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

01-OSR-0481

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

Dear Mr. Naventi:

CONTRACT NO. DE-AC-01RV14136 – INSPECTION REPORT IR-01-013 - SAFETY REQUIREMENTS DOCUMENT (SRD) DESIGN STANDARDS IMPLEMENTATION

This letter forwards the results of the Office of Safety Regulation inspection of the Bechtel National, Inc. (BNI) SRD design standards implementation process, which was conducted from October 29 – November 2, 2001. The inspectors identified no Findings.

The inspection team determined, through interviews and reviews of technical specifications, calculations, and related documentation, BNI had developed a process that has the capability to incorporate the safety standards stipulated in the SRD in the design of the Waste Treatment Plant. However, at the time of this inspection, there was insufficient approved design output documentation for the inspectors to completely evaluate the implementation of this process. Most work reviewed by the inspectors was "in process," resulting in a limited review of the SRD design standards implementation process.

If you have any questions regarding this inspection, please contact me or Pat Carier of my staff on (509) 376-3574. Nothing in this letter should be construed as changing the Contract, DE-AC27-01-RV14136. If in my capacity as the Safety Regulation Official, I provide any direction that your company believes exceeds my authority or constitutes a change to the Contract; you will immediately notify the Contracting Officer and request clarification prior to complying with the direction.

Sincerely,

Robert C. Barr
Safety Regulation Official
Office of Safety Regulation

OSR:RWG

Enclosure

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

Enclosure 1
01-OSR-0481

U. S. DEPARTMENT OF ENERGY
Office of River Protection
Office of Safety Regulation

INSPECTION:	SAFETY REQUIREMENTS DOCUMENT DESIGN STANDARDS IMPLEMENTATION
REPORT NO.:	IR-01-013
FACILITY:	Bechtel National, Inc. (BNI)
LOCATION:	3000 George Washington Way Richland, Washington 99352
DATES:	October 29 – November 2, 2001
INSPECTORS:	R. Griffith (Lead), Senior Regulatory Technical Advisor R. Smoter, OSR Consultant R. DeFayette, OSR Consultant V. Ferrarini, OSR Consultant
APPROVED BY:	P. Carier, Verification and Confirmation Official Office of Safety Regulation

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EXECUTIVE SUMMARY
SRD Design Standards Implementation
Inspection Report Number IR-01-013

INTRODUCTION

This inspection of the Bechtel National, Inc. (the Contractor) Safety Requirements Document (SRD) design standards implementation process covered the following specific areas:

- Implementation of SRD Civil-Structural Design Standards (Section 1.3)
- Implementation of SRD Mechanical Design Standards (Section 1.4)
- Implementation of SRD Control, Electrical, and Instrumentation Design Standards (Section 1.5)
- Implementation of SRD Mechanical (Ventilation) Design Standards (Section 1.6)
- Implementation of SRD Fire Protection Design Standards (Section 1.7)
- Deviations from the Implementation of SRD Design Standards (Section 1.8)

SIGNIFICANT OBSERVATION AND CONCLUSIONS

- Although tailoring of implementing standards will be required before the designs of steel structures and reinforced concrete structures can be approved by the Office of Safety Regulation (OSR), the Contractor was adequately incorporating the load combination requirements from these standards into the facility design. The use of equivalent static analysis for the design of high level waste (HLW) structures was acceptable for this stage of the design, but should be supplemented with appropriate soil-structural interaction analysis before the HLW structural design can be approved by OSR. The inspectors also confirmed use of proper seismic loadings and damping factors in the facility design. The inspectors identified a noteworthy practice in that the Contractor was applying the conservative material requirements of American Concrete Institute (ACI) standard 349 for all reinforcing steel on the project to prevent the possibility of improper installation of ACI standard 318 steel in applications requiring the ACI 349 steel. (Section 1.3)

- BNI's mechanical design staff was knowledgeable of contract design requirements, SRD safety criteria and implementing codes and standards, and the process for revising authorization basis documents. In addition, BNI's procedures were comprehensive and, if implemented properly, were adequate to assure implementation of requirements from the mechanical design codes and standards identified in the SRD. (Section 1.4)

- There was insufficient electrical design information available to establish conclusions regarding conformance with relevant electrical or instrumentation and control (I&C) standards identified in the SRD. However, based on interviews of Contractor electrical design engineering management and review of preliminary facility one-line electrical drawings and electrical load lists, the evolving electrical system design conformed to relevant standards identified in the SRD. (Section 1.5)

- Contractor managers were knowledgeable of SRD safety criteria and implementing codes and standards for the design and construction of Waste Treatment Plant (WTP) heating, ventilation, and air conditioning (HVAC) structures, systems, and components (SSC). The inspectors found design codes that had been implemented did not fully conform to those specified in the SRD; however, the Contractor indicated its intention to revise the SRD prior to or in conjunction with the appropriate standards confirmation activity. The HVAC design and construction codes implemented by the Contractor to date were consistent with SRD safety criteria. However, the lack of available design documentation, including drawings and specifications, limited the inspectors' ability to independently confirm the adequacy of implementation of code and standard in the ongoing design effort. (Section 1.6)

- Contractor personnel were knowledgeable of SRD safety criteria and implementing codes and standards requirements for the design and construction of WTP fire protection SSCs. Although the design of fire protection SSCs was, in most cases, preliminary at the time of the inspection, the fire protection design and construction codes implemented by the Contractor were consistent with SRD, Section 4.5 implementing codes and standards. However, the lack of available design documentation, including drawings and specifications, limited the inspectors' ability to independently confirm the adequacy of implementation of code and standards requirements in the ongoing design effort. (Section 1.7)

- No deviations to SRD implementing codes and standards were identified during the inspection. (Section 1.8)

SRD DESIGN STANDARDS IMPLEMENTATION INSPECTION, IR-01-013

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SRD DESIGN STANDARDS IMPLEMENTATION INSPECTION REPORT

1.0 REPORT DETAILS

1.1 Introduction

Standard 7, "Environment, Safety, Quality, and Health," Table S7-1, "Radiological, Nuclear, and Process Safety Deliverables," of the Contract, DE-AC27-01RV14136, dated December 11, 2000, between Bechtel National, Inc. (the Contractor) and the U.S. Department of Energy (DOE), requires the Contractor to submit a final Safety Requirements Document (SRD) as part of the River Protection Project Waste Treatment Plant (RPP-WTP) conceptual design and supporting documentation. As described in Standard 7, Section d, the SRD is the set of environment, safety, quality, and health (ESQ&H) tailored requirements as referenced in Section I Clause entitled, "Laws, Regulations, and DOE Directives." These requirements include both the safety criteria and implementing codes and standards specified in Volume II of the SRD. The objectives of this inspection were to assess the adequacy of the Contractor's implementation of the SRD implementing codes and standards into the RPP-WTP design and the Contractor's process for dispositioning deviations from these codes and standards.

