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

04-ESQ-047

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

Dear Mr. Henschel:

CONTRACT NO. DE-AC27-01RV14136 – SAFETY REQUIREMENTS DOCUMENT (SRD) DESIGN STANDARDS IMPLEMENTATION ASSESSMENT REPORT, A-04-ESQ-RPPWTP-007

This letter forwards the detailed results of the subject assessment report (attachment). The assessment, which was conducted from May 10 through 14, 2004, assessed Bechtel National, Inc. implementation of SRD electrical and mechanical design safety standards. No Findings were identified.

Four Assessment Follow-up Items (AFI) from the November 2003 as low as reasonably achievable Design Assessment were reviewed for closure. Sufficient information was provided to close three of the AFIs (i.e., A-03-OSR-RPPWTP-019-A01, -A03, and -A04). Additional work is required as described in the attached assessment report to close AFI -A02 by your commitment date of July 30, 2004.

If you have any questions, please contact me, or your staff may call Robert C. Barr, Director, Office of Environmental Safety and Quality, (509) 376-7851.

Sincerely,

Roy J. Schepens
Manager

ESQ:JLP

Attachment

cc w/attach:
R. D. Davis, BNI
E. T. Smith, BNI
W. R. Spezialetti, BNI

J. M. Eller, PAC

U.S. DEPARTMENT OF ENERGY
Office of River Protection

ASSESSMENT:	Safety Requirements Document Design Standards Implementation Assessment
REPORT NO.:	A-04-ESQ-RPP-WTP-007
FACILITY:	Bechtel National, Inc.
LOCATION:	2435 Stevens Center Richland, Washington 99352
DATES:	May 10 through 14, 2004
INSPECTORS:	J. Polehn, Lead Assessor, Sr. Regulatory Technical Advisor M. Ramsay, Team Member J. Panchison, Team Member
APPROVED BY:	P. Carier, Verification and Confirmation Official Environmental Safety and Quality Division

Executive Summary

Introduction

From May 10 through 14, 2004, the U.S. Department of Energy, Office of River Protection (ORP), Office of Environmental Safety and Quality assessed the Waste Treatment and Immobilization Plant Contractor's programs for implementation of its Safety Requirements Document (SRD) electrical and mechanical design standards. Civil-structural, mechanical (ventilation), and fire protection were not addressed during this assessment since these areas were extensively addressed in previous assessments. The assessment team utilized Inspection Technical Procedure, I-110, "Safety Requirements Document Design Standards Implementation Assessment" for the electrical and mechanical designs reviewed. The team interviewed Contractor personnel and reviewed documents and records to determine whether the standards were being implemented.

In addition, four Assessment Follow-up Items (AFI) from the November 2003 As Low As Reasonably Achievable (ALARA) Design Assessment were reviewed for closure. The team interviewed Contractor personnel and reviewed documents and records to determine whether the AFIs could be closed.

Significant Issues and Conclusions

For the codes and standards and important-to-safety equipment reviewed, the assessors found the Contractor's programs had implemented the SRD specified electrical and mechanical design standards at the various stages of the design. No deviations to the requirements within the codes and standards were evident of the documents reviewed.

Of the four AFIs, three were closed and one remains open because of insufficient documentation of corrective actions.

- **Safety Design Class (SDC) and/or Safety Design Significant (SDS) Design Standards Implementation for Control, Instrumentation and Electrical Structures, Systems, and Components (SSC)**

  At the time of this inspection, which was early in the design of electrical SSCs, limited documentation was available for evaluation. No deviations to the requirements of the selected codes and standards were evident in the documents reviewed. The Contractor had implemented an effective process for capturing the control, instrumentation and electrical standards and requirements, developing the specifications to address the standards, and ensuring the standards were appropriately implemented by vendors. Interviews with Contractor staff indicated personnel were knowledgeable of the SRD safety criteria, the standards, and the procedures for implementing the standards.

- **SDC and/or SDS Mechanical SSCs Standards Implementation**

  For the sample SSCs selected, the Contractor properly implemented the mechanical design and analysis codes and standards stipulated in the SRD and those requirements were provided to vendors. Based on interviews performed, Contractor personnel had an acceptable understanding of the safety significance of the American National Standards Institute and American Society of Mechanical Engineers implementing codes and standards identified in the SRD Safety Criteria and were knowledgeable of the standards implementation process.

