

## INCOMING CORRESPONDENCE COVERSHEET

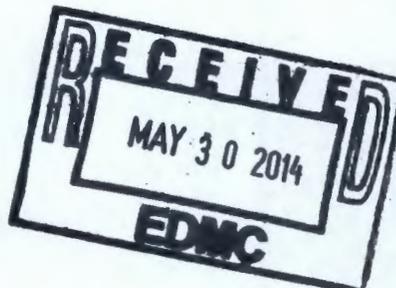
Author	Addressee	Correspondence No.
R. J. Schepens/ORP	J. Hedges/DOEC L. M. Bogert/EPA	06-WTP-089

Subject: HANFORD FEDERAL FACILITY AGREEMENT AND CONSENT ORDER (HFFACO)  
(ALSO KNOWN AS TRI-PARTY AGREEMENT) INTERIM MILESTONE M-62-01, "SEMI-ANNUAL COMPLIANCE REPORT FOR THE WASTE TREATMENT AND IMMOBILIZATION PLANT (WTP)," FOR JANUARY 2006 THROUGH JUNE 2006

## DISTRIBUTION

Name

CH2M HILL Hanford Group, Inc  
 CH2M Correspondence Control  
 SJ Bensussen  
 PK Brockman  
 DB Cartmell  
 JA Eacker  
 DW Ferrera  
 MN Hatcher  
 FM Ito  
 MN Jaraysi  
 JW Long  
 JA McDonald  
 VM Pizzuto  
 RS Popielarczyk  
 DL Renberger  
 MS Spears



## INFORMATION ONLY

Priority: None  
 Assignee: None  
 Received: August 3, 2006  
 Due Date: None

CH2M HILL Correspondence Control

For Questions or Distribution Corrections, Call: 376-0271

Outlook Mail Address: ^CH2M Correspondence Control



U.S. Department of Energy  
**Office of River Protection**

P.O. Box 450, MSIN H6-60  
Richland, Washington 99352

**JUL 3 1 2006**

06-WTP-089

Ms. Jane Hedges, Program Manger  
Nuclear Waste Program  
State of Washington  
Department of Ecology  
3100 Port of Benton Blvd.  
Richland, Washington 99352

Mr. L. Michael Bogert, Regional Administrator  
U.S. Environmental Protection Agency  
Region 10  
1200 Sixth Avenue  
Seattle, Washington 98101

Addressees:

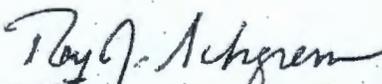
HANFORD FEDERAL FACILITY AGREEMENT AND CONSENT ORDER (HFFACO)  
(ALSO KNOWN AS TRI-PARTY AGREEMENT) INTERIM MILESTONE M-62-01, "SEMI-  
ANNUAL COMPLIANCE REPORT FOR THE WASTE TREATMENT AND  
IMMOBILIZATION PLAN (WTP)," FOR JANUARY 2006 THROUGH JUNE 2006

This letter transmits the U.S. Department of Energy, Office of River Protection, Semi-Annual  
Compliance Report (Attachment) required by Interim Milestone M-62-01 for the period January  
2006 through June 2006.

As stipulated in the M-62-01 milestone, this report includes project summaries of  
accomplishments, issues encountered, and actions being taken.

If you have any questions, please contact me, or your staff may contact John R. Eschenberg,  
Waste Treatment and Immobilization Plant, Project Manager, (509) 376-3681.

Sincerely,

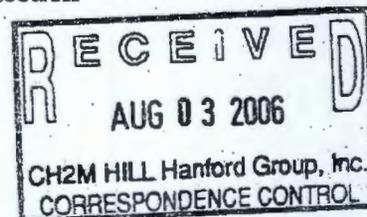
  
Roy J. Schepens, Manager  
Office of River Protection

WPD:BLN

Attachment

cc: See page 2.

M-062-01



Addresses  
06-WTP-089

-2-

JUL 31 2006

cc w/attach:

W. S. Elkins, BNI

M. N. Jarayasi, CH2M HILL

J. Cox, CTUIR

S. Harris, CTUIR

B. L. Becker-Khaleel, Ecology

L. Cusack, Ecology

S. L. Dahl, Ecology

R. D. Morrison, FH

T. M. Martin, HAB

G. Bohnee, NPT

K. Niles, Oregon Energy

R. Jim, YN

cc w/out attach:

B. G. Erlandson, BNI

M. Anderson-Moor, Ecology

G. P. Davis, Ecology

Attachment  
06-WTP-089

U.S. Department Of Energy (DOE)  
Office of River Protection (ORP)  
Semi-Annual Project Compliance Report For The  
Waste Treatment and Immobilization Plant (WTP)  
January 1, 2006 – June 30, 2006

WPD:BLN  
July 10, 2006

**U.S. DEPARTMENT OF ENERGY (DOE)  
OFFICE OF RIVER PROTECTION (ORP)  
SEMI-ANNUAL PROJECT COMPLIANCE REPORT FOR THE  
WASTE TREATMENT AND IMMOBILIZATION PLANT (WTP)  
January 1, 2006 – June 30, 2006**

**Office of River Protection**

**U.S. DEPARTMENT OF ENERGY  
OFFICE OF RIVER PROTECTION  
2440 Stevens Center Place  
Richland Washington 99352**

**July 31, 2006**

---

## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION TO M-62-01 – RPP – WTP PROJECT COMPLIANCE REPORT .....</b>	<b>5</b>
<b>2.0</b>	<b>WTP PROJECT ACCOMPLISHMENTS AND ISSUES .....</b>	<b>6</b>
2.1	Progress to Date .....	6
2.1.1	ORP – Project Management.....	6
2.1.2	WTP Complex Design and Construction.....	7
2.1.3	Environmental Permits Required for Start of Construction.....	13
2.2	Near-Term Issues.....	14
2.2.1	Regaining Confidence in Project Baseline .....	14
2.2.2	Intumescent Structural Steel Fire Coating Design Issue.....	15
2.2.3	Revised Ground Motion.....	15
2.2.4	Pulse Jet Mixers Design Closure .....	16
2.2.5	Hydrogen Generation.....	17
2.2.6	Hydrogen in Piping and Ancillary Vessels.....	17
2.2.7	Alternative Ion Exchange Resin Development.....	18
2.2.8	Ultrafiltration System Design Review .....	18
2.2.9	Safety Culture .....	19
2.2.10	Quality Issues.....	19
<b>3.0</b>	<b>ACTIONS TAKEN OR INITIATED TO RECOVER ANY AGREEMENT SCHEDULE SLIPPAGE .....</b>	<b>21</b>
3.1	After Action Report Findings and Recommendations – Report Dated January 2006 .....	21
3.2	External Review of Process Flowsheet – Report Dated March 17, 2006.....	24
3.2.1	Major Issues:.....	24
3.2.2	Potential Issues (grouped by component).....	26
3.3	External Review of Estimate at Completion – Report Dated March 31, 2006.....	27
3.4	Congressional Interactions.....	28
3.5	Summary.....	28
<b>4.0</b>	<b>BUDGET AND COST STATUS.....</b>	<b>29</b>
<b>5.0</b>	<b>DOE/DOE CONTRACTOR COMPLIANCE .....</b>	<b>29</b>
<b>6.0</b>	<b>AREAS OF NON-COMPLIANCE .....</b>	<b>31</b>
<b>7.0</b>	<b>STATUS OF HFFACO MILESTONES .....</b>	<b>31</b>
7.1	M-62-00 – Complete PT Processing and Vitrification of Hanford High Level and Low Activity Tank Wastes .....	31
7.2	M-62-00A – Complete WTP PT, Processing and Vitrification of Hanford HLW and LAW Tank Wastes.....	32
7.3	M-62-03 – Submit DOE Petition for RCRA Delisting of Vitrified HLW.....	32
7.4	M-62-07B – Complete Assembly of LAW Melter #1 so that it is ready for transport and installation in the LAW vitrification building (BNI baseline schedule activity 4DL321A3200 as part of DOE Contract No. DE-AC27-	

01RV14136), and complete schedule activity ID 4DH46102A2 – Move #1 melter into the HLW vitrification facility.....32

7.5 M-62-08 – Submittal of Hanford Tank Waste Supplemental Treatment Technologies Report, Draft Hanford Tank Waste Treatment Baseline, and Draft Negotiations Agreement in Principle (AIP).....33

7.6 M-62-09 - Start Cold Commissioning - Waste Treatment Plant .....34

7.7 M-62-10 - Complete Hot Commissioning - Waste Treatment Plant .....34

7.8 M-62-11 - Submit A Final Hanford Tank Waste Treatment Baseline.....34

**8.0 REFERENCES.....36**

**LIST OF TABLES**

Table 1. Key Commodity Quantity Progress..... 13

Table 2. Near-Term Dangerous Waste Permit (RCRA) Compliance Schedule Items ..... 14

Table 3. Impacted HFFACO Milestones ..... 30

## LIST OF ACRONYMS

AIP	agreement in principle
ASME	American Society of Mechanical Engineers
BNI	Bechtel National, Inc.
BOF	Balance of Facilities
CCP	Chiller Compressor Plant
DBVS	Demonstration Bulk Vitrification System
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DST	double-shell tank
EAC	estimate at completion
Ecology	State of Washington Department of Ecology
EFRT	External Flowsheet Review Team
EVMS	Earned Value Management System
FPD	Federal Project Director
FY	fiscal year
HFFACO	<i>Hanford Federal Facility Agreement and Consent Order</i>
HLW	High-Level Waste
HPAV	hydrogen in piping and ancillary vessel
HVAC	heating, ventilation, and air-conditioning
LAB	Analytical Laboratory
LAW	Low-Activity Waste
LDB	leak detection boxes
LERF	Liquid Effluent Retention Facility
LMI	LMI Government Consulting
NDE	nondestructive examination
OECM	Office of Engineering and Construction Management
OEM	Office of Environmental Management
ORP	U.S. Department of Energy, Office of River Protection
OSHA	Occupational Safety and Health Administration
P&ID	piping and instrumentation diagram
PJM	pulse jet mixers
PRT	Peer Review Team
PT	Pretreatment [Facility]
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RF	resorcinol formaldehyde
RGM	revised ground motion
RPP	River Protection Project
SBS	submerged bed scrubber
TPRA	Technical and Programmatic Risk Assessment
UFP	Ultrafiltration Process System
USACE	U.S. Army Corps of Engineers
WTP	Waste Treatment and Immobilization Plant Project

**U.S. Department of Energy, Office of River Protection**  
**River Protection Project – Waste Treatment and Immobilization Plant Project**  
**Semi-Annual Compliance Report**  
**Per Hanford Federal Facility Agreement and Consent Order Milestone M-62-01**

**1.0 INTRODUCTION TO M-62-01 – RPP – WTP PROJECT COMPLIANCE REPORT**

As required by the *Hanford Federal Facility Agreement and Consent Order (HFFACO)* (Ecology et al. 1989) Milestone M-62-01, this Semi-Annual Project Compliance Report (M-62-01M) reflects the status of the U.S. Department of Energy (DOE) Office of River Protection (ORP) Waste Treatment and Immobilization Plant (WTP) Project for the period of January 1, 2006, through June 30, 2006. As detailed in M-62-01, this report documents ORP's compliance with the HFFACO Milestone M-62-00 series requirements; updates WTP Project progress, activities, and issues relative to those milestones; and identifies activities expected in the near future.

