

Memorandum

DATE: MAY 15 2007

REPLY TO
ATTN OF: EM-60 (Chung, 202-586-5151)

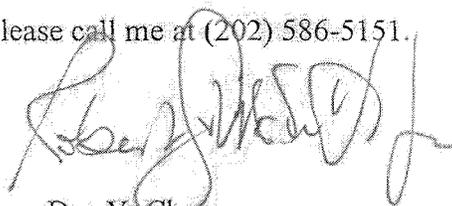
SUBJECT: Request of October 26, 2006, Memorandum for Concurrence with Recommendation of the Defense Nuclear Facilities Safety Board (DNFSB) 2004-2 3013 Container Surveillance and Storage Capability (CSSC) Project Ventilation System Evaluation Report

TO: Jeffrey M. Allison, Manager, Savannah River Operations Office

The report is approved with the considerations listed below. This approval is based on review of the information included in the subject report, evaluation by the Office of Environmental Management (EM) representative on the Defense Nuclear Facilities Safety Board (DNFSB) 2004-2 Independent Review Panel, subsequent information gathered and reviewed with the EM Fire Protection subject matter expert, and input from the Office of the Chief of Nuclear Safety.

- 1) Savannah River Operations Office commits to meeting at a minimum the Safety Significant design and evaluation criteria contained in the DNFSB 2004-2 Evaluation Guidelines.
- 2) Design evaluations continue at Savannah River that will establish the final safety status of the Container Surveillance and Storage Capability (CSSC) Fire Protection and Active Ventilation Systems.
- 3) Design will continue to be evaluated and safety demonstrated as part of the continuing critical decision and safety basis activities associated with the project.
- 4) Savannah River will continue their reviews of assumptions made for fire and criticality scenarios associated with the CSSC to include the potential for expanded 3013 fire safety tests.

If you have any further questions, please call me at (202) 586-5151.



Dae Y. Chung
Deputy Assistant Secretary for
Safety Management and Operations
Environmental Management

Memorandum to Jeffrey M. Allison, SRO, from Dae Chung, EM 60
 Subject: Request for Concurrence with Recommendation of the Defense Nuclear
 Facilities Safety Board (DNFSB) 2004-2 3013 Container Surveillance and
 Storage Capability (CSSC) Project Ventilation System Evaluation Report

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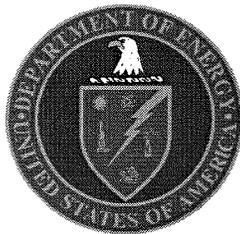
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CONCURRENCES		
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INDEPENDENT REVIEW REPORT

CONTAINER SURVEILLANCE AND STORAGE CAPABILITY

May 2007



BACKGROUND

On December 7, 2004, the Defense Nuclear Facilities Safety Board (DNFSB) issued Recommendation 2004-2, *Active Confinement Systems*. Recommendation 2004-2 noted concerns with the safety system (safety-class or safety-significant) designation strategy utilized in or planned for several facilities to confine radioactive materials during or following accidents. The Board's main issue is that for the purpose of confining radioactive materials through a facility-level ventilation system, safety system designation should be based on the active safety function (forced air through a high efficiency particulate air (HEPA) filter system). The DNFSB is concerned that a passive confinement safety function may not be as effective as the active safety function in a few postulated accident scenarios.

On March 18, 2005, the Secretary accepted DNFSB Recommendation 2004-2. On August 22, 2005, the Department of Energy (DOE) forwarded its Implementation Plan (IP) for this recommendation to the DNFSB. The DNFSB accepted the Department's IP on September 19, 2005. On July 12, 2006, the DOE forwarded a revised IP to the DNFSB which was accepted by the DNFSB on March 13, 2007. The DOE IP contains the methodology for systematically reviewing current or proposed ventilation systems at each of the sites. That methodology was established as the *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related Systems* and was further amplified by issuance of an addendum on March 6, 2007. The evaluation process was first piloted at several facilities prior to DOE-wide implementation. This review is subsequent to the pilot reviews and is for a project in the preliminary design phase following approval of critical decision (CD)-1, Conceptual Design. This facility review was added to the Environmental Management (EM) high priority reviews in order to meet early project timeline requirements.

FACILITY OVERVIEW

The Container Surveillance and Storage Capability (CSSC) project will be located in the existing K Area Material Storage (KAMS) Facility in what was previously the "final storage" and "presentation" areas. The facility will be a Hazard Class 2 (HC-2) facility. The purpose of the CSSC project will be to provide Non-Destructive Evaluation (NDE) and Destructive Evaluation (DE) as required by DOE Standard 3013 in addition to a storage capability. NDE surveillance will involve unpacking 3013 containers from 9975 shipping packages or removal of 3013 containers from the storage area for subsequent NDE or DE. NDE will include radiography, prompt gamma measurement, external visual inspection and measurement, weight measurement, and radiological control operations (RCO) surveys. DE will be performed in a glovebox to obtain samples for subsequent analysis in a facility outside of K area. Following DE, the project provides capabilities for restabilization, repackaging, and recertification of 3013 containers. Any anomalies from NDE surveillance would be resolved by use of the equipment for the DE process.