- **Deviations from the SRD Design Requirements**

  Interviews with Contractor engineering and design staff found them knowledgeable of the Contract and SRD implementing codes and standards and the change process. Interviewees were familiar with the process that must be followed if a desired standard was different from the implementing codes and standards identified in the SRD, including daughter standards. Authorization Basis Amendment Requests submitted to ORP since the time of the last SRD Design Standards Implementation Inspection provide documented evidence this process is working.

- **Assessment Follow-up Items**

  Based on review of corrective action implementation, records review and discussion with Contractor staff, the assessors closed assessment follow-up items A-03-OSR-RPPWTP-019-A01, -A03, and -A04. The assessors did not close A-03-OSR-RPPWTP-019-A02, which addressed ALARA design reviews for design products, because the Contractor had only addressed engineering specifications and not items such as design drawings or system descriptions. At the exit, the Contractor committed to corrective action completion by July 30, 2004.

Assessment of Implementation of the Waste Treatment and Immobilization Plant (WTP) Contractor's Programs for Safety Requirements Document (SRD) Design Standards

Assessment Purpose and Scope

During the period of May 10 through 14, 2004, the U.S. Department of Energy (DOE), Office of River Protection (ORP), performed an assessment of implementation of the WTP Contractor's programs for SRD Design Standards. The design areas assessed were limited to electrical and mechanical engineering since extensive assessment of the civil-structural, mechanical heating, ventilation, and air conditioning, and fire protection engineering designs had occurred in previous assessments. The assessment team utilized Inspection Technical Procedure, I-110, "Safety Requirements Document Design Standards Implementation Assessment" for the electrical and mechanical designs reviewed. The team interviewed Contractor personnel and reviewed documents and records to determine whether the standards were being implemented. The team's assessments were documented in Assessment Notes and have been maintained electronically. Copies of the Assessment Notes are available upon request.

In addition, four Assessment Follow-up Items (AFI) from the November 2003 as low as reasonably achievable (ALARA) Design Assessment were reviewed for closure. The team interviewed Contractor personnel and reviewed documents and records to determine whether the AFIs could be closed.

Significant Observations and Conclusions

Overall Conclusions

For the codes and standards and important-to-safety (ITS) equipment reviewed, the assessors found the Contractor's programs implemented the SRD electrical and mechanical design codes and standards. No deviations to the requirements within the codes and standards were evident in any of the documents reviewed.

Based on discussions with the Contractor and document and record reviews, the assessors concluded the Contractor provided adequate documentation to close AFIs A-03-OSR-RPPWTP-019-A01, -A03, and -A04. Documentation of corrective actions taken for AFI -A02 closure sufficient to ensure design products address appropriate ALARA design reviews was insufficient. As a result, the AFI will remain open until the Contractor committed corrective action completion date of July 30, 2004.

Design Standards Implementation for Safety Design Class (SDC) and/or Safety Design Significant (SDS) Control, Instrumentation and Electrical Structures Systems and Components (SSC)

The assessors interviewed personnel and reviewed documentation to determine whether the Contractor was implementing SRD codes and standards for the design of ITS control, instrumentation (C&I) and electrical systems and components. Only a few related ITS engineering specifications and drawings had been issued as numerical revision since the last ORP assessment the week of July 21, 2003. The ITS equipment reviewed included the Programmable Protection System (PPJ), Safety Instrumented Systems (SIS), Instrumentation for Package Systems, electrical power systems, equipment and components, alternating current (AC) instrument and control power systems, devices to shed load, tank/vessel level control and system flow control devices, instruments and alarms for lead acid storage batteries, and equipment displays. Seven SRD cited codes and standards were reviewed against Contractor documentation for the equipment listed above to determine whether the Contractor was implementing the SRD codes and standards. The review of these seven SRD cited codes and standards is described below.

- **Instrument Society of America (ISA) S84.01-96, "Application of Safety Instrumented Systems for the Process Industries"**

  The assessment for this standard primarily focused on ensuring:

  1. Control systems were designed so, once initiated automatically or manually, the intended sequence of protective actions of the executed features would continue to completion in accordance with the standard;

  2. Protective actions were automatically initiated in accordance with the standard;

  3. Process instrumentation field devices that energize to trip discrete input/output (I/O) circuits applied a method (e.g., end-of-line monitor, such as pilot current continuously monitored to ensure continuity; the pilot current is not of sufficient magnitude to affect I/O operations) to ensure circuit integrity in accordance with the standard; and

  4. For process instrumentation, the logic solvers were designed to ensure the process will not automatically restart when power is restored, unless the process hazards analysis indicates this is appropriate in accordance with the standard.

