GPU Nuclear **Training Content Record**

Program Title	Number	
ENGINEERING SUPPORT PERSONNEL TRAINING	6250-PGD-2720 10.1.20	
Course Title	**Number**	
Continuing Training Session #13	.010	
Lesson Title	**Number**	**Rev.**
CT 13 Saxton CV Incident	11.2.11.066	0

I. Behavioral Learning Objectives

Upon completion of this lesson and with sufficient self study, the trainee shall be able to:

A. Be aware of the need to field verify drawings.

B. Define reviewer and approver responsibilities.

C. Describe corrective actions taken as a result of this incident.

D. List Root Causes of Saxton Containment Vessel Incident.

E. Describe lessons learned from the Saxton Containment Vessel Incident.

1. Strengthen the independent technical review process.

2. More clearly define reviewer and approver assignments and responsibilities.

3. Verify field drawing as controlled and current.

4. Perform additional walkdowns of field site to increase assurance of accuracy.

Responsibility		Signature	Title	Date
Origination		/S/ MWA	GPUN ESP Coordinator	
Review/Concurrence		/S/ RH	SME	
Approval	Objectives	/S/ WRN	Corp. Trng. Mgr.	
	Final	/S/ [illegible]	Site ESP Coordinator	11/10/95

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Program Title	Number	
ENGINEERING SUPPORT PERSONNEL TRAINING	6250-PGD-2720 10.1.20	
Course Title	Number	
Position Specific Continuing Training	.010	
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Saxton CV Incident	11.2.11.066	0

II. References

A. Saxton Nuclear Experimental Corporation to NRC letter, C301-95-2019, 6575-952-501, Docket No. 50-146, Response to the Request for Additional Information Regarding the 15 Day Report Describing the Inadvertent Breach of the SNEF Containment Vessel Liner.

B. IOSRG Review of May 25, 1995 Saxton CV Incident, Memo Dated June 27, 1995.

C. Human Performance Enhancement System Report, Inadvertent Penetration of the Saxton containment vessel liner during site characterization activities, June 1995.

D. SAXTON Nuclear Experimental Corporation to NRC letter, C301-95-2011, 6575-952-388, Docket No. 50-146, 15 Day report describing the inadvertent breach of the SNEF containment vessel liner.

E. Critique/questions and answer session, perforation of Saxton Containment Vessel (CV) Steel shell via core bore, IOM, Dated June 6, 1995, JJB to Distribution, TMI-NOB2, 5830-95-044, 6575-952-391

F. Safety Review Process, 1000-ADM-1291.01

III. Duration

Approximately one and one half (1.5) hour

DOCUMENT HISTORY

Rev. 0 Provide increase awareness of technical reviewers responsibility when performing technical reviews, especially drawing reviews.

IV. INTRODUCTION

A. This training is offered to increase your awareness of the need to adequately verify correct drawings before use. Secondly, to impress upon you the responsibilities of a reviewer.

B. Let us now review the learning objectives on page one of your handout. (See Page 1 for BLO's)

V. BACKGROUND INFORMATION

A. Event Description

At approximately 0900 hours on May 25, 1995 Cutting Technologies Incorporated (the core boring contractor) personnel bored partially through the SNEF containment vessel liner below the rod room sump at the 765 foot elevation (approximately 47 feet below grade). They were in the process of making a three inch diameter, 18 inch deep bore into the rod room sump when water in excess of that being used to cool the coring bit was observed. The boring operation was secured and action to determine the source of the water was initiated.

When the bit was retracted from the bore location, the core was removed with it. The lower end of the core was smooth and conformed with the curvature of the liner. It was because of these observed characteristics and the water clarity and temperature that liner penetration, at least partially, is considered to be the cause of the in-leakage. The water flowed from the rod room sump through a cross connect line to the larger containment vessel sump from which it was pumped into 55 gallon drums. At approximately 1300, a temporary plug was installed in the hole and the in-leakage was stopped.

