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History Sheet

Rev	Date	Reason for revision	Revised by
0	29 Aug 2001	Supercedes and replaces RPT-24590-CN00001 and incorporates responses to OSR questions and comments	J Duke
1	24 Sep 2001	Incorporates 24590-WTP-ABCN-ESH-01-019 Rev 0 changes (contractor-approved ABCN).	J Duke
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1e	6 Sep 2002	ABCN 24590-WTP-ABCN-ESH-02-017 Rev 0 adds the reporting threshold for radiation exposure relative to industrial sources "Off Normal" and make word correction from "Use" to "Misuse" (contractor-approved).	J Duke
1f	26 Sep 2002	Incorporates change of 24590-WTP-ABCN-ESH-02-022 Rev 0 (CCN 040370) and inadvertently omitted text from 24590-WTP-ABCN-ESH-02-017 Rev 0 (CCN 038775).	J Duke

Revision Status

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2	Organization and Administration	1a	2-1, 2-2, 2-4
3	Overall Management Structure and Organization	1	N/A
4	Radiological Safety	1	N/A
5	Notification, Categorization and Consequence Assessment	1	N/A
6	Required Permits	1	N/A
7	Contractor's Technical and Experience Qualifications to Construct the Plant	1	N/A
8	Approach to Implement the SRD and the ISMP	1	N/A
Appendix A	Drawings	1b	A-1
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Acronyms and Abbreviations

ALARA	As Low As Reasonably Achievable
ASTM	American Society for Testing and Materials
BNI	Bechtel National Inc.
BOF	balance of facilities
CSM	Construction Site Manager
DOE	US Department of Energy
FRE	forms, rebar, and embedments
HLW	high-level waste
ISM	integrated safety management
ISMP	Integrated Safety Management Plan
ITS	important-to-safety
LAW	low-activity waste
LCAR	Limited Construction Authorization Request
OSR	Office of Safety Regulation
PSAR	Preliminary Safety Analysis Report
QA	Quality Assurance
RPP	Radiation Protection Program
SRD	*Safety Requirements Document*
SSC	structure, system, or component
TWRS	Tank Waste Remediation System
WAC	Washington Administrative Code
WTP	River Protection Project – Waste Treatment Plant

1 General Information

The River Protection Project - Waste Treatment Plant (WTP) is a new treatment facility to be constructed and operated to treat radioactively contaminated waste stored at the US Department of Energy (DOE) Hanford Site. The waste to be treated in the WTP is consistent with the definition of "radioactive high-level waste" per 10 CFR 72.3 and dangerous waste per Washington State Dangerous Waste regulations WAC 173-303.

The WTP will receive waste from the DOE's tank waste storage system in batches that are composed of either low-activity waste (LAW) feed or high-level waste (HLW) feed. The LAW and HLW feed will be transferred by pipelines to the WTP for pretreatment and immobilization by vitrification. The vitrification process will combine the pretreated tank waste with glass-forming materials and melt the mixture into a liquid that is poured into stainless steel containers. After the hot glass cools and hardens, each container is closed in preparation for storage and permanent disposal.

The Limited Construction Authorization Request (LCAR) seeks DOE authorization to proceed with site preparation, excavation, and other activities listed in Table 1-1. Table 1-1 also indicates which of these activities could have an impact on Important to Safety (ITS) structures, systems, or components (SSC) as defined in the Safety Requirements Document (SRD) and derived via the project's application of the Integrated Safety Management (ISM) process in accordance with DOE/RL-96-0004, Rev. 1, *Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization*. No inconsistencies have been identified relative to the proposed limited construction activities and the most recent Environmental Impact Statement for the River Protection Project.

The activities proposed for installation either support or do not affect the safety requirements of the completed facility. The work during the limited construction period will be performed in a manner that assures radiological, nuclear, and process safety to the workers, co-located workers, and the public.

Drawings cited in this document are for information only. Aspects of the cited drawings required to support limited construction authorization will be described in the text.

1.1 Facility Location

The Waste Treatment Plant Project Site Coordinate System is tied to the Washington State Coordinate System at a designated control point at the northwest corner of the Project Site Boundary. The Project Site Coordinate of this control point, defined as N 5000.00, E 10000.00 with US units in feet, is equivalent to N 136110.00, E 576195.00 with metric units in meters based on Washington State Coordinate System. Project North direction is the same as the Washington State Plane Coordinate System North direction.

The Washington State Coordinate System is based on the Washington State Plane Coordinate System (Southern Zone). The horizontal datum is the North American Datum of 1983 (NAD83/91) and the vertical datum is the North American Vertical Datum of 1988 (NAVD88).

The *Site Plot Plan*, 24590-BOF-P1-50-00001, shows the site dimensions relative to the control point described above.

A public receptor is defined as an individual at a boundary established around the facility at the nearest locations of uncontrolled public access. The boundary for the WTP, different than the traditional Hanford Site boundary, was established during Part A. The WTP public receptor boundary is encompassed by the Columbia River to the north and east and Highway 240 to the west. The southern boundary extends in an east-west line from the near bank of the Columbia River, across the northernmost part of the Energy Northwest site boundary, and intersects the Wye Barricade. From the Wye Barricade, the southern boundary extends at a 225° angle from north (north is 0°) until it intersects with Highway 240. Figure D-1, Appendix D, of the SRD shows the boundary. The approximate distances from the WTP facility to the nearest public receptor as described above are as follows:

Direction	Distance to Limiting Sector Location (miles)
N	8.1
NNE	6.3
NE	6.1
ENE	6.1
E	6.5
ESE	7.2
SE	7.2
SSE	6.9
S	5.8
SSW	5.7
SW	5.7
WSW	5.8
W	7.7
WNW	8.8
NW	8.4
NNW	8.4

1.2 Facility Description

There are three primary process facilities at the WTP each enclosing major process components: pretreatment (PT), LAW vitrification, and HLW vitrification. In addition, systems and utilities known as the balance of facilities (BOF) support each of these waste treatment processes. The layout of the WTP is shown on drawing 24590-BOF-P1-50-00001. ITS SSCs are not being installed by the activities described in this LCAR.

1.2.1 Primary Process Facilities

Each of the facilities will be constructed of reinforced concrete and structural steel work, supported by a reinforced concrete base mat. The loads on the base mat will be distributed uniformly to the surface being excavated as part of the LCAR scope. The base mat will be designed to transfer loads from equipment and structural elements to the structural fill material supporting the foundation. The soil interface will be prepared to a point of readiness for structural work (foundation, rebar, embeds, concrete, and so forth). Footprints of the buildings at the excavation elevation are shown on drawings referenced in section 1.3.1.2. Building outlines at grade elevation are shown on the *Site Plot Plan* referenced in section 1.2.

The primary process buildings are classified as important to safety. There are several contributors to the ITS classification of the buildings. The radiation shielding aspects of the structures are needed to achieve compliance with radiological exposure standards for workers during normal operation. Also, some aspects of the structures are required to maintain the confinement boundary for radiological release events to prevent workers, or the maximally exposed member of the public from receiving a radiological exposure that exceeds the exposure standards identified in the SRD. In addition, failure of the structures could impact the ability of ITS systems and components in performing an ITS function associated with radiological or chemical hazards.

1.2.2 Balance of Facilities

The portions of the BOF included in the scope of the LCAR are identified in Table 1-1 as not important to safety and are further discussed in section 1.3.2.

1.3 Limited Construction Activities

The limited construction activities listed in Table 1-1 support preparation of the WTP site for construction of the main facilities and buildings. These activities prepare the site, complete major excavation, place mud mats, and prepare temporary and permanent facilities needed to support initial construction activities. As previously noted, the following sections describe both important to safety and not important to safety areas and functions. The descriptions below have been organized to follow the three sections headings in Table 1-1, Pre-Construction of Main Facilities, Permanent Facilities and Services to be Utilized During Construction, and Construction of Temporary Facilities, with corresponding activity numbers noted.

Limited construction activities will commence in two phases (A and B). Table 1-2 provides additional information relative to Phase A and B commencement of activities.

The drawings referenced are for information only. These drawings reflect the current design as of the submittal date of this document, and will be reissued for construction prior to the start of work.

1.3.1 Pre-Construction of Main Facilities

1.3.1.1 Site Grading, Survey Control, and Site Drainage (Activities 0001 and 0036)

The site will be cleared, grubbed, and graded to facilitate construction of the permanent facilities shown on drawing 24590-BOF-P1-50-00001, *Site Plot Plan*. The construction facility areas will also be cleared, grubbed, and graded to establish reasonably level benched areas for material laydown, shop facilities, and road access within the outer construction area.

Surveyors will locate monuments across the WTP site based on the Hanford site grid system. Surveyors will also establish the location and elevation of each process facility from these monuments. The quality requirements applicable to survey controls are described in section 3.4.1.

1.3.1.2 Excavation and Compaction for Foundations (Activities 0002 - 0004)

Excavation will be performed for the foundations for the three primary process facilities, including installation of sheet piles, where applicable. Drawings 24590-HLW-DB-S13T-00001, 24590-LAW-DB-S13T-00003, and 24590-PTF-D0-S13T-00001 show the foundations that will be accommodated by the excavations. Sheet piles will be installed, where necessary, to facilitate excavations below the primary foundation elevations.

1.3.1.2.1 Site Geotechnical Conditions

Completed geotechnical investigations (Geotechnical Investigation Report, by Shannon and Wilson, Inc., H-1616-51 dated May 2000) have established the suitability of the site for plant structures. Field explorations and testing included exploratory borings and test pits, infiltration testing, refraction, and down-hole geophysical studies, seismic cone penetrometer studies, and in-place soil resistivity studies. The report also provides data on geological stratification of the soils in the vicinity of each facility. The Geotechnical Investigation Report did not indicate any anomalies in the subsurface conditions that would present problems in construction of the plant facilities.

The Geotechnical Investigation Report identified the various soil types and elevations across the WTP site. No additional geological logging or mapping of these layers will be conducted during excavation for the facility foundations. However, a Geotechnical Engineer will monitor the excavation process. When the excavation is completed, a Geotechnical Engineer will inspect the in-situ soil to confirm that subgrade conditions are consistent with the data contained in the Geotechnical Investigation Report. If deviations are identified, they will be documented in accordance with the QA Manual procedures and investigated under the direction of a Geotechnical Engineer.

1.3.1.2.2 Foundations

Design of WTP facilities foundation will be in accordance with the recommendation provided in the Geotechnical Investigation Report. The primary process facilities foundation types were identified to a Geotechnical Engineer prior to assessment with estimated soil bearing requirements. The report documents the test results and contains recommendations for soil bearing capacities and associated deflections under loading conditions. This information will be used as design parameters for development of the building footprint and assessment of the structural base mat.

1.3.1.2.3 Excavation

Excavation will be performed to accommodate the foundations shown on the drawings referenced in section 1.3.1.2. Over excavation may be required to remove dune sand if it is found at the exposed subgrade elevation. Material encountered that cannot be tested using the methods identified in ASTM D1557, will be removed. Excavated soil removed beyond the required footing elevation will be replaced with compacted structural fill, to the required footing elevation.

The removal of material (including site grading) to an elevation to support installation of the permanent foundation mats does not impact the capability of the soil to support the structures. The soil will be tested to ensure compaction requirements are met as described in section 1.3.1.2.5. Therefore, material removal is not ITS.

A soil retention system may be installed extending below the elevation of the open cut excavation, to facilitate construction of the portions of the foundations that extend below the primary foundation elevation. These sheet piles may remain in place, as a form for the construction of the concrete walls. This soil retention system will be designed in accordance with the soil properties indicated in the Geotechnical Investigation Report by Shannon and Wilson and construction loads identified around the excavation.

The retaining system is not relied upon for the structural integrity of the permanent concrete walls. During the construction process the retaining system will be monitored to ensure that no movement occurs that could compromise the structural integrity of the structural fill beneath the facility. The important to safety aspect of the structural fill material will be monitored in accordance the structural fill and compaction technical specification. Therefore, the soil retention piling installed for the portions of ITS facilities extending below the level of the general mat foundation are not ITS SSCs.

The soil retention system may remain in place following placement of the structural concrete. To avoid potential problems with the chemical content of materials used in the soil retention system adversely affecting the permanent concrete reinforcing, concrete cover between the retention system and permanent reinforcing will follow the guidelines for casting concrete against soil.