  Review of documentation and discussions with Responsible Engineers (RE) involved with writing the documents found ISA S84 was fully implemented for each of the SIS being defined for the WTP for each of the four criteria listed above from the ISA S84 standard. The documents reviewed listed ISA S84 in each of the "Applicable Documents" section. The Design Guide in particular was a "point-by-point" response to each of the elements in ISA S84. Within the documentation reviewed, the assessors did not identify any deviations

to the requirements of the standard. Each of the specific elements identified above were being implemented per the standard according to the Engineering Specifications (ES).

In regard to the third item above, it was noted, in most instances, field devices will not be energized to trip, but will be designed to trip to the de-energized safe state. This control philosophy was defined in the ES for Instrumentation for Package Systems.

- **IEEE 308-1991, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations"**

  The assessment for this standard primarily focused on ensuring:

  1. Electric power was supplied by two independent divisions of onsite power as required by the standard; and

  2. AC instrument and control power systems (ICPS ac) had sufficient energy to start and operate all required loads connected to the distribution system for each ICPS ac as required by the standard.

  The main single-line diagram showed the interface between onsite power for the WTP and offsite power. The scheme indicated two independent divisions of onsite power, redundant emergency diesel generators, and distribution equipment. The diagram revealed a configuration generally consistent with the Institute of Electrical and Electronics Engineers, Inc. (IEEE) 308 in regard to independence, redundancy, and testability of the sources.

  The ITS design documentation had not yet progressed to a level where a more detailed assessment could be made. However, a brief review of preliminary documents indicated the Contractor was implementing the standard. For example, the "Engineering Specification for 4.16kV Switchgear (ITS)," 24590-WTP-3PS-ESM2-T0001, Revision B, which had been issued for bidding purposes, included IEEE 308 in the list of industry standards subject to the statement: "Switchgear assemblies shall be designed, manufactured and tested in accordance with the applicable sections of the latest edition at time of contract award of the following standards…" Because the phrase "of the latest edition" could result in non-compliance with the SRD, the assessors reviewed the Contractor's standards process further. The assessors determined the Contractor's process assured consistency with the SRD's edition of the cited standard because when the vendor contract is awarded, the ES would be at Revision 0. For the ES to reach Revision 0, the Contractor's process validated the ES cited standards be consistent with the SRD cited standard revision. The Electrical Design Criteria and Guide was also specific to IEEE 308 requirements. In addition, the guide indicated, from its description of the SDC Uninterruptible Power Supply Distribution System Equipment, that SDC and SDS ICPS ac will have sufficient energy to start and operate all required loads connected to the distribution system.

  Review of documentation and discussions with Contractor personnel found the SRD codes and standards were implemented for the two criteria listed from the IEEE 308 standard.

- **IEEE 323-1983, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations"**

  The assessment of this standard primarily focused on ensuring:

  1. For electric equipment and components (motors, transformers, switchgear, relays, breakers, etc.), a qualification program was required in accordance with the standard.

  Due to the preliminary state of the electrical engineering and design, the ES for Low Voltage Adjustable Speed Drives (ASD), was the only document (Revision 0 or 1) directly related to the electric equipment mentioned above. IEEE 323 was referenced in the "Applicable Documents" section in conjunction with the statement, "…the following nuclear standards shall apply to ASDs as classified as important-to-safety and quality level designated as QL-1 or QL-2." This statement also included other standards considered in this evaluation, for example, IEEE 384, IEEE 1023, and ISA-S84.01.

  The ES for Environmental Qualification of Control and Electrical Systems and Components was entirely based on the requirements of IEEE 323 and the assessors found no deviations from the standard. A brief look at Revision 0 or 1 (QL) specifications in the C&I area, also found IEEE 323 was implemented "to the extent designated" in each document reviewed.