**Hanford Site Background:** The Hanford tank waste consists of approximately 190 million curies in 53 million gallons of mixed radioactive and hazardous waste stored in underground storage tanks at the Hanford Site in Richland, Washington. This tank waste will be remediated through treatment and immobilization to protect the environment and meet regulatory requirements. DOE determined through the "Record of Decision for the Tank Waste Remediation System, Hanford Site, Richland, WA" (62 FR 8693) that the preferred alternative to remediate the Hanford tank waste is to:

- Pretreat the waste to prepare it for processing and vitrification;
- Immobilize the low-activity waste (LAW) for onsite disposal; and
- Immobilize the high-level waste (HLW) for ultimate disposal in the national repository.

**WTP Complex Description:** The River Protection Project (RPP) WTP is a new waste treatment and immobilization complex being designed, constructed, and commissioned for DOE by Bechtel National, Inc. (BNI) at the Hanford Site under DOE Contract No. DE-AC27-01RV14136.<sup>1</sup> The WTP will be designed, constructed, and permitted to treat and immobilize radioactively contaminated waste to support the RPP mission.

The WTP complex will receive waste in batches from Hanford's double-shell (DST) tank system, operated by the tank farm contractor, through a pipeline system interface. The pretreatment process will separate (or continue to refine) the waste into LAW and HLW fractions for vitrification. The vitrification process will combine pretreated tank waste with glass-forming materials and melt the mixture into a liquid that is poured into stainless-steel containers. The hot glass cools and hardens, and then each container will be sealed in preparation for storage and permanent disposal. The waste and radioactive constituents will be destroyed, removed, or

---

<sup>1</sup> Contract No. DE-AC27-01RV14136 between the U.S. Department of Energy and Bechtel National, Inc., dated December 11, 2000.

immobilized in this durable glass matrix through the WTP process. The immobilized low-activity, containerized glass waste will be disposed on site and the immobilized high-level containerized glass waste will be disposed at the national repository.

The WTP complex waste-processing facilities include the waste-separating Pretreatment (PT) Facility, the glass-making HLW Vitrification Facility, and the glass-making LAW Vitrification Facility. These process facilities are supported by the WTP complex Analytical Laboratory (LAB) for process testing and the WTP infrastructure services in the Balance of Facilities (BOF).

This compliance report reviews each of the WTP Project functional areas, as well as the overall project. Financial data is through June 2006, unless otherwise noted. WTP Project status is also provided monthly through the Project Manager's Meeting and the Quarterly Milestone Review Meeting reports.

## **2.0 WTP PROJECT ACCOMPLISHMENTS AND ISSUES**

### **2.1 PROGRESS TO DATE**

#### **2.1.1 ORP – Project Management**

**Estimate at Completion (EAC):** Since the last WTP compliance report, dated January 31, 2006, BNI completed its December 2005 EAC. This represented a significant increase in both cost (\$3.37 billion) and schedule (5.75 years) from the March 2003 approved performance baseline. The U.S. Army Corps of Engineers (USACE) was engaged to begin a validation review of the December 2005 EAC. The USACE team was to review the estimate to ensure the basis for the estimate was correctly developed; the schedule could be accomplished; the risks are appropriately identified and quantified; and that prior comments from the ORP and USACE were addressed.

In addition, ORP requested BNI to conduct (1) a comprehensive review and analysis of the technical baseline focusing on the functionality of WTP process systems and (2) a comprehensive review and analysis of the cost and schedule baseline. BNI utilized the industry's most qualified people both within and external to BNI. The technical review team was comprised of approximately 50 industry experts representing various government and commercial backgrounds including, but not limited to: Rohm Haas, DuPont, BNG America, AREVA/Cogema, Shaw/Stone-Webster, Westinghouse Electric Co., and Occidental Chemical. The technical review team's report was submitted to ORP on March 17, 2006, and the cost and schedule review team's report was submitted to ORP on March 31, 2006.

The December 2005 EAC was based on receiving \$626 million in funding for fiscal year (FY) 2006. However, the WTP Project only received \$526 million for FY 2006, of which the contractor (BNI) received only \$490 million. Thus, ORP requested BNI to prepare a second submission of the EAC, which reflects the effects of the actual FY 2006 contractor funding of \$490 million, and incorporates changes recommended from the industry expert and USACE reviews.

BNI delivered an updated EAC to DOE on May 31, 2006, to reflect project changes as of late 2005, including those made as a result of available FY 2006 funding and those based on the

external review team reports. The May 2006 EAC estimated the project will cost \$11.6 billion (without fee) as compared to the December 2005 EAC of \$10.5 billion. The May 2006 EAC estimated completion date for hot commissioning is September 2019, as compared to the December 2005 EAC date of May 2017.

ORP and USACE review teams are currently reviewing the May 2006 EAC to ensure that (1) the schedule provided is meaningful and logically driven; (2) prior comments from the ORP and USACE review teams were addressed; and (3) risks have been appropriately identified and quantified based on review team comments. The USACE will complete and deliver to ORP its independent validation by late summer 2006. ORP's internal review is also scheduled to be complete by late summer 2006.

Assuming successful review and validation, the updated May 2006 EAC will be the basis used to establish a new performance baseline for the project in the late summer of 2006 through DOE's Secretarial Acquisition Executive change control process. This should provide DOE sufficient confidence in the project's technical, cost, and schedule estimate to serve as a firm foundation to re-baseline the project, start discussions with regulators on revising milestones, and conclude contract negotiations with BNI.

**Safety Record:** From project inception through the end of May 2006, WTP employees have worked in excess of 29 million hours with 173 Occupational Safety and Health Administration (OSHA) recordable injuries. The cumulative OSHA recordable injury rate for the entire project since inception is 1.2 injuries per 200,000 hours worked. By comparison, the OSHA recordable rate for the construction industry nation-wide is 5.9 injuries (by the Bureau of Labor and Industry as of December 2004) and for DOE construction contractors 2.2 injuries. The cumulative OSHA recordable injury rate for calendar year 2005 was 1.62 injuries, which is slightly higher comparable to the calendar year 2004 rate of 1.37 injuries, but still well below both DOE and national construction rates.

On March 7, 2006, BNI hosted a WTP Nuclear Safety and Quality Rally at a local convention center for nearly the entire project staff. Participants included ORP, Central Washington Building and Construction Trades Council representatives, an American Federation of Labor-Congress of Industrial Organizations (AFL/CIO) representative, and over 2,000 BNI and subcontractor employees. BNI management encouraged all workers to create, then sustain, an open and trusting environment where each person takes pride and ownership of safety and quality; questions what does not seem right; identifies and shares improvement opportunities; and embraces and accepts procedure compliance as the foundation of work. The Manager of Construction has met with all construction staff to reinforce his and BNI's commitment to nuclear safety and quality culture. BNI continues on the pathway to apply for Star status under the Voluntary Protection Program, a status that, if achieved, will be a first on a construction project of this scale.

### **2.1.2 WTP Complex Design and Construction**

**Project Overview:** Design, procurement, and construction activities continue on LAW Facility, BOF, and LAB. Design and limited procurements are continuing on PT and HLW Facilities, while construction has been dramatically slowed due to the reduced FY 2006 funding and the focus on creating a larger design backlog (the time between completion of design and start of

construction of a given facility component). The focus of construction activities continued on LAW Facility, BOF, and LAB. The PT and HLW Facilities will continue to focus on resolution of issues raised by external review groups and advancing the design. Design is 75% complete and Construction is 30 % complete. An average of 818 personnel (423 craft and 395 non-manual staff) was working on site, down from a peak of about 2,050 personnel in March 2005.

**Pretreatment Facility:** Construction activity has been suspended at the PT Facility during this period due to the pending seismic issue confirmation; and also, resolution of issues raised by the External Flowsheet Review Team. In addition, the focus has been on creating a larger design backlog for construction so there is more time between component or system design completion and start of construction on that item, and to resolve the suite of technical issues identified by the External Flowsheet Review Team. Before the suspension of work, construction forces completed placement of 100% of the concrete walls up to the 28-ft elevation and 95% of the concrete walls up to the 56-ft elevation. Structural steel was also put in place up to the 56-ft elevation with the exception of an area left open for crane access, and 30% of the floor slabs at this elevation were put in place. The decking over the hot cell, with the exception of a construction opening on the east end of the hot cell, was also installed. Control and ventilation piping was installed below the decking. The piping module for one of the black cells on the northwest corner of the building was completed to the point of being ready for placement in the black cell. Some minor pipe installation in the north and south tunnels has been accomplished this period in support of the BOF installation of underground transfer lines.

PT Engineering completed design for over 330,000 ft of the 540,000 ft of pipe in the facility before the seismic design criteria was changed. They have checked the design for about 68,000 ft of this piping to ensure that it will meet the new criteria. Civil/Structural engineers completed design of a third of the concrete walls from the 56-ft elevation to the 77-ft elevation to ensure adequacy in light of the new seismic design criteria, and are currently working on the remaining two-thirds of the walls at this elevation. They have also completed the structural steel design at the 56- and 77-ft elevations. The design of the bracing and connections between these two elevations is underway. Engineering is adjusting the design as methods for resolving issues identified by the External Flowsheet Review Team (EFRT) are developed. These design changes are being integrated with design changes associated with hydrogen in piping and ancillary vessel (HPAV) to minimize the number of design revisions that will be required.

PT Procurements were slowed substantially early in this period, but a limited amount of procurement activities are on-going for equipment where fabrication is close to completion and not impacted by the new seismic design criteria. The hot cell and filter cave shield door fabrication as well as the hot cell crane fabrication are nearing completion, and factory acceptance testing is scheduled to begin late in the fiscal year at the vendor's facilities. The process vessel fabricators are beginning to check vessel designs to ensure the vessels will withstand an earthquake, consistent with the revised ground motion (RGM) requirements. Testing on an alternative cesium ion exchange resin, resorcinol formaldehyde (RF), has continued to provide favorable results. Nearly all tests show that RF would be superior to the baseline resin and is significantly less expensive.

