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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

May 10, 1994

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: Michael J. Merritt

Subject: Savannah River Site (SRS), F-Canyon Systems Configuration Control Trip Report, March 21-22, 1994

1. **Purpose:** This trip report documents a DNFSB staff review on the control and documentation of piping changes in the SRS F-Canyon. The visit included DNFSB Staff member Michael Merritt and outside expert Ralph West during the period March 21-22, 1994.

2. **Summary:** The team reviewed the process for making piping configuration changes and the two most recent inadvertent transfers in F-Canyon caused by canyon piping alignment procedural problems, both of which had occurred in November 1991.

   A review of these two previous occurrences revealed that the first was caused by specifying an incorrect gang valve number in the procedure. The second was caused by using a normal procedure for a transfer before the piping alignment had been restored to the standard configuration after a previous evolution. In both cases various reviews and walkthroughs, intended to catch errors prior to the evolutions, failed to identify the problems before the occurrences. In the second occurrence, one reviewer did note a potential problem in the existing piping configuration, but no action was taken concerning his comment. In response to these occurrences WSRC took several administrative actions to ensure procedural development, pre-evolution reviews, and walkthroughs were more disciplined and provided improved accountability.

   The F-Area Engineering Manager and the F-Canyon Systems Engineer Manager of the Westinghouse Savannah River Corporation (WSRC) described their process to develop and review procedures and ensure operational control of piping changes. However, a review

of F-Canyon directives and work documentation showed that significant differences existed between the described process and the actual performance and documentation of piping changes. Additionally, overall program guidance was lacking and many administrative actions were not being accomplished in a thorough, disciplined manner.

3. **Background:** The F-Canyon facility processes nuclear fuel targets by solvent extraction to remove highly radioactive fission products and retrieve residual uranium and plutonium for future use. The general layout of the building is based on two parallel canyons, 15 feet wide at the bottom, 30 feet wide at the top and separated by a center section of four operating and office space levels. Each canyon is sized for a single row of process tanks. There are 14 sections in a canyon, each of which contains standard piping runs and wall nozzles. Pipe jumpers are used to effect connections from wall nozzles to vessel, pipe rack to vessel, and vessel to vessel as required by the process. Pipe in the canyons is fitted with coupling connections for remote installation and removal using the canyon cranes. The status of installed canyon piping is maintained on a system diagram which is referred to as the "scroll".

4. **Discussions/Observations:** A piping alignment change and transfer evolution requires a procedure prepared by crane operations personnel, a process procedure prepared normally by an engineer, a Design Authority Technical Review performed by an engineer, an Unreviewed Safety Question Screening done by an engineer, a lockout/tagout order prepared by crane personnel and the review and approval of these documents by operations and/or engineering managers. Each of these documents has a separate guiding directive which does not refer to other elements of the process. During discussions, personnel were unsure of some directive requirements and the application of some sections of existing directives. The results of a review of selected packages is provided in Attachment 1.

   The lack of clear guidance and discipline in developing, reviewing, approving and documenting actions concerning these procedures indicate that the lessons learned have not been effectively addressed. This failure to ensure continued accomplishment of actions deemed necessary as a result of earlier occurrences raise significant concerns as to the possibility of future inadvertent transfers under conditions similar to the previous ones. A more structured system that encompasses requirements for creating work packages with all elements of the proposed activity, maintaining independence of review, and documenting reviews thoroughly are essential to ensuring continuing safe accomplishment of F-Canyon piping changes.

   a. Review of Occurrence Reports: The two most recent occurrences, which occurred in November 1991, dealing with inadvertent discharges caused by control of canyon piping configuration were reviewed and are discussed below.

      1. An inadvertent transfer of un-neutralized waste to waste management occurred in

the morning of November 11, 1991. A special piping procedure specified the use of an incorrect Gang Valve. The review, walkthrough and approval process for the special procedure failed to detect the incorrect transfer path. The warm crane operator aligned the piping in accordance with the procedure and updated the canyon scroll, but did not recognize the incorrect transfer path. The special process procedure incorporated the incorrect flowpath alignment of the piping procedure. The procedure review, walkthrough and approval process failed to detect the incorrect transfer path. The transfer was effected using the process procedure with the result that un-neutralized radioactive liquid waste was transferred to an improper tank. The error was recognized prior to environmental discharge and thus had no effect on either health or the environment.

The direct and root causes of this occurrence is lack of proper supervision. The special procedures specified an improper flow path, received ineffective review and verification and received inadequate walkthrough. Corrective action consisted of strengthening the process of preparing and reviewing special procedures and increasing the accountability for accuracy of the personnel involved in procedure development and review.