- **IEEE 379-1994, "IEEE Standard Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems" and IEEE 384-1992, "IEEE Standard Criteria for Independence of Class 1E Equipment and Circuits"**

  The assessment of these two standards focused mainly on ensuring:

  1. Sensing lines for level-control systems met the single-failure requirements of the standard;

  2. Electrical supply systems had redundancy and/or diversity, as necessary, to meet the single failure criteria of the standard;

  3. Devices required to shed load were assigned the appropriate safety class and met the single-failure criteria of the standard;

  4. Tank/vessel level control and system flow control devices, which require single-failure protection, met the separation criteria in the standard; and

  5. Electrical supply systems (standby power diesel generator, direct current power, alternating current instrument and control power), including electrical circuits, were independent as required by the standard.

Due to the preliminary state of the electrical engineering and design, these elements could not be evaluated in detail. However, based mainly on two documents[1,2], it was evident IEEE 379 and IEEE 384 were being implemented particularly in regard to redundancy and independence. No deviations to the standards requirements were discovered.

- **IEEE 484-1996, "IEEE Recommended Practice for Installation Design and Installation of Vented Lead-Acid Batteries for Stationary Applications"**

  The assessment of this standard focused primarily on ensuring:

  1. Instruments and alarms were stipulated for lead acid storage batteries as required by the standard.

  Due again to the preliminary status of engineering and design, especially related to the ITS 125 volt Direct Current (DC) system, which contains the batteries, the element above could not be fully assessed. However, "Engineering Specification for 125V DC system (ITS)," 24590-WTP-3PS-ED00-T0001, Revision A, was reviewed. The assessors noted IEEE 484 was not referenced in the document. The RE was interviewed, recognized this fact and indicated a change regarding implementing IEEE 484 was underway and the issue would be resolved prior to the Revision 0 issuance of the ES.

- **IEEE 1023-1988, "IEEE Guide for the Application of Human Factors Engineering to Systems, Equipment, and Facilities of Nuclear Power Generating Stations"**

  The assessment of this standard focused mainly on ensuring:

  1. The design of parameters and displays included concepts such as visibility, readability or legibility, ability to access information, the meaningfulness of the display format (i.e., understanding without interpretation), and the precision to which the output can be read in accordance with the standard.

  The System Description (SD) for the PPJ references IEEE 1023, but the ES did not. Interviews with two REs recognized the discrepancy and indicated initially (when the SD was first written) it was thought IEEE 1023 might have applicability to the PPJ. Subsequently, it was determined, because the standard was such a high-level document, it actually did not have applicability to the PPJ. The PPJ is the logic solving element in the WTP SISs and is essentially a programmable logic controller that carries out its safety functions independent from operator involvement or action. Hence, IEEE 1023 was not called out in the PPJ ES because it was not specific enough for requirements connected with the computer equipment or the related annunciator panels in the ES. The C&I Engineering Manager also confirmed this and stated the high-level non-specific content of IEEE 1023 was clearly applicable to the WTP Contractor rather than equipment vendors. Moreover, if

[1] "Overall Facilities Main Single Line Diagram," 24590-WTP-DC-E-01-001, Revision 2.
[2] "Electrical Design Criteria and Guide," 24590-WTP-DC-E-01-001, Revision 1.

IEEE 1023 was levied on the PPJ vendor it would only add cost without an appreciable safety benefit to the project.

The Contractor, in its implementation of the standard, determined which elements were applicable to a given vendor(s) and then added specificity to the ES. In the case of the PPJ specification, the following requirement was an example of specificity with regard to human factors. "Annunciator window size shall be dual point type, legible from 6 feet away. Minimum character height shall be no less than 0.288 inches." In other documents, the requirements of IEEE 1023 were provided to vendors in a more generic fashion. For example in Section 3.4.2 of "Engineering Specification for Low Voltage Adjustable Speed Drives," the statement was made: "The control and instrumentation requirements of the ASDs shall be designed in accordance with the applicable sections of ISA S84.01, IEEE 338, IEEE 344, and IEEE 1023."

As a result of review of this information, the assessors determined the Contractor was adequately implementing IEEE 1023.

Based on the limited documentation evaluated, the assessors concluded the Contractor was implementing the SRD electrical safety standards and no deviations to the requirements within the standards were evident in any of the documents reviewed. The Contractor had a well defined process for capturing the standards and requirements, developing the specifications to address the standards, and ensuring the standards were appropriately implemented at the vendor or subcontractor level. Interviews with Contractor staff indicated personnel were knowledgeable of the safety criteria and the standards, and of the procedures for implementing the standards. (Assessment Notes 007-01.)