1.3.1.2.4 Structural Fill and Compaction

After the removal of dune sand and excavation to the desired elevation, the top 12 inches of the exposed subgrade surface will be compacted to an in-place density of at least 95 % of the maximum laboratory dry density as determined by ASTM D1557. Structural fill may consist of the excavated soil or imported fill. Excavated soil may be used for structural fill unless such material is determined to be unsuitable. Imported structural fill will be 5/8-inch minus crushed base course or 2-inch minus pit run gravel with less than 5 % fines (minus 200 sieve). All structural fill will be compacted to an in-place density of at least 95 % of the maximum laboratory dry density, in accordance with ASTM D1557, *Test Methods for Laboratory Compaction Characterization of Soil Uses / Modified Effort (56000 ft-lb./cu. ft [2700 kn.-m/cu. m.])*.

The structural fill will be compacted in lifts of loose soil by hand operated or mechanical compactors as specified in the structural fill and soil compaction technical specification. Moisture content of compacted material will be controlled to be within ± 5 % of optimum as determined by ASTM D1557.

The Engineering Design team may approve the use of alternative material for backfill from that stated above, either Controlled Density Fill or Portland Cement Concrete on a case by case basis. Approval will be based on a technical evaluation to ensure no adverse structural implications to the facility design and/or analysis.

1.3.1.2.5 Soil Compaction Testing

All sampling, field testing and laboratory testing work will be performed by a civil material testing laboratory, qualified per ASTM D3740, to verify that the compaction is in compliance with the latest issued design documents. Grading and compaction work shall be monitored by inspectors and testing will be performed to verify that compaction requirements have been met. SRD Safety Criterion 4.1-2 is applicable to soil compaction testing during limited construction. Standards for soil compaction testing will be selected from the following standards identified in Safety Criterion 4.1-2:

- ASTM D3740, *Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and /or Inspection of Soil and Rock as Used in Engineering Design and Construction*
- ASTM D2922, *Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)*
- ASTM D3017, *Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods*

The selected standards are industry-testing methods for determining soil properties in the laboratory and for field verification. These tests are to be used by the Geotechnical Engineer to confirm that structural fill material has been compacted in accordance with design requirements in the Geotechnical Investigation Report. Specific standards to be used, that are referenced in these parent standards, will be identified in the technical specification.

The soil compaction process is controlled through a quality related specification which contains installation, inspection and testing requirements to demonstrate that soils are compacted to meet the requirements specified for structural fill in the Geotechnical Investigation Report and in structural drawings. Materials used for backfill will meet the requirements of the Geotechnical Investigation Report and the standards described above. Moisture content will be controlled to be within ± 5% of optimum as

determined by ASTM 1557 in lieu of ± 2% that is recommended in the Geotechnical Investigation Report. Based on excavation, backfill, and compaction experience on site, controlling the moisture content to within ± 5% of optimum is sufficient to achieve the 95% dry density requirement. Confirmation that these materials meet these standards will be established through testing. Application of ASTM D3740 will ensure the capability of the civil testing laboratory to repeatedly and reliably perform tests to verify that important to safety attributes, such as soil density and compaction and moisture content, conform to design requirements.

ITS soil compaction testing may be performed in areas other than the process facility foundations as necessary to support construction activities and establish soil conditions for future ITS applications.

1.3.1.3 Mud Mat Placement (Activity 0005)

Mud mats will be placed to provide a working surface to facilitate construction of the foundations for the LAW, HLW, and PT areas. The mud mat will consist of an approximately 4 inch thick, non-structural, concrete surface slightly larger than the building footprint. This mat keeps compacted soil beneath from being disturbed and provides a consistent work surface for installation of the building foundation reinforcement.

The installation of the mud mat will be performed in accordance with the structural fill and soil compaction specification with non-ITS material for the mud mat. The acceptability of the mud mat material is confirmed through testing to ensure that backfill requirements are met. The load bearing capacity of the mud mat material is significantly greater than the load bearing capacity of the soils, as such, the soil's bearing capacity is not adversely affected by the presence of the mud mat.

The mud mats do not present a radiological or chemical hazard and are not required for the prevention or mitigation of any radiological or chemical hazards associated with the facility. Therefore, the installation of the mud mats is not an ITS activity and the mud mats are not ITS.

1.3.1.4 Pre-Assembly of Forms, Rebar, and Embedments (Activity 0006)

Fabrication and pre-assembly of forms, rebar, and embedments (FRE) will be performed in preparation for permanent installation. This onsite pre-assembly activity includes:

- Fabrication and pre-assembly of reinforcing steel for the HLW and LAW structures.
- Fabrication and pre-assembly of materials to be embedded in the concrete, including conduit, ductwork, miscellaneous steel, and pipe.
- Unload, shake-out, and pre-assembly forms, form accessories, and hardware.
- Fabrication and pre-assembly of reinforcing steel and embedded item support false-work, including items that will remain within the concrete.

Pre-assembly will be limited to connecting materials in large units to facilitate installation into a final location. Assemblies will not be brought into final locations, will not be connected to each other in a manner that would satisfy final installed design requirements, and will not have the necessary supports, templates, or false-work in place to satisfy final installed design requirements. These activities may be performed and assemblies and materials stored on the mud mats for the buildings.

The LAW vitrification facility contains SDC systems and components that are important to safety (ITS) based solely on chemical hazards. The structure itself is designated as SDS because failure of the structure, as a result on an NPH event, could reduce the functioning of the SDC systems and components contained within or supported by the structure.

Safety Requirements Document Volume II (SRD Vol. II), safety criterion (SC) 4.1-3 currently specifies that SSCs that are ITS based solely on chemical hazards be designated SC-III for earthquakes and PC-3 for other NPH events. An Authorization Basis Change Notice has been submitted to change the PC-3 designation for chemical hazard control SSCs to PC-2 (24590-WTP-ABCN-ESH-01-013, Revision 1).

The LAW facility structure will be designed to SC-III/PC-2 requirements. Design requirements for SC-III/PC-2 structures described in SRD Vol. II, SC 4.1-4 will be applied to the LAW rebar and embedments.

The concrete structure for the LAW facility has been identified through hazards analysis to have an SDS function. Therefore, the concrete and reinforcing steel and embedments will be performed such that the design requirements described in the Preliminary Construction Authorization Request (PCAR) general information volume, sections 2.4.4.2.1 and 2.4.4.2.2 are met when the assemblies are installed in their final location and configuration. These requirements have been identified in technical specifications.

The HLW vitrification structure is credited for secondary confinement of liquids, for anchorage of process equipment, and for providing protection of embedded process systems. As such, the HLW structure is designated SDC.

The HLW structure will be designed to SC-I/PC-3 requirements. Design requirements for SC-I/PC-3 structures described in SRD Vol. II, SC 4.1-3 will be applied to the design of the HLW rebar and embedments.

The concrete structure for the HLW facility has been identified through hazards analysis to have an SDC function. Therefore, the concrete and reinforcing steel have been classified as Quality Level 1. The fabrication and pre-assembly of reinforcing steel and embedments will be performed such that the design requirements described in the PCAR general information volume, sections 2.4.4.1.1 and 2.4.4.1.2 are met when the assemblies are installed in their final locations. These requirements have been identified in technical specifications.

Reinforcing steel for the facilities will comply with ASTM A706, in accordance with ACI 318 and ACI 349 and will be procured by the specification 24590-WTP-3PS-DG00-T0001, *Furnishing of Reinforcing Steel*. Fabrication and pre-assembly of reinforcing steel will support installation in accordance with the specification 24590-WTP-3PS-D000-T0001, *Concrete Work*. These specification implement the requirements of ACI 318 and ACI 349 as identified in SRD Vol. II, SC 4.1-3 and 4.1-4.

The C5 ductwork to be embedded in the HLW basemat will be welded stainless steel pipe in accordance with ASME B31.3. Welding procedures and welder qualifications will be in accordance with ASME Boiler and Pressure Vessel Code, section IX.

Rebar will be pre-assembled based on issued for construction rebar detail drawings. These drawings will be supported by completed calculations to ensure that rebar fabrication and pre-assembly will support design requirements.

Specific embedded materials such as conduit, ductwork, and piping will be fabricated and pre-assembled based on issued for construction drawings. Other generic embedded materials such as steel plates and cast in place anchor bolts may be arranged in predetermined arrays using false-work, but not positioned in final location.

Material receipt, control, and storage requirements described in sections 1.3.2.7 and 1.3.3.6 apply to the FRE described in this section.

1.3.2 Permanent Facilities and Services to be Utilized During Construction

As discussed in the following subsections, none of the permanent facilities or utilities to be installed during limited construction has been designated as ITS. Where it is efficient, cost–effective, and physically possible to do so, permanent plant utilities and services routed within the permanent utility trench will be utilized for construction as discussed below. Construction will document the location of all underground facilities and utilities. Temporary installations that are abandoned in place will be shown on applicable project drawings.

1.3.2.1 Trenching Excavation and Installation of Utilities (Activities 008, 0011, 0012, 0024)

Utility trenches will be excavated to allow installation of pipelines shown on the Composite Underground Utilities Plan drawings listed in Appendix A. Portions of the permanent electrical duct bank system shown on DWG-24590BF-E00001 will also be installed to the extent practical to facilitate expediting the construction schedule. No ITS duct banks will be installed during limited construction. ITS duct banks are designed to be separate from the non-ITS duct banks and will be installed in the future. Pipelines to be installed during limited construction are described in the following sections. Bedding and backfill above and around the pipelines will be compacted to 95 % of the maximum laboratory dry density, in accordance with ASTM D1557. Backfill will be installed after the project has tested and accepted the installed pipelines.

The scope of the piping and ductwork to be installed during limited construction is shown on the Issued for Bid (IFB) versions of the Composite Underground Utilities Plan drawings listed in Appendix A and the IFB version of the *Electrical Duct Bank Plan*, DWG-24590BF-E00001.

1.3.2.1.1 Fire Water (Activities 0009, 0010, and 0024)

Fire water is supplied to the site by DOE via an existing underground 12 inch diameter raw water line at locations identified on the Composite Underground Utilities Plan drawings listed in Appendix A. Firewater is distributed by an underground yard main loop with sectionalizing valves. Portions of the permanent underground yard main and hydrant system will be installed to the extent required to provide adequate fire protection throughout the WTP site during construction and to the extent practical to facilitate expediting the construction schedule. Distribution of fire/raw water to construction areas, material storage, and other construction facility site areas will be via temporary construction extensions with appropriate isolation valves from the permanent firewater system. Piping will be routed and installed in the site utility trench as shown on the Composite Underground Utilities Plan drawings listed in Appendix A.

The portions of the main fire protection yard loop being installed during limited construction will provide the water source for permanent facility sprinkler systems and hose stations. These lines will be 12 inch PVC piping. The 12 inch size was selected after the decision was made to change piping materials. The 12 inch PVC piping now being used actually has better hydraulic characteristics than the 14 inch HDPE piping originally identified. The system is sized to provide sprinkler coverage to the most demanding sprinkler system (assumed to be 0.2 gpm/ft^2 for 3,000 ft^2), plus 500 gpm for hose streams, at the most remote location. This assumption is based on sprinkler systems designed to extinguish ordinary hazard type fires, which is the highest anticipated hazard in the process buildings. The largest anticipated area of the facility requiring sprinklers to be activated to contain a fire is 3,000 square feet. Additionally, it is assumed that the fire department is flowing 500 gpm hose streams while the sprinklers are activated. This provides reasonable capacity for the system without being overly conservative. A hydraulic analysis will be prepared by a qualified fire protection engineer, based on the requirements of UBC and NFPA 24. The underground fire water piping drawings will be provided to the Authority Having Jurisdiction (AHJ) for review prior to installation. As the fire protection system design evolves, the size of individual sprinkler

systems will be limited to ensure the capacity of the supply system is not exceeded. This means that the sprinkler system designs will be governed by the available pressures in the water supplies. The contractor will design each system to operate within the design parameters, sizing the pipes accordingly.

The permanent portions of the fire water system installed during limited construction will be in accordance with SRD Safety Criterion 4.5-13

SRD Safety Criterion 4.5-13 implementing standards are DOE-STD-1066-97, *Fire Protection Design Criteria*, NFPA 801, 1995 edition, *Standard for Facilities Handling Radioactive Materials*, and DOE G-440.1, September 1995 revision, *Implementing Guide for use with DOE Orders 420.1 and 440.1, Fire Safety*. As such, the fire main and hydrant system will be designed and installed per NFPA 24, including requirements imposed on personnel performing testing and installation. There are no seismic requirements for the underground portions of the fire protection system that are being installed during limited construction. System components will be tested in accordance with NFPA 24 before placing into service. Ends of pipes that are installed during limited construction, but not completed and used, will be isolated with blind flanges and post indicator valves until further installation and testing is complete. Piping downstream of the isolation valves will be flushed and tested in accordance with NFPA 24 prior to putting the piping downstream of the isolation valves in service following future completion. Hydrants will be provided with individual isolation valves.

