Installation of Tank Systems and Miscellaneous Unit Systems

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History Sheet

Rev	Reason for revision	Revised by
0	Initial issue; Issued For Permitting Use	W Melvin
1	Incorporation of Washington State Department of Ecology Comments, CCN 048713	W Melvin
2	Incorporation of miscellaneous treatment equipment	W Melvin
3	Incorporate vacuum box testing; Replaced MRI with MAP for receipt inspection; Miscellaneous non-technical changes for clarity. Replaced WAC references with the appropriate permit condition references.	W Melvin
4	Incorporate Washington Department of Ecology Comments	W Melvin
5	Referenced DOE documents that affect ASME B31.3	W Melvin
6	Incorporated independent inspection of tank internals for tanks fabricated offsite per agreement with Ecology (CCN 186457/191987). Editorial changes to correct or clarify text. Extensive changes were necessary, therefore revision bars are not present.	K Keck

Contents

Acronyms and Abbreviations

ASME	American Society of Mechanical Engineers
AWS	American Welding Society
CDR	Construction Deficiency Report
CM	Commercial Grade
DWP	Dangerous Waste Permit
IQRPE	Independent, Qualified, Registered, Professional Engineer
MAP	Material Acceptance Plan
MRI	Material Receipt Instruction
NCR	Nonconformance Report
NDE	Non-Destructive Examination
PADC	Project Archives and Document Control
Q	Quality
SSC	System, structure, component
WAC	Washington Administrative Code
WTP	Hanford Tank Waste Treatment and Immobilization Plant

1 Introduction

This document describes how the Hanford Tank Waste Treatment and Immobilization Plant (WTP) satisfies requirements of Washington Administrative Code (WAC) 173-303-640 and Dangerous Waste Permit (DWP) conditions associated with the proper installation and handling of the permitted tank and miscellaneous unit systems as described in the following DWP Conditions:

- III.10.E.3 for the installation of tank systems
- III.10.E.3.a. through c. and e. for the installation of tanks
- III.10.E.3.a. through e. for the installation and tightness testing of tank system ancillary equipment
- III.10.E.5.b. and III.10.E.9.d.x. for the installation and testing of tank system process, control and leak detection instrumentation
- III.10.G.3.a., III.10.H.1.a.iv. and III.10.J.1.a.iv. for the installation of secondary containment of miscellaneous unit systems
- III.10.G.3.a. through c. and e., III.10.H.1.a.iv. through vi. and viii., and III.10.J.1.a.iv. through vi. and viii. for the installation of miscellaneous units
- III.10.G.3.a. through e., III.10.H.1.a.iv. through viii. and III.10.J.1.a.iv. through viii. for the installation and tightness testing of miscellaneous unit system ancillary equipment
- III.10.G.5.b., III.10.G.10.d.x., III.10.H.1.a.xiv., III.10.H.5.d.x., III.10.I.1.a.viii., III.10.J.1.a.xiv., III.10.J.5.d.x., and III.10.K.1.a.viii. for the installation and testing of miscellaneous unit system process, control and leak detection instrumentation

Miscellaneous unit systems and tank systems are referred to as *DWP SSC in the remainder of this document.*.

1.1 Applicable Documents

ASME Section VIII, *Pressure Vessels.*

ASME B 31.3 –, *Process Piping. (As tailored in 24590-WTP-SRD-ESH-01-001-02, Safety Requirement Document, Volume II, as amended, Appendix, C , Section C.26, which is not a permit affecting document.)*

ASME Section IX, *Qualification Standard for Welding and Brazing Procedures, Welders and Brazers and Welding and Brazing Operators.*

AWS D1.1, *Structural Welding Code – Steel.*

WAC, 173-303, *Dangerous Waste Regulations*

WAC, 173-303.640, *Tank Systems*

WA7890008967, *Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant.*

2 Description of Installation

This section provides an overview of field activities associated with installation of DWP SSCs performed by Bechtel National, Incorporated (BNI) Construction and Field personnel, including quality control/assurance.

2.1 Receipt Inspection, Rigging, and Installation

The following is a list of activities that prevent defects in DWP SSCs during receiving, installation, and testing. Construction installation and inspection records are generated in accordance with project or vendors' procedures to document work processes. For the purpose of this document, they are referred to as the *Field Installation Report*. This term is consistent with the permit.

