MEMORANDUM TO: Eric J. Leeds, Chief
Special Projects Branch
Division of Fuel Cycle Safety
and Safeguards, NMSS

Thru: Joseph G. Giitter, Chief
Enrichment Section
Special Projects Branch
Division of Fuel Cycle Safety
and Safeguards, NMSS

FROM: Andrew Persinko, Sr. Nuclear Engineer
Enrichment Section
Special Projects Branch **/RA/**
Division of Fuel Cycle Safety
and Safeguards, NMSS

SUBJECT: NOVEMBER 27-29, 2001, IN-OFFICE REVIEW SUMMARY: IN-OFFICE REVIEW OF DUKE COGEMA STONE & WEBSTER CONSTRUCTION AUTHORIZATION REQUEST SUPPORTING DOCUMENTS FOR THE MIXED OXIDE (MOX) FUEL FABRICATION FACILITY

On November 27-29, 2001, the U.S. Nuclear Regulatory Commission (NRC) conducted an in-office review of supporting documents and information associated with the construction authorization request (CAR) for the mixed oxide fuel fabrication facility (MFFF) submitted by Duke Cogema Stone & Webster (DCS) on February 28, 2001. The attachment provides a summary of the meeting.

Docket: 70-3098

Attachment: Mixed Oxide Fuel Fabrication Facility In-Office Review Summary

cc: P. Hastings, DCS
J. Johnson, DOE
H. Porter, SCDHEC
J. Conway, DNFSB
D. Moniak, BREDL
G. Carroll, GANE
R. Thomas, Environmentalists, Inc.

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DATE	12/ 6 /01		12/18 /01		12/ 14 /01			

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Mixed Oxide Fuel Fabrication Facility
In-Office Review Summary

Date: November 27-29, 2001

Place: Duke Cogema Stone & Webster (DCS) Offices; Charlotte, NC

Discussion:

Upon arrival, a short introduction was held. Following the introduction, U.S. Nuclear Regulatory Commission (NRC) staff reviewed information in the areas of safety analysis, instrumentation and control (I&C), and chemical safety. Related requests for additional information (RAIs) in the staff's June 21, 2001 letter, "Mixed Oxide Fuel Fabrication Facility Construction Authorization - Request for Additional Information," to DCS are also noted.

A. Safety Analysis

NRC staff reviewed the following documents:

1. Preliminary Accident Analysis (DCS01-ZJJ-CG-ANS-H-38317-A)
2. Natural Phenomena Hazard List (DCS01-RJJ-DC-ANS-H-38305-A)
3. MFFF System Dependencies (DCS01-RRJ-DS-CAL-H-38312-A)
4. Maximum Threshold Quantity for MFFF Chemical Consequences (DCS01-RRJ-DS-CAL-H-35601-A)
5. Preliminary Hazards External Man-made Event Screening (DCS01-RRJ-DS-ANS-H-38307-A)
6. Dose Consequences for Potential Radioactive Releases from Hazard Events (DCS01-RRJ-DC-ANS-H-38310-A)
7. MACCS2 Population Dose in Support of the Environmental Report (DCS01-RRJ-DS-CAL-H-38314-A)
8. Dispersion Factors (Chi/Q) Values for MFFF Accident Analysis (DCS01-RRJ-DS-CAL-H-38308-A)
9. Input Values for Radioactive Release Calculations for the MFFF (DCS01-ZJJ-DS-ANS-H-38309-A)
10. Preliminary Hazard Analysis (DCS01-ZJJ-DS-ANS-H-38301-C)

