U.S. Department of Energy
Office of River Protection
P.O. Box 450, MSIN H6-60
Richland, Washington 99352

APR 04 2006

06-WED-016

Mr. W. S. Elkins, Project Manager
Bechtel National, Inc.
2435 Stevens Center
Richland, Washington 99352

Dear Mr. Elkins:

CONTRACT NO. DE-AC27-01RV14136 – TRANSMITTAL OF U.S. DEPARTMENT OF ENERGY (DOE), OFFICE OF RIVER PROTECTION (ORP) DESIGN OVERSIGHT REPORT: REVIEW OF CONTRACTOR DESIGN CONTROL PROCESS (D-06-DESIGN-022)

ORP has conducted a Design Oversight of the Contractor Quality Assurance Manual Policy Q-03.1, "Design Control," as it was applied to approving design changes. The results are in the attached report.

Design Oversight Report D-05-DESIGN-022 concluded the Contractor design control process was compliant with the exceptions noted in the below Findings:

1. The failure to properly update the Standards Requirement Document for the requirement to follow 29 CFR 1910.119 "Process Safety Management," for exceeding the threshold requirements of a listed chemical is considered a Finding and is tracked by D-06-DESIGN-022-F01; and

2. The failure to issue Recommendation/Issue Tracking System items to track development of the Action Plans for "common theme" items referred to in Management Assessment Report 24590-WTP-MAR-ENG-05-013 as "common" theme items in accordance with Management Assessment Procedure GPP-MGT-002, Section 3.2, is considered a Finding D-06-DESIGN-022-F07 for failure to follow procedure.

The assessment further concluded the design change control process was effectively implemented for the identification, control, and verification of design changes with the exceptions noted in the below Assessment Follow-up Items (AFI) and Observations:

1. Four design change control assessment follow-up items will be tracked dealing with: a) completion of the conditions of acceptance for a determination of design impact (AFI D-06-DESIGN-022-A02); b) system description not updated for flow-down design change (AFI D-06-DESIGN-022-A03); c) lack of Trend Notice for the Cesium Ion Exchange System Authorization Basis Amendment Request 03-1144 (AFI D-06-DESIGN-022-A04); and d) Bechtel National, Inc. (BNI) self-identified design issues in the Fiscal Year 2005 Annual Engineering Management Assessment (AFI A-05-AMWTP-DESIGN-022-A05); and

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2. Observation D-05-DESIGN-022-O06: ORP recommends a system be developed and implemented to process design changes on design completed systems which are construction complete. This process should fully describe the documents affected by the design change prior to the approval of the design change.

The design oversight also concluded the oversight provided by BNI engineering organizations continues to provide effective design reviews and verifications with issues identified to the Corrective Action Management process with trending and common themes being identified for corrective action identification and closure.

ORP requests that BNI provide, within 30 days of receipt of this letter, a reply to the Findings above. The reply should include: 1) admission or denial of the 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 action steps that will be taken to avoid further Findings; and 5) the date when full compliance with the applicable commitments in your Contract and authorization bases will be achieved. When good cause is shown, ORP will consider extending the requested response time.

For the AFIs please address item three only, and for Observations please address acceptance or rejection of the Recommendations with basis of rejection, if rejected.

This letter is not considered to constitute a change to the Contract. In the event the Contractor disagrees with this interpretation, it must immediately notify the Contracting Officer orally, and otherwise comply with the requirements of the Contract clause entitled 52.243-7, "Notification of Changes."

If you have any questions, please contact me, or your staff may call Bill Hamel, Director, Waste Treatment and Immobilization Plant Project, Engineering Division, (509) 373-1569.

Sincerely,

John R. Eschenberg, Project Manager
Waste Treatment and Immobilization Plant

WED:JEA

Attachment

cc w/attach:
M. Ensminger, BNI D. J. Pisarcik, BNI
J. P. Henschel, BNI G. Shell, BNI
S. C. Lynch, BNI

Attachment
06-WED-016

DOE ORP DESIGN OVERSIGHT REPORT

REVIEW OF BNI DESIGN CHANGE PROCESS

February 2006

Design oversight: D-06-DESIGN-022

WED:JEA
March 7, 2006

Final

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

DOE ORP DESIGN OVERSIGHT REPORT

REVIEW OF BNI DESIGN CHANGE PROCESS

February 2006

Design oversight: D-06-DESIGN-022

Team Lead: 3/8/06

James E. Adams, Design Assessment Engineer
Waste Treatment and Immobilization Plant
Engineering Division

Team Members: 3/9/06

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for 3/9/06 - Sent in e-mail

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R. Cooper, Consultant
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Concurrence: 3/15/2006

William F. Hamel, Director
Waste Treatment and Immobilization Plant
Engineering Division

Approved: 3/20/06

John R. Eschenberg, Project Manager
Waste Treatment and Immobilization Plant

Executive Summary

The U.S. Department of Energy, Office of River Protection (ORP) staff conducted a design oversight to:

1. Review the design change control documentation for the sampled system design changes to verify the compliance and effectiveness of the design change control process. This oversight was conducted for design changes to the Pulse Jet Mixer/Sparger system, Ammonia Regent system, Cesium Ion Exchange system, and the Important to Safety (ITS) Switch Gear Separation of Buildings. This oversight reviewed design change documentation such as the Authorization Basis Amendment Request (ABAR), the trend notice, the approval of design change, the safety evaluation of the ABAR, and the changes to various design mediums including drawings, calculations, system descriptions, and Configuration Management databases to ensure the Bechtel National, Inc. (BNI) process has been properly followed.

2. Review the areas of design review and design verification to ensure that design changes are being adequately reviewed and approved.

3. Review Corrective Action Program for identification of corrective actions involved with the Engineering organization of the past six months to a year, and any trends associated with the design process with emphasis on codes and standards issues. This review includes proper identification of issues, extent of condition reviews, root cause analysis, and corrective actions including the effectiveness of the corrective actions.

Overall Conclusions

Objective 1: Review the design change control documentation for the sampled system design changes to verify the compliance and effectiveness of the design change control process.

The change documentation for the four systems was reviewed and interviews were conducted to determine if the design change process was implemented in compliance to Quality Assurance Manual (QAM) Policy 03.1 and the associated implementing procedures in the areas of design change control. The review included the design change initiation documentation, trend notices, ABARs, design media affected by the change including flow-down media, and Authorization Basis change process documentation including Integrated Safety Management notes, etc. Below are significant observations and the conclusion of that review:

- The ABAR for the High Level Waste Ammonia Reagent (AMR) system design change did not include a requirement to revise the safety requirements document to include a commitment to Title 29 *Code of Federal Regulation* (CFR) 1910.119, "Process Safety Management" (29 CFR 1910). This failure to properly update the safety requirements document for the requirement to follow 29 CFR 1910.119 is considered a Finding and will be tracked by **D-06-DESIGN-022-F01**.

- The majority of the design change control processes, as it is applied to the sampled systems, were adequately implemented. BNI itself identified potential trends in the

Fiscal Year (FY) 2005 Annual Engineering Management Assessment Report in the area of design documentation gaps, code implementation deficiencies, and design sequencing problems. These potential trends identified on RITS-QAIS-06-165, -166, and -167. The completion of the Recommendations and Issue Tracking System (RITS) items will be tracked by **Assessment Follow-up Item (AFI) D-06-Design-022-A05.**

- The system description revision containing the specifics of the Cesium Ion Exchange (CXP) system ion exchange valve interlock design requirement stated in the safety evaluation document for ABAR 03-1144 has not yet been drafted. This system description will contain the flow-down of the design and subsequently be contained in the safety system requirements specification (SSRS). This AFI will track the flow-down process for this requirement from the piping and instrumentation design (P&ID) to the revised system description or the SSRS (whichever occurs first) by **AFI D-06-DESIGN-022-A03**.

- The lack of a Trend Notice for the CXP ABAR 03-1144 will be tracked as **AFI D-06-DESIGN-022-A04** to determine if the trend documentation was in place or was not required by procedure.

- The completion of the AMR and CXP design changes without completion of the condition of acceptance associated with the ABAR review have the ability to affect the design. The completion of the condition of acceptances for a determination of design impact will be tracked by **AFI D-06-DESIGN-022-A02.**

- **Observation D-06-DESIGN-022-O06**: The design change process does not require the identification of all the affected design media. Since the QAM and existing design control procedures do not require this (the QAM only specifies design must be controlled but does not specify how), it is not a Finding. However, the flow-down process does not provide as timely a level of control to the design change control when systems are design completed and construction completed to support the commissioning and testing program. **ORP Recommends** a system be developed and implemented to support design change control for this eventuality.

Conclusion: The design oversight concluded the design change control process was compliant to the QAM Policy 03.1 because it did provide procedures to identify, control, and verify the design with the exception noted in **Finding F01**. The process was defined in multiple procedures and guides and was generally implemented. However, there were instances where individual errors were made on various topics including some programmatic issues such as Authorization Basis compliance due to personal oversights in the application of the design process. The program, if properly implemented, is adequate for this stage of the project, but needs modification prior to commissioning and testing. A more tightly controlled design change package process should be instituted prior to the commissioning and testing phase of the program.

Objective 2: Review the areas of design review and design verification, based on the review of the four specific design change packages, for the effective oversight the design change process to ensure an adequate design is approved.

The documentation for four sampled systems change was reviewed and interviews were conducted to determine if the design change process was effectively implemented. The review included the design change initiation documentation, trend notices, ABARs, design media affected by the change including flow-down media, and Authorization Basis change process documentation including Integrated Safety Management notes, etc.

The oversight team's review of the documented system design reviews conducted for systems such as the host configuration processor (HCP) and feed receipt process (FRP) concluded these reviews were very effective. These reviews need to continue via the system description design verification process, which verified both the design requirements have been input to the design and the design will successfully perform the system objectives.

Conclusion: Design review and design verification processes have been approved as "procedures compliant" with the QAM and in general been effectively implemented based on the review of the sampled engineering design reviews and design verification reviews performed on the pulse jet mixer system. Effectiveness continues to be monitored by both BNI and ORP.

Objective 3: Review Corrective Action Program for identification of corrective actions involved with the Engineering organization over the past year, and any trends associated with the design process. This review includes proper identification of issues, extent of condition reviews, root cause analysis, and corrective actions including the effectiveness of the corrective actions.

Engineering Corrective Action - The oversight team included three processes for determining if corrective actions were being properly identified including: 1) the review of 2005 corrective action report (CAR) descriptions for the last 6 months; 2) An in-depth analysis of selected CARs for proper evaluation, corrective action identification, CAR closure, and trending; and 3) a review of management assessments by Engineering to determine if identified issues were formally placed in the Corrective Action Management process. The following specific conclusions were reached by this review process.

The following conclusions were reached for items 1 and 2 above:

- Based on the review of FY 2005 engineering specific CARs, BNI Engineering was adequately identifying problems with engineering deliverables and processes, and appropriately documenting them in CARs.

- BNI Engineering is adequately determining the causes and extent of condition of problems reported in CARs.

- Corrective actions for the three sampled CARs included comprehensive actions that appropriately addressed the identified causes and extent of condition.