Fire mains will be connected to the facility buildings in the future to provide automatic and manual fire suppression capability within the buildings. Control strategies developed to manage hazards presented by potential fires in the facility do not rely on the fire suppression systems as a primary control. Passive fire protection features (for example, fire barriers and separation) are provided in the design to reduce the risk of fires to acceptable levels. Based on ISM assessments performed to date, fire suppression water within the facility buildings is not required to provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the workers and the public due to a radiological or chemical hazard. The fire main has therefore not been designated as ITS. Application of SRD Safety Criterion 4.5-13 provides assurance that the fire protection system will be designed and installed to fulfill the requirements of the best protection class of industrial risks (“Highly Protected Risk” and “Improved Risk”) and will provide protection to achieve “defense-in depth”.

1.3.2.1.2 Potable Water (Activities 0011 and 0012)

Potable water is supplied to the site by DOE via an existing underground 4 in. diameter potable water line at a location identified on the Composite Underground Utilities Plan drawings listed in Appendix A. Project distribution of potable water to construction areas, material storage, and other construction facility site areas will be by construction extensions from the permanent plant potable water system pipes routed and installed underground within the site utility trench. During the construction period, the site potable water lines will be charged from the DOE supply line. Temporary potable water headers will be routed to strategic locations within the construction work and material laydown areas as shown on the Composite Underground Utilities Plan drawings listed in Appendix A.

This utility does not present a radiological or chemical hazard and, based on ISM assessments to date, is not required for the prevention or mitigation of any radiological or chemical hazards associated with the facility. The potable water system is therefore not designated as ITS.

1.3.2.1.3 Compressed Air (Activities 0011 and 0012)

Portions of the permanent compressed air system supply header shown on the Composite Underground Utilities Plan drawings listed in Appendix A will be installed to the extent practical to facilitate expediting the construction schedule. Temporary construction compressed air piping will be used in conjunction with the portions of the permanent piping to supply compressed air for construction needs.

This utility does not present a radiological or chemical hazard and, based on ISM assessments to date, is not required for the prevention or mitigation of any radiological or chemical hazards associated with the facility. Any future identification of compressed air requirements to support ITS functions or equipment would be provided by dedicated ITS air supplies that are independent from the permanent compressed air system supply header piping to be installed during limited construction. The compressed air system header is therefore not designated as ITS.

1.3.2.2 Fencing (Activities 0013, 0019, and 0028)

Permanent and temporary fencing will be installed. The permanent fence will be a standard industrial fence per the Safeguard and Security Plan requirements. The fence is to provide protection against damage, destruction, or theft of property. Portions of the permanent fencing shown on the Composite Underground Utilities Plan drawings listed in Appendix A, necessary to provide separation between the construction area and the Hanford Site will be installed. Additionally, temporary fencing will be installed as needed to support construction activities.

Although restricting access of unauthorized personnel to the operating facility will be an important element in preventing accidents caused by human actions, hazardous situations caused by deliberate acts of sabotage are outside the scope of the ISM process. The fencing is therefore not designated as ITS. The perimeter fence will located on the boundary of the WTP controlled area. There are locations west and north of the WTP controlled area within 100 meters of the HLW and PT buildings. The Gaussian plume dispersion models used to calculate doses for co-located workers assumes the closest distance from a potential release to be 100 meters. Using a 100 meter distance to calculate this co-located worker dose slightly under estimates the dose received for co-located workers located outside of the controlled area and within 100 meters of the HLW and PT buildings and is potentially non-conservative. Even though it is anticipated that the mitigated dose to such individuals will be well below the Radiological Exposure Standards, BNI will establish administrative controls to ensure individuals outside the controlled area fence and within 100 meters of the HLW and PT buildings will be evacuated in a timely manner in the event of an accident (either at HLW or PT), thereby reducing their exposure even further

1.3.2.3 Electrical Grounding (Activity 0007)

The perimeter loop for the site wide electrical grounding grid will be installed.

The perimeter loop is part of a site wide electrical grounding grid that will be installed as shown on drawing DWG-24590BF-E00003, *Site Area Grounding Plan.* Electrical equipment will be connected to the site grounding system to provide personnel and equipment protection in the event of an electrical fault. Electrical equipment does not need a ground to operate. Degradation or malfunction of the grounding system would not impact the functionality of the electrical equipment. The facility instrumentation systems will also be connected to the site ground grid to provide shielding for the low voltage instrumentation loops. Due to the low voltages associated with instrumentation systems, the instrumentation systems will rely only on the portion of the ground system local to the facility to ensure adequate grounding of the instrument loops. The perimeter loop supports the overall ground capacity for large electrical faults for personnel safety and to prevent equipment damage. Therefore, the perimeter loop is not designated as ITS.

1.3.2.4 Administration Building (Activity 0014)

The Administration Building will be an office building used to house the daily engineering, operations, management, and administrative activities of the WTP project.

The administration building will not contribute to potential hazards or the prevention or mitigation of hazards. Equipment located within the building will not perform safety functions related to facility operations. Therefore, the administration building is not designated as ITS.

1.3.2.5 Sanitary System (Activities 0015 and 0017)

The sanitary system during construction will be a combination of permanent sanitary sewer system and portable sanitary equipment. The portions of the permanent sanitary sewer system to be installed will be the sanitary leach field shown on drawing 24590-BOF-P1-50-00001 and the collection system piping necessary to connect the temporary construction facilities to the leach field shown on the Composite Underground Utilities Plan drawings listed in Appendix A.

This utility does not present a radiological or chemical hazard and is not required for the prevention or mitigation of any radiological or chemical hazards associated with the facility. The sanitary sewer system is therefore not designated as ITS.

1.3.2.6 Roads (Activity 0016)

The DOE has constructed a permanent road around the WTP site. This paved roadway serves as the access road from the Hanford Site to the WTP site.

Some permanent onsite roads, shown on the Composite Underground Utilities Plan drawings listed in Appendix A, will be constructed early to support construction activities. Permanent roads will be constructed to specific load bearing ratings. Construction and location of roads are relevant to the safety case in that an assumption has been made that administrative controls will restrict traffic to those loads (type and quantity) for which the roads were designed. Therefore, the roads themselves are not designated as ITS.

1.3.2.7 Main Construction Warehouse (Activities 0031 and 0037)

A construction field warehouse will be built and may be used as permanent warehouse. This warehouse will be designed and constructed to accommodate receipt, control, and storage requirements described in the QA Manual for ITS materials. This warehouse does not present a radiological or chemical hazard and is not required for the prevention or mitigation of any radiological or chemical hazards associated with the facility. Although this warehouse will be used to store ITS items during construction activities and facility operation, the structure is not ITS.

Materials will be received, controlled, and stored in accordance with SRD Safety Criterion 7.3-5, ISMP section 1.3.11, and the QA Manual, as applicable (see LCAR section 3.4). Limited procurement of ITS materials, prior to PSAR approval, will be in accordance with 10 CFR 830.206. The types and quantities of ITS materials to be stored onsite during limited construction will not impact radiological nuclear or process safety.

1.3.2.8 Outdoor Lighting (Activity 0038)

Permanent outdoor lighting for the site will be provided for roadways, parking lots, walkways, or any other areas for pedestrian access. Portions of the outdoor lighting shown on drawing 24590-BOF-E2-LTE-00003 will be installed as necessary to support construction activities.

The outdoor lighting utilizes a high mast lighting system which consists of 100-foot-high steel poles with high pressure sodium (HPS) lamps and a pole lighting system which consists of 40-foot-high poles with HPS lamp(s). The outdoor lighting masts and poles are arranged in a pattern that provides lighting in various areas of the site in accordance with IESNA Lighting Handbook requirements. The high mast

poles are equipped with a lamp lowering device for maintenance and lamps that are dark sky compliant to eliminate uplight and concentrate the illumination inside the facilities. The high mast poles are capable of withstanding a sustained wind velocity of 85 mph with gusts up to 130%.

Temporary electrical power will be used until the permanent power supply is installed and available.

The masts and poles are located more than 100 feet and 40 feet, respectively, away from above ground structures, systems, and components (SSCs) that have been identified as ITS to avoid potential impact in the unlikely event that a mast or pole is knocked down. As such, the outdoor lighting does not present a radiological or chemical hazard and is not required for the prevention or mitigation of any radiological or chemical hazards associated with the facility. Should any SSC located within 100 feet of a mast or within 40 feet of a pole be determined to be ITS in the future, the SSC will be verified to be able to withstand an impact from the mast or pole, or the mast or pole will be relocated to maintain the required separation. Therefore, the high mast lighting is not ITS.

1.3.3 Temporary Construction Facilities/Utilities

Construction of temporary facilities is needed to support craft labor and construction equipment, site construction personnel, material receiving and storage, site security, and general construction services. Construction facilities are considered to include all construction support buildings, support areas, and construction services to assist the permanent construction of the WTP.

Temporary construction facilities and utilities do not present a radiological or chemical hazard and are not required for the prevention or mitigation of any radiological or chemical hazards associated with the facility. Temporary construction facilities and utilities are therefore not designated as ITS.

Below are descriptions of the temporary facilities to be installed.

1.3.3.1 First Aid Facility (Activity 0018)

A First Aid and Safety Facility will be provided close to the site construction areas.

1.3.3.2 Concrete Batch Plant and Operations Area (Activity 0020)

The Concrete Batch Plant and Operations Area will be located north of the construction areas.

Installation of concrete production equipment and facilities will be performed during limited construction. The subcontractor/owner of the batch plant(s) will be required to submit and follow an approved quality program. This program will contain the flow down requirements of the WTP commitments to control materials and processes during the production of concrete. Upon completion of the batch plant erection, qualification to produce ITS concrete will be conducted in accordance with the specification and quality program requirements.

The batch plant is not an ITS facility, but will utilize qualification testing to establish its ability to produce consistent quality concrete. Acceptability of the concrete will be evaluated prior to use in ITS facilities. No concrete will be produced by this facility for ITS applications during limited construction.
On the Hanford site north of Route 3 between the 200 East and 200 West areas there is a previously used gravel pit known as Pit 30. Aggregate from Pit 30 may be used in the concrete batch plant. If used, excavation of aggregate from Pit 30 will be monitored and controlled in accordance with the Radiation Protection Program (RPP) as described in section 4 for construction excavation.

1.3.3.3 Materials Testing Laboratory and Office (Activity 0026)

A materials testing laboratory and office will be located within the concrete operations area for ready access to concrete production activities. The materials testing laboratory and office is not an ITS SSC. However, the laboratory will perform ITS testing of soils during limited construction as described in section 1.3.1.2.5.

1.3.3.4 Site Parking Areas (Activity 0029)

Development and grading of the site construction parking areas will be included in the site grading and excavation contract package. Following completion of excavation and site grading, final construction phase parking area surfaces will be completed.

1.3.3.5 Construction Field Offices (Activity 0021)

Construction field offices will provide accommodation for WTP non-manual employees during the construction phase of the project.

1.3.3.6 Shops, Laydown Areas, and Change Rooms (Activities 0022 and 0037)

Open storage areas will be located in the outer construction facilities area for the storage of construction and plant materials not requiring protected warehouse conditions. Materials will be received, controlled, and stored in accordance with SRD Safety Criterion 7.3-5, ISMP section 1.3.11, and the QA Manual, as applicable (see section 3.4). Limited procurement of ITS materials, prior to PSAR approval, will be in accordance with 10 CFR 830.206. The types and quantities of ITS materials to be stored onsite during limited construction will not impact radiological nuclear or process safety.

A total of approximately 2,000,000 ft^2 (50 acres) has been identified for potential laydown, fabrication, and shop facility usage. Procedures for the control of materials that may have quality requirements in these areas is described in section 3.4.1.

A combination shop will be provided to support construction needs such as fabrication and maintenance. Activities performed in the combination shop will support limited construction activities described in this LCAR and will be consistent with requirements for those LCAR activities.

Construction craft change houses will be provided for WTP manual employees to change into work clothes, eat lunch, and clean up at the end of a workday.

