



U.S. Department of Energy
Office of River Protection

P.O. Box 450
Richland, Washington 99352

03-AMWTP-066

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

Dear Mr. Henschel:

CONTRACT NO. DE-AC27-01RV14136 – INSPECTION REPORT A-03-AMWTP-RPPWTP-002 – ON-LOCATION INSPECTION REPORT FOR THE PERIOD MAY 30, 2003, THROUGH JULY 10, 2003

This letter forwards the results of the U.S. Department of Energy, Office of River Protection (ORP) review of Bechtel National, Inc. (BNI) construction performance on the Waste Treatment and Immobilization Plant for the period May 30 through July 10, 2003. Two Findings were identified with one requiring a written response (Enclosure 1). Details of the inspection are documented in the inspection report (Enclosure 2).

Construction performance was good during this inspection period. Concrete placements continue to go well. The Finding requiring a response is an engineering issue regarding failure to adhere to the authorization basis requirements. One specific issue regarded ensuring daughter standards, referenced in standards identified in the Safety Requirements Document, are properly addressed in engineering procedures and specifications and implemented in design, procurement, and construction. Changes to these daughter standards, including year of edition, currently require safety evaluations and communication to ORP in accordance with Contract required RL/REG-97-13, *Regulatory Unit Position on Contractor-Initiated Changes to the Authorization Basis*. To allow some flexibility in the process, ORP is working with BNI in developing additional guidance regarding this daughter standard change process in an effort to reduce the impact these changes may have on construction.

If you have any questions, please contact me, or your staff may call John Eschenberg, WTP Project Manager, (509) 376-3681.

Sincerely,

Roy J. Schepens
Manager

AMWTP:JWM

Enclosures (2)

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

NOTICE OF FINDING

Section C.6, Standard 7, *Environment, Safety, Quality, and Health*, of Contract DE-AC27-01RV14136, dated December 11, 2000, between Bechtel National, Inc. (the Contractor) and the U.S. Department of Energy (DOE), defined the Contractor's responsibilities under the Contract as they relate to conventional non-radiological worker safety and health; radiological, nuclear, and process safety; environmental protection; and quality assurance.

Standard 7, Section (e) (2) (ii) of the Contract requires the Contractor to comply with the Specific nuclear regulations defined in the effective rules of the 10 CFR 800 series of nuclear requirements.

10 CFR 830, *Nuclear Safety Management, Subpart A, Quality Assurance Requirements*, requires the Contractor to conduct work in accordance with the requirements of Subpart A and to develop a Quality Assurance (QA) Program that reflects the requirements of Subpart A.

The Contractor's QA Program is defined in 24590-WTP-QAM-QA-01-001, "*Quality Assurance Manual*," Rev. 3a, dated May 15, 2003 (QAM).

Standard 7, Section (d) of the Contract required the Contractor to develop and implement an integrated, standards-based, safety management program to ensure radiological, nuclear, and process safety requirements are defined, implemented, and maintained. The Contractor is required to conduct work in accordance with the Contractor developed and DOE approved Safety Requirements Document (SRD).

The Contractor's SRD, Volume 2, was defined in 24590-WTP-SRD-ESH-01-001-02, Revision 2g, dated April 16, 2003.

During the performance of on-location inspections for the period May 30 through July 10, 2003, the following Findings were identified:

1. SRD Safety Criterion 4.1-2 references as an implementing standard MO16-89, *Manual for Steel Construction-Allowable Stress Design, 1989*. MO16-89 requires conformance with American Welding Society (AWS) D.1.1 1988 edition.

Contrary to the above, on June 26, 2003, the Contractor conditionally dispositioned Non Compliance Report (NCR) 24590-WTP-NCR-CON-03-113, which documented several non-compliances with SRD Safety Criterion (SC) 4.1-2 regarding conformance to AWS D.1.1 welding requirements of MO16-89, and proceeded with installing Low Activity Waste (LAW) structural steel using the wrong edition of the welding code referenced in MO16-89. The Contractor proceeded with installing LAW structural steel based on the conditional release of the NCR without properly changing the referenced standard in the SRD or correcting the non-compliance. Failure to install LAW structural steel in accordance with SRD Safety Criterion 4.1-2 is considered a Finding (A-03-AMWTP-RPPWTP-002-F01). (See Section 1.3.2 of Enclosure 2 for additional details.)

2. QAM Policy Q-05.1, *Instructions, Procedures, and Drawings*, Section 3.1 requires the Contractor to perform work in accordance with documented instructions, procedures, and drawings.

Contrary to the above, during review of forms, reinforcement steel, and embedments, inspectors identified several reinforcement steel installations not in conformance with the instructions, procedures, and drawings issued for this work. Failure to install reinforcement steel in accordance with design requirements is considered a Finding against QAM Policy Q-05.1 (Finding A-03-AMWTP-RPPWTP-002-F03). (See Section 1.6.2 of Enclosure 2 for additional details.)

No response is required for Finding number 2 above. The Contractor had taken appropriate action to address the noncompliances associated with this Finding during the inspection period. The ORP requests the Contractor provide, within 30 days of the date of the cover letter that transmitted this Notice, a reply to the first Finding described above. The reply should include: (1) admission or denial of the Finding; (2) the reason for the Finding, if admitted, and if denied, the reason why; (3) the corrective steps that have been taken and the results achieved; (4) the corrective steps that will be taken to avoid further Findings of this nature; and (5) the date when full compliance with the applicable commitments in your authorization bases will be achieved. Where good cause is shown, consideration will be given to extending the requested response time.

U.S. DEPARTMENT OF ENERGY
Office of River Protection

INSPECTION: On-location Inspection Report for the Period May 30 through July 10, 2003

REPORT NO.: A-03-AMWTP-RPPWTP-002

FACILITY: Bechtel National, Inc.

LOCATION: 2435 Stevens Center
Richland, Washington 99352

DATES: May 30 through July 10, 2003

INSPECTORS: J. McCormick-Barger, Sr. Regulatory Technical Advisor, Inspection Lead
B. Harkins, ORP Facility Representative
M. Evarts, Team Member
J. Mohatt, Team Member
D. Wallace, Team Member
D. Frey, Team Member
D. Kirsch, Team Member

APPROVED BY: M. Thomas, Operations and Commissioning Team Leader
Office of the Assistant Manager Waste Treatment and Immobilization Plant
(AMWTP)

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EXECUTIVE SUMMARY

Introduction

This inspection of Bechtel National, Inc. (the Contractor) construction activities covered the following areas:

- Adequacy of Drawings to Support Structural Steel Construction (Section 1.2)
- Adequacy of Structural Steel Construction Implementing Procedures (Section 1.3)
- Observation of LAW Backfill and Compaction Activities (Section 1.4)
- Hot Weather Concrete Placements (Section 1.5)
- Adequacy of Forms, Reinforcement Steel, and Embedded Steel Items and Associated Concrete Placements (Section 1.6)
- Adequacy of Fire Protection Piping System Work Activities (Section 1.7)
- Adequacy of Balance-of-Plant Construction Activities (Section 1.8)
- Review of Independent, Qualified, Registered, Professional Engineer (IQRPE) (Section 1.9)
- Industrial Health and Safety (IH&S) Oversight (Section 1.10)
- Review of Assessment Follow-up Items (Section 1.11)

Significant Observations and Conclusions

- The Contractor had provided the required details on structural steel installation and fabrication drawings, and had reviewed and approved the drawings for construction in accordance with the Quality Assurance (QA) manual requirements. (Section 1.2)
- The Contractor had not adequately prepared for the installation of structural steel in that Engineering had not acceptably implemented the requirements of the SRD regarding code applicability in either the technical specifications or procedures governing the fabrication and erection of structural steel. One Finding was identified for failure to implement the requirements of SRD Safety Criterion 4.1-2 (Finding Number A-03-AMWTP-RPPWTP-002-F01). (Section 1.3)

- The Contractor provided adequate implementing procedures specifying the method to be employed for backfill and compaction efforts and reflecting the applicable codes and standards specified in SRD SC 4.1-2. Soil testing was performed using calibrated testing equipment and when used, controlled density fill was properly sampled and tested. (Section 1.4)
- With the onset of summer hot weather, the Contractor reinitiated the corrective actions implemented last year to ensure 70°F concrete placements during hot weather were adequately controlled to preclude future concrete cold joints. (Section 1.5)
- Concrete testing was performed in accordance with the technical specifications, procedures, and applicable American Society for Testing and Materials (ASTM) requirements. (Section 1.6)
- With the exception of several examples, reinforcement steel installations and other attributes associated with the concrete placements for the Low Activity Waste (LAW), High Level Waste (HLW), and Pretreatment Facility (PTF) were performed in accordance with established procedures, specifications, and drawings. Qualified inspectors were performing Quality Control (QC) activities for this work, and QC activities were documented as required by procedures. One Finding was identified to document several examples where reinforcement steel was not installed in accordance with procedures, specifications, or drawings (Finding A-03-AMWTP-RPPWTP-002-F03). (Section 1.6)
- The Contractor accomplished hydrostatic testing of fire service water piping systems in accordance with established requirements. (Section 1.7)
- Rebar and embedded item placement for Switchgear Building # 87 Grade Beam (north beam), North and South slabs on grade, and Electrical Duct Banks were installed in accordance with technical specifications, procedures, and required codes and standards. (Section 1.8)
- Concrete for the Switchgear Building and Electrical Duct Banks was produced, placed, and consolidated in accordance with technical specifications, procedures, and required codes and standards. (Section 1.8)
- The installation and welding of the 48-inch Cooling Water System was performed in accordance with specifications, procedures, and manufactures recommendations. (Section 1.8)
- The hydrostatic tests of the Plant Wash and Disposal System segments were conducted in accordance with approved procedures and met acceptance criteria. (Section 1.8)
- Intertek Testing Services NA, Inc. performed the evaluation and acceptance of the elevator control panels, certifying compliance to UL 508A *Industrial Control Panels* and

the NEC. Intertek evaluated the components, but had not evaluated the elevator electrical equipment as an assembly. The inspectors and Contractor jointly identified multiply NEC code deficiencies. Corrective actions to address these items are being tracked as Assessment Follow-up Item A-03-AMWTP-RPPWTP-002-A04. (Section 1.8)

- PTF conduit installations and grounding installations conformed to governing installation requirements including the 2002 NEC. (Section 1.8)
- After inspectors notified the Contractor of NEC Article 250.32(E) requiring a 1/0 AWG grounding electrode conductor at Power Distribution Rack PDR-002, the deficiency was corrected. (Section 1.8)
- Electrical installations of Power Distribution Racks PDR-004 and PDR-005, Electrical Warehouse T-33, and the Distribution Rack at the Operators Welding Area were in accordance the 2002 NEC. (Section 1.8)
- General Distribution Rack GDR-014 overcurrent protection did not meet NEC Article 210.21(B) and terminations did not meet Article 110.14. The inspectors notified the Contractor and the correct fuses were installed, correcting the first item. Corrective actions to address the second item are being tracked as Assessment Follow-up Item A-03-AMWTP-RPPWTP-002-A05. (Section 1.8)
- The Contractor replaced the three-phase panelboard with the correct single-phase panelboard at the Fuel Dispensing Station closing the BOP Inspection Deficiency Report dated March 03, 2003, and Follow-up Item A-03-OSR-RPPWTP-001-A02. The new panelboard branch circuits did not comply with the adjustment factors as stated in NEC 310.15. Corrective actions to address this issue are being tracked as Assessment Follow-up Item A-03-AMWTP-RPPWTP-002-A06. (Section 1.8)
- Based on a review of the IQRPE inspection plans and recent inspection report, the IQRPE subcontractor (Caliber Inspection) was adequately implementing the requirements of the Washington Administrative Code regarding performing independent reviews of tanks and equipment. (Section 1.9)
- The Contractor continued to provide adequate industrial health and safety oversight at the construction facility. Several minor safety issues were identified and promptly addressed by the Contractor. Efforts continued to be taken to address Tower Crane safety issues. (Section 1.10)
- Four previously identified Assessment Follow-up Items and one previously identified Finding was closed during this inspection period. (Section 1.11)

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**ON-LOCATION INSPECTION REPORT FOR THE PERIOD
MAY 30 THROUGH JULY 10, 2003**

1.0 REPORT DETAILS

1.1 Introduction

This inspection assessed the Contractor's and subcontractors' performance of important-to-safety (ITS) construction activities for conformance with regulatory requirements specified in the Quality Assurance Manual (QAM), Safety Requirements Document (SRD), design documents, approved work procedures, and committed codes and standards. The inspection also reviewed the Contractor's implementation of aspects of its Industrial Health and Safety (IH&S) program, including observing Contractor and subcontractor worker safety practices, and firewater piping system construction activities as well as other Balance-of-Plant (BOP) construction activities not classified as ITS.