The Preliminary Hazards Analysis (PHA) is based upon a multi-discipline technical team applying a what-if approach. It includes accident consequences based upon a risk matrix and binning approach. This is a generally accepted approach at a preliminary level of design. The PHA includes a hazards evaluation table based upon the identified hazards. This table lists the events, hazards, causes, qualitative risk binning, potential prevention/mitigation approaches, and potential principal structures, systems, and components (PSSCs). The general impressions are: 1.) the listing is comprehensive; 2.) many events have only one initiator, and 3.) a generally conservative approach is used for risk binning. Although preventive and mitigative Structure, Systems and Components (SSCs) are identified in the PHA, a clear identification of the SSCs selected as PSSCs is not included in the PHA tables. The PHA provides information to the Preliminary Accident Analysis (PAA). The PAA also is based upon the qualitative, risk-binning approach. The PAA identifies the PSSCs for each accident or grouping of accidents analyzed in the PHA based on the opinion of the safety analysis team. NRC staff correlated approximately 25 accidents in the PHA to the associated PSSCs identified in the PAA to assure that the identified potential accidents were carried over into the PAA. However, correlating the accidents analyzed in the PHA to the PSSCs in the PAA is difficult due to the linkage between the PAA and the PHA. The final list of PSSCs in the PAA appears to be identical to the list in the construction application. The format and column headings in tables contained in the PHA and the consequence analysis are shown in DCS letter dated November 2, 2001.

The following are impressions and concerns from document review:

1. The hazard analyses were developed in accordance with the SRP guidance using the approach from Guidelines for Hazard Evaluation Procedures, AIChE (1995);
2. Among the approximately 40 individual hazard events that the staff reviewed, the staff observed that the potential calculated consequences were conservative and bounding. This is largely because the DCS method includes conservative assumptions regarding the chemical form of plutonium;
3. "Pyrophoric Materials" was not checked as a possible hazard in the "hazard identification checklist" for areas containing plutonium or uranium oxides; potential effects from UO_2 and PuO_2 pyrophoricity and burn-back were identified by the NRC staff that may not have been properly identified and considered;
4. Steam explosions were not included in the explosion hazard category in the "Preliminary Accident Analysis;" NRC staff identified steam explosions from the sintering furnace, which has a water-cooling jacket, as an event that needs to be considered;
5. There did not appear to be information from the Department of Energy (DOE) to justify the explosion assumptions that were used in the response to RAI# 57 regarding explosions in the Savannah River Site (SRS) F area.

The NRC staff reviewed the PHA for potential pyrophoric and burn-back hazards associated with UO_2 and PuO_2 powders. These were not identified in the PHA for the UO_2 drum emptying, PuO_2 container opening, PuO_2 buffer storage, 3013 storage area, truck bay, and PuO_2 can loading units. Potential pyrophoric hazards were identified for the rod loading unit. DCS staff noted that this was addressed in the reply to RAI #49. DCS staff further noted that nitrogen was used in the gloveboxes for process purposes (i.e., product quality) and not for safety reasons. The NRC reviewers mentioned pyrophoricity and burn-back likely involve both chemical forms and powder morphologies. The NRC requested additional information from the applicant to explain and clarify the pyrophoric/burn-back issue, and justify why DCS considers it resolved.

NRC staff inquired about the progress on responding to clarifying issues raised at the last in-office document review. These issues included combustible loading controls and dose assessments to workers from postulated load handling accidents. DCS staff agreed to include more precise language in its forthcoming submittals on combustible loading controls regarding transient combustible types and quantities of material that could be available in areas where combustible controls are listed as the PSSC. DCS staff is still performing calculations for the dose assessments to workers from load handling accidents and these calculations should be submitted in the near future. The request for dose calculations resulted, in part, from the applicant's response to NRC RAI #63, which requested the calculated consequences for all hazard assessment events and RAI #61, which requested an estimate of likelihood that training and procedures may not provide the intended mitigation.

The report titled, "Dose Consequences for Potential Radioactive Releases from Hazards Events," contained a list of assumptions that were made by DCS to support the consequence assessments. DCS agreed during the meeting to submit any such assumptions in writing if they have not been included in either the application or RAI responses.

