



U.S. Department of Energy  
**Office of River Protection**

P.O. Box 450  
Richland, Washington 99352

03-OSR-0245

Mr. J. P. Henschel, Project Director  
Bechtel National, Inc.  
2435 Stevens Center  
Richland, Washington 99352

Dear Mr. Henschel:

CONTRACT NO. DE-AC27-01RV14136 – STANDARDS SELECTION PROCESS  
INSPECTION REPORT A-03-OSR-RPPWTP-013

This letter forwards the results of the U.S. Department of Energy, Office of River Protection (ORP) inspection of Bechtel National, Inc. (BNI) standards selection process for the Waste Treatment and Immobilization Plant during the period May 12 through 16, 2003. For standards selection, the Contractor is required to follow the Integrated Safety Management (ISM) process described in Appendix A of the Safety Requirements Document (SRD). The primary focus of the inspection was to assess the Contractor's implementation of ISM as it pertains to standards selection.

The inspectors concluded that BNI procedures for implementing the ISM process for design changes and for authorization basis changes were adequate. The inspectors found many of the procedures were modified significantly just before the inspection. Therefore, the inspectors could not reach a conclusion on the effectiveness of the implementation of the new requirements of the procedures. The inspectors noted the project was in the early stages of ISM Cycle III and concluded the Contractor had properly initiated Cycle III activities in accordance with the requirements of Appendix A of the SRD.

The inspectors evaluated implementation of the standards selection process for High Level Waste (HLW) melter offgas system because ISM Cycle III work for that system was the farthest advanced. The inspectors found significant unresolved safety issues associated with HLW melter offgas system mercury adsorbers and concluded Hazard and Operability documentation was incomplete with respect to hazards identification and event sequence identification. Verification of the resolution of safety issues associated with the HLW melter offgas mercury adsorbers and proper documentation of the hazards analysis will be tracked by ORP as an assessment follow-up item.

Mr. J. P. Henschel  
03-OSR-0245

-2-

The inspection resulted in one Finding, documented in the Notice of Finding (Enclosure 1). The design changes made for the addition of mercury adsorbers to the HLW melter offgas system, as described in Design Change Application (DCA) 24590-HLW-DCA-PR-02-001, the review and approval of primary design drawing Process Flow Diagram 24590-WTP-HLW-M5-V17T-00004, involved unsubstantiated safety evaluation conclusions. The drawing was approved and issued without completing the ISM process as necessary to establish appropriate hazard controls and associated standards. Failure to fully implement the requirements of SRD Appendix A is considered an inspection Finding as documented in the Notice of Finding.

Details of the inspection, including the Finding, are in the enclosed inspection report (Enclosure 2). You are requested to provide a written response to this Finding within 30 days, in accordance with the instruction provided in the Notice of Finding.

If you have any questions, please contact me, or your staff may call Robert C. Barr, Director, WTP Safety Regulation Division, (509) 376-7851.

Sincerely,

Roy J. Schepens  
Manager

OSR:NNK

Enclosures (2)

## Notice of Finding

During performance of an inspection of the standards selection process conducted May 12 through 16, 2003, at the Contractor's offices, the U.S. Department of Energy (DOE), Office of River Protection (ORP) identified the following:

Standard 7, Paragraph (e)(2)(i) of the Contract<sup>1</sup> required the Contractor to develop and implement a program to ensure that radiological, nuclear, and process safety requirements were defined, implemented, and maintained. Related to this requirement, the contract specified 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*, as the process the Contractor was to use to establish a set of radiological, nuclear, and process safety standards and requirements. The Contractor's 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 that meets these contractual requirements.

The results of the Contractor's ISM process (hazard identification and evaluation, accident analysis, hazard control strategy development, and selection of standards for implementing control strategies) are described in the Waste Treatment and Immobilization Plant (WTP) authorization basis (AB), particularly in Chapter 3 of the Preliminary Safety Analysis Report (PSAR) and Volume II of the SRD.

Section 4.1.3 of DOE/RL-96-0006, *Top-Level Radiological, Nuclear and Process Safety Standards and Principles*, required the AB be established and maintained current with respect to changes in the facility design. Related to this requirement, Standard 7, Section (e)(2)(iii), specified that the Contractor shall implement RL/REG-97-13, *Office of River Protection Position on Contractor-Initiated Changes to the Authorization Basis*, which required, among other things, that safety evaluations be performed for changes to facility design that may affect the WTP AB.

The Contractor had established procedures 24590-WTP-3DP-G04T-00901, *Design Change Control*; 24590-WTP-3DP-G04B-00046, *Engineering Drawings*; 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance*; and 24590-WTP-GPP-SANA-002, *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards*, that implemented, among other things, the requirements and commitments described above. The procedures required that proposed design changes be reconciled with the AB, safety evaluations of proposed design changes be performed, and that the ISM process be completed, as necessary, for revisions to primary design drawings.

Contrary to the above requirements and procedures, in the case of design changes made in association with the addition of mercury adsorbers to the High Level Waste melter offgas system as described in Design Change Application 24590-HLW-DCA-PR-02-001, the review and approval of primary design drawing Process Flow Diagram 24590-WTP-HLW-M5-V17T-00004 involved unsubstantiated safety evaluation conclusions and the drawing was approved and issued

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<sup>1</sup> Contract No. DE-AC27-01RV14136 between the U.S. Department of Energy and Bechtel National, Inc., dated December 11, 2000.

without completing the ISM process as necessary to establish appropriate hazard controls and associated standards. Failure to fully implement the requirements of SRD Appendix A is considered an inspection Finding (A-03-OSR-RPPWTP-013-F01).

The ORP 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 NO: A-03-OSR-RPPWTP-013

FACILITY: Bechtel National, Inc.

LOCATION: 2435 Stevens Center  
Richland, Washington 99352

DATES: May 12 through 16, 2003

INSPECTORS: N. Kaushal, Inspection Lead  
R. Smoter, Consultant  
R. DeFayette, Consultant

APPROVED BY: P. Carrier, Verification and Confirmation Official  
WTP Safety Regulation Division

## **Executive Summary**

### Standards Selection Process Inspection

#### **INTRODUCTION**

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

- Implementation of the Integrated Safety Management (ISM) process as it related to ISM Cycle III
- ISM Process as it related to authorization basis maintenance process
- Implementation of the ISM process with respect to changes in plant design
  - Review of Design Change Application (DCA) 24590-HLW-DCA-PR-02-001
  - Review of design changes and AB changes
- Oversight of the ISM process by the Contractor

#### **SIGNIFICANT OBSERVATIONS AND CONCLUSIONS**

- The project was in the early stages of ISM Cycle III at the time of the inspection. The inspectors concluded the Contractor had properly initiated ISM Cycle III activities in accordance with project procedures and the requirements of Safety Requirements Document (SRD) Appendix A. (Section 1.2.3)
- ISM Cycle III work was progressing in accordance with project procedures. Contractor staff, supervisors, and managers directly involved in implementing ISM Cycle III work were knowledgeable and actively engaged in identifying and resolving safety issues identified in the course of performing ISM Cycle III work. However, the inspectors found that there were significant unresolved safety issues associated with the mercury adsorbers in the High Level Waste (HLW) melter offgas system and concluded the Hazard and Operability Study documentation was incomplete with respect to hazards identification and event sequence identification. Verification of the resolution of safety issues associated with mercury adsorbers in the HLW melter offgas system and proper documentation of the hazards analysis will be tracked as an assessment follow-up item. (Section 1.2.3)
- The Contractor had established adequate procedures for implementing the ISM process for design changes and for authorization basis changes processed under 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance* (SREG-002). However, due to late implementation of the new procedures, the inspectors could not determine the overall effectiveness of these procedures. (1.3.3)

- Design changes made in association with the addition of mercury adsorbers to the HLW melter offgas system (DCA 24590-HLW-DCA-PR-02-001) were not adequately coordinated with the ISM process. Consequently, reviews and approvals of design changes to numeric primary design documentation involved unsubstantiated safety evaluation conclusions. This is considered an inspection Finding. Corrective actions are currently being taken by the Contractor with respect to improving the documentation of safety evaluations in response to the Findings identified during a recent Authorization Basis Management inspection (Inspection Report A-03-OSR-RPPWTP-007). However, those corrective actions focused on process and documentation issues and, therefore, do not specifically address the condition described in the above Finding. (Section 1.4.1.3)
- The Contractor had recently made extensive revisions to its procedures related to the ISM process. At the time of the inspection, the Contractor had completed few design changes using these procedures, and the design changes that were completed involved relatively minor design issues. Based on reviews performed and interviews conducted for these limited design changes, the inspectors determined changes from approved designs, including the reason for the changes, were identified, approved, documented, and controlled. 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. Involved Contractor personnel were trained to perform the work. (Section 1.4.2.3)
- Based on discussions with involved personnel and review of appropriate documents, the inspectors concluded Contractor oversight of the ISM process was adequate. (Section 1.5.3)

