U.S. Department of Energy
Office of River Protection
P.O. Box 450
Richland, Washington 99352

02-OSR-0413

Mr. R. F. Naventi, Project Manager
Bechtel National, Inc.
3000 George Washington Way
Richland, Washington 99352

Dear Mr. Naventi:

CONTRACT NO. DE-AC27-01RV14136 – INSPECTION REPORT IR-02-013 - STANDARDS SELECTION INSPECTION

This letter forwards the results of the U.S. Department of Energy, Office of River Protection inspection of the Bechtel National, Inc. standards selection program conducted July 22 through 26, 2002. This inspection identified two Findings, which are documented in the Notice of Finding (Enclosure 1). Overall the inspection team concluded the Contractor was implementing the Integrated Safety Management process adequately for design changes and Authorization Basis Change Notice (ABCN) standard changes for the majority of cases reviewed. However, the institutionalization of the Safety Requirements Document (SRD), Appendix A requirements for the Process Management Team to review and recommend for approval ABCNs which changed SRD standards, was not captured in the approved implementing procedures. Details of the inspection, including the Findings, are documented in the enclosed inspection report (Enclosure 2).

If you have any questions, please contact me, or your staff may call Pat Carier, Office of Safety Regulation, (509) 376-3574.

Sincerely,

Roy J. Schepens
Manager

OSR:JEA

Enclosures (2)

cc w/encls:
W. R. Spezialetti, BNI

NOTICE OF FINDING

Section C, "Statement of Work," Standard 7, "Environment, Safety, Quality, and Health," of the Contract,[1] defines Bechtel National, Inc.'s (the Contractor) responsibilities under the Contract as they relate to conventional non-radiological worker safety and health; radiological, nuclear, and process safety; environmental protection; and quality assurance.

Standard 7, Section (d) of the Contract requires the Contractor to develop and implement an integrated, standards-based, safety management program to ensure that radiological, nuclear, and process safety requirements are defined, implemented, and maintained. The Contractor is required to conduct work in accordance with the Contractor-developed and Department of Energy (DOE)-approved Safety Requirements Document (SRD). The Contractor's SRD was defined in 24590-WTP-SRD-ESH-01-001-02, Rev. 0, dated October 14, 2001.

Standard 7, Section (e)(3), "Quality Assurance," of the Contract requires the Contractor to develop a Quality Assurance (QA) Program, supported by documentation that describes overall implementation of QA requirements. Documentation must identify the procedures, instructions, and manuals used to implement the Contractor's QA program within the Contractor's scope of work.

The Contractor's *Quality Assurance Manual*, 24590-WTP-QAM-QA-01-001 (QAM), Revision 0, dated August 31, 2001, contains the policies, which establish the QA requirements for the project. QAM Policy Q-05.1, "Instructions, Procedures, and Drawings," Section 3.1.1 states "Activities affecting quality shall be prescribed by and performed in accordance with documented instructions, procedures, and drawings of the type appropriated to the circumstances..."

During the performance of an inspection of the Standards Selection Process conducted July 22-26, 2002, at the Contractor's offices, the following items were identified:

1. The SRD, Volume II, Appendix A, contains the policies, which establish requirements for implementation of the standards selection process (Integrated Safety Management [ISM] Process). The policy for "Process Initiation," in Appendix A, Section 2.0, states "The Process Management Team shall oversee the ISM process and shall provide resources and resolve issues as necessary." The policy for "Identification of Work," in Appendix A, Section 3.0, states, "The identification of work activity is an iterative process. Identification of work will be reconsidered in light of design evolution, the outcome of hazards evaluations, and the development of hazard control strategies."

   Contrary to the QAM requirement to have procedures and the SRD requirement for the PMT to oversee the ISM process, procedure 24590-WTP-GPP-SREG-002_1, *Authorization Basis Maintenance,* Rev. 1, dated April 23, 2002, Section 3.4, "ABCN Initiation Process," which included requirements for generating Authorization Basis Change Notices (ABCNs) for SRD changes, did not require ABCNs which change SRD standards, to be subject to the Process Management Team oversight process specified in the SRD. In addition, procedure 24590-WTP-GPP-SANA-002C_0, *Hazard Analysis,*

[1] Contract No. DE-AC27-01RV14136, between U.S. Department of Energy and Bechtel National, Inc., dated December 11, 2000.

Development of Hazard Control Strategies, and Identification of Standards, Section 3.0, "Procedure," also did not provide instruction for performing Process Management Team reviews on ABCN SRD standard changes.

These examples constitute an inspection Finding for failure to have appropriate procedure as required by QAM Policy Q-05.1 (See IR-02-013, Section 1.2, IR-02-013-01-FIN).

2.a. Contractor implementing procedure 24590-WTP-3DP-G04B-00001A, Rev. 0, *Design Criteria*, required Design Input Memoranda (DIM) be generated to identify explicit safety design requirements (in the form of Safety Case Requirements [SCR] from the Standards Identification Process Database [SIPD], and other design inputs) used in developing the actual design.

Contrary to the above, the DIM for Process Flow Diagram (PFD) 24590-PTF-M5-V17T-00013, Rev. C, did not explicitly identify or reference any of the applicable SCR's denoted in the SIPD. Also, the DIM for Piping and Instrument Diagram (P&ID) 24590-PTF-M6-CXP-00004, Rev. 4, did not explicitly identify or reference Calculation 24590-PTFU7C-PVV-00001, Rev. A, *Reliability Analysis of Proposed PTF Vessel Ventilation Systems Design,* a design input.

These examples constitute an inspection Finding for failure to follow procedure as required by QAM Policy Q-05.1 (See IR-02-013, Section 1.3.1, IR-02-013-02a-FIN).

2.b. Contractor implementing procedure 24590-WTP-GPP-SANA-002C, Rev. 0, *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards*, dated March 20, 2002, required the SIPD to contain or reference specific documentation that provided "linkage" among all ISM process parts as they applied to specific hazards/events. It also required items listed in Section 3.11.3 of the procedure to be recorded or referenced in the SIPD.

Contrary to the above, SIPD entries associated with Control Strategy Document CSD-PCXP/N0006, and CSD-PCXP/N0020 did not reference or include the severity level calculation 24590-PTF-Z0C-W14T-00002, Rev. A, from which the severity levels were derived. Also, the majority of the information required by Section 3.11.3 of 24590-WTP-GPP-SANA-002C for CSD-PCXP/N0020 was neither documented nor referenced in the SIPD.

This constitutes an inspection Finding for failure to follow procedure as required by QAM Policy Q-05.1 (See IR-02-013, Section 1.3.2 and 1.3.3, IR-02-013-02b-FIN).

The Office of River Protection requires the Contractor to provide, within 30 days of the date of the cover letter that transmits this Notice, a reply to these Findings. The reply should include: (1) admission or denial of the alleged Findings; (2) the reason for the Findings, if admitted, and if denied, the reason why; (3) the corrective steps that have been taken and the results achieved; (4) the corrective steps that will be taken to avoid further Findings; and (5) the date when full compliance with the applicable commitments will be achieved. When good cause is shown, consideration will be given to extending the requested response time.

U.S. DEPARTMENT OF ENERGY
Office of River Protection

INSPECTION:	STANDARDS SELECTION
REPORT:	IR-02-013
FACILITY:	Bechtel National, Inc.
LOCATION:	3000 George Washington Way Richland, Washington 99352
DATES:	July 22-26, 2002
INSPECTORS:	J. Adams, Lead Inspector R. Cooper, Consultant R. DeFayette, Consultant W. Mullins, Consultant
APPROVED BY:	P. Carier, Verification and Confirmation Official Office of Safety Regulation

EXECUTIVE SUMMARY
Standards Selection

INTRODUCTION

This inspection of the Bechtel National, Inc. (the Contractor) standard selection process covered the following specific areas:

- Integrated Safety Management (ISM) process as it related to Authorization Basis Change Requests (ABCN) (Section 1.2)
- ISM process as it related to Design Change Applications (DCAs)
  - Identification of Work (Section 1.3.1)
  - Hazards Evaluation (Section 1.3.2)
  - Development of Control Strategies (Section 1.3.3)
  - Identification of Standards (Section 1.3.4)
- Oversight of ISM Process by the Contractor (Section 1.4)

SIGNIFICANT OBSERVATIONS AND CONCLUSIONS

- The Contractor's Integrated Safety Management (ISM) process was being adequately implemented for design changes and for those ABCNs involving Safety Requirement Document (SRD) standards. However, the approved procedures supporting the process (*Authorization Basis Maintenance* and *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards*) did not reflect actual practices being implemented and did not reflect the requirements of the SRD Appendix A for the Process Management Team (PMT) to oversee the ISM process. This was considered an inspection Finding against Quality Assurance Manual (QAM) Policy Q-05.1 regarding the requirement to have appropriate procedures (IR-02-013-01-FIN). (Section 1.2)

- The Contractor had procedures to evaluate design changes under the ISM process. "Work identification" was discussed in ISM Team meetings as the design evolved, potentially affecting ISM results in the Standard Identification Process Database (SIPD). However, documentation of the basis for deciding when a design change warranted discussion via an ISM team meeting, was inconsistent and resulted in instances in which the ISM records had not kept pace with the changing design. The Contractor was addressing this through a revision to the *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards* procedure. Two cases were identified in which documentation did not appropriately link design media and ISM results as required by Engineering procedures. These examples of failure to follow procedures constitute an inspection Finding against QAM Policy Q-05.1 regarding the requirement to follow procedures (IR-02-013-02a-FIN). (Section 1.3.1)

- The Contractor performed acceptable hazard analyses per applicable procedures that were consistent with established methodologies and guidelines. Postulated accidents from the hazard analyses were evaluated in accordance with procedures and resulted in assignment of severity levels based on estimated radiological consequences provided in Appendix A of the SRD. The Contractor established safety case requirements (SCRs) for preventing or mitigating the consequences of the accidents associated with the control strategy document (CSD) selected for review. (Section 1.3.2)

- The Contractor's control strategies for selected CSDs conformed to the requirements defined in the SRD for severity level frequency targets and defense-in-depth. The Contractor adequately considered and applied common cause and single failure criteria to the design via the ISM process. However, two additional examples of failure to follow procedures were identified. These involved (1) failure to link the calculation that supported assignment of severity levels to CSDs in SIPD, and (2) failure to link specific hazards and hazardous situations to selected hazard control strategies in SIPD. The additional examples of failure to follow procedures constitute an inspection Finding against QAM Policy Q-05.1 regarding the requirement to follow procedures (IR-02-013-02b-FIN). (Section 1.3.2 and 1.3.3)

- The Contractor followed the ISM process and met the requirements of Appendix A of the SRD. Linkage from the hazards analyzed to the control strategies was properly documented. (Section 1.3.4)

- The Contractor's PMT oversight of the ISM process was adequately performed. Due to insufficient information, no conclusion could be drawn relative to the ISM oversight of ES&H and QA.