NRC staff questioned DCS on how respiratory protection equipment that is required to mitigate the effects of a facility hazard event is classified. For example, a worker performing a routine glovebox maintenance task could be exposed to airborne plutonium compounds should there be a loss of material confinement. DCS staff stated that the unmitigated consequence of inhaling plutonium compounds during this event is unacceptable (i.e., above the worker performance requirements), so the worker's respirator must serve the safety function of preventing intake. NRC staff questioned DCS on whether the respirators alone would be classified as a PSSC for protection of the facility worker, or whether the Respiratory Protection Program, or the entire Radiation Protection Program, would be classified as such. This issue resulted, in part, from the applicant's response to RAI #64 which requested a description of training and procedures that are relied on as principal SSCs.

DCS is completing work on a supplement to the safety assessment that compares the consequences of potential hazard events against the 10 CFR 70.61(c)(3) performance requirements. This supplement is necessary because the safety assessment approach for this performance requirement in the construction application was not acceptable to the NRC staff. The calculations for this evaluation are not yet available for review by the staff. DCS staff stated that the assumptions required to meet the 10 CFR 70.61(c)(3) performance requirement may not be as conservative as were the assumptions stated in the application to demonstrate compliance with the other performance requirements. The staff will review the safety assessment results when the supplement is submitted in December 2001.

The following is the clarifying information and analyses requested by NRC as a result of its review of the above listed documents:

1. 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 pyrophoricity, and burn-back (RAI #49);
2. Basis (i.e., correspondence from DOE) for explosion potential in F area;
3. An analysis of the potential for steam explosion in the MFFF.

B. Instrumentation and Controls (I&C)

The aqueous polishing (AP) and MOX processing (MP) process system I&C architecture drawings were reviewed for PSSCs and some details of the programmable logic controllers (PLCs) and other computers function. The drawings are noted in Table 1. Results of the staff's review is summarized as follows:

1. The applicant stated that the referenced drawings in Table 1 will be designated Quality Level QL1, not QL3 as presently shown. Software controlled devices will be QL1b (RAI #66).

2. Interactions with the Manufacturing Management Information System (MMIS) computer are as follows:

    a. If transfer from MMIS to the Manufacturing Status Computer is incorrect, what is the impact?

- The manufacturing status computer receives the same local industrial network (LIN) data that the MMIS computer receives; the MMIS computer does not supply the Manufacturing Status Computer with data.

b. MMIS interaction with the PSSC safety controller (for criticality);

- A safety controller is designed to act independently; the applicant's plan is to take the software for criticality out of the MMIS and move it to redundant safety controllers; the affected drawings will be updated.

c. MMIS interaction with the diagnostic computer;

- The diagnostic computer and the MMIS are functionally independent and receive the same LIN data; the diagnostic computer is primarily used for system restoration advisories in the event of process unit breakdown or other anomaly.

d. Is MMIS a highly available computer?

- The MMIS is highly available and has a Redundant Array of Inexpensive Disks (RAID) that help assure data storage capabilities.

3. Details of PSSC safety controller application areas in the process stream (RAIs #66, 182) are as follows:

- The list of PSSCs by function and drawing is shown in Table 1; there are approximately 98 PLCs of which 9 are designated as PSSCs at the time of review; the PSSCs are associated with criticality control.

- The applicant stated that a list of functional units showing non-PSSCs and PSSCs would be submitted.

4. The PSSC safety controller configuration scheme in IEEE Standard 603, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," (autonomous, single/dual channel, sensors single/dual) is as follows (RAIs #66, 166, 173, 182):

- Section 11.6.7 of the application states that all safety controllers that are PSSCs will be designed to IEEE Standard 603-1998; the applicant stated that in Section 11.6.2.1 (last paragraph) of the application a clarification would be added to describe those cases where a safety control subsystem is used as a PSSC (the case which invokes IEEE 603-1998); Therefore, all safety controller subsystems would be single channel whether used as PSSCs or not; also, the applicant agreed to review other application sections, such as Section 11.6.7 and Table 5.6-1, to ensure correct design basis information is included for safety control subsystems; (subsequent to the in-office review, the staff also noted that the last paragraph in Section 5.5.5.2 of the application should be reviewed by DCS to ensure correct design basis information is provided for PSSCs not credited directly in the safety analysis.)

