November 6, 2001

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SUBJECT: OCTOBER 16-18, 2001, MEETING SUMMARY: IN-OFFICE REVIEW OF DUKE COGEMA STONE & WEBSTER CONSTRUCTION AUTHORIZATION REQUEST SUPPORTING DOCUMENTS FOR THE MIXED OXIDE (MOX) FUEL FABRICATION FACILITY

On October 16-18, 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 (MOXFFF) submitted by Duke Cogema Stone & Webster (DCS) on February 28, 2001. Upon arrival, a short introduction was held in which DCS presented a computer-generated walk-through of the proposed MOX fuel fabrication facility. Following the introduction, NRC staff reviewed information reviewed in the areas of heavy loads/material handling, safety analysis, fire protection, instrumentation and control (I&C), and quality assurance (QA). A summary for each technical area is provided below.

1. Heavy Loads/Material Handling

Supporting information reviewed consisted of the Preliminary Hazard Assessment (PHA), material transport systems, mechanical equipment, fluid systems, fluid transport systems, and the safety analysis chapter.

DCS staff answered questions regarding design basis and operation of the material handling process in the MP building. The information clarified the layout and the specific operation of the equipment. No new information was given to the staff that could be used in a safety evaluation.

DCS committed to provide clarifications related to material transport systems on the following topics:

A. The maximum lift height of a MOX fresh fuel package and "material handling controls."

B. Whether lessons learned from crane operation at similar European facilities will be incorporated into the MOXFFF design.

C. The release fraction for respirable plutonium.

D. The term "engineered equipment."

E. Provide examples of principal structures, systems, and components (SSCs) for material handing equipment.

DCS staff also answered questions about the process of the fluid transport system and other fluid systems that clarified the NRC's understanding of the design basis and operation of those systems. No new questions resulted from this review.

2. Safety Analysis

NRC staff reviewed the PHA performed by DCS for the MOXFFF. The PHA started with a what-if checklist approach to identify internal hazards associated with MOX processes. Consequence analysis were performed for each event and a determination was made as to whether the consequences were low, intermediate, or high for the facility worker, site worker, public and environment (low or intermediate only). For each credible event evaluated, a hazard evaluation was performed that listed the consequence category, possible preventive measures (if required) and possible mitigative measures (if required). DCS rolled-up the mitigative measures in terms of systems or functions into the summary tables in Section 5.5 of the CAR. DCS will clarify some scenarios in the load handling area and provide additional information to be used in the safety analysis and the load handling reviews.

Some of the information reviewed involves both the safety analysis and the individual technical disciplines. Technical information was reviewed by both the lead safety reviewer as well as the lead technical discipline reviewer during the in-office review. In some cases, discipline-specific information is included in both the safety analysis as well as the technical discipline discussions (e.g., fire protection). Information included in the safety analysis section of this summary has been coordinated with the individual technical disciplines.

Related to the review of fire protection documents such as the Fire Hazards Analysis (FHA), NRC questioned the adequacy of combustible loading controls alone to protect

various forms of plutonium that are not in fire-qualified containers. This included surveillance to augment the controls, fire modeling to demonstrate margin between available fuel loads and critical fuel loads, and the role of fire detection features not being credited. Further clarification on this issue will be provided by DCS.

With respect to worker safety, staff sought further clarification on the rationale being used for fire and other slow-acting events. More information on use of masks will be provided. 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.

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.

In addition, the following items will also be provided by DCS:

A. Additional information on the protection of the facility worker for the load handling event involving the final C4 filter within the C2 area. This will likely involve a revision to the response to Request for Information (RAI) 186.

B. Additional information to the response to RAI 135 to show that the waste transfer line is buried and, therefore, unlikely to be damaged by normal load handling activities.

C. Additional information regarding combustible loading controls and other fire prevention or mitigation features for areas containing 3013 canisters, fuel rods, and the final C4 high efficiency particulate air filter.