Pretreatment engineering has been involved with resolution of a number of technical issues associated with hydrogen detonations in piping and vessels, plant control racks, pulse jet mixer operation, and seismic impact to plant equipment.

In recent years it has been found that hydrogen generated by hydrolysis can accumulate and detonate within facility piping systems and vessels and result in damage to these systems. The WTP facilities have been reviewed to determine if this is an issue for the WTP. It was found that accumulation of Hydrogen in Piping and Ancillary Vessels (HPAV) is a concern for the Pretreatment and the High Level Waste facilities. Engineering identified the areas where hydrogen could accumulate and have developed methods of mitigating this hazard. In most locations the hazard can be eliminated by configuration changes, removing the waste (flushing) and therefore the source of hydrogen generation, or ventilation to prevent an explosive mixture from accumulating. The areas where these solutions were not viable were evaluated to determine if the piping and vessels were strong enough to withstand detonation of the hydrogen. The evaluation of these locations found them to be of sufficient strength to be able to withstand detonation. Engineering is in the process of adding the safety features required to mitigate the hazards associated with hydrogen accumulation into the plant design.

The pulse jet mixers (PJM) used to mix waste in process vessels have the potential of retaining hydrogen if the waste in the PJM is not thoroughly mixed to release the hydrogen. Testing found that nearly all of the waste in the PJM must be expelled periodically in order to achieve the required mixing. This intermittent mixing cycle was then added to the operational requirements for the PJMs. In order to accomplish this mixing additional piping and controls for the PJMs were needed to ensure safe operation.

Resolution of the HPAV, PJM, and related issues has increased the quantity of piping and the number of controls. These control devices are mounted on racks located in the upper floors of the facilities. The existing racks have been expanded to accommodate the increase number of controls and new racks are being added for the controls that cannot be accommodated on the existing racks.

The seismic design criteria for the Pretreatment Facility were increased by 38% in February 2005 to more accurately reflect conditions at the WTP site. The design for concrete walls and slabs up to the 56 foot elevation as well as the design for over 300,000 feet of process piping, and nearly all of the major process vessels required reevaluated based upon this change. Engineering has completed checking twenty-eight percent of the effected piping and about half of the concrete walls and slabs between the 56 foot and 77 foot elevations. The new seismic design criteria have been provided to the vessel fabricators and they are in the process of evaluating the adequacy of the vessel designs.

**Low-Activity Waste Vitrification Facility:** LAW Engineering is approximately 90% complete. Engineering continues with the design of the facility and its systems. Electrical lighting layout drawings and lighting panel schedules have been issued. Piping isometrics and heating, ventilation, and air-conditioning (HVAC) orthographics, used for fabrication, continue to be issued. Datasheets have been issued for some of the instrumentation and mechanical equipment

to support their procurement. The container export bay structural steel and siding drawings have been issued. The power raceway drawings are complete.

LAW Construction continued to focus on completing all concrete placements in the main facility and the export bay grade slab. The plan is to enclose the building with roofing and siding, set equipment at multiple elevations, and continue with bulk pipe and electrical installation. All concrete slabs within the main facility and the container export bay are complete. Four cranes have been installed. Construction crews continue to install piping at elevations -21 ft and +3 ft, drain system piping at elevation +28 ft, cable tray, conduit, and permanent lights at elevations -21 ft, +3 ft, and +28 ft, and structural steel including roof decking.

**High-Level Waste Vitrification Facility:** Construction on the HLW Facility has been suspended to allow analysis of the structures, systems, and components to understand the impact of the revised seismic criteria. No changes are required to portions of the facility below the 0-ft level. Analysis shows that upper levels of the facility will require design modifications due to the increased earthquake induced movements.

HLW Engineering has issued the piping and instrumentation diagrams (P&ID) for the following eight systems. Fifteen additional P&IDs are scheduled to be issued by July 31, 2006. P&IDs provide the design requirements for individual systems and allow piping isometrics to be issued to support piping fabrication.

- HCP – Concentrate Receipt
- ISA – Instrument Service Air
- LPS – Low Pressure Steam
- SCW – Steam Condensate
- PSW – Process Service Water
- PJV – Pulse Jet Ventilation
- HPH – Canister Welding
- RLD – Radioactive Liquid Disposal

Several vessels contain wash racks that are used to clean the upper portion of the vessels. The wash rack water supply is located at facility upper levels resulting in a high initial pressure as water is introduced into the normally dry system. HLW Engineering is looking at various approaches to supply water at the desired flowrates without inducing water hammers.

Mechanical Handling is continuing with their design reviews of the melter cave and decontamination areas. These reviews look at detailed elements of the melter cell design to ensure there are no interferences. This process has been used to route the cables, piping, jumpers, and components. The modeling software utilized in the review allows components to be operated, removed, installed, and sized to allow the design engineers to clearly understand if there are interferences. These reviews have been particularly effective in the melter cave where there are flanges that need to be installed/removed during routine operations maintenance. Component designs and locations have been altered because of these reviews.

BNI performed a series of analysis and tests to show that the likelihood of a fire in the carbon bed is low and, that in the event of a fire, the adsorber structure is capable of withstanding the high temperatures without a breach of containment.

The technical review team expressed concerns with the possible plugging of the melter off-gas jumper to the submerged bed scrubber (SBS). HLW Engineering stated that the conditions that result in the deposition of material in the jumper are known and that the operational procedures are designed to avoid these conditions. A SBS film cooler cleaner is being installed to enable removal of deposits.

**Balance of Facilities:** Engineering issued the HVAC equipment list for the Simulator Building and the BOF Switchgear Building. Engineering completed calculations for the glass former system, as well as issued concrete foundation drawings for the Glass Former Storage Facility. Engineering successfully completed modeling of the Nonradioactive Liquid Waste Disposal Air Stripper System. In addition, BNI received approval from the State of Washington Department of Ecology (Ecology) for the Dangerous Waste Permit Packages BOF-07 and BOF-08. These packages are for installation of the Liquid Effluent Retention Facility (LERF) lines.

BOF Construction successfully completed integrated factory acceptance testing for the water treatment system equipment packages (skids) and controls. The equipment skids have been delivered to the WTP site, and three skids have been placed on equipment pads within the Water Treatment Facility. These equipment skids are for the process service water feed pump, demineralized water feed pump, and domestic water feed pump. In addition, BNI met Milestone Schedule Activity ID 2CBP110400 for completion of the WTP Simulator process model (software).

BOF Construction placed the first section of LERF line and continues to fit up, weld, and place LERF lines. Construction crews installed the insulated roofing panels and the exterior siding on the Chiller Compressor Plant (CCP). Installation of flashing and trim around removable openings and installation of removable openings continue to progress, as does the installation of spooled pipe within the CCP. Crews completed installation of plant service air piping at the northwest corner of HLW. Construction continues to place rebar, forms, and concrete for sleeper supports to carry utility rack pipe. Construction installed special protective coating in the Water Treatment Facility. Crews continued installing diesel fuel oil, fire water tank piping, and supports, as well as Water Treatment Tank interconnecting piping. Site electrical work, excavation work, and backfilling of utility trenches are ongoing at multiple locations within the WTP complex.

**Analytical Laboratory (LAB):** Engineering, procurement, and construction activities moved forward throughout the period even though procurement and construction activities on some other WTP facilities were curtailed. Engineering completed calculations that establish the maximum number of radioactive samples that can be contained within the building at any given time, and also issued the Internal Interface Document for the Laboratory Information System Requirements. A block diagram for the breathing service air compressor, associated raceway, and cables was issued for construction. The laser ablation cold methods development work has been successfully completed. This is the first step in developing laser ablation analysis methods that are required before laser ablation equipment and analysis methods can be used within the

WTP LAB during operations. Engineering awarded a purchase order for the inductively coupled plasma-atomic emission spectrometry equipment. This equipment will be used at Hanford's 222-S analytical laboratory to validate turn-around time assumptions and develop hot methods in support of WTP laser ablation methods development. In addition, Engineering completed modeling the 17-ft-0-in. elevation embeds and penetrations, which enabled BNI to complete a milestone for completing steel and concrete design by May 4, 2006.

LAB factory acceptance tests for two airlocks were successfully completed and the airlocks were delivered to the WTP site and set in place. Also, the factory acceptance test for the Incell monorail was successfully completed.

LAB Construction installed embeds/grillage for C5 pump pit slab, drain pipe fit-up/welding to leak detection boxes for C2, C3, and C5 cells. Construction crews continue to install embeds, piping, and piping sleeves within the C2 tank pit and large bore piping spools in the C3 pit. Crews prepare for future pressure tests of in-slab piping. Construction plans to resume basemat concrete placements in mid-June 2006. Construction performed installation of rebar, embeds, and concrete placements for hot cell walls and hot cell roof placements.

**Commodities Installations:** Based on the construction activities summarized above, the total project commodities placed or installed as of April 2006 are summarized in Table 1.

**Table 1. Key Commodity Quantity Progress**

Quantity Progress	Installed To-Date Through April 2006	May 2006 EAC Planned at Completion
Concrete	161,929 cy	265,440 cy
Structural Steel	8,332 ton	34,576 ton
Piping (above ground)	71,056 ft	868,710 ft
Piping (underground)	99,785 ft	112,157 ft
Conduit (above ground)	69,983 ft	667,806 ft
Conduit (underground)	156,084 ft	187,315 ft
Cable Tray	9,861 ft	96,301 ft
Cable & Wire	192,283 ft	4,280,723 ft
HVAC Ductwork	442,008 lb	4,111,923 lb

### 2.1.3 Environmental Permits Required for Start of Construction

**Permitting and Licensing:** DOE and BNI continue to work closely with state and federal regulatory agencies to maintain permits, licenses, and authorizations needed to support WTP construction and commissioning. Permits required to support construction are in place. Permit modifications are required and submitted on an ongoing basis to depict the evolving engineering design. Non-radioactive and radioactive air permit applications containing updated design information were approved by Ecology and the Washington State Department of Health, respectively. Ecology also approved 23 dangerous waste permit modifications during this reporting period. The modifications to reflect the 2+2 melter design and elimination of the technetium removal system in the Dangerous Waste Permit are under review by Ecology. The Dangerous Waste permit includes a compliance schedule (*Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion*, Chapter 10, and Attachment 51, "Waste Treatment and Immobilization Plant" [Ecology 2004]) that requires the submittal of engineering and operational information. Commodity growth, performance deterioration in engineering and construction, hydrogen buildup in piping and vessels in the PF Facility, difficulty in mixing heavy fluids in the PT Facility, revised seismic criteria affecting structural design of the PT and HLW Facilities, and a reduced FY 2006 funding level all contribute to drive the project to exceed the current cost and schedule baseline.