5. PSSC safety controller interaction with an motor control center (MCC), normal controller, or actuator (RAIs #165, 173, 179) are as follows:

   a. What if a safety controller is wrong or fails silently (especially if normal controller data communications are down)?

      - If the safety controller is a PSSC, then it is redundant, so a single failure would not cause loss of function; if the failure was detected by self-diagnostics, then the front panel would indicate the detection; if not indicated on the front panel, then the faulted PSSC would be detected during surveillance.

   b. If an MCC control or process actuator fails, how is the desired safety action accomplished?

      - The MCC failure would be detected by the isolated monitoring of actuator current used as feedback to the PSSC safety controller; the safety controller would then take the shutdown action.

      - The MCCs are planned to be "smart" computerized MCCs that use data network techniques to reduce hardwiring and also use internal microprocessor control to allow enhanced protective functionality and diagnostics.

6. Details of utility control system are as follows:

   a. If the safety controller fails, then how does a manual station or safety work station accomplish the desired control action?

      - The manual station is planned to be hardwired into the MCC so that control would be maintained.

   b. If a MCC control or process actuator fails, how is the desired safety action accomplished?

      - The condition would be noted in the process; the operator would then use the emergency control system to shut down the process unit affected.

7. IEEE Standard 603 (RAI #173);

   a. How are IEEE Standard 603 requirements planned to be met (interactions with Emergency Control, etc.)?

      - PLCs that are PSSCs are discussed in Item 3 above; the Emergency Control System will be designed to meet full IEEE Standard 603-1998 requirements (as applied to MFFF).

- The applicant stated that the “Seismic Detection” input to the Emergency Control System is planned to be from an IEEE Standard 603 system.

- The applicant stated that they are in the process of determining the requirements for the fire detection system interface with the PSSC safety controller VDT.

b. What does "primarily manual" control and "selected systems" mean in terms of detailed requirements for Emergency Control System?

    - There will be a small amount of automatic actions, but most of the actions would be manually controlled; the selected systems will be those that are selected manually.

8. Networks (RAI #165);

    a. What happens if the LIN is down?

        - Process unit permissives from MMIS will stop and the affected process unit will shut down.

    b. What happens if the Immediate Control Network (ICN) is down?

        - Workstations will not receive data from the process and the ICN network shutdown will be detected; safety controllers will detect and act on unsafe conditions; some data exchange between normal controllers will be lost, but will be noted on workstations; the MMIS computer will still receive LIN data, but will stop sending permissives to affected process unit(s) when the lack of ICN data between PLCs causes data mismatch in the process.

    c. What happens if the X-Terminal Network (XTN) is down?

        - Data terminals on the XTN will not receive data; workstations will not receive XTN data, but will receive LIN and ICN data; MMIS and manufacturing status and diagnostic computers will not be functionally affected because they receive data from LIN net.

9. Symbols on the drawings listed in Table 1;

    a. The hard-wired control desk controls normal PLCs and actuators and is used for maintenance purposes; the control desk can override a normal PLC function only if the normal PLC allows it to override;

    b. The Nx monitors are workstations;

    c. The “control unit” is a computer;

d. The “PC” is used by the Production Engineers and is only to be connected to the XTN network;

e. The hard disk figures for the MP and AP Diagnosis System represent a computer to determine the state of a faulty functional unit; it is used typically for startup advisories after a stoppage.

10. Design documents for a functional unit;

a. The AP will be a continuous process with piping and instrumentation drawings (P&IDs) and process automation data sheets; the PLCs will be different than the PLCs used for the MP process.

b. The MP process will be similar to batch processing in a manufacturing plant; the major documents will be:

- Technical description;
- Control systems description;
- Flow charts;
- Time sequence diagrams;
- Kinematic diagrams;
- List of actuators and sensors; and
- Equipment list.