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STANDARDS SELECTION INSPECTION
IR-02-013

1.0 REPORT DETAILS

1.1 Introduction

Standard 7, "Environment, Safety, Quality, and Health," of Contract DE-AC27-01RV14136, dated December 11, 2000, between Bechtel National, Inc. (the Contractor) and the U.S. Department of Energy (DOE), defines the Contractor's responsibilities under the Contract as they relate to conventional non-radiological worker safety and health; radiological, nuclear, and process safety; environmental protection; and, quality assurance. Standard 7, Section (d) of the Contract required the Contractor to develop and implement an integrated, standards-based, safety management program to ensure that radiological, nuclear, and process safety requirements were defined, implemented, and maintained. DOE/RL-96-0004, *Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for the RPP Waste Treatment Plant Contractor*, described the process the Contractor was to use to develop and recommend a set of radiological, nuclear, and process safety standards and requirements. Safety Requirements Document (SRD) Appendix A, "Implementing Standard for Safety Standards and Requirements Identification," described the Contractor's commitment to implement an integrated safety management (ISM) process to establish the set of radiological, nuclear, and process safety standards and requirements.

This inspection was conducted during the Contractor's efforts to implement ISM Cycle III using 24590-WTP-GPP-SANA-002C_0, *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards*, dated March 20, 2002 (SANA-02).

This ISM Cycle III effort involves the large-scale production of approved Revision "0" Piping and Instrument Diagram (P&IDs) and Process Flow Diagrams (PFDs) needed to advance the design. The Contractor had modified designs of numerous systems using procedure 24590-WTP-3DP-G04T-00901A, Design Change Control, dated October 8, 2001, (hereafter referred to as the Design Change Process). A large number of Authorization Basis Change Notices (ABCNs) had been submitted to DOE seeking approval to revise SRD commitments. The focus of the inspection was to assess the Contractor's implementation and oversight of the ISM process on changes to plant design using the Design Change Process, and on changes to the Authorization Basis (AB) using 24590-WTP-GPP-SREG-002_1, *Authorization Basis Maintenance* (AB Maintenance). The inspection also assessed the Contractor's documentation of the justifications and traceable records of linkages in the ISM steps (work definition, hazards assessment, hazard controls, standards).

Although the previous inspection followed the inspection guidance in Inspection Technical Procedure I-105, *Standards Selection Process Selection,* this inspection was deviated from the inspection procedure in that it focused on design changes and modifications to the AB, rather than on a full ISM cycle review of the design. This deviation was reflected in the approved inspection plan. As noted in the purpose section of the procedure, this inspection was designed to assess the adequacy of the Contractor's use of the standards selection process (DOE/RL-96-0004) for design change processes. The standards selection process is a continuing element in the ISM process and must be applied to changes and modifications subsequent to initial standard selection. The criteria for this inspection were "tailored" to the intent of DOE/RL-96-0004 in satisfying SRD Appendix A. The "tailoring" resulted in the review of incorporation of selected design changes into related design media via Design Input Memoranda (DIMs), and maintenance of traceable records of linkages among the affected stages of the ISM process, identification of work, hazards evaluation, development of control strategies, and identification of standards.

The inspectors utilized a vertical slice methodology to implement the inspection and selected two significant design changes documented in Design Change Applications (DCAs) and reviewed the manner in which the changes were initiated and evaluated under the ISM process. The inspectors selected several technical ABCNs to evaluate how those proposed changes were initiated and evaluated by the Contractor. The inspectors also evaluated the oversight of the ISM process by the Process Management Team (PMT) and other parts of the process team.

1.2 ISM Process for ABCNs Involving SRD Standard Changes (Inspection Technical Procedure (ITP) I-105)

1.2.1 Inspection Scope

The inspectors reviewed, the implementing procedure for ABCN processing (*Authorization Basis Maintenance*) and the ISM process (*Authorization Basis Maintenance* and *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards* (SANA-02)), records of change (ABCNs) associated with the changes to the SRD, and the SRD Appendix A, to assess the implementation of the Contractor's ISM process during the review and approval of the ABCN SRD standard changes. In addition, the inspectors interviewed the ABCN authors, the ISM teams, and the PMT chair, to assess the implementation of the process and the results of the PMT reviews.

1.2.2 Observations and Assessments

The inspectors reviewed procedures 24590-WTP-GPP-SREG-002_1, *Authorization Basis Maintenance,* Rev. 1, dated April 23, 2002, and 24590-WTP-GPP-SANA-002C_0, *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards* (SANA-02), Rev. 0, dated March 20, 2002, to determine the interface between the ABCN review and approval process, and the ISM review process for an ABCN SRD change. The inspectors were unable to locate any tie between the procedures, which would direct an ABCN author to bring the ABCN to the attention of the PMT for ISM process review. Hence, the lead safety engineer, who would approve the ABCN, bore the responsibility for ensuring needed changes in the SIPD were incorporated, following approval of the ABCN.

The inspectors reviewed a listing of ABCNs recently approved by the Project Safety Committee (PSC) and submitted to DOE for approval, to verify the ISM process was properly conducted and documented, and changes were inputted to appropriate databases. Five ABCNs were selected that reflected changes to the SRD and involved technical standards, identified during ISM Cycle II, which directly governed the implementation of Safety Case Requirements (SCRs). The ABCNs reviewed included:

24590-WTP-ABCN-ESH-01-027 – *Deletion of IEEE 603 from SRD*
24590-WTP-ABCN-ESH-02-003 – *Tailoring of IEEE Standards*
24590-WTP-ABCN-ESH-02-004 – *Modification to Implementing Standards for Ventilation Related SRD Safety Criterion*
24590-WTP-ABCN-ESH-02-005 – *Addition of Implementing Standards for ITS Cranes*
24590-WTP-ABCN-ESH-02-008 – *Update to ERPG 2001 & TEEL 2000*

The inspectors reviewed each ABCN record for implementation of the ISM process steps in SANA-02, Section 3.5, by review of PMT meeting minutes, ISM Team meeting minutes, and the PSC meeting minutes. The inspectors conducted a group interview with the ABCN authors and their respective supervisors. From the interview of the group, the inspectors concluded the changes were developed either by permanent or special ISM Teams chartered by the PMT, and were generally familiar with the results of prior ISM team efforts to define the work, identify hazards, and select preferred hazard control strategies.

The inspectors observed documentation of the basis for changes to standards implementing SRD Safety Criteria was developed in accordance with the Contractor's procedure for Authorization Basis Maintenance, and coordination to the ISM Process (SANA-02) database (i.e. with earlier integration results) occurred via the oversight of the PMT. However, the inspectors were unable to locate any procedural tie between the two procedures, which would direct an ABCN originator to bring the ABCN to the attention of the PMT for ISM process review.

From the group interview discussed above, the inspectors confirmed the existing approved standard in the SRD was the starting point for the ABCN review. The inspectors determined the Contractor performed a delta analysis between the proposed change and the previously accepted material. However, this incremental process was not described in SANA-02. Rather, the PMT depended upon knowledgeable safety engineers to guide the assigned technical and operations representatives, who comprised the ISM Team, to maintain the pending change development in alignment with previous control strategies. In addition, knowledgeable safety engineers also were relied upon to recognize the need for amendments to the Standards Identification Process Database (SIPD) per 24590-WTP-GPP-SANA-003A, *Standards Identification Process Database.* The inspectors observed good interface among team members and no conditions were identified in which needed changes to SIPD went unrecognized.

The inspectors also reviewed the ISM team meeting minutes for three of the five ABCNs selected. Each team was represented by personnel with the range of disciplines required by the SANA-02 procedure. Although in some cases ISM team meeting minutes did not fully discuss the bases for changes, in all cases reviewed, the bases for the SRD standards change, including a justification of adequacy, were documented in the ABCNs. Based on the interview with the PMT Chair and the group interview, the inspectors determined the ISM teams did not comply with the SANA-02 procedure as written. However, the inspectors concluded the Contractor did maintain fidelity of the process elements based on the PMT Chair statement that the steps were either performed or deemed unnecessary (although this had not been documented in meeting minutes). Hence, the inspectors concluded the ISM process had provided acceptable results to the PMT. However, the inspectors also concluded the ISM teams had not followed the existing

SANA-02 procedure and there were no procedural requirements available for the purposes of ISM review of an SRD standards change.

SRD Appendix A defined the requirement for the PMT to provide oversight of the ISM process which encompasses oversight of the standards identified in the SRD and subsequent changes to the standards in the SRD. The PMT meeting minute records indicated each ABCN was reviewed and concurred in by the PMT prior to submission for the confirmatory review by the Project Safety Committed (PSC), even though this PMT review was not required by the AB Maintenance procedure. In turn, each ABCN was reviewed and concurred in by the PSC as required by Waste Treatment Plant (WTP) procedures. The meeting minutes of both the PMT and the PSC showed evidence of detailed questioning of, and guidance to, ABCN presenters. Furthermore, the minutes indicated normally an ISM team member was present for PSC discussions.