1.2 Contractor Implementation of Criticality-Related Design Requirements

The Office of Safety Regulation (OSR) Inspection Technical Procedure (ITP) I-110 includes requirements to verify that SRD standards, selected to prevent nuclear criticality, were applied to the design of the facility. These requirements were not included within the scope of this inspection. The reason for this reduction in scope is that, at the time of the inspection, the OSR was in the process of reviewing the Contractor's Criticality Safety Evaluation Report (CSER) No. 24590-WTP-RPT-NS-01-001, "Criticality Safety Evaluation Report for the RPP-WTP." This CSER provided, among other things, the results of calculations showing that RPP-WTP processes will remain subcritical based on the low concentration of plutonium in the liquid phase and the low plutonium loading in the solids. The CSER made the case that the only designed engineered safety system required to address nuclear criticality was the sampling system for the Pretreatment waste receipt vessels. These samples will be required in the Administrative Controls section of the Technical Safety Requirements (TSRs), which have not yet been prepared. The CSER also provided justification for not including either a criticality alarm or criticality detection system in the design of the RPP-WTP. Thus, the CSER submittal addressed the applicability of the five SRD safety criteria addressed in ITP I-110 to the RPP-WTP design. Based on the ongoing OSR review of the CSER and little or no expectation that any implementation of the SRD criticality-related Safety Criteria existed in the RPP-WTP design, Sections 5.2 and 6.2 of ITP I-110 were not assessed during this inspection.

1.3 Implementation of SRD Civil-Structural Design Standards (Inspection Technical Procedure I-110)

This part of the inspection was to verify the Contractor's implementation of the structural design codes and standards stipulated in Safety Criterion 4.1-2 of the SRD. Those codes and standards included American Concrete Institute (ACI) Standard 349-97, "Code Requirements for Nuclear Safety-Related Concrete Structures," American Society of Civil Engineers (ASCE) Standard 4-98, "Seismic Analysis of Safety-Related Nuclear Structures and Commentary," and American National Standards Institute/American Institute of Steel Construction (ANSI/AISC) Standard N690-94, "Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities." At the time of the inspection, the project's civil-structural design was more advanced than the rest of the engineering disciplines. However, only two approved drawings were available for review. These were the foundation excavation drawings for the high level waste (HLW) and low activity waste (LAW) buildings. The inspectors assessed four in-process calculations that were available for review. These calculations provided significant insight into the implementation of SRD design standards.

1.3.1 Inspection Scope

The inspectors reviewed calculations, procedures, and criteria relating to the civil-structural design and analysis of RPP-WTP structures to assess the adequacy of the Contractor's implementation of the design standards identified in SRD Volume II, Chapter 4.0, "Engineering and Design."

1.3.2 Observations and Assessments

The inspectors reviewed Contractor document 24590-WTP-DC-ST-01-001, "Structural Design Criteria," Rev. 0, dated October 18, 2001. This document provided the minimum structural design criteria and proper loadings for the structural design and analysis of RPP–WTP facilities. The document included considerations for dead, live, snow, wind, and earthquake loads, in addition to other applicable loads. The inspectors verified that the proper loadings were obtained from applicable codes and standards. As an example, the inspectors concluded that the snow loads and dead loads were properly obtained from ASCE 7-95, "Minimum Design Loads for Buildings and Other Structures," in accordance with SRD Safety Criterion (SC) 4.1-2.

For the design of Seismic Category I (SC-I) structures, the Contractor's Structural Design Criteria document contained a very prescriptive set of load factors and load combinations that needed to be considered during structural design and analysis. Section 5.4.1 of the document contained the design load requirements for reinforced concrete structures and Section 5.4.2 contained requirements for structural steel. For reinforced concrete, the basis for the load combinations was ACI 349. The basis for structural steel load combinations was ANSI/AISC N690. Both standards included requirements for operating basis earthquake (OBE) loading in the load combinations. However, the Contractor's Structural Design Criteria did not contain a load combination that included the OBE. The inspectors also reviewed Contractor document

24590-WTP-RPT-ST-01-002, "Seismic Analysis and Design Approach," Rev. 2, dated August 15, 2001. This document contained loading combinations for seismic design and analysis for steel and concrete structures. The load combinations referenced standards ACI 349 and ANSI/AISC N690, but also contained no OBE earthquake loadings in the load combinations. The inspectors found no evidence that the Contractor had documented its intent to tailor the requirements of ACI 349 and ANSI/AISC N690 or was processing an authorization basis change notice (ABCN). During further discussions with Contractor management, the Contractor indicated its intention to ensure that appropriate tailoring of SRD codes and standards was completed prior to or during the standards confirmation process for the submittal of future Contract deliverables to the OSR. The Contractor planned to submit any ABCNs required from the tailoring process with future Contract deliverables or with an SRD revision request. This process was considered acceptable and no deficiencies were identified.

The inspectors reviewed Contractor specification 24590-WTP-3PS-DG00-T0001, "Furnishing of Reinforcing Steel," Rev. 0, dated October 5, 2001. The specification was applicable for fabrication of reinforcing steel in accordance with standards ACI 349 and ACI 318-99, "Building Code Requirements for Structural Concrete." The specification delineated the technical requirements for furnishing, detailing, fabricating, and delivering reinforcing steel. The Contractor had designated the reinforcing steel as Quality Level (QL)-1 and was planning to purchase the steel to the more demanding requirements of ACI 349. This was being done to ensure that the reinforcing steel would meet the minimum requirements of both ACI 349 and ACI 318. The specification essentially allowed only one type of reinforcing steel to be used at the site; thus, eliminating the potential for using unqualified steel for important-to-safety concrete structures. The inspectors considered this to be a noteworthy practice.

The inspectors reviewed Contractor specification 24590-WTP-3PS-DB01-T001, "Furnishing and Delivering Ready-Mix Concrete," Rev. 0, dated August 17, 2001. This specification delineated the technical requirements for furnishing and delivering Portland cement concrete, grout, and flowable fill. The inspectors concluded this specification was adequate to ensure that concrete supplied for facility structures would meet both QL-1 and ACI 349 requirements.

The inspectors reviewed Contractor calculations 24590-HLW-S0C-S15T-00011, "Structural Analysis of HLW Building – In Support of LCAR," Rev. 0, dated August 28, 2001, and 24590-HLW-S0C-S15T-00012, "CS&A Wind, Snow, and Ashfall Loadings on HLW Structure for Determination of Basemat Thickness – In Support of LCAR," Rev. 0, dated August 29, 2001. These calculations provided the analytical basis for the Limited Construction Authorization Request (LCAR) submitted to the Department of Energy (DOE). The analysis involved a very large and complex structural model with approximately 11,000 joints and 15,000 elements/members. The loadings and load combinations were reviewed by the inspectors and agreed with the loadings identified in Contractor document 24590-WTP-DC-ST-01-001, "Structural Design Criteria." The seismic analysis performed for the LCAR utilized the equivalent static analysis method using 1.5 times the peak of the response spectrum. Since the HLW building is a SC-I structure, it required the use of seismic soil-structure interaction (SSI) analysis to obtain seismic responses. This requirement was identified in Section C.4.3 of DOE-STD-1020-94 (Change 1, 1996), "Natural Hazards Design and Evaluation Criteria for Department of Energy Facilities," in accordance with SRD Safety Criterion 4.1-2. The use of the equivalent static analysis method was determined by the Contractor to be conservative for determination of the LCAR requirements. The Contractor indicated its intention to perform the SSI analysis in support of the HLW building and Pretreatment (PT) building CAR submittals to OSR. This was acceptable to the inspectors and no deficiencies were identified.