Also, the May 2006 EAC estimated the project will cost \$11.6 billion (without fee) as compared to the December 2005 EAC of \$10.5 billion. The May 2006 EAC estimated completion date for hot commissioning is February 2019, as compared to the December 2005 EAC date of May 2017. As a result, the near-term compliance schedule items listed in Table 2 are in jeopardy. Compliance schedule items 26 and 31 are under development; however, sufficient engineering design will not be completed in time to deliver demonstration test plans with sufficient detail to meet the compliance schedule items. Compliance schedule item 23 will not be completed on time; this activity is a precursor to accomplishing HFFACO Milestone M-62-

10, which is unrecoverable (see Section 7.0). Though design work could potentially be re-sequenced to accomplish some of the compliance schedule items (Table 2), this would negate the necessary consistency required between facilities as designs are advanced.

**Table 2. Near-Term Dangerous Waste Permit (RCRA)  
Compliance Schedule Items**

Item Number	Description	Due Date
Item 23	Submit engineering information for LAW Vitrification Miscellaneous Treatment Unit sub-system	08/18/06
Item 26	Submit LAW Vitrification Environmental Performance Demonstration Test Plan for Ecology review and approval	10/02/06
Item 31	Submit HLW Vitrification Environmental Performance Demonstration Test Plan for Ecology review and approval	10/02/06

ORP is in the process of identifying the activities required to re-baseline the WTP, work the HFFACO and *Resource Conservation and Recovery Act of 1976* (RCRA) permit compliance issues with the regulators, and re-negotiate the BNI Contract. The tentative plan is to first complete the ORP and USACE reviews and receive approval of a new WTP cost and schedule from the DOE's Secretarial Acquisition Executive, then work with the regulators to try to resolve the HFFACO and RCRA permit schedule issues prior to completing contract negotiations with BNI.

## 2.2 NEAR-TERM ISSUES

### 2.2.1 Regaining Confidence in Project Baseline

There have been a number of independent reviews to help re-establish confidence in the WTP baseline. First, USACE reviewed the December 2005 EAC and is in the process of reviewing the May 2006 EAC to ensure the basis for the estimate was correctly developed, the schedule can be accomplished, prior comments from the ORP and USACE were addressed, and the risks are appropriately identified and quantified. Second, BNI completed a review of the December 2005 EAC cost and schedule, as well as the functionality of the WTP process systems utilizing independent industry experts. Third, USACE and the DOE Peer Review Team (PRT) are independently reviewing the development and implementation of the RGM criteria. And fourth, DOE Headquarters completed an After Action Review to assess causes of the WTP cost, schedule, scope, and project management issues, allowing for significant lessons learned to be incorporated into future management of the WTP baseline and BNI Contract.

In addition to ORP's own reviews, these reviews will provide ORP sufficient confidence in the project's technical, cost, and schedule estimate to serve as a firm foundation for ORP to baseline the project, start discussions with regulators, and begin contract negotiations with BNI.

### 2.2.2 Intumescent Structural Steel Fire Coating Design Issue

BNI continues to develop construction strategies to technically address repair to intumescent fire coating on structural steel that was damaged during the winter rains. The strategy involves a combination of repairs to the existing intumescent with same materials and the placement of alternative structural steel fire protection methods as required by industry standards. The repair will be supported by engineering analyses, laboratory and product manufacture technical data, and fire testing. For the LAW Facility, the initial repair is being done on perimeter facility steel to support siding; once the building is enclosed, interior steel coatings will be addressed. The project will incorporate lessons learned from LAW Facility coatings into the other project facilities.

### 2.2.3 Revised Ground Motion

The RGM response spectra developed in February 2005 increased the previous peak ground acceleration by 38%. RGM is being implemented in the design of WTP facility structures, systems, and components. Dynamic analyses for the PT and HLW Facilities were completed and in-structure response spectra, needed for the design of systems and components inside the facilities, were developed in September 2005. Measures were taken to evaluate the excess conservatism that existed in the design and analysis to minimize the impact on the already constructed facilities and equipment. Construction of the facilities was slowed down or halted to evaluate the design on a case-by-case basis against the RGM prior to installation. The 24590-WTP-DC-ST-01-001, *Structural Design Guide*, was revised to incorporate the RGM and the changes resulting from the above evaluations. The DOE PRT and independent experts from USACE reviewed the revision. Their comments were incorporated and Revision 10 to the guide was published. On June 28, 2006, DOE forwarded 24590-WTP-DC-ST-01-001, Rev. 10, to the Defense Nuclear Facilities Safety Board (DNFSB), with the expectation that this resolves two of the issues (seismic ground motion and structural engineering) raised by the DNFSB in their October 17 letter to DOE (DNFSB 2005).

BNI continues with the design of PT and HLW Facilities' concrete structures, piping, and equipment for the RGM. Thus far, none of the concrete structures required modifications; however, a number of vessels and piping systems required some modifications resulting from the design to the RGM. DOE PRT has been performing reviews of the revised analysis and design and providing feedback to BNI for improvements. DOE also instituted an independent over-the-shoulder review by the USACE teams. Both teams performed reviews of the dynamic analysis, the design of the buildings, vessels, equipment, and the piping and other distribution systems. Comment resolution is ongoing.

For the development of the RGM, good geotechnical and geological site profile information was available for site soil encountered to a depth of several hundred feet. However, the soil characterization information on the interbed sequence at deeper depths was estimated from a limited set of data. This causes some uncertainty in the RGM, even though this uncertainty was compensated for by using conservative site amplification results from the original analysis. To confirm that the RGM bounds this uncertainty, DOE has planned for the drilling of deep boreholes at the site to a depth of 1,500 ft to obtain shear wave velocity and other soil characterization data for basalt interbed layers. The approach includes (a) drilling four entry

holes to the top of the basalt layers to a depth of ~400 ft; (b) drilling wireline corehole to a depth of ~1,500 ft through one entry hole to obtain details of stratigraphy; and (c) drilling deep boreholes in the remaining three entry holes through interbed layers to a depth of ~1,500 ft to obtain soil characterization. Once the data is acquired and analyzed, site response analysis will be re-performed in 2007, using the appropriate attenuation model for the WTP site. The USACE has been tasked to provide oversight of this effort. The drilling plan was approved in March 2006. A sampling and analysis plan (SAP) was issued in May 2006. The contract for the entry holes was awarded in May 2006. The first deep borehole is scheduled to be complete in October 2006.

#### **2.2.4 Pulse Jet Mixers Design Closure**

PJM testing is focused on ensuring that hydrogen gas does not accumulate in individual pulse jet tubes in excess of the lower flammability limit. The current PJM air usage strategy assumes the anti-foam added due to sparging the non-Newtonian tanks will not increase the gas retention of these vessels. This assumption is being validated in a series of small tests at Savannah River National Laboratory. The interim test results are expected by summer 2006. Several PJM work scopes are being developed or are in progress.

- Testing to demonstrate that full-stroke PJM mixing fully exchanges the slurry within the PJMs (ensuring flammable gases do not accumulate in individual pulse jet tubes) has been completed. An extension to this test program to determine the minimum PJM strokes to accomplish the full slurry exchange is in the planning stage.
- Tests to demonstrate PJM overblow and when the PJMs are full using the pressure measurement instruments have been completed. Methods were developed for overblow detection, which are being incorporated into the plant design. The tests indicated that the current method for determining that the PJMs have been filled with slurry prior to "driving" will be successful.
- A third set of tests to verify design assumptions is being conducted to evaluate the impact of anti-foam additions on gas retention in the non-Newtonian vessels. Preliminary testing, which has not included the bubble coalescence and stripping driven by the sparging, has indicated the potential for increasing the gas hold-up. Testing strategy development to include the sparger effects was completed in June 2006. The rest of the schedule will be developed after the sparger scaling methodologies have been developed.

- New PJM testing is currently being planned to examine the waste particle mixing and resuspension in the Newtonian vessels to resolve questions raised during the recent technical review of the project process flowsheet. Testing activities are expected to be performed in scaled mixing platforms and will include the following work scopes of PJM mixing system designs: (1) to demonstrate resuspension of settled waste solids of Newtonian slurries; (2) to determine mixing times for various vessel mixing functions; (3) to determine if a hydraulic "short circuit" could occur in non-Newtonian slurries, which would cause insufficient mixing; (4) to confirm post-design basis event mixing of vessels; and (5) to demonstrate that normal process mixing successfully meets the flowsheet mixing requirements. The schedule for these tasks will be developed after the full scope definition, which is expected in summer 2006.

### **2.2.5 Hydrogen Generation**

In January 2005, ORP directed BNI to assume solids from DST 241-AY-102 as the most limiting feed to the WTP and to modify the design basis accordingly. ORP provided this direction to reduce hydrogen generation rates in waste delivered to WTP and to expedite development of the hydrogen generation calculation to support continued WTP design and construction. This direction will require blending DST 241-AZ-101 solids with other tank farm solids prior to delivery to WTP. In response, BNI recalculated hydrogen generation rates and times to the lower flammability limit for WTP hydrogen producing vessels. ORP formed a Design Product Oversight Team to perform a review of the revised calculation and identified 13 open items requiring further work by BNI before the calculation could be considered adequate for use in the WTP design and incorporated into the project's authorization basis. BNI provided their initial responses to the 13 open items and, in general, ORP and BNI have reached agreement on the responses. However, ORP must review the revised, committed hydrogen generation rate/time to lower flammability limit calculation to ensure adequacy.

### **2.2.6 Hydrogen in Piping and Ancillary Vessels**

BNI has been investigating the buildup of HPAV and developing methods for preventing hydrogen from accumulating in sufficient quantities to cause damage to affected systems. Engineering found that similar conditions existed in a number of locations throughout the facilities. Rather than develop an active mitigation design for each location, they developed a generic design solution that would be applicable at each location. Ultimately, there were nearly 20 generic solutions developed to address the different conditions. Once the generic solutions had been developed, BNI chartered a Hydrogen Review Committee to review the HPAV generic solutions. The Committee completed their review and concurred with the BNI design solutions. These design solutions made provisions for venting, flushing, or draining of vessels and lines to prevent hydrogen accumulation. There were, however, a number of locations that did not lend themselves to this type of solution. For these locations, BNI proposed letting the detonation occur if the system could withstand the impact without failing. A consultant, Dominion Engineering, Inc., was retained to demonstrate through calculations that system failures would not occur because of detonation of the hydrogen. Most major DOE concerns with the calculations have been resolved but there are a number of open issues that BNI must resolve.