## Table of Contents

1.0	REPORT DETAILS.....	1
1.1	Introduction.....	1
1.2	ISM Process for ISM Cycle III.....	2
1.2.1	Inspection Scope.....	2
1.2.2	Observations and Assessments.....	2
1.2.2.1	ISM Cycle III Process Initiation.....	2
1.2.2.2	ISM Cycle III Process Implementation.....	3
1.2.3	Conclusions.....	7
1.3	ISM Process for AB Maintenance.....	7
1.3.1	Inspection Scope.....	7
1.3.2	Observations and Assessments.....	7
1.3.3	Conclusions.....	8
1.4	Implementation of ISM Process with respect to Changes in Plant Design.....	8
1.4.1	Review of DCA 24590-HLW-DCA-PR-02-001, Revision 1, Incorporation of an Activated Carbon Column in the HLW Melter Offgas System.....	9
1.4.1.1	Inspection Scope.....	9
1.4.1.2	Observations and Assessments.....	9
1.4.1.3	Conclusions.....	15
1.4.2	Review of Design Changes and AB Changes.....	15
1.4.2.1	Inspection Scope.....	15
1.4.2.2	Observations and Assessments.....	16
1.4.2.3	Conclusions.....	18
1.5	Oversight of ISM Process by the Contractor.....	18
1.5.1	Inspection Scope.....	18
1.5.2	Observations and Assessments.....	19
1.5.3	Conclusions.....	20
1.6	Closure of Inspection Items.....	20
1.6.1	(Closed IR-02-013-01-FIN).....	20
1.6.2	(Closed IR-02-013-02a-FIN).....	21
1.6.3	(Closed IR-02-013-02b-FIN).....	21
2.0	EXIT MEETING SUMMARY.....	22
3.0	REPORT BACKGROUND INFORMATION.....	22
3.1	Partial List of Persons Contacted.....	22
3.2	List of Inspection Procedures Used.....	23
3.3	List of Items Opened, Closed, and Discussed.....	23
3.3.1	Items Opened.....	23
3.3.2	Items Closed.....	23
3.3.3	Items Discussed.....	24
4.0	LIST OF ACRONYMS.....	24



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## Standards Selection Process Inspection Report A-03-OSR-RPPWTP-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), defined, among other things, the Contractor's responsibilities for radiological, nuclear, and process safety. Standard 7, Paragraph (e)(2)(i) of the Contract required the Contractor to develop and implement a program to ensure that radiological, nuclear, and process safety requirements were defined, implemented, and maintained. Standard 7 of the Contract also specified 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*, as the process the Contractor was to use to develop and recommend a set of radiological, nuclear, and process safety standards and requirements.

The Contractor's 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 that meets requirements of Standard 7, Paragraph (e)(2)(i) of the Contract and DOE/RL-96-0004.

The Contractor established procedures 24590-WTP-GPP-SANA-002, Rev. 6, *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards*, (SANA-002) dated April 11, 2003, and 24590-WTP-GPG-SANA-002, *Integrated Safety Management*, for implementing the requirements of SRD Appendix A. These procedures implemented the details of the Contractor's hazards analysis, accident analysis, and standards selection processes the Contractor collectively referred to as the ISM process. These same procedures had been reviewed in a number of past DOE Office of River Protection (ORP) assessments and had been considered extensively during the Standards Selection and Construction Authorization regulatory actions. For these reasons, this assessment did not include a programmatic assessment of ISM process described in SANA-002. Rather, the inspection concentrated on the implementation of the process.

The Contractor had organized the programmatic implementation of the ISM process into "ISM Cycles" that correspond to key project milestones and DOE authorization actions. Cycle II ISM activities, which were associated with construction authorization and preparation of the Preliminary Safety Analysis Report (PSAR), had been completed at the time of the inspection. The project was very early in the ISM Cycle III process. The inspectors determined the Contractor had planned to conduct ISM Cycle III activities throughout much of the construction phase of the Waste Treatment and Immobilization Plant (WTP). The project schedules showed the completion of ISM Cycle III was tied to completion of detailed WTP design and commencement of the cold-commissioning phase of the project. ISM Cycle II results were presented in the PSAR and SRD submitted in connection with the construction authorization regulatory action. Since these documents were subjected to an extensive review associated with

the construction authorization regulatory action, this assessment focused on the implementation of ISM Cycle III activities.

The inspection also assessed the Contractor's implementation and oversight of the ISM process in connection with changes to the authorization basis (AB) and substantial changes to the WTP design that resulted in changes to the AB using 24590-WTP-GPP-SREG-002, Rev. 5, *Authorization Basis Maintenance* (SREG-002), dated April 15, 2003. Related to this portion of the inspection, the inspectors reviewed recent changes made to SREG-002 to verify there was an appropriate linkage between the Contractor's ISM and AB maintenance processes. Recent design changes and associated AB maintenance documents were assessed regarding the Contractor's justifications and traceable records of linkages with the ISM process steps (i.e., work definition, hazards evaluation, hazard control development, and standards selection), to the extent that could be determined.

The inspectors used the guidance in Inspection Technical Procedure I-105, *Standards Selection Process Assessment*, as a general basis for the inspection.

## **1.2 ISM Process for ISM Cycle III**

### **1.2.1 Inspection Scope**

The inspectors met with Contractor Engineering and Environmental and Nuclear Safety (E&NS) personnel and reviewed documents and records pertaining to implementation of ISM Cycle III. ISM Team meeting minutes, ISM team notebooks, process flow diagrams (PFD), pipe and instrument drawings (P&ID), and Standard Identification Process Database (SIPD) were among the documents and records reviewed to:

- Verify each of the steps of the Contractor's ISM process, as described in SRD Appendix A, were being accomplished in accordance with the Contractor's implementing procedures for ISM Cycle III.
- Assess the adequacy of the results of the ISM Cycle III with regard to identification of hazards, evaluation of the hazards, development of hazard control strategies, and selection of standards associated with implementing hazard control strategies.
- Determine if the ISM process was being documented in accordance with applicable Contractor procedures and assess the adequacy of the documentation.

### **1.2.2 Observations and Assessments**

#### **1.2.2.1 ISM Cycle III Process Initiation**

The inspectors reviewed project schedules and met with Contractor management and supervisory personnel regarding plans associated with ISM Cycle III. The inspectors determined project schedules included ISM Cycle III activities and the management was actively involved in

planning and scheduling ISM Cycle III activities. The inspectors reviewed Process Management Team (PMT) meeting minutes and determined that the PMT was providing oversight of ISM Cycle III planning and scheduling activities. The inspectors verified the PMT had taken steps to establish ISM teams. Interviews with applicable managers and supervisors indicated appropriate resources had been allocated to complete ISM Cycle III activities.

On the basis of the above reviews and observations, the inspectors concluded ISM process initiation requirements of SRD Appendix A had been met for ISM Cycle III.

#### **1.2.2.2 ISM Cycle III Process Implementation**

As described in the introduction of this report, the project was in the early stages of ISM Cycle III and the Cycle III ISM process had not been completed for any portion of the WTP at the time of the inspection. The HLW melter offgas system was the farthest along in the ISM process at the time of the inspection. For this reason, the inspectors decided to assess the ISM work associated with HLW melter offgas system for this portion of the inspection.

The Contractor's ISM procedures implemented a version of the Hazards and Operability (HAZOP) methodology described in the *Guideline for Hazard Evaluation Procedures*, produced by the American Institute of Chemical Engineers. The HAZOP process was performed in ISM team meetings. The Contractor had completed all the planned HAZOP ISM team meetings for the HLW melter offgas system at the time inspection.

The inspectors identified the following key documents associated with ISM team meetings:

- CCN 049914, *ISM Work Identification Meeting for Melter Offgas*
- CCN 049917, *HLW Offgas HAZOP*, which documents the results of six HAZOP meetings
- CCN 052607, *HLW Offgas HAZOP*, which documents the results of five HAZOP meetings.

