

January 28, 2009

MEMORANDUM TO: Peter J. Habighorst, Chief
Fuel Manufacturing Branch
Fuel Facility Licensing Directorate
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

FROM: Rafael L. Rodriguez, Project Manager **/RA/**
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SUBJECT: SUMMARY OF SITE VISIT TO AREVA NP, INC. RICHLAND,
WASHINGTON FACILITY TO SUPPORT SAFETY REVIEW OF
CO₂ LICENSE AMENDMENT APPLICATION

The staff from the Division of Fuel Cycle Safety and Safeguards participated in a site visit to the AREVA NP, Inc. (AREVA) facility in Richland, WA. on December 8 through December 11, 2008. The purpose of the visit was to discuss issues (see enclosure) and to clarify questions that the U.S. Nuclear Regulatory Commission staff had with respect to the information in the AREVA license amendment application for the proposed CO₂ extraction process.

Enclosure: Summary of Site Visit to AREVA

Docket No.: 70-1257
License No.: SNM-1227

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**SUMMARY OF SITE VISIT TO AREVA NP, INC., RICHLAND, WA FACILITY
IN SUPPORT OF CO₂ LICENSE AMENDMENT APPLICATION**

(DECEMBER 8 – 11, 2008)

AREVA NP, Inc. (AREVA) Representatives: Robert E. Link, Loren J. Maas, Calvin D. Manning, Murphy Carmichael, Sydney Koegler, Konrad Kulesza, and Steve Lockhaven

U. S. Nuclear Regulatory Commission (NRC) Representatives: Rafael L. Rodriguez, Merritt N. Baker, Alex Murray, Blake Purnell

The staff of the Division of Fuel Cycle Safety and Safeguards met with AREVA's technical staff to discuss the information in AREVA's license amendment application for the supercritical carbon dioxide (CO₂) extraction process. The following issues were discussed during the site visit:

a) Chemical Safety

The AREVA staff stated that CO₂ and Heating, Ventilation, and Air Conditioning detectors are items relied on for safety (IROFSs) and the vessels and piping will be constructed to the American Society of Mechanical Engineers (ASME) Code, Section VIII, Division 1. There are no process accident sequences that trigger the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) for individuals outside the controlled area boundary (i.e., the public). Additionally, the inspection of the area proposed for the CO₂ process indicated no accident scenarios involving interactions with the existing facility hazards that would trigger the requirements in 10 CFR 70.61. The principal outstanding issues involve the high pressure hazards, at the facility, that are due to the nominal pressure of 3,000 psig of the CO₂ process. AREVA identified the design and ASME Codes referenced in the license amendment application as the basis for the likelihood of various accident sequences involving these components as being "highly unlikely." However, the design and ASME codes are not identified as IROFS by AREVA. The NRC staff raised a concern about the reliance on elements (e.g., design and codes) beyond AREVA's control to ensure compliance with the requirements in 10 CFR 70.61, thus making it difficult for the NRC staff to accept it as a safety strategy. The NRC staff recommended that AREVA specify if the components will be the IROFSs and if the design/codes will be part of the Management Measures Program.

b) Integrated Safety Analysis (ISA)

AREVA conducted laboratory-scale testing and intermediate-scale testing to support their conclusions that the process was safe at a commercial scale. The NRC staff also discussed the accident sequences in the ISA Summary. For the leak scenario in the CO₂ ISA Summary, AREVA is relying on ASME codes and standards to render the sequences "highly unlikely," thus not requiring IROFSs. The NRC staff disagreed with AREVA on this approach, and stated that it should be reviewed in the context of the NRC-approved methodology described in the ISA Summary on October 25, 2007. The NRC staff also inquired about calculations of consequences to the public. The licensee produced the calculation books from the ISA during

Enclosure

this site visit, including uranium release and Airborne Release Fraction. These will be input to the Radiological Assessment System for Consequence Analysis code, with a split into the hydrofluoric acid fraction and insoluble uranium fraction. The NRC staff then inquired about engineering standards for piping and electrical equipment. AREVA stated that they would use the standards in the American National Standard Institute B31.1 (for piping) and the National Electrical Code (for electrical equipment).