The inspectors reviewed Contractor calculation 24590-LAW-S0C-S15T-00002, "Civil, Structural & Architectural Engineering - LAW Floor Loading." The calculation provided floor loadings for input into the structural model for the LAW building. The inspectors determined that the loadings agreed with the Contractor's Structural Design Criteria.

1.3.3 Conclusions

Design standards implementation was determined adequate in the areas reviewed, including the implementation of normal building dead, live, snow, roof live, ashfall, wind, and other loadings. The use of the proper seismic loadings, including damping, as identified in DOE-STD-1020-94, was confirmed. The specifications for furnishing of reinforcing steel properly identified the correct material to meet ACI 349 requirements. In addition, the inspectors considered it noteworthy that the Contractor intended to use the ACI 349 material requirements across the project, including ACI 318 structures, to avoid the potential use of improper reinforcing steel on ACI 349 installations. Likewise, the specification for furnishing and delivering ready-mix concrete for structural applications across the project met the more stringent requirements of ACI 349. The inspectors concluded that the Contractor's performance of equivalent static analysis of the HLW Building was adequate for the LCAR and the Contractor had plans in place to perform SSI analysis of this building in support of the CAR. The inspectors concluded that the correct codes and standards were utilized for load determination.

1.4 Implementation of SRD Mechanical Design Standards (ITP-110)

This part of the inspection was to verify the Contractor's implementation of the safety criteria design codes and standards as stipulated in SC 4.1-3, 4.2, 4.2-2, and 4.4-20 of the SRD for process safety piping and components such as tanks, valves, pumps, and heat exchangers. Those SC specify American Society of Mechanical Engineers (ASME) standard B31.3-96, "Process Piping Code," ASME "Boiler and Pressure Vessel Code," Section VIII, "Boiler and Pressure Vessel Codes, Rules for Construction of Pressure Vessels," and Tubular Exchangers Manufacturers Association (TEMA)-1986, Section RBC 3.13 as implementing codes and standards. The inspection was limited because the Contractor was in an early design phase and had not yet ordered or purchased any process safety piping or components. Therefore, there was a limited amount of documentation available for review, namely two draft Material Requisition (MR) packages; one for a QL-1 condensate vessel and the other for two commercial drain/sump collection tanks. At the time of the inspection, the MRs were nearing completion.

1.4.1 Inspection Scope

As explained to the inspector by the Contractor's Technical Baseline Manager, the Contractor identifies in the MR package those required codes and standards that must be designed into the product by the successful supplier. Upon receipt of the products, the Contractor reviews the documentation provided by the supplier to verify the proper standards were used.

The inspection, therefore, concentrated on the MR package for the QL-1 condensate vessel and whether it contained requirements that met the design standards as listed in the SRD. The inspectors also reviewed the Contractor's procedures related to processing MR packages and the Contractor's training requirements to determine whether Contractor personnel involved in preparing such packages were knowledgeable of the requirements. Specifically, the inspectors reviewed the QL-1 MR package, Contractor training procedures and procedures related to design and fabrication of process safety piping and vessels, training profiles for three design engineers, and applicable portions of the SRD. The inspectors also interviewed several mechanical design engineering management and technical personnel involved with the design of process safety piping and components.

1.4.2 Observations and Assessments

The inspectors reviewed MR package 24590-QL-MRA-MVA0-00002, Revision 0, for a QL-1 vessel that was dated October 5, 2001. Section 2 of the MR package was titled "Technical Specifications" and item 2.4.1 contained a statement that any deviations to the standards or other requirements shall be so noted in writing in the supplier's proposal. Item 2.4.10 of the MR package stated the seller's General Arrangement Drawing shall include, as a minimum, such items as the shell and head thickness, and all appropriate design conditions and materials of construction. Item 2.4.13 of the MR package discussed seismic design criteria and stated that the overall design code for pressure vessels was ASME Section VIII. It also stated for seismic analysis, the analysis method and acceptance criteria shall satisfy the requirements of ASME Section III. Section 2.5 of the MR package discussed deviations and stated that any deviation from the Contractor's design documents and specifications constituted a nonconformance and must be approved by the Contractor.

The inspectors reviewed several forms and procedures contained in the MR package including:

- A "Quality Verification Document Requirements" attachment that was initially prepared by the Contractor and completed by the seller. Its purpose was to transmit quality verification documents from the seller to the Contractor to provide a Certificate of Conformance from the seller, and to provide evidence of a field inspection check of the quality verification documentation received at the installation site.

- A "Technical Form of Proposal for Pressure Vessels" on which the seller must document such items as code certification, design programs used, seismic parameters considered, and material specifications.

- A "Mechanical Data Sheet" for the vessel that contained, among other things, a Design Data section that documented the quality level and listed the seismic category, fabrication specifications, and design code (ASME VIII, Division 1).

- Contractor procedure 24590-WTP-3PS-MV00-T0001, Rev. A, "Pressure Vessel Design and Fabrication." The scope of the procedure stated "this specification together with the Purchase Order and Drawings covers the requirements for the design, fabrication, and testing of steel pressure vessels." Section 2 was titled "Applicable Documents" and Section 2.1 was titled "Codes and Industry Standards." For this MR package, ASME Section VIII, Division 1, "Rules for Construction of Pressure Vessels," was included as one of the standards. Section 3 listed the basic design requirements and noted that "unless otherwise specified, all vessels shall be designed and fabricated in accordance with the ASME Section VIII, Division 1."

- Contractor procedure 24590-WTP-3PS-MVB2-T0001, Rev. A, "Welding of Pressure Vessels, Heat Exchangers and Boilers." Section 3 on Codes and References noted the welding specification of the procedure was based on, among other things, ASME Boiler and Pressure Vessel (B&PV) Code Sections VIII and IX. Section 4.3 noted that "welding procedures shall be qualified in accordance with the requirements of ASME B&PV Code Section IX." This was in accordance with the requirements of Safety Criterion 4.2-2 of the SRD that required welding requirements to comply with Chapter VIII, Part 9, paragraph M328 of ASME B31.3-96. That paragraph referenced paragraph 328 of ASME B31.3-96, and paragraph 328.2.1(a) required that "qualification of the welding procedures to be used and of the performance of welders and welding operators shall conform to the requirements of the B&PV Code, Section IX."

- Contractor procedure 24590-WTP-3PS-G000-T0002, Rev. A, "Positive Material Identification (PMI)." The procedure covered the minimum requirements for PMI tests on pressure retaining alloys of equipment and piping by the seller in the shop to assure the material was supplied correctly, as specified. It required the seller to submit to the Contractor, for review and comment prior to fabrication, procedures covering how PMI will be conducted and documented.

The inspectors also reviewed several other procedures that were not part of the MR package, but were germane to the inspection:

- Contractor procedure 24590-WTP-DC-PS-01-001, Rev. 0, "Pipe Stress Design Criteria." Section 1 noted that piping systems for the project must meet ASME B31.3 design criteria, and also must meet DOE-STD-1020-94 seismic criteria.