The inspectors obtained PFDs, P&IDs, and other design documents identified in CCN 049914 associated with HLW melter offgas system. In addition, the inspectors obtained access to SIPD data associated with the HLW melter offgas system.

The inspectors interviewed personnel and reviewed the above documentation in order to assess the ISM work associated with HLW melter offgas system. The inspectors determined the ISM process was being performed by knowledgeable personnel in accordance with project procedures. Supervisors and managers with responsibilities related to implementing the ISM process were knowledgeable and actively involved in resolving the key safety and process issues identified during the execution of the ISM Cycle III process.

The inspectors raised several issues in the course of this assessment as described below.

### Operation and Maintenance Event Initiators

The inspectors reviewed hazards analysis documentation to determine if there was a systematic evaluation of HLW melter offgas system malfunctions that could be initiated by operational or maintenance errors. The inspectors determined potential operations and maintenance errors that could result in system malfunctions were underrepresented in the hazards analysis. For example, loss of offgas exhausters fans due to an operations error or common cause maintenance failure was not addressed. SIPD documented a loss of these fans was attributed to a fire resulting in damage to all three fans. However, operations and maintenance errors resulting in temporary loss of the fans with similar consequences were not considered.

Contractor personnel involved in the hazards analysis process acknowledged that, in general, operations and maintenance would be given greater attention in ISM Cycle IV (associated with the hot operations phase of the WTP) when detailed design was complete and operations and maintenance procedures were available. The inspectors agreed that detailed evaluation of potential system operations and maintenance errors was appropriate for ISM Cycle IV.

### External Hazards<sup>2</sup>

The inspectors determined there was not a systematic identification of external hazards or energy sources that could adversely affect the HLW offgas system and certain potential events involving external hazards (e.g., load drops, fire water exposure, high energy line breaks, etc.) were not identified or evaluated in the hazards analysis. Contractor personnel acknowledged the situation and identified work was in-progress in this area.

The Contractor had established “Hazards Topography” procedures in SANA-002, which were developed specifically to address the evaluation of these external hazards and potential system interactions. The inspectors reviewed project schedules and procedures associated with the Hazard Topography process and documentation of meeting minutes (CCN 040172, 049920, 052601, 052602 and 052603) associated with the performance of this process for portions of the LAW facility. Based on this review the inspectors determined the hazard topography process, if properly implemented, should adequately address the external hazards issues described above.

The inspectors were provided a copy of draft procedure, 24590-WTP-GPG-ENG-053, *Engineering Guide for Hazard Control Strategy*. The procedure provided guidance in evaluating and eliminating external hazards when considering the layout of important-to-safety equipment. The inspectors reviewed the draft procedure and concluded the procedure adequately addressed external hazards.

Based on the above, the inspectors concluded the Contractor was taking comprehensive steps to ensure external hazards will be adequately addressed in future hazard analyses.

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<sup>2</sup> The term “External Hazard” as used in this report pertains to hazards from a source external to the system under consideration

### Hazard Identification and Potential Event Sequence Identification

The inspectors determined that chemical hazards associated with the HLW melter offgas system were characterized in CCN 049914. The inspectors noted that, although most hazardous chemical materials were identified, the quantities of materials at risk were not documented in the meeting minutes. Also, there was no identification and quantification of radioactive materials in the documentation. Since performing a quality HAZOP required an estimation of the quantities of hazardous materials at risk, the inspectors raised this issue with Contractor personnel involved in the ISM process. Contractor personnel explained the quantities of material were available from other documents and personnel available at the HAZOP meetings. The inspectors reviewed documentation in ISM team notebooks that was available during the HAZOP meetings and determined this type of information was generally available at the HAZOP meetings.

The inspectors also noted that identification of hazardous chemicals in the meeting minutes was incomplete. For example, mercury adsorbers in the system are expected to accumulate significant quantities of mercury sulfide over time. The presence of mercury sulfide was not identified in the Hazardous Chemical Information list in the ISM meeting minutes. This issue was raised with Contractor personnel who identified an action item was initiated to update the Hazardous Chemical Information list prior to the HAZOP, but this was not completed at the time of the HAZOP meetings. Contractor personnel provided documentation (an e-mail printout) available at the HAZOP meeting that provided an estimate of mercury sulfide inventory in the adsorbers. The inspectors reviewed the HAZOP information developed for mercury adsorber portion of the HLW melter offgas system and identified one event sequence that involved the potential for a mercury release to the C3 area. On this basis, the inspectors determined the presence of mercury sulfide was considered in the HAZOP.

The inspectors noted SANA-002 required the documentation of hazards identification in meeting minutes associated with ISM process and, based on the observations described above, the documentation of hazards in meeting minutes was incomplete. The Contractor personnel interviewed indicated hazardous materials and the specific quantities of these materials considered in hazards analysis activities would be documented by references to appropriate calculations and other relevant documents, once the HAZOP information was entered in SIPD. At the time of the inspection, HLW melter offgas system ISM Cycle III information had not been entered in SIPD. Therefore, the inspectors were unable to reach any conclusions regarding the quality of documentation associated with ISM Cycle III hazards identification (i.e., identification of types and quantities of material at risk and potential energy sources).

The inspectors performed a detailed review of a sample of the HLW melter offgas system HAZOP data (events characterized by deviations, causes, and potential consequences) documented in the meeting minutes. The mercury adsorber columns were selected for this detailed review. Based on this sample, the inspectors determined identification of potential event sequences and estimation of event consequences was incomplete in the documentation. The following are some examples:

- From review of the HAZOP data, the inspectors determined there was not a systematic evaluation of potential adsorber fire initiators, event sequences, or estimates of consequences evident in the HAZOP documentation. The magnitude of potential fires in

the adsorber beds was small (for instance, high levels of organics in the offgas was assumed to cause a “localized high temperature” in the adsorber bed). Assumptions associated with estimated severity of the fires (e.g., amount of fuel, energy release rate, etc.) were not described. Potential impacts of a fire inside the offgas system on downstream offgas system components were not addressed.

- There is a theoretical possibility of producing gunpowder in the adsorber beds (due to reactions involving sulfur, carbon, NO<sub>x</sub>, and chemical impurities in the activated carbon). This issue was not addressed in the HAZOP documentation.
- The adsorber beds may accumulate radioactive materials over time (in particular Iodine). The potential release of radioactive materials held-up in the adsorber beds was not identified in any of the event scenarios.
- A number of event sequences, particularly fires, could result in a release of hazardous chemicals (e.g., volatilized mercury) or radioactive materials directly to the environment through the HLW stack. This release scenario was not addressed.
- Hazards analysis documentation did not address the potential for NO<sub>x</sub>/carbon reactions.
- In general, consideration of potential event consequences in the HAZOP was only taken to the point of identifying an adverse impact on the HLW melter offgas system. That is, the consequences of event sequences to workers, the public, or the environment were not estimated. Consequently, the safety significance of the potential events identified in the HAZOP documentation was often unclear to the inspectors. Inspectors recognized that formal quantitative analysis of consequences was not normally performed for hazards analyses. However, as described in American Institute of Chemical Engineers (AIChE) hazard evaluation guidelines, qualitative consequences estimates (exposure, hazardous material released, etc.) were normally provided in a hazards analysis that were consistent with identified objectives of the analysis (i.e., worker safety, public safety, environmental protection, property loss, etc.).

The inspectors had extensive discussions with various project personnel involved in the ISM process and the design of the mercury adsorbers. The inspectors determined that, even though the HAZOP documentation was not complete, there either was work in progress related to resolving the safety issues associated with adsorbers or project documentation existed which addressed the issue. Contractor personnel indicated the ISM HAZOP meetings were an early phase of the ISM process and additional hazards identification, event sequence development, consequence estimation and hazard control strategy development work would continue. As the information matured, the hazards analysis information would be entered in SIPD and linked by reference to appropriate technical documentation supporting the SIPD entries.

Based on the above, the inspectors determined the HAZOP documentation in HAZOP meeting minutes associated with HLW melter offgas system was incomplete with regard to hazards identification and potential event identification at the time of the inspection. Also, while the Contractor indicated the HAZOP process was completed for the HLW melter offgas system, significant safety issues remained to be resolved that could affect the HAZOP results. Since the

Contractor had not completed the ISM Cycle III process, the inspectors determined that they could not draw conclusions regarding the adequacy of the hazards analysis. Verifying the resolution of safety issues associated with HLW offgas system and complete documentation of the hazards analysis was considered an assessment follow-up item (A-03-OSR-RPPWTP-013-A02).