c) Nuclear Criticality Safety

During the site visit, the AREVA staff clarified that nuclear criticality safety (NCS) evaluations have not yet been conducted for the new process, beyond what is currently in the license amendment application. The license amendment application indicates that there are two IROFSs designated for the unfavorable geometry ash preparation equipment. The NRC staff indicated that it was not apparent that these IROFS could independently prevent a nuclear criticality accident. The AREVA staff indicated that this equipment would likely require frequent cleanout and this may be a means to provide an additional control on mass.

AREVA discussed its hot water heating system. It indicated that the hot water heater is located near the process and will have a favorable geometry. Coils will be used to transfer heat to the process vessels. Due to the nature of the process, it is expected that some ash, containing uranium dioxide, will carry over to the process columns. AREVA indicated that it did not have a means for ensuring that the long-term accumulation of ash in the process columns would not exceed a specified limit. A few of the columns rely on the assumption that the concentration of uranium dioxide will not exceed a certain limit. AREVA indicated that the inside diameter of these columns would be favorable geometry for any concentration of uranium dioxide. The AREVA staff stated that it may need to conduct periodic inspections of the columns to ensure that any corrosion would not affect the favorable geometry of the columns.

It was noted that the NCS evaluation summary, included in the license amendment application, only used water as the moderator for the calculations. AREVA assumes that using water as the moderator in its NCS evaluations would bound any moderating effects of the actual process chemicals. AREVA stated that it had not performed an evaluation to verify this assumption.

There was also a discussion on how AREVA distinguishes design features from IROFSs. It was noted that the license amendment application identified a number of accident sequences as “highly unlikely” or “not credible” due to certain design features, without designating these design features as IROFSs. An example of such a design feature is certain equipment with favorable geometry. AREVA indicated that this practice was in effect when its ISA Summary was approved on October 25, 2007. AREVA indicated that it did not declare something as an IROFS when there was no credible mechanism for causing an accident other than the failure of its Configuration Management Program.

d) Management Measures

AREVA clarified that its Management Measures Program, as described in the license renewal application and the responses to the NRC’s requests for additional information, will be implemented for the proposed CO₂ extraction process. Specific elements of the proposed process (i.e., IROFS, training, procedures, etc.) will be managed and tracked using the current program.

AREVA will develop a qualification program as a requirement to work with the CO₂ process, and the individual will be re-qualified every two years. If there are changes to any procedure or aspects of the process, the individual will be re-trained on the specific change.

AREVA will use Engineering Change Notices (ECNs) to manage changes to any components of the CO₂ process. AREVA is also using a Change Evaluation Form (CEF) to evaluate how changing a component of particular equipment may affect the function of the equipment. The CEF also allows AREVA to determine if the replacement part will perform at the same level as the original part.

Several components and equipment for the CO₂ process will be built to certain codes and standards, such as the ASME Code, Section VIII, Division 1. Inspection activities for these components and equipment will be conducted by State inspectors in accordance with the State of Washington Code Inspection program. Additionally, AREVA will conduct daily visual inspections of the process vessels for any indication of corrosion, degradation, or any other anomalies.

e) General Information and Decommissioning

AREVA will commission the start-up and operation of the proposed CO₂ process through the use of ECNs. The Plant Projects function will handle the design, construction, installation, and modifications of the CO₂ process. The Operations function will be responsible for start-up activities and actual operations. Start-up activities will be overseen by a Start-up Council. The NRC staff inquired how the proposed process would affect future decommissioning activities. AREVA stated that the estimated decommissioning cost, as described in the current Decommissioning Funding Plan (DFP), would increase. The DFP will be revised to reflect the additional items associated with the proposed process (i.e., volume of equipment, labor costs, etc.). These revisions will be reflected in the DFP update scheduled for December 2011.