- BNI Engineering is appropriately closing CARs once actions taken are deemed closed. BNI Quality Assurance is ensuring the effectiveness of actions taken for Engineering CARs.

- BNI Engineering had developed and applied techniques identifying the existence of some adverse trends. However, this area was not reviewed from a procedure compliance perspective because the Engineering procedure for establishing common themes or trends was not approved when the inspection started.

- The Contractor's reviews and actions to date have identified what appears to be a broader problem associated with application of codes and standards; the Contractor has listed it as a common theme issue. RITS QAIS-06-166 was issued along with CAR-QA-056 to develop a formal action plan to address Engineering coded implementation deficiencies.

- The Contractor's reviews and actions to date have identified what appears to be a broader problem associated with design sequencing and design documentation gaps. The Contractor issued RITS-QAIS-06-165 and 167 to track development of formal action plans.

The oversight review for item three included the review of all engineering management assessments conducted in FY 2005 and FY 2006 to date. The design oversight concluded that the Contractor assessments were comprehensive and accurately represented issues as they existed. However, the assessment report did not always transfer the results of these assessments to the RITS process for assigning actions and due dates when common themes issues were reported.

The management assessment procedure required recommendations and observations made in assessments be placed into RITS. Although the "common themes" above are not categorized as either Recommendations or Observations, they are nevertheless issues that Engineering felt necessary to single out and act upon (based particularly on the statement that these require broader action than merely resolving the CAR condition). During the factual accuracy review process, BNI placed these "common theme" issues in the RITS via RITS-QAIS-06-163 through 167 and wrote CAR-QA-06-056 for failure to enter the items per management assessment procedure GPP-MGT-002, Section 3.2 (identified in 24590-WTP-MAR-ENG-05-013). However, this is considered a Finding because the CAR was written after the Finding was announced. This Finding is tracked by **D-06-Design-022-F07**.

Conclusion: For the most part, BNI Engineering was identifying deficiencies as discovered on a case-by-case basis and was adequately developing and implementing assigned corrective/ preventive actions. The failure to follow procedure and enter issues identified in 24590-WTP-MAR-ENG-05-013 as "common theme" items into RITS in accordance with management assessment procedure GPP-MGT-002, Section 3.2, is considered a Finding (D-06-DESIGN-022-F07).

Table of Contents

List of Terms

AB	Authorization Basis
ABAR	Authorization Basis Amendment Request
AFI	Assessment Followup Item
AMR	High Level Waste Ammonia Reagent [system]
BNI	Bechtel National, Inc.
BOF	Balance of Facility
CAR	corrective action report
CCN	correspondence control number
CDL	Change Document List
CFR	*Code of Federal Regulations*
CM	Configuration Management
COA	condition of approval
CXP	Cesium Ion Exchange
DCA	Design Change Authorization
DCD	Design Criteria Database
DCN	design change notice
DOE	U.S. Department of Energy
DTD	decision-to-deviate
DVM	Design Verification Matrix
DVR	design verification report
EDR	Engineering Design Review
EQA	Engineering Quality Analysis
FRP	Feed Receipt Process
HLW	high-level waste
HPAV	Hydrogen Control for Piping and Vessels
ISM	Integrated Safety Management
ITS	Important-to-Safety
LOC	limiting oxidant concentration
MAR	management assessment report
ORP	Office of River Protection
P&ID	piping and instrumentation design
PJM	Pulse Jet Mixer
PSM	Process Safety Management
QA	Quality Assurance
QAM	*Quality Assurance Manual*
RITS	Recommendations and Issue Tracking System
SC	safety classification
SDC	safety design criteria
SE	safety evaluation
SED	safety evaluation document
SER	safety evaluation report
SRD	safety requirement document
WED	WTP Engineering Division
WTP	Waste Treatment and Immobilization Plant

1.0 INTRODUCTION

A major component of the U.S. Department of Energy (DOE), Office of River Protection (ORP) mission is the design and construction of the Hanford Tank Waste Treatment and Immobilization Plant (WTP) in the 200 East Area of the Hanford Site. The design and construction contractor for the WTP is Bechtel National, Inc. (BNI). As part of its oversight responsibilities, ORP performs various assessments of BNI activities during the design and construction phase. One type of assessment is the design review of various systems and processes, called a design oversight, performed by the WTP Engineering Division (WED).

This design oversight provides compliance to DOE Order 226.1, *Implementation of Department of Energy Oversight Policy*, Section 4.0, via periodic assessments of design related functional areas scheduled via the *ORP Integrated Assessment Program* (ORP M 220.1, Rev. 3) on the Annual Integrated Schedule.

This design oversight focused on the design change control process to determine the compliance and effectiveness of these sampled changes. This oversight was scheduled in the ORP Integrated Assessment Schedule and conducted as scheduled. The formal phase of this oversight consisted of document reviews, field walk-downs, and BNI management and staff interviews conducted in January 2006. The team clarified and evaluated the initial information through February 2006, and prepared the report in March 2006. The preliminary report was informally reviewed by BNI for factual accuracy before issuing the final report.

2.0 BACKGROUND

The WTP Project continues with design and construction in a reduced work mode to facilitate the revision of the seismic loads required by new seismic ground motion criteria. The Contractor Quality Assurance (QA) organization recently completed their annual Design Process audit and briefed to ORP the results, including corrective action reports (CAR) in process of issuance. The last BNI Engineering management assessment report (MAR) (24590-WTP-MAR-ENG-05-0013) was performed in December 2005, and was evaluated in this oversight report in addition to other documents.

In addition to the design process review, this design oversight reviewed the Engineering organization implementation and effectiveness of the BNI Corrective Action Program.

3.0 OBJECTIVES, SCOPE, AND APPROACH

3.1 Objectives

ORP conducted this design oversight as part of its responsibility as the WTP owner to ensure that the design control implementation followed the *Quality Assurance Manual* (QAM) Policy 03.1 using approved design procedures. The specific objectives of this

oversight are listed in the "Design Product Oversight Plan Review of Contractor Design Control Process" (Appendix A) and repeated below:

1. Review the design change control documentation for the sampled systems design changes to verify the compliance and effectiveness of the design change control process for the implementation of these changes.

    - Cesium ion exchange system design change involving the purge and trap at the top of the ion exchange columns
    - Ammonia supply design change deleting urea injection and using liquid ammonia
    - ITS switchgear separation of buildings
    - Pulse jet mixer sparger re-design.

2. Review the areas of design change control, design review, and design verification based on the review of the four specific design change packages for the effective implementation of the design change process. The document review included the design change initiation documentation including the trend notice and design change initiation documentation, the impact of the change on the Authorization Basis (AB), the changes to various design mediums including drawings, calculations, system descriptions, Configuration Management (CM) databases, and design review processes to ensure the BNI process has been properly followed.

3. Review Corrective Action Program for identification of corrective actions involved within the Engineering organization of the past six months to a year, and any trends associated with the design process with emphasis on codes and standards issues. This review includes proper identification of issues, extent of condition reviews, root cause analysis, and corrective actions including the effectiveness of the corrective actions.

3.2 Scope

This oversight included a review of selected approved design changes for the sampled systems and supporting functional areas of the design processes including design change control, design review, and design verification. This oversight also reviewed the effectiveness of implementation of the Corrective Action Program by the Engineering organization including an analysis of trending of codes and standards issues.

3.3 Approach

ORP conducted oversight within the guidelines of ORP DI 220.1, *Conduct of Design Oversight*. Information was collected from various BNI and DOE documents, and interviews with BNI Design staff were conducted. See Section 6.0 for a full listing of reviewed documents and personnel contacted. The approved design oversight plan, "Design Product Oversight Plan Review of Contractor Design Control Process" is provided in Appendix A.

The design review team initiated four steps to obtain the information required to meet the oversight objectives. The order of review and depth of each step was left to the reviewer's discretion.

1. Evaluate of the Contractor's revisions of the design control process to understand the level of control of the design change process for both compliance and effectiveness over the time the sampled systems were modified.

2. Evaluate the individual system design changes including the initiating documentation, trend documents, authorization basis impact, flow-down implementation of the change, system description input, and other design media affected.

3. Evaluate the procedures and processes used for design change control, design review, and design verification to understand the level of assurance or risk assumed for the implementation of the design change.

4. Review the Engineering Corrective Action Program and associated documentation for the Contractor's identification, extent of condition, corrective action, and effectiveness of corrective action for the engineering related problems over the past year. This review included a trend analysis review of issues associated with code and standard implementation.

4.0 RESULTS

The oversight results are broken into three areas: 1) Design Change Control Process Compliance and Effectiveness, which includes the review of design change control of the sampled design changes for sampled systems; 2) Design Process Effectiveness for Design Review and Design Verification; and 3) Engineering Effectiveness of the Corrective Action Program. The data and conclusions for the objectives are provided from these analysis and conclusions.

4.1 Design Change Control Process Compliance and Effectiveness

The design program including the design change control process has been an evolving effort from the beginning of the project. The following documents were reviewed:

- 24590-WTP-QAM-01-001, *Quality Assurance Manual*, Rev. 6, August 1, 2005

- 24590-WTP-3DP-G04T-00901, *Design Change Control*, Rev. 3 through Rev. 9, June 9, 2003, through November 28, 2005

- 24590-WTP-3DP-G03B-0001, *Design Process*, Rev. 6, August 1, 2005

- 24590-WTP-GPG-ENG-069, *Design Development and Maintenance Work Process for Primary Drawing*, Rev. 1, November 16, 2005.

The oversight team reviewed the procedures 24590-WTP-3DP-G04T-00901, Rev.3, dated June 9, 2003, through Rev. 9, dated November 28, 2005, which is the current revision. In addition, the design process procedure 24590-WTP-3DP-G03B-0001 was also reviewed. The design change control procedure (Rev. 3) included the Design Change Authorization process, which provided a listing of documents impacted by the design change. This process was removed in Rev. 4 with a stated reason of "Removed DCA as a design change authorization process" with no explanation for the removal. The design change control procedure (Rev. 5) introduced the Change Document List (CDL) that listed existing approved and issued procurement and construction design documents but not all design media associated with the change. Subsequently revisions 6, 7, 8, and 9 clarified the requirements for the CDL.

This oversight makes the Observation that the existing design change process does not require the listing of all documents impacted by the design change.

Since the QAM and existing design control procedures do not require a listing of all impacted design documents (QAM only specifies design must be controlled but does not specify how), it is not a Finding. However, the flow-down process does not provide the same rigor of control to the design change control progress as will be needed when systems approach the construction complete level—as is the case now for some Balance of Facility (BOF) systems—and will need a more timely design change control process to provide effective configuration management. The large scope design changes still being done on this project (because of developing technologies) affect numerous other parts of the design and continue to need the flow-down process. Sufficient time exists in the project to accomplish the flow-down with the design review and verification processes ensuring the effectiveness of the flow-down.

4.1.1 High Level Waste Ammonia Reagent (AMR) Design Change Review

The oversight team reviewed the design change authorization (DCA) and associated support documents including the associated Trend Notice, Authorization Basis Amendment Request (ABAR)/Safety Evaluations (SE)/Decision-to-Deviate Notices (DTD), the primary design drawings, and other design media affected by the change, to determine the compliance and effectiveness of the implementation of the design change control process.