- Contractor instruction 24590-WTP-3DP-G04T-00905, Rev. 0, "Determination of Quality Levels." Section 1 of Exhibit A of the instruction noted that the SRD identifies required codes and standards for the structures, systems, and components (SSCs) to ensure they maintain their safety functions. The engineer performing the design was responsible for reviewing those codes and standards and selecting for application those requirements necessary to ensure implementation of the safety functions. Section 2.1 of Exhibit A was titled "Engineering Graded Approach" and noted the process begins with the safety classification. Upon completing the quality grading, the applicable codes and standards from the SRD were applied. The Discipline Manager was then to review and approve the recommended or tailored codes and standards. Deviation from the SRD set of codes and standards required an ABCN and DOE approval. Section 3.0 listed the procurement requirements and stated the quality and technical requirements were to be included in the procurement document and that the procurement document should clearly identify the applicable requirements to meet the function required of the item or service.

- Contractor procedure 24590-WTP-3DP-G06B-00001, Rev. 1, "Material Requisitions." The procedure stated the responsibility for completing the material requisition form rested with the originator who shall obtain engineering specifications that are attached to the form or written into the body of the MR.

- Contractor engineering instruction 24590-WTP-3DP-G04B-00058, Rev. 0, "Supplier Engineering and Quality Verification Documents." The purpose of the instruction was to specify supplier engineering and quality verification documentation requirements, and to provide guidelines for the technical review of the documents. Section 3.1.1 stated that the responsible engineer shall complete the attached form (G-321-E) that defined the various engineering documents that a seller must provide for RPP-WTP review and approval at specified points in the procurement process. For example, for the QL-1 package reviewed, welding procedures and qualifications were included as "hold" points. The completed forms would then be attached to the procurement package. Final review and approval of the forms were part of the review and approval cycle of the MR as discussed in Contractor procedure 24590-WTP-3DP-G06B-00001. Section 3.2.2 discussed review of documents and noted that the engineer responsible for the procurement package was responsible for review of the engineering-requested documents submitted by the supplier or subcontractor. The review must be documented on a Document Review Request form in accordance with Contractor procedure 24590-WTP-GPP-PADC-003, "Internal Review and Approval of Documents."

Based on these reviews, the inspectors determined that Contractor design procedures specified codes and standards consistent with SRD implementing codes and standards. Contractor instructions provided guidance for implementing SRD codes and standards and, if necessary, processing ABCNs to obtain DOE approval for tailoring of the SRD codes and standards as required by the evolving mechanical systems design. The inspectors determined the Contractor had instructions in place for specifying subcontractor engineering and quality verification documentation requirements and for ensuring review of subcontractor documentation by responsible Contractor engineering personnel. No deficiencies were identified.

The inspectors also discussed with a responsible engineer the status of purchasing heat exchangers. The engineer stated that, at the time of the inspection, no MRs had yet been issued for heat exchangers. However, technical specifications were being prepared, but were not yet complete. The engineer stated that the specifications being prepared not only included, but exceeded, the TEMA requirements.

In addition to the procedures, the inspectors reviewed the Contractor's training requirements to verify the engineers were trained and knowledgeable of the SRD requirements. Procedure 24590-WTP-GPP-CTRG-002-0, "Training," noted that training profiles were established by line managers and maintained by the Training Department. In addition to core training requirements, line managers must identify additional training requirements, as necessary, for specific positions and work assignments. This training included such topics as design change control, determination of quality levels, developing safety standards and requirements, design input memorandum, design criteria database, and authorization basis maintenance.

The inspectors reviewed training profiles for three engineers, all of whom had been involved in preparing the MR package discussed above. All three of the engineers had completed the required training and all were current in their training. In addition, the inspectors interviewed one of the engineers about the requirements for process safety piping and determined he was well aware of the requirements. This was further evidenced when he was asked why the drawing in the MR package was revision A and not revision 0. The engineer stated that MR packages can be issued without final, approved drawings, but that procurement documents cannot be issued until drawings are final and approved. The engineer stated that, in this particular case, the problem involved SRD Safety Criterion SC 4.2-3 that contained references to two obsolete documents. The drawing could not be finalized until the Contractor processed an ABCN to remove the two documents from the SRD and obtained DOE approval for doing so (the Contractor was in the process of seeking the change). This level of knowledge indicated that the engineer was aware of the SRD requirements and would likely result in the implementation of those requirements.

The inspector also interviewed several mechanical design engineering supervisors and personnel. All were knowledgeable of the design requirements and the applicable SRD safety criteria and the requirements for changes to the authorization basis.

1.4.3 Conclusions

Based on the reviews and interviews discussed above, the inspectors concluded that the Contractor's mechanical systems design staff was knowledgeable of Contract design requirements, SRD safety criteria and implementing codes and standards, and the process for revising authorization basis documents. In addition, the inspectors concluded that the Contractor's mechanical systems design procedures were comprehensive and, if implemented properly, were adequate to assure implementation of requirements from the codes and standards identified in the SRD.

1.5 Implementation of SRD Control, Electrical, and Instrumentation Design Standards (ITP-110)

This part of the inspection was to verify the Contractor's implementation of the safety criteria design codes and standards as stipulated in SC 4.3-1, 4.3-2, 4.3-4, 4.3-5, 4.3-6, 4.4-2, 4.4-9 and

4.4-18 of the SRD for control, electrical, and instrumentation systems and components. Those SC specify Institute of Electrical and Electronic Engineers, Inc. (IEEE) standards IEEE 308-1991, IEEE 323-1983, IEEE 379-1994, IEEE 384-1992, IEEE 484-1996, IEEE 603-1991, and IEEE 1023-1988 and Instrument Society of America (ISA) standard ISA-S84.01-1996 as implementing codes and standards. The inspection was limited because the Contractor was in an early design phase and had not issued any approved design media for instrumentation and control (I&C) systems and components. Therefore, there was a limited amount of documentation available for review. This is discussed further below.

1.5.1 Inspection Scope

The inspectors intended to review approved WTP electrical and I&C design media (e.g., drawings, calculations, system descriptions, equipment specifications, etc.) against the design criteria specified in relevant SRD design standards. Early in the inspection, the inspectors found from interviews with management and supervisory personnel that there was no approved I&C design media. Consequently, the inspectors concentrated on the electrical systems design area.

There were no approved design documents available in the electrical area; therefore, the inspectors reviewed draft design documents of the preliminary electrical system design. The inspectors reviewed draft one-line electrical drawings, draft equipment specifications, the electrical portion of Basis of Design Document, and draft Preliminary Safety Analysis Report (PSAR) material related to electrical systems. The inspectors also interviewed engineering and environmental, safety, and health (ES&H) personnel regarding the electrical system design.

1.5.2 Observations and Assessments

Design standards that were directly relevant to WTP electrical systems were identified in SRD Section 4.4. In general terms, the SRD established that Safety Design Class (SDC) electrical systems would be designed to meet IEEE standard 308-1991, "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations," and the various standards referenced in IEEE-308. The SRD also implied that there would be a Safety Design Significant (SDS) portion of the electrical system that would be designed to meet a specified subset of the IEEE standards that were associated with IEEE Class 1E electrical systems.

The inspectors reviewed preliminary one-line facility electrical drawings and, to the extent that such determinations could be made from these preliminary documents, important-to-safety (ITS) portions of the electrical system were being designed to conform with IEEE-308 requirements. The inspectors made the following observations:

- The WTP electrical system consisted of separate ITS and non-ITS subsystems
- The design provided three independent ITS subsystems, identified as A, B, and C
- Each independent ITS subsystem had normal and emergency power supplies

- The normal power supplies to each of the ITS subsystems were derived from two independent offsite power sources and the basic configuration conformed to the preferred power supply criteria specified in IEEE-765-1995, "IEEE Standard for Preferred Power Supply (PPS) for Nuclear Power Generating Stations." IEEE-765 was specified as a reference standard in IEEE-308

- Emergency power to each of the ITS subsystems was supplied from an independent emergency diesel generator.

