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JAN 29 2010

10-WTP-022

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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 JULY 01 THROUGH DECEMBER 31, 2009

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 July 01 through December 31, 2009. 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 Guy A. Girard, Acting Assistant Manager, Waste treatment and Immobilization Plant Project, (509) 376-3681.

Sincerely,

Shirley J. Olinger, Manager
Office of River Protection

WTP:RLC

Attachment

cc: See page 2

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ATTACHMENT

10-WTP-022

U.S. DEPARTMENT OF ENERGY (DOE)
OFFICE OF RIVER PROTECTION (ORP)
SEMI-ANNUAL PROJECT COMPLIANCE REPORT FOR THE
WASTE TREATMENT AND IMMOBILIZATION PLANT (WTP)
July 1, 2009 – December 31, 2009

(consisting of 25 pages)

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

July 1, 2009 – December 31, 2009



**U.S. DEPARTMENT OF ENERGY
OFFICE OF RIVER PROTECTION
2440 Stevens Center Place
Richland, Washington 99354**

January 31, 2010

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LIST OF ACRONYMS

AB	Authorization Basis
BNI	Bechtel National, Inc.
BOF	Balance of Facilities
CalTech	California Institute of Technology
CDR	Conceptual Design Report
CGD	Commercial Grade Dedication
COA	Condition of Acceptance
CPS	Cathodic Protection System
CRESP	Consortium for Risk Evaluation with Stakeholder Participation
CY	Calendar Year
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EFRT	External Flowsheet Review Team
EOC	Extent of Condition
FY	Fiscal Year
HEPA	High-efficiency Particulate Air (filter)
HFFACO	<i>Hanford Federal Facility Agreement and Consent Order</i>
HLW	High-Level Waste [Facility]
HPAV	hydrogen in piping and ancillary vessel
HPI	Human Performance Improvement
HVAC	Heating, ventilation and air conditioning
INPO	Institute of Nuclear Power Operations
IRP	Issue Response Plan
LAB	Analytical Laboratory
LAW	Low-Activity Waste [Facility]
MAR	Material at Risk
MSA	Mission Support Alliance (Hanford)
ORP	Office of River Protection
P&ID	Piping and Instrumentation Drawing
PDSA	Preliminary Documented Safety Analysis
PEP	Pretreatment Engineering Platform
PIP	Process Improvement Project
PJM	pulse jet mixer
PMB	Performance Measurement Baseline
PT or PTF	Pretreatment [Facility]
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RPP	River Protection Project
SC	Safety Class
SER	Safety Evaluation Report
SRD	Safety Requirements Document
SS	Safety Significant

SSC	systems, structures, and components
TAR	Technical Authority Review
TSG	Technical Steering Group
VCGD	Vendor Commercial Grade Dedication
VPP	Voluntary Protection Program
WRPS	Washington River Protection Solutions, LLC
WTP	Waste Treatment and Immobilization Plant

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

A Semi-Annual Project Compliance Report (M-62-01R) that reflects the status of the U.S. Department of Energy (DOE), Office of River Protection (ORP) Waste Treatment and Immobilization Plant (WTP) Project is required by the *Hanford Federal Facility Agreement and Consent Order* (HFFACO) (Ecology et al. 1989) Milestone M-62-01. As detailed in M-62-01, this report documents for the period from July 1, 2009, through December 31, 2009, 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: Hanford tank waste consists of approximately 53 million gallons of mixed hazardous waste containing 190 million curies of radioactive 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 for onsite disposal; and
- Immobilize the high-level waste for ultimate disposal in the national repository.

WTP Complex Description: The River Protection Project (RPP) WTP complex is being designed, constructed, and commissioned for DOE by Bechtel National, Inc. (BNI) at the Hanford Site under DOE Contract No. DE-AC27-01RV14136. The WTP will be designed, constructed, and permitted to treat and immobilize mixed waste to support the RPP mission.

The WTP complex will receive waste in batches from Hanford's double-shell tank system, operated by the Tank Operations Contractor (Washington River Protection Solutions, LLC [WRPS]), through a pipeline system interface. The pretreatment process will separate the waste into low-activity and high-level waste 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, where the hot glass cools and hardens. Each container will then be sealed in preparation for storage and permanent disposal. The dangerous waste and radioactive constituents will be 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 stored onsite until disposal at the national repository for high-level waste and spent nuclear fuel.

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

This compliance report discusses each of the WTP Project functional areas, and the overall project. Financial and earned value data is through December 2009. WTP Project status is also provided monthly to Ecology 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 WTP Complex Design and Construction

Project Overview: Design, procurement, and construction activities continue for all of the facilities. Design/Engineering for the WTP Project is 78% complete, construction is 48% complete, and the overall WTP Project is 52% complete. Currently, BNI employs about 3,000 personnel, with an average of about 1,500 personnel (800 craft, 300 subcontractor, and 400 non-manual staff) working at the construction site.

