DUKE COGEMA
STONE & WEBSTER

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U.S. Nuclear Regulatory Commission
Washington, DC 20555

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DCS-NRC-000078

Subject: Docket Number 070-03098
Duke Cogema Stone & Webster
Mixed Oxide Fuel Fabrication Facility
Request for Withholding Information From Public Disclosure - Non-Proprietary

Reference: (1) P. S. Hastings (DCS) letter to Document Control Desk (NRC), DCS-NRC-000077, dated 20 December 2001, *Request for Withholding Information From Public Disclosure*

(2) M. F. Weber (NRC) letter to R. H. Ihde (DCS) dated 21 November 2001, *Request for Withholding Information From Public Disclosure, Response to Request for Additional Information (DCS-NRC-000060) dated August 31, 2001 (Mixed Oxide Fuel Fabrication Facility)*

(3) P. S. Hastings (DCS) letter to Document Control Desk (NRC), DCS-NRC-000060, dated August 31, 2001, *Response to Request for Additional Information*

This letter provides the amended, non-proprietary responses to the request for additional information discussed in Reference 1. Reference 1 responds to Reference 2, regarding information originally designated as proprietary in Reference 3.

Enclosure 1 contains the non-proprietary information, which need not be withheld from public disclosure.

If you have any questions, please contact me at (704) 373-7820.

Sincerely,

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Enclosure 1

Non-Proprietary Responses to Request for Additional Information

123. Section 8.7, pp. 8.22 and 8.23

Describe and explain the process safety controls for evaporators containing tributyl phosphate (TBP).

Section 8.3 of the SRP states, "Information contained in the application should be of sufficient quality and detail to allow for an independent review, assessment, and verification by the reviewers. Some information may be referenced to other sections of the application , or incorporated by reference, provided that these references are clear, specific, and essentially complete." SRP Section 8.4.3.1 states that an application would be acceptable if it addresses the baseline design criteria for chemical safety and includes information on the chemicals, process, equipment, inventories, ranges, and limits. At the construction permit stage, this would be expected to include design bases and values for these items, with sufficient system description to allow verification of the design bases and values. Sections 8.4.3.5 B, C, D, and F recommend that design bases, process safety features, and IROFS be included in the application.

In Section 8.7, "Chemical Process Safety Design Basis," there is a brief statement that principal SSCs include the Process Safety Instrumentation and Control System to ensure that evaporator process temperature conditions do not exceed 275 F (135 C) in the presence of TBP. The reader is referred to Section 11.6 for details. Section 11.6 provides the general approach and codes and standards. Design basis functions and values are not included. Such information is needed before a safety determination can be made. For example, the NRC would anticipate that, in addition to temperature, there would be a design basis for determining the presence of TBP, design basis event(s), and a reliability requirement for the system (including the controllers and the sensors).

Response:

They will ensure the steam temperature is maintained below 135°C. Specific setpoint analysis will be performed as part of final design. The response to Question 39 provides information related to reliability and likelihood. Specific IROFS will be identified and described in the ISA.

Action:

None

124. **<u>Section 8.7, pp. 8.22 and 8.23</u>**

Describe and explain the process safety controls for hydrogen and hydrogen/argon gas mixtures.

Section 8.3 of the SRP states, "Information contained in the application should be of sufficient quality and detail to allow for an independent review, assessment, and verification by the reviewers. Some information may be referenced to other sections of the application, or incorporated by reference, provided that these references are clear, specific, and essentially complete." SRP Section 8.4.3.1 states that an application would be acceptable if it addresses the baseline design criteria for chemical safety and includes information on the chemicals, process, equipment, inventories, ranges, and limits. At the construction permit stage, this would be expected to include design bases and values for these items, with sufficient system description to allow verification of the design bases and values. Sections 8.4.3.5 B, C, D, and F recommend that design bases, process safety features, and IROFS be included in the application.

In Section 8.7, "Chemical Process Safety Design Basis," there are two brief statements that principal SSCs include the Process Safety Instrumentation and Control System to:

> "Ensure that a non-explosive mixture of hydrogen/argon is introduced into the MOX Fuel Fabrication Building."
>
> "Ensure that the flow of hydrogen is terminated prior to the attainment of explosive conditions."

The reader is referred to Section 11.6 for details. Section 11.6 provides the general approach and codes and standards for control systems. Design basis functions and values are not included. Such information is needed before a safety determination can be made. For example, the NRC would anticipate that there would be a design basis for determining the presence of hydrogen, the hydrogen ratio, presence/absence/quantity of flow, values and ranges, and reliability requirements (for sensors, controllers, and the system).

Response:

The design bases indicated in the CAR are implemented as follows:

- The H_2 content outside the furnace will be maintained equal to or less than 25% of the LEL in air.

Additional design information is provided below.

CAR Section 11.9.2.2 describes the Argon/Hydrogen System function, operation, major components, control concepts, and system interfaces.