Because of concerns with the HPAV work, ORP formed a Design Oversight Team to perform an assessment of the HPAV generic solutions. The assessment, which was completed on June 15, 2006, was primarily directed at the technical feasibility and effectiveness of the proposed generic solutions, and includes consultations with mechanical systems/mechanical design expertise. In addition to confirming the technical feasibility and effectiveness, the Design Oversight Team also assessed operational/availability implications, safety/authorization basis impacts, and research and technology bases. The team reported no major findings during the exit meeting; the Design Oversight Team Report is scheduled for issuance in summer 2006.

### **2.2.7 Alternative Ion Exchange Resin Development**

The baseline SuperLig® 644 cesium ion exchange resin is proprietary. To reduce the single-supplier risk, BNI is developing spherical RF resin as an alternative to the reference SuperLig® 644 resin for removal of cesium from tank waste. Work to develop spherical RF ion exchange resin is continuing to make good progress. Results meet or exceed project requirements in all areas including hydraulic performance, cesium removal, and spent resin decontamination for disposal. During the last six months, permeability testing was completed and testing began on the resin for the effects of aging and storage. BNI Research and Technology believes there is a high probability that this resin will qualify for commissioning. A WTP recommendation to select spherical RF as the baseline resin is expected in the November 2006 timeframe.

### **2.2.8 Ultrafiltration System Design Review**

The Secretary of Energy requested BNI form a team of world-class experts to conduct a technical review of the WTP Project. In response to this request, BNI formed the EFRT that was comprised of experts from chemical processing industry, glass industry, nuclear waste industry, national laboratories, and universities. This team reviewed the sizing and operation of the Ultrafiltration Process System (UFP). The EFRT concluded:

- For waste requiring leaching, a combination of inadequate filter flux and area will likely limit throughput to the HLW or LAW Vitrification Facilities.
- Neither the caustic leaching nor oxidative leaching process has been demonstrated at greater than bench scale.

These conclusions confirmed concerns held by ORP since early in the development of the process flowsheet. To evaluate the UFP design further, the ORP WTP Engineering Division conducted a design review of the PT Facility; the review was completed July 6, 2004. The design review concluded (1) the WTP process flowsheet was not optimized to remove soluble aluminum during caustic leaching and (2) modification to the sizing of the filters may be required to support mission completion. Based upon these results, ORP authorized BNI studies to address caustic leaching effectiveness and UFP throughput in October 2004.

Results from these initial studies are now being used as a starting point for engineering studies and process modeling that will be accomplished to determine optimum approaches to maximize filter area. Results from those studies will be used to define laboratory scale testing, which will be followed by pilot scale testing. The detailed schedule and plan for this work is under development.

### 2.2.9 Safety Culture

ORP and BNI are working together to reinforce a workforce-wide safety culture in the midst of changing work scope and significant reductions in force. In the past year, BNI and subcontractor workers experienced a number of near-miss, hazardous energy-related events. BNI initiated a Category R type of DOE occurrence report, used for reporting recurring events, and performed a root cause analysis. Corrective actions followed addressing work control issues, improving supervisory direction, and emphasizing personal responsibility. These efforts coincide with a DOE-wide effort to increase field focus on work control and work planning. ORP and contractor staffs assessed current processes and developed action plans to drive further gains in integrated safety management, including improved identification and analysis of job hazards, better engagement with workers on how to reduce risks, and timely investigation of events to more quickly address safety issues. In an effort to identify and eliminate organizational weaknesses that create opportunities for employees to fail, ORP and BNI introduced training based on the Institute of Nuclear Power Operations publication, *Excellence in Human Performance* (INPO 1997), and a consultant visited the site, evaluated workplace conditions, and assisted in the development of an implementation strategy. BNI is using this period of workforce restructuring to emphasize a strong safety culture among its workers to facilitate improved communication and training when the workforce size increases again in FY 2007.

### 2.2.10 Quality Issues

**WTP Welding Program Concerns:** Since DOE raised WTP weld program concerns in August/September 2005, BNI has taken a number of actions to improve the welding program. They performed several independent reviews of the structural steel and piping welding programs and completed a root cause analysis of identified welding issues. BNI incorporated recommendations from these efforts into a corrective action report, and most of the corrective actions have been substantially completed. For example, BNI hired a new weld manager and assistant weld manager, conducted welding and pipe installation program training with more detailed training to come, and performed a detailed review of the weld control manual. BNI is preparing to revise the manual to, among other things, simplify and greatly reduce the size of the manual.

A follow-up effectiveness review is planned for September 2006. Until BNI has determined the corrective actions are effective, periodic peer reviews of ongoing welding program oversight and inspections by field welding engineers will continue. Although recent DOE construction inspections of site welding has identified improvements in this area, several weld-related issues have been recently identified; i.e., issuing the wrong sized weld rod to repair tank nozzle welds, issuing weld rod that was not marked with the correct material information, and welders performing welds on materials they were not qualified to weld (thickness in excess of qualifications). These issues indicate additional efforts are needed to improve weld program implementation.

BNI had determined outer shell coaxial pipe (pipe within a pipe) welds, requiring in-process inspections, were acceptable based on BNI's ongoing welding surveillance program and documented inspections performed. Because of questions raised regarding the adequacy of the in-process inspection documentation, BNI agreed to perform limited non-destructive

examinations of a portion of the completed shop and field welds to demonstrate the welds were acceptable as installed. Examination of both shop and field welds identified some indications of weld defects, which BNI Engineering reviewed. BNI determined these indications did not meet code requirements, but analysis indicated the strength of the vessel welds significantly exceeded the design requirements and dispositioned the deficiency reports "use-as-is." The deficiency reports were sent to Ecology for acceptance. Ecology sent an e-mail indicating they had no issue with the piping and the affected piping could be imbedded in concrete. A formal acceptance letter from Ecology is expected in early July 2006.

**Supplier Quality:** Concerns with supplier welding and quality programs continue to be identified. During inspections of equipment manufacturers in March 2006, DOE identified issues with supplier welding and quality programs, such as a supplier purchasing weld rod from an unapproved sub-supplier, weld procedures with errors in allowable thickness of materials to be welded, and nondestructive examination (NDE) procedures not approved by the NDE Level III inspector. These issues, combined with issues identified over the last two years, have resulted in a number of BNI initiatives to improve supplier performance. In addition to addressing the specific issues identified, BNI recently developed a checklist containing elements derived from issues identified during DOE inspections for use by BNI Supplier Quality Representatives at each of their suppliers. BNI developed a number of alerts requesting Supplier Quality Representatives to perform specific quality and welding program element reviews. BNI also assigned an experienced weld engineer to specifically review supplier weld programs.

**Commercial Grade Dedication:** During a DOE review of a commercial supplier's quality program, a number of significant issues were identified with the implementation of BNI's commercial grade dedication program. This program is intended to be used to upgrade commercial grade materials and equipment for use as quality-level materials and equipment. BNI had about 30 different commercial grade dedication procurement activities ongoing at the time this concern was identified. Once brought to BNI's attention, BNI performed a detailed review of their commercial grade dedication program and identified a large number of issues. As a result, BNI stopped all commercial grade dedication procurements, including shipment of any completed materials and equipment to the construction site, until corrective actions were fully developed and implemented. Corrective action development and implementation is still ongoing.

**Leak Detection Boxes:** Just prior to installing leak detection boxes (LDB) at the PT and LAB Facilities, BNI discovered some nozzle welds did not appear to have adequate weld penetration. Following installation of the boxes at the PT Facility, BNI discovered the boxes were also not designed and fabricated to the code requirements specified in the original procurement package. However, the supplier's BNI-approved drawings allowed the use of the code combination (American Society of Mechanical Engineers [ASME B31.1]), *Process Piping*, and ASME Section VIII, *2004 ASME Boiler & Pressure Vessel Code*) to design and fabricate the boxes.

BNI performed a review of this issue to determine how the LDBs were procured and installed. They found that the original material requisition for the LDBs called for fabrication per ASME B31.1 manual, which would have required a full penetration weld for these joints. During fabrication, the supplier submitted fabrication drawings and calculations to BNI to

fabricate the LDBs per ASME Section VIII, which would allow for the use of partial penetration welds; BNI approved the shop fabrication drawings. Engineering has provided an interim disposition that would allow acceptance of the LDB as a non-listed device under the requirements of ASME B31.3. This approach requires a stress analysis of the vessel and a pressure test of the LDB in accordance with ASME Section VIII before a final disposition can be approved. The stress analysis has been started and construction has initiated planning for the pressure test.

**Preservation Maintenance Program:** DOE became concerned that equipment that had been delivered or installed was not being properly maintained and protected. As a result, the ORP Engineering Division completed a design oversight of BNI's preservation and maintenance performance program. The oversight activity resulted in one finding and three programmatic concerns. The finding was that BNI had failed to implement programs ensuring successful government property preservation even though BNI has equipment preservation and maintenance procedures. The three programmatic concerns contributed to BNI's failure to preserve government property. The concerns identified are (1) subcontracted facilities, equipment, and systems were not being effectively maintained, (2) deficiencies within BNI's property preservation programs/procedures, and (3) inconsistencies and program deficiencies related to equipment/system data being entered into various BNI databases such that government property cannot be effectively maintained. BNI has issued a corrective action report that identifies corrective actions to be taken, responsible personnel assigned to each action, and target dates for completion of each corrective action.

### 3.0 ACTIONS TAKEN OR INITIATED TO RECOVER ANY AGREEMENT SCHEDULE SLIPPAGE

#### 3.1 AFTER ACTION REPORT FINDINGS AND RECOMMENDATIONS – REPORT DATED JANUARY 2006

In 2005, the DOE Office of Engineering and Construction Management (OECM) requested an external organization, LMI Government Consulting (a non-profit firm), to perform an after-action fact finding review of the WTP Project. OECM directed LMI to examine the period from implementation of contract modification A029 in April 2003 until late 2005. LMI documented the results of their evaluation in a January 2006 report, which focused on the causes of growth in project cost estimates and extension of schedule and weaknesses in the functional areas of staffing/organization structure; project management policies; reporting effectiveness between ORP and the DOE Headquarters; and contract management.

The observations from the report are rolled up below under the major topics for which DOE has identified actions to resolve the underlying findings identified in the LMI report. Each observation is accompanied by the status of the corrective actions.