Issues associated with the maturity of technology in the WTP design have been evaluated by independent DOE Review Teams and in DOE's design oversight process. The most notable evaluation was the "Comprehensive External Review of the Hanford Waste Treatment Plant Flowsheet and Throughput," completed in March 2006 by the External (Expert) Flowsheet Review Team (EFRT). The EFRT identified 28 separate technical issues, some of which had not been previously identified by either BNI or DOE; three additional issues were raised by an internal ORP review for a total of 31 issues. In response, BNI developed Issue Response Plans (IRP) for each of the major issues. A Technical Steering Group (TSG) was formed collaboratively between DOE and BNI to develop issue closure criteria and accept the data object quality evidence verifying the closure of the EFRT-identified issues to date. DOE reviews and approves the IRPs as they are completed; to date 30 of the 31 issues have been closed. (See Section 3.1 for further discussion.)

Pretreatment Facility: The PT Facility will separate radioactive tank waste into high-level waste and low-activity waste fractions and transfer each waste type to the respective vitrification facility for immobilization. The design/engineering for the PT Facility is approximately 77% complete, and construction is approximately 29% complete.

The milestone "Complete Structural Steel Erection below El. 56 Ft" was completed on July 23, 2009, well ahead of the proposed Consent Decree milestone date of December 31, 2009.

Most of the construction activities for the last six months relate to placement of concrete walls and slabs and installation of steel structures at the north and west end of the facility, at the 56-foot (ft) and 77-ft elevations. Slab placements for the 56-ft elevation are complete except for the slabs above the cells required to remain open for vessel installations through the cell tops. Construction of the walls between the 56-ft and 77-ft elevations is ongoing, with approximately 20 walls remaining. Installation of slabs at the 77-ft elevation was initiated in October 2009. Over the last six months there have been concrete placements of more than 3,100 cubic yards (CY) and structural steel installation of more than 600 tons, with both exceeding the baseline schedule. BNI has restarted the installation of Black Cell piping on the west side (Planning Area 01-D) ahead of the restart schedule. The installation of heating, ventilation and air conditioning (HVAC) ductwork, fabrication of rebar curtains, erection of scaffolding, and the installation of grounding are key on-going efforts.

Engineering issued 2,091 isometric drawings which exceeded the planned linear ft output of piping by more than 15,000 ft. Conceptual designs for jumper/framing in the hot cell have been

advanced to facilitate system integration with the piping and equipment design and reduce procurement risks.

All of the technical issues identified by the External Flowsheet Review Team (EFRT) have been resolved and closed, except the issue of Vessel Mixing (M3). Closure of the EFRT M3 issue did not occur prior to the end of Fiscal Year (FY) 2009 and is currently scheduled for completion prior to the proposed consent decree milestone of June 30, 2010. Early tests indicated that nine to twelve vessels may need modifications to ensure adequate mixing. Implementation of a test and analysis plan to validate the specific modifications is ongoing.

One of the most technically challenging activities has been the work associated with the EFRT issue associated with validation of the adequacy of waste leaching and ultrafiltration processes (M12), which was closed successfully in June 2009, through extensive testing using the scaled Process Engineering Platform (PEP).

Current engineering efforts are focused on planning areas with critical path schedules to minimize the impacts of Material at Risk (MAR) and hydrogen in piping and ancillary vessel (HPAV) implementation. The safety analysis for the MAR/HPAV change was approved by DOE in October 2009 with four Condition of Acceptance (COA) items. Efforts to resolve these COAs are ongoing and are scheduled to be complete by early 2010. BNI engineering was authorized to perform design advancements from the MAR/HPAV changes to facilitate schedule challenge.

BNI developed a risk mitigation plan for the issue of solid formation in the Cesium Ion Exchange Process (CXP) system, and recommended two alternative design improvements to ORP management for decision in November 2009. The proposed equipment and process changes affecting the current design are currently under ORP review. One of the alternatives has higher cost; however, this alternative may provide life-cycle cost savings due to the reduction of glass canisters. The ORP decision will be made in January 2010. The Reboiler condensate contamination issue has been resolved by addition of secondary steam loops to the system.

High-Level Waste Vitrification Facility: The design/engineering for the HLW Facility is approximately 83% complete, and construction is approximately 24% complete. The number of craft personnel at the HLW Facility has increased from approximately 170 to 210 to support an increase in the placement of concrete walls and slabs, erection of structural steel, and installation of other commodities. From July to December 2009, over 2,878 cubic yards of concrete were placed, and 241 tons of structural steel and 876 tons of rebar were erected, to support construction efforts at various elevations of the facility.