### **1.2.3 Conclusions**

The inspectors concluded the Contractor had properly initiated ISM Cycle III activities in accordance with project procedures and the requirements of SRD Appendix A.

The HLW melter offgas system was the system farthest along in the ISM Cycle III process at the time of the inspection; however, substantial work remained prior to completion. The inspectors determined that ISM work on the HLW melter offgas system was progressing generally in accordance with project procedures. However, the inspectors found that there were significant unresolved safety issues associated with the mercury adsorbers in the HLW melter offgas system. The inspectors also concluded HAZOP documentation in ISM team meeting minutes reviewed was incomplete with respect to hazards identification and event sequence identification. Verification of the resolution of safety issues associated with mercury adsorbers in the HLW melter offgas system and proper documentation of the hazards analysis is considered an assessment follow-up item. (A-03-OSR-RPPWTP-013-A02)

## **1.3 ISM Process for AB Maintenance**

### **1.3.1 Inspection Scope**

The inspectors reviewed the AB implementing procedure, SREG-002, Rev 5, the Hazards Analysis procedure, GPP-SANA-002, and the guide implementing the Integrated Safety Management (ISM) process, 24590-WTP-GPG-SANA-002, Rev. 2, *Integrated Safety Management*. The purpose was to assess the Contractor's implementation of its ISM process for reviewing and approving changes to the AB.

### **1.3.2 Observations and Assessments**

On April 15, 2003, the Contractor issued Revision 5 to the AB Maintenance Procedure, SREG-002. The revision combined Revision 4 of that procedure with 24590-WTP-GPP-SREG-009, *Safety Screening and Safety Evaluation* into one procedure. It also combined the safety screening, safety evaluation, Authorization Basis Change Notice (ABCN), and Authorization Basis Approval Request (ABAR) into a single form; separated safety evaluations into design and administrative controls versions; transferred responsibility for safety evaluation and AB changes from the Engineering Department to the Environmental and Nuclear Safety (E&NS) Department; removed the Project Safety Committee (PSC) from ABAR approval, except for SRD changes; and established clear directions on the differences and needs for ABCNs and ABARs. These changes were made in response to revisions of RL/REG-97-13, *Office of River Protection Position on Contractor-Initiated Changes to the Authorization Basis* and corrective actions taken



by the Contractor in response to various issues associated with engineering and authorization basis maintenance processes.

SREG-002 required all changes to facility designs or administrative controls that could affect the AB required a safety evaluation to ensure the facility, as designed, constructed, and operated, was safe and consistent with the requirements described in the AB. Appendix 3 of SREG-002 described the process used for those safety evaluations. The process was subdivided into four parts. Part 1, Safety Screening, determined whether the change modified or deleted a standard in the SRD, and whether an ISM meeting was required. If the proposed change modified a standard, Part 2 (a safety screen) would be completed to determine whether the change was an ABCN or an ABAR. If it was an ABCN, Part 3 would be completed and if it was an ABAR, Part 4 was completed. ABARs were approved by the PMT and PSC Chairmen and certified by the Contractor's Project Director.

Of particular importance to the ISM process was question 9 in Part 1 of Appendix 3, which required a decision on whether the design change required an ISM meeting. For guidance on making the decision, the reader was directed to SANA-002. Appendix F, entitled "*ISM Review of Issued Design Media*" provided a method of documenting screening reviews. It noted that in conjunction with the issuance of primary design drawings associated with a given system, the E&NS and Engineering ISM team members conducted screening reviews (in addition to the AB screening and safety evaluation reviews performed per SREG-002) to verify the adequacy of existing ISM documentation and to determine whether an iteration of the ISM hazards analysis was warranted.

### **1.3.3 Conclusions**

The inspectors concluded the Contractor had established adequate procedures for implementing the ISM process for design changes and for authorization basis changes processed under SREG-002. However, as indicated in Section 1.4.2.3, there was insufficient experience with the new procedures to establish conclusions regarding the overall effectiveness of these procedures.

A deficiency related to an inadequate procedure identified by DOE in a previous inspection was corrected (see Section 1.6.1), and recent procedural changes discussed above simplified the process to evaluate design and administrative changes and to implement changes to the AB.

## **1.4 Implementation of ISM Process with respect to Changes in Plant Design**

This portion of the inspection assessed the Contractor's implementation of the ISM process as initiated during the evaluation and implementation of changes to WTP design. This assessment was performed in two parts.

Section 1.4.1 documents the assessment of the ISM process as it relates to the addition of mercury adsorbers to the HLW melter offgas system and the changes made to design documents associated with changes to the offgas system. This review was coordinated with the ISM Cycle III assessment described in Section 1.2 of this report since both sections involved the consideration of the HLW offgas system.

Section 1.4.2 documents the assessment of ISM process in connection with the Contractor's implementation of the authorization basis maintenance process. This portion of the assessment considered authorization basis maintenance actions taken since the recent extensive revision of SREG-0002.

#### **1.4.1 Review of DCA 24590-HLW-DCA-PR-02-001, Revision 1, Incorporation of an Activated Carbon Column in the HLW Melter Offgas System.**

##### **1.4.1.1 Inspection Scope**

The inspectors interviewed Contractor Engineering and E&NS personnel and reviewed documents and records pertaining to DCA 24590-HLW-DCA-PR-02-001. ISM Team meeting minutes, PFDs, P&IDs, Design Input Memoranda (DIMs), design change documentation, authorization basis maintenance documentation, and SIPD were among the documents and records reviewed to:

- Verify each step of the Contractor's ISM process, as described in SRD Appendix A, was being accomplished in accordance with the Contractor's implementing procedures as appropriate for the design change.
- Assess the adequacy of the results of the ISM process with regard to identification of hazards, evaluation of the hazards, development of hazard control strategies, and selection of standards, to the extent applicable to the design change.
- Verify coordination with the ISM process during the implementation of the design change and the associated authorization basis maintenance process.

##### **1.4.1.2 Observations and Assessments**

###### Background

DCA 24590-HLW-DCA-PR-02-001 (hereafter referred as the DCA) involved the addition of an adsorber column to the HLW melter secondary offgas system. The addition of the adsorber column was necessary in order to ensure the WTP mercury stack emissions will be within applicable environmental requirements. Based on an engineering study (24590-WTP-RPT-ENG-01-013), the adsorber material selected for this application was sulfur-impregnated activated carbon. The DCA was initiated in January 2002 and was approved for implementation on June 16, 2002.

Revision 1 to the DCA was initiated on October 21, 2002, and was approved on December 23, 2002. The revision involved two significant changes: (1) spray cooling of the offgas entering adsorber column was added in order to ensure the mercury removal efficiency, and (2) a second adsorber column was added in a series lead-lag configuration to allow changing adsorber media without interrupting HLW processing.

Following the approval of the DCA, DCA 24590-HLW-DCA-OR-03-003 was initiated and approved on April 3, 2003, to address the rearrangement and relocation of HLW melter

secondary offgas system components (hereafter referred to as the rearrangement DCA). Among other things, the rearrangement involved potentially relocating the mercury adsorber columns from the stack-end of the secondary offgas system to a position near the front-end of the process. The principal reason for the rearrangement was to remove mercury before the offgas enters the Selective Catalytic Reducer (SCR), since it was determined that mercury in the offgas had the potential to poison the SCR, thereby reducing its life.

The inspectors reviewed the implementation of the ISM process with respect to these design changes because: 1) much of the design and associated analysis activities associated with the DCA occurred after the last standards selection inspection was completed, and 2) the addition of mercury adsorbers to the HLW offgas system introduces new hazards to offgas process and results in need to evaluate several new potential event sequences (examples of safety issues associated with mercury adsorbers are discussed in Section 1.2.2.2 of this report).

#### Application of the ISM Process to the Design Change

The inspectors found an E&NS reviewer determined that a complete ISM review of the design change proposed by the DCA was required. This determination was documented on a “ES&H Review Checklist for Design Documents,” which was incorporated in the DCA documentation package. An evaluation of the impacts of the DCA on the WTP Authorization Basis (AB) in accordance with 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance*, was initiated with Authorization Basis Change Notice (ABCN) 24590-WTP-ABCN-ENS-02-036; however, the Contractor had not completed the ABCN at the time of the inspection.