The project layout consists of two main areas: the 3013 container storage area, and the process area. The storage area, constructed with SC/Performance Category (PC)-3 three-hour fire rated concrete walls that form a fire area, may contain approximately 1900 3013 containers stored in Safety Class (SC) racks. The storage area will be strictly controlled to preclude introduction of any significant combustible loading or ignition sources. The process area will contain the NDE, DE, glovebox, and restabilization/repacking equipment. The process area will also be located within a three-hour fire rated SC/PC-3 concrete walled structure adjacent to the storage area. The process area will also have SC/PC-3 interior walls with at least a two-hour fire rating creating smaller fire areas. The glovebox will be functionally classed as SS/PC-2 to protect the facility worker (FW) and is expected to function as primary confinement to a PC-2 level. The glovebox will use a dry air supply with manual Mg Oxide sand fire suppression and SS automatic CO₂ fire suppression. The exhaust ventilation for the glovebox will be through the main project area active confinement ventilation system (ACVS) with in-place testable HEPA filters provided on the glovebox exhaust to minimize contamination of the exhaust duct and main HEPA filters.

The consolidated hazards analysis process (CHAP) identified several events with the potential for radionuclide release. The most significant was a fire induced over-pressurization of the 3013 container which is postulated to result in a pressurized release of Pu Oxide. The conservative unmitigated off-site dose from this event was analyzed to be about 1.3 Roentgen Equivalent Man (REM) per 3013 container (assuming 4.4 kilograms of Pu per container). The storage area may contain approximately 1900 3013 containers. However, SC storage racks, SC fire barriers, SC structural protection, and SS¹ fire suppression ensure that a significant fire or criticality resulting in 3013 container failures in the racks is not credible. A failure of a single 3013 container outside the racks is prevented by the facility SS¹ fire suppression. In the entire project area, up to five 3013 containers² are postulated to be at risk from a hypothetical accident involving all process areas simultaneously. This accident is thus postulated to result in an off-site dose of about 6.5 REM with significant on site consequences to the co-located worker (CW) warranting PC-3 designation for prevention and mitigation systems. Waste and glovebox holdup may add slightly to this.

INDEPENDENT EVALUATION

An independent review of the evaluation conducted by the Savannah River Site (SRS) Site Evaluation Team (SET) was conducted for the Office of Environmental Management. This review concentrated on assuring compliance with the requirements of the DNFSB 2004-2 Evaluation Guidelines and Supplemental Guidance. As a new construction project approaching CD-2, CSSC has committed to meeting the DNFSB 2004-2 ACVS Evaluation Guidelines. Therefore, due to the non controversial status of

¹The original CSSC evaluation report indicated the presence of a SC fire protection system. Further review and consideration as discussed later in this report has reduced the classification of the fire protection system to SS.

² However it is highly unlikely that more than two 3013 containers will be present in any single fire area at any point in time.

the CSSC review, the involvement of the complete IRP as designated in DNFSB 2004-2 was considered not to be necessary. The SRS SET fully documented the intended compliance with DNFSB 2004-2 in their facility evaluation and the current compliant status of the preliminary design.

However, as a result of simultaneous reviews beyond the DNFSB 2004-2 review being conducted by EM staff on fire protection design and project costs, a site visit was conducted by the EM DNFSB 2004-2 lead and the EM lead fire protection engineer. The major consideration of this site visit, beyond familiarization with the project and project integration into the existing KAMS Facility, was to review the current project selection, as described in the CSSC DNFSB 2004-2 report, of a SC gas discharge fire protection system integrated with the SS ACVS to satisfy the DNFSB 2004-2 evaluation guidelines. Beyond the selection of the SC gas fire protection system over a conventional water system, the review also concentrated on assumptions made in the CHAP for the CSSC. Extremely bounding fire accident assumptions utilized to make project decisions were reviewed and challenged.

Subsequent to the site visit, the CSSC project and SRS site reevaluated project decisions with respect to project assumptions, process restrictions, and available control strategies and presented their new position to EM which will be used in developing the CD-2 package. The current CSSC project position has resulted in the use of a SS gas discharge fire protection system integrated with the SS ACVS. Notwithstanding this change, the project continues to commit full compliance with the DNFSB 2004-2 Evaluation Guidelines for the selected strategy. The CSSC report and review documentation along with this report were provided for final consideration by the PSO and CTA in order to support their conclusions with respect to compliance of the CSSC with the provisions of DNFSB 2004-2.

INDEPENDENT RECOMMENDATION

It is recommended that the PSO and CTA accept the CSSC ACVS evaluation and commitment to meet the provisions of the DNFSB 2004-2 Evaluation Guidelines. The CSSC project is in preliminary design and as illustrated in the independent evaluation above continues to undergo changes in programmatic assumptions and design. As a new project, compliance with DNFSB 2004-2 Evaluation Guidelines will be finalized through formal design reviews and review and acceptance of project safety basis documentation. Verification of continued compliance with the provisions of DNFSB 2004-2 must continue to be emphasized during subsequent project reviews and critical decisions.