A major accomplishment achieved by engineering in this period is the completion of engineering design of all the main structural steel for the entire HLW Facility. A current focus of the HLW Engineering Team is the design effort to relocate the second-stage High Efficiency Particulate Air (HEPA) filters from the filter cave to the 37-ft elevation. The filters are being relocated as one of the conditions that provide a comparable level of safety as delineated in DOE-STD-1066 for protection of final filter systems. By relocating the filters, personnel access is provided to allow manual filter change-outs safely – if the primary filters are damaged by fire and cannot be changed remotely. General engineering activities for this period include the issuance of embeds,

structural steel and steel framing, piping, joggle, process and instrumentation diagrams, ventilation and instrument diagrams, and isometric drawings.

Procurement achieved a major milestone - the delivery and receipt of the Melter Cave #1 crane maintenance shield door. The glass former mixer and parts washer were other notable pieces of equipment received in this period. In the next six months, fabrication of the first of two HLW Melters will be completed at the vendor, as well as completion of Factory Acceptance Testing in preparation for shipment of the Melter Cave #1 primary containment shield door.

Construction forces continue to install structural steel, decking, rebar, concrete embedments, forms, and concrete from the 0-ft to 37-ft elevation. At the lower elevations, construction forces continue to install liner plate, piping, HVAC ductwork, and electrical cable tray and conduit. Installation of all of the 0-ft to 14-ft elevation structural steel is planned to be completed in January 2010, approximately 11-months ahead of the proposed Consent Decree milestone date for this activity.

Low-Activity Waste Vitrification Facility (LAW): Design/engineering is approximately 92% complete and construction is approximately 57% complete. The critical path for LAW continues to be procurement and installation of the offgas treatment unit operation components including the thermal catalytic oxidizer. ORP resolved the technical issues surrounding the LAW offgas system by modifying the system to be under vacuum from the melter to the fan discharge, with the fans as the last in-line component. ORP has approved BNI's justification for continued design, procurement, and installation, and BNI is in the process of redesigning the system.

Construction forces completed the switchgear building, setting the HEPA filter units on the 48-ft elevation, performing the load tests on the pour cave monorail, and installing girt supports for the import bay overhead doors and supports for the import bay roll-up coiling doors. Construction forces continued installing fans for the air filter system, piping and hangers, conduit, cable tray, gypsum wallboard, perimeter sealants, panels and transformers, and metal-stud framing.

Resolution of technical issues for excessive heat retention in some Melter Pour Cave equipment continues. A high temperature condition has been calculated to occur in certain container handling equipment that could significantly reduce the yield stress of these items.

Computational Fluid Dynamics calculation results will be analyzed for equipment stresses by a subcontractor and if a potential problem remains, design changes will be made to rectify the issue. Completion of the analysis is expected in January 2010.

Major accomplishments scheduled for the next six months include: receipt of the auto sampler, shield windows, melter connections, carbon dioxide vessel, decontamination system, and the submerged-bed scrubber condensate pumps, and completing engineering for the LAW process and mechanical handling equipment.

Balance of Facilities (BOF): Overall design/engineering for BOF is approximately 80% complete and construction is approximately 56% complete. BNI has issued the engineering specifications for the emergency diesel generator and scheduled pre-qualification interviews with vendors.

Construction forces completed installing the mechanical air tank at the Glass Former Storage Facility, welding drip shield supports at the Switchgear Building, and pulling cable to the air filters in the Chiller Compressor Building. Construction forces continued installing: conduit and fire detection equipment at the Chiller Compressor Building; conduit, instrumentation, and skid piping at the Water Treatment Building; drip shield in the Switchgear Building; fire alarm/detection system at the warehouse; and erecting scaffolding at the glass former blend building.

In September 2009, BNI presented to ORP the results of the updated electrical load calculations for WTP during operations. Based on the updated calculation and the potential conversion of temporary construction power for permanent use, there is no immediate need to upgrade the A6 substation. In December 2009, ORP, DOE Richland Operations Office, and Mission Support Alliance (MSA) contractor personnel met with a representative from the Federal Energy Management Program to discuss possible energy savings that could be realized within the WTP. Possible approaches include providing alternative fuel/energy to the WTP to replace the 45,000 gallon of diesel fuel per day, and identifying potential alternative energy sources.

The extent of condition piping excavations for underground piping corrosion is complete. Nine of the 11 excavation sites exhibited coating defects of varying degrees. BNI is evaluating the results and plans to present a proposed path forward to ORP in early 2010.

Major accomplishments scheduled for the next six months include: completing construction of the Cooling Tower Facility, achieving significant construction completion of the Fuel Oil Pumphouse, and meeting the Cathodic Protection construction complete Contract Activity Milestone.

Analytical Laboratory (LAB): LAB design/engineering is approximately 79% complete while construction is approximately 59% complete. Factory acceptance testing of the Hotcell Waste Transfer System is complete, and the equipment was delivered in late December 2009.