The inspectors determined that electrical load lists for the ITS load centers were being compiled and analyzed, but the load list information was incomplete and analysis information was preliminary.

Due to the lack of available design information, the inspectors could not evaluate the electrical system with respect to detailed design criteria contained in the various design standards that were identified in the SRD or referenced in IEEE-308. Specifically, design topics such as separation, isolation, fault protection, system performance specifications, and equipment qualification, were not assessed during the inspection due to this lack of design output documentation.

On this basis of the above, the inspectors were unable to draw any conclusions about the adequacy of electrical systems design with respect to relevant SRD design standards. However the inspectors had the following observations regarding the electrical system design and conformance with the SRD:

- At the time of the inspection, electrical design drawings provided sketchy information regarding the classification of various portions of the WTP electrical system. To the extent that classification information was shown, electrical drawings identified ITS and non-ITS classifications. From the electrical drawing classification information and discussions with Contractor engineering personnel, it was clear that the WTP electrical systems will consist of two classifications. There will be an ITS electrical system that will be a tailored version of an IEEE Class 1E electrical system, and a non-ITS system that will be designed to typical industrial standards. These electrical systems will supply power to SDC and SDS electrical loads as determined and justified by the integrated safety management (ISM) process. The SRD safety criteria did not address electrical SSCs in terms of ITS and non-ITS, but described the application of electrical standards to the electrical systems based on SDS and SDC classifications.

  The inspectors considered the clear definition of electrical SSC classifications was necessary to ensure the appropriate application of SRD design standard requirements. To this end, the inspectors discussed with Contractor management the need for SRD and WTP project electrical design documents to consistently classify electrical systems. Contractor management acknowledged the need for consistent electrical system classifications and indicating its intention to address this matter. The inspectors found the Contractor plans acceptable. The Contractor will submit an ABCN, if necessary, to request OSR approval for changes to the SRD electrical system classifications.

- At the time of the inspection, there were no approved or draft design documents that addressed equipment qualification for ITS electrical SSCs. While attempting to determine how the Contractor intended to implement IEEE-323, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations," the inspectors found from discussions with management and engineering personnel that there were divergent views and interpretations regarding how IEEE-323 requirements would be implemented for ITS electrical SSCs. Part of the confusion associated with the use of this standard was because IEEE-323 was developed specifically for nuclear power plants. Consequently, application of IEEE-323 to WTP ITS electrical SSCs required significant tailoring. This was discussed with Contractor management during the inspection exit meeting. The Contractor acknowledged the need to tailor the requirements of IEEE-323 to the design of the project electrical systems. Further, the Contractor indicated its intention to initiate the tailoring of IEEE standards using formal project processes and documentation. The Contractor will submit ABCNs, as necessary, to request OSR approval for proposed changes to the SRD to reflect this tailoring. The Contractor plans were acceptable to the inspectors.

1.5.3 Conclusions

Based on the review described above, the inspectors determined that there was insufficient electrical design information available to establish conclusions regarding conformance with relevant electrical or I&C standards identified in the SRD. However, the inspectors concluded that the evolving electrical system design conformed to relevant standards identified in the SRD.

1.6 Implementation of SRD Mechanical (Ventilation) Design Standards (ITP-110)

This part of the inspection was to verify the Contractor's implementation of SRD specified design codes and standards as stipulated in SC 4.4-5 and 4.4-6 for mechanical (ventilation) design engineering. These codes and standards included ASME Standard N509-1989, "Nuclear Power Plant Air-Cleaning Units and Components," Underwriters Laboratories, Inc. (UL) Standard UL 586-1990, "Standard for High-Efficiency, Particulate, Air Filter Units," and, (IEEE) Standard 379-1994, "IEEE Standard Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems." The inspection was limited because the Contractor was in an early design phase and had not yet ordered or purchased any mechanical (ventilation) SSCs. Therefore, there was a limited amount of documentation available for review.

1.6.1 Inspection Scope

The inspectors interviewed Contractor engineering management and personnel and reviewed draft technical specifications and drawings for mechanical (ventilation) SSCs. These activities were intended to verify that the SRD specified design codes and standards were being properly implemented in the ongoing design of mechanical (ventilation) SSCs and any deviations from the implementation of these design codes and standards were evaluated and documented in accordance with Contract requirements.

1.6.2 Observations and Assessments

ASME Standard N509-1989 provided requirements for determining the allowable stresses, materials selection, and construction requirements for nuclear power plant air-cleaning units and components. This code implemented SRD SC 4.4-6 which stated that each air treatment system designated as Safety Design Class (SDC) must be designed to ensure its operability under normal and accident conditions. In addition, the design must permit appropriate periodic inspection and pressure and functional testing to assure:

(a) the structural and leaktight integrity of its components

(b) the operability and performance of the active components of the systems such as fans, filters, dampers, pumps, and valves

(c) the operability of the systems as a whole and, under conditions as close to design as practical, the performance of the full operational sequence that brings the systems into operation, including operation of applicable portions of the protection system, the transfer between normal and emergency power sources, and the operation of associated systems.

The inspectors interviewed Contractor heating, ventilation, and air conditioning (HVAC) engineering managers and reviewed draft technical specifications for the high integrity centrifugal fans and the HVAC safe change high-efficiency particulate air (HEPA) filter housing. The Contractor HVAC managers were knowledgeable of the SRD safety criteria for the design of SDC HVAC systems and components. However, the Contractor made a determination to design the HVAC system and components, including determining allowable stresses, materials selection, and construction requirements, using ASME Code AG-1, instead of ASME-N509. Both the AG-1 Code and standard N509 were prepared by ASME's Committee on Nuclear Air and Gas Treatment (CONAGT). The Deputy HVAC Manager was a member of CONAGT and noted that the intention of the committee was to adopt all of the N509 requirements into AG-1, and delete the standards. The Foreward to ASME N509 acknowledged that the AG-1 code requirements were acceptable alternates to N509 requirements and encouraged users to utilize the latest AG-1 code requirements, whenever practical. As such, there appeared to be no technical issue associated with the Contractor's use of the AG-1 Code. However, the Contractor was not in the process of preparing an ABCN to revise the SRD to reflect the use of the AG-1 Code. Based on further discussion with Contractor engineering and ES&H personnel, the inspectors were informed the Contractor intended to correct the SRD prior to or during the standards confirmation process for the appropriate Construction Authorization Request (CAR) submittal. The inspector considered this acceptable. No other deficiencies were identified.

The inspector reviewed draft (Revision A) technical specifications 24590-WTP-3PS-MACS-T0001, "Engineering Specification for High Integrity Centrifugal Fans," and 24590-WTP-3PS-MKHO-T0001, "Specification for HVAC Safe Change HEPA Filter Housing." Both specifications required design in accordance with ASME Code AG-1; Section BA for the centrifugal fans and Section HA for the HEPA filter housings. Neither specification contained reference to the requirements of ASME Standard N509 for the design of these components. This was consistent with the Contractor's position on compliance with the ASME AG-1 Code, as discussed above. No deficiencies were identified with the technical specifications requirements for determining the allowable stresses, materials selection, and construction requirements for these components.

