank KCD-TK-1500 Buffer Annular Tank KCD-TK-2000 Feeding Tank KCD-TK-3110 Priming Pot Tank KCD-TK-3120 Orienting Pot to Tank 4100 & 1500 Tank KCD-TK-1000 Reception Annular Tank KCD-TK-4000 Reception Concentrates Slab Tank KCD-TK-4100 Control Concentrates Slab Tank KCD-TK-4200 Concentrates Recycle to Tank 1000 Slab Tank KCD-TK-4220 Tank 4200 Separator Pot Tank KCD-DMST-4030 Tank 4000 Demister Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.

Table 6 - MFFF Fire Area Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-AP-125	C-135	Vessels Room, KPA	None	Smoke	Two hours	KPA-TK-8000 Pu Rework Slab Tank KPA-TK-9000 Raffinates Reception Annular Tank KPA-TK-9100 Control Annular Tank KPA-TK-9500 Recycling Annular Tank Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-126	C-136	Vessels Room, KPB	None	Smoke	Three hours	KPB-TK-2000 Recovered Solvent Tank KPB-TK-3000 Solvent Regeneration Waste Tank Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-127	C-137	Vessels Room, KPA	None	Smoke	Two hours	KPA-J-1900 Tank 1000 Steam Ejector KPA-TK-1000 Feeding Annular Tank Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-128	C-138	Vessels Room, KPC	Clean agent	Smoke	Two hours	KPC-TK-1210 Tank 1000 Separator Pot Tank KPC-TK-1310 Separator Pot Tank KPC-TK-2110 EV 2000 Separator Pot Tank Fire barriers	
FA-AP-129	C-139	Vessels Room, KPC	None	Smoke	Two hours	KPC-CLMN-2500 Rectification Column KPC-DRIP-4900 Drip Pan KPC-DMST-2720 Overheads from Tank 2710 Demister KPC-E-2730 Overheads from Tank 2710 Cooler Exchanger KPC-E-2740 Overheads from Tank 2710 Cooler Exchanger KPC-TK-2710 Separator Pot at CLMN 2500 Tank KPC-TK-4000 Recovered Acid Reception Tank KPC-TK-4500 Recovered Acid Feeding Tank Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-130	C-140	Vessels Room, KPC	None	Smoke	Two hours	KPC-TK-1000 Feeding Tank KPC-TK-3000 Concentrates Tank Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-131	C-141	Vessels Room, KPA	None	Smoke	Two hours	KPA-TK-7000 Pu Reception Annular Tank KPA-TK-9500 Recycling Tank Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-132	C-143	Glove Box Room, KPA	Clean agent	Smoke	Three hours	KPA-GB-1000 Pulsed Column (drain) Valves Glovebox (shell) KPA-GB-8000 Metering Pumps P8100 and P8200 Glovebox (shell) KPB-GB-2000 Metering Pump P3100 Glovebox (shell) Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-133	C-125	Utility Chase	None	Smoke	Two hours	Fire barriers	
FA-AP-134	C-128	Utility Chase	None	Smoke	Two hours	Fire barriers	
FA-AP-135	C-130	Utility Chase	None	Smoke	Two hours	Fire barriers	
FA-AP-136	C-110	KCD Room	None	Smoke	Two hours	KCD-TK-6000 Distillate Control Tank Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-137	C-117	U Concentration Room	Clean agent	Smoke	Two hours	Fire barriers	