The water was sampled and analyzed to verify that it was ground water in-leakage. The sample counted at 1000 showed Cs 137 at a level above that expected. This was attributed to contamination of the sample by suspended particles from the boring process and residual contamination in the rod room sump. this was later confirmed by a second, 1630 hour sample result which showed a reduced Cs 137 level.

B. The reasons for that failure are as follows:

1. The plan originator and other reviewers depended upon TLG, Inc. to conduct a review of such concerns and to specify sampling locations which would not challenge the liner integrity, while such an expectation is reasonable, a GPUN independent review was still required.

2. The responsible technical reviewer of the plan did not conduct a review outside his specific area of expertise and did not seek assistance for technical review of areas such as core bore activities which were outside his area of expertise as required.

3. An inappropriate drawing was used by some reviewers (drawing #D-37794). This drawing shows the area in question (rod room sump), and appears to indicate adequate concrete depth in this area for an 18" core. However, the view shown of the sump is out of plane on this drawing and as such, does not represent the actual location. This fact is not obvious and requires interpolation of the drawing.

4. When the work instruction was developed to implement the Characterization plan, a different drawing (D-37757) was used to check the core bore locations. This drawing accurately shows the area in question (rod room sump), however, in transposing the measurement of the drill location from the plan view to the sectional view of the drawing, the reviewer erred and located the planned bore site closer to the containment center line than the actual core bore location. Because the containment bottom is sloped, this resulted in the appearance of adequate concrete depth at this location. The estimated depth determined by this reviewer, using drawing D-37757, closely matched the depth determined in the first review using drawing D-37794. As a result, good correlation was achieved using separate drawings by different reviewers, however, different errors made by each reviewer resulted in a failure to detect the inadequate concrete depth at the core bore location.

   Drawing D-37794 does not reflect the true location of the sump and will not be used for planning activities. Drawing D-37757 is accurate but was misread. The errors in applying these drawings and the failure to obtain cross disciplinary independent technical review of the Characterization plan with-in GPUN will be corrected to prevent recurrence as described in the response to question 1.

VI. DRAWING VERIFICATION

A. Let's review the errors in the example at SNEC.

1. Each principle reviewer in the process thought another would review areas they did not review.

2. Reviewers limited their reviews to their areas of expertise.

3. Reviewers did not seek out reviewers for areas beyond their area of expertise.

4. The drawing sectional view utilized for calculations was the inappropriate plane.

5. The plan view of the drawing was misused in locating the core bore site.

B. The "comedy of errors" was:

1. An inaccurate section view gave a false assurance of adequate concrete.

2. An accurate plane view was used to incorrectly locate a core bore site.

3. The two errors collaborated each other.

C. Their 1st and 2nd ERROR was the view was out of plane.

VII. REVIEWER AND APPROVER RESPONSIBILITIES

A. Responsibilities of the Responsible Technical Reviewer (RTR)

1. The RTR is responsible to perform a thorough review to verify the technical and safety adequacy of the change.

2. This review is to include the change itself, the Safety Determination, and the Safety Evaluation (if one is required).

3. This review also includes consideration of other regulations and commitments as was described for the preparer.

4. The RTR must be knowledgeable in the area of affected by the change.

5. The RTR is responsible for ensuring that safety determination/safety evaluation documentation and any supporting evaluations or analyses are applicable to the document describing the actual change or activity and that draft documents, if used to support safety determination/safety evaluation documentation, **are accurate**.

6. **Obtain cross-disciplinary review or input where necessary**.

B. Responsibilities of the Independent Safety Reviewer (ISR)

(Required if a Safety Evaluation was generated)

1. The ISR is responsible to perform a thorough review to verify the safety adequacy of the change.

2. This review is to include the change itself, the Safety Determination, and the Safety Evaluation (if one is required).

3. The ISR is also responsible to review and concur with the associated Safety Evaluation.

4. The ISR is responsible for confirming that the safety evaluation documentation and any supporting evaluations or analysis are applicable to the document describing the actual change or activity and that draft documents, if used to support safety evaluation documentation, are accurate.