As stated above, the SRD Appendix A requires the Contractor to utilize the PMT to oversee the standards in the SRD and any changes to these standards. However, the Contractor's procedure 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance*, did not provide any steps for the PMT review of ABCNs, which could change an SRD standard, and did not provide a requirement for the signature of the PMT in the signature block of the ABCN for this purpose. Failure to prescribe requirements in procedures for performing a modified ISM review of ABCNs associated with changes to standards, and requiring these ABCNs to be reviewed and approved by the PMT, is considered an inspection Finding for failure to follow Quality Assurance Manual (QAM) Policy Q-05.1 regarding the requirement to have appropriate procedures (IR-02-013-01-FIN).

1.2.3 Conclusions

The inspectors concluded the Contractor's Integrated Safety Management process was being adequately implemented for design changes and ABCNs involving changes to SRD standards under the guidance of the PMT. However, the approved procedures supporting the process (AB Maintenance and SANA-02) did not reflect actual practice and did not interlink to reflect the requirements of the SRD Appendix A. This was considered an inspection Finding (IR-02-013-01-FIN).

1.3 ISM Process as it is Related to DCAs (ITP I-105)

1.3.1 Identification of Work

1.3.1.1 Inspection Scope

The inspectors interviewed Contractor Engineering and environmental safety and health (ES&H) personnel and reviewed the documents/records pertaining to the following design change applications:

1. DCA 24590-PTF-DCA-PR-01-001, Rev. 0, *Change to Carousel Ion Exchange Columns, Addition of Hydrogen Mitigation, and Removal of Miscellaneous Vessels* (CXP system).

2. DCA 24590-HLW-DCA-PR-01-005, Rev. 0, *Melter Feed Preparation Vessel Batch Volume Modification Identification of Work.*

A system description, PFDs, P&IDs, ISM Team meeting minutes, calculations, Design Input Memoranda (DIMs), Safety Implementation Notes (SINs), and SIPD were among the documents/records reviewed to verify:

- "Work" (in the context of design and design changes) was identified for evaluation under the ISM process, and subsequently analyzed for hazards impact by ISM Teams

- "Identification of work" was reconsidered as the facility design evolved, and was based on the outcome of the hazards evaluations and development of hazard control strategies

- Changes from approved design inputs, including the reason for the changes, were identified, approved, documented, and controlled

- Mechanisms were in place and being followed to revisit identification of work when new or unexpected information about the process was identified.

The inspectors also reviewed training records of the involved Engineering and ES&H personnel to determine if they were qualified to perform their functions.

1.3.1.2 Observations and Assessments

1.3.1.2.1 Review of DCA 24590-PTF-DCA-PR-01-001, Rev. 0, *Change to Carousel Ion Exchange Columns, Addition of Hydrogen Mitigation, and Removal of Miscellaneous Vessels (CXP system)*

Background

DCA 24590-PTF-DCA-PR-01-001 involved the addition of equipment to mitigate of hydrogen deflagration to the Cesium Ion Exchange Process (CXP) system. The change added gas separation vessels to the top of the cesium ion exchange columns with appropriate air supply and control scheme to eliminate build-up of gases in the cesium columns. The Deputy Engineering Manager signed the DCA on August 7, 2001, indicating his acceptance of the proposed change and authorization to continue processing the proposed change. The Area Project Manager subsequently approved the DCA on December 6, 2001.

Identification of Work

The inspectors reviewed ISM Team meeting minutes documented in SIN 24590-PTF-SIN-ESH-02-007, Rev. 0 to determine whether the Contractor considered the DCA as changing the "identification of work" related to the CXP system. Five ISM Team meetings occurred between

September 20, 2001 and December 11, 2001, with a meeting on November 11, 2001 (meeting minutes CCN:025104), which focused exclusively on the CXP system's hydrogen mitigation design and identification of hazards from the design. The SIN described the design and process safety/technical information used in "work identification" under the ISM process. This information included:

- 24590-PTF-M5-V17T-00013, Rev. A, *Process Flow Diagram Cesium Ion Exchange Process Columns System* CXP
- 24590-PTF-M6-CXP-00001, Rev. A, P&ID – *PTF Cesium Ion Exchange Process Vessels System CXP* (Q)
- 24590-PTF-M6-CXP-00004, Rev. A, P&ID – *PTF Cesium Ion Exchange Hydrogen Separation System* CXP (Q).

Based on the review of the documentation, the inspectors concluded the design change was an example of an iteration of the ISM process where a hazard had been identified (discussed below) that required a change to the design to prevent or mitigate it.

The inspectors also concluded the design change associated with the DCA for hydrogen mitigation was adequately evaluated under the ISM process step "identification of work."

<u>Application of the Results of the ISM Process to the Design</u>

The *Design Criteria* procedure (24590-WTP-3DP-G04B-00001A, Rev. 0) described requirements associated with DIMs. DIMs were prepared for drawings and specifications to provide a record of design inputs used in the generation of design documents. The procedure required that the DIM document explicit safety design requirements from SIPD used in developing the actual design.

The inspectors reviewed design media affected by the DCA and evaluated the Contractor's implementation of the ISM process to determine if the results of ISM evaluation were appropriately applied to the design. The inspectors reviewed SIPD entries for control strategy developments (CSDs) pertaining to the hydrogen mitigation design and the associated SCRs developed to address the CSDs. The DIMs for the affected design drawings (PFDs, P&IDs) were reviewed to determine if all applicable SCRs were also referenced in the respective DIMs.

CSD-PCXP/N0006 involved a potential level control failure in the hydrogen separation vessel, which might uncovered the resin, causing dry-out and auto-ignition, and resulting in a column breach. Eight SCRs were specified to mitigate this CSD. CSD-PXCP/N0020 involved potential radiolytic hydrogen buildup in the headspace, which might result in a hydrogen concentration in the explosive range, with the potential to breach the primary containment of the ion exchange columns. Four Safety Criterion (SCs) were specified to mitigate this CSD. The following DIMs (for the drawings of record) were reviewed to ascertain whether the SCRs associated with the CSDs described above were included:

- PFD 24590-PTF-M5-V17T-00013, Rev. C (issued 6/25/02)

- P&ID 24590-PTF-M6-CXP-00004, Rev. B (issued 5/31/02).

The PFD DIM included the SCRs for CSD-PCXP/N0006 and CSD-PCXP/N0020 with the exception of SCR-QSERV/N0004, which was not referenced. The P&ID DIM did not reference any of the SCRs, noting instead, "Draft SCRs in SIPD do not reflect current design/ISM basis and are being updated." Notwithstanding these deficiencies, the design reflected in the cited drawings did align with the SCRs for the CSDs evaluated, as required by the Design Criteria procedure.

The SIN for the CXP system referenced calculation 24590-PTF-U7C-PVV-00001, Rev. A, *Reliability Analysis of Proposed PTF Vessel Ventilation Systems Design*. The calculation presented the unreliability analyses of proposed designs for the Gas Separation Vessels (GSVs) to ensure that unreliability of these components met the target of 1E-06 per year. The calculation indicated the proposed design provided adequate hydrogen dilution given the various design constraints (the final arrangements and assumptions). The DIM for P&ID 24590-PTF-M6-CXP-00004, Rev. B, which was the drawing of record, did not reference this calculation. As a consequence, the P&ID did not reflect the Pretreat Facility (PTF) Hydrogen Final Purge Arrangement, required by the subject calculation (double check valves were not installed on the non-important-to-safety (ITS) air line to the GSVs per the calculation). The inspectors concluded the current design (P&ID 24590-PTF-M6-CXP-00004, Rev. B) was inconsistent with the current calculation (24590-PTF-U7C-PVV-00001, Rev. A) and it was unclear to the inspectors whether the design would meet the required target unreliability due to the lack of double check valves.

Failure of the two DIMs discussed above, to include documentation on design inputs is an example of a Finding for failure to follow instructions or procedures as required by QAM Policy Q-05.1 (IR-02-013-02a-FIN).

<u>Maintaining the Design Current Relative to the ISM Process</u>

The inspectors reviewed SANA-02 for guidance and minimum requirements, by which a design change would be evaluated to support the previous ISM process results. Section 3.4, "Identify Work," of the procedure stated, "The identification of work activity is an iterative process. Identification of work should be reconsidered in light of design evolution, including the outcome of the hazards evaluations and development of hazard control strategies. The product of this identification of work activity includes: process descriptions, system descriptions … PFDs, P&IDs … hazardous material inventories, and process safety information. The above information collected to support the ISM process leading to issuance of the construction authorization will be preliminary and not always complete…. The preferred basis for the identification of work is formally issued design material."

The inspectors reviewed 24590-WTP-GPG-SANA-002, Rev. 0, *Integrated Safety Management* (Integrated Safety Management), and noted in Section 4.1, "Identification of Work," "Where/when available, DCAs frequently contain safety impact assessments that require consideration of potential safety concerns during the ISM process. All active DCAs pertaining to the system should be examined by the Safety Engineer to be certain that these concerns are appropriately addressed during the study."

The inspectors interviewed the safety analyst from Environmental, Safety, and Health (ES&H) and the design engineer responsible for the hydrogen mitigation system on the subject DCA concerning the threshold for consideration of the re-evaluation of the ISM process for design changes. The individuals stated they communicated frequently and kept informed of design and other changes. The individuals also stated project procedures required design changes to be routed through Engineering and ES&H. The inspectors confirmed procedure 24590-WTP3DP-G04T-00901 *Design Change Control*, Section 3.2.1 provided opportunities for design engineers and ES&H safety analysts to consider the impact of changes and the need for ISM team meetings", if the DEM (Design Engineering Manager) determines impact assessments are needed". The inspectors also noted the DCA form and process provided two vehicles by which ES&H could identify the need to evaluate design changes under ISM from an "identification of work" perspective. One vehicle was the Impact Assessment Form (24590-WTP3DP-G04T-00901 *Design Change Control*, Exhibit B), which is filled out by Design Engineering and sent to selected disciplines to evaluate the impact of the proposed change within their disciplines. The other vehicle involved Section 4 of the DCA form, which required the ES&H Manager to sign for having evaluated whether the design change adequately defined the regulatory impacts.