Table 6 - MFFF Fire Area Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-AP-138	C-146	Utility Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-139	C-147	U Solidification Off Gas Treatment	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-201	C-202	Air Lock	Preaction sprinkler	Smoke	Two hours	Fire barriers	
FA-AP-202	C-204	Powder Sampling Room	Clean agent	Smoke	Two hours	KCB-GB-2000 PuO2 Powder Sampling Glovebox (shell) KCB-GB-2000 collecting ducts KCB-GB-2000 sampling equipment KCB-GB-2000 uncloggable filter KCB-GB-2000 bagport KCB-GB-2000 process HEPA filters KCB-GB-3000 PuO2 Sample Pneumatic Transfer Glovebox (shell) KCB-GB-3000 scale KCB-GB-3000 identification system KCB-GB-3000 bag port KCB-GB-4000 Sample Fractionation Glovebox (shell) KCB-GB-4000 scale KCB-GB-4000 identification system KCB-GB-5000 Moisture Analysis Glovebox (shell) with removable glovebox panel KCB-GB-6000 Dishes Introduction Glovebox (shell) KCB-GB-6000 bag port KCB-GB-7000 Powder Sample Storage Glovebox (shell) KCB-GB-7000 vial storage KCB-GB-7000 bag port KCB-GB-8000 Recycled Powder Glovebox (shell) KCB-GB-8000 ducting KCB-GB-8000 safety valve Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-203	C-206	Personnel and Material Corridor	Preaction sprinkler	Smoke	Two hours	Fire barriers	
	C-207	Personnel and Material Corridor					
	C-208	Personnel and Material Corridor					
	C-201	Air Lock					
	C-220	Air Lock					
	C-212	Air Lock	None				
	C-230	Air Lock					
	C-238	Air Lock					
FA-AP-204	C-210	Vessels Room, KDB	None	Smoke	Two hours	KDB-DRIP-3900 Tank 3000 and 4000 Drip Pan to Drip 7900 KDB-TK-1500 Nitric Acid Storage Tank KDB-TK-2500 Nitric Acid Storage Tank KDB-TK-3000 Receiving Tank KDB-TK-4000 Receiving Tank Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-205	C-211	Telephone Closet	Clean agent	Smoke	Two hours	Fire barriers	

Table 6 - MFFF Fire Area Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-AP-206	C-209	U Solidification Off Gas Treatment	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-207	C-213	KDC Room	Clean agent	Smoke	Two hours	Uranyl nitrate tank (KDC-TK-2000) KDC-TK-3200 Nitric acid effluents tank KDC-TK-4000 Nitric acid effluents tank Fire barriers Fire detection Clean agent system	
FA-AP-208	C-214	Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-209	C-216	Utility Chase	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-210	C-217	U Solidification Process Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-211	C-218	Vessels Room, KPF	None	Smoke	Two hours	KPF-TK-3000 Silver Nitrate Control Tank KPF-TK-4000 Silver Nitrate Buffer Tank KPF-TK-1000 Recirculation Tank Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-212	C-219	Neutron Counting Room	Clean agent	Smoke	Three hours	Fire barriers	
FA-AP-213	C-221	Sampling Room	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-AP-214	C-222	Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-215	C-223	Electrical Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-216	C-224	Spare	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-217	C-227	Vessels Room, Reagents	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-218	C-228	Vessels Room, KDB	None	Smoke	Two hours	KDB-DRIP-7900 Tank 5000 Drip Pan KDB-TK-5000 Dilution and Sampling Tank KDB-TK-6000 Dilution and Sampling Tank KDB-TK-7000 Buffer Tank Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-219	C-229	KWG Vessels Room	None	Smoke	Two hours	Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-221	C-231	Electrical Room	Clean agent	Smoke	Three hours	Fire barriers	

Table 6 - MFFF Fire Area Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-AP-222	C-233	Glove Box Room, KPA, KPB	Clean agent	Smoke	Three hours	KPA-MIXS-4000 Pu barrier Mixer Settler KPA-MIXS-5000 Uranium Stripping Mixer Settler KPA-MIXS-5100 Mixer Settler KPA-GB-4000 Mixer Settler 4000 Glovebox (shell) KPA-GB-4010 Pu Analyzer Glovebox (shell) KPA-GB-5000 Mixer Settler 5000 and 5100 Glovebox (shell) KPA-GB-1000 Mixer Settler 1000 and 1100 Glovebox (shell) Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-223	C-234	Active Gallery	None	Smoke	Two hours	KCA-CND-7700 Condenser KCA-CND-8400 Condenser KCA-DMST-1010 Tank 1000 Demister KCA-DMST-2010 Tank 2000 Demister KCA-DMST-7410 Tank 7400 Demister KCA-DMST-7510 Tank 7500 Demister KCA-DMST-8500 Spray Demister KCA-TK-1610 Separator Pot Tank KCA-TK-2610 Separator Pot Tank KCA-TK-3030 Leak Detection Tank KCA-TK-5300 Tank Above Precipitator 5000 KCA-TK-6300 Tank Above Precipitator 6000 KCA-TK-7010 Buffer Tank KCA-TK-7020 Buffer Tank KCA-TK-7030 Leak Detection Pot Tank KCA-TK-7400 Separator Pot Tank KCA-TK-7430 Barometric Seal Pot Tank KCA-TK-7500 Separator Pot Tank KCA-TK-7530 Buffer Pot Tank KCA-TK-8410 Barometric Seal Pot Tank KCD-TK-1110 Tank 1000 Separator Pot Tank KCD-TK-1520 Tank 1500 Separator Pot Tank KCD-TK-2110 Tank 2000 Separator Pot Tank KDB-DMST-1510 Tank 1500 Demister KDB-DMST-2510 Tank 2500 Demister KDB-DMST-3010 Tank 3000 Demister KDB-DMST-4010 Tank 4000 Demister KDB-DMST-5010 Tank 5000 Demister KDB-DMST-6010 Tank 6000 Demister KDB-DMST-7010 Tank 7000 Demister KDB-E-2610 Exchanger from Tank 2500 to Tank 2640 KDB-TK-1400 Buffer Pot Tank KDB-TK-1640 Tank	This is a process cell. Fire detectors located in the ventilation exhaust ducting.