1.3.3.7 Construction Electric Power and Lighting (Activity 0023 and 0034)

DOE will supply electricity to the site for project construction needs. No permanent power cables will be installed during limited construction. Construction power will be routed in temporary concrete–encased duct banks, spare conduits in permanent non-ITS duct banks, and by overhead power distribution lines around the perimeter of the storage and laydown areas. Direct burial may also be used for temporary construction power where appropriate and practical. Construction power will follow the permanent underground utility trench, where practical.

The feeders will provide primary power to temporary 13.8 kilovolt to 480 volt substations installed at strategic locations within the construction site and lay down areas. Construction subcontractors will provide and install their own low voltage distribution equipment and feeders from the load centers. Temporary construction lighting will be installed as needed. Power and lighting will also be provided by portable electric generators to areas of the construction site as needed.

1.3.3.8 Communication Services (Activity 0025)

Communications on and off the site may include such features as:

- Land line telephone service based with the local telephone company
- Onsite telephone system with distribution to primary site, office, shop, warehouse, and construction areas
- Multi-channel radio system for onsite construction communication
- Cellular telephone communication for on and offsite communications
- Electronic transfer and networking capability via a Local Area Network (LAN) line

1.3.3.9 Waste and Trash Disposal (Activity 0027)

Waste and trash disposal equipment and services will be provided as needed to support construction activities.

1.3.3.10 Main Construction Field Office (Activity 0030)

A main construction field office will be provided to accommodate non-manual employees.

1.3.3.11 Time Office and Craft Entry Gates (Activity 0032)

Time offices and construction access points will be provided as necessary.

1.3.3.12 Special Material and Tool Cribs (Activity 0033)

Tool crib inventories will be located in storage units located close to construction work areas.

Weld rod inventories will be maintained and controlled in storage units located close to construction work areas. Storage units will be provided with utilities required to maintain rod inventories in accordance with project requirements. No ITS welding will be performed to support the activities identified in this LCAR.

Special materials and construction tools, such as grout and concrete vibrators, will be stored in dry and secured storage units. These storage units will be located adjacent to construction areas to provide reasonable access without affecting access to ongoing construction activities. These units may be portable to support site access conditions.

1.3.3.13 Construction Heavy Equipment Mobilization (Activity 0035)

This activity includes the setup, testing, and servicing of various cranes, earthmovers, and vehicles needed to support limited construction activities.

1.4 Potential for Design Changes

The overall plant configuration reflected in this submittal is consistent with the baseline design that is integrated with project schedules and costs. Potential changes that go beyond detailed design implementation will be captured in the project change management process (see section 3.1). The design and safety criteria described in this LCAR, especially as they relate to permanent ITS systems, structures, and components, will be changed only as allowed by RL/REG-97-13, *Regulatory Unit Position on Contractor-Initiated Changes to the Authorization Basis*.

The most likely source of changes initiated within the project would result from ongoing redesign of the pretreatment facility and design evolution of the other primary facilities. Installations that are scheduled to be completed during limited construction that could be impacted by these ongoing design activities are as follows:

- Primary Facility Excavations
- Permanent Underground Utilities

The impact of potential change in these areas on the various safety and quality related considerations in the LCAR is limited. The potential impact is minimized due to the limited scope of the work to be accomplished under this LCAR.

Primary Facility Excavations

The relative positioning of the process facilities on the site, and therefore the relative location of excavations, has been fixed in the project baseline based on functional relationships between facilities, effective arrangement of support facilities and utilities, and individual facility design requirements. The site layout is acceptable based on hazard analyses performed to date (particularly with respect to radiological releases to co-located workers).

The footprint of individual buildings that must be accommodated within the planned excavations is largely driven by process or utility requirements as reflected in major equipment, by safety and maintenance requirements that drive considerations for confinement spaces, shielding requirements, and by access for operation and maintenance.

The ISM process has identified natural phenomena design bases and has identified the Seismic Category and Performance Category of each facility in accordance with the requirements outlined in SRD Section 4.1 Safety Criteria. The codes and standards identified in the appropriate Safety Criteria are used to develop the loads on the structure, including:

- Live loads
- Dead loads
- Startup and operational loads
- Loads associated with fault conditions

During development of facility layouts, basic structural requirements are also addressed. Upon resolution of the primary structural systems, finite element structural models of the facilities are developed and appropriate design loads applied. Loads determined to have the greatest effect on the WTP structural design, including the foundations, are loads associated with natural phenomena events, particularly seismic events. Design basis seismic events are documented in the following reports, previously submitted to DOE for review:

- *Validation of the Geomatrix Hanford Seismic Report for Use on the TWRS Privatization Project*, RPT-W375-RU00004
- *Applicability of DOE Documents to the Design of TWRS-P Facility for Natural Phenomena Hazards*, RPT-W375-RU00003
- *TWRS-P Facility Design Basis Earthquake – Peak Ground Acceleration, Seismic Response Spectra, and Seismic Design Approach*, RPT-W375-RU00002
- *Seismic Analysis and Design Approach*, RPT-W375-RU00005

To develop confidence in the direction of the structural design, preliminary seismic analyses are performed utilizing a finite element model of the primary load-resisting elements. These analyses assess the configurations of the structural systems and support the proposed configuration of the base mats. A detailed seismic analysis will be performed prior to issuing foundation drawings for construction. These analyses will consider the structural systems for each facility and identify loads for detailed design.

To evaluate adequacy of the soil to support the foundations, a geotechnical investigation of the WTP site was conducted to determine bearing capacities and dynamic soil properties. Preliminary estimated load requirements were identified to the Geotechnical Engineer. The Geotechnical Investigation Report confirms that the site soil conditions have adequate capacity to support these loads without significant deflections and indicates that the soil is capable of sustaining significantly greater bearing loads than those estimated. When the final seismic analysis is completed, estimated soil loads will be replaced by calculated loads and confirmed to be acceptable. Additionally, the designs will demonstrate that the facilities are capable of accommodating the settlements corresponding to the calculated loads. Permanent ITS structures will not be installed during limited construction.

Excavation drawings to be issued for limited construction work will be updated based on issued general arrangement drawings that are consistent with the layouts described above prior to commencing excavation work. As such, it is unlikely that excavation work performed during limited construction would require rework as a result of ongoing design activities.

An evaluation is also underway to consider the performance of structures used for primary containment of process liquors under seismic events that exceed the design basis. Preliminary analyses to date indicate that increased reinforcement may be required in some structural elements, but not to the extent of affecting structural dimensions. This assessment focuses on performance of individual elements and should not affect the building footprints.

Permanent Underground Utilities

Utility requirements serving the facilities, such as power, fire protection supply, potable water, compressed air, and sewer have been identified for each facility and routed based on drawing 24590-BOF-P1-50-00001, *Site Plot Plan*. These services are located predominantly underground to enhance unobstructed movement around the site. Constructability reviews support the present arrangement of utilities. The portions of the permanent underground utilities to be installed during limited construction consist of the main yard supply headers, external to the excavation areas for the primary facilities. Utility headers are sized to meet the expected facility service requirements for fully expanded operation with sufficient margin added to accommodate variances due to ongoing design evolution within the facilities. The excavation drawings for the primary facilities will be based on issued building general arrangement drawings. Drawings for permanent utility installations will not be issued for construction, in areas that could be impacted by ongoing pretreatment redesign, prior to finalizing the pretreatment general arrangement and associated excavation requirements. As such, it is unlikely that permanent utilities to be installed during limited construction would require rework as a result of ongoing design activities.

Table 1-1 WTP Project Limited Construction Activities

Activity No.	ACTIVITY DESCRIPTION	Impact on ITS Structure, System, or Component (SSC) Yes / No	Justification	LCAR Section Reference
	Pre-Construction of Main Facilities - Pretreatment/HLW/LAW			
0001	Site Grading/Survey Control established -Clear and Grub	No – Grading	The ability to prevent or mitigate accidents related to the SSCs that will be installed in the future is not dependent on the clearing and grading of the areas in which they will be installed. Final grading is not part of the LCAR Scope.	1.3.1.1
		Yes – Survey Control	Some plant physical dimensions are ITS. Survey activities will be performed in accordance with an approved Project Survey program. Commercial survey tools and methods with QA program oversight is sufficient. (Quality related procurement of survey services will supplement the project survey program).	
0002	Soil Retention Sheet Pile Installation for Pretreat/HLW Base Slab Foundations	No – Structure	The sheet piles to be installed will not be used as part of the foundation or structure of the ITS SSCs to be constructed at a later date.	1.3.1.2
0003	Pretreat/HLW/LAW Main Foundation Excavation	No	The ability to prevent or mitigate accidents of the SSC that will be installed in the future is not dependent on the material removal process.	1.3.1.2
0004	Subgrade Compaction Inspection for Activity #0003	Yes	Some of the compacted soil will support buildings that will be ITS. Hazards of inadequately compacted soil include unexpected settlement that damages buried waste transfer lines, and dynamic response to natural phenomena that exceeds the design basis, (Quality related procurement of testing services)	1.3.1.2

Table 1-1 WTP Project Limited Construction Activities

Activity No.	ACTIVITY DESCRIPTION	Impact on ITS Structure, System, or Component (SSC) Yes / No	Justification	LCAR Section Reference
0005	Mud Mat Placement for Activity #0003	No	A mud mat is used for construction convenience. The properties of the mud mat substantially exceed adjacent soil and do not affect the ability of the future structure to perform the required safety function.	1.3.1.3
0006	HLW/LAW basemat rebar pre-assembly	Yes	The main process facility structures are ITS as described in section 1.3.1.4.	1.3.1.4
	Permanent Facilities and Services to be Installed/Utilized during Construction			
0007	Electrical Grounding	No	The grounding system is installed for personnel safety reasons. The perimeter system to be installed under the LCAR is not required for the functioning of ITS circuits.	1.3.2.3
0008	Excavation for U/G Firewater System	No	Fire hazards control strategies do not rely on active fire suppression systems.	1.3.2.1
0009	Installation and Testing of U/G Firewater System	No	See Activity 0008 above.	1.3.2.1
0010	Temporary Commissioning of portions of U/G Firewater System	No	See Activity 0008 above.	1.3.2.1
0011	Excavation for other U/G utilities - raw water, potable water, permanent power, site drainage, compressed air, cathodic protection.	No	None of the underground systems to be installed during the LCAR period have been identified as ITS in the hazards analysis. Permanent potable and raw water supplies to the facility are not designated as ITS. These utilities do not present a radiological or chemical hazard and are not required for the prevention or mitigation of any radiological or chemical hazards associated with the facility.	1.3.2.1
0012	Installation of Items in Activity #0011	No	See Activity 0011 above.	1.3.2.1
0013	Permanent Facility Fencing Installation	No	Security criteria are not ITS.	1.3.2.2
0014	Administration Building	No	The Administration Building will not house any ITS SSCs.	1.3.2.4

Table 1-1 WTP Project Limited Construction Activities

Activity No.	ACTIVITY DESCRIPTION	Impact on ITS Structure, System, or Component (SSC) Yes / No	Justification	LCAR Section Reference
0015	Permanent Sanitary System Installation	No	The Sanitary System has no safety function.	1.3.2.5
0016	Site Road Construction	No	The site roads under the LCAR are not ITS SSCs	1.3.2.6
0031	Main Construction Warehouse	No	Temporary use for construction phase.	1.3.2.7
0036	Site Drainage System	No	The site drainage system has no safety function.	1.3.1.1
0037	Material Receipt and Storage	Yes	Material received and stored during limited construction may include ITS items	1.3.2.7 1.3.3.6
0038	Permanent Outdoor Lighting	No	The lighting has no safety function and will be located to prevent potential impact on ITS SSCs.	1.3.2.8
	Construction Temporary Facilities (concurrent activities)		No temporary construction facility will be ITS or will impact the ability of an ITS SSC to perform the required safety function. In those cases that the activity associated with a construction facility can impact an ITS SSC, the activity will be subject to appropriate Quality Assurance Program requirements. The specific items below that enable quality-related activities are activity 0020, Concrete Batch Plant, and activity 0026, Civil Testing Laboratory.	
0017	Temporary Sanitary Facilities	No	Temporary installation for construction phase.	1.3.2.5
0018	First Aid Trailer/Emergency Response/Fire Protection	No	Temporary installation for construction phase.	1.3.3.1
0019	Site Security	No	Security is not ITS.	1.3.2.2
0020	Concrete Batch Plant	No	See 1.3.3.2 (Quality related procurement for qualification and production processes)	1.3.3.2
0021	Temporary Site Offices	No	Temporary installation for construction phase.	1.3.3.5