2. An inadvertent discharge of vessel 6.8 material to vessel 7.8 occurred while performing a special procedure to transfer this material to 241-F in the morning of November 18, 1991. The planned route was the normal route of material movement from 6.8 and the special procedure writer was unaware that this route had not been reestablished after a previous operation. The operator conducting the initial walkthrough noted that the routing was incorrect, but the procedure writer did not add this information to the procedure as a verification to the procedure. The error was not noted during a second walkthrough and the procedure review and approval. Operating positions were not properly labeled.

   The direct and root cause of this occurrence is inadequate procedures. The special procedure used by control room operators did not have a step verifying the route was in place. In addition, engineering reviews and walk-throughs failed to identify the incorrect pipe route.

b. Briefings, Discussions and Directives Review. The DNFSB team was briefed concerning piping configuration control for piping in the warm and hot sides of F-Canyon. A lockout order, a piping procedure, and a process procedure are prepared to describe the conditions required for making a change, the method for making the change and the process to use the realigned piping to accomplish movement of fluid in a canyon. The procedures and lockout order are reviewed by an engineer, walked-down by operations personnel and approved by an operations and engineering manager. The approved lockout order and piping procedure are executed by canyon

personnel as scheduled by the Canyon Operations Manager. The procedures reviewed all included an initial step to obtain the supervisor's permission to begin the procedure. The control room scroll, and motor control center and gang valve corridor tagging are updated as a step in the piping procedure. This overview of the process appeared logical, but examination revealed the lack of any integrating directive or reference between the multiple documents providing direction which resulted in several problems. The following paragraphs describe the various directives applicable to configuration control and the problems noted:

1. Standard Operating Procedure (SOP) 221-F-50606, *Crane Special Procedure Preparation and Use* describes the methodology for preparing and using crane special procedures to make piping changes in the Canyons. This SOP defines the term "crane knowledgeable personnel" and requires that operations personnel meeting the definition author and walkdown crane special procedures. The SOP provides guidelines for authors and approvers concerning procedural requirements to be included in special procedures for conduct of the operation, control room scroll updating, leak check requirements, step-by-step completion verification documentation, and specific responsibilities of the crane operator and supervisor with respect to verifying the procedure establishes the intended route and all steps have been completed.

2. The authority for writing the process instructions is the Conduct of Operations 2S Manual Procedure 1.1, *Procedure Administration*. This manual was published in January 1994. The manual which was applicable prior to that date was not available for comparison with the procedures reviewed. Only one procedure was reviewed with a date after the issuance of the new manual. This procedure does not comply with the 2S Manual procedure, primarily in the area of required reviews and the documentation of reviews. The new manual appeared to state that process procedures should not be special procedures. Discussions with F-Canyon managers revealed that the current 2S Manual Implementation Plan does not include plans and a schedule for adhering to this new procedure. Meetings are scheduled in the immediate future to develop an implementation schedule for procedure administrative to be included in the existing Implementation Plan.

3. Manual E7 Procedure 3.14, *Design Authority Technical Reviews* (DATR), establishes requirements for technical reviews by a Design Authority to ensure that proposed activities are systematically evaluated, documented, validated and approved prior to implementation. This directive is applicable to the review of special procedures since these constitute major changes to facility operating procedures. A Design Authority Engineer is appointed to conduct a technical review using the guidance in an attachment of the Manual E7 procedure and to complete a report using the format of another attachment of the procedure. The

report format is primarily a checklist of items to ensure that the proposed activity documentation has adequately addressed the item. If the item has been adequately addressed and no adverse impact exists, "NO" is checked. If an adverse impact exists, "YES" is checked and the adverse impacts are detailed in a comment section of the report. The 3.14 Procedure requires that the Design Authority Engineer "Have not directly participated in the preparation of the proposed activity to be reviewed." A review of completed DATRs identified several occasions where the DATR and process procedure were done by the same person in violation of the 3.14 procedure. The Engineering Manager stated that this was recognized and a change was being prepared to remove this requirement for independent review.

4. The 3.14 Procedure also requires copies of all documents generated during the review including all comment sheets be attached to the DATR when it is forwarded to the Design Authority for approval. The engineering personnel at the facility have interpreted this to apply only to official comments received when the reviewer needs additional assistance and expertise to perform the review. The procedure also requires that this entire package be retained. The DATR documentation reviewed by the DNFSB team did not include any supporting documentation and many checklists did not have engineer or manager approval signatures. The team was informed that no signed copies could be found. Conversations with engineering managers indicated that supporting documentation as required by the procedure was not normally forwarded with the DATR for approval. This raises questions about the thoroughness of the review and the extent and effectiveness of managements review for approval.