Construction forces completed installing: two ventilation system fans, the air tank, compressor, and breathing service air skid on the 17-ft elevation, low pressure steam system piping in two planning areas, and rough-set for second-stage filter system fans. Construction forces continued installing piping, metal-stud framing, gypsum wall board, conduit, installing/setting electrical equipment, ductwork and supports, and steam piping.

LAB engineering does not currently have any major technical issues and BNI continues to focus on confirmation of design. Major accomplishments scheduled for the next six months include receipt of the LAB Autosampling Equipment and completing design of the LAB HVAC systems. ORP is currently working with BNI to resolve the issue for use of combustible insulation in the LAB roof assembly. BNI drafted a white paper discussing the issues and met with ORP in early December to discuss the path forward. Conversations are currently on-going to determine an acceptable path forward for both ORP and BNI.

2.1.2 Commodities Installations

Based on the construction activities, the total WTP Project commodities placed or installed through December 2009 are summarized in Table 1.

Table 1. Key Commodity Quantity Progress

Quantity Progress	Current Forecast at Completion Quantity	Installed To-Date Through November 2009	Percent Complete
Concrete	262,310 cy	193,400 cy	74%
Structural Steel	39,590 ton	14,905 ton	41%
Piping (in buildings)	912,960 ft	169,890 ft	19%
Piping (underground)	116,010 ft	95,670 ft	82%
Conduit (in buildings)	1,010,790 ft	108,610 ft	14%
Conduit (underground)	191,900 ft	176,160 ft	91%
Cable Tray	97,790 ft	20,530 ft	21%
Cable and Wire	4,933,070 ft	253,210 ft	5%
Heating, Ventilation, and Air-Conditioning Ductwork	4,303,600 lb	1,077,690 lb	26%

2.1.3 Environmental Permits Required for Start of Construction

Permitting and Licensing: DOE and BNI continue to work 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 and revisions on evolving engineering designs are required and submitted on an ongoing basis.

Non-radioactive and radioactive air permit applications containing updated design information have been approved: The Washington State Department of Health (WDOH) approved the radioactive air permit in June 2006, and Ecology approved the non-radioactive air permit in December 2006. On June 18, 2009 WDOH confirmed closure of the WTP Diffuse and Fugitive Emission Notice of Construction approval; the approval was removed from revision E of the Hanford Site Air Operating permit on December 18, 2009.

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 2007]*) that requires the submittal of engineering and operational information. Commodity growth, hydrogen buildup in piping and ancillary 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 all contributed to increased project costs and schedule extension. As a result, compliance schedule items were missed as previously reported.

In February 2010, a progress report in accordance with the Dangerous Waste Permit requirements is planned to be submitted. The report is due one year from completion of the last compliance schedule item [Compliance Schedule Item 24, completed by a February 2009 submittal of permit design package LAW-018, *Miscellaneous Unit Subsystem Equipment for LAW Facility LAW Melter Process (LMP) System.*]

2.2 Near-Term Issues

2.2.1 Pulse Jet Mixers Design Closure

New pulse jet mixer (PJM) testing is planned to address mixing concerns identified in the EFRT review of WTP. The work is defined in the EFRT Issue Resolution Plan (IRP) for issue M3, "Inadequate Mixing." PJM testing activities will be performed in scaled mixing platforms to: (1) demonstrate re-suspension of settled waste solids of Newtonian slurries¹; (2) determine mixing times for various vessel mixing functions; (3) determine if a hydraulic "short circuit" could occur in non-Newtonian slurries, which would cause insufficient mixing; (4) confirm post-design basis event mixing of vessels; and (5) demonstrate that normal process mixing successfully meets the flowsheet mixing requirements. The schedule for the various related activities is detailed in the M3 IRP. The program status is being independently reviewed by the Consortium for Risk Evaluation with Stakeholder Participation (CRESP). A second round of testing has been completed on the Feed Evaporator Process vessel and Ultra-filtration Process vessel designs and work is proceeding to evaluate alternative designs for the High-Level Waste Process receipt vessel. The current plan is to complete testing and close M-3 prior to the proposed Consent Decree milestone date of June 30, 2010.

2.2.2 Hydrogen in Piping and Ancillary Vessels (HPAV)

Concerns have been identified regarding potential hydrogen detonations within WTP piping systems due to accumulations of flammable concentrations of hydrogen gas in piping and ancillary (small) vessels, and designing safety controls to mitigate such events. Potentially flammable gas mixtures will be radiolytically and chemically generated, and ignition of significant accumulations is conservatively assumed. Currently, the HPAV design contains a significant number of safety class and safety significant structures, systems and components that could substantially affect the ability to effectively operate the facilities. WTP has identified where these conservatisms are excessive, and is designing controls to prevent/mitigate hydrogen detonations. For instance, detonations are allowed in small piping, if it can be shown by analysis or testing that the piping system (pipe including hangers and supports) response to a detonation is elastic (i.e., no deformation). Conversely, safety controls are developed to prevent/mitigate

¹ Newtonian slurry has a low-viscosity like a liquid, whereas non-Newtonian slurry has a higher viscosity like a sludge.

detonations that result in an inelastic response regardless of pipe size. The intent is to identify those significant contributors to the HPAV hazard and provide a reasonable set of controls without unduly hampering operations.