Table 6 - MFFF Fire Area Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
	C-234	Active Gallery (continued)				KDB-TK-2400 Buffer Pot Tank KDB-TK-2640 Tank KDB-TK-7210 Separator Pot Tank KDB-TK-7310 Separator Pot Tank KPB-DMST-2000 Tank 2000 Demister KPB-DMST-3000 Tank 3000 Demister KPB-TK-1000 Tank 1000 KPB-TK-1100 Buffer Tank KPB-TK-1200 Separator Pot Tank KPC-DMST-1010 Tank 1000 Demister Fire barriers	
FA-AP-224	C-235	Evaporator Room, KPC	None	Smoke	Two hours	KPC-EV-6000 Evaporator with Reboiler Fire barriers Fire detection Clean agent system	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-225	C-226	Utility Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-226	C-237	Evaporator Room, KCD	None	Smoke	Two hours	KCD-COOL-3300 Cooler KCD-EV-3000 Evaporator KCD-TK-2120 Separator Pot Tank KCD-TK-3610 Separator Pot Tank KCD-TK-3710 Separator Pot Tank KCD-TK-3800 Circulation Buffer Tank KCD-CND-3200 Condenser KCD-DMST-4020 Tank 3610 Demister KCD-TK-3400 Condensate Tank Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-227	C-239	Air Lock	Preaction sprinkler	Smoke	Two hours	Fire barriers	
FA-AP-228	C-232	Evaporator Room, KPC	None	Smoke	Two hours	KPC-EV-2000 Evaporator with Reboiler Fire barriers Fire detection Clean agent system	This is a process cell. Fire detectors located in the ventilation exhaust ducting.
FA-AP-229	C-225	Utility Chase	None	Smoke	Two hours	Fire barriers	
FA-AP-230	C-244	Tumbling Mixer Room	Clean agent	Smoke	Two hours	KCB-GB-1000 Mixer Tumbler Glovebox (shell) Mixing hopper Hopper feed Isolation and discharge valves Product transfer line Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
	C-242	Motors Room					

Table 6 - MFFF Fire Area Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-AP-301	C-301	Personnel and Material Corridor	Preaction sprinkler	Smoke	Two hours	Fire barriers	
	C-302	Personnel and Material Corridor					
	C-304	Personnel and Material Corridor					
	C-316	Air Lock					
	C-309	Air Lock	None				
	C-321	Air Lock					
	C-331	Air Lock					
	C-332	Air Lock					
FA-AP-302	C-305	Radioprotection Storage	Clean agent	Smoke	Three hours	Fire barriers	
FA-AP-303	C-306	Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-304	C-308	Sampling, Ventilation/U Solidification	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-AP-305	C-336	KPA Glove Box Room	Clean agent	Smoke	Three hours	KPA gloveboxes (shells) Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-306	C-310	Utility Chase	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-307	C-311	Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-308	C-312	Electrical Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-309	C-313	Electrical Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-310	C-314	Vessels Room, KPC	Clean agent	Smoke	Two hours	KPC-TK-5000 Distillates Tank KPC-TK-5500 Distillates Tank Fire barriers	
FA-AP-311	C-317	Pump Room, KCA	Clean agent	Smoke	Two hours	Glovebox (KCA GB 1400)(shell) KCA-P-1400 Pump KCA-P-1500 Pump KCA-P-2400 Pump KCA-P-2500 Pump Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.