- **Acquisition Management:** The accelerated award of a contract in 2000 resulted in three weaknesses: (1) an incomplete government cost analysis and basis upon which to award the contract; (2) commercial-like contract arrangements; and (3) exacerbation of vulnerabilities in a design-build approach.

**Actions and Status:** (1) DOE tasked the USACE to complete an independent validation of the most recent contractor project EAC by summer 2006. (2) The contract did not initially include provisions of DOE O 413.3, *Program and Project Management for the Acquisition of Capital Assets*. ORP modified the contract on November 15, 2005, to include DOE O 413.3 as a project requirement. (3) Direction was provided to the contractor to maintain a lag of 12 months between completion of design of structures, systems, or components and the beginning of construction.

- **Accounting for Project Risk:** The contractor did not have a sound basis for a complex project involving first-of-a-kind technologies leading to an optimistic treatment of project risk. Contributors to risk included not accounting for design of novel technologies, inadequate expectations of availability of construction materials and qualified labor, underestimating design requirements, and lack of strong technical and cost expertise in risk management.

**Actions and Status:** (1) DOE arranged for an External Review Team to conduct a comprehensive review and analysis of WTP's cost and schedule baselines, with a focus on the contractor's December 2005 EAC. The External Review Team generally confirmed the most recent project cost estimated but identified several recommendations including one that observed the project Technical and Programmatic Risk Assessment (TPRA) did not address the "unknown unknowns" associated with new technology facilities. To address that finding, the External Review Team recommended an additional \$1 billion in project costs and to extend the schedule by 18 to 24 months. This recommendation was incorporated in the May 2006 EAC. (2) ORP has hired a risk assessment manager to advise the ORP WTP and Hanford Site manager in the area of incorporating risk in project and organizational activities. Additionally, ORP is expected to issue a WTP risk management procedure by late summer 2006.

- **Project Management Issues:** There were several weaknesses in project management. These include (1) premature establishment of baselines and negotiation of project milestones with regulators, given the reliance on novel technologies; (2) failure to require the contractor to comply with DOE's project management requirements; (3) reporting deficiencies in the area of earned value management systems (EVMS) and inappropriate use of the contractors project control system data; (4) inadequate change control process; and (5) inappropriate deletion of project scope to provide additional project contingency.

**Actions and Status:** For project management considerations in general, the ORP Site Manager committed to ensuring that ORP personnel comply with the requirements of DOE O 413.3 and its corresponding manual, DOE M 413.3, *Project Management for the Acquisition of Capital Assets*. This was augmented by a technical assistance visit by an external expert to assist with adherence to these requirements. The status of responses to the individual items is noted as follows. (1) The Office of Environmental Management (OEM) is incorporating lessons learned for critical decisions in other projects and the establishment of regulatory milestones. (2) The contract did not initially include provisions of DOE O 413.3. ORP modified the contract in November 2005 to include DOE O 413.3 as a project requirement. (3) Several audits of the project's EVMS have been conducted. An EVMS certification review is scheduled for September 2006, which

is projected to lead to certification by the end of calendar year 2006. (4) ORP is drafting a revised change control procedures to address deficiencies related to using contractor real-time management of project baseline, with a planned completion of late summer 2006. (5) ORP is drafting a contingency management process, with a planned completion of late summer 2006.

- **Organizational/Staffing Issues:** The report identified several weaknesses in organizations and staffing. These included: (1) ORP staff requires a larger contract administration staff with additional contracting officers, supported by additional contracting specialists, as well as a dedicated legal advisor to address contract issues; (2) the two major projects comprising the RPP mission scope (WTP and Tank Farm Project) warrant a dedicated and certified Federal Project Director (FPD).

**Actions and Status:** (1) The following new positions have been established and are being filled: a Director of Procurement (with warrant authority), a procurement attorney, two senior experienced contracting officers (one for the WTP contract and one for the Tank Farm Project contract), two senior contract specialists, and two other contract specialists for the WTP. The Director of Procurement was hired in February 2006, and the other hires are complete. (2) In December 2005, the Assistant Secretary for Environmental Management (EM-1) appointed the Assistant Manager Tank Farms as the FPD for Tank Farm (certified at Level 4) and the Assistant Manager Waste Treatment Plant as FPD for the WTP (certified at Level 3 with path for Level 4 by late FY 2006).

- **Contract Management Issues:** ORP contract management processes did not follow strict interpretation of DOE contract management policy, including sending direction letters to the contractor exceeding change order authorities.

**Actions and Status:** DOE has taken several actions to improve contract management. In December 2005, the ORP Site Manager issued a procedure to have each FPD, as the contracting officer's representative, sign non-contract correspondence; and the contracting officer sign contract correspondence. Similarly, the ORP Site Manager issued a procedure to ensure the contracting officer, contracting officer's representative, and legal counsel review proposed correspondence to BNI before the correspondence is signed and sent.

- **Oversight Issues:** The evaluation found that there was inadequate oversight of the project on the part of Headquarters.

**Actions and Status:** At DOE Headquarters, the Assistant Secretary for Environmental Management (EM-1) has established the Office of Project Recovery, which reports to Assistant Secretary and the Principal Deputy Assistant Secretary. Projects are assigned to this office by EM-1 when there is concern with the project's performance. For projects assigned, this office assesses the current conditions, stabilizes the situation, establishes a "path forward" for the project, works with the field office to develop actions and an implementation plan, and serves as the DOE Headquarters advocate and oversight for the project. The Director, Office of Project Recovery provides the Principal Deputy Assistant Secretary with updates every two weeks. DOE Headquarters' Environmental

Management, Office of Performance Assessment, and OECM, as part of Quarterly Project Reviews, provide independent assessment of the WTP Project.

- **Annual Funding Constraints:** Constrained funding pushes costs to the future and extends project schedules, resulting in an additional cost premium for work to be performed.

**Actions and Status:** DOE is requesting funds to maintain necessary progress, and an efficient and effective number of construction personnel on site.

### 3.2 EXTERNAL REVIEW OF PROCESS FLOWSHEET – REPORT DATED MARCH 17, 2006

In October 2005, an EFRT began a comprehensive review of the process capability of the WTP process flowsheet to meet the throughput requirements contained in the contract. Specifically, the scope was to:

- Identify if there are any flaws that would prevent the WTP from operating;
- Identify any major issues that will prevent the WTP from meeting contract requirements and future processing requirements; and
- Identify any potential issues that could prevent the WTP from meeting contract capabilities and future processing requirements.

On March 17, 2006, the EFRT completed their review and published their report. The report identified one issue (flaw) that would prevent the WTP from operating, 17 major issues that must be fixed for the plant to meet its design throughput (includes the one issue that would prevent the WTP from operating), and 11 potential issues that could prevent the WTP from meeting contract capabilities or future processing requirements.

The contractor has prepared a project response plan to define a process to address and resolve each of the EFRT issues. Proposed responses will be developed and, subject to DOE's approval, appropriate revisions will be made to the design, commissioning, and/or the operating and maintenance procedures. BNI has assigned a senior corporate engineer to lead their team in the resolution of issues and the timely revision of the design and operating procedures. As a status, a listing of the issues, with a brief summary of the current proposed response is given below. In some cases, where the resolution plans are similar, the issues are grouped together.

#### 3.2.1 Major Issues:

1. **Plugging in Process Piping.** Develop a new design guide that will address flow velocity and plugging prevention requirements, and evaluate actual WTP design against the new design guide. Perform research and testing to demonstrate that chemical plugging recovery design features are viable.
2. **Mixing Vessel Erosion.** Conduct experiments to verify that the calculated erosion wear rates under conditions representative of WTP conditions (e.g., appropriate particle size

distributions, angles of impingement, concentrations, hardness, and velocities, in both dilute and concentrated suspensions) are conservative.

3. **Inadequate Mixing System Design.** Conduct experiments that will analytically demonstrate the vessel mixing design capability to re-suspend solids that have undergone a settling process. A mixing time requirements document will be developed that can be used by process throughput models to ensure that predicted plant capacities are appropriate. Also re-evaluate the mixing model assumptions and input data, and capability of the model software to predict mixing zone of influences.
4. **Plant Designed for Commissioning Wastes versus Complete River Protection Project Mission Needs.** Conduct a series of tests to determine the solubility potential of various tank farm wastes (in particular the capability to form precipitates and potentially result in plugging of pipes and components). Testing will also address the speciation of various types of tank farm wastes and investigate the solubility and reaction potential under WTP process conditions.
5. **Must Have Feed Prequalification Capability.** Develop a detailed plan for waste pre-qualification to accomplish: composition analyses of both soluble and insoluble fractions of the waste, measurement of the waste physical properties, and small-scale testing of cross-flow filtration, sludge washing, ion exchange performance, and HLW and LAW melting to confirm glass formulation.
6. **Process Operating Limits Not Completely Defined.** Investigate the range of parameters that each unit operation will be expected to experience during routine running of the process and in standby conditions when the process train is controlled and stopped. Task includes evaluation of a loss of power event. This activity will be integrated with the work identified under item 4.
7. **Inconsistent Short-Term versus Long-Term Focus.** Purchase spare LAW and HLW melter, and evaluate redesign of HLW melter head to optimize melter operation.
8. **Limited Remotability Demonstration.** WTP remotability demonstration plan will be modified to require crane remotability testing using permanent facility equipment for components that are unique to WTP or where heat-up/cool-down cycles could affect remotability.
9. **Lack of Comprehensive Feed Testing in Commissioning Plan.** Revise commissioning plan to incorporate leaching during cold commissioning.
10. **Critical Equipment Purchases.** Review current purchases and determine which orders need to be re-bid in order to obtain the best value for the government.
- 10a. **Questionable Ion Exchange Column Design.** Upon selection of the baseline ion exchange resin, column design and testing will be restarted, addressing cross-contamination control, complexity of valving, and the effectiveness of cesium-137 breakthrough monitoring. The following are related potential issues being resolved through this resolution plan: ion exchange inadequate process development, questionable cross-contamination control, complexity of valving, and effectiveness of cesium-137 breakthrough monitoring system.