The most significant outstanding technical concerns are designing pipe hangers and supports to withstand the associated reaction loads from these detonations and deflagrations, and developing code compliant piping design criteria for impulsive loading. Because there is little experimental data regarding such loads, ORP contracted with CalTech to conduct experiments to measure prototypical detonation loads on pipe hangers and supports. Testing commenced in June 2008 and included three testing phases, which were completed in February 2009. Follow-on testing at CalTech continues, to be completed in March 2010. In addition, BNI contracted with Dominion Engineering, who subcontracted to the Southwest Research Institute, to perform HPAV testing which was completed in January 2009. Subsequently, BNI again contracted with Dominion Engineering for an additional scope of testing at the Southwest Research Institute which completed in December 2009. Results from all testing programs will be used to evaluate any impacts (e.g., reduction in classification of systems, structures, or components) on the safety analysis and design. In addition, analysis methodology for design criteria for piping systems is under development. This effort is scheduled to culminate with a change to the WTP Authorization Basis (AB) by February 2010.

2.2.3 Ultrafiltration System and Leaching Process Design

Between 2004 and 2006, technical issues were identified with the WTP PT Facility ultrafiltration system and leaching processes regarding demonstration of the process at meaningful scale and uncertainty regarding system capacity. In response, a plan was prepared to optimize system design, test actual tank waste, develop simulants, and confirm system design and scale-up with an engineering scale (1:4.5) test. The Pretreatment Engineering Platform (PEP) is the 1:4.5 scale equipment used to confirm the ultrafiltration and leaching process system design.

The PEP was designed, fabricated, assembled, and operated over a 2.5 year period to confirm the WTP ultrafiltration and leaching process system design. Results obtained indicate the process scale-up factor from bench to full scale should be one for filtering, caustic leaching to dissolve alumina, and oxidative leaching to dissolve chromium. Performance in completing ultrafiltration and leaching of tank waste over the ORP mission is projected to be slightly better than previously modeled (~5% more capacity). Data obtained is supporting ultrafiltration system design completion and equipment procurement. Lessons learned while addressing the ultrafiltration system issues helped avoid significant issues that would have impacted progress during WTP commissioning.

The Ultrafiltration System issue was closed in September 2009. The PEP was placed in a dry and stable condition to preserve equipment for potential future testing to resolve emerging issues and optimize ultrafiltration system operations.

2.2.4 Material at Risk

The Material at Risk (MAR) update for the WTP is being implemented by the Contractor through submission of a Preliminary Documented Safety Analysis (PDSA) Addendum for the PT Facility. ORP conditionally approved the PT Facility Authorization Basis (AB) Control Strategy

Change Package (ORP letter 09-NSD-044, dated Nov 2, 2009). The technical documents include the PTF PDSA Addendum, Unit Liter Doses for updated MAR accident analysis, updated PTF severity level calculations and hydrogen related analyses for a total of six documents. ORP issued four (4) Condition of Acceptance (COA) items on the PTF AB control strategy change package. One of the COA has been closed, and BNI is working to resolve the three remaining COAs.

2.2.5 Quality Issues

WTP Black Cell Pipe Spool Issue (Update):

BNI's Authorization Basis and specifications required black cell pipe shop and field welds to include 100% radiography and positive material identification examination. However, until June 2005, neither piping isometric drawings nor the procurement specifications contained sufficient information for pipe fabricators to differentiate black cell spools from non-black cell spools. Black cells are areas where there will be no access for maintenance and repair after completion of construction because the areas will be sealed off for the life of the facility. BNI has discovered that some black cell pipe spools were shop-fabricated and sent to the WTP Project without the required examinations. BNI completed a formal root cause analysis and issued a revision to the report in response to ORP comments. Corrective actions required by the root cause analysis were completed in January 2009. In addition, BNI proposed examination requirements for pipe spool welds that are inaccessible because of high-radiation hazards or because the welds are in piping and components designated as 'hard-to-reach.' The proposed inspection requirements for 'hard-to-reach' piping and components are equivalent to the black cell. ORP reviewed the proposal and provided extensive comments. The comments were addressed and the final list of areas designated as 'hard-to-reach' was incorporated into the Basis of Design by Basis of Design Change Notice 24590-WTP-BODCN-ENG-08-0008, *Revision of Black Cell and Hard-To-Reach Area NDE Requirements*.