5. **The ISR must be knowledgeable in the area affected by the change**.

6. The ISR shall not have direct responsibility for the work function under review.

7. The Independent Safety Review is normally accomplished prior to approval and implementation and must be completed prior to use of the change in plant operation.

8. **Obtain cross-disciplinary review or input where necessary.**

C. Other Considerations (For Approver)

1. The preparer, the RTR and the ISR **must all be separate individuals**.

2. The ISR cannot be the approver, since the approver is normally directly responsible for the work function under review.

3. The preparer and reviewers are all equally responsible for the content and conclusions of safety review documentation. Where the conclusions are not adequately supported or in sufficient detail to allow the reviewer to come to the same conclusion, RTR/ISR's should provide appropriate comments to the preparer. RTR/ISR's are concurring with the safety review documentation conclusions based on the content of the documentation.

VIII. CORRECTIVE ACTIONS TAKEN

The following items describe corrective actions taken or to be taken:

A. All personnel involved with the subject activities have reviewed the HPES report and the findings.

B. The core bore work instruction was revised to include "lessons learned" from the event review and it underwent additional independent technical review.

C. Information will be disseminated on the need to field verify Saxton drawings before use.

D. A walk-down of all remaining core bore locations was performed by an independent technical reviewer, the manager of decommissioning projects and a member of the Independent On-site Safety Review Group, who wrote the HPES report. This walkdown verified that the remaining core bores would not challenge the containment liner integrity.

Note: The remaining core bores to be taken were verified to be shallow (<6"), and are not in any location where the concrete depth is less than approximately 18".

E. Plugging materials are on-site to stop a ground water intrusion should a liner penetration occur.

F. The event and the "lessons learned" will be reviewed as a topic in an upcoming session of engineering support personnel (ESP) training.

G. The Saxton procedure process was reviewed and is being revised. The revision will improve the review process and more clearly define reviewer responsibilities and assignments.

IX. ROOT CAUSE OF SAXTON CONTAINMENT VESSEL INCIDENT

The cause of the event was determined to be an inadequate review of design drawings to verify that the depth of the intended core bore without breaching containment integrity.

The Westinghouse drawing series D37792 to D37795 were used by TLG Engineering, Inc. (TLG), the firm contracted to provide a characterization plan for SNEC, in determining the location and characteristics for the core bore to be made in the rod room sump as described in Exhibit 1-6 of the SNEC Site Characterization Plan. Independent design review by TLG **failed to identify the actual depth of the concrete**. There was a failure to verify the adequacy of the depth of the concrete. The failure to verify the adequacy of the depth of the concrete persisted through the internal reviews of the Characterization Plan by GPUN. During the internal reviews, GPUN requested of TLG a specific depth be identified for this core bore. As a result, a depth of 18" was specified by TLG. This depth was chosen to allow characterization of possible deep activation from postulated high energy neutron streaming from the control rod drive mechanisms.

Since the initial characterization plan drafted by TLG and the one ultimately utilized by GPUN to perform the characterization activities varied only in format, the original error was carried forward. Both plans were reviewed with the practical and technical emphasis on the adequacy of the characterization effort to provide meaningful data for the decommissioning of the SNEF containment vessel. Before the boring began, an engineer utilizing Westinghouse drawing D37757, a suitable structural drawing for the location, **misread the drawing during the walkdown** to locate the specific core bore site. Work instruction procedure drafts were revised to include precautions and depth stops to prevent inadvertent breach of the liner. Although these actions were taken, the

error was not prevented since the depth of concrete below the proposed bore location remained incorrectly identified.

X. LESSONS LEARNED/SUMMARY

We need to:

A. Strengthen the independent technical review process.

B. Clearly define reviewer and approver assignments and responsibilities.

C. Field verify drawings.

D. Conduct additional reviews and walkdowns prior to commencing work process.

Attachment 2

SNEC PROCEDURE DEVELOPMENT, GHANGE REQUESTS AND SAFETY REVIEWS

PROCEDURE #6575-ADM-4500.07