The inspectors determined the Contractor held ISM meetings associated specifically with the addition of the mercury adsorbers to the HLW Melter Offgas system; however, the ISM process was never completed with respect to the design changes proposed in the DCA. The ISM meetings addressed preliminary hazards identification and evaluation; however, the analysis was not complete and did not proceed to the point of developing hazard control strategies, documenting the results of the ISM process in the Standards Identification Process Database (SIPD) as required by project procedures, or selecting standards associated with the hazard control strategies.

Interviews with E&NS staff indicated the ISM process activities specifically associated with the DCA were subsequently subsumed by ISM Cycle III activities associated with the HLW Melter Offgas system, which was still in progress at the time of the inspection. The inspectors’ review of the Contractor’s HLW Melter Offgas ISM Cycle III work is described in Section 1.2.2.2.

In summary, the ISM process associated with the addition of mercury adsorbers to the HLW offgas system as proposed in the DCA had not yet been completed at the time of the inspection.

#### Implementation of Design Changes associated with the DCA

In the course of following-up on the implementation of design changes associated with the DCA, the inspectors identified the following items:

- Revision 2 of Process Flow Diagram 24590-HLW-M5-V17T-00004 (HLW Secondary Offgas System PFD) was issued on August 8, 2002. Revision 2 referenced the DCA as one of the reasons for the revision.
- Design Change Notice (DCN) 24590-HLW-DCN-PR-02-020 was approved on September 18, 2002, which modified Revision 2 of HLW Secondary Offgas System PFD to incorporate adsorber spray cooling and a second mercury adsorber column consistent with Revision 1 of the mercury adsorber DCA. Documentation associated with the DCN indicated a safety review was performed by ES&H personnel and that the design change was found acceptable. The DCN documentation did not provide any basis for this determination.
- Revision 3 of the HLW Secondary Offgas System PFD was approved on September 16, 2002. The mercury adsorber was shown on this revision of the drawing; however, the adsorber was indicated as being on hold pending “the selection of the mercury removal media.” A safety evaluation screening for this revision of the PFD was documented on DIM 24590-HWL-M51-V17T-00004 indicating that the drawing was consistent with the AB and, therefore, no ABCN was required.
- Drawing Change Notice 24590-HLW-M5N-V17T-00001 was approved on October 14, 2002, removing the hold on adsorber columns. A decision was made with regard to the choice of adsorber media was given as the reason for removing the hold on the engineering drawing. No safety evaluation is documented in connection with the review and approval of the DCN.
- Revision 1 of the DCA was approved on December 23, 2002, which added spray cooling and an additional adsorber column. The revision documentation indicated safety impacts had been adequately defined. The basis given for this determination was the “ES&H Review Checklist for Design Documents” performed for Revision 0 of the DCA.

Subsequent to the above outlined design change activities, Drawing Change Notice 24590-HLW-M5N-V17T-00004 was issued on December 19, 2002, placing the entire HLW Secondary Offgas system on hold, pending the disposition of the HLW secondary offgas system rearrangement DCA.

The Contractor’s procedures (24590-WTP-3DP-G04T-00901, *Design Change Control*; 24590-WTP-3DP-G04B-00046, *Engineering Drawings*; 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance*; and 24590-WTP-GPP-SANA-002, *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards*) required that safety evaluations of proposed changes be performed, design changes be reconciled with AB, and that the ISM process be completed as necessary for numeric revisions of primary design drawings (Note: Process Flow Diagrams are designated as a “primary design drawings” in 24590-WTP-3DP-G04B-00046). The inspectors were unable to verify from the documentation provided that these issues were addressed during the implementation of design changes associated the DCA as outlined above. Specifically with regard to the scope of this inspection, the mercury adsorbers were added to the HLW Secondary Offgas System PFD; however, the ISM process was never completed with respect to the adsorbers. Additionally, AB maintenance and associated design

change documentation did not reflect the consideration of the specific safety issues associated with the design change.

The inspectors raised these issues with Contractor management and supervisory personnel. The Contractor personnel interviewed agreed that there were problems associated with implementation of changes to the HLW Secondary Offgas System PFD, and that these problems were addressed by actions taken in connection with Corrective Action Report (CAR) 24590-WTP-CAR-QA-02-0252, *Design Conflicts with the Descriptions in the PSARs* (CAR 252). Among other things, the corrective actions of CAR 252 included a review of all numeric revision primary design drawings to verify consistency with the AB and, where necessary, to complete the necessary AB maintenance documentation. The Contractor reasoned that resolving conflicts between the PSAR and project design documents would result in proper safety evaluations being performed and the ISM process being performed or reiterated as necessary to address changes in design.

#### Evaluation of Corrective Actions associated with CAR 252

The inspectors reviewed the status of corrective actions associated with CAR 252 and noted that all corrective actions had been completed and verified by the Contractor. However, there was no evidence that an adequate safety evaluation of the mercury adsorbers had been performed, that the ISM process had been completed for the adsorbers, or that AB documentation had been completed showing impacts on the relevant PSAR hazards and safety analysis descriptions. The Contractor personnel indicated the mercury adsorbers were currently on hold due to the HLW melter offgas system rearrangement DCA, therefore the adsorbers had not yet been subjected to the review called for in CAR 252.

The inspectors noted that the mercury adsorbers were on hold for rearrangement of the HLW offgas system, not the addition of the mercury adsorbers to the system. The inspectors reviewed the Contractor's engineering and AB maintenance procedures and determined the procedures do not specifically describe review requirements for removing holds from design drawings. Therefore, it was not clear removing the hold on mercury adsorbers would result in an evaluation of the safety issues associated with adding the adsorbers to the system.

Contractor management personnel stated all aspects of a design were subjected to the AB maintenance process when a hold was removed from a portion of drawing, not just the issues associated with placing the hold on the drawing. Therefore, the safety evaluation that would be performed for removing the hold on the mercury adsorber would not only address safety issues associated with rearranging the adsorber, but also their addition to the HLW Offgas system.

The inspectors requested and obtained recent documentation of changes to numeric revision primary design drawings involving removing holds from the drawings. The inspectors reviewed the following documentation provided by the Contractor to determine the scope of the safety evaluation performed prior to removing the holds:

- Drawing Change Notice 24590-LAW-M6N-RLD-00004 and associated safety evaluation 24590-WTP-SE-ENS-03-130

- Drawing Change Notice 24590-BOF-C2-C12T-00002 and associated safety evaluation 24590-WTP-SE-ENS-03-227.
- Drawing Change Notice 24590-BOF-M6-RWW-00001 and associated safety evaluation 24590-WTP-SE-ENS-03-179
- Drawing Change Notice 24590-HLW-M6N-HCP-00001 and attached safety design checklist screening documentation.
- Drawing Change Notice 24590-BOF-M6N-PSA-00006 and attached safety design checklist screening documentation.

The drawing changes made under these DCNs involved minor design issues and, in general, the documentation lacked sufficient detail for the inspectors to determine the scope of the safety evaluations performed for these DCNs. To the extent that safety evaluations did provide insight into the scope the evaluation, the safety evaluations were specifically limited to the change as identified on the DCN documentation. For example, in the case of DCN 24590-LAW-M6N-RLD-00004, approved on May 1, 2003, and associated safety evaluation 24590-WTP-SE-ENS-03-130, holds were removed from portions of effluent lines. The safety evaluation clearly indicated that the only issue considered in the safety evaluation was the renumbering of two effluent lines. None of the cases identified above demonstrated a decision taken to iterate a portion of the ISM process based on the change being implemented by the DCN.

Also, related to this issue, the inspectors reviewed ABCN 24590-WTP-ABCN-ENS-03-011 and Safety Evaluation 24590-WTP-SE-ENS-03-033 that were drafted for the HLW melter offgas system rearrangement DCA. The secondary HLW melter offgas system was placed on hold on the basis of the pending rearrangement of the system, therefore, the safety evaluation and ABCN documents associated with this DCA described the scope of the safety evaluation performed by the Contractor in connection with removing the hold from the system. The documentation indicated the safety evaluation of this DCA only considered the rearrangement of the offgas system, not the addition of mercury adsorbers. Since these documents had not been reviewed and approved at the time of the inspection, no conclusions could be reached specific to this documentation; however, the evaluations performed so far did not support a conclusion that design changes would consider all AB consistency and safety issues associated with portions of drawing being removed from a hold status.