Table 6 - MFFF Fire Area Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-AP-312	C-318	Furnace Room	Clean agent	Smoke	Two hours	KCA-GB-8000 Calcination Furnace Glovebox (shell) KCA-FUR-8000 Furnace KCA-FLT-8300 Furnace Filter KCA-FLT-8010 Furnace Filter KCA-FLT-8020 Furnace Filter Removable glovebox section Connecting tube KCA-TK-8310 Buffer Pot Tank Product feed line Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-313	C-319	Utility Room	Clean agent	Smoke	Three hours	Fire barriers	
FA-AP-314	C-320	KDC Room	Clean agent	Smoke	Two hours	Uranium Hopper Glovebox (KDC-GB-1100)(shell) Uranium Powder Hopper (KDC-HPR-1000) Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-316	C-322	Electrolyzer Room, KDB	Clean agent	Smoke	Two hours	KDB-GB-1000 Electrolyzer Glovebox (shell) Electrolyzer EZR1000 Transfer Pump P1100 Uncloggable filter FLT1300 Controlled Valve V1050 Controlled Valve V1110 Controlled Valve V1430 Controlled Valve V1710 Controlled Valve V1720 Spectrophotometer PHOT1020 Spectrophotometer pump P1020 Drip Pots (TK1700 and TK1800) Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-317	C-323	Electrolyzer Room, KDB	Clean agent	Smoke	Two hours	Electrolyzer Glovebox (shell) Electrolyzer, Transfer Pump Uncloggable filter Controlled Valves Spectrophotometer Spectrophotometer pump Drip Pots Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.

Table 6 - MFFF Fire Area Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-AP-318	C-324	Filter Glove Box Room, KDB	Clean agent	Smoke	Two hours	KDB-GB-1200 Filters Glovebox (shell) Process filter FLT1200 Process filter FLT2200 Process filter FLT3200 Process filter FLT4200 Process pump P3100 Process pump P4100 Manual valves Pot TK3330 Spectrophotometer (PHOT3300) Off gas air filters Glovebox supply HEPA filters Glovebox exhaust HEPA filters Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-319	C-325	Air Lock	Preaction sprinkler	Smoke	Two hours	Fire barriers	
FA-AP-320	C-337	Filter Room	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-AP-321	C-329	Tank Room, Reagents	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-322	C-330	Precipitation Room, KCA	Clean agent	Smoke	Two hours	KCA-GB-7000 Precipitators and Filter Glovebox (shell) Precipitator lid Sealing flange Precipitators Basket Collection manifold Transfer tube Rotating filter Connecting tube Precipitator overflow Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-324	C-333	Electrolyzer Room, KPF	Clean agent	Smoke	Two hours	KPF-EZR-2000 Silver Recovery Electrolyzer KPF-GB-2000 Silver Recovery Electrolyzer Glovebox (shell) KPF-GB-3100 Pumps 3100 and 4100 Glovebox (shell) Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-325	C-334	Vessels Room, KCA	None	Smoke	Two hours	KCA-TK-1000 Annular Tank KCA-TK-2000 Annular Tank Fire barriers	This is a process cell. Fire detectors located in the ventilation exhaust ducting.

Table 6 - MFFF Fire Area Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-AP-401	C-401	Personnel and Material Corridor	Preaction sprinkler	Smoke	Two hours	Fire barriers	
	C-402	Personnel and Material Corridor					
	C-403	Personnel and Material Corridor					
	C-413	Corridor					
	C-423	Personnel and Material Corridor					
	C-426	Vestibule (Access Polishing)					
	C-427	Vestibule (Exit Polishing)					
	C-436	Personnel Corridor					
	C-412	Air Lock					
	C-424	Air Lock					
	C-417	Air Lock	None				
	C-419	Air Lock					
FA-AP-402	C-404	Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-403	C-405	Vessels Room Reagents	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-404	C-406	KPG Sampling and KCD On Line Analysis Room	Clean agent	Smoke	Two hours	KCD-GB-4000 Valves and Flow Transmitters Glovebox (shell) KCD-GB-3000 Pu Nitrate & Pu Nitrate Recycle Glovebox (shell) Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-405	C-407	Pulsation Valves G.B. Room KPA	Clean agent	Smoke	Three hours	KPA-GB-2110 Pulsation Valves 1 Glovebox (shell) KPA-GB-2010 Pulsation Valves 2 Glovebox (shell) KPA-GB-2210 Pulsation Valves 3 Glovebox (shell) KPA-GB-3110 Pulsation Valves 4 Glovebox (shell) KPA-GB-3010 Pulsation Valves 5 Glovebox (shell) Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-406	C-408	Steam Distribution and Vessels Room	Clean agent	Smoke	Two hours	KPC-CND-2800 Condenser KPC-COOL-2900 Cooler Fire barriers	
FA-AP-407	C-409	Reagents Distribution Room	Clean agent	Smoke	Three hours	Fire barriers	
FA-AP-408	C-410	Decontamination Distribution Room	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-AP-409	C-411	A.C. Air Jet Distribution Room	Clean agent	Smoke	Two hours	Fire barriers	C-400 is an unventilated process cell.
	C-400	Air Jet Room	None	None			
FA-AP-411	C-414	Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-412	C-415	Pneumatic Transfer Room, KCC	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-413	C-416	Filter Room	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	