11. **Loss of WTP Expertise Base.** Develop and issue a technical staffing strategy and plan for the startup and commissioning phase of WTP. The staffing strategy and plan will consider the following:
  - Identification of key skills and personnel
  - Recruiting, training, and rotation programs
  - Local partnerships with Pacific Northwest National Laboratory and Washington State University, Tri-Cities
  - Preparation of system design descriptions for process systems
  - Preparation of melter engineering, procurement, construction and commissioning manual
  - Estimated cost and schedule
12. **Undemonstrated Leaching Process.** Perform scale-up testing to demonstrate design effectiveness, including both caustic and oxidative leaching.
13. **Ultra-Filter Area and Flux.** Conduct further analysis and testing to determine what operating characteristics affect filter performance, options to enhance performance, what alternate filter types are available and how they perform, and how to accommodate added surface area in the facility.
14. **Instability of Baseline IX Resin.** Revise baseline cesium ion exchange resin based on research and technology report contingent on Stage 2 testing. Scope design changes and safety implications of using RF with SuperLig® 644.
15. **Availability, Operability, and Maintainability.** Revise the operations research model and reliability, availability, and maintainability data to address current deficiencies. Additional work may be required to validate this information. The second phase involves establishing a longer-term plan for incorporating the design details, vendor equipment data, operating logic, and maintenance philosophy as the design matures.
16. **Mis-batching of Melter Feed.** Revise the integrated sample and analysis requirements document to require sampling and analysis of the LAW melter feed for every batch to avoid mis-batching.
17. **HLW Film Cooler Plugging.** Document the operating conditions required to minimize or avoid film cooler plugging, and revise design criteria for the film cooler cleanout device.

### 3.2.2 Potential Issues (grouped by component)

#### Evaporators

1. **Undemonstrated Decontamination Factor.** Identify alternatives and impacts associated with relaxing the evaporator decontamination factor requirements.
2. **Effect of Recycle on Capacity.** Issue being addressed in context of items 4 and 6 in subsection 3.2.1.

3. **Adequacy of Control Scheme and Incomplete Process Control Design.** Develop a controls and instrumentation engineering execution plan, control systems design review plan, and confirm agreement of WTP control strategy.

#### **Ultrafiltration**

1. **Potential Gelation/Precipitation.** Issue being addressed with item 4 in subsection 3.2.1.

#### **Ion-Exchange**

1. **Questionable Ion Exchange Column Design.** Issues identified as sub-items under item 10a in subsection 3.2.1.

#### **Analytical Laboratory**

1. **Undemonstrated Sampling System.** Develop and conduct confirmation testing of the sampling system.

#### **Balance of Facilities**

1. **Lack of Analysis of Silo Feeds.** A BOF sampling point at the silos will be added to the integrated sample and analysis requirements document requiring field verification of glass formers, as they are off loaded in the silos.

### **3.3 EXTERNAL REVIEW OF ESTIMATE AT COMPLETION – REPORT DATED MARCH 31, 2006**

In November 2005, a team of industry experts was chartered to review the technical, cost, and schedule aspects of the WTP Project. The focus of the review was the contractor's December 2005 EAC, which was based on funding of \$626 million in FY 2006 and continued funding of \$690 million per year thereafter.

The focus of the team was to assess and comment on the following:

- Efficacy of the project execution plan underlying the EAC based on an FY 2006 funding level of \$626 million
- Credibility of the estimate and schedule
- Overall confidence level of the December 2005 EAC.

The recommendations from the report are summarized below along with the actions identified to address the recommendations. Each recommendation is accompanied by the status of the corrective actions.

- Increasing the EAC to \$11.3 billion (excluding fee) to address “unknown unknowns,” and raise confidence in the estimate to 80%.

**Actions and Status:** DOE has provided guidance to the WTP contractor as to the appropriate assignment of risks into management reserve, contingency or TPRA, considering the recommendations from the team. The contractor provided the May 2006 EAC to DOE on May 31, 2006, which includes the revised assignment of risks. The USACE' validation of this estimate is expected by late summer 2006.

- Extending hot commissioning schedule to fourth quarter FY 2018 to account for funding limitations.

**Actions and Status:** The May 2006 EAC has incorporated this recommendation.

- Strengthening contract management and risk management to build project credibility.

**Actions and Status:** The after-action report, directed by the OECM, identified similar weaknesses in their report issued in January 2006. The status of the actions taken is listed above under the after-action report.

- Modifying startup and commissioning strategy to provide for:
  - Hiring and training personnel to allow transfer to permanent operating staff
  - Increasing the staff to meet full operating requirements
  - Developing operating, maintenance, and training programs tailored for candidates with varying experience levels.

**Actions and Status:** DOE is revising the contract statement of work to address these issues.

### 3.4 CONGRESSIONAL INTERACTIONS

In January 2006, DOE submitted the first quarterly report to the House and Senate Committees on Appropriations on the activities and financial status of each of the five subprojects within the WTP Project including progress on items noted above. Also, the Assistant Secretary of Environmental Management is continuing to meet with Congressional members and staff on a regular basis for discussion and to deliver updates on the WTP Project.

### 3.5 SUMMARY

In summary, DOE, along with the USACE and WTP Contractor, is undertaking key initiatives to ensure there is a full understanding of what is required to successfully complete this project and begin plant operations. DOE is reviewing and evaluating all of the major project management systems, project controls, business systems, and technical processes by both internal senior professionals and outside "best and brightest" industry experts. It is again important to note that the Secretary of Energy is personally involved in the WTP Project and is briefed by the Assistant Secretary of Environmental Management on a regular basis.

#### 4.0 BUDGET AND COST STATUS

**Status:** In September 2005, BNI implemented an interim baseline for project performance reporting which then reflected more closely the planned activities and their projected costs. However, the plan was based on as assumed funding of \$626 million for FY 2006. While the contractor has been replanning the EAC based on reduced funding for FY 2006, project performance has still been reported against the interim baseline. Through April 2006, the WTP Project has a cumulative negative schedule variance of \$71 million and a positive cost variance of \$29.5 million on \$3,064 million of completed work to date. The negative schedule variance is primarily attributed to reductions in procurements and construction personnel as a result of reduced funding for FY 2006, as construction on the PT and HLW Facilities was suspended by the end of January 2006. The positive cost variance is primarily attributed to good productivity by the construction field craft and favorable procurements.

**Budget:** The WTP Project received new FY 2006 funding of \$520.4 million, with \$97 million of prior-year uncommitted carryover still available. For FY 2007, the Congressional Budget request includes \$690 million for the WTP Project.

**Costs:** Anticipated spending, based on BNI's May 2006 EAC, is about \$618 million in FY 2006.

#### 5.0 DOE/DOE CONTRACTOR COMPLIANCE

Commodity growth, performance deterioration in engineering and construction, hydrogen buildup in piping and vessels in the PT Facility, difficulty in mixing heavy fluids in the PT Facility, revised seismic criteria affecting structural design of the PT and HLW Facilities, and a reduced FY 2006 funding level will drive the project to exceed the current cost baseline and schedule milestones. The May 2006 EAC, which was submitted on May 31, 2006, estimated the project will cost \$11.6 billion (without fee) as compared to the December 2005 EAC of \$10.5 billion. The May 2006 EAC estimated completion date for hot commissioning is September 2019, as compared to the December 2005 EAC date of May 2017. DOE, BNI, and the USACE are in the process of evaluating the impact of these changes through the development of a revised cost and schedule estimate, which was completed on May 31, 2006.

When these reviews are complete, ORP will have sufficient confidence in the project's technical, cost, and schedule estimate to serve as a firm foundation for the project. Based upon the information provided in the May 2006 EAC, the remaining HFFACO milestones listed in Table 3 are beyond recovery.

ORP is continuing to identify the activities required to re-baseline the WTP, work the HFFACO and RCRA permit compliance issues with the regulators, and re-negotiate the BNI Contract. The plan is to first complete the ORP and USACE reviews and receive approval of a new WTP cost and schedule from the DOE's Secretarial Acquisition Executive; then work with the regulators to try to resolve the HFFACO and RCRA permit schedule issues prior to completing contract negotiations with BNI.

**Table 3. Impacted HFFACO Milestones**

Milestone	HFFACO Date	Description
M-062-00	12/31/2028	Complete Pretreatment Processing and Vitrification of Hanford High Level (HLW) and Low Activity (LAW) Tank Wastes.  Compliance with the work schedules set forth in this M-62 series is defined as the performance of sufficient work to assure with reasonable certainty that DOE will accomplish series M-62 major and interim milestone requirements.
M-062-00A	02/28/2018	Complete WTP Pretreatment Processing and Vitrification of Hanford HLW and LAW Tank Waste.  Tank Waste processing shall complete the WTP pretreatment and vitrification of no less than 10% of Hanford's Tank waste by mass and 25% by activity.
M-062-07B	12/31/2007	Complete Assembly Of Low Activity Waste Vitrification Facility Melter #1 So That It Is Ready For Transport And Installation In The LAW Vitrification Building (BNI Baseline Schedule Activity 4DL321A200 As Part Of DOE Contract No. DE-AC27-01RV14136).
M-062-08	06/30/2006	Submittal Of Hanford Tank Waste Supplemental Treatment Technologies Report, Draft Hanford Tank Waste Treatment Baseline, And Draft Negotiations Agreement In Principle (AIP).  DOE will submit a supplemental Treatment Technologies Report that describes the technical, financial, and contractual alternatives which in combination with the WTP and any required additional LAW vitrification facilities, are needed to treat all of Hanford's Tank Wastes.
M-062-09	02/28/2009	Start Cold Commissioning - Waste Treatment Plant.  DOE Will Start Cold Commissioning Of Its Tank Waste Treatment Plant. Start Of Cold Commissioning Is Defined As Introduction Of First Feed Simulant Into A Process Building.
M-062-10	01/31/2011	Complete Hot Commissioning - Waste Treatment Plant.  DOE Will Achieve Sustained Throughput Of Pretreatment, Low-Activity Waste Vitrification And High-Level Waste Vitrification Processes, And Demonstrate WTP Treatment Complex Availability To Complete Treatment of no less than 10% of the tank waste by mass and 25% of the tank waste by activity by December 2018.
M-062-11	06/30/2007	Submit A Final Hanford Tank Waste Treatment Baseline.  Following The Completion Of Negotiations Required In M-62-08, DOE Will Modify Its Draft Baseline As Required And Submit Its Revised Agreed-To Baseline For Treating All Hanford Tank Waste (HLW, LAW, and TRU) by 12/31/2028.

Note: A decision for disposal at the Waste Isolation Pilot Plant (WIPP) will not be made until (1) the waste meets the WIPP Waste Acceptance Criteria, with special emphasis on the waste determination as delineated in the WIPP recertification decision by the Environmental Protection Agency in March 2006; and (2) it meets the regulatory eligibility requirements for disposal as described in the WIPP Hazardous Waste Facility Permit.