On the basis of the documentation sampled, the inspectors were unable to conclude that safety evaluations performed for DCNs to remove holds from numeric revision primary design drawings would result in a review equivalent to that performed in connection with CAR 252 for the portions of the drawing that were on hold. Since CAR 252 addressed a significant issue with respect to the adequacy of the WTP authorization basis, the inspectors determined verifying the corrective actions of CAR 252 for portions of drawings that were on hold will be tracked as an assessment follow-up item (A-03-OSR-RPPWTP-013-A03).

### Assessment of Safety Documentation associated with the Contractor's Review of HLW Melter Offgas P&IDs

In the course of reviewing corrective actions associated with CAR 252, the inspectors reviewed ABCN 24590-WTP-ABCN-ENS-02-047 and Safety Evaluation 24590-WTP-SE-ENS-02-047. These documents were developed in connection with the review of HLW Offgas system P&IDs in response to CAR 252. Contrary to statements made by Contractor management personnel, the review did address the addition of mercury adsorbers to the HLW Melter Offgas system. The ABCN and associated safety evaluation both indicated the addition of the mercury adsorbers affected the design description in HLW PSAR and the adsorbers were addressed in the safety evaluation.

The safety evaluation did not provide any insight into the specific safety issues considered during the evaluation, however, the evaluation contained the following conclusions: "The change does not create a new DBE or increase the frequency or consequences of an analyzed DBE" and "The change provides adequate safety because the applicable questions on the Safety Evaluation have been answered in a way that ensures adequate safety following the change."

Some of the safety issues associated with the mercury adsorbers, and an overview of the status of dealing with issues, are discussed in Section 1.2.2.2 of this report. Considering the range of issues that remained to be evaluated in connection with addition of the mercury adsorbers to the HLW offgas system, the inspectors determined the safety conclusions presented in the approved ABCN and associated safety evaluation were unsubstantiated at the time of the inspection. This issue was raised with Contractor supervisor and management personnel and it was agreed the conclusions reached in the safety evaluations were incorrect; however, corrective actions were underway at the time of the inspection to make improvements to safety evaluations.

### Review of Corrective Actions associated with Safety Evaluations

The inspectors requested and obtained documentation related to the Contractor's ongoing corrective actions with regard to safety evaluations to determine if they addressed the issue described above. The inspectors noted that the documentation was related to findings and issues raised in the ORP AB maintenance inspection documented in Inspection Report A-03-OSR-RPPWTP-007. The corrective actions were documented in Contractor-prepared CARs. The inspectors reviewed the following CARs associated with safety evaluations:

- Corrective Action Report 24590-WTP-CAR-QA-03-033, *Safety Checklist Documentation*
- Corrective Action Report 24590-WTP-CAR-QA-03-035, *Changes made to Facility Inconsistent with AB*
- Corrective Action Report 24590-WTP-CAR-QA-03-036, *Safety Evaluations*
- Corrective Action Report 24590-WTP-CAR-QA-03-037, *ABCN did not contain a summary of the safety evaluation*

From the review of the above documents, the inspectors determined the CARs addressed various process and documentation issues associated with the Contractor's AB maintenance process. The corrective actions were targeted at improving procedural adherence with respect to creating appropriate documents when necessary and providing appropriate level-of-detail in the documentation. Since the corrective actions did not address the issue of unsubstantiated conclusions being documented in safety evaluations associated with design changes or the lack of coordination between the ISM process, the design change process, and the authorization basis maintenance process, the inspectors could not conclude the Contractor's corrective actions described in the above CARs would address the condition identified in this inspection. Therefore, the approval of the HLW Secondary Offgas System PFD without completing the relevant portions of the ISM process or completing an adequate safety evaluation is considered an inspection Finding (A-03-OSR-RPPWTP-013-F01).

### **1.4.1.3 Conclusions**

The inspectors concluded that, in the case of design changes made in association with the addition of mercury adsorbers to the HLW melter offgas system (DCA 24590-HLW-DCA-PR-02-001), the Contractor's process for making changes to design was not adequately coordinated with the ISM process. Consequently, reviews and approvals of design changes to numeric primary design documentation involved unsubstantiated safety evaluation conclusions. This is considered an inspection Finding (A-03-OSR-RPPWTP-013-F01).

Also, during a review of corrective actions taken by the Contractor in connection with CAR 24590-WTP-CAR-QA-02-0252, which involved actions taken by the Contractor to reconcile the WTP design with the authorization basis, the inspectors found that portions of numeric revision primary design drawings that were on hold at the time the corrective actions were implemented, may not have been reconciled with AB. Based on a review of relevant documentation, the inspectors were unable to conclude portions of drawings that were on hold during the implementation of CAR 252 corrective actions would be reconciled with the AB. Accordingly, the ORP will confirm actions taken by the Contractor when removing holds from numeric revision primary design drawings to ensure conformance with the AB in a future inspection. This is an assessment follow-up item (A-03-OSR-RPPWTP-013-A04).

## **1.4.2 Review of Design Changes and AB Changes**

### **1.4.2.1 Inspection Scope**

The inspectors interviewed Contractor Engineering and E&NS personnel and reviewed documents/records pertaining to several plant design changes. ISM Team meeting minutes, DCAs, safety checklists for design, and safety evaluations were among the documents/records reviewed to:

- Verify the steps of the Contractor's ISM process, as described in SRD Appendix A, were being accomplished in accordance with the Contractor's implementing procedures as appropriate for the design change.
- Assess the adequacy of the results of the ISM.



- Determine if the ISM process was being documented in accordance with applicable Contractor procedures and assess the adequacy of the documentation.
- Determine if changes from approved designs, including the reason for the changes, were identified, approved, documented, and controlled.
- Verify 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 inspectors also reviewed training records of the involved Engineering and E&NS personnel to determine whether they were qualified to perform their functions.

#### **1.4.2.2 Observations and Assessments**

At the time of the inspection the Contractor had processed few design changes using its recently revised procedures, and none of the changes were significant. Only one of them resulted in an ABAR (24590-WTP-SE-ENS-03-053, Rev. 0) and it did not result in any new ISM meeting because the changes had been discussed and confirmed previously in an ISM meeting with subject matter experts and validated through previously accepted hazards and safety analyses. The change deleted requirements for the use of automatic fire suppression systems in normally inaccessible, or completely inaccessible, high radiation and low combustible loading areas. The inspectors reviewed the safety evaluation and agreed with the Contractor's conclusions.

The inspectors also reviewed safety evaluations for two changes resulting in ABCN's:

- 24590-WTP-SE-ENS-03-060, Rev. 0
- 24590-WTP-SE-ENS-03-136, Rev. 0

The inspectors determined both of the evaluations were processed correctly and adequately, and agreed with the Contractor's determination that neither change required a new ISM meeting.

The inspectors reviewed the following safety evaluations related to design changes that had been screened using the "Safety Evaluations for Design" form but that did not result in either an ABCN or an ABAR:

- 24590-WTP-SE-ENS-03-156, Rev. 0
- 24590-WTP-SE-ENS-03-130, Rev. 0
- 24590-WTP-SE-ENS-03-129, Rev. 0
- 24590-WTP-SE-ENS-03-101, Rev. 0
- 24590-WTP-SE-ENS-03-100, Rev. 0
- 24590-WTP-SE-ENS-03-082, Rev. 0
- 24590-WTP-SE-ENS-03-075, Rev. 0

The inspectors determined all of the evaluations were processed correctly and adequately, and agreed with the Contractor's determination that none of the changes required a new ISM meeting or were ABCNs or ABARs.

Subsequent to issuance of Rev. 9 of RL/REG-97-13 but before the revision to the AB maintenance procedure (24590-WTP-GPP-SREG-002, Rev. 5) that redefined the safety screening process for changes, the Contractor had processed several design changes. Related to those changes, the inspectors reviewed documentation on potential safety impacts resulting from a proposed change to remove a drum inner lid mechanism from the drum transfer tunnel for the HLW radioactive waste handling system. An initial ISM meeting was held on September 26, 2002 (CCN-044862) at which hazards were discussed. The minutes documented that when the design of the lidding machine was completed, a full ISM hazards identification meeting would be required. Subsequently, a second ISM meeting was held on November 15, 2002 (CCN-047097). The meeting resulted in initiation of DCA 24590-WTP-DCA-M-02-028, Rev. 0, *Removal of System RWH Drum Inner Lid Machine*, which was approved on February 10, 2003. The approval of the DCA resulted in initiation of ABCN-ENS-02-046. (The Contractor had completed a "Safety Checklist for Design" on December 5, 2002; those checklists were the previous mechanisms for safety screenings of primary design drawings and specifications, and were required for safety evaluations associated with actual AB changes.) The safety screening concluded DOE approval was not required. After reviewing the documentation, the inspectors concluded the Contractor adequately followed the ISM process for the change, and agreed DOE approval was not required.