Table 6 - MFFF Fire Area Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-AP-414	C-430	Electrolyzer Feed Room, KDA	Clean agent	Smoke	Two hours	KDA-GB-5000 Transport Pneumatic Arrival 1 Glovebox (shell) KDA-GB-5000 bar code reader KDA-GB-7000 Convenience Can Opening 1 Glovebox (shell) KDA-GB-7000 scale KDA-GB-7000 can overturning and emptying tilter KDA-GB-9000 Dosing Storage Hopper 1 Glovebox (shell) KDA-GB-9000 dosing hopper KDA-GB-9000 scale Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-415	C-418	Utility Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-416	C-431	Electrolyzer Feed Room, KDA	Clean agent	Smoke	Two hours	Fire barriers Fire detection Clean agent system	
FA-AP-417	C-420	Utility Chase	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-418	C-421	Electrical Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-419	C-422	Glove Box Room, KCA	Clean agent	Smoke	Two hours	KCA-GB-3000 Metering Wheels Glovebox (shell) Metering wheel KCA-DSW-3000 Metering wheel KCA-DSW-4001 Fire barriers Fire detection Clean agent system	Fire detectors provided in gloveboxes.
FA-AP-423	C-428	Electrical Room	Clean agent	Smoke	Two hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-424	C-429	U Solidification	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-425	C-432	Reagents Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-426	C-433	Compressed Air Distribution	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-427	C-437	Pumps Room, KCA	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-501	C-501	Radioprotection Laboratory	Clean agent	Smoke	Two hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-502	C-502	Clean Agent Bottle Storage	Clean agent	Smoke	Two hours	Fire barriers Portions of clean agent suppression system supplying clean agent to QL-1b clean agent systems	
FA-AP-503	C-503	Compressed Air Distribution	None	Smoke	Two hours	Fire barriers	
FA-AP-504	C-504	Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-505	C-505	Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-506	C-518	Electrical Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-507	C-507	Electrical Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.

Table 6 - MFFF Fire Area Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-AP-508	C-508	Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-510	C-511	Transmitter Room	Clean agent	Smoke	Three hours	Fire barriers	
FA-AP-511	C-512	Transmitter Room	Clean agent	Smoke	Three hours	Fire barriers	
FA-AP-513	C-514	Storage, Reagents	Clean agent	Smoke	Three hours	Fire barriers	
FA-AP-514	C-515	Reagents Room	Clean agent	Smoke	Three hours	Fire barriers	
FA-AP-515	C-516	Transmitter Room	Clean agent	Smoke	Three hours	Fire barriers	
FA-AP-516	C-517	Electronics Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-517	C-513	Cooling Loop Room/Expansion Tanks	Clean agent	Smoke	Three hours	Fire barriers	
FA-AP-518	C-519	Emergency Air Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-519	C-520	Personnel and Material Corridor	Preaction sprinkler	Smoke	Two hours	Fire barriers	
	C-521	Personnel and Material Corridor					
	C-525	Personnel and Material Corridor					
	C-530	Personnel and Material Corridor					
	C-532	Personnel and Material Corridor					
FA-AP-520	C-522	Compressed Air Distribution	Clean agent	Smoke	Three hours	Fire barriers	
FA-AP-521	C-523	U Solidification/Utility Room	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-522	C-526	Electrical Room	Clean agent	Smoke	Three hours	Fire barriers	Suppression is provided above and below the raised floor.
FA-AP-523	C-527	Utility Chase	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-524	C-528	U Solidification Electronics	Clean agent	Smoke	Two hours	Fire barriers	
FA-AP-525	C-529	KWG Room	Clean agent	Smoke	Two hours	Fire barriers	