The DCA procedure 24590-WTP-3DP-G04T-00901 (Rev. 3) provided the authorization for the initiation of the design change and stated in Section 3.3.1: "The originator identifies (by document number) the issued design documents impacted by the change." The oversight team reviewed the DCA document 24590-LAW-DCA-PR-03-004, *Addition of Two Anhydrous Ammonia Tanks*, Rev. 0, dated June 5, 2003, and a listing of affected documents was provided including primary design documents, the safety requirements document (SRD), the preliminary safety analysis report, design basis events, calculations, support system primary design documents, and major components added. The DCA also referenced the Trend Notice TN-24590-02-00811.

The oversight review of the DCA documentation determined the High Level Waste AMR system design change required a commitment to the Occupational Safety and Health Administration (OSHA) Process Safety Management (PSM) standard of Title 29 *Code of Federal Regulations* (CFR) 1910.119, "Process Safety Management," and the U.S. Environmental Protection Agency records management plan (40 CFR 68), because the design now involved tanks holding more than 10,000 lb of anhydrous ammonia, exceeding the threshold level of entry to PSM. 29 CFR 1910.119 requires operational hazard analysis reviews to any subsequent design change following approval of the design modification. The DCA impact statements recognized the commitment to develop a process safety management design change program modification would take six months to a year to implement. The DCA was provided to Operations to become aware of the program change for concurrence to comply with the OSHA PSM rule, but Operations provided no impact statement. The DCA impact statements also addressed control room habitability, but the Meeting Minutes Correspondence Control Number (CCN) 063055 recommended against carbon filters for the control room standby ventilation system and suggested more review of the ventilation system.

ABAR 24590-WTP-SE-ENS-03-051, Rev. 0, was reviewed and did reference the calculation for the design basis event of an ammonia release (6,000 gal) based on the rupture of one tank-in calculation 24590-BOF-Z0C-AMR-0001. In turn, the ABAR safety analysis recommended mitigation for the ammonia hazards via commitment to a tailored standard American National Standards Institute (ANSI) K61.1 *American National Standard Safety Requirements for the Storage and Handling of Anhydrous Ammonia*, 29 CFR 1910.111, "Storage and Handling of Anhydrous Ammonia," and *Washington Administrative Code* (WAC) Chapter 296-24, Part F-2, "Storage and Handling of Anhydrous Ammonia." However, the ABAR does not identify the need to revise the SRD for the commitment to 29 CFR 1910.119, "Process Safety Management." **This failure to update the SRD for the requirement to follow 29 CFR 1910.119, "Process Safety Management," is considered a Finding and will be tracked by D-06-DESIGN-022-F01.** At the preliminary exit meeting of February 02, 2006, the Contractor provided CAR 24590-WTP-QA-06-047, *Requirement Not Added Back into the SRD When Necessary*, Rev. 0, dated February 2, 2006. The Finding will be issued for response since the Finding was identified as a result of the assessment and prior to the issuance of the CAR.

The original ABAR did not analyze for a double tank rupture, but rather a single tank rupture. ORP placed a Condition of Approval (COA) No. 1 that required the Contractor to re-perform the calculation to analyze for this condition, which could affect the AB or the design. This has not been done and is scheduled for March 2006. Because there was no probable impact on the design, the procurement for the AMR system was issued for the two 6,000 gal tanks. **The completion of the AMR ABAR COA #1, with the verification of the assumption of no AB or design impact, will be tracked by Assessment Follow-up Item (AFI) D-06-DESIGN-022-A02.**

The reviewers requested an interview to review this calculation (24590-BOF-Z0C-AMR-0001), following the ABAR interview, to determine status of unverified assumptions, and probable impact of the revision of the calculation. **The interview was conducted, but**

the calculation was in revision at the time and not available for review. This will be tracked as AFI D-06-DESIGN-022-A02 to complete the COA required calculation for design impact and procedure compliance when the calculation is available for review. The Contractor indicated the existing calculation already exceeded threshold offsite and onsite limits requiring controls to mitigate, and it was an unverified assumption that the ventilation systems could be designed sufficiently to mitigate control room habitability issues without impacting the base design of the AMR system.

The oversight team concluded this design change was completed in a compliant and effective manner with exceptions noted in the Finding and AFI listed above.

4.1.2 Cesium Ion Exchange Design Change Review

The oversight team reviewed the design change control process and associated implementing procedures to determine the compliance of the procedures to the BNI QAM Policy Q-03.1 and the effectiveness of implementation of the design change control procedures for the design change associated with Cesium Ion Exchange (CXP) hydrogen mitigation.

The design oversight reviewed the documents listed in Section 6.1 to verify that the design change involving hydrogen mitigation for the CXP system was compliant with approved BNI procedures.

Hydrogen mitigation for the CXP system evolved over the last several years. The design advanced from a Gas Separation Vessel located in the black cell and connected to the IX column in 2002, to active level control within the IX column in 2003, to a trap and purge system external to the IX column in 2004, to an inerted trap and purge system external to the column in 2005. The primary reasons for the multiple changes in the design were (1) lack of reliable, tight tolerance control of the column liquid level to ensure mitigation of hydrogen under normal dynamic as well as accident conditions, (2) lack of space available in areas where additional equipment needed to be located, (3) detailed design requiring components to be seismically qualified that could not be, and (4) accumulation of a stoichiometric mixture of oxygen and hydrogen that could be flammable, which represented an unacceptable safety risk.

The inspectors reviewed design media (current piping and instrumentation designs [P&ID] and electronically linked design change notices [DCN], select calculations, related ABAR SE and DOE's safety evaluation report [SER], select Integrated Safety Management [ISM] meeting minutes, the IX column vessel specification, and selected isometrics) to ensure they were all consistent with each other. In particular, the inspectors traced several key design features or inputs through the design media to ensure they were aligned and accurately reflected in each, thus establishing CM via the design flow-down.

The following issues were identified by the oversight review of the reviewed design media:

1. The DCA was not part of the design change process at the time the most recent design was accomplished under ABAR 03-1144; hence, the flow-down redline process was used. The inspectors noted the ABAR contained apparent "requirements" for interlocks (language used states "can be interlocked") between the gas relief valves (V-3) in each IX column and their respective ITS bypass valves (V-2). The interlocks are needed for reliability and for preventing adverse conditions during power loss. The inspectors noted these interlocks and the basis for their existence would need to be documented in some design media such that they would be picked up and incorporated into the software functional specification and design when that is developed at a later date. **The oversight team reviewed the safety evaluation document (SED) revision containing the specifics to the CXP ion exchanger valve interlock function as stated in SED-ENS-03-002-02, Section 4.4.16.2, "System Description." The AFI D-06-DESIGN-022-A03 will track the incorporation of this information to the System Description when revised.**

2. The Contractor Trend Notice was requested to provide the trend review associated with the last major change to the design of the CXP hydrogen mitigation system. The inspector wanted to review this to ensure the scope of the change described therein was the same as that described in ABAR 03-1144. The Contractor was unable to identify whether a Trend was initiated. **The lack of Trend Notice will be tracked as AFI D-06-DESIGN-022-A04 to determine the trend was in place or not required by procedure.**

3. The oversight review of the ISM Meeting Minutes/ABAR/SER determined that a condition of acceptance (COA No. 2) was contained in the ORP SER for ABAR 24590-WTP-SE-ENS-03-1144, Rev. 1, and it required BNI to determine the limiting oxidant concentration (LOC) for the hydrogen/nitrogen/nitrous oxide system and to use this value for the LOC if it is less than the LOC for the hydrogen/nitrogen/oxygen system (otherwise, use the LOC for the hydrogen/nitrogen/oxygen system of 5% as a basis). ORP placed COA No. 3 on the Contractor to develop and implement a plan to evaluate the hazards and identify controls necessary for ensuring safe operation of the hydrogen mitigation collection system and the siphon break. This has not yet been completed so the impact on the design (ion exchange columns, collection system configuration, and size) is not yet known. The completion of COA No. 3 with verification of the impact on the AB and/or design will be tracked as part of **AFI D-06-DESIGN-022-A02.**

4. SE/ABAR to P&ID inconsistency – The SE for ABAR 24590-WTP-SE-ENS-03-1144, Rev. 1, states the IX column safety classification (SC) will be changed from safety design criteria (SDC)/SC-I to safety signification (SS)/SC-III. The current P&ID 24590-PTF-M6-CXP-00002, Rev. 2, includes note 2, "Ion exchange columns and associated piping are quality level QL-1 and seismic category SC-I, unless otherwise noted." (Note: DOE's SER for the subject ABAR noted in its evaluation that the Contractor's decision to procure the columns as meeting SC-I load represented added conservatism in the design and was acceptable to the reviewers.) The drawing was never revised to reflect the "downgrade" in safety/seismic

classification, or clarify what may have been a management decision to procure the IX columns to the higher safety/seismic class.

5. Design media to engineering specification inconsistency – The specification for the IX columns, 24590-PTF-3PS-MWD0-T0005, Rev. 1, includes Appendix A, "Cesium Ion Exchange Process Data for Operation Modes," which is in the form of a table. The normal operating pressure in different modes is not filled in "TBD," nor are most parametric values associated with modes 7 (resin addition), 8 (resin removal), and 9 (off-spec resin recycle). Note 3 of the table states, "Values for fields marked TBD shall be provided by Buyer prior to award." The contract was awarded in May 2004, under MR No. 24590-QL-MRA-MWD0-00001, but these values were not filled in and provided to the vendor. Currently, there appears to be nothing documented to track this issue to ensure that the subject information is provided to the vendor.

6. Internal inconsistency within P&ID – There is a disparity related to the line size between note 5 on P&ID 24590-PTF-M6-CRP-00003, Rev. 1, (indicates a 1 in. line - CRP-ZF-00003-S11B-01) and the actual line number on the same P&ID (indicating a 2" line consistent with the isometric – CRP-ZF-00003-S11B-02).

Observation: A potential trend exists in the area of failure to flow-down design change requirements from the primary design documents to lower level documents in a timely fashion. It is noted in this report as a recommendation for BNI to maintain continuing vigilance via the Engineering Corrective Action Program and Quality Assurance in this area.

4.1.3 Pulse Jet Mixer Design Change Review

The oversight team reviewed the documents listed in Section 6.1 to verify the Pulse Jet Mixer (PJM)/Sparger design change was compliant to the QAM and was effectively implemented by approved procedures.

The PJM change was a major design change initiated in late 2003, based on evolving technology and ongoing research that continues at this time. The P&IDs were revised to Rev. 1 in mid-2004 with changes to lower tier engineering design ongoing (piping, instrumentation, etc.) and flowing down from the P&IDs. The System Description, Rev. A, was released on May 19, 2004, and is scheduled to be revised in late 2006 or early 2007 after the upcoming seismic changes.

The oversight team reviewed the Trend Notice, the ABAR, the SE, the P&IDs, and numerous other documents to determine the effectiveness of the implementation of the change control process.

Design Change Process – The DCA was not required for this change with the revision of the P&ID, via the flow-down process, as the initiating design change mechanism in effect at this time.