Of the total inventory of the 14,325 black cell and hard-to-reach piping spools, all spools were reviewed to ensure documentation of required examinations. Of the total spools, 1,795 spools required additional verification to meet the necessary requirements. Of the 1,795 spools, approximately 279 required physical re-work to bring them into compliance. BNI has completed its review and has closed the corresponding deficiency reports for all of the spools in question. ORP reviewed the corrective actions completed by BNI and identified two areas that needed correction. BNI provided a response on October 27, 2009, which outlined how they had addressed the areas of concern and ensured all spools were reviewed and determined compliant. ORP provided concurrence on closure of the black cell piping issue on November 13, 2009.

Vendor Commercial Grade Dedication:

After the discovery that NQA-1 requirements for Commercial Grade Dedication (CGD) were not being adequately imposed upon sub-tier suppliers, BNI reviewed all of its important to safety "Q" suppliers. After the initial review of the conditions/circumstances, BNI opted to take the conservative action of suspending all further shipments of Q materials and/or equipment until such time that the Extent of Condition (EOC) was understood, and appropriate compensatory and

corrective measures were put into place. The direction to suspend shipments was issued by BNI via direct letter to affected vendors the week of July 27, 2009. Release of each suspension has been made on a case-by-case basis.

BNI identified ninety-five (95) Q Vendors, of which sixty-four are actively supplying the project with Q material. The remaining thirty-one (31) vendors have previously supplied the project; however, they are inactive or no longer under contract. The total population of vendors includes BNI subcontractors.

Vendor program reviews had been scheduled to be completed by the end of calendar year 2009 for materials, bulk materials and equipment, but were completed ahead of schedule. The priority of the BNI CGD corrective action work was to address the items needed to support construction schedules, as identified by the respective Area Project Managers. The effort was accomplished with no delays to construction. Additionally, by the end of the year, all civil-related nonconformance reports were dispositioned and all items installed in concrete at the WTP were determined to be compliant with the critical characteristics so as to be able to perform their designated safety function.

WTP staff is completing efforts to close the remaining noncompliance reports, correcting the perceived deficiencies in dedication programs of its suppliers, and clearing questions of dedication from equipment. To date, there have been no reports of failures for any materials tested during the extensive sampling and testing of materials. ORP will continue to closely monitor BNI's efforts to identify vendor CGD problems and address WTP indeterminate quality materials.

WTP Fire Protection with DOE-STD-1066, *Fire Protection Design Criteria* (Update):

The WTP authorization basis invokes DOE-STD-1066, Fire Protection Design Criteria, which includes requirements in Section 14 for fire protection features within nuclear facility ventilation systems to protect High-efficiency Particulate Air (HEPA) filters from damage during a facility fire. The radial flow HEPA filter configuration used in the WTP ventilation systems does not support explicit compliance with DOE-STD-1066-99. The WTP design is based instead on facility-specific fire hazard analyses and the Integrated Safety Management process.

BNI developed and submitted to ORP an alternative design option that provides comparable safety and mission protection as allowed by DOE-STD-1066, and in accordance with DOE Order 420.1B, *Nuclear Facility Safety*. The alternate approach does not provide all of the fire protection features prescribed in Section 14 of DOE-STD-1066, but does provide multiple levels of fire protection features that adequately protect final HEPA filters from fires.

The alternate approach was identified by ORP as a gap in implementation of DNFSB Recommendation 2004-2, Active Confinement Ventilation Systems. DOE-EM accepted the gap analysis in July of 2009. ORP then directed BNI to implement the alternate approach in the authorization basis documents and the design. BNI has completed its implementation of the alternate approach in the Authorization Basis. ORP is currently reviewing BNI's implementation, with completion of the review expected by March 2010.

WTP Structural Steel Fire Protection (Closed):

DOE and the contractor have proposed providing fireproof coatings on primary structural steel members that are necessary to prevent loss of confinement or structural collapse, and elimination of fireproofing on secondary members not required for stability or confinement. DOE and the contractor provided documentation and demonstrated structural integrity to the DNFSB. Thus, the issue was closed as documented in the "Nineteenth Annual Report to Congress" issued by the DNFSB in March 2009. The Board performed independent evaluation of the technical issue and concluded that the fire protection strategy at WTP is acceptable from a nuclear safety perspective.

3.0 ACTIONS TAKEN OR INITIATED TO RECOVER ANY AGREEMENT SCHEDULE SLIPPAGE

DOE and its contractor are working to resolve issues raised by various review teams, such as the EFRT, in order to successfully complete this project and begin plant operations. DOE continues to evaluate all of the major project management systems, project controls, business systems, and technical processes.