2.1.1 Receipt Inspection

A material acceptance plan (MAP) is generated based on key attributes that require independent verification. The MAP is developed from approved technical requirements taken from applicable codes, specifications, drawings, standards and other similar sources specific to the material requisition/ purchase order. Examples of requirements that may be found in a MAP include the following:

- specific attributes/activities that require independent verification:
  - material type/grade/class/color/finish
  - equipment type/rating/class/capacity/manufacturer
  - manufacturing methods/process/controls
  - size/shape dimensions
- hold/witness points
- specific acceptance criteria for defined attributes/activities directly or by reference
- proper identification of materials and DWP SSC items
- storage levels and any special requirements or conditions associated with receiving, handling and storage

2.1.2 Rigging

Rigging instructions are generated, when applicable, and ensure the following requirements are met:

- rigging equipment is of sufficient rating to perform the lift
- DWP SSCs are lifted in accordance with manufacturer's instructions when provided. When the vendor does not provide specific rigging instructions BNI standard rigging practices are employed.

Rigging equipment is examined periodically and required maintenance is performed to ensure proper function.

2.1.3 Installation

Installations of DWP SSCs and materials are documented on field installation/inspector reports. Activities that have field installation/inspector reports generated include the following:

- concrete placement, cure and finishing
- equipment installation/alignment
- installation of pipe/pipe supports
- welding activities
- bolt torquing
- coating system installation
- sub-grade and foundation materials and compaction
- rebar, embed, and anchor placement
- installation of liner plate
- installation of corrosion protection systems
- placement of shop and field fabricated tanks and miscellaneous units
- support installation
- instrument sensing lines and support installation
- instrument installation.

DWP SSCs and materials are inspected for physical damage at the time of installation.

Protective boxes, welding blankets, and access control are used, as necessary, to protect DWP SSCs and materials from damage during construction and testing.

2.2 Inspection

BNI inspections of DWP SSC installations are performed by persons qualified to perform the inspections. Inspections are performed prior to the DWP SSC being covered, enclosed, or placed in use. Inspections are documented on the field installation reports. The inspector's signature indicates compliance with the requirements.

Inspections are performed and documented to the current design at the time of inspection.

Current design is constituted by documents issued for construction; these include, but are not limited to the following:

- BNI approved vendor drawings
- BNI approved vendor installation manuals
- BNI approved vendor rigging instructions
- piping isometric drawings
- support drawings
- equipment location drawings
- concrete placement drawings
- embedded plate detail and location drawings
- instrument installation details
- approved interim design changes

Installation activities that are inspected include, but are not limited to, the following:

- sub-grade and foundation materials and compaction
- rebar, embed, and anchor placement
- concrete placement, cure, and finishing
- installation of liner plate
- installation of corrosion protection systems
- placement of shop and field fabricated tanks and miscellaneous units
- welding activities
- bolt torquing
- support installation
- instrumentation, instrument sensing lines and support installation
- instrument installation
- equipment installation/alignment
- coating system installation
- installation of pipe/pipe supports

Field installation reports are reviewed for accuracy and completeness. Retention of field installation reports is performed in accordance with Project Archives and Document Control (PADC) controls and procedures.

2.3 Control of Discrepancies

Discrepancies found during receipt, installation, surveillance, and test inspections are documented in a *nonconformance report* (NCR) for items identified as Quality (Q) and a *construction deficiency report* (CDR) for items identified as Commercial Grade (CM). An NCR/CDR provides the following:

- a detailed description of the discrepancy
- a description of the requirement
- a disposition to correct the discrepancy
- appropriate approvals of the disposition
- confirmation that the disposition has been completed

Hold tags are applied when appropriate to the discrepant item to prevent it from being covered, enclosed, or placed in use until the discrepancy has been remedied. Any discrepancies will be remedied prior to the DWP SSC being covered, enclosed, or placed in use. [Permit Conditions III.10.E.3.a. and c., III.10.G.3.a. and c., III.10.H.1.a.iv. and vi., and III.10.J.1.a.iv. and vi.].

NCRs/CDRs with a final disposition of "Use As Is" or "Repair" that affect critical systems are provided to the Washington Department of Ecology within five (5) calendar days in accordance with Permit Condition III.10.C.9.d.

Closed NCRs/CDRs are retained in PADC.

2.4 Testing

Tightness testing is performed in accordance with the design and installation code applicable to the DWP SSC. Testing is performed and inspected by persons competent in the performance of the applicable test (e.g. hydrostatic, pneumatic or vacuum box testing). Testing is documented to provide a record that the system or DWP SSC was tested for the prescribed period and fully inspected for leakage.