SDC and/or SDS Mechanical SSCs Standards Implementation

The intent of this part of the assessment was to verify, by interviewing Contractor personnel and reviewing selected design documents, the Contractor was implementing mechanical design codes and standards for ITS piping and components, such as tanks, valves, pumps, and heat exchangers, as specified in the SRD.

The verification was to ensure:

1. Designated piping materials complied with Chapter VIII, Part 7, of the American Society of Mechanical Engineers (ASME) B31.3-96, Process Piping Code, Category M;

2. Seismic design criteria stipulated for piping systems addressed criteria for earthquakes and other loading factors as required by DOE-STD-1020-94[3];

[3] "Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities," DOE-STD-1020-94, April 1994.

3. Pressure vessels, heat exchangers, and the pressure-retaining parts of pumps and valves were designed in accordance with the ASME Boiler and Pressure Vessel (B&PV) Section VIII; and

4. Corrosion evaluations were prepared to document the review process in determining types of materials and minimum corrosion allowances that should be used in the design of process vessels and piping consistent with SRD and its Appendix H Ad Hoc Implementing Standard for Erosion/Corrosion.

The Contractor's process to assure SRD standards implementation was found, in part, in procedures 24590-WTP-3DP-G04B-00037, "Engineering Calculations," Revision 5, dated November 14, 2003, and 24590-WTP-3DP-G04B-00049, "Engineering Specifications," Revision 6, dated September 22, 2003. These procedures both stated specifications and calculations supporting the design of important-to-safety SSCs must implement the applicable codes and standards identified in the SRD. In addition, these SRD implementing codes and standards directly referenced specific editions of "daughter" codes and standards that also must be implemented. The assessors reviewed the above listed codes and standards for the following specific ITS equipment: Cesium Ion Exchange Columns (CIX), Vessel Connections, Acidic Waste Vessel, High-Level Waste (HLW) Feed Blending Vessel, HLW Melters, and Piping. The review is described below for the standards utilized.

- **ASME Section VIII "Boiler and Pressure Vessel Codes" and "Rules for Construction of Pressure Vessels," and SRD Appendix H Ad Hoc Standard**

  The assessors reviewed the engineering specification for the "Cesium Ion Exchange (CIX) Columns," 24590-PTF-3PS-MWDO-T0005, Revision 0, which appropriately invoked ASME Section VIII as the code governing design consistent with SRD requirements to retain their hazardous inventory. The assessors further reviewed the Material Requisition Package (MR) that included excerpts of specification 24590-WTP-DC-ST-01-001, "Structural Design Criteria" and correctly invoked American National Standards Institute (ANSI)/American Institute of Steel Construction (AISC) N690, "Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities" as tailored by Appendix C of the SRD. Mechanical Data Sheets (MDS) for the CIX Columns were found in a Supplement to the MR, reviewed by the assessors and found consistent with standards and materials requirements. Corrosion Evaluation 24590-PTF-N1D-CXP-00002, Revision 1, recommended a Type 316 Stainless Steel material with maximum carbon content of 0.030% and a corrosion allowance of .04 inch all of which were appropriately found on the MDS made part of the MR package. Additionally the Corrosion Evaluation met the requirements of SRD Appendix H Ad Hoc Standard for Erosion/Corrosion. Another specification referenced by the MR and reviewed by the assessors was 24590-WTP-3PS-G000-T0002, "Specification for Positive Material Identification," the purpose of which was to assure the column material was correctly supplied. The content of this specification was consistent with SRD and project requirements.

The assessors also reviewed drawings which were a part of the MR package and found them consistent with standards requirements.