Details and conclusions regarding this inspection are described below.

1.2 Adequacy of Drawings to Support Structural Steel Construction (Inspection Technical Procedure (ITP) I-121 and 135)

1.2.1 Inspection Scope

The inspectors examined several structural steel fabrication and installation drawings to verify conformance with the selected requirements of the Contractor's QA Manual regarding checking, approving, and issuing drawings for construction. In addition, the inspectors examined selected drawings for conformance with selected code requirements specified by the SRD, Volume II, SC 4.1-2, 4.1-3, and 4.1-5.

1.2.2 Observations and Assessments

The inspectors examined several structural steel design drawings to determine whether the drawings had been issued for construction and reviewed and approved in conformance with requirements of the Contractor's Quality Assurance Manual (24590-WTP-QAM-QA-01-001, *Quality Assurance Manual*, Revision 3a, dated May 15, 2003), Policy Q-03.1, *Design Control*.

The inspectors found the selected structural steel design drawings had been reviewed, approved, and issued to the site for construction, as required.

The drawings were clear, legible, and approved for construction. The drawings conformed to the above requirements of the QA manual.

The Preliminary Safety Analysis Report (PSAR) defined the LAW building as Seismic Category III, the HLW and Pretreatment buildings were defined as Seismic Category I. In addition, the PSAR provided for Seismic Category I and II building structural steel design, fabrication, and erection in accordance with ANSI/AISC standard N690, *Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities*, 1994 Edition,

and Seismic Category III and IV building structural steel design, fabrication, and erection in accordance with the AISC MO16, *Manual for Steel Construction-Allowable Stress Design*, 1989 Edition.

The inspectors examined the following drawings to determine whether the proper codes for design, fabrication, and erection had been specified:

- 24590-LAW-S0-S15T-00002, *LAW Vitrification Building General Steel Notes*, Revision 4, dated March 20, 2003.

Note 4.A of this drawing properly specified the AISC MO16, 1989 Edition as the code for design, fabrication, and erection.

- 24590-HLW-S0-S15T-003, *HLW Vitrification Building Structural Steel Notes*, Revision 1, dated April 3, 2003.

Note 4.A of this drawing specified both AISC MO16, 1989 Edition, and AISC N690, 1994 Edition, as governing the structural steel design, fabrication, and erection without defining which parts of the structure were governed by each code. The inspectors found the specification of both codes without explanation provided a source of potential confusion for the installers.

- 24590-PTF-S0-S15T-00008, *Pretreatment Facility Structural Steel Notes and Legend*, Revision 1, dated May 22, 2003

This drawing correctly specified ANSI/AISC N690, 1994 Edition, as the code governing the structural steel design, fabrication, and erection.

The Contractor stated the HLW building drawing code requirement would be corrected and clarified before structural steel installation began in the HLW building.

1.2.3 Conclusions

The inspectors concluded the Contractor had provided the required details on structural steel installation and fabrication drawings, and had reviewed and approved the drawings for construction in accordance with the QA manual requirements.

1.3 Adequacy of Structural Steel Construction Implementing Procedures (ITP-I-114, 115, and 135)

1.3.1 Inspection Scope

The inspectors examined the Contractor's engineering technical specifications and procedures governing the performance of structural steel procurement, receiving, welding, and non-destructive examination activities of structural steel welding for conformance with the SRD, Volume II, SC 4.1-2, 4.1-3, and 4.1-5, and the QAM.

1.3.2 Observations and Assessments

The inspectors examined the following Contractor engineering technical specifications and procedures applicable to the purchase, material management, erection, and welding of structural steel:

- 24590-WTP-3PS-SS00-T0001, *Engineering Specification for Welding of Carbon Structural Steel*, Revision 4, dated April 4, 2003.
- 24590-WTP-3PS-SS01-T0002, *Engineering Specification for Purchase of Structural Steel*, Revision 2, dated May 30, 2003.
- 24590-WTP-3PS-SS02-T0001, *Engineering Specification for Erection of Structural Steel*, Revision 0, dated September 20, 2002.
- 24590-WTP-GPP-CON-3206, *Structural Steel Installation and On-Site Fabrication*, Revision 0, dated January 30, 2003.
- 24590-WTP-PL-C-03-001, *Steel Execution Plan*, Revision 0, dated April 3, 2003.
- 24590-WTP-GPP-GCB-00100, *Field Materials Management*, Revision 5, dated May 15, 2003.

The inspectors examined the engineering specification for erection of structural steel and the procedure for structural steel installation and on-site fabrication for conformance with and implementation of the proper code requirements. The inspectors found the engineering specification referenced the standards required by the SRD in this area; however, there was inadequate specification of which code applied to each building.

The inspectors examined the procedure for structural steel installation and on-site fabrication of structural steel to determine whether the procedure properly implemented the N690 requirements and acceptance criteria during inspections, as required by the Contractor's QAM, Policy Q-05.1, *Instructions, Procedures, and Drawings*. QAM Policy Q-05.1, Section 1.1, required the instructions, procedures, and drawings include or reference the necessary quantitative or qualitative acceptance criteria for determining the prescribed results had been satisfactorily attained. The procedure for structural steel erection required Field Engineer and Quality Control verification of, for example: plumb and horizontal member tolerances (procedure 24590-WTP-GPP-CON-3206, page 15 of 26, sub-item 4); holes sized for standard, oversized, short-slotted, and long slotted holes meets design criteria (procedure 24590-WTP-GPP-CON-3206, page 19 of 26, sub-item 1); thermal cut edges conform to finish requirements (procedure 24590-WTP-GPP-CON-3206, page 19 of 26, sub-item 1); maximum and minimum edge distance and bolt hole spacing (procedure 24590-WTP-GPP-CON-3206, page 19 of 26, sub-item 1); and use of beveled washers (procedure 24590-WTP-GPP-CON-3206, page 15 of 26, sub-item 6). The inspectors found no quantitative or qualitative acceptance criteria, for the above examples, had been included in either the specification or procedure for erecting structural steel.

The Contractor's specification for erection of structural steel specified, in Section 2.1.1, that American Institute of Steel Construction (AISC) standards 303-2000, *Code of Standard Practice for Steel Buildings and Bridges*, and 348-2000, *Specification for Structural Steel Joints Using ASTM A 325 or A 490 Bolts*, would supercede the existing publications in the AISC Manual and be used to establish erection tolerances instead of the AISC manual tolerances. Furthermore, the structural steel specification (24590-WTP-3PS-SS02-T0001), Section 4.2.6, stated erection tolerances as listed in the AISC 303, *Code of Standard Practice*, and 335, *Specification for Structural Steel Buildings*, shall apply. The specification for erection of structural steel buildings, AISC 335 in Section 2.1.1, was not identified, by reference to the note, as superceding the existing publications included in the AISC Manual. These standards were not specified in the SRD. The inspectors concluded Engineering had failed to properly implement the implementing code requirements of the SRD, SC 4.1-2, 4.1-3, and 4.1-5.

The Contractor initiated immediate action to compare the requirements of AISC 303 and 335 with the SRD requirements of ANSI/AISC 690, 1994 Edition, and AISC MO16, 1989 Edition, document and evaluate discrepancies, correct the specifications, provide or reference quantitative acceptance criteria in the procedure for erecting structural steel, and evaluate the need to change the SRD sections specifying the implementing codes and standards.

The inspectors observed ANSI/AISC N690 required conformance with the 1992 edition of the AWS D1.1 code (American Welding Society (AWS) Standard D1.1, *Structural Welding Codes-Steel*, 1992 Edition) and MO16, 1989 Edition, required conformance with the 1988 edition of AWS D1.1. However, the specification for welding of carbon structural steel, Section 4.6, required conformance with the 2000 edition of the AWS D1.1 code. The inspectors determined the specification for purchase of structural steel required, in Section 3.5, the use of AWS D1.1, 2002 Edition, and required the supplier to perform welding in accordance with the Project Specification for Welding (the specification for welding carbon steel) which required conformance with AWS D1.1, 2000 Edition. The inspectors concluded Contractor Engineering had not been fully diligent in assuring consistency during their review of specifications.

The Contractor examined the apparent inconsistency between the specifications and the SRD requirements and its affect on structural steel in production and in the laydown area and issued NCR 24590-WTP-NCR-CON-03-113 documenting this welding uncertainty. On June 26, 2003, the Contractor conditionally dispositioned the NCR to released LAW structural steel for installation based on a memorandum from engineering providing justification for the continued installation of structural steel. This justification included the planned performance of comparisons of engineering specified specifications and standards with those specified in the SRD and the generation of future Authorization Basis Change Notices (ABCNs) to correct the deficiencies. Following approval of the conditionally released NCR, the Contractor began installing LAW structural steel.

However, conditionally dispositioning the NCR to allow installation of important-to-safety structural steel did not comply with RL/REG-97-13, *Regulatory Unit Position on Contractor-Initiated Changes to the Authorization Basis*. The Contractor is required to implement RL/REG-97-13 in accordance with Section J, Attachment E, *List of Applicable Directives (List B-DEAR 970.5204.78*, of the Waste Treatment Plant Contract. Position 3.7 of RL/REG-97-13 allows the

Contractor to make certain authorization basis deviations provided a safety evaluation is performed and the Office of River Protection is notified of the deviation within 24 hours. These actions were not performed. Failure to implement the requirements of MO16, 1989 Edition, or properly process a decision to deviate from the SRD, during the fabrication and installation of LAW structural steel is a Finding against the requirements (implementing standards) specified in SRD SC 4.1-2 (Finding Number A-03-AMWTP-RPPWTP-002-F01).

Purchasing and Receiving

The inspectors examined the receiving records for four receiving activities conducted on steel shapes supplied by Hirschfield Steel Co., Inc (Material Receiving Report (MRR) numbers 07274, 07304, 07688, and 07439). The inspectors found the materials had been inspected and the Material Receiving Instructions processed and completed as required by the procedure for Field Materials Management. The inspectors selected a sample of steel piece numbers and verified the material was traceable to Certified Material Test Reports, as required by the specification for purchase of structural steel. The inspectors also found the coating product identity certifications and cleaning and coating reports had been supplied and were in the packages, as required.