Table 1-1 WTP Project Limited Construction Activities

Activity No.	ACTIVITY DESCRIPTION	Impact on ITS Structure, System, or Component (SSC) Yes / No	Justification	LCAR Section Reference
0022	Fabrication Shops/Laydown areas/Change Rooms	No	Temporary installation for construction phase. See 3.5.1 for material control and receipt inspection.	1.3.3.6
0023	Construction Power Distribution, priorities: Batch Plant, Site Office facilities, Fabrication Shops	No	Temporary installation for construction phase.	1.3.3.7
0024	Construction Water Distribution	No	Temporary installation for construction phase.	1.3.2.1.1
0025	Site communication	No	Temporary installation for construction phase.	1.3.3.8
0026	Civil Testing Laboratory Facility	No	See 1.3.3.3 (Quality related procurement for Testing services)	1.3.3.3
0027	Construction Waste and Trash Disposal	No	Temporary installation for construction phase.	1.3.3.9
0028	Construction Fencing	No	Temporary installation for construction phase.	1.3.2.2
0029	Site Parking Lots	No		1.3.3.4
0030	Main Field Office	No	Temporary installation for construction phase.	1.3.3.10
0032	Timekeepers Trailers/Entry Turnstiles	No	Temporary installation for construction phase.	1.3.3.11
0033	Tool Cribs	No	Temporary installation for construction phase.	1.3.3.12
0034	Area and Security Lighting	No	Temporary installation for construction phase.	1.3.3.7
0035	Construction Heavy Equipment Mobilization	No	Temporary installation for construction phase.	1.3.3.13

Table 1-2 WTP Project Limited Construction Activities Phase A/B Commencement Description

Activity No.	Phase	ACTIVITY DESCRIPTION	ITS Impact?	Phase A/B discussion	LCAR Section Reference
		Pre-Construction of Main Facilities - Pretreatment/HLW/LAW			
0001	A/B	Site Grading/Survey Control established -Clear and Grub	No – Grading Yes – Survey Control	Grading will be performed during Phase A as described in LCAR Section 1.3.1.1 Survey monuments will be located during Phase A. Establishing location and elevation of the process facilities will be performed during Phase B.	1.3.1.1
0002	B	Soil Retention Sheet Pile Installation for Pretreat/ HLW Base Slab Foundations	No – Structure	Soil retention systems for process facilities will be performed during Phase B. No other soil retention systems are planned.	1.3.1.2
0003	B	Pretreat/HLW/LAW Main Foundation Excavation	No	Main process facility excavations will be performed during Phase B. Excavations for temporary and non-ITS facilities described in the LCAR will be performed during Phase A. Excavation for these facilities is not specifically requested or described in the LCAR as they are not associated with ITS facilities.	1.3.1.2
0004	B	Subgrade Compaction Inspection for Activity #0003	Yes	ITS subgrade compaction inspections (testing) for the process facilities will be performed during Phase B. Other non-ITS soil testing will be performed during Phase A to support site preparation and construction of temporary and non-ITS facilities described in the LCAR. This testing is not specifically requested or described in the LCAR as it is not associated with ITS facilities or activities.	1.3.1.2
0005	B	Mud Mat Placement for Activity #0003	No	Mud mats for the process facilities will be placed during Phase B.	1.3.1.3

Table 1-2 WTP Project Limited Construction Activities Phase A/B Commencement Description

Activity No.	Phase	ACTIVITY DESCRIPTION	ITS Impact?	Phase A/B discussion	LCAR Section Reference
0006	N/A	HLW/LAW basemat rebar pre-assembly	Yes	This activity is being added after Phase B authorization and will require specific approval and authorization.	1.3.1.4
		Permanent Facilities and Services to be Installed/Utilized during Construction			
0007	A	Electrical Grounding	No	Installation of the perimeter loop for the grounding grid will commence during Phase A.	1.3.2.3
0008	B	Excavation for U/G Firewater System	No	Excavation for portions of the permanent fire water system will commence during Phase B.	1.3.2.1
0009	B	Installation and Testing of U/G Firewater System	No	Portions of the permanent fire water system will be installed and tested during Phase B.	1.3.2.1
0010	B	Temporary Commissioning of portions of U/G Firewater System	No	Portions of the permanent fire water system installed and tested during Phase B will also be temporarily commissioned during Phase B.	1.3.2.1
0011	A	Excavation for other U/G utilities - raw water, potable water, permanent power, site drainage, compressed air, cathodic protection.	No	Excavation for the site drainage system will be performed during Phase A as part of the site preparation subcontract. Excavation for temporary construction raw water will also be performed during Phase A (see activity 24). The rest of the work will be performed during Phase B.	1.3.2.1
0012	A	Installation of Items in Activity #0011	No	Installation of the site drainage system will commence during Phase A as part of the site preparation subcontract. The rest of these permanent installations will be performed during Phase B.	1.3.2.1
0013	A	Permanent Facility Fencing Installation	No	Installation of permanent and temporary fencing will commence during Phase A.	1.3.2.2
0014	B	Administration Building	No	Construction of the administration building will commence during Phase B or later.	1.3.2.4

Table 1-2 WTP Project Limited Construction Activities Phase A/B Commencement Description

Activity No.	Phase	ACTIVITY DESCRIPTION	ITS Impact?	Phase A/B discussion	LCAR Section Reference
0015	B	Permanent Sanitary System Installation	No	Installation of the permanent sanitary system will commence during Phase B. Temporary sanitary facilities will be installed during Phase A as described in activity 17.	1.3.2.5
0016	A	Site Road Construction	No	Road installation will commence during Phase A.	1.3.2.6
0031	B	Main Construction Warehouse	No	Excavation for the warehouse will commence during Phase A as described in activity 3. Building the structure will commence during Phase B.	1.3.2.7
0036	A	Site Drainage System	No	The site drainage system installation will commence during Phase A as described in activities 11& 12.	1.3.1.1
0037	A	Material Receipt and Storage	Yes	Material receipt and storage will commence during Phase A to support LCAR activities and future construction activities.	1.3.2.7 1.3.3.6
0038	B	Outdoor Lighting	No	This activity is being added after Phase B authorization and will require specific approval and authorization.	1.3.2.8
		Construction Temporary Facilities (concurrent activities)		No temporary construction facility will be ITS or will impact the ability of an ITS SSC to perform the required safety function. In those cases that the activity associated with a construction facility can impact an ITS SSC, the activity will be subject to appropriate Quality Assurance Program requirements. The specific items below that enable quality-related activities are activity 0020, Concrete Batch Plant, and activity 0026, Civil Testing Laboratory.	
0017	A	Temporary Sanitary Facilities	No	Installation of temporary sanitary facilities will commence during Phase A.	1.3.2.5
0018	A	First Aid Trailer/Emergency Response/Fire Protection	No	Installation will commence during Phase A.	1.3.3.1
0019	A	Site Security	No	Site security will be established during Phase A.	1.3.2.2

Table 1-2 WTP Project Limited Construction Activities Phase A/B Commencement Description

Activity No.	Phase	ACTIVITY DESCRIPTION	ITS Impact?	Phase A/B discussion	LCAR Section Reference
0020	A/B	Concrete Batch Plant	No	The concrete batch plant production equipment and facilities installation will commence during Phase A. Qualification of the batch plant will commence during Phase B.	1.3.3.2
0021	A	Temporary Site Offices	No	Installation of temporary site offices will commence during Phase A.	1.3.3.5
0022	A	Fabrication Shops/Laydown areas/Change Rooms	No	Preparation/installation will commence during Phase A.	1.3.3.6
0023	A	Construction Power Distribution, priorities: Batch Plant, Site Office facilities, Fabrication Shops	No	Installation of temporary power will commence during Phase A.	1.3.3.7
0024	A	Construction Water Distribution	No	Temporary installation will commence during Phase A.	1.3.2.1.1
0025	A	Site communication	No	Temporary installation will commence during Phase A.	1.3.3.8
0026	A/B	Civil Testing Laboratory Facility	No	The civil testing laboratory will be installed during Phase A. This laboratory will perform testing during Phase A to support installation of temporary and non-ITS facilities. The testing to be performed during Phase A is standard industrial practice and is not ITS. This testing is not specifically requested or described in the LCAR as it is not associated with ITS facilities or activities. The laboratory will perform ITS testing during Phase B as described in activity 4.	1.3.3.3
0027	A	Construction Waste and Trash Disposal	No	Waste and trash disposal will be established during Phase A.	1.3.3.9
0028	A	Construction Fencing	No	Installation of temporary construction fencing will commence during Phase A.	1.3.2.2
0029	A	Site Parking Lots	No	Temporary parking lots will be provided during Phase A.	1.3.3.4

Table 1-2 WTP Project Limited Construction Activities Phase A/B Commencement Description

Activity No.	Phase	ACTIVITY DESCRIPTION	ITS Impact?	Phase A/B discussion	LCAR Section Reference
0030	A	Main Field Office	No	Installation of a temporary main field office will commence during Phase A.	1.3.3.10
0032	A	Timekeepers Trailers/Entry Turnstiles	No	Installation of a temporary timekeeper trailers and entry turnstiles will commence during Phase A.	1.3.3.11
0033	A	Tool Cribs	No	Tool cribs will be established during Phase A.	1.3.3.12
0034	A	Area and Security Lighting	No	Installation of temporary area and security lighting will commence during Phase A.	1.3.3.7
0035	A	Construction Heavy Equipment Mobilization	No	Mobilization will commence during Phase A.	1.3.3.13

2 Organization and Administration

The following section describes the construction organization that will perform the limited construction activities. Included in this description are the functional titles and responsibilities to be performed by those functions. Within the limitations imposed by the ISMP and QA Manual on functional independence for the Field QC Manager and ES&H Manager, the responsibilities may be reassigned to other functional areas and functional titles may be revised. SRD Safety Criterion 7.0-4 and ISMP sections 3.2, 6.1.1, 6.1.2, and 11.1 are applicable to the Project organization during limited construction.

2.1 Overall Management Structure and Organization

The Project Manager is responsible for the proper execution of all work under the contract. The project management organization, including engineering and procurement support for construction, is described in the QA Manual.

2.2 Construction Organization

The construction organization for the limited construction activities is shown in Figure 2-1. The site organization and the responsibilities of project construction management personnel are discussed below.

2.3 Responsibilities

The Construction Site Manager (CSM) is responsible for the overall management of the WTP site and site work force, and the implementation of the plans and procedures governing construction activities. The CSM implements this direction through the following construction management staff:

- Field Engineering Manager
- Area Superintendents - pretreatment, HLW, LAW, and BOF/Yard
- General Superintendent
- Labor Relations Manager
- Field Quality Control Manager (FQCM)
- Environmental, Safety and Health Manager
- Project Field Procurement Manager
- Project Field Subcontracts Manager
- Field Project Controls Manager (FPCM)

The Construction Site Manager is responsible to the WTP Project Manager or Deputy Project Manager for day-to-day operations on the project. Areas of responsibility include:

- Total WTP site management
- Reporting construction progress to Project Manager
- Implementing the WTP Site Environmental, Health and Safety program, which provides strict adherence to Federal, State, and site safety codes
- Site Organization Management
- Overall quality of work being performed and implementation of the WTP Quality Control Program
- Construction site policies and procedures
- Site Specific or Task Specific (if required) training of manual labor on the project

- Executing overall construction scope within schedule and budget
- Monitoring construction performance on the project and controlling site expenditure for craft supervision, labor, equipment, services, and material
- Directing and coordinating the activities of the construction effort, determining manpower needs; coordinating established operational plans; reviewing work accomplished by each craft
- Providing input and direction to estimates, schedules, construction methods, and procedures
- Administering labor relations onsite and coordinating these activities with the Corporate Labor Relations Department
- Providing overall administration and direction to subcontractors to ensure that their work is in compliance with construction procedures, specifications, and schedules
- Site Interface for regulatory agencies

The Field Engineering Manager is responsible for construction engineering and technical support activities, including the interface with Design Engineering and maintaining configuration control of the design during the construction phase.

The Pretreatment Area Superintendent is responsible for directing the planning and execution of work performed by WTP direct hire craft and WTP subcontractors in the pretreatment facility.

The HLW Area Superintendent is responsible for directing the planning and execution of work performed by WTP direct hire craft and WTP subcontractors in the HLW facility.

The LAW Area Superintendent is responsible for directing the planning and execution of work performed by WTP direct hire craft and WTP subcontractors in the LAW facility.