Process and control instrumentation for WTP DWP SSCs will be commissioned after installation. Commissioning will be performed using procedures that implement vendor technical guidance. Calibration procedures are written, reviewed, and approved to satisfy the program controls contained in WTP administrative procedures. If required, a loop calibration check will be performed to verify the proper instrument output to the WTP distributed control system. Similar to instrument calibrations, the instrument loop calibration check procedures will satisfy vendor guidance and WTP administrative controls.

3 Certification of Installation

Independent installation inspections are performed by BNI subcontractor as required by the WAC 173-303-640 and DWP Conditions. The independent inspector has full access to the job site including the opportunity to inspect DWP SSCs that are fabricated off site during installation on-site. The inspector is provided access to DWP SSCs, including tank and vessel internals, as work packages are issued. As a part of the installation certification process the inspector reviews and verifies the results of installation and fabrication work and test and inspections performed by responsible field engineers, field welding engineers, and quality control engineers. The inspector maintains cognizance of construction, erection, installation, inspection and testing activities, but can not perform or witness inspections for all in-process activities for all components. The inspector performs inspections in accordance with a tank installation inspection plan.

3.1 Independent Inspections

WAC 173-303-640(3)(c) and permit conditions require that prior to covering, enclosing, or placing new DWP SSC(s) in use, an independent, qualified, installation inspector or an independent, qualified, registered professional engineer (IQRPE), either of whom is trained and experienced in the proper installation of DWP SSCs, shall have inspected the system for the presence of any of the following items [Permit Conditions III.10. E.3.a. and c., III.10.G.3.a. and c., III.10.H.1.a.iv. and vi., and III.10.J.1.a.iv. and vi].

- weld breaks
- punctures
- scrapes of protective coatings
- cracks
- corrosion
- other structural damage or inadequate construction/installation

Inspections of tanks and miscellaneous units internals are performed on tanks that are large enough and designed for entry to ensure that no damage occurred to the internal piping and other equipment during

shipping and installation. Inspections may occur during final clean checks prior to vessel turn over from construction to start-up.

The following documentation (available in PADC) is considered by the independent qualified installation inspector, or IQRPE, in certifying proper installation of DWP SSCs [Permit Conditions III.10.E.3.g., III.10.G.3.g., III.10.H.1.a.x., and III.10.J.1.a.x.]:

- field installation reports (previously listed Section 2.2)
- approved welding procedures
- welder qualifications and certifications
- tightness test reports in accordance with the codes specified by design
- tester credentials
- inspector credentials
- field inspector reports (previously listed in Section 2.2)
- field waiver reports (i.e.,NCRs, CDRs),
- non-compliance reports, corrective action and repair reports (i.e., NCRs, CDRs)

Procedures for excavation and backfill, concrete placement and system turnover to commissioning and test will have controls to ensure that the independent qualified installation inspector or IQRPE has performed installation inspections and inspections to confirm that discrepancies have been remedied before the DWP SSC is covered, enclosed or placed in use.

3.2 Corrosion Protection Inspection

Installation of the field fabricated cathodic protection system for the underground transfer piping is supervised by a independent corrosion expert to ensure proper installation [Permit condition III.10.E.3.e].

3.3 Certification of Installation

Certified written statements from the independent qualified installation inspector or IQRPE and from the independent corrosion expert will be obtained attesting that the DWP SSCs and field fabricated cathodic protection system were properly installed and any repairs were performed [Permit Conditions III.10.E.1.d, III.10.G.1.d., III.10.H.1.a.iii., III.10.I.1.a.iv., III.10.J.1.a.iii., and III.10.K.1.a.iv.].

The written statements will be maintained and available in the WTP Unit Operating Record [Permit Conditions III.10.E.3.f., III.10.G.3.f., III.10.H.1.a.ix., and III.10.J.1.a.ix.].

4 Summary

Tank systems and miscellaneous unit systems are installed in accordance with the applicable engineering documents and manufacturer's installation instructions. Special instructions for installation requirements that are not skill of the craft are provided in a field installation report developed from the engineering documents or manufacturer's instructions or BNI standard practices or a combination of all. Field installation/inspectors reports, when completed, document the inspections necessary to ensure the quality installation of the DWP SSCs.

Installation and/or process instructions include the following, where applicable:

- rigging instructions
- step-by-step assembly instructions
- welding procedures and conditions
- coatings system installation
- tightness testing
- instructions to prevent damage to the DWP SSC during construction and startup

Installation activities ensure that required inspections by construction inspectors and the independent qualified installation inspector, or IQRPE, are performed before the DWP SSC to be inspected becomes covered, enclosed, or placed in use.