The inspectors found the Quality Verification Documentation forms (Form G-321-V) failed to include the requirement to review the supplier reports of visual weld inspection results. The specification for welding of carbon structural steel required, in Section 11.2.1, a visual inspection shall be performed on all welds in accordance with AWS D1.1, Section 6. Section 13.1 required the supplier submit Quality Verification Documents (NDE testing reports) in accordance with the applicable technical specification and Form G-321-V. Form G-321-V did not require review of visual inspection NDE records. The inspectors verified, by review of records, the required visual inspections of structural steel welds had been performed by the fabricator and source inspected by the Contractor. The inspectors found the Contractor had previously identified the G-321-V form may not include all the specification verbiage regarding required submittals. The inspectors examined an electronic mail documenting discussions between the QA Manager and the Manager of Engineering stating the engineer had made a conscious decision regarding what was required and included that decision of the G-321-V form; accordingly, the requirements of the G-321-V form took precedence. The inspectors found the Contractor had previously addressed and acceptably resolved the issue regarding the submittal of documentation by suppliers by the decision of G-321-V precedence.

The supplier's documentation did provide evidence regarding the welding process used and the identification of the welder performing each weld, and the date of inspection.

The inspectors examined the structural steel material storage area and verified the material was stored on dunnage, properly identified, and accurately marked.

Subsequent to this inspection, the Contractor identified a number of weld deficiencies associated with recently received structural steel, wrote several NCRs documenting these deficiencies, and was taking actions to address the issues with the suppliers.

Welding Procedures

The inspectors examined the Contractor's welding procedures for compliance to the SRD, ANSI/AISC N690, AWS D1.1-92, and design documents. The Contractor was currently using a prequalified welding procedure P1-A-LH (Structural), Revision 0 welding structural steel in the LAW building. The welding procedure was qualified using the 2000 edition of AWS D1.1. The welding procedure was qualified acceptable in accordance with AWS D1.1 requirements with the exception that ANSI/AISC N690 references AWS D1.1-92 edition. The inspectors concluded the Contractor had a qualified welding procedure to weld structural steel, but needed to reconcile the two different code year requirements from ANSI/AISC N690 for AWS D1.1 (see the Finding described above).

Welding Inspection Procedures

The inspectors examined the Contractor's welding inspection procedure for compliance to the SRD, ANSI/AISC N690, AWS D1.1-92, and design documents. The Contractor is currently using VT-AWS D1.1, *Visual Examination*, Revision 3. The visual inspection procedure was acceptable in accordance with AWS D1.1 requirements with the exception that ANSI/AISC N690 references AWS D1.1-92 edition. The inspectors concluded the Contractor's visual welding inspection procedure was acceptable in accordance with the requirements of AWS D1.1 but the Contractor needed to reconcile the two different code year requirements from ANSI/AISC N690 for AWS D1.1 (see the Finding described above).

Welder Qualifications

The inspectors examined the Contractor's welder qualifications program for compliance to ANSI/AISC N690, AWS D1.1, and design documents. The Contractor was currently using procedure WQ-2, *Welding Performance Qualification Specification (AWS D1.1)*, Revision 2, dated January 23, 2003, to qualify structural steel welders. This specification referenced the 2000 edition of AWS D1.1. The welder qualification specification was acceptable in accordance with AWS D1.1 with the exception that ANSI/AISC N690 references AWS D1.1-92 edition. The inspectors concluded the Contractor was qualifying welders acceptably in accordance with the requirements of AWS D1.1 but needed to reconcile the two different code year requirements from ANSI/AISC N690 for AWS D1.1 (see the Finding described above).

Field Installation

The inspectors examined the field installation of structural steel clips being welded to embeds at the northeast corner of the LAW building. The inspectors verified the clip material, welding procedure, welder qualification, welding electrodes, and final weld acceptance were acceptable in accordance with engineering specification 24590-WTP-3PS-SS02-T0001, *Erection of Structural Steel*, Revision 0, dated September 20, 2002, and drawing 24590-BOF-DB-S13T-00016, *LAW Vitrification Building Structural Standards Steel Details*, Revision 5, dated June 8, 2003. The inspectors concluded the Contractor's program for installing structural steel in the LAW building met the requirements of the authorization bases and the current design with the exception of the need to reconcile the two different code year requirements from AISC MO16, 1989 Edition for AWS D1.1 (see the Finding described above).

1.3.3 Conclusions

The inspectors concluded the Contractor had not adequately prepared for the installation of structural steel in that Engineering had not implemented the requirements of the SRD regarding code applicability in either the technical specifications or procedures governing the fabrication and erection of structural steel. One Finding was identified for failure to implement the requirements of SRD Safety Criterion 4.1-2 (Finding Number A-03-AMWTP-RPPWTP-002-F01).

1.4 Observation of LAW Backfill and Compaction Activities (ITP I-112)

1.4.1 Inspection Scope

The inspectors examined the Contractor's programs and procedures governing the conduct of backfill and observed backfilling operations around the north side of the LAW to verify soil compaction was being conducted in accordance with industry codes and standards specified in SRD, Volume II, SC 4.1-2.

1.4.2 Observations and Assessments

The inspectors examined the following documents governing the conduct of backfill, controlled density fill, and compaction for the LAW:

- 24590-WTP-3PS-DB01-T0001, *Engineering Specification for Furnishing and Delivering Ready-Mix Concrete*, Revision 6, dated June 4, 2003.
- 24590-BOF-3PS-CE01-T0001, *Engineering Specification for Excavation and Backfill*, Revision 4, dated March 17, 2003.
- 24590-BOF-3PS-C000-T0001, *Engineering Specification For Material Testing Services*, Revision 2, dated July 12, 2002.
- 24590-LAW-DB-S13T-00003, *LAW Vitrification Building Main Building Concrete Key Plan at El (-) 21'-0"*, Revision 8, dated June 17, 2003.
- 24590-LAW-A1-A10T-01300001, *LAW Vitrification Building Architectural Elevator Plans and Sections*, Revision 0, dated October 18, 2002.

Based upon the above examinations the inspectors concluded that the Contractor had provided adequate implementation procedures for ITS backfill, adequate design drawings to assure location of ITS backfill, adequate provisions to assure only acceptable backfill would be placed, and adequate provisions for testing and documenting density test results.

The inspectors observed backfill (12 inch loose lift) and compaction on the northwest side of the LAW at elevation 658.83' and 658.71'. The inspectors observed addition of water to the backfill material for compaction and dust control purposes. The inspectors verified the Contractor

performed backfill and compaction per the above listed drawings and specifications. The inspectors verified the Contractor's soil density testing equipment was currently calibrated. The inspectors witnessed the Contractor perform density testing with a calibrated density gauge. The inspectors reviewed the Contractor's *In Place Density & Moisture Test Report* and verified acceptable density and moisture test results were documented.

The inspectors reviewed the Contractor's *Backfill Inspection Report* and verified acceptable density and moisture test results were documented for the subgrade at the east side of LAW. The inspectors verified 95 percent compaction as required by section 3.3.4 of *Engineering Specification for Excavation and Backfill* was obtained. The inspectors verified Field Change Request (FCR) # 24590-WTP-FCR-C-03-127, Revision 0 was generated to allow the Contractor to place controlled density fill at elevation 5' below rebar and up to the bottom of the mudmat on the east side of LAW. The inspectors reviewed the Contractor's Flow Consistency Report and concluded the test results met the requirements listed in Table 3 of *Engineering Specification for Furnishing and Delivering Ready-Mix Concrete* for flow consistency and unit weight.

1.4.3 Conclusions

The inspectors concluded the Contractor had provided adequate implementing procedures specifying the method to be employed for backfill and compaction efforts and reflecting the applicable codes and standards specified in SRD SC 4.1-2. The inspectors verified soil testing was performed using calibrated testing equipment. The inspectors verified controlled density fill was sampled and tested. Test results were documented per Contractor specifications and procedures.

1.5 Hot Weather Concrete Placements (ITP I-113)

1.5.1 Inspection Scope

Following the development of the LAW concrete cold joint on July 11, 2002, due to high ambient temperatures and other contributing factors, the Contractor developed extensive correction actions to ensure concrete placements were well controlled to preclude another unplanned cold joint. These actions were reviewed by inspectors previously and documented in several previous inspection reports. In late Fall 2002, the Contractor suspended hot weather concrete activities and took actions to prepare for cold weather concrete activities. With the onset of hot weather concrete activities, the inspectors verified the Contractor was taking appropriate actions to guard against potential cold joint conditions.

1.5.2 Observations and Assessments

The inspectors verified the Contractor was continuing to implement the Concrete Placement Special Instructions (CPSI) developed as a result of the July 11, 2002, cold joint. The Contractor's corrective actions to the cold joint event, including the development of the CPSI was previously documented in Section 1.2 of inspection report IR-02-011 dated September 13, 2002 (Letter Number 02-OSR-0426). The CPSI contained a number of important administrative requirements to ensure appropriate planning and communications occur prior to each large placement of concrete that is 3 feet or more thick, requiring concrete to be no more than 70 °F at

the point of placement. In addition, to add additional margin of assurance, the Contractor began placing concrete at night in early June 2003 when ambient temperatures are lower and heat issues are reduced. Since the July 11, 2002, concrete cold joint, a number of improvements at the concrete batch plant had been implemented. They included:

- Increasing the reserve of chilled water from 45,000 gals to 90,000 gals.
- Adding side slabs with sprinklers for cooling 1 ½” aggregate.
- Insulation above ground water lines.
- Bypassing the water day-tank to prevent solar heating.
- Covering rock conveyors to reduce solar heating.
- Adding an onsite ice making and storage capability.

The Contractor tested the ice delivery system to ensure its capability should it be needed. The inspectors observed this test and verified its operation. Using ice added only nominal time to the concrete batching process.

The Contractor developed Construction Guide 24590-WTP-GPG-CON-3212, *Concrete Placement*, Revision 0, with the intent of using this procedure to replace the CPSI. The inspectors reviewed this procedure and raised a number of concerns regarding the adequacy of the guide. Although many of the administrative controls found in the CPSI were found in the guide, the requirements were often optional and go-no go criteria were not clearly described. Also, although the guide was supposed to be for hot weather concrete placements, a large portion of the guide contained cold weather provisions and was silent regarding related hot weather provisions. The inspectors discussed these concerns with construction management and were informed the guide would not be implemented until it was thoroughly reviewed and discussed with the inspectors. The Contractor stated they would continue to implement the CPSI until the review was completed. Follow-up on the Contractor’s actions to address inspector concerns regarding the adequacy of Construction Guide 24590-WTP-GPG-CON-3212, will be tracked as assessment follow-up item A-03-AMWTP-RPPWTP-002-A02.

As discussed in the following section of this report, the inspectors observed a large number of placements during the inspection period and verified the Contractor was taking adequate precautions to ensure concrete discharge temperatures were controlled and cold joints did not occur.

1.5.3 Conclusions

With the onset of summer hot weather, the inspectors verified the Contractor reinitiated the corrective actions implemented last year to ensure 70°F concrete placements during hot weather are adequately controlled to preclude future concrete cold joints.

1.6 Adequacy of Forms, Reinforcement Steel, and Embedded Steel Items and Associated Concrete Placements (ITP I-113)

1.6.1 Inspection Scope

The inspectors examined the Contractor's and subcontractors' procedures and engineering technical specifications governing the installation of reinforcement steel, embedment plates, and structural concrete, to determine whether the stated activities conformed to authorization basis (AB) specified industry codes and standards, specified in the SRD, Volume II, SC 4.1-2. Further, for the following placements, the inspectors examined the installations of reinforcing steel, and for selected Pour Cards, concrete placement activities in the field to assess whether those activities had been conducted in accordance with Contractor's programs, procedures, and AB requirements.