The BOF/Yard Area Superintendent is responsible for directing the planning and execution of work performed by WTP direct hire craft and WTP subcontractors in the BOF/Yard area.

The General Superintendent is responsible for organizing, directing and controlling the manual labor force. He has overall responsibility for craft worker safety on the project site and implementing the project Zero Accident policy.

The Labor Relations Manager, reporting directly to the Construction Site Manager, is responsible for assisting the Construction Site Manager in handling the labor relations related aspects of the project.

The Field Quality Control Manager, who receives functional and technical direction from the Quality Assurance department, is responsible for the implementation of the WTP Construction Quality Control program.

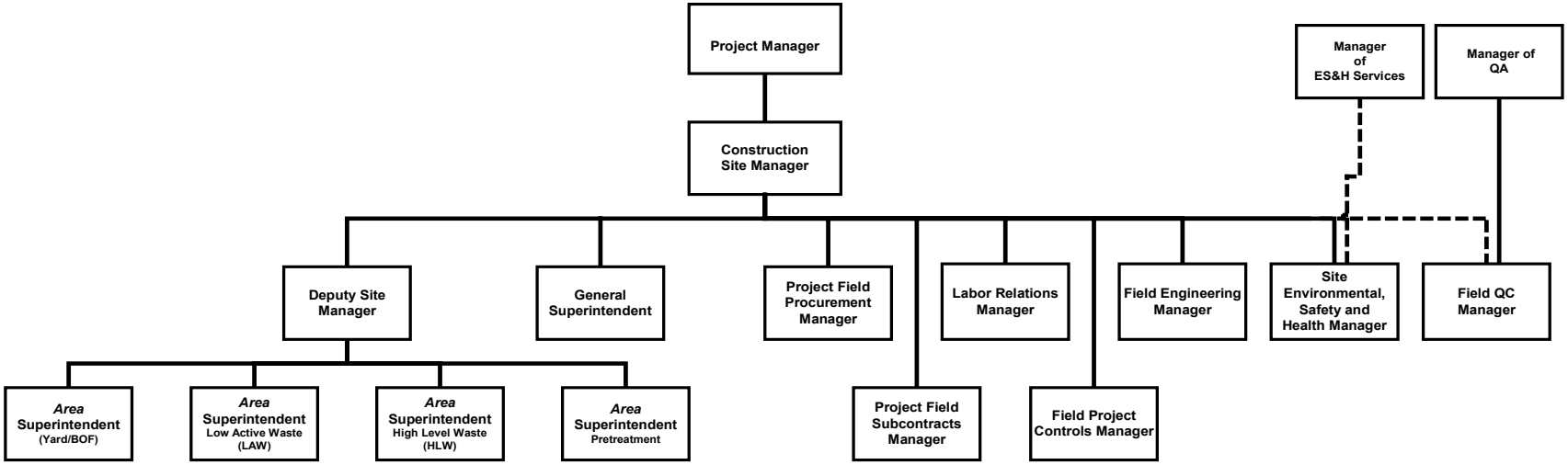
The Site Environmental Safety and Health Manager receives oversight direction from the Environmental, Safety and Health Manager and is responsible for assisting the Site Manager in handling the Environmental, Safety and Health related aspects of the construction site.

The Project Field Procurement Manager reports directly to the CSM and is responsible for procuring all field materials and services required by the design that are not procured by the Project Procurement organization.

The Project Field Subcontracts Manager reports directly to the CSM and is responsible for ensuring that the subcontractors' contractual obligations regarding the scope of the WTP project are met.

The Field Project Controls Manager is responsible for implementation of the project controls program, including cost control, planning, and scheduling.

Figure 2-1 WTP Project Construction Organization



3 Management Control Systems

3.1 Configuration Management

During the Limited Construction Phase of the WTP project, the Configuration Management (CM) program, identified in the project CM plan (PL-W375-MG00002), is applied to work activities that describe and control the facility configuration. Configuration management is an integrated management process that identifies and documents the physical and functional characteristics of the facility's structures, systems, components, and computer software. It also ensures changes to these characteristics are properly developed, assessed, approved, issued, implemented, verified, recorded, and incorporated into the facility's documentation. SRD Safety Criteria 4.0-1 and 4.0-2 and ISMP sections 1.3.16 and 5.3 are applicable to configuration management for limited construction activities.

3.2 Quality Assurance

The QA Manual describes the WTP commitment to quality, establishes quality policy, and defines the approach to the implementation of QA Manual requirements on the Project. The QA Manual is in accordance with SRD Safety Criterion 1.0-10 and the safety criteria contained in SRD section 7.3. The QA Manual has been approved by OSR. Associated procedures will be available and appropriate training completed prior to commencing limited construction activities. The QA Manual will be applied, using a graded approach as described in the QA Manual, to all limited construction activities.

3.3 Records Management

The commitments and requirements for records management are addressed in the QA Manual. The current project records management program will be implemented for limited construction activities.

3.4 Procedures

Procedures will be developed to support quality related BNI activities within the LCAR scope that require procedures. The procedures will be developed in accordance with ISMP section 1.3.13 and QA Manual requirements governing the need for and production of procedures. Specific titles may change and content may be reorganized as actual procedures are developed. Procedures for subcontracted activities will be developed and implemented as directed by the subcontract.

3.4.1 Construction Procedures

Construction procedures are planned to support quality related limited construction activities. Key points and objectives of these procedures are discussed below. Procedures will be issued sufficiently in advance of the work activity to support planning and training requirements.

<u>Construction Organization</u>

This procedure describes the construction organization and establishes specific responsibilities on both departmental and individual bases.

The Construction management staff consists of representatives of functional departments including Labor Relations, Field Engineering, Procurement, Project Controls, Human Resources, and Quality Control, and is headed by the Construction Site Manager.

Where organizational independence is required, matrixed reporting relationships are in place, such as the Construction Quality Control department is matrixed to the construction organization and reports to the Quality Assurance organization.

Construction Quality Control Program

Control of construction quality is the responsibility of the Construction Site Manager, and is accomplished through application of a variety of tools, processes, and organizations. Quality will be built into the work processes, not inspected into the work.

Quality construction will be accomplished via the following:

- Appropriate work process development
- Procedural development
- Training
- Self verification and checking by the installer
- Verification and/or inspection by others, as required for the quality level of the work performed
- Appropriate documentation commensurate with the quality level of the work

Field engineers qualified in the area of work being performed accomplish first-line verification of day-to-day construction activities, regardless of quality classification.

Quality Control will perform inspections on quality related work activities, as required by the Quality Control Program. Quality Control Program elements will be applied using a graded approach based on the assigned quality classification or safety significance of the work item or process. The process described in the QA Manual will be utilized to establish the scope, depth, and rigor of the application of QA requirements.

Procedures for activities affecting quality will specify required verifications and inspections, including methods, acceptance criteria, documentation requirements, and responsibility for their performance, or contain provisions for assignment of inspection points in working documents. Deficiencies discovered during Quality Control inspections will be documented and evaluated for nonconforming conditions and adverse trends, dispositioned for correction, and input to trending data. Nonconformance reports will be generated as required.

Construction Training

Construction personnel will receive DOE required Hanford site access training, project Indoctrination, Safety Orientation, Quality Assurance Orientation, and additional training applicable to their assignments and duties. Subject matter will encompass applicable technical criteria and procedures, applicable quality assurance program elements, and individual job responsibilities and authority. Training methods include on-the-job training, classroom/formal training sessions, reading assignments, and refresher courses.

Ongoing training will address revised project requirements, and other subjects specified by management. Training will be documented and training records maintained.

Technical qualification of crafts personnel will be ensured through hiring of trades people who have achieved journeyman status through the applicable Building Trade training and qualification program.

Qualified journeyman building tradesmen, or apprentices working under journeyman direction, will perform activities affecting quality.

Selected activities such as welding require additional training and qualification, which will be completed prior to performing the specified activity.

Field Engineering personnel performing verification of quality affecting activities will be qualified for those activities. Quality Control personnel inspecting activities affecting quality will be qualified and certified, as applicable, prior to performing the subject inspection activity.

Also see section 7.2.

Construction Work and Inspection Packages

Construction Work and Inspection Packages (CWIPs) will be required for quality affecting work activities and may also be utilized for non-quality affecting work. Packages will be assembled by Field Engineering. Packages will typically include the following:

- A description of work to be performed
- A list of design documents required to implement the work and indication of which design documents are included in the package
- Details and documentation required by the construction procedures applicable to each included work activity
- A list of material required to implement the package
- Inspection and test documents for the work

The CWIP will be issued to craft supervision and will be the guiding document for important to safety work performed in the field. The work sequencing and detailed instructions will not normally be required unless circumstances require them. Documentation required by construction procedures, when complete, will serve as the permanent records of the subject construction activity.

Measures will be established to ensure that the correct revision and issue of design documents is in use in the field for construction and inspection activities.

Field Document Control

The existing Project Document Control procedures will be revised or amended, if required, to accommodate implementation of the project document control processes at the construction site.

Field Change Requests and Field Change Notices

Field changes to engineering documents will be communicated by Construction to Engineering through the use of Field Change Requests (FCRs) and Field Change Notices (FCNs).

Specific direction for, and limitations on use, will be established and changes will be reviewed, approved, and issued in accordance with the Configuration Management program described in section 3.1.

Quality Control Certification

Quality Control personnel will be certified for inspection activities based on the requirements of the QA Manual. Certification will be based on related experience, training and, as applicable, examination(s), to determine knowledge level and confirm capability to perform inspection activities. The Field Quality Control Manager will administer the certification program.

Nonconforming Items

Nonconforming items will be documented, clearly describing the conditions that do not conform to specified criteria. Nonconforming items will be controlled via tagging, segregation, or other means to prevent inadvertent use. Nonconforming items will be dispositioned by qualified personnel assigned by the responsible technical organization, with technical justification when required, and configuration management concerns addressed in the disposition.

Reworked and repaired items will be inspected, tested, or reviewed in accordance with original requirements or specified alternate requirements, respectively.

Measuring and Test Equipment Control

Measuring and Test Equipment (M&TE) utilized for acceptance of activities affecting quality requires control and calibration traceable to national standards. M&TE control is administered by the Field Engineering department with equipment calibration and maintenance performed by a qualified testing laboratory. Controls will be imposed in accordance with the QA Manual and will include:

- Equipment identification, calibration, and inclusion of a recall system
- Equipment storage and calibration in a suitable environment
- Segregation of out of calibration equipment until recalibration is performed
- Application of calibration status indicators to equipment

Subcontract Administration

Subcontractors performing important to safety activities are required to have an approved quality program appropriate to the work, or will work directly to the WTP QA Manual.

- If implementing an approved subcontractor quality program, activities will be verified to be in compliance with contract quality requirements by Quality Assurance or Quality Control through audit, surveillance, and document review, as appropriate.
- If working to the WTP QA Manual, activities will be performed to the appropriate construction procedures with monitoring and inspection by Field Engineering and Quality Control as specified therein.

Material Control

Materials will be controlled in accordance with QA Manual requirements including measures to ensure that:

- Storage areas will be identified and materials will be stored under conditions appropriate to their sensitivity and physical characteristics.

- Movement of materials into, out of, between, and within storage areas will be documented.
- Storage conditions will be monitored periodically by material handling personnel (and Quality Control for important to safety materials) to verify that materials are properly identified and stored under suitable conditions.
- Special maintenance requirements specified by Engineering are implemented and documented as required to maintain equipment integrity or warranty.

Identification of materials requiring traceability will be maintained either on the items or in documents traceable to the item(s).

Receipt Inspection

Materials and components will be subject to receipt inspection, before release for installation at the site, in accordance with the QA Manual. Quality Control inspection will be performed utilizing a graded approach that considers quality classification and safety significance, attributes of the item (such as standard catalog item versus unique design), and inspections performed at the source. Inspections will typically include:

- Confirmation that items comply with the requirements of the purchase order.
- Proper packaging.
- Items are received free of damage.
- Provision may be included for sampling inspection of bulk items where appropriate.

Survey Control

This procedure will require establishment of several primary control points, which will be utilized for horizontal and vertical control for layout of the site's secondary and tertiary monuments and benchmarks. Secondary and tertiary monuments will be established after site grading and earthwork activities.

In addition to requirements imposed by the M&TE program, equipment will receive periodic field checks to ensure continued proper operation and minimize risk of calibration failure.