In an interview with Engineering management, it was determined the redline method (24590-WTP-GPG-ENG-069, *Drawing Development and Maintenance Work Process for*

Primary Drawing, Rev. 1, dated November 16, 2005) was used by Engineering to coordinate this large change. When Engineering chooses to process a large change, a redlined P&ID is photographed and disseminated to all affected groups, and there are **many** coordination meetings to discuss impacts on affected groups. When these informal coordination meetings and comments are agreeable to all parties, the primary design document is revised using a DCN and the formal Engineering Drawing Review form is processed for the primary drawing. The released P&IDs become the top tier drawings, and the flow-down of subsequent documents begins. The BNI Engineering design package is very large, and involves **many, many** drawings and documents.

This method of redlining the affected documents does not appear to be covered by any formal procedure although the process is described by a guide (24590-WTP-GPG-ENG-069, Rev. 1) which specifically states this is a non-mandatory process and for coordination purposes only. This type of coordination system is used by many architect/engineering firms to manage both the original design and large changes for issuance to a construction organization of standardized design facilities. Engineering for the River Protection Project WTP facilities is now at the 60 – 70% level. As the design continues to be developed and released for procurement and construction, more control of changes will be required in order to not impact CM of the design, as well as changes to released procurements and rework by construction. The redline process does a good job of getting a design into the field for construction/procurement but is not sufficiently timely for CM of the design with the flow-down still moving.

Trend Notice – This oversight reviewed the Trend Notice (24590-03-1123) dated July 2004, for the PJM change. This change was sufficiently large ($83.4 million) to require a Trend Notice and had multiple systems involved. The Trend Notice included test results precipitating the change, along with the basic engineering design criteria used to develop the Trend Notice.

The Trend Notice documents the impact on each engineering group, in terms of number of drawings and budgetary requirements, but it does not specify each and every document affected by the change. In some cases, the drawings do not yet exist, and require the origination of new drawings.

Authorization Basis Amendment Request – ABAR 24590-WTP-SE-ENS-04-041, Rev. 2, for the PJM/Sparger change was reviewed. This ABAR was initiated by BNI Safety and approved by Engineering, the Area Project Manager, and Operations. The affected implementing documents referenced four DTDs. There were no other implementing documents listed.

The ABAR describes the safety hazards associated with the accumulation of hydrogen in the vessels and the mitigating methods used to prevent an explosion. The safety barriers described in the ABAR will require a closer review (and debate) during the planned future Hydrogen in Pipes and Ancillary Vessels (HPAV) design review. The ABAR was prepared and approved in accordance with procedures.

10 sets of calculations were reviewed, and the review did not arrive at any adverse conclusions. One corrective action report (CAR-QA-05-251) showed the vessel designers did not take into account the moment caused by the pulse jet nozzle velocity (at an angle) and will require re-analysis of the PJM structures inside the vessels. This was a significant discovery found by the BNI design review process that would have prevented correct operations if it had not been discovered.

This oversight team reviewed the 25 P&IDs and 42 engineering change notices for the Lag Storage and Blending systems, and the subsequent review of these documents.

The P&ID'S for the PJM system were initially released for construction as Rev. 0 in January/February 2003. The PJM was a major change released in mid-2004. Since then, a total of 42 DCNs had been issued against the P&IDs, many of which addressed the concerns generated during the "Black Cell review." The oversight team concluded the design change associated with the PJM to date was performed in compliance to procedure, with an effective review process by the Mechanical Engineering group.

On the PJM and Sparger systems, there are two major changes that are forthcoming. They are the HPAV and changes that are anticipated as a result of the seismic re-evaluation. The HPAV change is outlined in ABAR 24590-WPT-DTD-ENS-05-0084.

The P&IDs for the above HPAV change are scheduled to be revised in the next two months, followed by the piping design for the lower levels. Construction is on hold in this area, as well as the vendor for the vessels.

Conclusion: The oversight team concluded the PJM design changes have been in continuous state of flux because of evolving technology. As a result of the testing program, there have been changes to the vessels, PJMs, and the Sparger systems. As shown by the existing history of design changes and need for deviation from the AB via DTDs, the research and technology, engineering, and construction are all progressing forward in the same timeframe with major changes continuing to be made after approved design is released for procurement and construction.

Observation: An insufficient gap exists between the development of technology supporting-approved design and issuance of the approved design for procurement/ construction. This gap results in an inefficient design which changes frequently, increasing the cost and schedule of the project.

4.1.4 Important to Safety Electrical Switchgear Change Review

The oversight team reviewed the documents listed in Section 6.1 to verify the design change involving the ITS switchgear building was compliant with committed codes and standards and was compliant to procedures.

The oversight team determined the ITS building design change was compliant to committed standards and was adequately documented in record meeting minutes. The design process was implemented in accordance with established procedures effecting design change, AB maintenance, design verification, engineering drawings, calculations,

and specifications. The detailed scope of the design change was clearly defined and described in the Trend and ABAR process documents. The proposed changes have been fully implemented in the design and verified as complete.

No Findings or Open Items were identified regarding the Contractor's Design Control Process as implemented in regard to the ITS building modification.

Observation: The extent of standards implementation particularly in regard to the words "as applicable" should be better defined. It is generally not apparent in the design documentation reviewed including the material request and design specifications that the entire code or standards is implemented for the entire procurement but only as specified in the design requirements. The SRD calls out a code or standard, but not all the code is placed in the engineering specification via a certificate of compliance that the entire procurement is built to code.

4.1.5 Design Change Control Conclusion

The oversight team concluded the design change control process was compliant to QAM Policy 03.1 because it did provide procedures to identify, control, and verify the design with exceptions noted as Findings. The process was defined in multiple procedures and guides, and was generally implemented with issues identified as discussed below where individual errors have been made on various topics including some programmatic issues such as AB compliance due to personal oversights in the application of the design process. However, the program as described, if properly implemented, is adequate for this stage of the project, but the effectiveness of the implementation is beginning to suffer individual errors due to the volume and magnitude of the design changes being processed late in the design. The following are significant observations and conclusions of the review:

- The failure to update the SRD to include a commitment to 29 CFR 1910.119 will be tracked by **D-06-DESIGN-022-F01**.

- The completion of the AMR and CXP design change without completion of the COAs associated with the ABAR review may have the ability to affect the design. This completion of the COAs for a determination of design impact will be tracked by **AFI D-06-DESIGN-022-A02.**

- The oversight team reviewed the SED revision containing the specifics to the CXP ion exchanger valve interlock function as stated in SED-ENS-03-002-02, Section 4.4.16.2, "System Description." The **AFI D-06-DESIGN-022-A03** will track the incorporation of this information to the system description when revised.

- The lack of Trend Notice for the CXP ABAR 03-1144 will be tracked as **AFI D-06-DESIGN-022-A04** to determine if the trend documentation was in place or not required by procedure.

- The majority of design change control process, as it is applied to the sampled systems, was adequately implemented, with some examples where design information

was not consistently flowed-down to various design media. Potential trends in the areas of design documentation gaps, code implementation deficiencies, design sequencing problems were self-identified by BNI in RITS-QAIS-06-165 and -167. The completion of the Recommendations and Issue Tracking System (RITS) items will be tracked by **AFI D-06-DESIGN-022-A05**.

- **Observation D-06-DESIGN-022-O06** – The present design change process does not require the design change to identify all affected design media involved. Since the QAM and existing design control procedures do not require this (QAM only specifies design must be controlled but does not specify how), it is not a Finding. However, the existing process will not provide an effective level of control to the design change control progress as systems are at the design complete and construction completion level, as is the case now for some BOF systems. Since large scope design changes are still being done on this project, due to the evolving technologies that affect numerous other parts of the design, the flow-down process is still needed. However, a design change control package process needs to be developed for changes based on a completed design, which does not require the primary design to change but details the affected documents to improve the CM on systems which have been completed but not yet turned over for testing and operations.

Observation: The research/design interface is changing too much for some portions of the design to be effectively established and to issue approved design, without substantial risk of rework. The decision to manage risk with the design construct process has now resulted in inefficient design change control which is being mitigated with the slowdown of the construction of buildings to complete the design.

4.2 Design Review and Design Verification Process Compliance and Effectiveness

4.2.1 Design Review

The oversight team reviewed the design review process and associated procedure 24590--WTP-3DP-G04T-0913, *Review of Engineering Documents,* Rev. 4, dated September 30, 2005, to determine if BNI Engineering is in compliance with the procedures and effective in the implementation of the process. In addition, the oversight team reviewed the BNI oversight documentation from both BNI QA and Engineering to determine the significant issues BNI has identified and their impact.

The primary method of design review for individual documents is the engineering design review (EDR). Each individual document(s) is routed through each affected Engineering organization, plus organizations outside of Engineering such as Construction, Operations, and Environmental and Nuclear Safety. Within the Mechanical Design organization, the EDR is routed through several groups. The completed EDRs are stored in record retention.

The design oversight review of the four EDRs for the PJM system, developed by the BNI Mechanical Engineering group, determined the EDRs were circulated to the correct organizations and the process was compliant to procedure. No issues were identified.

The oversight team requested the four EDR packages from records retention to review the nature of the comments and to determine how they were incorporated to the design. The EDRs were correctly circulated to the affected organization, the reviewers' names and the dates recorded, and their dispositions noted. However, in seven cases, when a mandatory disposition was noted, there was no data in the package allowing the reviewer to understand what the mandatory comments were. In the referenced procedure (24590-WTP-3DP-G04T-0913), the procedure states in Section 4.0, "Documentation generated by this procedure shall be submitted to PDC."

For each mandatory comment, there were signatures indicating that the person who made the comment agreed to the disposition. However, from the standpoint of an external review, there was no way to determine what the mandatory comment was, and if the comment was actually incorporated.

Observation: The design review comments, particularly mandatory comments, are not retained in Project Administration Document Control (PADC) after the approval of the change. The design review procedure does not require the retention of these mandatory comments following the commenter's concurrence that the comments were adequately incorporated to the design.

In addition to primary drawing design review via the EDR process, other forms of design review were found. There have been many design reviews on the PJM system that included ISM reviews, the Black Cell review, Defense Nuclear Facilities Safety Board (DNFSB) reviews, design verification reviews, and informal design group reviews. Early in the program, there were process reviews to define the systems; however, based on comments relative to the design verification process, BNI Engineering has committed to a functional requirement reviews when the system description is revised that will determine if the system being reviewed has incorporated the functional requirements for the system into the design media. These reviews will be limited to a total of 45 critical system descriptions.

The "Best and Brightest" group, under the sponsorship of BNI, (but not considered a procedurally mandated process) reviewed all of the major systems to determine if the plant would meet the through-put requirements and other lessons learned/operability areas of concern. The report results were scheduled to be submitted in late February 2006. This was a significant review of the pretreatment facility and its processes. In January 2004, BNI conducted an extensive review called a "Vertical Slice of the Waste Feed Receipt Process (FRP) System."

Currently, there is an internal BNI review team reviewing the recommended changes being proposed for HPAV.