- **ASME Section VIII "Boiler and Pressure Vessel Codes" and "Rules for Construction of Pressure Vessels," and "Seismic Design Criteria"**

  The assessors randomly chose Acidic Waste Vessel RLD-VSL-00007 and HLW Feed Blending Vessel HLP-VSL-00028 for review. Engineering Specification 24590-WTP-3PS-MV00-T0001, "Pressure Vessel Design and Fabrication" that covered the design of these vessels was reviewed and the assessors found it appropriately invoked ASME Section VIII consistent with SRD requirements to retain their hazardous inventory. Corrosion Evaluations 24590-HLW-N1D-RLD-00001 covering the RLD-VSL-00007 vessel and 24590-PTF-N1D-HLP-00010 addressing the HLP-VSL-00028 vessel were reviewed. The results of the corrosion allowances indicated for both vessels, Type 316 Stainless Steel material with maximum carbon content of 0.030% and a corrosion allowance of .04 inch was required. These specifications were found on the MDS contained in MRs 24590-QL-MRB-MVAD-00001 and 24590-QL-MRG-MVA0-00002, respectively. Specification 24590-WTP-3PS-MV00-T0002, "Seismic Qualification Criteria for Pressure Vessels" was incorporated in the MRs. This specification correctly invoked ASME Section VIII consistent with SRD requirements for the equipment to retain their hazardous inventory and also referenced specification 24590-WTP-3PS-SS90-T0001, "Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks." This specification was reviewed and found to correctly specify Design Basis Events ground motion at the WTP site as 0.26g horizontal and 0.18g vertical corresponding to SRD SC 4.1-3 requirements. Also the specification appropriately referenced standard IEEE 344-1987, "Recommended Practice for Seismic Qualification of Class 1E Equipment," and standard American Society of Civil Engineers 4-98, "Seismic Analysis of Safety Related Nuclear Structures and Commentary."

  The assessors also reviewed drawings which were a part of the MR package and found them consistent with standards requirements.

- **ASME B31.3-96 "Chemical Plant and Petroleum Refinery Piping," ASME Section VIII "Boiler and Pressure Vessel" and "Seismic Design Criteria," and SRD Appendix H Ad Hoc Implementing Standard for Erosion/Corrosion**

  The assessors also chose the HLW Melters for review for SRD standards compliance. Performance Specification 24590-HLW-3PS-AE00-T0001 covering the melters was reviewed. ASME B31.3, "Chemical Plant and Petroleum Refinery Piping," and ASME Section VIII, "Boiler and Pressure Vessel" code were appropriately referenced consistent with SRD requirements for the equipment to retain their hazardous inventory. The specification also referenced document 24590-WTP-DC-ST-01-001, Revision 0, "Structural Design Criteria." The assessors verified this document correctly invoked ANSI/AISC N690, "Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities" as tailored by Appendix C of the SRD and was consistent with the SRD requirements to be able to withstand the effects of Natural Phenomena Hazards. The

melter designer Duratek submitted calculation CAL-WTP-21007, "HLW Melter Seismic Qualification," which correctly identified ANSI/AISC N690 as the appropriate acceptance criteria.

The assessors additionally requested the Contractor to provide the Corrosion Evaluation for the HLW Melters. The Contractor stated a corrosion evaluation was not performed since Duratek had design responsibility for the Melters. The corrosion requirements specific to the melters were identified in the Basis of Design (BOD), 24590-WTP-DB-01-001, Section 15. Section 15.3.1 of the BOD, General Functional Requirements, specified each melter have a minimum five-year design life, and materials of construction able to withstand the corrosive environment caused by the melter feed, glass, and off-gases. Section 3.2.A.2 of the Melter Performance Specification, Design Life, included the melter minimum five-year design life requirement. Section 3.4.H.2, Material Requirements, required materials selected be able to withstand the corrosive environment caused by the melter feed, glass, and off-gases for lifetimes given in Section 3.2.A.2. The Duratek Contract No. 24590-101-TSA-W000-0010, Scope of Work, required Duratek to submit a Melter Materials Selection Report to meet the cited requirements. Duratek's "HLW Melter Materials Selection Report," 24590-101-TSA-W000-0010-418-01, (REP-WTP-21003) was reviewed by the assessors. Its scope included documentation of the design environments within the HLW melter and the materials selected for melter components based on those environments, and included a comprehensive corrosion evaluation. The assessors found the report met the requirements of SRD SC 4.2-2, 4.2-3, and Appendix H Ad Hoc Implementing Standard for Erosion/Corrosion.

- **ASME B31.3-96 "Chemical Plant and Petroleum Refinery Piping"**

  The assessors additionally randomly selected piping stress analysis calculations for review. This review was performed to follow-up on previous assessment findings related to inappropriate reference to ASME III code requirements rather than ASME B31.3 required by the SRD for equipment to retain their hazardous inventory. Calculations 24590-PTF-P6C-FRP-00029 and 00032 were reviewed and found to correctly invoke ASME B31.3 consistent with SRD requirements. Discussions with the Contractor revealed all other related calculations affected by the previous finding had been revised consistent with SRD requirements.