Table 6 - MFFF Fire Features Summary

Fire Area	Room	Description	Automatic Suppression System	Detection System	Minimum Fire Barrier	IROFS (TBV)	Notes
FA-SW-101	All	Secured Warehouse Building	Wet pipe	Smoke	See notes	None	Depleted Uranium storage area fire-rated at a minimum of two hours.
FA-RW-101	All	Receiving Warehouse Building	Wet pipe	Smoke	None	None	
FA-AD-101	All	Administration Building	Wet pipe	Smoke	See notes	None	Records vault barriers fire-rated at a minimum of three hours.
FA-TS-101	All	Technical Support Building	Wet pipe	Smoke	TBD	None	
FA-ED-101	F-101	Electrical Equipment Room B	Clean agent	Smoke	Three hour	Emergency 4.16kV switchgear Fire barrier that separates this fire area from F-103	
FA-ED-102	F-102	Emergency Diesel Generator Room B	Preaction sprinkler	Smoke	Three hour	Emergency generator Emergency diesel	
FA-ED-103	F-103	Electrical Equipment Room A	Clean agent	Smoke	Three hour	Emergency 4.16kV switchgear Fire barrier that separates this fire area from F-101	
FA-ED-104	F-104	Emergency Diesel Generator Room A	Preaction sprinkler	Smoke	Three hour	Emergency generator Emergency diesel	
FA-SD-101	All	Standby D/G Building	Wet pipe	Smoke	Two hours	None	
FA-PR-101	All	Reagents Building	Wet pipe	Smoke	None	None	
FA-SH-101	P-101	Sally Port Maintenance	Wet pipe	Smoke	Two hours	None	
	P-102	Safe Haven					
	P-103	Egress Tunnel					
	P-104	Egress Tunnel					
FA-SH-102	P-105	Safe Haven	Wet pipe	Smoke	Two hours	None	
	P-106	Sally Port Maintenance					
FA-SH-103	P-107	Egress Tunnel	Wet pipe	Smoke	Two hours	None	
	P-108	Egress Tunnel					
	P-109	Safe Haven					
	P-110	Sally Port Maintenance					
FA-SH-104	P-111	Safe Haven	Wet pipe	Smoke	Two hours	None	
	P-112	Sally Port Maintenance					
FA-SH-105	P-201	Safe Haven	Wet pipe	Smoke	Two hours	None	
	P-202	Sally Port Maintenance					
FA-GS-101	N/A	Gas Storage Area	N/A	N/A	N/A	None	
FA-YD-101	N/A	Yard Area	TBD	TBD	N/A	None	
FA-EF-101	N/A	Emergency Diesel Fuel Storage Tank Room B	Dry pipe	Smoke	Three hour	Diesel fuel oil tank and related equipment	
FA-EF-102	N/A	Emergency Diesel Fuel Storage Tank Room A	Dry pipe	Smoke	Three hour	Diesel fuel oil tank and related equipment	

Enclosure B
Remaining NRC Clarification Requests

The following table summarizes the status of the open clarification requests noted within the 03 and 06 November 2001 and 18 December 2001 NRC In-Office Review Summaries and verbal information requests received by DCS.

Subject Area/Action Item	Source
Heavy Loads/Material Handling	
RAI 221: Clarify the editions of the Codes and Standards that will be used to design heavy lift cranes.	03 Nov 2001 item 2E
Confinement/Ventilation	
NRC recommends the use of a 99 percent removal efficiency in both fuel cycle facility and reactor applications. NRC staff explained there have been fires at plutonium facilities that have resulted in failures of banks of HEPA filters and that the recommended removal efficiency of 99 percent reflected such experience. DCS proposed to consider another calculation that would better define the accident conditions affecting the HEPA filters.	03 Nov 2001 item 4
Is the ventilation stack considered to be a PSSC? Have analyses for seismic and natural phenomena been performed? Discuss design basis for stack.	Verbal information request
Instrumentation & Controls	
The staff pointed out that IEEE 603-1998 conformance may be difficult for the following reasons: A. The MMIS computer system and the data communications network would have to meet IEEE 603-1998 criteria; and B. The subset of the MMIS software that would be used for IEEE 603 credit would have to be qualified. After discussion of the dimensions of the difficulties, DCS stated that it would take the observations under advisement and inform the staff whether it intends to revise its design basis for the MMIS system.	06 Nov 2001 item 4, 3rd paragraph
DCS staff will clarify Section 11.6.2.1 (last paragraph) of the application to describe those cases where a safety control subsystem is used as a PSSC (the case which invokes IEEE Std 603-1998).	18 Dec 2001 item B3
DCS staff will review other sections in the application, such as Section 11.6.7, Table 5.6-1, and Section 5.5.5.2, to ensure the correct design basis information is included for safety control subsystems.	18 Dec 2001 item B4
When the AP or MP control room(s) is shutdown, does that mean that all functions performed in that room are also shutdown (i.e., fire detection system is shutdown when the control room is down)? Need to clarify the text in the CAR.	Verbal information request
Safety Analysis/Chemical Safety	
As a result of the review of safety analysis documents, NRC staff questioned the terminology "Process Safety I&C Systems" to determine the actual systems were being listed as SSCs. DCS will provide the information.	06 Nov 2001 item 2, 5th paragraph
For each listing of "Process Safety I&C systems" in the Principal SSC summary tables of Section 5.5 of the CAR, DCS will replace with "Process Safety Control Subsystem" or "Emergency Control System".	06 Nov 2001 item 2D
DCS agreed to clarify the nomenclature so that the nomenclature is consistent between the chapters of the CAR. In doing so, DCS will revise the Chapter 5 tables so that for a particular event, the principal SSCs for I&C systems will be clearly identified.	06 Nov 2001 item 4, 2nd paragraph
Verify that pressure sensors will detect a hydrogen leak in the sintering furnace and will terminate hydrogen flow.	18 Dec 2001 item CC5*