The above documents delineate the requirements for the processing and the PLC software.

11. Although DCS stated in an August 31, 2001, letter (see RAI #151) that the communication system is not a principal SSC nor is it an IROFS because the system is not relied on for mitigation of accidents, NRC staff believed that the communication systems may have been credited in the prevention or mitigation of events analyzed in the MFFF safety analysis. Contrary to this, DCS confirmed during the in-office review that the design basis for this system was correctly stated in the August 31 letter and further stated that the system is not relied on to prevent accidents. DCS committed to clarify their response to RAI #151 to further describe the basis for not classifying the communications system as an IROFS (RAI #151).

To summarize, the applicant will provide or confirm the following information:

1. The referenced drawings in Table 1 will be designated quality level QL1, not QL3 as presently shown; software controlled devices will be QL1b;
2. A list of functional units showing non-PSSCs and PSSCs will be submitted;
3. 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 Standard 603-1998);
4. 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;

5. The “Seismic Detection” input to the Emergency Control System is from a IEEE Standard 603 system;
6. The requirements for the fire detection system interface with the PSSC safety controller VDT;
7. DCS staff will further describe the basis for not classifying the communications system as an IROFS.

TABLE 1
MOX and AP Process System Architecture Drawings and PLC Normal & PSSC Identification (RAI #66)

Process System Functional Unit (FU) Description	Qty PSSC/ Normal	PSSC Description	PSSC Designation
Shipping/Receiving Powders & Powders	1 1 1 1 4/16	Primary Dosing (CRITICALITY) Final Dosing (CRIT) Homogenization and Pelletizing (CRIT) Homogenization and Pelletizing (CRIT)	NDP NDS NPE NPF
Pellet	0 0 0/17		
Cladding-Rod inspection	0 0/11		
Assembly-Waste	1 1/11	Fire Detection as input	VDT
Utilities Control: HVAC; Electrical Distribution; Fluids/Effluents	0 0/12		
Aqueous Polishing	1 1 1 1 4/20	Decanning (CRIT) Pneumatic Transfer Line 1,2 (CRIT) Homogenization (CRIT) Canning (CRIT)	KDA KDA KCB KCC
Health Physics Monitoring; Criticality Accident Detection	0 0/2		
TOTAL PSSC/Normal PLCs	**9/89**		

C. Chemical Safety

NRC staff reviewed the PHA, DCS01-ZJJ-DS-ANS-H-38301-C, dated February 21, 2001, for additional information on accident assessments, identification of PSSCs, dissolution operations, red oil concerns, HAN/hydrazine, chemical safety approaches, and clarification of related RAIs (RAIs 50, 113,123,124,125, and 141). A discussion of the PHA is provided in the Safety Analysis section above. A brief review of the hazard identification tables noted generally acceptable results for the purification, acid recovery, silver recovery, plutonium precipitation, oxalic mother liquor, liquid waste, and sintering units. However, flammable gas, toxic gas (NOx), explosion, and corrosion hazards were not identified for the dissolution unit. Hydrazine and HAN hazards were not identified for the solvent recovery unit, even though at least trace quantities would be anticipated.

Specific events reviewed include:

- AP-6 and AP-41: hydrogen effects,
- AP-7: chemical overpressurization (e.g., HAN and N2H4)
- AP-9: HAN and N2H4
- AP-37: peroxide concentration controls
- AP-39: red oil (based upon temperature control)