5. For each proposed activity an Unreviewed Safety Question (USQ) Screening is completed in accordance with Manual 11Q Procedure 3.10, *Nonreactor Nuclear Facility Unreviewed Safety Questions*. An engineer is assigned as Safety Evaluation Originator (SEO) to conduct a screening using a form in the procedure. If the screening results in a determination that a USQ safety evaluation is not required, then a Qualified Reviewer (QR) reviews the screening. If the QR agrees with the results, the QR signs the form and returns it to the SEO to retain with the proposed activity documentation in accordance with program-specific documentation. If either the SEO of QR determine that a USQ Evaluation is required, then such action is initiated in accordance with Procedure 3.10. Despite the procedural requirement to retain screening documentation, most of the forms provided to the DNFSB team did not contain SEO or QR signatures.

5. **Future Staff Actions:** The staff will continue to review the procedure development process to ensure adequate engineering reviews and formality of review and execution .

ATTACHMENT 1

Review of Recent Individual Activity Packages:

Routing Vessel 5.3 to Vessel 8.3. The package to support this activity conducted December 23,1993 contains a DATR form, USQ Screening form, Lockout/Tagout (LO/TO) Order, piping procedure and process procedure. The DATR does not reference the process procedure as being reviewed and the procedure is dated 13 days later than the DATR. The front of the process has a handwritten annotation of the DATR number with no indication of who entered this or its purpose. The copy of the DATR provided is unsigned and has no indication of who approved the documentation. The USQ Screening copy provided does not contain a signature and has no indication of QR review.

Routing Vessel 5.2 to Vessel 5.3. The package to support this activity conducted December 23,1993 contains a DATR form, USQ Screening form, LO/TO Order, piping procedure and process procedure. The DATR is undated and unsigned, and does not reference the process procedure as being reviewed. As in the previous example, the procedure is dated after the piping procedure was reviewed and accomplished and has a similar notation of the number of the DATR on the face of the process procedure. The originator of the process procedure and the printed name on the DATR are the same and the copy of the DATR provided is unsigned by either the preparer or approver. The USQ Screening copy provided does not contain a signature and has no indication of QR review. The process procedure has a pen and ink correction of a vessel number in paragraph 2.1 from "8.3" to "5.3". This correction has only one initial which appears to be the engineering approving official but no operations official indicated approval.

Routing Vessel 9.7 to 12.6. The package to support this activity conducted February 15, 1994 contains a DATR form, USQ Screening form, LO/TO Order, piping procedure and process procedure. The DATR does not reference the process procedure as being reviewed although the procedure indicates that the same person was the originator of the process procedure and the DATR. The copy of the DATR provided is unsigned and has no indication of who approved the documentation. The USQ Screening copy provided does not contain a signature and has no indication of QR review. One of the crane knowledgeable personnel signing the cover sheet of the piping procedure was not on the list of qualified crane operators provided to the DNFSB team. The piping procedure had a Comment Disposition Form attached with two reviewer's comments. The comments appeared to have been included in the procedure but the Procedure Group Disposition section of the form was not filled in and the procedure group writer had not signed in the appropriate block.

Routing the Railroad Tunnel Sump to Vessel 5.3. The package to support this activity conducted December 5, 1993 contains a DATR form, USQ Screening form, LO/TO Order, piping procedure and process procedure. The DATR does not reference the process procedure as being reviewed. The copy of the process procedure provided does not have an approval page so there is no indication of originator, walkthrough person, or approval. The procedure has an Immediate Revision Cover Sheet attached with shift manager's approval to insert permanent independent verification spaces for each procedural step. A completed copy of the process procedure was not readily available. The block for indicating review by "crane knowledgeable personnel" had printed names not signatures as required by the crane special procedure preparation directive. The LO/TO Order was not reviewed by an engineering manager as was described to the team as standard procedure in conjunction with the review and approval of the DATR of the piping procedure.

Routing 17W Sump to Vessel 17.5. The package to support this activity conducted December 30, 1993 contains a DATR form, USQ Screening form, LO/TO Order, piping procedure and process procedure. The process procedure and LO/TO Order are not compatible since the Order requires 17W Sump to PO Nozzle 106 to be placed in the open position upon removal of tags, while the process procedure includes a step to open the same valve after the LO/TO removal would have been accomplished. The process procedure was developed by modifying a standard procedure by pen and ink changes. These changes were made by at least two different people with only one person initialing a given change. Confusion existed as to whether the originator and person conducting the walkthrough verified the same version of the procedure or that changes were made during the walkthrough.