4 Radiological Safety

4.1 Radiation Protection Program for Construction

WTP activities shall be conducted in compliance with a documented Radiation Protection Program (RPP), as approved by the DOE, unless specifically excluded by 10 CFR 835.1(b). The RPP presents plans and measures for managing potential exposure scenarios involving radioactive material and radiation (such as source handling/use) encountered during construction activities. These plans and measures are designed to assure site personnel safety and comply with the requirements of 10 CFR 835, *Occupational Radiation Protection*. The RPP for Design and Construction shall be approved by the DOE prior to start of construction activities. SRD Safety Criteria 5.0-1 and 1.0-10 and ISMP section 2.3 are applicable to the RPP for Design and Construction.

4.2 Radioactive Contamination Detected During Construction

The WTP construction site characterization study, documented in HNF-2067, Rev. 0, *TWRS Phase 1 Privatization Site Pre-construction Characterization Report*, indicates radiological conditions consistent with Hanford Site-wide background levels. However, due to the potential for encountering legacy radioactive material during construction activities, the WTP project will implement a radiological monitoring program to assure site personnel and public radiological safety. The periodicity and type of radiological surveys performed during construction will be determined by the programs and procedures specified in the RPP. BNI does not intend to perform additional site characterization and will establish a monitoring program initially based on the characterization specified in HNF-2067. Background determinations will be based on the Hanford Site background determination. An initial radiological survey will be performed to confirm radiological conditions of the construction site. Currently, the site is not under radiological control and is not posted as a radiological area. If an area of the construction site is determined to be contaminated it will be placed under radiological control. Subsequent surveys will be performed to confirm that radiological conditions have not changed, with the frequency based on the amount of earth moved. The survey frequency will be determined by the amount of radioactivity detected, with a target frequency of quarterly. If significant excavation occurs, as expected at the initial stages of construction, then surveys will take place daily. Should the survey indicate radioactivity is routinely detected (the number of contamination events is more significant than the specific contamination level of each event) or a condition changes, such as high level radiological work performed by another contractor adjacent to the WTP construction site, the survey frequency will be increased commensurate with the risk and good health physics practices. Surveys will also be conducted after periods of sustained high winds. This is intended to mean that during environmental conditions that transport a distinguishable accumulation of vegetation to the WTP construction site, additional radiological surveys of the vegetation will be performed. If radioactivity is detected, the transport path of the across the construction site will be surveyed. In addition to the biological and environmental transport vectors, the remote possibility exists that unidentified radioactive discharges were previously conducted at the location now being used to construct the WTP. Because of this, surveys of the spoil pile will be conducted after an excavation depth of approximately 15 - 20 feet or if excavation is stopped due to the discovery of unexpected buried debris or material. The requirements and considerations for establishing and modifying a radiological survey frequency are described in the *River Protection Project - Waste Treatment Plant Radiological Control Manual*, article 551.

The radiological monitoring program is designed to detect radioactive material or conditions above existing background levels and to ensure prompt identification and response to conditions warranting protective measures in accordance with 10 CFR 835, *Occupational Radiation Protection*. Procedures will be developed to address construction site response to off-normal radiological conditions in support of implementation of the RPP. Limiting doses in accordance with the requirements of 10 CFR 835 per the RPP implementing procedures will ensure conformance to public dose standards in SRD Safety Criteria 2.0-1 and 2.0-3 in the event that contamination or buried waste are encountered. If contamination is detected that requires one RCT more than eight hours to verify the boundaries and remediate, the area will be posted, work activities in that area stopped, and OSR will be notified.

The RPP implementing procedures will:

- Include action levels that will trigger mitigative actions if radioactive contamination above background levels is encountered
- Provide controls on radioactive contamination encountered during limited construction activities and the release of materials and property containing residual radioactive contamination (SRD Safety Criterion 5.3-8 is applicable to limited construction activities)
- Provide methods to limit and control the spread of radioactive contamination
- Provide methods to collect, document, store, and retain all contamination and exposure records

The RPP implementing procedures and programs described above will ensure that an inadvertent release of radioactive material to the environment will be managed and controlled such that the impacts to the environment and exposures to the public are kept as low as reasonably achievable (ALARA). These procedures and programs will be consistent with 10 CFR 835 and will be available for review prior to the limited construction readiness evaluation.

Should it occur, the discovery of legacy waste will be recorded, reported, and evaluated as described in section 5. The radioactive emission license discussed in section 6.1.1 will include conditions to address environmental radiological protection requirements should radioactive contamination be encountered during limited construction excavation activities. Procedures provided to address the radioactive emission license conditions will include SRD Safety Criteria 5.3-1, 5.4-2, 5.4-3, 5.4-6, 5.4-7, 5.4-8, 5.4-9, and 5.4-10 requirements that are relevant to limited construction activities.

5 Notification, Categorization and Consequence Assessment

Construction occurrence reporting procedures will include categorization and notification requirements specified in SRD Safety Criteria 7.7-4, 7.7-5, 7.7-6, and 7.7-7 relative to "Unusual Occurrences" and "Off-Normal Occurrences". "Emergency" categorizations are not applicable prior to facility operation.

Construction occurrence reporting procedures will be developed in accordance with DOE Manual 232.1-1A, section 8. These procedures will satisfy the requirements of SRD Safety Criterion 7.7-6 and associated implementing standard, ISMP section 1.3.17. Notification and reporting will be in accordance with DOE Manual 232.1-1A, sections 5.3.2 and 5.4 to satisfy the requirements of SRD Safety Criterion 7.7-8.

Construction occurrence reporting procedures will include provisions to address the requirements of ISMP section 2.5 relative to 10 CFR 820.

Subcontractors and suppliers will be required to report defective items, materials, and services during limited construction in accordance with SRD Safety Criterion 7.7-9 as described in the QA Manual and associated implementing procedures.

The Construction Occurrence Reporting Plan for use during limited construction is included as Appendix B.

As described in SRD Safety Criterion 7.7-1 and DOE/RL-96-0006 incidents that result in or could reasonably have resulted in a major accident shall be investigated. Per the definitions in section 12 of the ISMP, relative to implementation of the investigation and reporting requirements of 29 CFR 1910.119(m), a major accident is a major uncontrolled emission, fire, or explosion, involving one or more highly hazardous chemicals or radioactive materials, that presents serious danger to facility worker.

During limited construction, highly hazardous chemicals described above will not be utilized and there is no reason to believe that significant amounts of hazardous chemicals were improperly disposed of on the construction site. Radioactive process materials will not be required to perform limited construction. The anticipated low level legacy contamination that may be encountered during construction will be controlled as described in section 4.1. The radiation protection program establishes a site monitoring and control process that identifies and controls radioactive contamination to a level several thousand times below the level necessary to present a serious danger to facility workers. As such, incident investigation requirements contained in SRD Safety Criteria 7.7-1, 7.7-2, and 7.7-3 are not applicable to limited construction activities. Incident investigation procedures will be developed consistent with DOE Manual 232.1-1A, section 5.5, for use during limited construction activities.

6 Required Permits

6.1.1 Clean Air Act

Two Notice of Construction (NOC) applications have been prepared to support WTP limited construction activities.

A radioactive NOC will be submitted to the Washington State Department of Health (WDOH) in support of excavation activities (WAC 246-247). The radioactive emission license issued by WDOH is being obtained as a precautionary measure should radioactive contamination be encountered during soil excavation, but is not specifically required for construction to begin.

A dust control plan will be used to minimize non-radioactive fugitive emissions resulting from excavation and construction traffic.

An NOC is also being prepared for particulate emissions from the concrete batch plant (WAC 173-400). This NOC will be submitted to the Washington State Department of Ecology. The concrete batch plant air permit is required prior to erecting the batch plant.

6.1.2 Clean Water Act

Documentation will be submitted to WDOH supporting agency approval for operation of a *Large On-Site Sewer System* (WAC 246-272). Section 1.3.2.5 describes the strategy for managing sanitary wastes during construction.

Water permits will be required to support some construction discharge activities. Three existing state waste discharge permits have been approved for Hanford Site activities and will meet most WTP needs.

- *Hydrotest, Maintenance, and Construction* (ST-4508)
- *Cooling Water and Condensate* (ST-4509)
- *Industrial stormwater discharges* (ST-4510)

In addition to these existing permits, a state sand and gravel general permit may be required to cover discharges associated with sand and gravel and concrete batch plant operations not addressed by existing permits.

7 Contractor's Technical and Experience Qualifications to Construct the Plant

7.1 Experience

Bechtel's successful history in safely designing and constructing large and complex projects to exacting quality standards in a highly regulated environment is notable and extensive. With more than 50 years of nuclear experience, Bechtel has designed or built more than half of the nuclear power plants in the United States, constructed over 150 nuclear power plants world-wide, managed the DOE's (FUSRAP) nuclear waste cleanup program and performed design for the DOE's Defense Waste processing facility at the Savannah River Site.

Bechtel has time tested and proven construction work processes, which will be deployed to construct WTP. These work processes and construction management systems have received recognition in the areas of safety and quality performance. Some notable accomplishments include the following:

- Winning the National Safety Council Award of Honor twice, for completing 2.75 million work hours without a lost time injury in 1994 and 2.6 million in 1996 at DOE's Savannah River Site
- Over 75 % of Bechtel's projects worldwide, over 75 million work hours have been performed without a single lost time accident, even under exceptionally hazardous conditions
- Winning the National Safety Achievement Award from the National Contractors Association for Outstanding Safety Performance
- Replacement of North Anna nuclear power station steam generators setting a US record for the lowest plant shutdown time and lowest total radiation exposure, with a safety record twice that of the previous best
- Ten consecutive Outstanding ratings for performance as Environmental Restoration Contractor at the DOE's Hanford Site since 1994
- Tennessee Quality Commitment Award from the Tennessee Quality Awards program for Bechtel's consistent record of excellence in environmental cleanup
- US Department of Energy's "Large Contractor of the Year" from the US Department of Energy's Oak Ridge Operations Office for FUSRAP

In addition to the construction experience and history described above, Bechtel is or has recently provided construction and field services to support the DOE mission of Waste Cleanup with substantial experience in the areas of radiological safety, radiation protection, environmental radiation protection, Quality Assurance, and management controls as follows:

Oak Ridge-Bechtel Jacobs Role

- Overall guidance and integration of cleanup programs at the uranium enrichment facilities at Oak Ridge, Paducah, and Portsmouth
- Safe and environmentally compliant storage of uranium hexafluoride cylinders at the East Tennessee Technology Park, Paducah, and Portsmouth
- Environmental investigation and cleanup at hundreds of sites, ranging from remediation of reactor basins to deactivation of high-ranking facilities and stabilization of nuclear material Storage, consolidation, characterization, and ultimate disposal of all legacy waste and any newly generated waste
- All 29 activities were essentially completed on schedule and below cost

Bechtel Hanford

- Decontamination and decommissioning of former weapons material production facilities
- Interim safe storage of nuclear reactors, where hazardous materials, equipment, and outer structures are removed and the reactor core is sealed within its shield walls to allow safe radioactive decay over several decades
- Cleanout of spent nuclear fuel storage basins
- Remediation of massive contaminated soil sites and disposal of excavated wastes, including design, construction, and operation of a 4-million-ton disposal facility
- Permitting, environmental compliance, groundwater remediation, waste management, and surveillance and maintenance of retired facilities and sites

Savannah River Site

- Design and construction of four facilities for tritium handling and processing, upgrades to a high-level waste tank farm, and restart of the F-canyon, FB-line, and HB-line
- Evaluation of technologies for treating spent nuclear fuels; technologies include co-disposal, melt and dilute, press and dilute, electromet-allurgy, glass material oxidation dissolution, and plasma arc melting
- Environmental restoration, including managing, integrating, and remediating over 300 waste sites and groundwater cleanup units
- Planning, design, and construction of facilities for the storage, disassembly, and conversion of excess plutonium for ultimate disposition by reactor burning or immobilization
- Five times our construction department completed over 2.5 million job-hours without a lost-time accident.

Nevada Test Site

- Stockpile stewardship, nuclear waste management, and crisis and consequence management for nuclear emergencies
- Development of new environmental technologies and emergency response capabilities
- Counter-terrorism technology development, training, and intelligence to detect activities leading to illegal weapons of mass destruction

Energy's Formerly Utilized Remedial Action Program (FUSRAP)

We were responsible for site characterization, stabilization, remediation, and restoration at 46 facilities nationwide, including six high-priority Superfund sites, and over 300 vicinity properties in both residential and industrial areas. Site soils, surface water, groundwater, sediments, or sludge were contaminated with heavy metals, dioxin, cyanide, acids, PCBs, volatile organics, asbestos, or petroleum hydrocarbons, as well as uranium, radium, or thorium.