The inspectors reviewed documentation related to a change to in-cave decontamination requirements for the HLW Filter Cave Handling system that eliminated a decontamination booth from the Crane Maintenance Area and added decontamination capability to the Filter Cave. The first ISM meeting was held on November 11, 2002 (CCN-047095). DCA 24590-HLW-DCA-M-03-003 for this change was approved on March 12, 2003, and a Safety Checklist for Design was completed on March 17, 2003. ABCN 24590-WTP-ABCN-ENS-03-018 was completed on April 2, 2003, and concluded DOE approval was not required for the change. After reviewing the documentation, the inspectors concluded the Contractor adequately followed the ISM process for the change, and agreed DOE approval was not required.

The inspectors also reviewed ISM meeting minutes (CCN-049911) for work identification involving the impact on LAW C2V requirements to support hydrogen removal and heat removal requirements for the important-to-safety (ITS) uninterrupted power supply system. That was a work in progress. Nevertheless, the minutes were detailed and documented a significant discussion of the issues. Three action items were assigned to specific individuals. The inspectors concluded the Contractor adequately followed the ISM process for the change.

The inspectors reviewed results of a series of six melter offgas hazards and operability analysis ISM meetings (CCN-049917) that were conducted in March 2003 to identify any safety and operability issues associated with the HLW melter offgas system. In preparation for those meetings the Contractor had issued a memorandum (CCN-051756) on February 19, 2003, stating the purpose of the meetings, their objectives, and a summary of the methodology to be used. It included a reference to AIChE *Guidelines for Hazard Evaluation Second Edition with Worked*

*Examples.* The minutes stated the meetings were conducted in accordance with SANA-002, Rev. 5, (Rev. 6 had not yet been issued).

The minutes also stated notebooks were provided for team members use during the first meeting and throughout the series of HAZOP meetings. The notebooks contained, among other things, system descriptions, engineering specifications, lessons learned, toxicity information, and reactive chemical hazards. The minutes also contained a summary of the HAZOP activities including systems and nodes analyzed, and summarized the results of the hazards analyses with a list of 20 action items. Although this particular design change was still a work-in-progress at the time of the inspection, it indicated the hazards analysis aspects of the ISM process for the activity was adequate and acceptable. The minutes were detailed and timely.

The inspectors reviewed training profiles of 10 randomly selected personnel involved with the ISM process (safety analysts, lead engineers, hazard and safety analyst leads, and a special assistant to the manager) to determine whether they were qualified to perform the work. All of the profiles verified the personnel were current in their required training.

### **1.4.2.3 Conclusions**

The Contractor had recently made extensive revisions to its procedures related to the ISM process. At the time of the inspection, the Contractor had completed few design changes using these procedures, and the design changes that were completed involved relatively minor design issues. The inspectors therefore reviewed several relatively minor changes that had been completed and concluded, based on those changes and interviews with Contractor personnel, the Contractor was aware of the ISM process and adequately implemented it for the limited changes completed. Changes from approved designs, including the reason for the changes, were identified, approved, documented, and controlled. Methodologies and guidelines in the 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. Involved Contractor personnel were trained to perform the work.

Nevertheless, because of a lack of completion of any significant design changes, the inspectors had insufficient information to draw any conclusions regarding the effectiveness of the recently revised ISM procedures.

## **1.5 Oversight of ISM Process by the Contractor**

### **1.5.1 Inspection Scope**

The inspectors reviewed procedures 24590-WTP-GPP-SREG-001, Rev. 4, *Project Safety Committee* and 24590-WTP-GPP-SREG-007, Rev. 1, *Process Management Team*, to ascertain responsibilities of those committees in the ISM process. The inspectors then reviewed PMT and PSC meeting minutes to verify the Contractor had implemented the requirements. The inspectors also reviewed pertinent Corrective Action Reports (CAR) and management assessments associated with ISM oversight, and interviewed appropriate Contractor personnel involved in those activities.

### 1.5.2 Observations and Assessments

In a previous inspection (IR-02-13) the inspectors had observed that there was no formal tracking system for action items resulting from ISM meetings making it difficult to determine the status of completion of those actions. This also was also noted by the Contractor in Management Assessment Report 24590-WTP-MAR-ENS-03-011, Rev. 0, *Standards Selection Gap Analysis* dated May 1, 2003. To correct this shortcoming the Contractor recently developed a tracking database and was inputting past actions into it. At the time of the inspection it had loaded over 500 actions from ISM meetings dating back to the summer of 2002. The database included not only a listing of actions with assignees, due dates, and action resolutions, but “Impact Resolution” fields identifying impacted organizations, documents and databases and resolutions of those impacts. To implement the database, the Contractor was developing a Desk Instruction that was in draft form at the time of the inspection. The inspectors reviewed a copy of a partially completed section of the database and determined it was thorough and if completed properly should be adequate to track ISM action items to completion.

Section 3.6.1 of SANA-002 discussed ISM team meetings and noted meetings held to fulfill requirements of the procedure could be conducted without all ISM team members present. However, the procedure also stated that before the controls selected for a particular hazard were implemented, at least the core ISM team members must have reviewed and concurred with the strategy and the results documented in accordance with Section 4.0 of the procedure. The inspectors noted the Contractor had identified, in the Management Assessment Report noted above, a specific example where minutes for an ISM meeting had not been written. The Management Assessment had made a recommendation for the responsible individual to write them. The inspectors interviewed the individual to whom the recommendation was made; he stated the meeting in question had occurred several months previously and he did not recollect what was discussed. Therefore, he probably would not be able to write any substantial minutes as recommended. Although this did not appear to have impacted any major decisions for the issue in question because subsequently there were other meetings, it was a prime example of why minutes should be written soon after meetings are concluded.

The inspectors also reviewed Management Assessment Report 24590-PTF-MAR-NS-03-001, Rev. 0, *Standards Identification Process Database (SIPD)* dated May 6, 2003. Its purpose was to assess the adequacy and effective implementation of project management systems. It used a random sample of 10% of the Pretreatment control strategy development records (91 records in total) and identified 12 errors. It initiated CAR 24590-WTP-CAR-QA-03-108 to address the specific deficiencies identified, and made recommendations for improvement. A Contractor tracking item was opened for the actions (24590-WTP-RITS-QAIS-03-453). The inspectors interviewed two personnel who had been assigned corrective actions. One action was to correct, by July 2, 2003, the specific deficiencies identified. The responsible individual informed the inspector the action was nearly complete at the time of the inspection.

A second action was to conduct a training session with applicable E&NS and Engineering staff to clarify the use of the database. The responsible individual informed the inspector that prior to any training being conducted, however, significant actions resulting from a Contractor initiated CAR had to be completed (24590-WTP-CAR-QA-03-007, Rev. 0, *Design Interface Control*). The CAR described the inadequate conditions as follows: “Project implementation of design

inputs, interfaces, and control processes is inadequate to support ongoing Project needs. The central focus of concern is the documentation and transmittal of design information and status of that information across interfaces and the management and communication of changes in source documents and databases. As an example, the Standards Identification Process Database (SIPD) is relied upon by the Project to log and accumulate draft and approved information on processes that affect the design, and on key attributes of the design intended to meet specified safety requirements. SIPD and other data bases are used rather than the controlled documents for design inputs, interfaces, and control of processes. Document hierarchy is not adequately established for source documents...Controlled documents in many cases are not available to the engineer or are lacking in sufficient detail to support verification of component design.”

The CAR required the Contractor to determine the root cause of the identified problems. The responsible individual informed the inspector a draft of a management assessment describing the root cause analysis was being prepared at the time of the inspection and would be presented to the Contractor’s management shortly after the close of the inspection. The inspectors did not review the draft report but noted the CAR captured a number of significant issues that had impacted the Contractor’s activities in designing and constructing site facilities.

The inspectors reviewed minutes of two meetings (CCN-051719 and 051718) held on March 7, 2003, and March 10, 2003, involving specific systems relating to the SIPD database (LAW Finishing Handling System and Radioactive Waste Handling System). The minutes noted SIPD had undergone several changes since the minutes were last approved. These changes had resulted from Issue For Construction drawing reviews, recent design changes, and implementation of the risk reduction classification. The purpose of the meetings was to examine the SIPD initiators, Hazardous Situations, Frequency, Severity Levels, Control Strategy Elements, and Safety Case Requirements with Operations and Engineering to ensure the records were correct and up to date before approval. Actions were assigned to update the records as necessary.