3.1 External Review of Process Flowsheet

EFRT issue resolution has focused on near-term project impacts. To date, 30 of the 31 issues identified by the EFRT have been resolved and approved by the ORP Project Manager (Table 2). The remaining issue is projected to be complete by June 2010. Table 3 provides background, current status, and plan of action for the remaining open issue. The issue related to inadequate mixing design is the only remaining open issue of those issues identified in March 2006, when the EFRT completed a critical review of the WTP process flowsheet for BNI. The team identified 17 major issues and 11 potential issues that would prevent the WTP from meeting contract capabilities; three additional issues were raised by an internal ORP review, for a total of 31 issues. In response, BNI developed a project response plan describing the proposed actions to address the issues; IRPs were developed, issued, and approved for each issue. The IRPs include the actions required for issue resolution, a schedule for completion, integration with other issues, and integration with the overall project schedule. Examples of some of the identified issues include: inadequate ultrafiltration area and flux; undemonstrated leaching process; plugging of process piping; mixing vessels erosion; inadequate mixing systems; instability of baseline ion exchange resin; PT Facility availability; lack of comprehensive feed testing in commissioning; and limited remotability demonstration.

Table 2. Status of EFRT Issue Closure (as of December 2009)

Issue No	EFRT Issue Title	Actual/Forecast Closure Date	Closure Status
M 7a	Lack of Spare LAW Melter	Nov-06(A)	CLOSED
M 7b	Lack of Spare HLW Melter	Nov-06(A)	CLOSED
P 3	Adequacy of Control Scheme	Dec-06 (A)	CLOSED
M 8	Limited Remotability Demonstration	Oct-07 (A)	CLOSED
M10	Critical Equipment Purchases	Oct-07 (A)	CLOSED
P10	Lack of Analysis of Silo Feeds	Oct-07 (A)	CLOSED
M16	Misbatching of Melter Feed	Oct-07 (A)	CLOSED
M 9	Lack of Comprehensive Feed Testing in Commissioning	Oct-07 (A)	CLOSED
M14	Baseline IX resin	Oct-07 (A)	CLOSED

Table 2. Status of EFRT Issue Closure (as of December 2009)

Issue No	EFRT Issue Title	Actual/Forecast Closure Date	Closure Status
P 8	Effectiveness of Cs-137 Breakthrough Monitoring System	Oct-07 (A)	CLOSED
P 6	Questionable Cross-Contamination Control	Oct-07 (A)	CLOSED
M 5	Must Have Feed Prequalification Capability	Oct-07 (A)	CLOSED
M10a	Questionable Column Design	Nov-07 (A)	CLOSED
P 2	Effect of Recycle on Capacity	Nov-07 (A)	CLOSED
M 4	Designed for Commissioning Waste vs. Mission Needs	Nov-07 (A)	CLOSED
M 7	Inconsistent Short-term vs. Long-term focus	Nov-07 (A)	CLOSED
P11	Incomplete Process Control design	Dec-07 (A)	CLOSED
P 5	Inadequate Process Development	Dec-07 (A)	CLOSED
M11	Loss of WTP Expertise Base	Mar-08 (A)	CLOSED
P 7	Complexity of Valving	Mar-08 (A)	CLOSED
P 1	Undemonstrated Decontamination Factor	Apr-08 (A)	CLOSED
M17	HLW Film Cooler Plugging	Apr-08 (A)	CLOSED
M15	Pretreatment Facility Availability	Apr-08 (A)	CLOSED
M 1	Plugging in Process Piping	Mar-09 (A)	CLOSED
M 2	Mixing Vessel Erosion	Oct-08 (A)	CLOSED
M 6	Process Operating Limits Not Completely Defined	Dec-08 (A)	CLOSED
P 4	Potential Gelation/Precipitation	Dec-08 (A)	CLOSED
P 9	Undemonstrated Sampling System	Nov-09 (A)	CLOSED
M13	Ultrafilter Area and Flux	Sep-09 (A)	CLOSED
M 3	Inadequate Mixing System Design	Jun-10	
M12	Undemonstrated Leaching Process	Sep-09 (A)	CLOSED

Green	Closure Package in Final Review
Yellow	Actions Complete, Package in Preparation
Orange	Actions Not Complete
Red	Closure in Dispute or Closure Package Needs Major Update
Magent	Behind projected completion date

Table 3. Open EFRT Issues as of December 2009

Issue/Topic	Background, Current Status, Plan of Action
<p>M3 Inadequate Mixing System Design</p>	<p>Background: Concerns were raised that fluids with quickly settling solids may not be adequately mixed by Pulse Jet Mixers in selected Pretreatment facility and HLW facility vessels.</p>
	<p>Current Status: PJM mixing requirements were clarified for each PJM mixed vessel based on the function of process vessels. Parametric testing of mock PJMs using glass beads of varying sizes and densities was completed in early August 2008. Data was evaluated to develop PJM mixing correlations. A second phase of testing is currently underway to further test and evaluate the adequacy of PJM mixed vessels.</p> <p>A second round of testing has been completed on the Feed Evaporator Process (FEP) vessel and Ultra-filtration Process (UFP) vessel designs and work is proceeding to evaluate alternative designs for the High Level Waste Process (HLP) receipt vessel. Design improvements are being identified for those vessels at risk of not meeting their mixing requirements.</p>
	<p>Plan of Action: Complete the Phase 2 testing program focused on evaluating cohesive simulants. Based on the Extent of Condition design assessment, and/or testing, initiate design or operational changes for the PJM mixed vessels. BNI is conducting testing on 12 vessels of concern. Issue closure is projected prior to the proposed Consent Decree milestone date of June 30, 2010.</p>