Based on the above, the inspectors concluded the threshold for entering the ISM process for this particular example, was subjective with no clear documentation of decision-making relative to the bases for convening or not convening an ISM Team meeting when the design changed. From interviews with design engineers and safety analysts, the inspectors determined maintaining the design consistent with SIPD was challenging (not always up to date) due to the dynamic nature of changes to the design, particularly relative to the Pretreatment Facility. General recognition of this condition (lack of complete assurance of alignment between SIPD and the design for all systems) was part of the motivation for the Contractor's plan to perform ISM Cycle III across the Project. The Contractor's goal for ISM Cycle III was to align the Issued-for-Construction design with the ISM process results in SIPD. The inspectors concluded, for this example, the ISM process was not being followed from either a compliance nor performance point of view. However, the Contractor stated this example was unique and a worst-case scenario. The inspectors reviewed another example in Section 1.3.1.2.2 below.

The inspectors noted the Contractor's SANA-02 procedure was being revised (the team was provided the approved revision at the inspection exit meeting) to include an explicit, system-by-system review process to be accomplished prior to ISM Cycle III and the issuance of primary design media at Revision 0. This procedure change was given a trial use (via desk instruction) under the oversight of the PMT for several months.

Desk Instruction 24590-ESH-DI-SANA-002, Rev. 0, "Issued-For-Construction PHA Screening and ISM Iteration" was issued with an effective date of July 9, 2002. The Contractor stated the instruction was issued to ensure safety analysts and design engineers would implement ISM Cycle III (in progress) in a consistent, controlled, and documented manner. The purpose of this desk instruction was to determine, through a formal step-wise screening process and review of current design media, whether an iteration of ISM process hazards identification and analysis (PHA) was warranted, as well as to identify and close action items and assumptions relative to the design media. The desk instruction was a temporary measure used until the SANA-02 procedure could be revised to include Appendix F, which replaced the desk instruction. On July 23, 2002, procedure 24590-WTP-GPP-SANA-002_1, *Hazard Analysis, Development of Hazard*

Control Strategies, and Identification of Standards was issued to reflect the desk instructions. The revision incorporated the PHA in its entirety as Appendix F.

1.3.1.2.2 DCA 24590-HLW-DCA-PR-01-005, Rev. 0, "Melter Feed Preparation Vessel Batch Volume Modification Identification of Work"

Background

This DCA increased the sizes of the melter feed preparation vessel (V31101) and the melter feed vessel (V31102). This resulted in the useable batch size (volume of melter feed that is fed forward for glass production) increasing from the previous 1485 gallons to 5500 gallons. DCA Impact Assessment Forms were sent to 12 internal Contractor organizations to assess the impact of the change on their areas of responsibility. The completed forms were returned to Process Engineering documenting the analyses of the impact of the changes on their areas of responsibilities. The DCA was accepted by the ES&H Manager on October 8, 2001, and approved by the Deputy Engineering Manager and Area Project Managers on October 16, 2001.

Identification of Work

The inspectors reviewed minutes of a meeting of September 12, 2001 (CCN-023018), called to discuss safety criteria for the melter feed preparation vessels, to verify mechanisms were being followed to revisit identification of work when new information about the process was identified (the volume of the vessels was being increased to 5500 gallons). The minutes documented the group acceptance of the 5500-gallon batch volume for the melter feed vessels. The inspectors also reviewed minutes of an ISM meeting of September 25, 2001 (CCN-023554), called to identify any changes in the safety cases caused by the increased vessel sizes. The ISM team concluded the hazards created by the increase in vessel volume did not require a change in the existing control strategies and therefore, the existing control strategies were adequate.

The inspectors reviewed the training profiles of selected ES&H and Engineering personnel involved in the ISM process. The inspectors verified they had received and were current with the required training for their positions.

The inspectors concluded the design changes from the DCA related to the melter vessel volume change were adequately evaluated under the ISM process relative to "identification of work."

1.3.1.3 Conclusions

The inspectors determined the Contractor had procedures in place to evaluate design changes under the ISM process, which included the topic of "Work identification." However, documentation of the ISM team bases for deciding when a design change warranted discussion via an ISM team meeting was inconsistent, and resulted in instances in which the ISM record had not kept pace with the changing design. The Contractor was addressing this through a revised SANA-02 procedure. Two examples were identified in which documentation did not appropriately link design media and ISM results. These were classified as examples of failure to follow procedures and are included in Finding IR-02-013-02a-FIN.

1.3.2 Hazards Evaluation

1.3.2.1 Inspection Scope

The inspectors interviewed Contractor Design Engineering and ES&H personnel and reviewed application of SANA-02 to the DCA described below to verify:

- The Contractor's hazard evaluation process included the elements required by Project procedures

- The methodologies and guidelines in the American Institute of Chemical Engineers (AIChE), *Guidelines for Hazard Evaluation Procedures, Second Edition with Worked Examples*, were used to perform a structured and systematic examination of systems and components to identify potential accidents

- The severity levels assigned to postulated radiological accidents (reflect unmitigated consequences) conformed to the estimated radiological consequences in Appendix A of the SRD

- The set of established hazard controls addressed means for preventing and/or mitigating accident consequences.

1.3.2.2 Observations and Assessments

1.3.2.2.1 Hazard Analysis for Review of DCA 24590-PTF-DCA-PR-01-001, Rev. 0, *Change to Carousel Ion Exchange Columns, Addition of Hydrogen Mitigation, and Removal of Miscellaneous Vessels* (CXP system)

The inspectors determined 24590-WTP-GPG-SANA-002, Rev. 0, *Design Guide: Integrated Safety Management,* provided implementation details to help the practitioner fulfill requirements of Appendices A and B of the SRD and associated procedures. Appendix A of the Design Guide provided detailed guidance for performing PHA, which had been developed from and consistent with AIChE methodologies and guidelines.

The inspectors reviewed the methodology and the results of the hazard analysis performed for hydrogen mitigation. The Design Guide stated that in the design confirmation and detailed design stages, the hazard and operability (HAZOP) analysis study is the preferred methodology for the WTP. The hazard analysis for hydrogen mitigation was found in ISM team meeting minutes in the SIN for the CXP system. Interviews with the responsible safety analyst confirmed that the HAZOP methodology was used for this analysis.

The inspectors reviewed DCA 24590-PTF-DCA-PR-01-001 to assess the application of the ISM process to the DCA review. Because hydrogen mitigation was added to the design, identification of hazards associated with the design change was documented in an ISM Team meeting on November 11, 2001 (CCN: 025104). PFD 24590-PTF-M5-V17T-000013, Rev. C, was used as the design media for performing this evaluation. Preliminary candidates for Control Strategy Elements (CSEs) for credible events were discussed, with actions assigned to further evaluate potential CSEs. A second ISM Team meeting was held on February 4, 2002 (CCN: 029148), to pursue open issues from the previous ISM Team meeting. The inspectors concluded potential hazards discussed were consistent with the specifics of the evolved design, and the results of the hazard analysis were reasonable and appropriate for the hydrogen mitigation design and function relative to the potential accidents considered. From the review of SIPD information related to hydrogen mitigation, the inspectors concluded the database contained adequate and consistent information on the results of the hazard evaluation process as reflected in the associated CSDs and SCRs.

Severity Level Determination

The inspectors reviewed preliminary calculation 24590-PTF-Z0C-W14T-00002, Rev. A, *Revised Severity Level Calculations for the Pretreatment Facility*, for consistency of assumptions with relevant design media and hazard analysis results, as well as consistency of the methodology with procedural requirements. For ion exchange column fires, the unmitigated consequences to facility workers, co-located workers, and the public were calculated at severity level (SL)-1. For hydrogen explosions in the cesium ion exchange column or gas separation vessel, the unmitigated consequences to the facility workers, co-located workers, and the public were calculated at SL-1, SL-2, and SL-4, respectively. The inspectors verified the methodology used in the severity level calculation was consistent with the requirements of 24590-WTP-GPP-SANA-001A, Rev. 0, *Accident Analysis.* In addition, the assignment of severity levels based on the results of the calculation conformed to the estimated radiological consequences in Appendix A of the SRD.

Consistency of Severity Level Calculation Results with SIPD Entries

The inspectors reviewed current SIPD entries relating to "fire"(CSD-PCXP/N0006) and "explosion"(CSD-PXCP/N0020) accident types for CXP system "initiators" to determine if CSD records were consistent with the results of the above calculation. CSD-PCXP/N0006 involved a level control failure in the hydrogen separation vessel that uncovered the resin. The severity levels for facility workers, co-located workers, and members of the public were all at SL-1, consistent with the calculational results noted above for ion exchange column fires.

CSD-PXCP/N0020 involved radiolytic hydrogen buildup in the head-space of ion exchange columns CXP-IXC-00001 to –00004, resulting in a hydrogen concentration in the explosive range, with the potential to breach the primary containment of the ion exchange columns. The severity levels were at SL-1 for the facility worker, SL-2 for the co-located worker, and SL-4 for the public, consistent with the calculational results noted above for ion exchange column explosions.

For the CSDs reviewed, the inspectors determined the related severity levels were consistent with those resulting from the cited calculation. The ITS classifications of the selected SCRs for these CSDs were reflected in SIPD and consistent with the assigned severity levels and the requirements of SANA-02.

Based on the above, the inspectors determined the Contractor had established SCRs for preventing or mitigating the consequences of the accidents associated with the CSDs selected for review.

According to SANA-02, Section 3.11, SIPD was required to contain or reference specific documentation, which provided "linkage" among all ISM process parts as they applied to specific hazards/events. However, the SIPD entries associated with CSD-PCXP/N0006 and CSD-PCXP/N0020 did not reference or include the SL calculation (24590-PTF-Z0C-W14T-00002, Rev. A) from which the related SLs were derived. The failure to "link" the calculation that supports assignment of severity levels to CSDs in SIPD was not in accordance with SANA-02. This is a part of an additional example of an inspection Finding for failure to comply with QAM Policy Q-05.1 regarding the requirement to follow instructions or procedures (IR-02-013-02b-FIN). See Section 1.3.3.2.1 for discussion of the remaining part to this Finding.