- Concrete Pour Card - HLW-015
- Concrete Pour Card - HLW-025
- Concrete Pour Card - LAW-023
- Concrete Pour Card - LAW-027
- Concrete Pour Card - LAW-028
- Concrete Pour Card - LAW-045
- Concrete Pour Card - PCC-0016
- Concrete Pour Card - PCC-091B
- Concrete Pour Card - PCC-091C
- Concrete Pour Card - PCC-092B
- Concrete Pour Card - PCC-092C
- Concrete Pour Card - PCC-0042
- Concrete Pour Card - PCC-0044
- Concrete Pour Card - PTF-C-0009-2-A
- Concrete Pour Card - PTF-C-0028
- Concrete Pour Card - PTF-C-0029
- Concrete Pour Card - PTF-C-0032
- Concrete Pour Card - PTF-C-0034

1.6.2 Observations and Assessments

The inspectors examined the following documents governing the installation and inspection of ITS structural concrete:

- 24590-WTP-DD-S13T-00009, *Civil/Structural Standards Wall Penetration Details*, Revision 4, dated February 27, 2003.
- 24590-WTP-DG-S13T-00005, *Civil/Structural Standards Concrete Reinforcement Details*, Revision 2, dated April 24, 2003.

- 24590-PTF-DG-S13T-00006, *Pretreatment Facility Structural Concrete Reinforcement Pit Sections A & B*, Revision 6, dated March 10, 2003.
- 24590-WTP-3PS-D000-T0001, *Engineering Specification For Concrete Work*, Revision 4, dated June 11, 2003.
- 24590-WTP-3PS-DB01-T0001, *Engineering Specification For Furnishing and Delivering Ready-Mixed Concrete*, Revision 6, dated June 4, 2003.
- 24590-BOF-3PS-C000-T0001, *Engineering Specification For Material Testing Services*, Revision 2, dated July 12, 2002.
- 24590-WTP-3PS-FA01-T0001, *Engineering Specification For Furnishing of Anchor Bolts (Rods)*, Revision 1, dated February 5, 2002.
- 24590-WTP-GPP-CON-3203, *Concrete Operations (Including Supply)*, Revision 5, dated June 26, 2003.

The inspectors concluded the documents described above continued to conform to the Codes and Standards required by SRD, SC 4.1.2, and contained the necessary installation requirements to perform the work.

In preparation for walk downs of recently installed reinforcement steel and other components incorporated within the placements described above, the inspectors examined drawings in the areas of concrete reinforcement, forming, and arrangement, and examined construction work activities associated with the placements for conformance within the requirements of the applicable drawings. The inspectors concluded the drawings were the most current revisions at the time of the walk down.

Installation of Forms, Reinforcement Steel, and Embedments

For the placements listed above, the inspectors witnessed in-process final inspections of installed forms, reinforcement steel, and embedments performed by QC inspectors. These inspections included verifying embed plates, form configuration, clear cover requirements, reinforcement placement, splice lengths, joint preparation, and final clean up conformed to applicable drawings and procedure requirements. In addition, the inspectors performed a general inspection of the above items and other attributes shown on the drawings applicable to the items being inspected. Below are discrepancies identified during in-process inspections after the Contractor had signed "Release for Placement" on the Concrete Pour Cards:

The inspectors performed an in-process inspection of PTF Basemat Foundation area 21-A East after the Concrete Pour Card had been signed off and released for placement. The inspectors identified to the Contractor three areas along the east wall forms that contained minimum rebar clear-cover less than the 1 ½" required by drawing 24590-PTF-DO-S13T-00008, *Pretreatment Facility Structural Concrete Notes and Legend*, Revision 5, dated March 11, 2003. The inspectors also identified to the Contractor two areas on the top mat that exceeded the maximum

rebar spacing of 18” required by specification 24590-WTP-3PS-D000T0001, *Engineering Specification for Concrete Work*, Revision 4, dated June 11, 2003. These items were subsequently identified on the Package Punchlist attached to Concrete Pour Card # PTF-C-0032. The Contractor reworked the items and resigned the Concrete Pour Card before the concrete was placed.

The inspectors performed an in-process inspection of PTF Basemat Foundation area 21-A West after the Concrete Pour Card was signed off and released for placement. The inspectors identified two # 11 north/south top mat bars that were lap spliced (non-contact) greater than the 6 inch apart requirement of drawing 24590-PTF-D0-S13T-00008, *Pretreatment Facility Structural Concrete Notes & Legend*, Revision 5, dated March 11, 2003. The Contractor documented the discrepancy on NCR # 24590-WTP-NCR-CON-03-118. The Contractor dispositioned the above listed NCR “use-as-is”. The inspectors verified the Contractor re-signed the Concrete Pour Card after the NCR disposition and before the placement.

The inspectors performed an in-process inspection of PV Pit Wall #11 after the Concrete Pour Card was signed off and released for placement. The inspectors identified to the Contractor out-of-plane lap splices from elevation (-) 8’-0” to elevation (-) 6’-0” shown by Detail 1 on drawing 24590-PTF-DG-S13T-00006, *Pretreatment Facility Structural Concrete Reinforcement Pit Sections A & B*, dated March 10, 2003. Out-of-plane lap splices for other PV pit walls were documented on Field Change Requests by the Contractor. This area, from elevation (-) 8’ to (-) 6’ was not covered by any previous documentation. The Contractor placed concrete placement PV Pit Wall # 9A, located on the south half of the same wall as PV Pit Wall #11, on July 1, 2003. Out-of-plane lap splices also existed in this placement. The Contractor did not have documentation covering this area either. Subsequently, the Contractor generated NCR 24590-WTP-NCR-CON-03-122 documenting the discrepancy. The NCR was closed before PV Pit Wall # 11 was placed. The Concrete Pour Card was re-signed by the Contractor before concrete was placed.

For the examples described above, failure to ensure rebar was installed in accordance with the drawings, procedures, and specifications, is considered a Finding against QAM Policy Q-05.1, Section 3.1.1 for failure to follow procedures or drawings (Finding A-03-AMWTP-RPPWTP-002-F03). As described above, the Contractor took appropriate actions to address these examples and this Finding is considered closed.

Concrete Placements

- Concrete Pour Card – HLW-025
- Concrete Pour Card – LAW-028
- Concrete Pour Card – PTF-C-028
- Concrete Pour Card – PTF-C-029
- Concrete Pour Card – PTF-C-034
- Concrete Pour Card – PCC-0016
- Concrete Pour Card – PCC-0042
- Concrete Pour Card – PCC-0044

For the placements listed above, the inspectors observed field engineering staff performing concrete receipt activities and observed their review of the batch tickets, as required by Section 3.11.2 of *Concrete Operations (Including Supply)*. The inspectors observed field engineer occasionally directing the Material Testing subcontractor to perform additional testing of the delivered concrete to ensure conformance with specification requirements. The inspectors concluded these activities were performed in accordance with established requirements.

The inspectors observed the Materials Testing subcontractor field technicians performing concrete receipt activities, observed the review of batch tickets, and observed recording of information required by Section 3.2.1 of the *Engineering Specification for Material Testing Services*. The inspectors concluded these activities and documents were performed or completed in accordance with the specification.

The inspectors examined the conduct of testing for concrete temperature, slump, and unit weight, and observed filling and capping the 6-inch by 12-inch compressive test cylinders, and the field storage of the test cylinders for the placements identified above. The inspectors concluded the Material Testing subcontractor technicians were performing these testing activities in accordance with their procedures, the applicable American Society for Testing and Materials (ASTM) standards, and Contractor's specifications.

The inspectors witnessed the placement of concrete, for the placements listed above, and concluded the concrete was being produced, placed, consolidated, and tested in accordance with procedures, specifications, and required codes and standards. The inspectors concluded the Contractor was conforming with the maximum 24 inch lift height, as required by Section 3.7.4 of *Engineering Specification for Concrete Work*. The inspectors observed the 3 or 4 vertical foot per hour maximum placement rate, established by the panel manufacturer, was being maintained. Wall placements were being performed using cut-away tremie systems, which insured concrete was being placed in a controlled manner. The process also ensured the concrete did not exceed the maximum free fall distance, as outlined in Section 3.7.1 of *Engineering Specification for Concrete Work*.

The inspectors examined the above listed Concrete Pour Cards for placements observed during this inspection period, and concluded the required signatures were in place prior to the start of the placements.

The inspectors observed revibration efforts on the above identified wall placements or when wall dowels are located for future wall placements in basemat areas, after completion of the final lifts and before the concrete has reached its initial set.

1.6.3 Conclusions

The inspectors concluded the following:

- Concrete testing was performed in accordance with the technical specifications, procedures, and applicable ASTM requirements.

- With the exception of several examples, reinforcement steel installations listed above and other attributes associated with the concrete placements for the LAW, HLW, and PTF were performed in accordance with established procedures, specifications, and drawings. Qualified inspectors were performing QC activities for this work, and QC activities were documented as required by procedures. One Finding was identified to document several examples where reinforcement steel was not installed in accordance with procedures, specifications, or drawings (Finding A-03-AMWTP-RPPWTP-002-F03).

1.7 Adequacy of Fire Protection Piping System Work Activities (ITP I-138)

1.7.1 Inspection Scope

The SRD, Volume II, Section 4.5, *Fire Protection*, safety criterion required the Contractor to conform with National Fire Protection Association (NFPA) 801, *Standard for Facilities Handling Radioactive Materials*, 1995 Edition. NFPA 801 required conformance with several other NFPA standards, including the 1992 addition of the NFPA-24, *Standard for the Installation of Private Fire Service Mains and their Appurtenances*.

The inspectors examined one hydrostatic test packages for conformance with SRD Safety Criteria specified in Volume II, Section 4.5 requirements and observed the conduct of hydrostatic testing on one fire protection piping segments to determine whether the testing conformed to the requirements.

1.7.2 Observations and Assessments

In preparation for inspecting firewater testing activities, the inspectors examined the following documents governing the installation, flushing and cleaning, and hydrostatic testing of the Fire Service Water System:

- 24590-BOF-C2-C12T-00015, *Firewater, Potable Water, Plant Service Air Yard Utility Composite Plan – Area 15*, Revision 2, dated September 9, 2002.

The inspectors examined test packages 24590-WTP-PTR-P-03-0058, Revision 0, BOF Area 15. The inspectors verified the proper test boundaries were specified, valve line-ups were thorough, and the required test parameters had been specified. The inspectors verified the calibration of the pressure gauge was current, the appropriate calibration stickers were affixed, and the gauge range conformed to the requirements established by National Fire Protection Association (NFPA), *Standard for the Installation of Private Fire Service Mains and their Appurtenance*.

The inspectors observed the conduct of hydrostatic testing on a portion of the fire service water piping in Area 15 and verified the hydrostatic testing had been conducted in accordance with the Contractor's established requirements and NFPA 24, and the system tests conformed to established requirements regarding leakage and time at pressure.

1.7.3 Conclusions

The inspectors concluded the Contractor had accomplished hydrostatic testing of fire service water piping systems in accordance with established requirements.

1.8 Adequacy of BOP Construction Activities (ORP M 414.1-4)

1.8.1 Inspection Scope

The inspectors reviewed selected balance-of-plant (BOP) construction activities to determine if the Contractor was performing these activities in accordance with the QAM, approved design, technical specifications, construction procedures, work packages, and other related documents.

1.8.2 Observations and Assessments

Installation of Electrical Duct Banks

The inspectors witnessed the installation of the thicken electrical duct bank from station N3.592/E10.772 to station N3.592/E10.620. The inspectors verified the conduit material and size was acceptable in accordance with drawing 24590-BOF-CO-50-00008, *Electrical Duck Bank System Plan Area – 8*, Revision 3, dated February 5, 2003. The inspectors verified the reinforcement around the electrical conduits were acceptable in accordance with drawing 24590-BOF-CO-50-00010, *Non-ITS Duck Bank Sections and Details*, Revision 2, dated July 18, 2002. The inspectors concluded the conduit and reinforcement were installed in an acceptable manner in accordance with the design requirements.