UL Standard 586-1990 provided requirements for the design and construction of HEPA filters. This code implemented SRD SC 4.4-6, as stated above. The inspectors interviewed Contractor HVAC management who were knowledgeable of the SRD criteria for the design and construction of the HEPA filters, including conformance to UL Standard 586 requirements. As was the case for other HVAC components, the Contractor had decided to comply with HEPA filter design and construction requirements of the ASME AG-1 Code (Sections FC and/or FK), rather than the requirements of UL Standard 586. However, the Contractor did not have a draft technical specification available for review to allow the inspectors to independently confirm the adequacy of the selected HEPA filter design and construction code requirements against the SRD safety criteria. The Contractor stated that, through design and construction of the HEPA filters to the requirements of ASME Code AG-1, they intended to comply with the requirements of UL Standard 586. The Contractor stated the SRD will be revised to reflect the change in the HEPA filter design and construction code prior to or during the standards confirmation process for the appropriate CAR submittal. No deficiencies were identified.

IEEE Standard 379-1994 contained requirements for the application of the single-failure criterion to nuclear power generating station safety systems. This code implemented SRD SC 4.4-5 which stated that each air treatment system designated as SDC shall have suitable redundancy in components and features, and suitable interconnections, leak detection, isolation, and confinement capabilities to ensure that for onsite electric power system operation (assuming onsite power is not available) its safety function can be accomplished, assuming a single failure. The code also allowed for the use of alternate equipment to satisfy the single failure requirement. The inspector interviewed Contractor mechanical (ventilation) management personnel concerning compliance with the requirements of IEEE Standard 379-1994. Contractor HVAC management stated their intention to apply the single failure criterion to the design of WTP ITS HVAC SSCs. Contractor HVAC management further stated that ITS air treatment systems were being designed to be separate, redundant, and meet the single-failure criterion. However, the full applicability of this requirement to facility HVAC systems had not been determined pending the completion of ISM Cycle 2 activities. Due to the lack of available HVAC design drawings, the inspector was unable to independently confirm that the ITS HVAC system designs met the requirements of IEEE Standard 379. This will have to be confirmed in a future inspection or during CAR reviews. No deficiencies were identified.

1.6.3 Conclusions

Contractor managers were adequately knowledgeable of SRD safety criteria and implementing codes and standards requirements for the design and construction of WTP HVAC SSCs.

Although implemented design codes did not fully conform to those specified in the SRD, the Contractor indicated its intention to revise the SRD prior to or in conjunction with the appropriate standards confirmation activity. However, the lack of available design documentation, including drawings and specifications, limited the inspectors' ability to independently confirm the adequacy of implementation of code and standards requirements in the ongoing design effort.

1.7 Implementation of SRD Fire Protection Design Standards (ITP-110)

This part of the inspection was to verify the Contractor's implementation of the safety criteria design codes and standards as stipulated in SC 4.5-1 through 4.5-23 of the SRD for fire protection design engineering. Those codes and standards included National Fire Protection Association (NFPA) Code 801-1995, "Facilities Handling Radioactive Materials." The inspection was limited because the Contractor was in an early design phase and had only issued the facility fire water main layout plan as an approved design output document. Other facility protection design documentation was either preliminary or had not yet been initiated.

1.7.1 Inspection Scope

The inspectors interviewed Contractor engineering personnel and reviewed draft technical specifications and drawings for fire protection SSCs. These activities were intended to verify that the SRD design codes and standards were being implemented in the ongoing design of fire protection SSCs and any deviations from the implementation of SRD design codes and standards were evaluated and addressed in accordance with Contract requirements.

1.7.2 Observations and Assessments

NFPA 801-1998, Section 3-5, "Construction," required buildings in which radioactive materials were to be used, handled, or stored to be fire resistive or noncombustible (Type I or Type II in accordance with NFPA-220, "Standard on Types of Building Construction"). This code requirement implemented SRD Safety Criterion 4.5-2 that stated "buildings containing a significant quantity of radioactive and/or hazardous material shall be constructed of noncombustible or fire-resistive material, where appropriate." To assess Contractor compliance with the SRD safety criterion, the inspectors reviewed draft document 24590-HLW-BCA-AR-01-001, "Building Code Analysis for High Level Waste (HLW) Facility." The Building Code Analysis provided a preliminary assessment of HLW occupancy requirements for the facility arrangement, construction limitations based on occupancy, construction classification and material limitations, allowable fire resistant methods for establishing fire and smoke barriers for occupancy and life safety separations, and interior finish restrictions for flame spread and smoke control, as defined in the 1997 Uniform Building Code (UBC). The 1997 UBC was identified as the applicable building code for RPP-WTP in the Contract. As discussed in Section 1.2 of the Building Code Analysis, the HLW facility was to be a windowless, Type I FR (Fire-Rated) structure. The requirements for a Type I FR construction designation were specified in the UBC,

Table 6-A, and Section 602. These included actual or equivalent fire protection construction of 4-hour fire rated exterior bearing walls, 3-hour fire rated interior bearing walls, 4-hour fire rated exterior nonbearing walls, 3-hour rated structural frame, and similar fire ratings for permanent partitions, shaft enclosures, floors and floor-ceilings, roofs and roof-ceilings, and stairways. Contractor plans called for the Pretreatment Building to also be classified as Type I FR and the LAW facility to be classified as Type II FR. The Type II FR construction, per the UBC, was also fire resistive, but the fire ratings for interior bearing walls (2-hours), structural frame (2-hours), and roofs and roof-ceilings (1-hour) were not as substantial as for Type I FR construction. Pending formal receipt and review of the fire hazards analyses and PSARs, the WTP building construction designations were considered to be reasonable by the inspectors. No deficiencies were identified.

NFPA 801-1998, Section 3-6.3 required penetration seals provided for electrical and mechanical openings to be listed to meet the requirements of American Society for Testing and Materials (ASTM) E 814, "Fire Tests of Through-Penetration Fire Stops," or UL 1479, "Fire Tests of Through-Penetration Fire Stops." This code requirement implemented SRD Safety Criterion 4.5-3 that stated "confinement of the fire to its origin should be achieved through passive barriers and by activating systems such as fire and smoke dampers, exhaust fans, and drainage pumps to prevent migration of gases, hot combustion products, and flammable liquids outside the fire area." To assess the adequacy of Contractor implementation of these requirements, the inspectors interviewed the Deputy Architectural Manager. The Deputy Architectural Manager stated that the Contractor had not initiated the design of electrical and mechanical protection seals. However, the Contractor provided draft Design Guide 24590-WTP-GPG-CSA-002, "Requirements and Responsibilities for Penetrations and Seals," for review. The design guide identified the responsibilities of the various engineering disciplines for the providing design inputs and designing electrical and mechanical penetration seals. Appropriate coordination with the fire protection discipline was specified. Personnel within both the architectural and fire protection disciplines were interviewed and had adequate knowledge of the SRD and NFPA requirements for the design of mechanical and electrical penetration seals, including the requirements for listing by either the ASTM or UL organization. Although there were no "in progress" or completed designs of mechanical or electrical penetration seals against which implementation of NFPA 801-1998 requirements could be verified, the inspectors determined that Contractor personnel were adequately knowledgeable of the SRD and NFPA requirements to provide confidence that such design, when completed, would be acceptable. No deficiencies were identified.