1.3.2.2.2 Hazard Analysis for DCA 24590-HLW-DCA-PR-01-005, Rev. 0, *Melter Feed Preparation Vessel Batch Volume Modification Identification of Work*

The inspectors reviewed the methodology and results of the hazard analysis for the melter feed system to determine whether the methodologies and guidelines of the AIChE were used to perform a structured and systematic examination of the system. Minutes for meetings dated December 2, 1999, and December 7, 1999 (CCN-009415), documented the HAZOP methodology used for identifying hazards. The minutes stated the system had been broken into study "nodes" prior to the ISM meeting and "guidewords" (as defined in the AIChE model HAZOP process) had been assigned. These guidewords were discussed at the meeting and additional guidewords were added. Attachment 2 of the minutes listed deviations (e.g. potential hazards) discussed the consequences, causes of the deviations, and controls necessary to mitigate them.

The inspectors reviewed Calculation 24590-HLW-U4C-U78T-00001, *Design Basis Event for Liquid Spill*s, dated December 5, 2001 (for CSD-H100/N0035), to assess if DCA 24590-HLW-DCA-PR-01-005, Rev. 0, changed the results of the previous ISM cycle control strategies in SIPD. During the ISM process, the calculation indicated the process vessel and transfer failures could result in SL-1 consequences to the facility and co-located worker. The analysis provided in the calculation identified the controls necessary to minimize the likelihood of in-cell leaks and to mitigate the consequences of such failures to levels consistent with the radiological exposure standards defined in the SRD. Both internal and external failure mechanisms for vessels were evaluated. The purpose of the calculation was to provide the Design Basis Event (DBE) analyses for liquid spills from various process vessels and associated piping in the High Level Waste (HLW) vitrification facility. The calculation provided the bounding case based on the leak from the vessel with the highest radionuclide content (based on concentration and volume), and determined the vessels with the highest potential to produce the worst case scenario were the concentrate receipt vessels (V31001 and V31002) because they were larger than the melter feed vessels (14,100 gallons versus 7,190 gallons).

Calculation 24590-HLW-U4C-U78T-00001 considered accident scenarios; initiating event frequencies; evaluation of source terms; calculation of consequences; comparison to radiological exposure standards; control strategy requirements; defense-in-depth requirements; and assessment of uncertainties and conservatism. The calculation further stated the wet process cell walls provided for secondary containment of liquid material in the event of a vessel leak, and that cell walls and the C5 ventilation system provided for secondary containment of radioactive aerosols made airborne in the event of a leak.

The calculation noted that the loss of confinement from either melter vessel resulted in a SL-1 event for both workers and co-located workers, and a SL-3 event for the public. It also noted this scenario was the same as the representative DBE for loss of confinement from the concentrate receipt vessel. The calculation concluded the risk associated with process vessel and transfer pipe failures was demonstrated to be within the radiological exposure standards; functional and performance requirements for the selected ITS controls were developed; and the controls selected provided adequate defense-in-depth protection in accordance with the requirements of Appendix B of the SRD.

The inspectors confirmed the SIPD database for the melter system contained the information, either directly or by reference, required by procedure SANA-02, Section 3.11.3. They also reviewed ISM meeting minutes of September 25, 2001 (CCN-023554), which discussed changes to the vessels sizes. The meeting concluded that the hazards created by the increase in vessel volume did not require a change in the existing control strategies.

The inspectors reviewed Chapter 3, "Hazard and Accident Analyses," of the Preliminary Safety Analysis Report (PSAR) (24590-WTP-PSAR-ESH-01-002-04, Rev. H) to get another view of how the Contractor applied the hazard and accident methodology to the design of the WTP facility. The PSAR stated the HLW hazard was in accordance with Contractor guide 24590-WTP-GPG-SANA-002, *Integrated Safety Managemen*t. Section 3.3.3 of Chapter 3 of the PSAR presented the HLW hazard evaluation results for radiological, nuclear, and process safety. It noted subsequent sub-sections and associated hazard evaluation tables in Appendix A (which was the SIPD database) provided the results for the major process areas or systems, in terms of hazard description, initiating frequency, potential severity level, control strategies, and associated safety case requirements. The inspectors confirmed the information was consistent with SIPD ISM entries.

1.3.2.3 Conclusions

The inspectors concluded the Contractor performed acceptable hazard analyses per applicable procedures consistent with established methodologies and guidelines. Postulated accidents from the hazard analysis were evaluated in accordance with procedures and resulted in assignment of severity levels based on estimated radiological consequences provided in Appendix A of the SRD. The inspectors also concluded the Contractor established adequate SCRs for preventing or mitigating the consequences of the accidents associated with the CSDs selected for review. A part of an example of an inspection Finding for failure to comply with QAM Policy Q-05.1 regarding the requirement to follow procedures was identified (IR-02-013-02b-FIN).

1.3.3 Development of Control Strategies

1.3.3.1 Inspection Scope

The inspectors interviewed Design Engineering and ES&H personnel and reviewed the SIPD to verify:

- Documentation of the hazards control strategies provided the bases for the strategies and conformed to the guidance in Appendix A of the SRD
- Control strategies conformed to the requirements defined in the implementing standard for defense-in-depth in the SRD
- Structures, systems, and components (SSCs) used in control strategies for severity level one and two events satisfied the single failure criteria.

1.3.3.2 Observations and Assessments

1.3.3.2.1 Selection of Control Strategies for DCA 24590-PTF-DCA-PR-01-001, Rev. 0, *Change to Carousel Ion Exchange Columns, Addition of Hydrogen Mitigation, and Removal of Miscellaneous Vessels (CXP system)*

<u>Requirements to Meet SRD Appendix A (severity level frequency targets)</u>

The inspectors reviewed documentation, and discussed with the safety analyst, the selection of control strategies for CSD-PCXP/N00006 to assess the ISM process results were unchanged following the approval of DCA 24590-PTF-DCA-PR-01-001, Rev. 0. Calculation 24590-PTF-Z0C-W14T-00027, Rev. A, *Design Basis Event – Overheating of Cesium Ion Exchange Media*, provided the DBE analyses for cesium ion exchange column dry-out and overheating scenarios. One of the 3 mechanisms analyzed to result in a loss of liquid from a loaded ion exchange column (subsequently resulted in dry-out and overheating of the resin), was a liquid level control failure. This failure was characterized as a unique DBE (failure of liquid feed combined with continued pressurized purge air flow through the column gas separation vessel (GSV), causing liquid to be blown out of the column).

Three initiators (related to CSD-PCXP/N0006) were initially identified for further study, but one subsumed the others. The prevailing initiator was determined to be the logic control failure in GSV level control system, with subsequent closure of the liquid feed line isolation valve. Based on analysis of this event, the Contractor selected controls to prevent or mitigate the event to ensure the accident frequency was less than the SL-1 target. The selected controls were as follows:

- GSV level control system was considered but determined not to be required for hydrogen control, due to orifice plates in supply and exhaust regulator valves providing for sufficient flow to purge hydrogen should the valves fail closed. Consequently, the analysis assumed the GSV level control system was not ITS, but was classified as Risk Reduction Class (RRC). .

- The primary ITS control was a trip on column low level that closed the column isolation valve and maintained the inlet isolation valve open. This trip involved an interlock between the column level detection system and the automatic caustic addition system. On column low level, an open signal would be sent to the feed isolation valve, a closed signal would be sent to the column outlet isolation valve, and the feed pump would tripped off. This lineup would prevent column blow-down, thus preventing the accident (fire from dry-out of loaded resin).

- If a fire were to occur, the primary release path is through the Process Vessel Ventilation System. The particulate removal function of this system was ITS for other accidents. If this system was overwhelmed by soot released in the fire, venting to the cell air and mitigation by the C5 system would occur.

The Contractor applied failure rates to various components in the primary ITS control strategy to calculate the accident frequency. This was compared to the SL-1 target frequency to determine if it was met or exceeded. The accident frequency was calculated from the product of the initiating event frequency and the frequency of failure of the primary ITS control function.

Failure rates for various components were assigned from the RPP-WTP Project Reliability Data Base. Using failure rates for the GSV level controller, and GSV supply and exhaust regulator valves, the initiating event frequency (annual failure frequency for GSV loss of level control) was calculated as 0.184/year.

Failure of the primary ITS control function, the low level trip, was determined to be caused by either failure of the low level switch, or failure of the column isolation valves to move to the required positions. On-demand failure rates for each of the above components were conservatively assigned, and an “alpha factor” was assigned to account for common cause failure of the redundant low level switches. The product of the initiating event frequency and the summation of all on-demand failure rates for the low level trip function was calculated as 5.6E-07/year. This accident frequency was less than the SL-1 target frequency of 1E-06/year. Because the Contractor’s control strategy was one of prevention, mitigative functions were not required to be considered for meeting SRD Appendix A severity level target frequencies.

Based on this fairly involved logic diagnosis by the inspectors, the inspectors concluded the documentation for the hazard control strategies provided the basis for the control strategies and conformed to the guidance in Appendix A of the SRD.

<u>Selection of control strategies to meet SRD Appendix B (Defense-in-Depth) Requirements</u>

In accordance with the SRD Appendix B, two or more independent physical barriers (to protect against the release of radioactivity) were required for accidents with potential SL-1 consequences. To satisfy the single failure criterion (thus ensuring an accident target frequency of less than 1E-06/year), ITS SSCs containing these barriers were also required. . The design provided for a low-level trip function as the first ITS barrier to release. The design required redundant low-level trip systems to meet the single failure criterion. The second barrier to release was provided by the Process Vessel Ventilation System and contamination zone 5 (C5) ventilation systems, which provided a mitigative function in the event a fire resulted from failure to maintain liquid level in the CXP ion exchange column.

Documentation of selected control strategies in SIPD

The inspectors reviewed the SIPD record related to CSD-PCXP/N0006 and the above control strategies and confirmed the CXP ion exchange column fire DBE calculation was referenced and SCRs included: (1) the SRD, Appendix A, ITS primary control function (low level trip), (2) Defense-in-Depth functions provided by the systems noted above, and (3) a GSV level control function and associated low level trip independent of the ion exchange vessel level control system.