The ISM reviews, the design verification reviews, the Black Cell review, and the group reviews generally focused on components, or specific segments of a system. The future system description reviews (mentioned above) will determine if a system meets the design requirements that are specified for each system in the basis of design. The high-level waste (HLW) melter is scheduled to have contractually mandated reviews at

the 30%, 60%, and 90% completion levels, which is appropriate; however, these reviews may not address the rest of the systems that interface with the melter. The HCP review was held in 2002 and the FRP review in early 2004. With the exception of the "Best and Brightest" review, this oversight did not find any type of end-to-end type system design review being performed in the last two years.

Conclusion: The design review process was considered compliant and generally effective based on the review of the sampled EDRs performed on the PJM system. The reviews conducted by BNI for systems such as the HCP and FRP were effective but there does not appear to be a systematic approach to these highly effective reviews for all critical systems.

Observation: There is immense value in conducting a systems review on critical systems, systems that will be operated remotely, or located in cells that are not accessible during operations. In addition to system type reviews, it is also important to review remote handling and non-functional items such as embeds and shielding.

4.2.2 Design Verification

The oversight team reviewed the design verification process and associated procedures to determine if BNI Engineering is in compliance with the procedures. In addition, the oversight team reviewed the BNI oversight documentation from both BNI QA and Engineering to determine the significant issues BNI has identified and their impact. Documents reviewed are listed in Section 6.1.

Engineering design verifications are performed on systems and attributes of subsystems in accordance with procedure 24590-WTP-3DP-GO4B-00027, *Design Verification*, Rev. 7, dated August 1, 2005, which states:

> "Design verification of SSC's shall be documented on one of the following:
>
> - Design Verification Report (DVR)
> - DVR with attached Meeting Minutes
> - DVR with attached interoffice Memoranda signed by the verifier or team leader.
>
> All SDC/SC, SDS/SS, and IHLW product quality-affecting SSC's shall be documented on the Design Verification Matrix (DVM)."

The method used, and the results of the verification, are contained in a DVR. The planning document for these design verifications are contained in 24590-WTP-DVM-M-03-001, *Design Verification Scope and Approach Overview Matrix*, Rev. 6. Unverified portions of the design are to be identified on the Design Verification Matrix (DVM), and are tracked by RITS.

Four DVRs reviewed were design verifications performed on the Pretreatment Lag Storage and Feed Blending Process (HLP). The reviews properly identified the key

documents to be reviewed, the safety requirements, process requirements, interfaces, and areas selected for a detailed review. There was evidence of daily meetings held by the Engineering team to ensure the review addressed the process, safety, and functional requirements for the system being addressed. The oversight team concluded that the reviews were thorough, adequately supported by senior manpower, and had adequate time provided to perform the review. Below are the results of these reviews.

- The DVRs fully documented the systems that were reviewed, safety requirements, and the individual DVRs for each specific review. The action items and incomplete design verifications were well documented in accordance with the procedure. Incomplete verifications are tracked by a RITS and a Mechanical Systems database, CCN 091511.

- A notable exception in compliance to the design verification procedure is noted in CAR 24590-WTP-CAR-QA-05-221, whereby it was found that the AMR system was not identified, controlled, or tracked on the DVM. It was verified that the AMR system was added to the DVM on November 2, 2005. Completion of this design verification is scheduled for June 2006.

- Another CAR (24590-WTP-VST-QA-05-267) found that five DVRs did not list the appropriate RITS number in the DVM as required by the procedure.

- This oversight team found that the design verification investigation reports were well documented and that a considerable amount of time was expended on each item being reviewed. Each action item was clearly spelled out, and the reports were very comprehensive.

- The actions that are the result of a DVR are tracked by an RITS, and the RITS number is noted on the DVM. Prior to January 2006, the follow-on actions and re-verification of a system were dropped off the DVM. In some instances, the initial verification was done at an early stage of the design, and the re-verification could be significant, particularly if a major design change occurred after the initial verification.

Observation: Followup actions, and particularly re-verification of a system, should remain on the DVM until the action has been completed. Special attention to re-verification should occur if there is a major design change. For every major change, there should be a re-verification entered on the DVM. At the very end of this oversight, 24590-WTP-DVM-M-03-001, Rev. 7 was issued adding a column entitled "Design Verification Required," which listed the documents requiring re-verification as a result of the initial design verification. This is a significant addition to the DVM, which resolved the concerns of this oversight during the conduct of the oversight.

In addition, design verification can be completed by testing:

> "Design verification for some designs or specific design features can be achieved by suitable qualification testing of a prototype or initial production unit."

There have been a number of significant tests conducted on the PJM/Sparge system. The results of these tests are documented in the referenced test reports dated March 2004, June 2004, and April 2005. Tests were conducted using different sized vessels, with various sized pulse jets; with a variety of nozzle sizes, orientation, and nozzle velocities. The efficiency of the systems tested was documented, and the conclusion was that the PJMs are efficient in mixing the non-Newtonian mixture at the bottom of the tank, but are not effective in mixing the mid-range and top portion of the tank. Spargers and circulation flow were added to the test vessels, and it was found that the combination of PJMs, spargers, and the circulation flow were effective in mixing the contents of the tanks. The design of the PJMs, spargers, and pump flow velocities were based on the tests documented in March 2004, using sizing factors to size up from the test article to the plant vessels. Testing of these systems is continuing at Pacific Northwest National Laboratories. This is a significant and necessary test program.

4.2.3 Conclusion to Design Verification Review

Design verification process has approved procedures compliant with the QAM and that are in general effectively implemented based on the review of the sampled engineering DVRs performed on the PJM system. Effectiveness continues to be monitored by both BNI and ORP due to the existence of design documentation gaps and flow-down issues documented in RITS-QAIS-06-165 and 167.

4.3 Engineering Corrective Action Program Implementation

The oversight team reviewed the BNI oversight documentation from both BNI QA and Engineering to determine the significant issues BNI had identified and their impact. Specifically, the oversight team reviewed BNI audits, surveillances, CARs, and management assessments to determine if BNI had identified, controlled, and effectively resolved issues associated with the design change process in accordance with the Corrective Action Program per QAM Policy Q-16.1, "Corrective Action."

4.3.1 Observations and Assessments

The oversight team reviewed the documents listed in Section 6.1 to verify that problems associated with the design control program were identified, controlled, and effectively resolved in accordance with QAM Policy Q-16.1, "Corrective Action."

4.3.2 Engineering Corrective Action Program Review

Per the QAM implementation strategy, the objective of the Corrective Action Program was to identify, control, document, evaluate, and trend conditions adverse to quality, and to develop and implement appropriate actions to correct the adverse conditions. Significant conditions adverse to quality required performance of root cause evaluations and development and implementation of effective preventive actions to prevent recurrence. QAM Policy Q-16.1 also required trending for identification of adverse quality and performance trends.

The inspectors reviewed many CAR descriptions and performed detailed reviews of selected CARs during this assessment. The analysis of the individual areas of the Corrective Action Program process were developed from the following specific examples and developed based on the population of CARs reviewed.

Identification

- Engineering's 24590-WTP-MAR-ENG-05-001, *Corrective Action Reports- Self Identification Assessment*, Attachment 1, provided data allowing the conclusion that Engineering self-identified 70%, 57%, and 70 %, respectively, of all Engineering-related CARs originated in calendar years 2003, 2004, and 2005 (at the time of the assessment, only 37 CARs had been issued in 2005). The inspectors concluded Engineering was adequately reporting problems.

- The inspectors reviewed a list of CARs for 2005 for primary processes and engineering deliverables (calculations, design change control, design verification/reviews, drawings, material requisition, system descriptions, and specifications) associated with design control (102 records). The inspectors also reviewed QA surveillances involving Engineering from July 1, 2005, to December 31, 2005 (66 records), and Engineering performance assurance surveillances from July 1, 2005, to December 31, 2005, involving design process control (19 records). The inspectors noted the surveillances and CARs documented engineering problems across a vast spectrum (technical, process, performance, and compliance). The descriptions of the problems were very detailed and able to be clearly understood.

- From a corrective action standpoint, "identification" not only involves identifying singular occurrences of problems, but also involves identifying chronic or repeat problems, possibly representing an adverse trend. The inspectors noted BNI was proactive in identifying an adverse trend involving designation of slopes for process and utility piping.

Conclusion: Based on the review of BNI Engineering oversight documentation, BNI was adequately identifying problems with Engineering deliverables and processes, and appropriately documenting them in CARs.

Evaluation (including Extent of Condition (EOC))

- 24590-WTP-CAR-QA-05-277, Rev. 0, involved failure to include specific editions of daughter standards cited in an engineering specification. CCN 131634 discussed the results of the cause and extent of condition evaluations. This evaluation appropriately concluded the problem may not be unique to a single engineering discipline, resulting in assigning actions to multiple disciplines to identify additional examples of the problem, should they exist, and correct them. The CCN stated the cause was "Behavior – failure to properly implement procedural requirements in all cases. Responsible personnel did not ensure referenced codes and standards editions were

applied consistently in all affected specifications." Corrective actions across all disciplines are pending and were due for completion on January 27, 2006.

- The inspector concluded the extent of condition was adequately identified. However, the cause for the condition was a restatement of the condition and stopped at a level above that which may have provided substantive information on which to act. For example, the reasons why personnel did not ensure they applied codes and standards consistently may have resulted in identifying a common theme warranting additional corrective actions.

- 24590-WTP-CAR-QA-05-263, Rev. 0, involved a process bulge specification that failed to pass on the tailoring of American Society of Mechanical Engineers (ASME) B31.3-1996 required by the SRD. CCN 107940 discussed the results of the cause and extent of condition evaluations. The extent of condition review noted 11 mechanical system specifications having the same problem as the specification noted in the condition description. This review also noted the existence of additional CARs ([05-212 – tailoring of ASME B31.3 in SRD Appendix C] and 05-264 [ANSI/AISC N690 in SRD Appendix C]) that reported failures to pass on WTP-specific tailoring requirements of industry standards in engineering specifications. The CCN stated the cause was "a lack of awareness on the part of the individuals involved that specific tailoring requirements of ASME B31.3 were added to the SRD... and that a DCD search would not identify the tailored information." The CCN stated a related cause was not having the SRD, Appendix C-tailored requirements in the SRD.

- The inspector concluded the extent of condition was adequately identified. The associated CCN stated as a result of corrective actions to CAR 05-212, design criteria from SRD, Appendix C, were added to the design criteria database (DCD) and are maintained current therein. The inspector considered the causes identified for this CAR to be appropriate.

- 24590-WTP-CAR-QA-05-199, Rev. 0, involved issued isometric drawings that included information that deviated from primary design drawings (P&IDs). Deviations included incorrect line sequencing, a missing line, and a missing drain valve. In the four cases cited in the CAR, the isometrics were not properly checked. The extent of condition identified many additional instances of isometric-to-P&ID mismatch with all facilities affected – BOF (11), LAB (25), LAW (56), PTF (18), and HLW (42). These discrepancies included problems with slope, paint codes, insulation, valve sequence, line lists, flow arrows, instrumentation callouts, and seismic category. The CAR identified the cause as failure on the part of originators and checkers in performing their assigned tasks. Contributing factors included: schedule pressures to meet isometric release dates, multiple input document changes as isometrics were being prepared for issuance for construction, many changes on one DCN making them overly complex and lengthy, and slope criteria shown in P&ID notes and not on actual lines.