1. NRC staff reviewed Events PT-4 and E-2, which involve hydrogen in the sintering furnaces. Potential explosion hazards with the air locks and controls are not included. As a result of reviewing the PHA, NRC staff asked the applicant to clarify the proposed controls and PSSCs with respect to the sintering furnace. The applicant stated hydrogen sensors in the room would detect any leaks and would terminate the hydrogen flow to the furnace. In addition, pressure controls would detect any loss of pressure in the furnace due to a leak and also terminate the hydrogen flow. The staff expressed concerns about the potential for small leaks to result in hydrogen burning that might go undetected and contribute to radionuclide release. The staff thought sensor placement and coverage would be important and requested the applicant to review industry standards for guidance, which DCS staff agreed to do. Regarding the airlocks, the applicant stated there would be interlocks to prevent both doors from opening at the same time. In addition, hydrogen sensors in the airlock and oxygen sensors in the furnace would detect their respective gases and terminate the hydrogen flow; all of these would be PSSCs. NRC staff requested a clearer explanation of these controls around the furnace and their design bases as a follow-up to the PHA review and RAI #124. The applicant agreed to do this.

2. The waste areas were not analyzed in the PHA.

3. The chemical accident analyses were reviewed (DCS01-RRJ-DS-CAL-H-35601-A and 35602-A) as a follow-up to the PHA and PAA reviews, and RAI #113. The analyses used the EPA ALOHA code, with the chi/q input from the ARCON96 code (i.e., same as for the radiation dose calculations). NO_2 and dodecane were included, but nitrogen, argon, and hydrogen were not. Potential chemical effects at 100 m (site workers) and 5 miles (the public) were considered. The approach back-calculated the chemical quantities ("threshold quantities" or TQs) based upon each chemical's temporary emergency exposure limits (TEEL) (TEEL-3 for site worker and TEEL-2 for public) and chi/q. The anticipated chemical inventories for the MFFF were found to be below these TQs, and, by inference, chemical effects were dismissed. No analyses were presented for the worker. NRC staff also reviewed a subsequent document (35604-A) that considered nitrogen, argon, and hydrogen. The update also applied evaporation models for liquids, based upon 25°C, and a confined entry protection level of 15 percent oxygen for asphyxiants. Paradoxically, the analyses assumed a release of asphyxiants would not reduce the oxygen concentration below 15 percent for the site worker and public. The report noted a 17.55 kg/hr release of NO_2 via the MFFF stack. Again, the results indicated TQs would not be exceeded.

4. NRC staff inquired about updates to these documents, including the PHA and PAA. DCS responded that no further updates were planned and that HAZOPS have been initiated for the Integrated Safety Assessment of the MFFF. Only a few have been completed thus far. The staff briefly reviewed the HAZOPS for the oxalic mother liquor unit (DCS01-RRJ-DS-ANS-H-38327-A), which includes

an evaporator that would likely require controls for potential red oil phenomena. The document identified team disciplines but did not associate authors or team members with specific areas or reviews. A commercial software package assisted the HAZOPS process. The HAZOPS incorporated many assumptions excluding considerations and effects, such as radiolysis, chemical evolutions, and NOx. The HAZOPS identified 57 action items on the unit, with 14 directly related to the red oil phenomena. Significantly, only temperature control was considered for the red oil.

5. The HAZOPS for the other evaporators is planned to be performed next Spring.

6. The staff reviewed draft I&C documents concerning the oxalic mother liquor unit (no citations available). These displayed specific diagrams and information down to the component level. Significantly, only temperature control is indicated for the evaporator. Similar I&C documentation will be assembled for the other units containing evaporators in the Spring of 2001.