4.0 BUDGET AND COST STATUS

Status: On December 22, 2006, a new WTP Project baseline with a Total Project Cost (TPC) of \$12.263 billion was approved by the DOE Secretarial Acquisition Executive. The components of the TPC were an \$8.786 billion Performance Measurement Baseline (PMB), and \$3.477 billion in contingencies, fee, and other project costs. Through December 2009, ORP has approved a series of adjustments to the PMB that have increased the PMB and decreased contingencies by a total of \$1,189.5 million. Many of these adjustments were anticipated at the time of the performance baseline approval in December 2006, but were only rough estimates or based on Monte Carlo risk analysis (a multi-iteration, statistical technique) for the costs. The proposed adjustments were initiated to: (1) resolve issues resulting from an external technical review of the WTP process flowsheet; (2) implement facility capacity modifications in the PT Facility; and (3) incorporate a replan of the to-go engineering estimate. In addition, in December 2008 there was a major replanning adjustment implemented by BNI, which was incorporated into the revised contract signed between ORP and BNI on January 16, 2009, along with resolution of other technical scope issues. These proposed adjustments and strategies have not resulted in a change to the TPC of \$12.263 billion.

BNI continues to review work processes in an effort to mitigate future overruns. These include: receipt of vendor information; document reviews; and identification, timely analysis, and closure of technical issues. Strong attention continues to be given to vendor performance through enhanced team and collaboration efforts with vendors. BNI has set up a focused equipment group with senior engineers to strengthen production focus on key equipment procurements.

Budget: Total funding available for the WTP Project in FY 2010 is \$1.009 billion, which includes \$690 million new budget authority, and \$319 million of FY 2009 carryover funds. To-date, the WTP Project has received \$5.715 billion of funding.

Spend: For FY 2009, the WTP Project spent \$717 million. Through FY 2009, the total WTP Project spend is \$5.385 billion, and an additional \$173 million has been spent in FY 2010 through December 2009. The current anticipated spend for FY 2010 is approximately \$815 million. This would result in a carryover of about \$195 million of uncosted funds to FY 2011.

5.0 DOE/DOE CONTRACTOR COMPLIANCE/STATUS OF HFFACO MILESTONES

The December 2006 approved baseline assumes consistent Congressional appropriations of \$690 million from FY 2007 through construction and commissioning completion.

Negotiations regarding HFFACO milestones began in May 2007 with the public being provided the opportunity to review and comment on the draft schedule for Single-Shell Tank Retrieval and Closure and WTP activities/milestones. Negotiations continued through most of 2008, unsuccessfully, resulting in the State of Washington filing a Complaint in November of 2008. The State's lawsuit asserted that DOE has missed, or was certain to miss, the milestones listed in Table 4. The State of Washington and DOE reached a tentative agreement in August, 2009. DOE and Ecology provided the public with an opportunity to comment on the proposed Consent Decree and HFFACO milestones; the public comment period ended December 11, 2009. DOE and Ecology are currently reviewing the comments and discussing the best way to address them.

Table 4. 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.

Table 4. Impacted HFFACO Milestones

Milestone	HFFACO Date	Description
M-062-10	01/31/2011	<p>Complete Hot Commissioning - Waste Treatment Plant.</p> <p>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.</p>
M-062-11	06/30/2007	<p>Submit A Final Hanford Tank Waste Treatment Baseline.</p> <p>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.</p>

6.0 AREAS OF NON-COMPLIANCE

As identified in section 2.1.3, compliance schedule items in the WTP portion of the Dangerous Waste Permit were missed (previously reported). After final approval of the Consent Decree and revised TPA milestones, a revised compliance schedule for the WTP portion of the Dangerous Waste Permit will be proposed. The status of HFFACO milestones is addressed in Section 5.0.

7.0 REFERENCES

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- CCN 132846, letter, BNI to ORP, "Report of External Flowsheet Review Team for the Hanford Waste Treatment and Immobilization Plant-Final Report Titled: 'Comprehensive Review of the Hanford Waste Treatment Plant Flowsheet and Throughput'," dated March 17, 2006
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- Resource Conservation and Recovery Act of 1976*, 42 USC 6901, et seq., as amended