Idaho National Engineering Laboratory

- Expanding INEEL's scientific capabilities in areas such as subsurface geoscience
- Managing environmental restoration at INEEL in a safe, legally compliant manner, especially the cleanup of buried nuclear waste
- Continuing core research in nuclear reactor science and technology to develop the next generation of reactors, which are safer, more economical, and proliferation-resistant and produce less waste
- Developing new science and technology for alternative energy and energy efficiency, such as biomass derived fuels
- Sensing and diagnostics for safety and industrial processes

7.2 Training and Qualification

Personnel will be trained and qualified to ensure they are capable of performing their assigned work and provided with continuing training to ensure job proficiency is maintained in accordance with ISMP section 1.3.12 and SRD Safety Criterion 7.3-3.

8 Approach to Implement the SRD and the ISMP

The SRD and ISMP contain radiological, nuclear and process regulatory commitments that, if applicable, must be implemented in order to perform project activities including limited construction activities. The approach to implement these commitments is as follows:

1 Identify the limited construction activities including those that may impact ITS SSCs. This element of the approach is documented in Table 1-1 WTP Project Limited Construction Activities.
2 Identify the radiological, nuclear and process regulatory commitments from the SRD and ISMP that apply to the activities identified in step 1.
3 Identify and develop procedures that will implement the regulatory commitments from the SRD and ISMP identified in steps 2.
4 Assess that the plan for performance of limited construction activities is in compliance with the SRD and ISMP. That is, the LCAR submittal, integrated with a project self-assessment and an OSR readiness inspection performed prior to start of activities, will ensure acceptability and compliance of the activities with the SRD and ISMP.

This approach ensures that the limited construction activities will be implemented consistent with the program described in the ISMP and that the applicable requirements of the ISMP and SRD are met as required by RL/REG-99-17, Rev. 4, sections F.3.3 and G.3.3, Regulatory Acceptance Criteria.

The LCAR cites ISMP and SRD requirements that are specific to limited construction activities. Those SRD and ISMP requirements, applicable to other project activities, that are not cited in the LCAR are not excluded during limited construction.

Appendix A

Drawings

Appendix A
Drawings

The drawings referenced herein are for information only. They reflect the current design as of the submittal date of this document and will be issued for construction prior to start of work.

Drawing Number	Title
24590-BOF-P1-50-00001	RPP-WTP Site Plot Plan
24590-BOF-C2-900-00001	RPP-WTP Site Composite Underground Yard Utilities Plane Area 1
24590-BOF-C2-900-00002	RPP-WTP Site Composite Underground Yard Utilities Plane Area 2
24590-BOF-C2-900-00003	RPP-WTP Site Composite Underground Yard Utilities Plane Area 3
24590-BOF-C2-900-00004	RPP-WTP Site Composite Underground Yard Utilities Plane Area 4
24590-BOF-C2-900-00005	RPP-WTP Site Composite Underground Yard Utilities Plane Area 5
24590-BOF-C2-900-00006	RPP-WTP Site Composite Underground Yard Utilities Plane Area 6
24590-BOF-C2-900-00007	RPP-WTP Site Composite Underground Yard Utilities Plane Area 7
24590-BOF-C2-900-00008	RPP-WTP Site Composite Underground Yard Utilities Plane Area 8
24590-BOF-C2-900-00009	RPP-WTP Site Composite Underground Yard Utilities Plane Area 9
DWG-24590BF-E00001	RPP-WTP Site Electrical Distribution Duct Bank Plan
DWG-24590BF-E00003	RPP-WTP Site Area Grounding Plan
24590-LAW-DB-S13T-00003	LAW Vitrification Building Main Building Concrete Key Plan At El (-) 21’-0”
24590-HLW-DB-S13T-00001	HLW Vitrification Building Concrete General Arrangement Plan At El. (-) 21’-0”
24590-PTF-D0-S13T-00001	Pretreatment Facility Concrete Foundation Outline General Arrangement Plan for Excavation
24590-BOF-E2-LTE-00003	Site Lighting Feeder Distribution Plan

Appendix B

Construction Occurrence Reporting Plan for Limited Construction

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Construction Occurrence Reporting Plan for Limited Construction

During limited construction, incidents will be categorized, OSR will be notified, and reports will be generated and transmitted to OSR consistent with the requirements specified in SRD Safety Criteria 7.7-4, 7.7-5, 7.7-6, and 7.7-7 relative to "Unusual Occurrences" and "Off-Normal Occurrences" as described below. "Emergency" categorizations are not applicable prior to facility operation.

All WTP employees and subcontractors will be responsible for notifying their supervisor or manager immediately to report events and conditions which have caused or have the potential to cause adverse effects on safety, health, quality assurance, security, or have operational or environmental implications. Employee training will include:

- Each employee's duty to report occurrences
- Indoctrination in the philosophy of occurrence reporting
- Identification of reportable occurrences; their categorization, notification, and associated reporting requirements

The WTP Project Manager (PM) or designee will be immediately notified of potentially reportable conditions for categorization and notification/reporting to OSR. Offsite notification and reporting will be performed consistent with DOE M 232.1-1A, sections 5.3.2 and 5.4, tailored as described below.

The PM or designee will verbally notify the OSR Safety Regulation Official (SRO) that an event has been categorized as a Off-Normal Occurrence as soon as practical.

The PM or designee will verbally notify the SRO that an event has been categorized as an Unusual Occurrence as soon as practical but within two hours of categorization.

The PM or designee will make follow-up oral notifications to the SRO as soon as practical, if the event has been re-categorized, but no later than two hours of the following information:

- An Off-Normal Occurrence has been upgraded to a Unusual Occurrence
- Any further degradation in the level of safety or impact on the environment, safeguards and security, health, or operations of the facility or other worsening conditions subsequent to the previous notifications

Written notifications of all reportable occurrences will be provided to the SRO before the close of the next business day from the time of the categorization of the occurrence (not to exceed 80 hours). An update shall be submitted when significant new information (including changes in categorization) is available.

Completion of the final report will be provided when the analysis of the occurrence has been completed, root cause and contributing cause(s) finalized, corrective action(s) determined and scheduled, and lessons learned identified. The final report will be submitted to the SRO within 45 days of categorization of the occurrence.

The written occurrence report will contain, at a minimum, the following information:

- An occurrence report number identifying the facility, the year of the occurrence, and the sequential number of the occurrence
- Category of the occurrence
- All systems, equipment, structural items, administrative controls, or procedures involved
- Date and time when the occurrence was discovered and categorized
- Date and time of notification of regulatory and state and local authorities
- A thorough and complete description of what occurred or the defect reported
- Immediate or remedial actions taken to correct or alleviate the anomalous condition, and the results of those actions
- Cause of the occurrence
- Recommendations about whether further evaluation is required
- Action taken or planned to correct the problem
- Impact of the occurrence
- Levels and types of contamination, human exposures, and known or projected environmental, safety, and health impacts, if applicable
- Lessons learned from the occurrence that should be addressed in personnel training or facility procedures
- Any previous similar events at the same facility that are known
- PAAA reportability determination (PAAA Reportable/PAAA Below Threshold/Not PAAA Reportable)

The types of incidents that will be reported to the SRO during limited construction and the reporting thresholds are as follows:

Incident Type	**Reporting Threshold**	**Category**
Programmatic breakdown	Systematic failures of one or more administrative controls described in the AB that results in 1) multiple instances of nonconforming conditions, or 2) indeterminate conformance with the AB	Off-Normal
Facility or activity not in conformance with an authorization agreement or associated AB	(1) An activity that is not bounded by the Limited Construction Authorization Agreement that could affect radiological, nuclear, or process safety (RNPS) (i.e., any activity that could involve a radiological hazard during limited construction or that could affect RNPS for the completed RPP-WTP facility that is not addressed in the AB and authorized in the Limited Construction Authorization Agreement.	Off-Normal
	(2) A substantial nonconformance with an authorization agreement or associated AB (i.e., nonconformance that, if uncorrected, could have a serious effect on safety, operability of systems, structures or components, or product quality or is determined to be reportable under the PAAA)	Off-Normal

Incident Type	Reporting Threshold	Category
Defect in the AB	A significant deficiency, excluding typographical or editorial errors (i.e., correcting the AB would require prior OSR approval of the change). Example: A non-ITS LCAR activity is determined to be ITS	Off-Normal
Events with radiological safety significance	Events related to activities involving the use of industrial radioactive sources or material requiring the notification of a federal, state, or local entity not otherwise reportable under this plan.	Off-Normal
	A measurement of personnel or clothing contamination (excluding protective clothing) at a level exceeding the total contamination limits identified in 10 CFR 835, Occupational Radiation Protection, Appendix D, measured (prior to washing or decontamination) in accordance with the WTP Radiological Control Manual Article 338. The contamination level shall be based on direct measurement and not averaged over any area.	Off-Normal
	A single occurrence resulting in the contamination of five or more personnel or clothing (excluding protective clothing) measured (prior to washing or decontamination) in accordance with WTP Radiological Control Manual, Article 338, at a level exceeding the values for total contamination limits identified in 10 CFR 835, Occupational Radiation Protection, Appendix D. The contamination level shall be based on direct measurement and not averaged over any area.	Unusual Occurrence
	Radiation exposure relative to the misuse of industrial sources such as soil density gauges or radiography cameras.	Off-Normal
	Determination of a dose that exceeds the limits specified in 10 CFR 835, Subpart C, Occupational Radiation Protection (for onsite exposure	Unusual Occurrence
	A single occupational exposure that exceeds an expected exposure by 100 mrem.	Off-Normal
	A single unplanned exposure onsite to a minor or member of the public that exceeds 50 mrem.	Off-Normal
	Identification of radioactive contamination onsite that is not located within a Controlled Area, Fixed Contamination Area, or Soil Contamination Area, and is in excess of two times the total contamination levels in 10 CFR 835, Occupational Radiation Protection, Appendix D.	Off-Normal

Incident Type	Reporting Threshold	Category
Events with radiological safety significance (continued)	Discovery of major amounts of radioactive contamination (i.e., requires more than 8 field man hours to remediate) Note: Requires stopping work activities in the affected area	Unusual Occurrence
	During excavation activities, detection of evenly distributed contamination with detection readings greater than 500,000 dpm/probe beta/gamma, or greater than 200 dpm/probe above background alpha. Note: Requires stop work per Radioactive Air Emissions Notice of Construction.	Unusual Occurrence
	Radiological events that require reporting to other federal, state, or local agencies that would not otherwise be reportable under this plan.	Off-Normal
Defects in ITS SSC, including defects in design, manufacture, fabrication, installation, etc of SSCs	Defects that if left uncorrected could have resulted in a substantial safety hazard (i.e., the defect could have prevented the function of a hazard control strategy or initiated an accident. Note: Per the QA Manual, procurement documents shall specify the purchaser's requirements for the supplier's reporting of nonconformances and the purchaser approval of the disposition of nonconformances.	Off-Normal
Potential concerns/issues	Identification of potential concerns that are deemed worthy of reporting by the PM or designee.	Off-Normal or Unusual Occurrence (discretionary)

Following a reportable occurrence, the PM or designee will initiate the collection of information pertaining to the event. Collection of data will be conducted with the assistance of the Responsible Manager or other individuals deemed necessary.

A graded approach will determine the level of effort required to investigate the cause of an occurrence. The graded approach is based on the severity or risk associated with the event. Using the graded approach, all occurrences must have some degree of investigation. The investigation can take the form of a meeting with involved individuals, a single person gathering information, or a Root Cause Analysis Team trained in accident investigation techniques conducting a formal investigation.

Reportable occurrences are considered Conditions Adverse to Quality as defined in the Quality Assurance Manual. Reportable occurrence investigations (including the identification of causes and appropriate corrective actions) and report initiation, review, and approval will be performed in accordance with the project Corrective Action procedure. The project Corrective Action Management System (CAMS) will be used to ensure corrective actions identified are tracked and implemented. Conditions Adverse to Quality, as documented on a Deficiency Report, will be reviewed for reporting requirements specified in this Construction Occurrence Reporting Plan.

The project Price Anderson Amendments Act (PAAA) Coordinator will be notified of reportable occurrences as soon as practical and within two hours for Unusual Occurrences to ensure PAAA requirements are met.