## 6.0 AREAS OF NON-COMPLIANCE

The WTP portion of the RCRA permit includes a compliance schedule for the submittal of permit design packages. The following six compliance schedule items were not completed as scheduled in Attachment 51, Appendix 1 of the RCRA permit:

1. Item 10, "Submit detailed information associated with containers and container management area," due 3/22/06.
2. Item 13, "Submit engineering information for each dangerous waste tank and primary sump to be included in the permit," due 4/29/06.
3. Item 14, "Submit engineering information for each tank system ancillary equipment to be included in the permit," due 4/29/06.
4. Item 19, "Submit engineering information for Pretreatment Plant Miscellaneous Unit Systems," due 02/11/06.
5. Item 20, "Submit engineering information for Pretreatment Plant Miscellaneous Unit Systems equipment," due 4/12/06.
6. Item 24, "Submit engineering information for equipment for each LAW Vitrification Miscellaneous Treatment Unit subsystem," due 6/02/06.

This reporting period, permit design packages were submitted to complete the following two compliance schedule items. Note that Ecology comments regarding unresolved issues on ghosting of utilities and support systems were not incorporated into the packages and revision may be required on resolution of open issues.

1. Item 28, "Submit engineering information for HLW Vitrification Miscellaneous Treatment Unit sub-system," due 6/18/06.
2. Item 29, "Submit engineering information for equipment for each HLW Vitrification Miscellaneous Treatment Unit sub-system," due 6/18/06.

## 7.0 STATUS OF HFFACO MILESTONES

The HFFACO milestones for WTP, the M-62 milestone series that were completed during this reporting period or are outstanding, are listed below with full text and status as of this report.

### 7.1 M-62-00 – Complete PT Processing and Vitrification of Hanford High Level and Low Activity Tank Wastes

**Milestone Date:** December 31, 2028

**Description:** Compliance with the work schedules set forth in this M-62 series is defined as the performance of sufficient work to assure with reasonable certainty that DOE will accomplish series M-62 major and interim milestone requirements.

DOE internal work schedules (e.g., DOE approved schedule baselines) and associated work directives and authorizations shall be consistent with the requirements of this agreement. Modification of DOE contractor baseline(s) and issuance of associated DOE work directives and/or authorizations that are not consistent with agreement requirements shall not be finalized prior to approval of an agreement change request submitted pursuant to agreement action plan, Section 12.0.

**Status:** Unrecoverable.

**7.2 M-62-00A – Complete WTP PT, Processing and Vitrification of Hanford HLW and LAW Tank Wastes**

**Milestone Date:** February 28, 2018

**Description:** Tank waste processing shall complete the WTP PT and vitrification of no less than 10% of Hanford's tank waste by mass\* and 25% by activity.

\*[In meeting this requirement DOE will pretreat and vitrify no less than 6,000 metric tons of sodium (in the instance of LAW feed) and 800 metric tons of waste oxides (in the instance of HLW feed)]

**Status:** Unrecoverable.

**7.3 M-62-03 – Submit DOE Petition for RCRA Delisting of Vitrified HLW**

**Milestone Date:** December 31, 2006

**Description:** DOE will submit its petition for delisting of the immobilized HLW from the Waste Treatment Plant from RCRA and the Washington State Hazardous Waste Management Act (delisting petition) in accordance with 40 CFR 260.22 and Washington Administrative Code 173-303-072.

**Status:** On schedule - BNI submitted the delisting petition to ORP on June 22, 2005. DOE Headquarters reviewed the draft petition and provided comments. Comment resolution is underway. Submittal of the delisting petition should be consistent with the timing for the rest of the project and this milestone will be reviewed in light of other project delays.

**7.4 M-62-07B – Complete Assembly of LAW Melter #1 so that it is ready for transport and installation in the LAW vitrification building (BNI baseline schedule activity 4DL321A3200 as part of DOE Contract No. DE-AC27-01RV14136), and complete schedule activity ID 4DH46102A2 – Move #1 melter into the HLW vitrification facility.**

**Milestone Date:** December 31, 2007

**Description:** This milestone represents (1) the assembly of LAW Melter #1 to the point it is ready for refractory as part of BNI baseline activities 3EL3212A00 "Specifications and Analysis," 4DL321A000 "LAW - Procure Material & Equipment for Melters," and 4DL321A200 "LAW- Assemble Melter #1," (Contract No. DE-AC27-01RV14136). In addition, activities 4DL121U100 "LAW - Elev +3 South Melter FREP," and 4DL131D000 "LAW - Elev +28 Columns, Beams & Q-Decking at +48," shall be substantially completed; and (2) moving the first HLW melter into the HLW Facility as defined in BNI baseline activities ID 4DH46102A2.

Completion of this milestone will be met when (1) LAW melter #1 will have been fully fabricated, assembled, and ready for refractory material to be installed. Assembly of the melter is scheduled to occur near the end of LAW construction when the facility is most ready to have the assembled melter moved into the LAW cell where the refractory material will be installed. Meeting this milestone therefore represents significant accomplishment of the engineering, design, and construction of the LAW Facility; and (2) HLW melter #1 has been fully fabricated and moved into the HLW Vitrification Facility.

**Status:** Unrecoverable.

#### **7.5 M-62-08 – Submittal of Hanford Tank Waste Supplemental Treatment Technologies Report, Draft Hanford Tank Waste Treatment Baseline, and Draft Negotiations Agreement in Principle (AIP).**

**Milestone Date:** June 30, 2006

**Description:** DOE will submit a supplemental treatment technologies report that describes the technical, financial, and contractual alternatives, which in combination with the WTP and any required additional LAW vitrification facilities, are needed to treat all of Hanford's tank wastes. The report will identify and describe viable path(s) forward to complete treatment of all tank wastes by December 31, 2028. The report shall apply the same selection criteria to all options and include the second LAW vitrification facility as an option. The report will include the results of all waste form performance data (compared against the performance of borosilicate glass) for all the treatment technologies being considered; performance data will be adequate to make decisions as to the acceptability of any proposed waste form for the waste being considered; and description of the considered treatment technologies (including size, throughput, technical viability, and life cycle cost estimates).

This report will also include a discussion of waste treatment plant throughput commitments and the realistic potential for enhancing the throughput of currently planned melters, proposed additional melters and potential second generation melters installed at first melter change out.

The draft baseline will contain DOE's proposed approach for treating all Hanford Site tank wastes (HLW, LAW, and transuranic) by December 31, 2028, including life-cycle cost estimates that indicate projected funding requirements through completion of the RPP mission; a schedule for construction and operation of proposed new facilities and/or enhancements to the WTP; and projected throughput for each facility.

The report and baseline will be accompanied by a draft negotiations agreement in principle (AIP) and draft agreement change request containing milestones and associated agreement requirements sufficient to effectively drive all required work. These, include but are not limited to: (1) the establishment of requirements regarding any necessary WTP modification(s); (2) the establishment of requirements scheduling the acquisition and operation of any approved treatment technology systems; (3) the establishment of production metrics for treatment complex (WTP plus any supplemental treatment system or second LAW vitrification facility) consistent with completion of treatment by December 31, 2028; and (4) the establishment of requirements scheduling acquisition and operation of feed delivery systems for any approved supplemental technology (M-47 milestones). The AIP will be finalized within 30 days of submittal and provide for negotiations to be completed within 180 days of AIP finalization, and will provide that, in the event the parties do not reach agreement within this timeframe, the negotiations will be resolved as a resolution of a dispute via final determination of the Director of Ecology pursuant to HFFACO Article VIII. Unless otherwise agreed by the parties, this final determination will be issued within seven months of AIP finalization.

**Status:** Milestone M-62-08 was not achieved by June 30, 2006, primarily due to lack of process design and cost information that was to have been obtained from the Demonstration Bulk Vitrification System (DBVS) project. Although ORP and CH2M HILL Hanford Group, Inc. have conducted tests on bulk vitrification technology, the DBVS project was to provide additional information based on vitrification of actual tank waste. Since the supplemental technologies report has not been completed, both the tank waste treatment baseline and the draft negotiations AIP have also not been completed.

#### **7.6 M-62-09 - Start Cold Commissioning - Waste Treatment Plant**

**Milestone Date:** February 28, 2009

**Description:** DOE will start cold commissioning of its tank waste treatment plant. Start of cold commissioning is defined as introduction of first feed simulant into a process building.

**Status:** Unrecoverable.

#### **7.7 M-62-10 - Complete Hot Commissioning - Waste Treatment Plant**

**Milestone Date:** January 31, 2011

**Description:** DOE will achieve sustained throughput of PT, LAW vitrification, and HLW vitrification processes and demonstrate WTP treatment complex availability to complete treatment of no less than 10% of the tank waste by mass and 25% of the tank waste by activity by December 2018.

**Status:** Unrecoverable.

#### **7.8 M-62-11 - Submit A Final Hanford Tank Waste Treatment Baseline**

**Milestone Date:** June 30, 2007 (See M-62-8)

**Description:** Following the completion of negotiations required in M-62-08, DOE will modify its draft baseline as required and submit its revised, agreed-to, baseline for treating all Hanford tank waste (HLW, LAW, and transuranic) by December 31, 2028.

**Status:** Unrecoverable.

## 8.0 REFERENCES

- 62 FR 8693, 1997, "Record of Decision for the Tank Waste Remediation System, Hanford Site, Richland, WA," *Federal Register*, Vol. 62, pp. 8693-8704, February 26.
- ASME B31.3, 2004, *Process Piping*, American Society of Mechanical Engineers, New York, New York.
- ASME III, 2004, *2004 ASME Boiler & Pressure Vessel Code*, American Society of Mechanical Engineers, International, New York, New York.
- 24590-WTP-DC-ST-01-001, 2005, *Structural Design Criteria*, Rev. 10, River Protection Project, Bechtel National, Inc., Richland, Washington.
- DNFSB 2005, letter to Hon. Samuel Bodman, Secretary of the U.S. Department of Energy, from A.J. Eggenberger, Chairman, Defense Nuclear Facilities Safety Board, Washington, D.C., dated October 17.
- DOE Contract No. DE-AC27-01RV14136 between the U.S. Department of Energy and Bechtel National, Inc., dated December 11, 2000.
- DOE M 413.3-1, 2003, *Project Management for the Acquisition of Capital Assets*, U.S. Department of Energy, Washington, D.C.
- DOE O 413.3, 2005, *Program and Project Management for the Acquisition of Capital Assets*, Change No. 1, U.S. Department of Energy, Washington, D.C.
- Ecology et al. 1989, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.
- Ecology 2004, *Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste*, WA7890008967, Rev. 8, Washington State Department of Ecology, Olympia, Washington.
- INPO 1997, *Excellence in Human Performance*, Institute of Nuclear Power Operations, Atlanta, Georgia.
- Resource Conservation and Recovery Act of 1976*, 42 USC 6901, et seq., as amended.