The hydrogen distribution system will be designed and operated following the recommendations of NFPA 50A, "Standard for Gaseous Hydrogen Systems at Consumer Sites."

The design of the sintering furnace, including the electrical heating system, gas supply, mixing system, and flow controls and piping system will comply with the safety requirements of NFPA 86C, "Standard for Industrial Furnaces Using a Special Processing Atmosphere."

Argon/hydrogen mixtures are potentially flammable above a mixture of 94.2% argon and 5.8% hydrogen in the presence of air based on *Accidental Explosions* by Louis Medard.

Each process room containing a sintering furnace is equipped with hydrogen detectors, which terminate argon/hydrogen flow (and initiate 100% argon flow) if hydrogen content in the room exceeds 25% of the LEL in air (1% hydrogen).

Note that the feed from the backup argon/hydrogen supply and the feed of pure argon is not designated as a principal SSC. These features provide additional processing capability and equipment protection. Specific IROFS will be determined during detailed design and described in the ISA.

See the response to Questions 144 and 208 for additional information on the argon/hydrogen system.

Action:

In the next update of the CAR, revisions to Section 11.9.2.2 to include this response will be provided.

140. Section 11.3, General

Explain the flow path and disposition of the impurities (primarily americium, gallium, and uranium) in the plutonium.

Section 8.3 of the SRP states, "Information contained in the application should be of sufficient quality and detail to allow for an independent review, assessment, and verification by the reviewers. Some information may be referenced to other sections of the application , or incorporated by reference, provided that these references are clear, specific, and essentially complete." SRP Section 8.4.3.1 states that an application would be acceptable if it addresses the baseline design criteria for chemical safety and includes information on the chemicals, process, equipment, inventories, ranges, and limits. At the construction permit stage, this would be expected to include design bases and values for these items, with sufficient system description to allow verification of the design bases and values. Sections 8.4.3.5 B, C, D, and F recommend that design bases, process safety features, and IROFS be included in the application.

The aqueous polishing removes impurities (primarily americium, gallium, and uranium) from the plutonium. Tables 11.3-27 and 11.3-28 list some of the impurities, including values for maximum content and maximum exceptional content. It would be beneficial to have an explanation of the two terms "maximum content" and "maximum exceptional content." The flow path and intermediate accumulation locations of these impurities are not clear in Section 11.3, along with their disposition. A description of the flow path and disposition of these impurities, and their associated design bases and values, is needed before a safety determination can be made.

Response:

The maximum impurity content means the value that will not be exceeded on a routine production basis by PDCF. This impurity content will be checked and confirmed for each can of plutonium oxide received from PDCF.

The maximum exceptional impurity content is the value that the process can accept for a single impurity exceeding the maximum content and all other impurities being in the maximum impurity content range. This exceptional maximum value can be accepted by MFFF after notice from PDCF that the impurity content will exceed the maximum value but remains in the range of the maximum exceptional content, and the total impurity content does not exceed the maximum agreed total value. The decontamination factor of the purification cycle permits this maximum exceptional impurity content. The polished plutonium oxide will remain in agreement with the MFFF MOX fuel specification.

The impurities in the plutonium oxide are removed by an aqueous extraction process, in which the plutonium oxide is first dissolved in nitric acid and silver to form a fully dissolved nitrate solution. In the next step, an organic solvent is used to selectively extract the plutonium and uranium salts, leaving the other impurities behind in the acid solution. The acid solution is then separated for reuse, concentrating the impurities in the bottoms of the first evaporation column. The bottoms are then processed in an electrochemical cell to remove the silver that is reused in dissolution and to transfer the americium and gallium to temporary storage.

The uranium is separated from the plutonium in a subsequent aqueous reduction step in which the uranium (containing 30% U-235) remains in the organic liquid and the plutonium is transferred in the aqueous solution for further processing. The uranium is separated from the solvent with nitric acid solution and is subsequently transferred to waste storage where it is diluted to less than 1% U-235 using depleted uranium solution containing 0.25% U-235. The isotopically diluted uranium solution is combined with the other high alpha waste in temporary storage in the BAP.

After testing, the high-alpha liquid waste is transferred via a pipeline to SRS for treatment using their existing waste treatment plan.

Action:

None

144. Section 11.4.1.2, pp. 11.4-1 thru 11.4-4

Provide a discussion of how the confinement system concepts in this section are applied to the sintering furnace. Provide justification for not enclosing the furnaces in gloveboxes to prevent releases to areas normally occupied by personnel.

Regulatory Guide 3.12, "General Design Guide for Ventilation Systems of Plutonium Processing and Fuel Fabrication Plants," states that ventilation systems should confine radioactive materials and prevent uncontrolled releases into room and areas normally occupied by personnel. The sintering furnaces are presented as static barriers without being enclosed by gloveboxes. Since the sintering furnaces operate at a positive pressure to maintain the reducing environment needed for reliable operation, any release from the sintering furnace would be discharged directly to an area normally occupied by personnel.

Response:

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.

Action:

None