### **1.5.3 Conclusions**

Based on discussions with involved personnel and review of appropriate documents, the inspectors concluded Contractor oversight of the ISM process was adequate.

## **1.6 Closure of Inspection Items**

### **1.6.1 (Closed IR-02-013-01-FIN)**

Failure to require ABCNs that change SRD standards subject to the PMT process specified in the SRD. The Contractor provided its response to the Finding by letter on November 18, 2002 (CCN-046514) and documented the discrepancy in 24590-WTP-CAR-QA-02-234 on December 17, 2002.

The inspectors confirmed procedure 24590-WTP-GPP-SANA-002 was revised to provide instructions for ISM evaluation of standards changes. The inspectors also confirmed procedure

24590-WTP-GPP-SREG-002 contained a requirement for the PMT Chairman to approve all changes that required a change to the SRD. This Finding is closed.

### **1.6.2 (Closed IR-02-013-02a-FIN)**

The DIM for PFD 24590-PTF-M5-V17T-00013, Rev. C, did not explicitly identify or reference any of the applicable SCRs denoted in the SIPD, and the DIM for P&ID 24590-PTF-M6-CXP-00004, Rev. 4 did not explicitly identify or reference Calculation 24590-PTFU7C-PVV-00001, Rev. A. The Contractor provided responses to the Finding in letters dated November 18, 2002 (CCN-046514) and November 27, 2002 (CCN-046971) in which it disagreed with the specific Finding but agreed there were programmatic issues related to DIMs. The Contractor also documented the issue in 24590-WTP-CAR-QA-02-240 on December 3, 2002.

The inspectors reviewed the Contractor's responses and its actions for closing the CAR. The Contractor stated in the CAR that after careful review of the Inspection Report it concluded the DIMs were properly filled out at the time the DIM was checked, and provided its rationale for these conclusions in CCN-046514.

With regard to the programmatic issues related to the DIMs, the Contractor stated in a letter to DOE on October 30, 2002 (CCN-042775) that guidance in procedures was not prescriptive and left discretion to the originator. Therefore, procedures would be revised to include minimum content for DIMs. The inspectors reviewed the revised procedure and confirmed that it had been revised to include content for DIMS. This Finding is closed.

### **1.6.3 (Closed IR-02-013-02b-FIN)**

SIPD entries associated with CSD-PCXP/N0006 and CSD-PCXP/N0020 did not reference severity level calculation 24590-PTF-Z0C-W14T-00002, Rev. A, and the majority of the information required by Section 3.11.3 of SANA-002C for CSD-PCXP/N020 was neither documented nor referenced in the SIPD. The Contractor provided its response to the Finding by letter on November 18, 2002 (CCN-046514) and documented the discrepancy in 24590-WTP-CAR-QA-02-262 on March 7, 2003.

In its response, the Contractor stated the specific discrepancies of the records in question had been corrected. In the case of CSD-PCXP/N0020 there was a direct correlation between the severity levels and a formal calculation and the calculation was linked to the CSD. In the case of CSD-PCXP-N0006, there was no formal calculation but the procedures allowed the severity level to be determined by engineering judgment, and an entry to that effect was made to the CSD record. The inspectors reviewed the referenced SIPD entries and confirmed the corrections had been done.

In its November 18, 2002, response, the Contractor also committed to conduct a management assessment by January 2003 to verify all approved SIPD records were adequate. In discussions with Contractor personnel the inspectors were told the letter was not correct and it should have stated the records for the Pretreatment facility would be assessed, and not all records. Furthermore, the assessment was not done in January; it was delayed contingent on Revision 0 drawings being complete, and many were not complete in January. The assessment was initiated

in February and completed on May 6, 2003 (24590-PTF-MAR-NS-03-001, Rev. 0). Nevertheless, the Contractor was aware of problems with design interface control and issued 24590-WTP-CAR-QA-03-108 to address specific deficiencies identified in the management assessment report, and CAR 24590-WTP-CAR-QA-03-007, Rev. 0, to address a long-term fix for SIPD entries and design interface control. This last CAR directed a root cause analysis be conducted from which comprehensive long term actions will result. As noted in this inspection report, the management assessment report was still in draft form at the time of the inspection.

The inspectors concluded that although the literal interpretation of the Finding was not completed, the Contractor had taken, and was taking, corrective actions for a long term fix and was tracking those actions by way of CARs. Therefore, the specific Finding is closed.

## **2.0 EXIT MEETING SUMMARY**

The inspectors presented the inspection results to members of Contractor management at an exit meeting on May 16, 2003. The inspectors asked the Contractor whether any material examined during the inspection should be considered limited rights data. The Contractor stated that no limited rights data was examined during the inspection.

The Contractor acknowledged the observations and conclusions presented. The Contractor indicated in the exit meeting that additional information existed that was relevant to the Finding and committed to provide that information to the inspectors during the subsequent week. The inspectors considered this information but concluded that the Finding as included in this report was still a valid Finding. This was communicated to the Contractor in an inspection re-exit on May 27, 2003, by a telephone call between the VCO and the Contractor management.

## **3.0 REPORT BACKGROUND INFORMATION**

### **3.1 Partial List of Persons Contacted**

- M. Beary, Safety Analyst
- A. Cutona, Mechanical Systems Engineer
- T. DeGarmo, Fire Safety Lead
- R. Garrett, Safety Analysis Manager
- K. Gibson, Safety & Licensing Engineer
- J. Hinckley, Hazard and Safety Analysis Lead (PT)
- D. Klein, Radiological, Nuclear & Process Safety Manager
- P. Lowry, Central ISM Group Supervisor
- T. McDonnel, Assessment Team Leader
- J. Miller, Plant Design Engineer
- R. Peters, Melter Systems Engineer
- M. Platt, Safety Program Lead
- J. Roth, Engineering Processes, Procedures & Personnel Manager
- B. Spezialetti, Regulatory Safety Manager
- C. Willingham, CS&A Engineer

S. Woolfolk, Hazard and Safety Analysis Lead (HLW)

### 3.2 List of Inspection Procedures Used

Inspection Technical Procedure I-105, “Standards Selection Process Assessment”  
Inspection Administrative Procedure A-105, “Inspection Performance”  
Inspection Administrative Procedure A-106, “Verification of Corrective Actions”

### 3.3 List of Items Opened, Closed, and Discussed

#### 3.3.1 Items Opened

A-03-OSR-RPPWTP-013-F01	Finding	Failure to fully implement requirements of SRD Appendix A.
A-03-OSR-RPPWTP-013-A02	AFI	Verify the resolution of safety issues associated with HLW offgas system and complete documentation of the hazards analysis.
A-03-OSR-RPPWTP-013-A03	AFI	Verify the corrective actions of CAR 252 for portions of drawings that were on hold.
A-03-OSR-RPPWTP-013-A04	AFI	Confirm actions taken by the Contractor when removing holds from numeric revision primary design drawings to ensure conformance with the AB.

#### 3.3.2 Items Closed

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



### 3.3.3 Items Discussed

None

## 4.0 LIST OF ACRONYMS

AB	authorization basis
ABAR	Authorization Basis Amendment Request
ABCN	Authorization Basis Change Notice
BNI	Bechtel National, Inc.
BOF	Balance of Facilities
CAR	Corrective Action Report
CSD	Control Strategy Document
CSE	Control Strategy Element
DBE	Design Basis Event
DCA	Design Change Application
DCN	Design Change Notice
DIM	Design Input Memorandum
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
E&NS	Environmental and Nuclear Safety Department
HAZOP	Hazards and Operability
HEPA	High Efficiency Particulate Activated
HLW	High Level Waste
HVAC	Heating, Ventilation, and Air Conditioning
IR	Inspection Report
ISM	Integrated Safety Management
ITS	important-to-safety
LAW	Low Activity Waste
ORP	Office of River Protection
OSR	WTP Safety Regulation Division
PADC	Project Archives and Document Control
P&ID	Piping and Instrument Drawing
PFD	process flow diagram
PMT	Project Management Team
PSC	Project Safety Committee
RRC	Risk Reduction Class
SC	Safety Criterion
SCR	Safety Case Requirement
SIN	Safety Implementation Notes
SIPD	Standard Identification Process Database
SL	Severity Level
SRD	Safety Requirements Document
WTP	Waste Treatment and Immobilization Plant