The inspectors witnessed the installation of the electrical duct bank conduits and reinforcement at the east end of the switchgear building 87 to the existing duct bank from the WTP substation. The inspectors verified the conduit material and size was acceptable in accordance with drawing 24590-BOF-E0-E54T-00016, *Electrical Duct Bank System Site Plan – Area 5*, Revision 0, dated April 3, 2003. The inspectors verified the reinforcement around the electrical conduits were acceptable in accordance with drawing 24590-BOF-CO-50-00010, *Non-ITS Duck Bank Sections and Details*, Revision 2, dated July 18, 2002. The inspectors concluded the conduit and reinforcement were acceptable in accordance with the design requirements.

Building 87 (Switchgear Building)

The inspectors performed in process inspection of the North Grade Beam, and North and South slabs of Building 87 (Switchgear Building). With the following exceptions, the inspectors determined rebar size, (for placement pour cards 24590-BOF-DBR-CON-03-C134, 141 and 142) lap length (spot check), and anchor bolt type; size, and location were in accordance with the drawings and specifications listed below. For placement number 24590-BOF-DBR-CON-03-C134 (north grade beam) the inspectors identified missing splice bars at wall lines 5 and A and short lap splices at wall lines 4 and A to the Contractor during in process inspections. The Contractor had released the placement for concrete on the Concrete Pour Card. The Contractor

corrected the deficiencies before the concrete was placed. The Contractor re-signed the Concrete Pour Cards before the placements.

- 24590-WTP-3PS-D000-T0001, *Engineering Specification For Concrete Work*, Revision 4, dated June 11, 2003.
- 24590-BOF-3PS-C000-T0001, *Engineering Specification For Material Testing Services*, Revision 2, dated July 12, 2002.
- 24590-BOF-DB-S13T-00001, *Switchgear Building Foundation & Slab Plans At El 0'-0" And El (-) 9'- 0"*, Revision 2, dated May 8, 2003.
- 24590-BOF-DB-S13T-00003, *Switchgear Building Foundation Vault Reinforcing Details*, Revision 1, dated December 17, 2002.
- 24590-BOF-DB-S13T-00004, *Switchgear Building Foundation – Grade Beams And Slab Reinforcing Details*, Revision 0, dated December 17, 2002.

Building 91 (BOF Switchgear Building)

The inspectors performed in process inspection of footings for Building 91 (BOF Switchgear Building). The inspectors determined rebar size (for concrete pour card 24590-BOF-DBR-CON-03-C143), development length (spot check) and location were in accordance with drawings and specification listed below.

- 24590-BOF-DB-S13T-00005, *BOF Switchgear Building Concrete Foundation Plans*, Revision 4, dated June 14, 2003.
- 24590-BOF-DB-S13T-00006, *BOF Switchgear Building Foundation – Grade Beams, Footing and Slab Reinforcement Details*, Revision 2, dated May 20, 2003.
- 24590-WTP-3PS-D000-T0001, *Engineering Specification For Concrete Work*, Revision 4, dated June 11, 2003.

Installation of Chilled Water, Cooling Water Pipelines

The inspectors reviewed the pipe material and witnessed the installation of the 48-inch Cooling Water system. The inspectors verified the markings on the pipe/fittings material were acceptable in accordance with the Contractor's specification 24590-BOF-3PI-CY01-00001, *Installation of Cooling Water, Chilled Water Ductile Iron Pipelines*, Revision 0, dated February 19, 2003, and 24590-WTP-3PB-P000-TH20A, *Piping Material Classification – Pipe Class H20A*, Revision 0, dated January 29, 2003. The inspectors concluded the piping/fittings were acceptable in accordance with the Contractor's specifications. The inspectors witnessed the installation of cooling water line south of the LAW building. The Contractor was using the manufactures instructions for installing a restrained joint ductile iron pipe assemblies system. The inspectors concluded the Contractor was installing the cooling water system acceptable in accordance with

the manufactures instructions and drawing 24590-BOF-CO-PCW-00012, *Plant Cooling Water Plan C1 and C2 Profile for C1 – Sta 0+00 to Sta 1+59.7*, Revision 0, dated March, 11, 2003.

The inspectors reviewed the materials and welding, and witnessed the installation of the 48-inch Cooling Water system. The inspectors verified the markings on the pipe/fittings were acceptable in accordance with the Contractor's specification 24590-BOF-3PI-CY01-00001, *Installation of Cooling Water, Chilled Water Ductile Iron Pipelines*, Revision 0, dated February 19, 2003, and 24590-WTP-3PB-P000-TH20A, *Piping Material Classification – Pipe Class H20A*, Revision 0, dated January 29, 2003. The inspectors concluded the piping/fittings were acceptable in accordance with the Contractor's specifications. The inspectors witnessed the welding of the ½" retaining bar around the 48" pipe. The inspectors concluded that the Contractor was following their approved welding procedure (P1, AWWA C151-A, Revision 1, dated May 29, 2003) and the U.S. Pipe manufactures instructions. The inspectors witnessed the installation of the cooling water line south of the HLW building. The Contractor was using the manufacture's instructions for installing a restrained joint ductile iron pipe assembly system. The inspectors concluded the Contractor was installing the cooling water system in an acceptable manner in accordance with the manufactures instructions and drawing 24590-BOF-CO-PCW-00012, *Plant Cooling Water Plan C1 and C2 Profile for C1 – Sta 0+00 to Sta 1+59.7*, Revision 0, dated March, 11, 2003.

Plant Wash and Disposal System Hydro Testing PTF Building

The inspectors examined testing on sections of the PT Facility Basemat drain piping to determine whether the testing was performed in accordance with the requirements of 24590-WTP-3PS-PS02-T0003, *Engineering Specification for Field Fabrication and Installation of Piping*, Revision 0, dated June 17, 2002.

The inspectors witnessed hydro test 24590-WTP-PTR-P-03-0005. The hydro test was required to be a 10-foot static head of water to be held for 15 minutes with no drop in the water level. The inspectors examined leak testing performed on PT Basemat drainpipe spools for C2 and C3 systems. There was no drop in water level during the fifteen-minute test. The inspectors concluded the Contractor conducted the pressure test acceptably in accordance with the approved procedure.

Tool Room #2

The inspectors examined a temporary 60-amp panelboard installed at Tool Room #2 located south of the T-4 building, as specified in *Control of Temporary Electrical Installations*, 24590-WTP-GPP-CON-3311, Revision 2, dated May 8, 2003, for conformance with the 2002 National Electrical Code.

To perform this inspection the inspectors reviewed the Contractor's Temporary Power Request Form Number 24590-WTP-EIP-CON-03-051.

With one exception the electrical equipment described above was found to comply with the National Electric Code (NEC) requirements. The following NEC noncompliance issue was identified and discussed with the Contractor:

- NEC Article 2002, Article 408.20 requires the equipment grounding conductor terminal bar to be bonded to the panelboard frame.

The Contractor had not installed the bonding jumper from the equipment grounding conductor terminal bar to the panelboard enclosure. This NEC noncompliance issue was discussed with the Contractor field engineer and the Contractor subsequently installed the bonding jumper. This resolves this issue.

Tower Crane Elevators

The inspectors examined, in conjunction with the Contractor's inspector, the electrical panel installed with the elevator located on the PTF Tower Crane, as specified in *Control of Temporary Electrical Installations*, 24590-WTP-GPP-CON-3311, Revision 2, dated May 8, 2003, for conformance with the 2002 National Electrical Code. Note: The tower crane elevator panels located at the HLW and the LAW are identical to the one inspected at the PTF.

Intertek Testing Services NA, Inc. (formerly ETL) performed the evaluation and acceptance of the elevator control panels, certifying compliance to UL 508A *Industrial Control Panels* and NFPA/70 National Electrical Code, 2002 edition prior to delivery to the site. After research, the inspectors determined Intertek evaluated the components, but had not evaluated the elevator electrical equipment as an assembly.

The inspectors and Contractor identified the following NEC code deficiencies which were also documented by the Contractor on NEC Inspection Report #24590-WTP-EIP-CON-03-048.

- NEC-2002, Article 620.5 & Article 110.26(A)(2) requires the width of the working space in front of electric equipment to be either the width of the equipment; or 30 inches, whichever is greater.

The control panels installed in the elevators did not have the 30-inch working space. With the door open, the working space was approximately 21 inches. The door had 220-volt lights and switches mounted on the door, adding to the hazard of working on the panel energized. Inspectors' discussions with the elevator installer, verified this panel would require work to be performed with an energized panel for trouble shooting purposes and maintenance.

- NEC-2002, Article 110.3(B) requires listed or labeled equipment to be installed and used in accordance with any instructions included in the listing and labeling.

The electric diagram provided with the elevator did not reflect the as fabricated installation of the Cage Electric Panel. The wiring diagram showed a 480-220 volt control transformer, the actual transformer was a 480-220/120-volt. The wiring diagram also did not show where the 120-volt supply to the battery charger was derived from or the 2-amp circuit breaker protecting this circuit.

- NEC-2002, Article 250.20(B) requires alternating-current systems to be grounded where the system can be grounded so the maximum voltage to ground on the ungrounded conductors does not exceed 150 volts. NEC-2002, Article 250.26 requires the conductor to be grounded in a single-phase, 3-wire ac system to the neutral conductor.

The grounding of the 480–220/120-volt control transformer did not meet the above requirement. The neutral conductor was not grounded, one of the phase conductors was grounded resulting in 220 volts phase to phase, and also 220 volt phase to ground.

- NEC-2002, Article 250.24 states “A grounding connection shall not be made to any grounded circuit conductor on the load side of the service disconnecting means except as otherwise permitted in the article.

The neutral (grounded) conductor installed for the battery charger receptacle was grounded at the control transformer and also again at the equipment grounding terminal bar.

- NEC-2002, Article 200.6(A) requires insulated grounded conductors of #6 AWG or smaller to be identified by a continuous white or gray outer finish.

The control transformer’s grounded conductor was an orange conductor, therefore not meeting the above requirement.

- NEC-2002, Article 430.7(A) requires a motor to be marked with the rated horsepower if 1/8 hp or larger.

The horsepower rating was not identified on the motor nameplate.

- NEC-2002, Article 310.11 requires conductors and cables to be marked with the following information: 1) maximum rated voltage; 2) the proper type letter or letters for the type of wire or cable; 3) the manufacturer’s name, trademark, or other distinctive marking; and 4) the AWG size or circular mil area.

Some cables were not marked with this information.

Resolution of these items will be tracked as follow-up item A-03-AMWTP-RPPWTP-002-A04.

Pretreatment Facility Conduit Installation

The inspectors examined the 1” rigid steel conduits installed for lighting circuits associated with work package PTF-E-L-0001, prior to concrete placements at the Pretreatment Facility. In preparation for the examination, the inspectors reviewed the following documents governing the installation:

- Field Sketch 24590-PTF-FSK-CON-E-03-006, *Embedded Lighting Conduit Pretreatment Facility Elevation 0'0"*, Revision 1, dated May 13, 2003, between columns 25 through 27 and E through H.
- Field Sketch 24590-PTF-FSK-CON-E-03-005, *Embedded Lighting Conduit Pretreatment Facility Elevation 0'0"*, Revision 2, dated May 21, 2003, between columns 30 through 33 and AA through H.
- Field Sketch 24590-PTF-FSK-CON-E-03-006, *Embedded Lighting Conduit Pretreatment Facility Elevation 0'0"*, Revision 1, dated May 13, 2003, between columns 30 through 33 and AA through H.
- Field Sketch 24590-PTF-FSK-CON-E-03-011, *Embedded Lighting Conduit Pretreatment Facility Elevation 0'0"*, Revision 2, dated May 13, 2003, between columns 30 through 33 and H through N.
- Field Sketch 24590-PTF-FSK-CON-E-03-002, *Embedded Lighting Conduit Pretreatment Facility Elevation 0'0"*, Revision 2, dated May 21, 2003, between columns 07 through 14 and A through E.