D. 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."

E. 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.

F. Clarify "Training and Procedures" and show that training and procedures are management measures, not principal SSCs; that the principal SSCs are the worker actions; and add information to radiological protection section regarding respirator procedures and codes.

G. Blank analysis sheets with headers from preliminary hazard assessment and other calculations to show information flow into and out of the safety analysis process

H. Information describing more clearly the relationship of the CAR Chapter 5 tables to the safety analysis flowchart provided in Chapter 5.

3. Fire Protection

NRC staff reviewed the Preliminary Fire Hazards Analysis, portions of the draft Fire Hazards Analysis that is currently under internal review by DCS, and the "Fire Vulnerability Evaluation of Polycarbonate Glovebox" report. NRC was provided copies of the Bergman and the Washington Group reports, which were not proprietary.

Based on review of the FHA (10/18/01), DCS agreed to provide the following:

A. Explanation that fire doors to the material transfer system are normally shut and only manually opened when material is transferred.

B. Confirm that process room cable trays are solid on top and on the bottom.

C. Basis for not allowing portable extinguishers in Rod Assembly Storage/handling areas due to as low as reasonably achievable (ALARA) concerns.

D. Clarification that areas with vertical openings or grated floors will be treated as one fire area.

E. Clarification that cementitious grouting used for vertical penetration will be appropriately rated.

F. Basis for using one sheet of polymethylmethacrylate (PMMA) as representative transient loading.

G. Revised paragraph clarifying the use of sprinklers in plutonium handling areas.

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.

Given that the use of fire severity analysis is controversial in that it may not be representative of an actual fire duration, other methods should be used to demonstrate that flashover is not reached, especially where severity times are close to the barrier rating. In other words, the analysis should demonstrate a larger factor of safety. As a result, DCS will consider performing additional fire analysis of bounding fires.

DCS explained the relationship of the polycarbonate report to the FHA, including the use of DOE-STD-1066 as input to the polycarbonate decision and will provide this explanation in a letter.

4. I&C

The staff surveyed some preliminary functional specifications and a architectural diagram of the control systems. DCS stated that the drawings were proprietary. The staff requested that the drawings be submitted for additional design basis understanding; DCS said they would determine if this is feasible.

In order to more fully understand the nomenclature being used by DCS, the consistency of the nomenclature in the CAR, the Chapter 5 tables and Chapter 11.6, were discussed. In clarifying the nomenclature, it was evident that the "process safety I&C system" in the Chapter 5 tables did not show that it contained the principal SSCs of "process safety control subsystem" and an "emergency control system." The tables also did not clearly show that the "manufacturing management information system (MMIS) computer system" in conjunction with the "process safety control subsystem" were used for criticality safety as discussed in Chapter 6 of the CAR. 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 discerned.

DCS indicated that the MMIS computer system, in conjunction with the process safety control subsystem, would meet Institute of Electrical and Electronics Engineers (IEEE) 603-1998 criteria. 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.

Subsequent to the visit to the DCS office, NRC staff also questioned the design basis for the seismic monitoring system. DCS agreed to review this matter and ensure that the design basis for the seismic monitoring system is addressed.

5. Quality Assurance

NRC staff reviewed the DCS planning and implementation of the MOX Project Quality Assurance Program (MPQAP) requirements for organization, program management, design control, procurement, document control, quality level (QL) categorization, and graded application of QA controls. The DCS organization responsibilities and assignments were reviewed. The process for and documentation of the master Work Task Agreement (WTA) which documents the MOX project and Savannah River Site (SRS) service, technical information exchange, and interface agreements were discussed with DCS QA and site management, and selected documentation was reviewed. The planning, schedule, and process for long-lead item procurement and the application of QA controls were discussed with the DCS procurement manager and QA manager. A review was made of the QL categorization of SSCs and application of

graded QA controls in the areas of fire protection, criticality control, I&C, and safety analyses, with particular attention to cross-cutting issues affecting several technical disciplines. DCS agreed to provide further clarification of the terminology for and categorization of criticality control SSCs as QL-1a and -1b.

Docket: 70-3098

cc:
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