7. After reviewing the PHA and the PAA, the staff requested additional explanation on the red oil phenomena described in the PHA, PAA and other documents (e.g., RAI #123). In general terms, the applicant explained the need to control the concentrations of chemical species and to keep certain materials ("byproducts") out of the evaporator. NRC staff asked about the accuracy of the proposed temperature design basis of 135°C. The applicant responded that the temperature design basis was still accurate and included a margin (the actual temperature of concern was stated as 147°C), but the temperature limit included a consideration of several factors. The applicant noted, for example, that a solution at 60-70°C could undergo red oil reactions but the final temperature would not exceed 135°C (i.e., like an "effective" temperature). When asked for written documentation, the applicant stated that they had reviewed DOE and other related work, including the Tomsk-7 incident, and were comfortable with the 135°C design basis. NRC staff mentioned that the Tomsk-7 incident occurred at lower temperatures and appeared to involve more than just temperature, such as n-butanol, butanol nitrate, and separate phase(s), and that the proposed MFFF PUREX processing (in Aqueous Polishing) appeared to have more in common with historical PUREX processes than differences. NRC staff further commented that it seemed that more controls/design bases might be involved. NRC staff requested that the applicant justify their position in a formal letter submission with supporting references and calculations as appropriate, which DCS staff agreed to do.

8. From the review of DCS documents, NRC staff could not find additional information on the MFFF waste streams (i.e., RAIs 135, 140, and 143). In response to the NRC's query, the applicant provided draft tables on the waste streams and the appropriate waste acceptance criteria (WACs). The information was qualitatively descriptive, but did not indicate a clear coherence between the potential wastes and the WACs and the capability and willingness of SRS to accept them. The NRC noted that this information was needed to complete the design basis of the waste units and to verify that additional operations, such as tankage and processing (by evaporation, ion exchange, electrolysis, etc.), and their associated potential hazards, would not be needed. NRC staff requested DCS to provide a written summary that would include the following: 1.) an explicit comparison, at the component/radionuclide level, of expected MFFF waste and specific WAC requirements; 2.) copies of the referenced SRS WACs;

3.) a copy of the contractual clause requiring the DOE to accept waste from the MFFF; and 4.) copies of any correspondence and meetings minutes between DCS and SRS or DOE demonstrating communication on the waste subjects and likely future agreement and acceptance of the waste. DCS agreed to provide this documentation.

9. Design related activities (e.g., HAZOPS) are in progress concurrently with activities supporting the application. Some evolution in safety control philosophy and strategy, with potential changes in assumptions and design bases, may be occurring. Figure 5-1 in the MFFF Standard Review Plan, NUREG-1718, recognizes that design bases may change as design progresses. However, unless updated information is provided in writing to NRC by the applicant, the Safety Evaluation Report will be based upon design bases that are documented in written correspondence to NRC (i.e., application, RAI responses, letters).

The following are DCS commitments from in-office reviews:

1. Clarification/explanation of sintering furnace sensors, controls, and PSSCs related to hydrogen explosions (RAI #124);

2. Explanation of the applicant's interpretation of the red oil phenomena and justification for a temperature design basis of 135 °C (RAI #123);

3. Written comparison/analysis demonstrating the proposed MFFF facility's waste streams will meet SRS/DOE WACs, and assurance (at the functional level) from DCS, SRS, and DOE that the site can accept them in the expected quantities generated by MFFF operations.

In addition, the following DCS commitments were made during phone calls between DCS and NRC staff prior to the in-office review:

1. RAIs 135 and 140: provide information to demonstrate MFFF wastes will meet SRS/DOE WACs and the site has the ability to accept them without changes to the MFFF design basis (see 4 above);

2. 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 (related to 4 above);

3. RAI #123: provide information to support and justify the 135°C limit as the only design basis for the evaporators (see 3 above);

4. RAI #122: respond to NRC concerns about the approach for inerting hydrazine and solvent;

5. RAI #124: verify that pressure sensors will detect a hydrogen leak in the sintering furnace and will terminate hydrogen flow (related to 1 above);

6. RAI #123: provide information to support and justify the 135°C limit as the only design basis for the evaporators (see 3 above);

7. RAI #122: respond to NRC concerns about the approach for inerting hydrazine and solvent;

8. RAI #124: verify that pressure sensors will detect a hydrogen leak in the sintering furnace and will terminate hydrogen flow (related ti 1 above);

9. RAI # 204: estimate the number of high pressure cylinders in the facility and the annual usage.