NFPA 801-1998, Section 3-10.2.1 provided the provisions for drainage design in areas handling radioactive materials and in any associated drainage facilities (e.g., pits, sumps, and sump pumps). This code implemented SRD SC 4.5-3 that stated "confinement of the fire to its origin should be achieved through passive barriers and by activating systems such as fire and smoke dampers, exhaust fans, and drainage pumps to prevent migration of gases, hot combustion products, and flammable liquids outside the fire area."

The inspector interviewed Contractor fire protection and mechanical systems personnel to assess the status of design for facility drainage systems. Fire protection engineering personnel stated that the process facilities were being designed to accommodate the maximum flow from automatic suppression systems (i.e., sprinklers) or a 500 gpm hose stream for a period of 30 minutes. This was consistent with the NFPA requirements stated above. At this point in the design and fire hazards analysis, there were no identified requirements in the process buildings to provide drainage for spills of flammable or combustible liquids or the contents of piping systems and containers that are subject to failure in a fire. During interviews with Contractor mechanical systems personnel, it was identified that the LAW building drainage system design included drain piping designed in accordance with ASME B31.3 and discharging to an ASME Section VIII drain effluent tank for C3/C5 drains. As a general rule, a floor drain was installed for each 1,500 ft^2 of floor space. The inspector reviewed the following LAW drain system design documentation:

- Drawing 24590-LAW-M6-RLD-00001, Rev. A, "P&ID – LAW Radioactive Liquid Waste Disposal System Plant Wash & SBS Condensate Collection"
- Drawing 24590-LAW-M6-RLD-00002, Rev. A, "P&ID – LAW Radioactive Liquid Waste Disposal System C3/C5 Drains/Sump Collection"
- Drawing 24590-LAW-M6-RLD-00003, Rev. A, "P&ID – LAW Radioactive Liquid Waste Disposal System C3/C5 Floor Drains Collection"
- Drawing 24590-LAW-M6-NLD-00001, Rev. A, "P&ID – LAW Non-Radioactive Liquid Waste Disposal System"
- Drawing 24590-LAW-M6-NLD-00002, Rev. A, "P&ID – LAW Non-Radioactive Liquid Waste Disposal System C1/C2 Floor Drain Collection"
- Mechanical Data Sheet: Vessel – Plant Item No. 24590-510-V25002
- Mechanical Data Sheet: Vessel – Plant Item No. 24590-520-V25032
- Design Input Memorandum 24590-LAW-M61-RLD-00002, Rev. A, "P&ID – LAW Radioactive Liquid Waste Disposal System C3/C5 Drains/Sump Collection"
- Design Input Memorandum 24590-LAW-M61-NLD-00001, Rev. A, "P&ID – LAW Non-Radioactive Liquid Waste Disposal System."

The preliminary LAW floor drain system was being designed to accommodate worst case fire water flow rates (0.2 gpm/ft^2 plus 250 gpm hose stream). This was being accomplished using 6-inch floor drains for every 1,500 ft^2 of floor area discharging into a 2-inch drain header. The drains discharged to either the Drains/Sump Collection Vessel (V25002) for the C3/C5 drains or to the Drains/Sump Collection Tank (T25032) for the C1/C2 drains. These vessels were being designed to maintain a free volume of at least 5,000 gallons to accommodate the drainage of water from operation of sprinklers or a fire water hose. Both vessels overflowed into berms inside a lined cell. The berms were sized to accommodate a 30,000 gallon overflow from either vessel. The combined volumes of the berm and free space in the vessels was sufficient to accommodate the expected worst case fire water discharge. No deficiencies were identified.

However, the inspector requested, but was unable to obtain, the preliminary calculation for the drain system design. The calculation was apparently performed prior to the Contractor's assumption of project design responsibility. Neither the Mechanical Systems group nor the Process Engineering group was able to produce the calculation during the period of the inspection. Thus, the inspector was unable to confirm the adequacy of the calculational basis for the drainage system design.

The inspectors reviewed an early draft of Contractor technical specification 24590-BOF-3PS-PZ41-T0002, "Water Treatment Plant Wet Pipe Sprinkler Specification." The specification was still "work-in-progress" and had not undergone any internal reviews. However, the specification required design of the facility wet pipe sprinkler systems in accordance with the requirements of NFPA Standard 13, "Standard for the Installation of Sprinkler Systems." The requirement for design of the sprinklers per NFPA 13, "Standard for the Installation of Sprinkler Systems," was in compliance with NFPA 801, Section 4-7 requirements for fire suppression systems and equipment. In addition, the materials, fittings, layout requirements, requirements for spares, sprinkler types, sprinkler spacing, use of sprinkler head guards, and other requirements of draft technical specification 24590-BOF-3PS-PZ41-T0002 were consistent with NFPA 801 requirements. No deficiencies were identified.

NFPA 801-1998, Section 4-8.3 provided the requirements for design of the fire alarm system for the facility. These code requirements implemented SRDSC 4.5-7 which stated that "the facility shall include a fire detection system to detect the presence of a fire and activate alarm systems so that measures for confinement and suppression of the fire and personnel evacuation may start promptly. The detection system shall include a means to summon the Hanford Site fire department. The system shall be capable of operation without offsite power."

The inspectors interviewed the Fire Protection Engineering Lead concerning the status of the facility fire alarm system design. The Contractor was in the process of establishing plans for the design of the fire alarm system and was planning to follow the requirements of NFPA Standard 72, "National Fire Alarm Code." This was determined by the inspector to be in accordance with NFPA 801, Section 4-8, which required that fire detection and automatic fixed fire suppression systems be equipped with local audible and visual notification appliances with annunciation of the main fire control panel or at another constantly attended location in accordance with NFPA 72. Specifically, the Contractor was planning to include the following in the facility design:

a. Means to notify and evacuate building occupants in the event of a fire, including fire detection systems equipped with local audible and visual notification appliances with annunciation on the main fire control panel or at other constantly attended location

b. A fire signaling system as part of the facility communications system that provided:

   - A manual fire alarm system by which employees could report fires or other emergencies

- A facility-wide alarm system by which personnel could be alerted of an emergency

- Means to notify the Hanford Site Fire Department.

c. A fire detection system to detect the presence of a fire and activate alarm systems so that measures for confinement and suppression of a fire and personnel evacuation could start promptly, including a means to summon the Hanford Site Fire Department and capability of operation without offsite power.

For the interface between the facility and the Hanford Site Fire Department, the Contractor was planning to install RFAR (radio fire alarm reporting) boxes consistent with those used across the site for communication of fire events and fire equipment malfunctions to the Hanford Site Fire Department. There were no drawings or technical specifications in progress for review to allow the inspectors to determine compliance of the fire alarm system design with NFPA 801 and NFPA 72 requirements. Based on input provided during the interviews, the inspectors determined that the Contractor's plans for design of the facility fire alarm system were proceeding in accordance with SRD implementing codes and standards requirements. No deficiencies were identified.