- The inspector concluded the extent of condition and causes/contributing factors were adequately identified.

Conclusion: BNI Engineering is adequately determining the causes and extent of condition of problems reported in CARs.

Correction Action

- Corrective Actions for the three CARs noted above were evaluated to determine if they addressed the identified causes and extent of condition. In all cases, the inspector concluded the specified actions were comprehensive.

- The FY 2005 Annual Engineering Management Assessment did not include any formal recommendations. However, the Executive Summary states there are common themes among Engineering CARs that require broader action than merely resolving the CAR condition. The common themes include:

  - Procedure compliance deficiencies
  - Behavior issues (attention to detail)
  - Design documentation gaps
  - Code implementation deficiencies
  - Design sequencing problems.

  The assessment further states "Engineering has implemented actions to (address) these issues and is developing formal action plans for improvement." Discussion with the Engineering Process Manager indicated that some actions have been taken to address issues 1, 4, and 5. To date, no actions have been developed or implemented to address issues 2 and 3. However, no formal action plans have been issued to date.

  The management assessment procedure required recommendations and observations made in assessments be placed into RITS. Although the "common themes" above are not categorized as either Recommendations or Observations, they are nevertheless issues that Engineering felt necessary to single out and act upon (based particularly on the statement that these require broader action than merely resolving the CAR condition). However, these issues were not documented in RITs to track development of action plans as listed in the Executive Summary, which states, "These common themes included procedure compliance deficiencies, behavior issues (attention to detail), design documentation gaps, code implementation deficiencies, and design sequencing problems. Engineering has implemented actions to these issues and is developing formal action plans for improvement." Some of the action plans were initiated and some were still pending project actions outside of Engineering control.

Conclusion: For the most part, BNI Engineering was identifying deficiencies on a case-by-case basis and was adequately developing and implementing assigned corrective/preventive actions. It was noted by the oversight that some broad-based problems identified in the FY 2005 Annual Engineering Management Assessment were not assigned RITS tracking for scheduling resolution. The failure to enter issues reported in 24590-WTP-MAR-ENG-05-013 as "common theme" items in RITS in accordance

with management assessment procedure GPP-MGT-002, Section 3.2, is a Finding tracked as **D-06-DESIGN-022-F07** for failure to follow procedure

Issue Closure Effectiveness

Many of the CARs reviewed were closed. The inspectors reviewed the details of several of these CARs, including the basis for closure and QA's effectiveness review. Some CARs had escalations and additional actions to complete as a result of QA's review. In some cases, due dates for individual corrective actions were extended with management approval. Of the CARs reviewed, one (05-124 – failure to include applicable year/date for codes/standards, daughter standards) stated the issue was an isolated event and the CAR was closed. Later, a second event occurred for which a CAR was written (05-277 - failure to include code editions in specs.) that indicated the issue was not isolated. A broader extent of condition was identified and more extensive corrective actions were assigned. **This CAR is still open.**

Conclusion: BNI Engineering is appropriately closing CARs once actions taken are deemed effective. QA is assuring the effectiveness of actions taken for Engineering CARs.

Trending

In early 2005, four CARs were written concerning piping slope problems: CAR-05-067 - no calculation reference provided for recommended slopes for piping systems; CAR-05-079 – conflict between DCN and specification for slope requirements; CAR-05-084 – piping slope in black cell areas; and 05-103 – piping isometric drawings do not match P&IDs. Although each of these CARs was addressed individually, BNI appropriately recognized the common theme inherent in these CARs as representing a trend with problems applying correct slope requirements to process and utility piping. As a result, a management assessment was performed by Engineering (24590-WTP-MAR-ENG-05-0011, Rev. 0) and comprehensive actions were assigned to resolve the problem. The inspector considered this an excellent example of trending across related CARs/problems by BNI Engineering.

Engineering Quality Analysis (EQA) is a tool Engineering was using to provide enhanced analysis focused on revealing thematic trends in Engineering's performance. The Contractor institutionalized this through a guide that was approved January, 31, 2006 (24590-WTP-GPG-ENG-0096, *Engineering CAR Management, Trending and Follow-up*, Rev. 0). The EQA Chart rates performance based on previously reported CARs, characterizes them as "local" or "broad," "low" or "high" significance, and includes demographics by discipline and cause code. Results are shown in a visual format using green, light and dark yellow, and red to illustrate Engineering's performance. Engineering revises the chart monthly for new CARs and revises its analysis to identify potential trends and to characterize performance in the areas of "deliverables," "processes," and causes. At the end of 2005, the chart indicated "procedure adherence" and "behavior" as the two most prevalent causes for engineering performance problems. Performance is generally green or yellow for the majority of deliverables and processes,

with only calculations having open CARs (2) in the red area. Both of these CARs have root cause analyses and assigned corrective/preventive actions, some of which are still being implemented.

Engineering analyzes the EQA Chart to focus its surveillance program. The inspectors reviewed the plan and schedule for engineering surveillance for FY 2006 and concluded that it focuses appropriately on many of the deliverable and process areas in the EQA Chart where recent/open CARs populate quadrants other than "green."

The inspectors also reviewed selected 2005 CARs to identify potential trends associated with design control. The following potential trends were identified:

- Specification of slope for piping

  As noted in the Identification section above, the Contractor recognized the existence of this trend, performed a management assessment, and developed and implemented comprehensive corrective actions.

- Specification and application of codes and standards

  The EQA Chart provides a distribution for cause codes that shows that Code Implementation and Safety Envelope Compliance causes represent 3% and 9% respectively, of the overall causes for CARs on the Chart. However, one of the CARs (CAR 05-024) has broad and significant impact.

  The *FY 2005 Annual Engineering Management Assessment Executive Summary* (24590-WTP-MAR-ENG-05-013) states that a common theme among Engineering CARs is code implementation deficiencies. One of the actions stemming from the CAR 05-024 root cause analysis involved implementing a process to identify and provide specific guidance and awareness training on application of unique codes and standards when making work assignments and monitoring for effectiveness of the application. This action was based on acknowledgement that although the individuals involved in CAR-05-024 were registered Professional Engineers, and thereby familiar with typical industry codes and standards, WTP has unique code requirements based on the safety envelope requirements. CCN 102111 covered this topic and described how the Contractor proceeded: Criteria were established for selecting "unique codes/standards," disciplines identified them, and execution ground rules were specified for training to ensure a consistent approach was taken. The focus of this effort was to familiarize personnel with the content and nuances of the selected (unique) codes to improve code implementation.

- Misalignment among design media

  The EQA Chart provides a distribution for cause codes that shows that Configuration Problem causes represent 4% of the overall causes for CARs on the Chart. Many of these issues may represent examples of problems with application of the design change process, which may be missed by single coding each CAR to the engineering product that was affected or involved. The *FY 2005 Annual Engineering Management Assessment Executive Summary* states that a common theme among

Engineering CARs is design misalignment/design gap implementation deficiencies and have documented this in RITS-QA-06-163 through 167; the disposition and closure of these RITS items is tracked by **AFI D-06-Design-022-A05**.

The inspector concluded the Contractor's reviews and actions to date and have identified what appears to be a broader problem associated with misalignment among design media.

Overall Conclusion Engineering Corrective Action Management: BNI Engineering's implementation of its Corrective Action Program is generally sound. BNI Engineering had applying techniques identifying the existence of some adverse trends in the form of common themes issues in the *FY 2005 Annual Engineering Management Assessment Executive Summary* (24590-WTP-MAR-ENG-05-013). This EQA process was formalized in a guide, which was just approved during this assessment. No evaluation was performed on the use of this guide at this time; hence no conclusions are drawn at this time for trending. However, some broad-based problems identified in a MAR were not assigned and scheduled for resolution. The failure to issue RITS items through the RITS process for resolution (per management assessment procedure GPP-MGT-002, Section 3.2) as reported in 24590-WTP-MAR-ENG-05-013 is considered a Finding (**D-06-DESIGN-022-F07**) for failure to follow procedure.

5.0 OPEN ITEMS AND RECOMMENDATIONS

Open Items:

A-05-AMWTP-DESIGN-0220-F01: The failure to update properly the SRD to include a commitment to 29 CFR 1910.119, Process Safety Management," is a Finding tracked by **D-06-DESIGN-022-F01**.

A-05-AMWTP-DESIGN-022-A02: The completion of the AMR and CXP design change without completion of the COAs associated with the ABAR review have the ability to affect the design. This completion of the COAs for a determination of design impact will be tracked by **AFI D-06-DESIGN-022-A02**.

A-05-AMWTP-DESIGN-022-A03: Tracking the CXP ion exchanger valve interlock function as stated in SED-ENS-03-002-02, Section 4.4.16.2, into the system description will be tracked by **AFI D-06-DESIGN-022-A03**.

A-05-AMWTP-DESIGN-022-A04: The lack of Trend Notice for the CXP ABAR 03-1144 will be tracked as **AFI D-06-DESIGN-022-A04** to determine if the trend documentation was in place or not required by procedure.

A-05-AMWTP-DESIGN-022-A05: The FY 2005 Annual Engineering Management Assessment Executive Summary states that a common theme among Engineering CARs is design misalignment/design gap implementation deficiencies and have documented this in RITS-QA-06-163 through 167; the disposition and closure of these RITS items are tracked by **AFI D-06-Design-022-A05**.

A-05-AMWTP-DESIGN-022-O06: The design change process does not require the identification of all the affected design media. Since the QAM and existing design control procedures do not require this (QAM only specifies design must be controlled but does not specify how), it is not a Finding. However, the flow-down process does not provide a timely level of control to the design change control when systems are design completed and construction completed to support the commissioning and testing program. **ORP Recommends a system be developed and implemented to support design change control for this eventuality**.

Observation D-05-DESIGN-022-F07: The failure to follow procedure and enter issues identified in 24590-WTP-MAR-ENG-05-013 as "common theme" items in accordance with management assessment procedure GPP-MGT-002, Section 3.2, into RITS, is considered a Finding (**D-06-DESIGN-022-F07**).