Procedure SANA-02, Section 3.6.4 stated, "To link the specific hazards and potentially hazardous situations to specific hazard control strategies, the items listed in section 3.11.3 (of SANA-02) shall be recorded or referenced in the SIPD." Review of SIPD for this information related to CSD-PCXP/N0020 for the hydrogen mitigation system revealed the majority of the above information was neither documented nor referenced in SIPD. The safety analyst stated this information must be in SIPD after the CSDs are approved. The SIPD printout in the SIN, dated May 5, 2002, showed the status of the two CSDs as "approved."

Failure to incorporate the above information in SIPD is a part of an additional example for failure to comply with QAM Policy q-05.1 regarding the requirement to follow instructions or procedures (IR-02-013-02b-FIN). See Section 1.3.2.2.1 above, for discussion of the remaining part of this example of a Finding.

1.3.3.2.2 Selection of Control Strategies for DCA 24590-HLW-DCA-PR-01-005, Rev. 0, *Melter Feed Preparation Vessel Batch Volume Modification Identification of Work*

The inspectors reviewed Calculation 24590-HLW-U4C-U78T-00001, Rev. B, *Design Basis Events-Liquid Spills*, to confirm the control strategies selected through the ISM process were still valid following the approval of DCA 24590-HLW-DCA-PR-01-005, Rev. 0. This calculation indicated the controls selected to prevent or mitigate the DBE, were selected by a multidisciplinary team, consisting of representatives from the safety organization and various engineering disciplines involved in the design of the HLW receipt system (ISM team). The calculation stated that unmitigated consequences of the accident were determined to be SL-1 to the facility and co-located workers, and SL-3 for the public. It then described defense-in-depth strategy whereby a second physical barrier was provided by cell walls for liquid spills, and a combination of cell pressure boundary, the C5 high efficiency particulate activated (HEPA) filters, and the C5 extract system for aerosols.

In addition, the calculation discussed single failure criteria, noting the single failure criterion should be applied to the ITS SSCs selected to prevent or mitigate the accident. The first physical barrier (the vessels themselves) was postulated to fail and the single failure criterion was applied to the second physical barrier, which included the cell pressure boundary and the active C5 ventilation system. The calculation then described how such failures would be mitigated. It noted that the second barrier, that included the cell pressure boundary and active C5 ventilation system, provided secondary confinement for aerosols made airborne in-cell in the accident. A credible failure in the passive cell pressure boundary would be represented by failure of a single penetration. The active ventilation system was sized to maintain confinement capture velocity across the largest failed penetration, thus ensuring negligible release from secondary confinement. Conversely, failure of the active C5 extract system would not cause a release unless a concurrent passive failure in the cell boundary also was postulated.

The active ventilation and filtration functions provided by the C5 ventilation system were designed with sufficient redundancy to ensure the single failure criterion was met. The C5 extract system contained three parallel trains of HEPA filters. Two trains were active with one standby. Each filter train consisted of five primary and five secondary HEPA filters in series. The secondary HEPA filter mitigated release to the environment should a failure occur in a primary HEPA filter. The discharge monitoring system ensured that common cause failure (bypass) of HEPA filters in each bank of an active train was detected and would result in manual switchover to the backup train of HEPA filters. The C5 system consisted of two 100% capacity fans. Should the primary fan fail, the heating, ventilation, and air conditioning (HVAC) system was designed to detect the failure and automatically switch to the alternate fan. Both fans were provided with backup power to ensure the single failure criterion was met should loss of normal power occur.

As noted above, the Design Criteria Procedure required that DIMs be prepared for drawings and specifications to provide a record of design inputs used in the generation of design documents. The inspectors reviewed the SIPD entries for CSDs pertaining to the melter feed vessels, which included explosions, liquid spills, overflows, and sprays from the vessels. The inspectors reviewed the SCRs developed to address each of the CSDs, and the DIMs, which had been generated for the design change. The inspectors confirmed applicable SCRs were referenced in the DIMs. The inspectors also confirmed applicable drawings contained references to the appropriate DIMs.

The SIPD also referenced calculation W375HV-NS00018, *Severity Level Calculation for High Level Waste Vessels,*" which was generated for the original vessel sizes. The calculation concluded the worst-case scenario (the entire volume of the vessels was spilled) would result in a SL-1 accident for the facility worker and co-located worker, and a SL-3 accident for the public. The inspectors also reviewed the ISM Cycle II Reconciliation Record calculation, which was included in SIN W375-01-00002. The SIN was generated to provide a record of the documentation used in completing the ISM Cycle II activities for the HLW vitrification system. The calculation compared Rev. C and Rev. E drawings and noted the volumes of the concentrate receipt vessels had been increased from total/maximum operating/normal operations volumes of 8696/7563/4980 gallons to 15550/12040/9960 gallons. The severity level calculations were updated to reflect the vessel size change in order to determine if any severity levels required change. The conclusion was there were no needed changes to the previously calculated severity levels for spills, sprays and deflagrations. The contractor concluded from the calculation that the changes to the design were inconsequential and no new hazards needed to be put in or deleted from SIPD. They also concluded no new ISM integrated team meetings were required for the reconciliation. The inspectors had no issues with the Contractors process or results for this DCA, and confirmed the control strategies selected through the ISM process were still valid following the approval of DCA 24590-HLW-DCA-PR-01-005, Rev. 0

1.3.3.3 Conclusions

The inspectors concluded the control strategies for selected CSDs conformed to the requirements defined in the SRD for severity level frequency targets and defense-in-depth. The Contractor adequately considered and applied common cause and single failure criteria to the design via the ISM process. However, the inspectors identified a part of an example of a failure to comply with QAM Policy Q-05.1 regarding the requirement to follow procedures (IR-02-013-02b-FIN). This involved failure to link specific hazards and hazardous situations to selected hazard control strategies.

1.3.4 Identification of Standards

1.3.4.1 Inspection Scope

The inspectors interviewed Contractor Engineering and ES&H personnel and reviewed project procedures, design guides, design change documentation, and the output from the ISM process as documented in the SIPD database to assess:

- The implementation of the standards selected was tailored to better fit the hazards as the design evolved
- The linkage from the hazards analyzed, through the control strategies selected, to the standards was properly documented.

1.3.4.2 Observations and Assessments

Identification of standards tailored and selected as a result of applying the ISM process to evolving design changes was not assessed. This was because the design changes (the two DCAs reviewed in detail, identified in Section 1.3.1.1 above) evaluated under the ISM process did not result in changes to DBE’s that established performance requirements for ITS SSCs selected as control strategies for the hazards associated with the design change. The emphasis in this section was on reviewing documentation of the linkages from the hazards analyzed to the control strategies selected.

The inspectors reviewed Contractor documents such as SIPD, calculations, meeting minutes, DCAs, DIMs, and design media, to assess whether the Contractor was maintaining traceable records of linkages in the ISM steps. Generally, such linkages were documented. The inspectors confirmed, with noted exceptions, applicable SCRs were referenced in the DIMs, and applicable drawings contained references to DIMs.

The inspectors requested the Contractor's tracking mechanism for ISM action items but were informed by the Acting Safety Analysis Manager there was no formal tracking system in place at the time of the inspection. Rather, the safety analysts kept track of such items for their systems. He stated the issue would be clarified in the revision to procedure SANA-02, which was pending approval and distribution at the time of the inspection. (Note: The inspectors received a formal copy of the issued procedure during the inspection exit meeting on July 27, 2002; it had an issue date of July 23, 2002.) Section 2.2 of Appendix F of the revised procedure discussed this issue and stated that action items from previous ISM cycles were documented in ISM meeting minutes. It directed that the minutes were to be reviewed to determine whether any actions remained open or issues remained unresolved. Resolution of ISM action items must be documented, and action items and assumptions also must be closed. The inspectors concluded that if implemented properly, the revised procedure would assure action items were completed as required.

The inspectors also noted, unverified assumptions were used in calculations, which implied the design media could not be finalized until such assumptions were verified. The inspectors determined Section 3.6 of Procedure 24590-WTP-GPP-SANA-001A_0, "Accident Analysis" required such assumptions be tracked in the ES&H Unverified Assumptions Database. The inspectors reviewed a copy of the database, which tracked the basis of the assumption, whether it was verified, the date it was closed, the referenced calculation number, the responsible organization, and the closing document. The inspectors also determined Desk Instruction 24590-ESH-DI-SANA-002_0, "Issued-for-Construction PHA Screening and ISM Iteration" (recently incorporated into SANA-02), contained a requirement to verify all design assumptions made in prior ISM cycles, be verified prior to approving the design. The inspectors determined the combination of controls based on procedure and tracking databases was adequate to assure unverified assumptions were tracked and closed.

1.3.4.3 Conclusions

The inspectors concluded the Contractor followed the ISM process and met the requirements of Appendix A of the SRD. The inspectors also concluded linkage from the hazards analyzed to the control strategies was properly documented.

1.4 Oversight of ISM Process by Contractor (ITP I-105)

1.4.1 Inspection Scope

The inspectors reviewed the SRD for PMT requirements, reviewed the PMT Charter for the list of responsibilities, reviewed PMT and Project Safety Committee (PSC) meeting minutes for verification of implementation of PMT requirements, reviewed pertinent Corrective Action Reports (CAR) and management assessments associated with ISM oversight, interviewed the PMT chair and PSC Co-Chair, and attended a PMT meeting to assess the project

(PSC/PMT/quality assurance [QA]/ES&H) oversight processes of the Contractor relative to the ISM process.

1.4.2 Observations and Assessments

1.4.2.1 PMT Oversight

SRD Volume II, Appendix A implemented the process for establishing a set of radiological, nuclear, and process safety requirements and standards as described in DOE/RL-96-0004 and RL/REG-98-17, *Office of Safety Regulation Position on Tailoring for Safety*. The SRD required the establishment of a PMT, chaired by the Radiological, Nuclear, and Process Safety Manager, to assist the River Protection Project WTP Project Manager in assuring that the input information required for the safety standards and requirements identification process was collected and organized. The SRD required the PMT to include managers from the following project organizations:

- ES&H
- Engineering
- Operations.