The assessors concluded for the sample SSCs selected, the Contractor had properly implemented the mechanical design and analysis codes and standards stipulated in the SRD. Based on interviews performed, the assessors concluded Contractor personnel had a good understanding of the safety significance of the ANSI and ASME implementing codes and standards identified in the SRD Safety Criteria and were knowledgeable of the process. (Assessment Notes 007-02.)

Deviations from the SRD Design Requirements

The assessors determined during interviews the Contractor engineering and design personnel and supervision were knowledgeable of the Contract and Authorization Basis requirements. Interviewees were familiar with the process that must be followed if a desired standard was

different from the implementing codes and standards, including daughter standards, identified in the SRD. Evidence this process was working was reflected in Authorization Basis Amendment Requests 24590-WTP-SE-ENS-03-005, "Deletion of Train C," and 24590-WTP-SE-ENS-03-308, "Modification of Cesium Ion Exchange Process," submitted to the ORP since the time of the last SRD Design Standards Implementation Inspection the week of July 21, 2003.

Based on the above information, the assessors concluded Contractor personnel were knowledgeable of Contract design requirements and SRD implementing codes and standards and the process required to change them. Documentation demonstrated the codes and standards were properly implemented and deviations were appropriately documented and processed. (Assessment Notes 007-03.)

(Closed) Assessment Follow-up Item A-03-OSR-RPPWTP-019-A01

During the November 2003 ALARA Design Assessment, the assessors found the Contractor had not documented changes to the Radiation Protection Program (RPP)[4] cited formal plans and measures for achieving compliance with 10 CFR 835. Specifically, the Contractor had not documented an evaluation of whether changes to the RPP cited RPP-WTP Occupational ALARA Program reduced the effectiveness of the RPP.

The Contractor believed no documentation of the evaluation of RPP reduction in effectiveness was warranted, the Contractor changes to the RPP cited document were administrative and did not reduce the effectiveness of the RPP, and the Contractor's signature alone on the Program document sufficient to document an evaluation had been performed and the changes to the RPP cited program document did not reduce the effectiveness of the RPP. The Contractor's corrective action was to change the RPP-WTP Occupational ALARA Program Executive Summary to document only the results of the reduction in effectiveness evaluation. Specifically, the Program document was changed in Revision 2 to indicate changes had been analyzed for reduction in effectiveness and the approval signature on the Program document certified the RPP's effectiveness had not been reduced. No documentation of the analysis of the individual changes to the Program document was developed or retained.

RPP "Requirement 18" cited guidance DOE G 441.1-1[5] stated "Documentation of the rationale applied to RPP changes implemented without prior DOE approval <u>should</u> be retained for future reference and demonstration of compliance." [Emphasis added.] Discussions with DOE[6,7] Headquarters also indicated the expectation of documentation of the rationale. However, DOE 10 CFR 835 requirements and its above cited implementing guidance did not provide specific detail as to required content of rationale documentation (i.e., did not identify the analysis/content

[4] "Radiation Protection Program for Design and Construction," 24590-WTP-RPP-ESH-01-001, Revision 0, dated December 11, 2001.
[5] "Management and Administration of Radiation Protection Programs Guide for use with Title 10, Code of Federal Regulations, Part 835, Occupational Radiation Protection," G 441.1-1, Section 4 Implementation Guidance, Paragraph 4, March 17, 1999.
[6] Phone conversation with Joel Rabovsky, EH-52, on May 19, 2004.
[7] Phone conversation with Tony Weadock, EH-6, on May 20, 2004.

itself as required documentation). As a result of lack in specificity of DOE requirements and guidance, the Contractor met the requirements of 10 CFR 835 and this AFI is closed. (Assessment Notes 007-04.)

(Open) Assessment Follow-up Item A-03-OSR-RPPWTP-019-A02

During the November 2003 ALARA Design Assessment, the assessors found the Contractor had not cited the appropriate ALARA Design Review Record (ADR) on HLW concentrate receipt vessel drawings for material requisitions. As a result, the assessors issued an AFI for the Contractor to take actions to ensure ADRs cited on design products are appropriate for that intended use. Subsequently, the assessors reviewed documents provided for AFI closure and discussed them with Contractor personnel to determine whether the evidence was adequate for AFI closure.