* Note on usage: Section C of the 18 Dec 2001 letter contains two action item lists, both beginning with "item 1"; the first list is herein designated beginning with "C1" and the second beginning with "CC1" for clarity. Also, certain items in the second list are repeated; the redundant actions (CC6-8) are excluded in this listing.

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Remaining NRC Clarification Requests

Explanation of the applicant's interpretation of the red oil phenomena and justification for a temperature design basis of 135 C (RAI 123). RAI 123: Provide information to support and justify the 135 C limit as the only design basis for the evaporators.	18 Dec 2001 item C2* and CC3*
Verify the accident scenario labeled "fire" in AP/MP C3 glovebox area is the same used for bounding mitigated fire/loss of confinement consequence assessment - appears to be some minor differences.	Verbal information request
Multiple possible explosion sources assumed for bounding mitigated explosion? (Not clear whether this means multiple simultaneous sources or sources in different locations at different times).	Verbal information request
The draft FHA in preparation by DCS indicates that the nitrogen system is relied upon for 70.61 compliance. DCS to clarify position on nitrogen system.	Verbal information request
In CAR Chapter 10, DCS stated an ALARA goal for effluent releases to limit dose to the public and limit the concentration in the air. If the concentrations provided in the Environmental Report (Table D7 or B7) are applied at the discharge of the stack, it appears to exceed the ALARA goal. Provide an updated list of radionuclides or other assumptions such that demonstrates the ALARA goal is achieved.	Verbal information request
As part of the Environmental Consequences calculation, ensure that information is provided at the restricted area boundary, identify the HEPA filter efficiency used, and that a respirable fraction is not included.	Verbal information request
Electrical	
RAI 162: In the DCS clarification letter of 07 January 2002, p. 23, DCS cites section 5.2 of IEEE-484 and the practice of using acid resistant insulation between cells and steel of the racks. NRC Regulatory Guide 1.128 also indicates that the insulation is moisture resistant. What is DCS position on moisture resistant insulation for this application?	Verbal information request
RAI 162: In the DCS clarification letter of 07 January 2002, p. 23, item 6. The NRC position notes that the "should" in the IEEE standard are to be treated as "shall." Discuss how DCS intends to apply this guidance in RG 1.128, item 6 with respect to IEEE 484.	Verbal information request
RAI 162: In the DCS clarification letter of 07 January 2002, p. 23, item 2, the response did not address Regulatory Guide 1.189 information on battery room fire protection that superseded Regulatory Guide 1.120	Verbal information request
Criticality	
RAI 40/41: NRC provided DCS with additional information on highly unlikely and double contingency. DCS to provide discussion of position.	03 Nov 2001 item 3E
RAI 68: NRC provided additional information to DCS on the Qualifications of a Criticality team. DCS to provide an updated response to minimum qualifications.	03 Nov 2001 item 3F
RAI 83: DCS provided an clarification by letter dated 07 January 2002, however, the NRC was expecting more discrete values.	Verbal information request
RAI 90: NRC has reviewed the DCS response in the letter of 31 August 2001 and the clarification provided by letter dated 05 December 2001 and has additional questions. First, for the discussion of ANSI 8.1, define what is meant by "or other justifications" and define "not expected in the life time of the facility" - is this the same as 1E-2 or is it something different since the life of the facility is not 100 years? In the discussion for ANSI 8.15, DCS uses the term "very low" and states that ANSI 8.1 will be used for special actinides. Define "very low" and at what point does DCS expect quantities to be low enough that the use of ANSI 8.1 is applicable. Finally, define the use of "or other justifications" in the discussion of ANSI 8.17.	Verbal information request