The lighting drawings showed all exposed conduit runs. Design Change Notice (DCN) 24590-WTP-E0N-E13T-00001 allowed embedding of unscheduled conduits, such as lighting. The Contractor redlined the above field sketch drawings for actual configuration of the conduit runs and the Contractor plans to generate a field change notice to incorporate the final location of embedded conduits.

The inspectors examined the 2" and 6" rigid steel conduits installed for power circuits associated with work package PTF-E-L-0001, prior to concrete placements at the Pretreatment Facility. In preparation for the examination, the inspectors reviewed the following documents governing the installation:

- 24590-PTF-E21-E54T-00002, *Pretreatment Facility Embedded Conduit Layout Elevation 0'0" Area 5*, Revision 1, dated November 1, 2002.
- 24590-PTF-E2-E53T-00019, *Pretreatment Facility Raceway Layout Elevation (-) 19'0" Area 10*, Revision 0, dated September 5, 2002, between columns G through H at column 30.

The inspectors concluded the Contractor's installation conformed to the above documents, redlined field sketches, and the 2002 National Electrical Code.

Pretreatment Facility Grounding Installation

The inspectors examined the grounding cables, splices, and grounding configuration prior to concrete placement at the Pretreatment Facility, associated with work package PTF-E-G-0001.

In preparation for the examination, the inspectors reviewed the following documents governing the installation and inspection of the grounding cable layout:

- 24590-WTP-GPP-CON-3308, *Grounding Procedure*, Revision 1, dated April 9, 2003.
- 24590-PTF-E22-GRE-00005, *Pretreatment Facility Grounding Layout EL. 0'0" Area 3*, Revision 2, dated November 11, 2002, between column 22 through 27 and E through G.
- 24590-PTF-E22-GRE-00008, *Pretreatment Facility Grounding Layout EL. 0'0" Area 6*, Revision 2, dated November 11, 2002, between columns 22 through 27 and G through H.
- 24590-PTF-E22-GRE-00005, *Pretreatment Facility Grounding Layout EL. 0'0" Area 3*, Revision 2, dated November 11, 2002, between column 30 through 33 and AA through N.
- 24590-PTF-E22-GRE-00008, *Pretreatment Facility Grounding Layout EL. 0'0" Area 6*, Revision 2, dated November 11, 2002, between columns 30 through 33 and AA through H.
- 24590-PTF-E22-GRE-00003, *Pretreatment Facility Grounding Layout EL. 0'0" Area 1*, Revision 1, dated August 29, 2002, between columns 07 through 10 and A through E.

The inspectors concluded the Contractor's grounding cable installation conformed to the documents described above and to the 2002 National Electrical Code.

Power Distribution Rack PDR-002

The inspectors examined temporary power distribution rack PDR-002 located at the northwest corner of the PTF, as specified in *Control of Temporary Electrical Installations*, 24590-WTP-GPP-CON-3311, Revision 2, dated May 8, 2003, for conformance with the 2002 National Electrical Code.

To perform this inspection the inspectors reviewed the Contractor's Temporary Power Request Form Number 24590-WTP-EIP-CON-03-057. The following electrical equipment installed at PDR-002 was examined: 1) 480-volt, 400 amp non-fused main disconnect; 2) 480-volt, 225 amp panelboard (branch circuits 1, 3 and 9, 11); 3) 12" x 12" junction box with four cord drops for welders; and 4) three 200 amp and one 100 amp spare disconnects (line side only).

The following NEC noncompliance issues were identified and discussed with the Contractor:

NEC 2002, Article 250.32(E) requires a 1/0 grounding electrode conductor for the 400 amp main disconnect with 500 kcmil feeder, sized per Table 250.66.

The Contractor had installed a #6 AWG grounding electrode conductor.

The inspectors discussed the above NEC noncompliance with the Contractor's electrical field engineer and the Contractor subsequently replaced the #6 grounding electrode conductor with a 1/0 conductor the same day. This resolved this issue.

Power Distribution Rack PDR-004 & PDR-005

The inspectors examined temporary power distribution rack PDR-004 & PDR-005 located at the northeast corner and south center of the PTF, as specified in *Control of Temporary Electrical Installations*, 24590-WTP-GPP-CON-3311, Revision 2, dated May 8, 2003, for conformance with the 2002 National Electrical Code.

To perform this inspection the inspectors reviewed the Contractor's Temporary Power Request Form Number 24590-WTP-EIP-CON-03-057. The following electrical equipment installed for both PDR-004 & PDR-005 was examined: 1) 480-volt, 400 amp non-fused main disconnect; 2) 480-volt, 225 amp panelboard (branch circuits 6, 8 and 14, 16); 3) 12" x 12" junction box with four cord drops for welders; and 4) three 200 amp and one 100 amp spare disconnects (line side only).

The inspectors concluded the Contractor had installed the power distribution racks listed above in accordance with the 2002 NEC.

Electrical Warehouse T-33

The inspectors examined the temporary Electrical Warehouse located north of the existing substation, as specified in *Control of Temporary Electrical Installations*, 24590-WTP-GPP-CON-3311, Revision 2, dated May 8, 2003, for conformance with the 2002 National Electrical Code.

The following electrical equipment was examined: 1) 480-volt, 400 amp non-fused disconnect; 2) 480/277 volt, three phase, four wire 400 amp main lug panelboard H-1; 3) 45 KVA three phase transformer XMFR-1; and 4) 120/208 volt, three phase, four wire, 225 amp panelboard (150 amp main).

The inspectors concluded the Contractor had installed the electrical equipment listed above in accordance with the 2002 NEC.

Temporary General Distribution Rack GDR-014 (Electrical)

The inspectors examined temporary construction general distribution rack GDR-014, located east of the PT slab, as specified in *Control of Temporary Electrical Installations*, 24590-WTP-GPP-CON-3311, Revision 2, dated May 8, 2003, for conformance with the 2002 National Electrical Code.

To perform this inspection, the inspectors reviewed the Contractor's NEC Inspection Report Number 24590-WTP-EIP-CON-03-068. The following electrical equipment was examined at the distribution rack: 1) 480-volt 200 amp main disconnect; 2) 100 amp spare disconnects (line side only); 3) 100 amp disconnect feeding pipefitter's connex; 4) 30 amp welder disconnect

(fused 30 amp); 4) junction box with cord drops (20 amp plugs); 5) 100 amp disconnect (fused 60 amp) feeding transformer; 6) 25 KVA single phase transformer; 7) 125 amp panelboard with 100 amp main; and 8) 6 x 6 wireway.

The following NEC noncompliance issue was identified and discussed with the Contractor:

- NEC 2002, Article 210.21(B) & 110.10 requires a 20 amp overcurrent protective device for 20 amp receptacle plugs.

The Contractor installed 30 amp fuses in the disconnect feeding the 20 amp receptacle plugs. This NEC noncompliance issue was discussed with the Contractor and the Contractor subsequently replaced the 30 amp fuses with 20 amp fuses. This resolves this issue.

- NEC 2002, Article 110.14 requires terminals used for multiply conductors shall be listed for such use.

The Contractor installed multiple conductors in split bolt (listed for two conductors) in the 6 X 6 wireway and 25 KVA transformer.

The inspectors discussed the above NEC noncompliance with the Contractor's electrical field engineer. This item was not reworked prior to the end of this inspection period. Resolution of this issue will be tracked as follow-up item A-03-AMWTP-RPPWTP-002-A05.

Temporary Distribution Rack at Operators Welding Area

The inspectors examined temporary distribution rack at the operators welding area east of the PT slab, as specified in *Control of Temporary Electrical Installations*, 24590-WTP-GPP-CON-3311, Revision 2, dated May 8, 2003, for conformance with the 2002 National Electrical Code.

To perform this inspection, the inspectors reviewed the Contractor's NEC Inspection Report Number 24590-WTP-EIP-CON-03-068. The following electrical equipment was examined at the distribution rack: 1) 480-volt 100 amp disconnect; 2) two 30 amp welder disconnects (fused 20 amp); 3) two junction boxes with cord drops (20 amp plugs); 4) 100 amp disconnect (fused 60 amp) feeding transformer; 5) 25 KVA single phase transformer; 6) 125 amp panelboard with 100 amp main; and 7) a 6 x 6 wireway.

The inspectors concluded the Contractor had installed the electrical equipment listed above in accordance with the 2002 NEC.

Re-inspection of Fuel Dispensing Station Panelboard

The inspectors re-inspected the panelboard replaced at the Fuel Dispensing Station closing the BOP Inspection Deficiency Report dated March 3, 2003, and Follow-up Item A-03-OSR-RPPWTP-001-A02. The following NEC noncompliance issues were identified and discussed with the Contractor:

NEC-1999 Article 310-15(B)(2) requires “Where the number of current-carrying conductors in a raceway or cable exceeds three, the allowable ampacity of each conductor shall be reduced as shown in Table 310.15(B)(2)(a).” The Contractor installed 13 current carrying conductors in 1” rigid conduit routed from the panelboard to the fuel station without applying the 50% adjustment factor.

This item was identified and documented in Inspection Report A-03-OSR-RPPWTP-001 when the Contractor installed the first panelboard. The inspectors had previously discussed this deficiency with the electrical field engineers and the Contractor had replaced the 20-amp circuit breakers with 15-amp breakers in the original panelboard. When the Contractor installed the new panelboard the 15 amp circuit breakers were replaced with 20 amp breakers on circuits #8 and #13. The inspectors discussed this item with the Contractor and the Contractor exchanged the spare 15 amp breaker installed on circuit #14 with circuit #8. The other 15 amp circuit breaker (circuit #13) was subsequently ordered and will be replaced when it arrives on site. Resolution of this will be tracked as follow-up item A-03-AMWTP-RPPWTP-002-A06.

1.8.3 Conclusions

The inspectors concluded the following:

- The inspectors verified rebar and embedded item placement for Switchgear Building # 87 Grade Beam (north beam), North and South slabs on grade, and Electrical Duct Banks were installed in accordance with technical specifications, procedures, and required codes and standards.
- The inspectors verified the concrete for the Switchgear Building and Electrical Duct Banks was produced, placed, and consolidated in accordance with technical specifications, procedures, and required codes and standards.
- The inspectors concluded the installation and welding of the 48-inch Cooling Water System was performed in accordance with specifications, procedures, and manufactures recommendations.
- The inspectors concluded the hydrostatic tests of the Plant Wash and Disposal System segments were conducted in accordance with approved procedures and met acceptance criteria.
- After inspectors notified the Contractor of NEC Article 408.20 requirement to bond the terminal bar to the panelboard enclosure at Tool Room #2, the deficiency was corrected.
- Intertek Testing Services NA, Inc. performed the evaluation and acceptance of the elevator control panels, certifying compliance to UL 508A *Industrial Control Panels* and the NEC. Intertek evaluated the components, but had not evaluated the elevator electrical equipment as an assembly. The inspectors and Contractor jointly identified multiply

NEC code deficiencies. Corrective actions to address these items are being tracked as Assessment Follow-up Item A-03-AMWTP-RPPWTP-002-A04.