The assessors found the Contractor had taken insufficient action to ensure ADRs cited on design products were appropriate for that intended use. Specifically, a determination of the extent of the condition for whether inappropriate ALARA Design Review Records were cited on design products had not been performed for all of the design products. While the Contractor had evaluated engineering specifications, documentation was not provided to demonstrate it had adequately evaluated drawings and system descriptions to determine the extent of condition and determine appropriate corrective action(s). The Contractor acknowledged this but indicated it had vertical slice management assessments ongoing to identify and correct the issue. For example, a recently issued management assessment report[8] reviewed fourteen system descriptions, engineering specifications, and drawings to determine whether the ADRs were appropriately referenced. No deficiencies were identified. However, the Contractor stated a recent preliminary Low Activity Waste (LAW)/Lab assessment identified a problem between the LAW Concentrate Receipt Vessel drawing design product and the cited ADR. As a result of our AFI and the Contractor's preliminary assessment, the Contractor issued a Corrective Action Report (CAR), 24590-WTP-CAR-QA-04-072, to address and correct the condition by July 30, 2004. As a result, this AFI will remain open. (Assessment Notes 007-04.)

(Closed) Assessment Follow-up Item A-03-OSR-RPPWTP-019-A03

During the November 2003 ALARA Design Assessment, the assessors asked whether design changes like the change in height of the HLW building had been evaluated to demonstrate whether fugitive or operational emissions complied with the occupational ALARA design goals. At the time of the assessment, the Contractor was unable to provide the documented evaluation so the assessors identified the item as an AFI. The Contractor subsequently provided documentation and the assessors reviewed it to determine whether the AFI could be closed.

The assessors discussed the document with Radiological Operations Lead. From the discussion and the document review, the assessors found the Contractor's evaluation adequately demonstrated compliance with the occupational ALARA design goals. The evaluation, and

[8] "Lab Facility Self-Assessment," 24590-WTP-MAR-ENG-04-002, Revision 1, dated April 28, 2004.

associated conservative assumptions, adequately demonstrated the dose to the worker would be ALARA (i.e., well below the 100 mrem/year limit at which monitoring is required for an individual). Based on this information, the assessors closed the AFI. (Assessment Notes 007-04.)

(Closed) Assessment Follow-up Item A-03-OSR-RPPWTP-019-A04

The assessors found during the November 2003 ALARA Design Assessment, the Contractor had not considered specific ALARA design criteria for heat exchangers for HLW vessels, HLP-VSL-00022 and 00027A/B. The Contractor provided documentation and the assessors reviewed it and discussed it with Contractor personnel to determine whether the evidence was adequate for closure of the AFI.

Based on discussions with Contractor staff and review of the documentation, the assessors found evidence the heat exchanger ALARA criteria had been updated in the ADR and the ALARA criteria for heat exchangers appropriately considered. As a result, the assessors closed the AFI. (Assessment Notes 007-04.)

List of Assessment Items Opened, Closed, and Discussed

Opened

None.

Closed

A-03-OSR-RPPWTP-019-A01	Follow-up	Determine if the Contractor has established a process in accordance with the Quality Assurance Manual to document the rationale applied to Radiation Protection Program changes implemented without prior DOE approval. See Inspection Note Number: A-03-OSR-RPPWTP-19-05.
A-03-OSR-RPPWTP-019-A03	Follow-up	Determine if WTP emissions need to be considered in demonstrating compliance with the occupational ALARA goals. See Inspection Note Number: A-03-OSR-RPPWTP-19-05.
A-03-OSR-RPPWTP-019-A04	Follow-up	Determine if the revised ADR for HLW Lag Storage and Feed Blending System vessels 00022, 00027A/B, and 00028 considered the heat exchanger criteria from "Application of ALARA in the Design

		Process." See Inspection Note Number: A-03-OSR-RPPWTP-19-05.

Discussed

A-03-OSR-RPPWTP-019-A02	Follow-up	Determine if the Contractor has taken action to ensure ADRs referenced on design products are appropriate for their intended use. See Inspection Note Number: A-03-OSR-RPPWTP-19-05.