1.7.3 Conclusions

Contractor personnel were adequately knowledgeable of SRD safety criteria and implementing codes and standards requirements for the design and construction of WTP fire protection SSCs. Although the design of fire protection SSCs was, in most cases, preliminary at the time of the inspection, the fire protection design and construction codes implemented by the Contractor to date were consistent with SRD, Section 4.5 implementing codes and standards. However, the lack of available design documentation, including drawings and specifications, limited the inspectors' ability to independently confirm the adequacy of implementation of code and standards requirements in the ongoing design effort. The design and construction requirements for the facility fire water main, including hydrants and sectionalizing valves, were reviewed by OSR as a separate Contractor submittal and properly implemented the SRD implementing codes and standards requirements.

1.8 Deviations from the Implementation of SRD Design Standards (ITP-105)

1.8.1 Inspection Scope

The inspectors interviewed Contractor engineering and ES&H personnel and reviewed approved, draft, and in process design documentation, as discussed in Sections 1.2 – 1.6 of this report. During the performance of these activities, the inspectors intended to verify that any deviations from SRD design requirements were properly justified and approved in accordance with prescribed requirements.

1.8.2 Observations and Assessments

As discussed in Sections 1.2, 1.4 and 1.5 of this report, the inspectors identified situations where the Contractor was deviating from or not fully conforming with the requirements of SRD implementing codes and standards. This included compliance with ANSI/ASCI Standard N690 requirements for earthquake loadings (Section 1.2), environmental qualification of ITS electrical SSCs per the requirements of IEEE Standard 323 (Section 1.4), and use of the ASME AG-1 code for the design and construction of HVAC SSCs versus compliance with ASME Standard N509 as specified in the SRD (Section 1.5). The deviations were discussed with Contractor management. Contractor management provided a presentation to the inspectors and OSR management on November 6, 2001, which described the Contractor's program for performing standards confirmation in support of construction, Contract deliverables, or procurements. Prior to the submittal of a Contract deliverable to DOE/OSR or the awarding of a procurement for ITS equipment, the Contractor will complete the standards confirmation process. The standards confirmation process will include the identification of deviations from SRD implementing codes and standards for which ABCN(s) will be developed and which will require DOE approval. These deviations will include both changes to the implementing codes and standards and tailoring of the code and standard requirements, as necessary, to meet the specific needs of the project. The Contractor's position of standards confirmation was acceptable to the inspectors and OSR management. Therefore, since the deviations discussed above were to designs that had not been issued for construction, Contract deliverables, or procurement, there were no deviations to SRD implementing codes and standards identified during the inspection as they relate to this inspection element.

The inspectors also interviewed Contractor quality assurance (QA) personnel concerning the Contractor's program/plans for performing assessments of SRD codes and standards implementation. Contractor QA personnel indicated that they had not performed such assessments to date, but were developing a program that would accomplish this objective. This included the revision of existing procedures to:

- integrate authorization basis and ISM System requirements into the assessment process
- focus on effective and efficient management assessments
- require oversight assessments/audits that follow management assessments
- utilize a multi-discipline approach to assessments.

The program being developed was intended to result in an integrated inspection process with standardized lines of inquiry which broadened the traditional focus of QA oversight. The multi-disciplined assessment teams would include representatives from the QA, ES&H, operations, and engineering organizations. The Contractor was optimistic that the assessment of the implementation of authorization basis requirements could begin as early as the Design Process audit scheduled for January 2002. To support this effort, the Contract prepared a QA requirements matrix and work was in progress on an authorization basis requirements matrix. The inspectors determined that this authorization basis requirements implementation assessment program would provide valuable information to the Contractor concerning the ongoing status of compliance with project regulatory requirements.

1.8.3 Conclusions

The Contractor's program for addressing deviations to SRD implementing codes and standards is not implemented until design documents are issued for construction, submitted to DOE as a Contract deliverable, or issued for procurement. In recognition of these Contractor program requirements, no deviations to SRD implementing codes and standards were identified during the inspection.

2.0 EXIT MEETING SUMMARY

The inspectors presented the inspection results to members of Contractor management at an exit meeting on November 2, 2001. The Contractor acknowledged the observations and conclusions presented. The inspectors asked the Contractor whether any materials examined during the inspection should be considered limited rights data. The Contractor stated that no limited rights data was examined during the inspection.

3.0 REPORT BACKGROUND INFORMATION

3.1 Partial List of Persons Contacted

Steve Lynch, Manager of Engineering Technology
Gary Kloster, Technical Baseline Manager
Pete Lowry, HLW Hazards and Safety Analysis Lead
Maurice Higuera, Pretreatment Hazards and Safety Analysis Lead
John Hinckley, LAW Hazards and Safety Analysis Lead
D. Smith, Safety Program Engineer
Mark Platt, Safety Program Lead
Jan Sanders, HVAC and Fire Protection Manager
Gerard Garcia, Deputy HVAC and Fire Protection Manager
Chuck McKnight, Fire Protection Engineering Lead
Dennis Klein, Radiological, Nuclear, and Process Safety Manager
Fred Beranek, Environmental, Safety, and Health Manager
Bek Posta, Mechanical Systems Manager
Salwa Ibraham, Deputy Architectural Manager
Don Scribner, CS&A Manager
Eric Isern, LAW Mechanical Systems
Paquito (Frank) Holgado, LAW Mechanical Systems
George Shell, QA Manager
Fred Howell, Process Engineering
Dolores Mitchell, Process Engineering
Steve Lynch, Manager of Engineering Technology

Mark Braccia, Deputy Manager CS&A
Randy Jorissen, Supervisor CS&A
Ron Hearne, Supervisor CS&A
Scott Horn, Supervisor CS&A
Dave Houghton, CS&A

3.2 List of Inspection Procedures Used

ITP I-110, "SRD Design Standards Implementation Assessment"

3.3 List of Items Opened, Closed, and Discussed

3.3.1 Opened

None

3.3.2 Closed

None

3.3.3 Discussed

None

3.4 List of Acronyms

ABCN	Authorization Basis Change Notice
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
B&PV	Boiler and Pressure Vessel Code
BNI	Bechtel National, Inc.
CAR	Construction Authorization Request
CONAGT	Committee on Nuclear Air and Gas Treatment
CSER	Criticality Safety Evaluation Report
DOE	U. S. Department of Energy
ES&H	environment, safety and health
ESQ&H	environment, safety, quality, and health

FR	Fire-Rated
HEPA	high-efficiency particulate air
HLW	High Level Waste
HVAC	Heating, Ventilation, and Air Conditioning
I&C	instrumentation and control
IEEE	Institute of Electrical and Electronic Engineers, Inc.
ISA	Instrument Society of America
ISM	Integrated Safety Management
ISMP	Integrated Safety Management Plan
ITP	Inspection Technical Procedure
ITS	important-to-safety
LAW	Low Activity Waste
LCAR	Limited Construction Authorization Request
MR	material requisition
NFPA	National Fire Protection Association
OBE	operating basis earthquake
ORP	Office of River Protection
OSR	Office of Safety Regulation
PSAR	Preliminary Safety Analysis Report
QA	quality assurance
QL	Quality Level
RFAR	Radio Fire Alarm Reporting
RPP-WTP	River Protection Project- Waste Treatment Plant
SC	Safety Criteria
SDC	Safety Design Class
SDS	Safety Design Significant
SRD	Safety Requirements Document
SSCs	structures, systems, and components
SSI	soil-structure interaction
TEMA	Tubular Exchangers Manufacturers Association
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.