The Contractor documented the PMT Charter (CCN-019452) issued by the Project Manager in the 24th meeting minutes of the PMT (CCN-021520). The charter documented PMT oversight responsibilities. Inspection Report IR-01-006, issued November 13, 2001, confirmed the PMT organization included qualified managers from these project organizations. The inspectors reviewed the charter and selected three listed PMT oversight responsibilities for inspection to verify the charter was being implemented.

1. <u>Provide an oversight of the ISM process to utilize the hands-on experience of the members to enhance that oversight.</u>

The inspectors attended the 47th PMT meeting on July 24, 2002, to observe the PMT oversight of the ISM process as performed for the normal agenda of PMT issues. The inspectors verified a quorum was present. The team approved the previous meeting minutes, and listened to presentations on: (1) the Embedded C5 Ductwork ABCN, (2) a Defense Nuclear Facility Safety Board (DNFSB) issue concerning safety analysis, and (3) the SIPD database data quality issue. The PMT also made an assignment for an ISM team dealing with a revision of a standard to support worker safety initiatives.

The inspectors reviewed documented evidence of PMT oversight, as it related to involvement in the ISM process, by reviewing meeting minutes for the last five PMT meetings. The minutes documented ISM team charters, provided a record of discussion of ISM team results, and provided feedback to the presenters including but not limited to:

- Advice relative to level of commitment to a given standard

- Request for additional research prior to forwarding an ABCN to PSC
- Request for statement by a presenter indicating the issue being presented was not a reduction of commitment or safety
- Lack of preparedness by a presenter and instruction to return later
- Lack of technical detail (failure to establish a baseline measurement standard for erosion and corrosion standard).

Based on these reviews, the inspectors concluded PMT oversight of the ISM process was adequate, and the experience of the PMT members was reflected in the high quality, depth, and breadth of their review questions and comments.

2. <u>Provide guidance as required and ensure the procedures provide clarity with regard to process control, connectivity of supporting data with results, and compatibility with configuration management.</u>

The inspectors interviewed the PMT Chair to determine how guidance was provided to the Contractor's staff on the ISM process. The inspectors were told procedures such as SANA-02, and 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance*, provided the primary direction to the staff for conducting ISM review and AB Maintenance changes. However the PMT Chair did indicate a PMT procedure was in concurrence, which would define how the PMT performed its function (a copy was not available for review by the inspectors). The approval of the procedure was being carried as an open action item by the PMT. The action originated on March 5, 2002 and completion was scheduled for April 1, 2002. The PMT Meeting No. 44 (May 29, 2002) put the PMT procedure on the PMT docket for review and approval with the procedure approval actually occurring July 31, 2002, subsequent to the inspection exit.

The inspectors concluded the PMT had a defined process for review, which was being implemented, however, the need for the PMT procedure to provide consistency of results was known to the Contractor and the procedure preparation and review was in progress during the inspection. The inspectors' review of the DCAs and ABCNs validated the Contractor's evaluation (mixed results with one DCA indicating good documentation of the use of the ISM process including documentation of linkages in the SIPD, and the other DCA indicating some weakness in the process). Inspection Findings regarding issues concerning DIMs and SIPD database linkages also were identified in previous sections of this report.

The inspectors also reviewed PMT and PSC meeting minutes to verify the PSC was consistently using the PMT for ISM evaluations. The inspector found examples of PSC assignments to individuals (or subcommittees) to review SRD standard-related issues affecting standards (could change the ISM process results), which were not referred to the PMT as required by SANA-02. Examples included an as low as reasonably achievable (ALARA) Subcommittee issue (43^{rd} PSC action item No. 40-1, dated March 20, 2002) dealing with a Gamma Interlock Issue related to ISM Cycle II Safety Case Requirements, and a Decision To Deviate (24590-WTP-DTD-ENG-02-001) dealing with a deviation from an SRD standard (44^{th} PSC Meeting item 8). The inspectors determined some issues were resolved directly by the PSC, which might have been referred to the PMT to ensure the ISM process was being properly considered. It was not clear to the inspectors if either of these issues had been considered for ISM process by the assigned individual/group.

The inspectors concluded the PMT did provide adequate guidance for ISM teams but improvements in formality and rigor should be realized in the ISM team results by the approval of the PMT procedure.

3. Review process methodologies/proposals and implement improvements when identified.

Based on interviews with the PMT Chair, review of meeting minutes, and interviews with ISM team leads, the inspectors found substantial evidence of the PMT oversight of process methodologies used by the ISM teams to complete technical evaluations and of guidance provided to the teams (i.e., Meeting Minutes No. 43-topic Centrifugal Pump Standard-PMT recommended that the SRD tailor the standard to address American Society of Mechanical Engineers (ASME), Section 8, for the pump seals and confinement boundary).

The inspectors reviewed applicable procedures and interviewed the Safety Program Leads and the PMT Chair to understand how the ISM process was considered when processing changes to SRD standards. From review of the AB Maintenance Procedure, Section 3.4, the inspectors determined although a step-by-step process for control of the ABCNs was in place, it did not provide any step that would refer evaluation of the change to the ISM process as required by SANA-02. Rather, the Contractor depended upon the PMT oversight to ensure that occurred. That led to a situation where some SRD standards and design changes were being processed without the benefit of a formal ISM review. Instead, a graded approach was being performed that did not provide the same level of rigor or formality of documentation as the full SANA-02 six-step process. This graded approach depended in large part on an intuitive assessment of the proposed change by the PMT-designated ISM team that was based on the subject matter experts' opinion of the impact of the design change on previous control strategies, and continued standards equivalency after the design change. This approach did not always document a clear statement by the ISM teams of how the analysis was performed or how the conclusions were reached.

This lack of procedural guidance was resolved during the inspection by the issuance of a revision to SANA-02 with an Appendix F that contained a checklist that formally directed ISM involvement if, among other things, the design involved changes since the last ISM cycle that increased hazardous material inventories. This procedure revision was generated as a direct result of an initiative by the PMT, which recognized the weakness and directed that the procedure be revised. The inspectors determined the PSC also had recognized the weakness and recently requested the PMT Chair to concur on ABCNs, which changed SRD standards, for the specific purpose of ensuring the ISM process was considered.

ES&H and Quality Assurance Oversight

The inspectors reviewed management assessment report 24590-WTP-MAR-ESH-02-009, *Management Assessment of Safety Analysis Calculations*; CAR 24590-WTP-CAR-QA-02-095 (CAR-095); CAR 24590-WTP-CAR-QA-02-119 (CAR-119); and CAR 24590-WTP-CAR-QA-

02-134, and interviewed ES&H and QA staff and management to assess the oversight of the ISM process by the ES&H and QA organizations.

The inspectors reviewed CAR-095 and interviewed the ES&H Safety Analysis Manager relative to the Defense Nuclear Facility Safety Board (DNFSB) staff review of the HLW facility, which identified significant numbers of errors in the HLW DBE calculations including math errors, controls improperly identified, and use of improper methodology. On April 30, 2002, the Contractor initiated a management assessment to address the DNFSB issue. Based on an initial sampling of the calculations (sampling of 12 drawings), the Contractor initiated CAR-095 with the description of the problem listed as numerous errors in calculations caused by:

- Inadequate procedure compliance
- Input errors
- Assumptions not justified
- Computational errors
- Inadequate consistency reviews.

The cause and extent of condition was listed as aggressive scheduling but was limited to the DBE calculation notes and their reflection in the PSAR. Within the action plan, a full management assessment was to be performed for all of the HLW facility. On May 13, 2002, the Contractor's QA organization validated the CAR but concluded it did not meet the criteria for designation as a "significant condition adverse to quality." The assessment was completed on May 31, 2002. The final assessment contained a review of 27 calculations with 1091 comments including 3 Category 1 errors (potential errors that could affect the conclusion of the calculation).

The inspectors interviewed the ES&H Safety Analysis Manager responsible for the report and the QA screener to understand why this CAR had not been listed as significant. During the interview, the QA representative identified another CAR on the same subject, which had been screened as "significant." This CAR (CAR 24590-WTP-CAR-QA-02-119) was originated by QA based on surveillance trending and issued on June 6, 2002. The inspectors questioned why CAR 095 had not been categorized as significant. First, the Contractor stated the management assessment had not been completed when the initial screening was done. Secondly, the subsequent ES&H evaluation concluded the extent of the discrepant conditions was not "significant" because no change in a DBE safety case requirement was necessary because of the conditions. Following the interview, the QA representative re-reviewed CAR-095 on July 18, 2002, and upgraded it to "significant." He also linked the two CARs, thus linking the CAR root cause analysis to include the full information of the management assessment results. This issue was resolved during the inspection.

1.4.3 Conclusions

The inspectors concluded the PMT oversight of the ISM process was adequate. No conclusion could be drawn relative to the ISM oversight of ES&H and QA due to insufficient information.

2.0 EXIT MEETING SUMMARY

The inspectors presented preliminary inspection results to members of the Contractor's management at an exit meeting held on July 26, 2002. The Contractor acknowledged the information presented. The inspectors asked the Contractor whether any materials examined during the inspection should be considered as limited rights data. No limited rights data were identified.

The inspectors re-exited with the Contractor on September 20, 2002, to address changes to the inspection team's characterization of issues following Office of Safety Regulation Management review of this report. Several issues were upgraded to inspection Findings as documented above.