6.0 REFERENCES AND PERSONNEL CONTACTED

6.1 References

23246-D1, *HLW Lag Storage Vessel, Harris Thermal Transfer Products*, Rev. E, April 26, 2005

24590-B88-M4C-C1V-00001 – ITS Switchgear – C1V- HVAC Load Calculations

24590-BOF-DBC-88-00001 – ITS Switchgear Building –Foundation Design

24590-BOF-DDC-88-00001 – ITS Switchgear Building –Embed Plate Capacities

24590-BOF-DDC-88-00002 – ITS Switchgear Building –Equipment Anchorage

24590-BOF-DDC-88-00003 – ITS Switchgear Building –Column Anchorage to Foundation

24590-BOF-SOC-S15T-00001 – ITS Switchgear Building –Structural Model for SSI Analysis

24590-BOF-SOC-S15T-00002 – ITS Switchgear Building –Seismic Analysis (ABAR)

24590-LAW-3PS-AMR-T0002, *Engineering Specification for Anhydrous Ammonia Storage/Supply Package*, Rev. 0, May 20, 2005

24590-LAW-DCA-PR-03-004, *Addition of Two Anhydrous Ammonia Tanks*, Rev. 0, June 5, 2003

24590-PTF-3PS-MWD0-T0005, *Engineering Specification for Cesium Ion Exchange Columns*, Rev. 1, February 15, 2005

24590-PTF-3YD-CXP-00001, *System Description for the Cesium Ion Exchange Process – System CXP*, Rev. 0, September 10, 2002

24590-PTF-3YD-HLP-00001, *System Description for HLW Lag Storage and Feed Blending Process System (HLP)*, Rev. 0, September 11, 2002

24590-PTF-3YD-HLP-00003, *System Description for Pulse Jet Mixers and Supplemental Mixing Subsystems*, Rev. A, May 19, 2004

24590-PTF-3YN-CXP-00002, *System Description Change Notice for the Cesium Ion Exchange Process – System CXP*, Rev. 0, May 20, 2004

24590-PTF-DCA-M-03-006, *Design Change Application: Reconfiguration of CRP System,* Rev. 0, July 9, 2003

24590-PTF-DVR-M-03-001, *Design Verification Report. Pretreatment Waste Feed Receipt Process (FRP)*, Rev. A, July 14, 2003

24590-PTF-DVR-M-03-002, *Design Verification Report, Pretreatment Facility (PTF) Pulse Jet Ventilation System (PJV)*, Rev. A, September 10, 2003

24590-PTF-DVR-M-03-006, *Design Verification Report, Pretreatment Lag Storage and Feed Blending Process*, Rev. 0, October 23, 2003

24590-PTF-DVR-M-04-003, *Design Verification Report, Pretreatment Facility (PTF) Plant Wash and Disposal System (PWD)*, Rev. 0, June 3, 2004

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24590-PTF-M6-CRP-00003, *P&ID – PTF Cesium Ion Exchange Hydrogen Mitigation and Fresh Resin Addition*, Rev. 1, August 6, 2004

24590-PTF-M6-CXP-00002, *P&ID – PTF Cesium Ion Exchange Columns System*, Rev. 2, February 16, 2005

24590-PTF-M6-HLP-00001-00026, *P&ID- PTF HLP Lag Storage and Feed Blending Process*

24590-PTF-M6-HLP-P0001-10, *Calculations for HLW Lag Storage and Feed Blending System*

24590-PTF-MVC-CXP-00015, *CXP Ion Exchange Column Gas Generation Rates*, Rev. B, July 11, 2005

24590-PTF-MV-HLP-00009, *Equipment Assembly HLW Lag Storage Vessel HLP-VSL-00027A*, Rev. 0, April 29, 2004

24590-PTF-P3-CRP-ZF00003085, *Pretreatment Facility Isometric,* Rev. 0, March 15, 2005

24590-SE-ENS-03-051, *Incorporation of Ammonia Storage Tanks at the BOF Facility*, Rev. 0, CCN 098998, October 29, 2004

24590-WTP-3DP-G03B-0001, *Design Process* Rev. 6, August 1, 2005

24590-WTP-3DP-G04B-00027, *Design Verification*, Rev. 7, August 1, 2005

24590-WTP-3DP-G04T-00901, *Design Change Control*, Rev. 4

24590-WTP-3DP-G04T-00903, *System Descriptions and Test Acceptance Criteria* Rev. 6, November 28, 2005

24590-WTP-3DP-G04T-0913, *Review of Engineering Documents*, Rev. 4, September 30, 2005

24590-WTP-CAR-QA-05-199, "Deviation between lower-level isometric drawing and primary design drawing," Rev. 0, August 19, 2005

24590-WTP-CAR-QA-05-221, "The AMR system is not identified, controlled, and tracked on the Design Verification Matrix," Rev. 0, September 19, 2005

24590-WTP-CAR-QA-05-263, "Process bulge specification fails to pass on tailoring of ASME B31.3-1996 required by the SRD," Rev. 0, September 29, 2005

24590-WTP-CAR-QA-05-267, "Design Verification action items missing RITS numbers," Rev. 0, October 19, 2005

24590-WTP-CAR-QA-05-277, "Failure to include code editions in specifications," Rev. 0, October 26, 2005

24590-WTP-DVM-M-03-001, *Mechanical and Process Engineering Design Verification Scope and Approach Overview Matrix,* Rev. 6, November 2, 2005

24590-WTP-DVM-M-03-001, *Mechanical and Process Engineering Design Verification Scope and Approach Overview Matrix,* Rev. 7, January 26, 2006

24590-WTP-GPG-ENG-0096, *Engineering CAR Management, Trending and Follow-up*, Rev. 0, January 31, 2006

24590-WTP-GPG-ENG-069, *Drawing Development and Maintenance Work Process for Primary Drawing*, Rev. 1, November 16, 2005

24590-WTP-GPG-M-045, *Design Guide for Design Freeze*, Rev. 1, May, 12, 2003

24590-WTP-GPP-MGT-002, *Management Assessment*, Rev. 5, October 1, 2005

24590-WTP-MAR-ENG-05-0001, *Corrective Action Reports – Self Identification Assessment*, Rev. 0, May 15, 2005

24590-WTP-MAR-ENG-05-0007, *Implementation and Flow-down of Black Cell Basis of Design Requirements, Management Assessment Report*, Rev. 0, September 2, 2005

24590-WTP-MAR-ENG-05-0011, *Piping Slope and Gravity Drain Line Requirements,* Rev. 0, September 2, 2005

24590-WTP-MAR-ENG-05-0013, FY2005 Annual Engineering Management Assessment, Rev. 0, December 22, 2005

24590-WTP-PL-ENG-05-0005, *FY2006 Engineering Management Self-Assessment Plan and Schedule*, Rev. 0, December 23, 2005

24590-WTP-QAM-01-001, *Quality Assurance Manual*, Rev. 6, August 1, 2005

24590-WTP-SED-ENS-03-002-02, *Safety Evaluation Document, Pre-Treatment Facility Specific Information*, Rev. 0

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24590-WTP-SE-ENS-03-051, *Incorporation of Ammonia Storage Tanks at the BOF Facility*, Rev. 0, CCN 098998, October 29, 2004

24590-WTP-SE-ENS-03-1144, *CXP – Hydrogen Mitigation/Emergency Elution/Flooded Column Design,* Rev. 1, June 21, 2004

24590-WTP-SE-ENS-04-0106, *Modification of ITS Switchgear Building Design* Rev. 0, CCN 093521, August 24, 2004

24590-WTP-SE-ENS-04-041, *Pretreatment Facility Non-Neutonian Vessels (Hydrogen Mitigation)*, November 22, 2004

29 CFR 1910.111, "Storage and Handling of Anhydrous Ammonia," *Code of Federal Regulations*, as amended

29 CFR 1910.119, "Process Safety Management," *Code of Federal Regulations*, as amended

40 CFR 68, "Risk Management Program," *Code of Federal Regulations*, as amended

ANSI K61.1, *American National Standard Safety Requirements for the Storage and Handling of Anhydrous Ammonia,*

CCN 030626, "HLW Cave Receipt Process System Design Review," March 20, 2002

CCN 085848, "Hybrid Mixing System Test Data Supporting the Ultrafiltration Feed Process (UFP-VSL-00002A/2B) HLW Lag Storage (HLP-VSL-00027A/B) Vessel Configurations," March 2004

CCN 102111, CAR-05-024 Action: Unique Codes and Standards

CCN 107940, memorandum from Hoffman to Webb, "24590-WTP-CAR-QA-05-263 Responsible Organization Response," November 22, 2005

CCN 130831, "WTP Quality Assurance Trend Report – Third Quarter CY 2005," November 29, 2005

CCN 131634, memorandum from Gaulden to Smith, "24590-WTP-CAR-QA-05-277 Responsible Organization Response," November 30, 2005

D-03-DESIGN-006, *Black Cell Design Adequacy Oversight Report*, February 11, 2004

DOE Letter 04-WTP-253, Schepens to Henschel, "Safety Evaluation Report (SER) of ABAR 24590-WTP-SE-ENS-03-1144, Rev. 1," November 4, 2004

DOE Order 226.1, *Implementation of Department of Energy Oversight Policy*

DOE-STD-1066-99, *Fire Protection Design Criteria*

DOE-STD-2020-2002, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities*

DOE-STD-3009-94, *Preparation Guide for U. S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*

Engineering Performance Assurance surveillances from July 1, 2005 to December 31, 2005, involving design process control (19 records)

Letter 04-WTP-215, Schepens to Henschel, "Approval of Authorization Basis Amendment Request (ABAR)," September 16, 2004

Letter CCN 126005, "Request for US DOE Approval of ABAR 24590-WTP-SE-ENS-03-051, Rev. 0 and Associated Decision to Deviate," September 14, 2005

List of Corrective Action Reports for 2005 for primary processes (calculations, design change control, design verification/reviews, drawings, material requisition, system descriptions, and specifications) associated with design control (102 records)

Meeting minutes CCN 058204, "Trend Presented and Disposition Status for TN-24590-03-00811, Use of Ammonia in LAW Offgas vs. Urea," May 15, 2003

ORP DI 220.1, *Conduct of Design Oversight*

ORP letter 05-WTP-196, "Approval of BNI ABAR Request," September 30, 2005

ORP M 220.1, *ORP Integrated Assessment Program*, Rev. 3

Quality Assurance (QA) surveillances from July 1, 2005, to December 31, 2005, involving Engineering (66 records)

TN-24590-03-01227, *Reforecast ITS Switchgear Building*

Trend Notice 24590-03-00811, May 15, 2003

Trend Notice 24590-03-01123, "Non-Neutonian Mixing Implementation," July 29, 2004

"Vertical Slice of the Waste Feed Receipt Process (FRP)," design review dated January 22, 2004

WAC 296-24, Part F-2, "Storage and Handling of Anhydrous Ammonia," *Washington Administrative Code*, as amended

WTP-RPT-128, *Hybrid Mixing System Test Results for Prototype Ultrafiltration Feed Process and High-Level Waste Lag Storage Vessels*, Rev. 0, April 2005

6.2 Personnel Contacted

J. Julyk
R. Stevens
J. Olson
G. Duncan
M. Delamare
D. Kammenzind
H. Schuette
D. Pisarcik
M Ehlinger
J. Roth
B. Voke
R. Hanson
H. Moorman
M. Sanvictores
J. Hinckley
A. Larson
M. Medsker
D. Jackson
G. Goolsby
E. MacQuarrie

APPENDIX A DESIGN PRODUCT OVERSIGHT PLAN REVIEW OF CONTRACTOR DESIGN CONTROL PROCESS

DESIGN PRODUCT OVERSIGHT PLAN

REVIEW OF CONTRACTOR DESIGN CONTROL PROCESS

January 20, 2006

Design Oversight: D-06-DESIGN-022 Rev. 1

Team Lead: James E. Adams

Team Member: M. Ramsay, ORP WED Electrical SSO
R. Cooper, WED Consultant
V. DesCamp, WED Consultant

Submitted by:

_____ Date _____
James E. Adams, Team Lead
WTP Engineering Division

Concurrence:

_____ Date _____
William F. Hamel, Director
WTP Engineering Division

_____ Date _____
John Eschenberg, Project Manager WTP

1.0 BACKGROUND, PURPOSE, AND OBJECTIVES

1.1 Background

The River Protection Program Waste Treatment Waste Treatment and Immobilization Plant (WTP) facilities are under a temporary suspension of work for the High Level Waste (HLW) and Pre-Treatment (PRT) Buildings to allow progress on the revised seismic design, as well as other emerging technical areas. The Low Activity Waste (LAW) Building and the Laboratory Facility (LAB) continue with a reduced site manning. The design process and other nuclear safety culture programs are being reviewed by Office of River Protection (ORP) and the Contractor with the goal of increasing the Contractor's effectiveness in light of the recent ORP environmental, safety and health (ES&H) reports that indicate a reduced nuclear safety culture (including procedure compliance, training processes, etc). This design process oversight will focus on specific, recently approved design changes in the important-to-safety (ITS) systems to determine if the design process has been properly executed per the Quality Assurance Manual (QAM) and approved procedures.