- PTF conduit installations and grounding installations conformed to governing installation requirements including the 2002 NEC.
- After inspectors notified the Contractor of NEC Article 250.32(E) requiring a 1/0 AWG grounding electrode conductor at Power Distribution Rack PDR-002, the deficiency was corrected.
- Electrical installation at Power Distribution Racks PDR-004 and PDR-005, Electrical Warehouse T-33, and Distribution Rack at the Operators Welding Area were in accordance the 2002 NEC.
- General Distribution Rack GDR-014 overcurrent protection did not meet NEC Article 210.21(B) and terminations did not meet Article 110.14. The inspectors notified the Contractor and the correct fuses were installed, correcting the first item. Corrective actions to address the second item are being tracked as Assessment Follow-up Item A-03-AMWTP-RPPWTP-002-A05.
- The Contractor replaced the three-phase panelboard with the correct single-phase panelboard at the Fuel Dispensing Station closing the BOP Inspection Deficiency Report dated March 03, 2003, and Follow-up Item A-03-OSR-RPPWTP-001-A02. The new panelboard branch circuits did not comply with the adjustment factors as stated in NEC 310.15. Corrective actions to address this issue are being tracked as Assessment Follow-up Item A-03-AMWTP-RPPWTP-002-A06.

1.9 Review of the Independent, Qualified, Registered Professional Engineer (ITP I-135)

1.9.1 Inspection Scope

To support Washington State Department of Ecology Dangerous Waste Permit independent inspection requirements, the Contractor procured the services of an independent, qualified, registered professional engineer, (IQRPE) (Caliber Inspection) to perform independent inspections of certain tanks and equipment specified in the Dangerous Waste Permit. This inspection reviewed the IQRPE inspection plan to determine if the plan adequately covered the Dangerous Waste Permit requirements. To accomplish this activity the inspectors reviewed the following documents:

- Washington State Department of Ecology *Guidance for Assessing and Certifying Tank Systems that Store and Treat Dangerous Waste*, dated June 1994, Publication No. 94-114.
- Results of the Contractor's review of Caliber Inspection Quality Assurance Manual Revision 6, dated December 31, 2002, CCN:049451.

- Caliber Inspection Report, dated May 14, 2003.
- Tank Installation Inspection Plan, Revision 1.0, dated May 2, 2003.
- Washington Administrative Code 173-303.

1.9.2 Observations and Assessments

The inspectors reviewed the IQRPE inspection plans against the requirements contained in the Washington Administrative Code (WAC) 173-303 regarding IQRPE inspections to determine if the planned activities would meet these requirements. The inspectors specifically took the WAC requirements for the IQRPE and searched for the same action in the IQRPE inspection plans.

The inspectors determined the WAC requirements were adequately incorporated in the inspections plans. From a review of the May 14, 2003, IQRPE inspection report, the inspectors determined the IQRPE inspectors were working in accordance with the inspection plan.

1.9.3 Conclusion

Based on a review of the IQRPE inspection plans and recent inspection report, the inspectors determined the IQRPE subcontractor (Caliber Inspection) was adequately implementing the requirements of the WAC regarding performing independent reviews of tanks and equipment.

1.10 IH&S Oversight (ITP I-162)

1.10.1 Inspection Scope

The inspections in this area focused on the implementation of the Contract industrial health and safety requirements described in ORP M 440.1-2, *Industrial Hygiene and Safety Regulatory Plan for the Waste Treatment Plant Contractor*. Specifically, the inspectors assessed compliance to the requirements of the Contractor's *Nonradiological Worker Safety and Health Plan (HSP)*, 24590-WTP-PL-IS-01-001, Revision 3, dated May 6, 2003, for the River Protection Project Waste Treatment and Immobilization Plant, which had been reviewed and approved by the ORP, along with applicable requirements specified in ORP M 440.1.2. Areas reviewed included Contractor oversight of fire protection issues, industrial hygiene, elevator safety, subcontractor safety, and hoisting and rigging activities.

1.10.2 Observations and Assessments

General:

The inspectors conducted a walkthrough inspection of the PT facility where both the Contractor safety engineer and the inspectors noticed required whip checks on the air manifold were missing. The Contractor safety engineer took immediate corrective action through the area superintendent to have whip checks replaced. According to one of the workers, the whip checks were being borrowed for use on other facilities.

Tower Crane Issues:

The Contractor was placing a subcontract with a qualified Washington State elevator inspection service. The elevator inspectors will inspect the elevators and landings in accordance with recent standards published for agricultural and industrial (non-public) conveyances such as those on the tower cranes.

The inspectors inspected one tower crane elevator landing (all landings are identical) and determined the landings conformed to the requirements of 29 CFR 1926.502. However, some of the original tower crane decking, used on the landing was deformed and required upgrading (see previous open item (assessment follow-up item A-03-OSR-RPPWTP-006-A02) in inspection report A-03-OSR-RPPWTP-008.

The Contractor was mitigating the above-mentioned open item dealing with ladder ways and footwalk decking. The Contractor informed the inspectors engineering was examining alternative, more substantial, decking material to be installed on all footwalks. The inspectors were informed Contractor management had initiated a field material request for new footwalk material to replace the vendor supplied decking. However, because of the increased weight of the new, more substantial, decking material, the Contractor must seek formal approval from the crane vendor before any repairs would be made.

The inspectors walked through the technique used for rack maintenance on the elevator with a Contractor mechanic. Based upon the walk-through, the inspectors determined if the lock and tag procedure were followed, the maintenance could be done without any worker being exposed to unprotected live electrical circuits behind the cab panel. The mechanic or elevator inspector must activate the inspection switch behind the control panel door prior to performing maintenance or service. This practice required the worker or vendor to blind reach for the switch over exposed energized parts behind the control panel door. Blind reaching was not in conformance with the requirements of NFPA 70-E. The inspectors agreed sound lock and tag procedure adherence would protect personnel needing to activate the inspection switch; however, ultimately a redesign of the electrical panel must be undertaken to eliminate long-term reliance upon administrative procedures, i.e. lock and tag. Also, the issues regarding other periodic maintenance and working clearance requirements around the panel remained open for resolution and would be resolved with panel redesign.

The inspectors attended a meeting requested by the Contractor's general superintendent where all open issues dealing with the tower cranes were discussed. The general superintendent made verbal commitments that many of the issues (not all) would be resolved promptly in a conforming manner. These issues will continue to be tracked by assessment follow-up item A-03-OSR-RPPWTP-006-A02.

Industrial Hygiene Issues:

The Contractor provided the Material Safety Data Sheet (MSDS) on Iron oxide particulate to the inspectors for reviewed. The inspectors also searched the National Institute of Occupational Safety and Health (NIOSH) database for any additional information regarding health studies

concerning this material. The material did not constitute a significant hazard to workers. Essentially, the material was rouge, which is used by some people daily as facial makeup. The inspectors inquired how the material was being placed on the duct bank and in what quantity. The inspectors inspected the duct bank placement on Monday June 9, 2003, and spent time with the workers and the foreman inspecting the work practices and interviewing personnel.

Two workers (finishers) were required to finish concrete associated with the duct bank concrete placement. Both were provided with disposable coveralls and heavy nitrile gloves. One worker was provided a respirator with combination cartridges and was also provided with an individual sampling pump and breathing zone cassette attached to his lapel. The other worker had been sampled on a previous duct bank placement and according to the interview had exceeded the time-weighted exposure for the TLV of iron oxide of 5-milligrams/cubic meter. This TLV non-conformance was validated by the Contractor's Industrial Hygienist. The Contractor is required to comply with the TLV as required by ORP M440-1.2 referenced above. Although the manufacturer recommended the material should be mixed with the concrete for application, the oxide is being placed in a dry form by hand on the concrete surface during finishing. The inspectors requested the results of the sampling data from the last duct bank placement from the Contractor.

None of the individuals interviewed on this placement experienced any difficulties resulting from the oxide exposure. However, they did indicate other workers, who were assigned to remove the walls and forms from the bank, had experienced some difficulty related to the dust. The inspector attempted to identify those other impacted workers and interviewed one who had been affected. As a result of the way in which the material had been applied, other crafts are exposed to the dust from the oxide. These included workers who remove the walls and forms (a job the inspectors inspected) and those who stack the used wall forms in the laydown area. One person who was interviewed by the inspectors work was exposed to the red dust and did indicate that he had become ill allegedly from either breathing or swallowing too much red dust. This person did not report the illness to the first aid station nor to his supervisor. The employee did not miss work but was complaining of joint pain when interviewed. The inspectors discussed the general flow of work and the resulting worker exposure to the oxide with an industrial hygienists and asked if the Contractor intended to evaluate other duct bank related jobs and provide employee sampling if warranted. The inspectors were informed one additional sample for iron oxide had resulted in a conforming level on another employee and the industrial hygienists had sampled yet another employee and the results were not yet processed. The Contractor informed the inspectors they intended to continue to evaluate the red dust issue.

The Contractor told the inspectors appropriate resolution of the above exposure issues would be resolved through additional hazard analysis, sampling, and work controls. The inspectors determined the Contractor was providing proper and adequate industrial hygiene attention to this area.

Structural Steel:

The inspectors observed the Contractor's preparation for installation of a permanent stairway in the LAW. The portion of the erection observed by the inspectors followed the requirements of the published JHA, which was reviewed by the inspectors.

Hoisting and Rigging:

The inspectors interviewed the oiler of a LS 278 luffing crane while operating at the HLW facility. Based upon the interview, the inspectors determined the proper pre-operational checks were being conducted and the crane was operating in accordance with the vendor specifications.

The inspectors inspected the shortening of the LAW LS 248 luffing crane. The main boom and the luffing jib were being shortened and the switches were being reset under the on-site presence of the factory representative. This particular crane was involved in an incident where it and the adjoining tower crane jib violated the required minimum airspace separation as specified within the Contractor's procedure, 24590-WTP-GPP-CON-1902, Rev 0, *Tower Crane Coordination*. Based upon the preliminary investigation the cranes did not contact, but were extremely close to one another. The Contractor took several immediate corrective actions to include retraining staff in proper crane coordination, improving the communication network, and shortening the luffing crane main boom and jib.

The inspectors determined LAW heavy lift rigging was being stored above the ground; thus preventing excess wear on wire ropes and other devices from the soil.

Balance of Facilities:

The inspectors determined an oily substance was contaminating at least a portion of the pipeline that was constructed and intended to provide oxygen to the site for welding and construction support. The existence of oily substances in an oxygen line is in non-conformance with NFPA-50 and thus with SRD, Volume II, Section 4.5 This non-conformance was brought to the attention of the Contractor by the inspectors. After some evaluation of the options, the Contractor decided not to use the existing line for oxygen transport. The issue was satisfactorily closed.

Subcontractor site Inspections:

The inspectors inspected the following subcontractor worksites in the company of the Contractor's subcontract administrator and safety engineer:

- Concrete Production and Delivery Subcontractor.
- Material Testing Subcontractor.
- Wholesale Electrical Subcontractor.
- Tank Fabrication Subcontractor.

Below are the results of these inspections. In some cases the inspectors identified non-conformances with either the Contractor's Nonradiological Safety and Health Plan or 29 CFR 1926:

Concrete Production and Delivery Subcontractor:

Housekeeping was poor on the upper level of the concrete batch plant, pneumatic and electrical powered tools were left out on the decking, wiring ran through unprotected holes in the walls, tools damaged beyond repair were found in the back of a pickup truck (a pick and a choker), personnel were required to traverse the conveyor belt structure to grease the rollers at a distance of 6' or greater above the lower level without adequate methods for fall restraint, and chute and back-up light bulb covers on the concrete trucks were significantly obscured with built up dust thereby reducing performance ability.