Enclosure B
Remaining NRC Clarification Requests

Mechanical	
Address corrosion allowances in process cells vs ability to perform inspections.	Verbal information request
For the manual isolation valve discussion in CAR Section 11.4.7.1.5, clarify if these are the only type of isolation valves on gloveboxes (for mechanical systems).	Verbal information request
NRC understands that DCS is considering changes to fresh fuel storage in shipping bay, possibly in frame storage. If so, what is design bases for the frames holding shipping casks? Will casks contain fresh fuel, i.e., used as buffer storage?	Verbal information request
In the 05 December 2001 letter, DCS provided a clarification to RAI 217 on fresh fuel cask lift heights. The response is not clear whether the height is applicable when lifting off a truck, i.e., what is max lift height to truck bay floor?	Verbal information request
Material maintenance and surveillance – clarify/address if the corrosive effects of dissimilar metals will be considered (e.g., bolting, galvanic processes). Need more discussion of corrosion effects on wet process systems.	Verbal information request
With respect to welded construction for fluid transport systems – are welding and welding procedures, qualifications, etc considered IROFS? If so, what are the specific codes and standards and criteria?	Verbal information request
In the CAR discussion of interfaces for decontamination systems, the text doesn't mention interface with demineralized water and nitric acid systems.	Verbal information request
Clarify why scavenging air is classified as IROFS. Identify where the instrument air system transitions from non-PSSC to PSSC – a diagram would be useful.	Verbal information request
Clarify status of N2 system as non-PSSC or PSSC (FHA implies PSSC, but informal discussions with DCS have indicated non-PSSC).	Verbal information request
RAI 201/CAR 11.9.1.9: The discussions of the instrument air system references ISA standard ISA S7.0.01-1996 and Service Air references ISA 7.3. Which one is DCS using and the issue date if ISA 7.3 is used?	Verbal information request
Clarify why the design bases for instrument air includes a HEPA for penetrations through confinement (CAR 11.9.1.10.2) but the bulk gas systems do not specify HEPAs (CAR 11.9.2).	Verbal information request
Provide glovebox design basis for structural analysis (discussed in polycarbonate report telecon).	Verbal information request
Clarify basis for not including seismic isolation and isolation valves in design basis for hydrazine system.	Verbal information request
CAR pgs 8-8, 8-27, 8-28 discusses P10 gas (methane and argon 7%). P10 gas is a different mixture than that specified (mixture reversed). Need clarification – provide any and all design bases for P10 system, including use, storage locations, and application and hazards. Other tables on smothering gases did not include P10.	Verbal information request
CAR pg 11.9-48 - What is the operating temperature for N2O4 (CAR 11.9.3.13.2 states 50 C). The RAI response (RAI 117?) provides a different temperature (30 C). If RAI is correct, how will temperature be maintained?	Verbal information request
CAR pgs 11.9-48 and Figure 11.9-29 identify service air interface with N2O4 system. Drawing GNO-RMN-14735 shows an instrument air interface. Which is correct?	Verbal information request
RAI 191 response discusses check valves design criteria. Need similar information for isolation valves.	Verbal information request
Site Description	

Enclosure B
Remaining NRC Clarification Requests

Section 1.3, Site Description – Does DCS plan to update the site description information – need statement from DCS that any new information at the time of license application will be included and provided to NRC.	Verbal information request
In section on site hydrology, CAR 1.3.4.6, there is a statement that no radiation was detected in Upper Three Runs and Gordon aquifers. Clarify if this means no detectable radiation or no radiation above EPA limits for drinking water.	Verbal information request
NRC and DCS staff to decide how to release information from seismic calculation justifying unlikely events.	30 January 2002 letter
Are any more studies of seepage basin plume for the state RCRA permits planned? Will DCS provide any updated study information on direction and flow of plume in aquifers? Information in the CAR seems generic and new studies might provide additional information.	Verbal information request
Financial	
Information on the project design costs is necessary. The RAI response for CAR chapter 2 stated that the information was under review by DOE. What is the status and when does DCS plan to submit new information?	Verbal information request
Does the design cost information include licensing costs? Are escalating and contingency costs included in design costs (they appear to be included in construction costs)?	Verbal information request
NRC understands Duke is undergoing reorganization. NRC needs the appropriate CAR sections updated to reflect financial and organizational changes.	Verbal information request