In addition to the specific need mentioned above, the design oversight will examine the oversight provided by both the Bechtel National, Inc. (BNI) Quality Assurance organization and the Engineering organization to provide assurance of BNI's continuing commitment to Integrated Safety Management via an effective Corrective Action Management program.

1.2 Purpose

This oversight will review the Contractor's design process with a focus on specific, approved design changes in the Balance of Facility and ITS systems to determine the design process has been properly executed for design changes.

1.3 Objectives

The following are the specific objectives of this oversight:

- Review the design change control documentation for the sampled system design changes to verify the compliance and effectiveness of the design change control process. Specifically, review these changes and their implementation via design change documentation, such as the Authorization Basis Amendment Request (ABAR), the trend notice, the approval of design change, the safety evaluation of the ABAR, and the changes to various design mediums including drawings, calculations, system descriptions, and Configuration Management (CM) databases to ensure the BNI process has been properly followed.

- Review the areas of design review and design verification based on the review of the four specific design change packages for the effective oversight of the design change process ensuring an adequate design is approved.

- Review the Corrective Action Program for identification of corrective actions involved with the Engineering organization for the past year, and any trends associated with the design process with emphasis on codes and standards issues. This review includes proper identification of issues, extent of condition reviews, root cause analysis, and corrective actions including the effectiveness of the corrective actions.

  a. Cesium ion exchange system design change involving the purge and trap at the top of the ion exchange columns

  b. Ammonia supply design change deleting urea injection and using liquid ammonia

  c. ITS switchgear separation of buildings

  d. Pulse jet mixer sparger re-design.

2.0 PROCESS

This oversight shall be conducted within the guidelines of ORP M 220.1 and the draft OPR PD 220.1, "Conduct of Design Oversight," as revised January 13, 2006.

2.1 Scope

This oversight will include review of the design processes and the design products produced to date in support of the topic under review. This will include procedures, calculations, deliverables, and other documents that describe the applicable processes and products.

This oversight will also include monitoring the internal functioning of the BNI design process to assess its effectiveness in producing the design products under review.

2.2 Preparation

1. Identify the Contractor Point of Contact for the Review.
2. Establish the scope and elements of the design processes and deliverables under review.
3. Identify and review the applicable Contract and requirements source documents.
4. Review background information as provided by Contractor and identified through review of available databases.
5. Review previously performed Contractor design review reports, documentation, open issues, and the plans for and status of their resolution.
6. Review the applicable design processes and a sample of the resulting design deliverables.
7. Table A-1 lists information requested from the Contractor to initiate this oversight.

Table A-1 – Initial Information Requirements

1.	Oversight documents from both QA and Engineering associated with the Design Process program. This includes surveillances, management assessments, QA audits, corrective action reports, subcontractor audits/surveillances/etc. on the U.S. Nuclear Regulatory Commission (NCR) process.
2.	Design information associated with the sampled design changes. This includes all approved design media including the research, calculations, change documentation, design review including Authorization Basis review, and other documents necessary to review the adequacy of the design, as well as the following of the design process used to obtain the approved design.
3.	Presentation on design change control process indicating how the changes are scoped, the flow process of the change (using procedure references), and how the design change is verified implemented.
4.	Presentation of the results of the recent QA audit on design process and any Consolidated Action Reporting System (CARS) items being considered.

2.3 Review and Identify, Resolve or Document Issues

Evaluate the selected attributes and develop lines of inquiry and specific questions that are then explored with cognizant Contractor personnel to meet the oversight objectives. This phase will be documented in summary tables as shown in ORP PD 220.1 (draft, as revised January 2006), Attachment 9.4, Appendix A. This effort will include participating in any applicable internal Contractor reviews and discussions. The output from this phase of the oversight will be a completed summary table with Contractor responses to the questions and lines of inquiry, and a list of remaining open issues that need further evaluation by Contractor for resolution.

2.4 Reporting

De-brief ORP and Contractor management periodically as required. Prepare a draft report that summarizes the activities, the results, conclusions, and recommendations of the review. Issue the draft Design Oversight Report for review and comment of ORP management and cognizant Contractor personnel. The final report will resolve comments received on the draft report.

3.0 SCHEDULE OF ACTIVITIES

Table A-2 summarizes the schedule for completion of this oversight.

Table A-2 – Schedule

Activity Description	Responsibility	Complete By
Develop Design Product Oversight Plan	Adams	01/06/06
Identify Team members	Adams/Hamel	01/06/06
Obtain approved plan and advise Contractor of planned oversight, provide Design Process Oversight Plan to identify needed Contractor support, and obtain Point of Contract (POC)	Eschenberg/Hamel	01/19/06
Obtain Contractor documentation defined in Table A-1 to support review and provide to team members	Adams	01/23/06
Qualify Team members – Hanford General Employee Training (HGET)/ Attachment 9.1	Adams	01/23/06AM
Kick-off meeting with Contractor Discipline Engineering Managers to outline objectives, scope, schedule, and establish POCs	Team	01/24/06 PM
Review documents from Contractor and provide oversight strategy, lines of inquiry, and interview requests to Team Lead	Team	01/24/06
Review Contractor documents, participate in relevant Contractor internal meetings, and meet with Contractor as required.	Team	01/24 – 02/01/06
Prepare draft Design Oversight Report notes	Team	02/01/06 COB
ORP and Contractor Exit Briefing	Team and Contractor	02/02/06
Draft Report	Team	02/17/06
Resolve comments and place Final Report into concurrence including factual accuracy review with Contractor	Adams	02/24/06
Approve Final Report	All on Concurrence	03/10/06

4.0 DOCUMENTATION

The final report of this task shall contain the sections and content as summarized in ORP PD 220.1 "Conduct of Design Oversight," draft as revised January, 13, 2006, Attachment 9.4, "Design Oversight Report Outline."

The open issues identified in this oversight shall be listed in the final report. Each open issue shall be assigned an item number and shall be tracked to resolution through the Consolidated Action Reporting System (CARS). These shall also be tracked to

resolution by Contractor through the Correspondence Control Number (CCN) that will be assigned to the transmittal of the report from ORP to the Contractor.

5.0 CLOSURE

The Team Lead with concurrence of the Director shall confirm that the open items from this oversight are adequately resolved.

Task# ORP-WTP-2006-0038

E-STARS™ Report
Task Detail Report
04/05/2006 1016

TASK INFORMATION

Task#	ORP-WTP-2006-0038		
Subject	CONCUR: (06-WED-016) TRANSMITTAL OF U.S. DEPARTMENT OF ENERGY (DOE), OFFICE OF RIVER PROTECTION (ORP) DESIGN OVERSIGHT REPORT: REVIEW OF CONTRACTOR DESIGN CONTROL PROCESS (D-06-DESIGN-022)		
Parent Task#		**Status**	CLOSED
Reference	06-WED-016	**Due**	
Originator	Almaraz, Angela	**Priority**	High
Originator Phone	(509) 376-9025	**Category**	None
Origination Date	03/08/2006 0733	**Generic1**	
Remote Task#		**Generic2**	
Deliverable	None	**Generic3**	
Class	None	**View Permissions**	Normal
Instructions	Hard copy of the correspondence is being routed for concurrence. Once you have reviewed the correspondence, please approve or disapprove via E-STARS and route to the next person on the list. Thank you. bcc: MGR RDG File WTP OFF File J. J. Short, OPA J. E. Adams, WED W. F. Hamel, WED J. R. Eschenberg, WTP		

ROUTING LISTS

1 Route List Inactive

- Adams, Jim E - Review - Concur with comments - 03/15/2006 1428
  Instructions:
- Hamel, William F - Review - Concur - 04/05/2006 1018
  Instructions:
- Short, Jeff J - Review - Concur - 04/05/2006 1017
  Instructions:
- Schepens, Roy J - Review - Concur - 04/04/2006 1522
  Instructions:
- Eschenberg, John R - Approve - Approved - 04/05/2006 1017
  Instructions:

ATTACHMENTS

No Attachments

COLLABORATION

COMMENTS

Task# ORP-WTP-2006-0038

Poster Adams, Jim E (Adams, Jim E) - 03/15/2006 0203

Concur

Report has been contractor factual accuracy reviewed and comments incorporated, the consultants comments have been incorporated, and text editing completed. Ready for management concurrence.

TASK DUE DATE HISTORY

No Due Date History

SUB TASK HISTORY

No Subtasks

-- end of report --

Task# ORP-WTP-2006-0038

E-STARS™ Report
Task Detail Report
03/08/2006 0735

TASK INFORMATION

Task#	ORP-WTP-2006-0038		
Subject	CONCUR: (06-WED-016) TRANSMITTAL OF U.S. DEPARTMENT OF ENERGY (DOE), OFFICE OF RIVER PROTECTION (ORP) DESIGN OVERSIGHT REPORT: REVIEW OF CONTRACTOR DESIGN CONTROL PROCESS (D-06-DESIGN-022)		
Parent Task#		**Status**	Open
Reference	06-WED-016	**Due**	
Originator	Almaraz, Angela	**Priority**	High
Originator Phone	(509) 376-9025	**Category**	None
Origination Date	03/08/2006 0733	**Generic1**	
Remote Task#		**Generic2**	
Deliverable	None	**Generic3**	
Class	None	**View Permissions**	Normal

Instructions Hard copy of the correspondence is being routed for concurrence. Once you have reviewed the correspondence, please approve or disapprove via E-STARS and route to the next person on the list. Thank you.

bcc:
MGR RDG File
WTP OFF File
J. J. Short, OPA
J. E. Adams, WED
W. F. Hamel, WED
J. R. Eschenberg, WTP

Jim - Good Report. Thanks. John

ROUTING LISTS

1 Route List Active

- Adams, Jim E - Review - Awaiting Response 3/8/06 w/comments
  Instructions:
- Hamel, William F - Review - Awaiting Response WFH 3/8/06
  Instructions:
- Short, Jeff J - Review - Awaiting Response 3/15/06 This as written, is not technical direction. COR disclaimer should be included if COR signs.
  Instructions:
- Schepens, Roy J - Review - Awaiting Response 1 cc/14/3/06
  Instructions:
- Eschenberg, John R - Approve - Awaiting Response 3/27
  Instructions: Comments 3/19 JRE

ATTACHMENTS

No Attachments

COLLABORATION

COMMENTS