Material Testing Subcontractor:

This new subcontractor had just completed construction of the laboratory. The inspector reviewed their JHAs and found them to have cover the elements required of a material testing laboratory. The subcontractor was in the process of working with the Contractor to provide baseline and routine monitoring programs for hydrogen sulfide exposure while working within the hood. The inspector found no non-conforming items. The subcontractor did indicate they would be testing (destructive) asphalt. The subcontractor will need to provide bituminous off vapor sampling for employees when this process begins. The subcontractor informed the inspectors they were working very closely with the Contractor's industrial hygiene personnel for technical assistance.

Wholesale Electrical Subcontractor:

This subcontractor had not yet fully mobilized into its new facilities. The inspectors inspected their storage racks and housekeeping. The inspectors found no non-conforming items.

Tank Fabrication Subcontractor:

The inspectors determined this subcontractor conformed to the housekeeping procedures. However, they had not conformed with the crane safety requirement to provide barriers around the mobile crane counter-weight; had not placed all fire extinguishers in easy to see locations; had installed a ladder on the automatic welder landing backwards; and failed to provide documentation of correction of crane inspection issues in the crane folder.

The subcontractors and Contractor informed the inspector the non-conforming issues discussed above would be promptly corrected.

1.10.3 Conclusions

The Contractor continued to provide adequate industrial health and safety oversight at the construction facility. Several minor safety issues were identified and promptly addressed by the Contractor. Efforts continued to be taken to address Tower Crane safety issues.

1.11 Review of Assessment Follow-up Items (Inspection Administrative Procedures (IAP A-106))

The following Findings, and Follow-up Items were reviewed to determine if they could be closed. The inspectors reviewed the Contractor's description of the items, the corrective actions, and other information provided. The inspectors verified by records and, if applicable, hardware reviews, the corrective actions stated were appropriately completed.

1.11.1 (Closed Assessment Follow-up Item A-03-OSR-RPPWTP-001-A02) The Contractor had installed a 208/120-volt three-phase four-wire panelboard as a 120/240-volt single-phase, three-wire panelboard.

The Contractor replaced the three-phase panelboard with the correct single-phase panelboard with neutral switch circuit breakers (listed for gas pump applications). This resolves this issue.

1.11.2 (Closed Assessment Follow-up Item A-03-OSR-RPPWTP-008-A06) Implementation of an adequate assured grounding program, reference NEC 2002 Article 527.6 and 29 CFR 1926.404(b)(1)(i).

The Office of River Protection determined an assured equipment grounding program was not required for the 240-volt cords supplying "spider boxes" or the 480-volt welder power cords. The DOE Headquarters' Construction Safety Manager supported this interpretation (by e-mail dated June 26, 2003). This closes this follow-up item.

1.11.3 (Closed A-03-OSR-RPPWTP-009-A02) A subcontractor Discrepancy Notice implied a willful failure to follow procedures regarding failure to obtain a soil test when placing crushed rock on the construction parking lot, a non important-to-safety activity. A Material Testing inspector wrote a Discrepancy Notice indicating a construction foremen had intentionally bypassed a required soil test when compacting soil in preparation for placing crushed rock on the construction parking lot. The Contractor opened a RITS to investigate the issue. The Contractor issued NCR 24590-WTP-NCR-CON-02-242 for the missing soils test. Because this issue was reported relatively late, the Contractor issued letter CCN: 053756 from the BNI Lead Construction Subcontract Administrator to the other construction subcontractor administrators regarding the need for timeliness in reporting non-conformances.

The inspectors reviewed the material testing subcontractor G. N. Northern (GNN) records for any other discrepancy notices sent to the Contractor for missing tests and found none. Based on review of the Contractor's investigation report, the inspectors concluded there was a communication problem between the day and night shift foremen regarding when to test and not a deliberate failure to obtain the test. The Contractor had changed the field engineers working with GNN about the time the Discrepancy Notice arrived from GNN and the new field engineer did not realize there was any action required. The inspectors concluded this was an isolated case and responsible parties had subsequently been instructed on how to handle sub-contractor's discrepancy notices.

Based on the above, this item is closed.

1.11.4 (Closed A-03-OSR-RPPWTP-010-F01a) Failure to install reinforcement steel in accordance with drawings, nor obtain engineering direction prior to cutting two # 9 vertical dowels. The Contractor provided its response to the Finding on June 23, 2003, by letter CCN: 059875.

In the response to this Finding, the Contractor documented the discrepancy by NCR 24590-WTP-NCR-CON-03-032 on March 11, 2003, and closed the NCR on May 28, 2003. The Contractor also documented this issue on Corrective Action Report (CAR) 24590-WTP-CAR-QA-03-071 on March 12, 2003, and closed the CAR on June 11, 2003. The Contractor re-instructed the LAW crews that after a pour card is signed off for a particular work activity, no work to change that condition is permitted without obtaining approval from Field Engineering and QC. The Contractor is to also document any work performed after signatures are applied by marking notes in the “comments” section of the pour card. This should assure the activity is monitored and inspected.

The inspectors verified drawing 24590-WTP-DG-S13T-00005, detail 3, was revised to eliminate similar confusion regarding its applicability in the future. Although the block out in question was missing #5 diagonal reinforcement per detail 3 in the above listed drawing, the Contractor classified the construction opening as temporary. Per engineering disposition of the NCR listed above, “The construction opening will be filled with concrete and will act integrally with the rest of the concrete stub wall.”

Based on the above, this item is closed.

1.11.5 (Closed Assessment Follow-up Item A-03-AMWTP-001-A05) The Ice Trailer had #12 AWG conductors feeding the lights in the trailer, tapped off of the 50-amp cord feeding the compressor, protected by 40 amps.

The Contractor installed a 15-amp in-line fuse in the lighting circuit. This resolves this issue.

2.0 EXIT MEETING SUMMARY

The inspectors presented preliminary inspection results to members of Contractor management at an exit meeting on July 10, 2003. The Contractor acknowledged the observations and conclusions. Substantial discussion occurred between Contractor senior management and ORP senior management regarding the need for the Contractor to process Authorization Basis Change Request or a Decision-to-Deviate (DTD) in a timely manner rather than circumvent authorization basis requirements. ORP management also emphasized the importance of using the DTD process effectively when warranted rather than to needlessly stop work. The Contractor acknowledged this expectation.

3.0 REPORT BACKGROUND INFORMATION

3.1 Partial List of Persons Contacted

C. Davis, Safety Assurance Manager
J. Dougherty, Site Manager
M. Ensminger, Quality Control Supervisor
M. Ensminger, Quality Control Supervisor
T. Horst, Construction Manager
D. Houghton, CS&A
W. Klinger, Assessment Manager
S. Lynch, Engineering
J. Manning, Materials Specialist
G. McClain, General Superintendent
D. Murphy PAAA Coordinator
D. Scribner, Engineering
G. Shell, Quality Assurance Manager
E. Smith, Safety Programs
B. Spezialetti, Regulatory Safety Manager
R. Tosetti, Manager of Engineering

3.2 List of Inspection Procedures Used

Inspection Administrative Procedure A-106, " Verification of Corrective Actions"
Inspection Technical Procedure I-105, " Piping Systems Construction Inspection"
Inspection Technical Procedure I-112, "Geotechnical/Foundation Inspection"
Inspection Technical Procedure I-113, "Structural Concrete Inspection"
Inspection Technical Procedure I-114, "Structural Steel Inspection"
Inspection Technical Procedure I-115, "Structural Steel Welding Inspection"
Inspection Technical Procedure I-120, "Nondestructive Testing Inspection"
Inspection Technical Procedure I-121, "Piping Systems Construction Inspection"
Inspection Technical Procedure I-135, "Readiness for Construction Inspection"
Inspection Technical Procedure I-138, "Inspection of Fire Protection System Inspection, Testing, and Maintenance"
Inspection Technical Procedure I-162, "Industrial Health and Safety Inspection"
ORP Instruction ORP M 414.1-4, "WTP Balance-of-Plant Construction Oversight Program."

3.3 List of Items Opened, Closed, and Discussed

Opened

A-03-AMWTP-RPPWTP-002-F01	Finding	Failure to implement the LAW structural steel welding requirements of MO16-89 of SRD SC 4.1-3. (Section 1.3.2)
A-03-AMWTP-RPPWTP-002-A02	Assessment Follow-up Item	Follow-up on Contractor's actions to address administrative control concerns with concrete placement guide used to address hot weather concrete placements. (Section 1.5.2)
A-03-AMWTP-RPPWTP-002-A04	Assessment Follow-up Item	Follow-up on the Contractor's actions to address Tower Crane Elevator electrical issues. (Section 1.8.2)
A-03-AMWTP-RPPWTP-001-A05	Assessment Follow-up Item	Follow-up on the Contractor's actions to address GDR -014 multiple conductors in a split bolt for the 6 X 6 wireway and 25 KVA transformer. (Section 1.8.2)
A-03-AMWTP-RPPWTP-002-A06	Assessment Follow-up Item	Follow-up on the Contractor's actions to replace 20 amp circuit breaker with 15 amp circuit breaker in the Fuel Dispensing Station panelboard. (Section 1.8.2)

Closed

A-03-AMWTP-RPPWTP-002-F03	Finding	Failure to install rebar in accordance with procedures, specification, or drawings. (Section 1.6.2)
A-03-OSR-RPPWTP-001-A02	Assessment Follow-up Item	The Contractor had installed a 208/120-volt three-phase four-wire panelboard as a 120/240-volt single-phase three-wire panelboard. (Section 1.11.1)
A-03-OSR-RPPWTP-008-A06	Assessment Follow-up Item	Implementation of an adequate assured grounding program (Section 1.11.2)
A-03-OSR-RPPWTP-009-A02	Assessment Follow-up Item	A subcontractor Discrepancy report implied a willful failure to follow procedures regarding a soil test on the construction parking lot. (Section 1.11.3)

A-03-OSR-RPPWTP-010-F01a	Finding	Failure to install reinforcement steel in accordance with drawing, nor obtain engineering direction prior to cutting two #9 vertical dowels. (Section 1.11.4)
A-03-AMWTP-RPPWTP-001-A05	Assessment Follow-up Item	The Ice Trailer had #12 AWG conductors feeding the lights in the trailer, tapped off of the 50-amp cord feeding the compressor protected by 40 amps. (Section 1.11.5)

Discussed

A-03-OSR-RPPWTP-006-A02	Assessment Follow-up Item	Follow-up on the Contractor's actions to resolve OSHA concerns associated with the Potain Tower Crane. (Section 1.10.1)
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3.4 List of Acronyms

AB	Authorization Basis
ABCN	Authorization Basis Change Notice
AISC	American Institute of Steel Construction
AMWTP	Assistant Manager Waste Treatment and Immobilization Plant
ASTM	American Society for Testing and Material
AWS	American Welding Society
BNI	Bechtel National, Inc.
BOP	Balance of Plant
CAR	Corrective Action Request
CPSI	Concrete Placement Special Instruction
DCN	Design Change Notice
DOE	U.S. Department of Energy
DTD	Decision to Deviate
FCR	Field Change Request
GDR	General Distribution Rack
GNN	G. N. Northern, Inc.
HLW	High Level Waste
IH&S	Industrial Health and Safety
IQRPE	Independent Qualified Registered Professional Engineer
ITP	Inspection Technical Procedure
ITS	important-to-safety
JHA	Job Hazards Analyses
LAW	Low Activity Waste
M&TE	Measuring and Test Equipment
NCR	Nonconformance Report
NEC	National Electric Code
NFPA	National Fire Protection Association

ORP	Office of River Protection
PDR	Power Distribution Rack
PSAR	Preliminary Safety Analyses Report
PTF	Pretreatment Facility
QA	Quality Assurance
QAM	Quality Assurance Manual
QC	Quality Control
RITS	Recommendations and Issues Tracking System
SRD	Safety Requirements Document
WAC	Washington Administrative Code