3.0 REPORT BACKGROUND INFORMATION

3.1 Partial List of Persons Contacted

D. Klein, Radiological, Nuclear, and Process Safety Manager
P. Lowry, LAW/HLW HSA Lead
J. Hinckley, PT HSA Lead
R. Garrett, Safety Analysis Manager
M. Platt, Safety Program Lead
G. Warner, Quality Engineering Manager
E. Smith, Safety Program Engineer
B. Niemi, Safety Program Engineer
J. Angely, Safety Programs Specialist
D. Cresci, Safety Analyst
C. Lindquist, Safety Analyst
C. Bogaert, Process Engineer
F. Howell, Supervisor, Process Engineering
J. Christiansen, Safety Analyst
R. Van Vleet, Safety Analyst
J. Lavender, Lead Health and Safety Analyst
G. Garcia, HVAC Engineer
R. Garrett, Safety Analysis Manager
P. Sullivan, HVAC Engineer
S. Henry, Radiological Operations Lead Engineer
R. Yorg, Safety Analyst
S. Anderson, Lead Electrical Engineer
B. Harshberger, Electrical Engineer
R. Petrocchi, Safety Engineer
J. Olson, Process Engineer

3.2 List of Inspection Procedures Used

Inspection Technical Procedure I-105, "Standards Selection Process Assessment"

3.3 List of Items Opened, Closed, and Discussed

3.3.1 Items Opened

IR-02-013-01-FIN	Finding	Failure to procedurally address SRD requirements to have the Process Management Team review SRD standard change ABCNs. (Section 1.2)
IR-02-013-02a-FIN	Finding	Failure to follow procedures regarding DIMs containing required design inputs. (Sections 1.3.1)
IR-02-013-02b-FIN	Finding	Failure to follow procedures regarding linking design media and ISM results to SIPD. (Sections 1.3.2 and 1.3.3)

3.3.2 Items Closed

None

3.3.3 Items Discussed

None

3.4 Key Documents Reviewed

Procedures

24590-WTP-GPP-SANA-001A, Rev. 0, *Accident Analysi*s, dated December 27, 2001

24590-WTP-GPP-SANA-002C, *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards*, dated March 20, 2002 (Rev. 0) and July 23, 2002 (Rev. 1)

24590-WTP-GPG-SANA-002_0, *Integrated Safety Management*, dated September 28, 2001

24590-WTP-GPP-SANA-003A, *Standards Identification Process Database*, dated December 14, 2001

24590-WTP-GPP-SREG-001A, *Project Safety Committee*, dated May 17, 2002

24590-WTP-GPP-SREG-002_1, *Authorization Basis Maintenance*, dated April 23, 2002

24590-WTP-GPG-SREG-002_0, *Environmental, Safety and Health Review of Documents*, dated September 28, 2001

24590-WTP-3DP-G04B-00001A, Rev. 0*, Design Criteria*, dated January10, 2002

24590-WTP-3DP-G04T-00901A, Design Change Control, dated October 8, 2001

Authorization Basis Documents

24590-WTP-SRD-ESH-01-001-02, Rev. 1*, Safety Requirements Document* (SRD)

24590-WTP-ISMP-ESH-01-001, Rev. 1, *Integrated Safety Management Plan* (ISMP)

Authorization Basis Change Notices (Technical Standards Related)

ESH-01-027 – Deletion of IEEE 603 from SRD

ESH-02-003 – Tailoring of IEEE Standards

ESH-02-004 – Modification to Implementing Standards for Ventilation Related SRD Safety Criterion

ESH-02-005 – Addition of Implementing Standards for ITS Cranes

ESH-02-008 – Update to ERPG 2001 & TEEL 2000

ISM Process Management Oversight

CCN 019452, Memorandum – Appointment of the Process Management Team, April 6, 2001, includes PMT Charter from Project Manager

Meeting Minutes

CCN 029148, ISM Team Meeting Minutes, dated February 4, 2002

CCN 027561, Meeting Minutes, ISM (Team) to review, ISM Team – WTP Control Room Habitability

CCN 027242, Meeting Minutes, ISM (Team) to review, ISM – IEEE Std Mtg

CCN 027043, Meeting Minutes, ISM (Team) to review, Tailoring of IEEE Standards

CCN 026324, Meeting Minutes, ISM (Team) to Review the tailoring of IEEE

CCN 026088, Meeting Minutes, ISM (Team) to Review 24590-WTP-ABCN-ESH-01-027, Deletion of IEEE 603 from the SRD, dated December 3, 1999

CCN 025104, ISM Team Meeting Minutes, November 11, 2001

CCN 023554, ISM Team Meeting Minutes, September 25, 2001

CCN 021520, PMT Meeting Minutes No. 24, with Process Management Team Charter, As Amended, June 25, 2001

CCN 09415, Minutes of Safety Implementation meetings of December 2 & 7, 1999

CCN 02318, Minutes of Safety Criteria meeting of September 12, 2001

Process Management Team Meeting Minutes No. 19-24, 31, 32, 35, 37-44

Project Safety Committee Meeting Minutes No. 33, 37, 42-46

<u>Safety Implementation Notes (SINs)</u>

SIN, 24590-WTP-PTF-SIN-ESH-02-007, *ISM Activities for Pretreatment Cesium Ion Exchange Process (CPX) System*

SIN, W375-01-00002, Rev. 0, *Documentation of Integrated Safety Management Cycle II Activities for HLW System 100* (Reconciliation Record)

SIN, W375-00-00047, *System Notebook for ISM Cycle 2 Study of HLW Melter Feed System 100*

<u>Corrective Action Reports</u>

CAR-QA-02-095, dated May 13, 2002

CAR-QA-02-119, dated June 6, 2002

CAR-QA-02-134, dated July 2, 2002

<u>Management Assessment Reports</u>

MAR-ESH-02-009, Rev. 0, *Management Assessment of Safety Analysis Calculations,* issued June 20, 2002

SV-QA-02-012, *Follow-up Surveillance for Noncompliance within NTS-RP-2001-0001* (SIPD maintenance)

<u>Drawings</u>

24590-HLW-M6-HFP-00001, Rev. B, “HLW Melter Feed Process System, Melter Feed Preparation Vessel”

24590-HLW-M6-HFP-00002, Rev. B, “HLW Melter Feed Process System, Melter Feed Vessel

24590-PTF-M5-V17T-00013, Rev. A, B, and C, "Process Flow Diagram Cesium Ion Exchange Process Columns System CXP"

24590-PTF-M6-CXP-00001, Rev. A, P&ID – "PTF Cesium Ion Exchange Hydrogen Separation System CXP (Q)"

24590-PTF-M6-CXP-00004, Rev. A and B, P&ID-"PTF Cesium Ion Exchanger Process Vessels System CXP (Q)"

Design Media

24590-PTF-DCA-PR-01-001, Rev. 0, *Change to Carousel Ion Exchange Columns, Addition of Hydrogen Mitigation, and Removal of Miscellaneous Vessels*

24590-HLW-DCA-PR-01-005, Rev. 0, *Melter Feed Preparation Vessel Batch Volume Modification Identification of Work*

24590-PTF-SIN-ESH-02-007, Rev. 0, *Safety Implementation Notes for Pretreatment CXP System*

24590-PTF-U7C-PVV-00001, Rev. A, *Reliability Analysis of Proposed PTF Vessel Ventilation Systems Design*

24590-PTF-Z0C-W14T-00002, Rev. A, *Revised Severity Level Calculations for the Pretreatment Facility*

24590-PTF-Z0C-W14T-00027, Rev. A, *Design Basis Event – Overheating of Cesium Ion Exchange Media*

24590-HLW-DCA-PR-01-005, Rev. 0, *Melter Feed Preparation Vessel Batch Volume Modification,* dated November 17, 2001

CALC W375-HV-NS00018, *Severity Level Calculation for HLW Vessels*

CALC 24590-HLW-U4C-U78T-00001, Rev. B, *Design Basis Event-Liquid Spills*, dated February 23, 2002

CALC 24590-HLW-Z0C-U10T-00001, Rev. A, *HLW Facility Hazard Categorization and Chemical Hazards Identification*, dated November 20, 2001

CALC 24590-HLW-Z0C-W14T-00013, Rev. B, *Revised Severity Level Calculations for HLW Facility*, dated June 3, 2001

DIM-HLW-M5I-V17T-00001, Rev. 1, *Process Flow Diagram for HLW Receipt and Feed Preparation*

DIM-HLW-M6I-HFP-00001, *HLW Melter Feed Process System, Melter Feed Preparation Vessel*

DIM-HLW-M6I-HFP-00002, *HLW Melter Feed Process System, Melter Feed Vessel*

3.5 Other Documents Reviewed

Employee Training Profiles

24590-WTP-PSAR-ESH-01-002-04, Rev. H, *Hazard and Accident Analyses*

DI-SANA-001, Desk Instruction: *Integrated Safety Management Documentation*, dated January 16, 2002

24590-ESH-DI-SANA-002, Rev. 0, *Issued-for-Construction PHA Screening and ISM Iteration*, dated July 9, 2002

4.0 LIST OF ACRONYMS

AB	authorization basis
ABCN	Authorization Basis Change Notice
AIChE	American Institute of Chemical Engineers
ALARA	as low as reasonably achievable
ASME	American Society of Mechanical Engineers
C5	Contamination Zone 5
CAR	Construction Authorization Request
CSE	Control Strategy Element
CSD	Control Strategy Document
CXP	Cesium Ion Exchange Process
DBE	Design Basis Event
DCA	Design Change Application
DEM	Design Engineering Manager
DIM	Design Input Memorandum
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U. S. Department of Energy
ES&H	Environmental, Safety and Health
GSV	Gas Separation Vessel
HAZOP	Hazards and Operability
HEPA	High Efficiency Particulate Activated
HLW	High Level Waste
HVAC	Heating, Ventilation, and Air Conditioning
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IFI	Inspection Follow-up Item
IR	Inspection Report
ITS	important-to-safety

ISM	Integrated Safety Management
ORP	Office of River Protection
PFD	Process Flow Diagram
PHA	Process Hazard Analysis
P&ID	Process and Instrumentation Diagram
PMT	Process Management Team
PSAR	Preliminary Safety Analysis Report
PSC	Project Safety Committee
PTF	Pretreat Facility
QA	quality assurance
QAM	Quality Assurance Manual
RRC	Risk Reduction Class
SCR	Safety Case Requirement
SIN	Safety Implementation Notes
SIPD	Standard Identification Process Database
SL	severity level
SRD	Standards Requirement Document
SC	Safety Criterion
SSC	systems, structures, and components
WTP	Waste Treatment Plant