

Activities and Financial Status
Waste Treatment and Immobilization Plant (WTP)
Line Item – 01-D-416

Subprojects: **Low-Activity Waste Facility - 01-D-16A**
 Analytical Laboratory - 01-D-16B
 Balance of Facilities - 01-D-16C
 High-Level Waste Facility - 01-D-16D
 Pretreatment Facility - 01-D-16E

Quarterly Report

FY 2006 2nd Quarterly Report

Hanford Site, Washington

HANFORD WASTE TREATMENT PLANT

The Waste Treatment Plant (WTP) is the Department's approach for cleaning up the high-level radioactive waste at the Hanford Site. The WTP will process and solidify radioactive waste currently stored in underground storage tanks. The concept is to treat the Hanford tank waste by separating it into a high-level fraction and a low-activity fraction. Both fractions will be immobilized through vitrification into glass. The high-level fraction will be disposed in the national geologic repository, while the low-activity fraction will be placed in a disposal facility on the Hanford Site. The figure below illustrates the WTP process.

Figure 1. Waste Treatment and Immobilization Plant Process

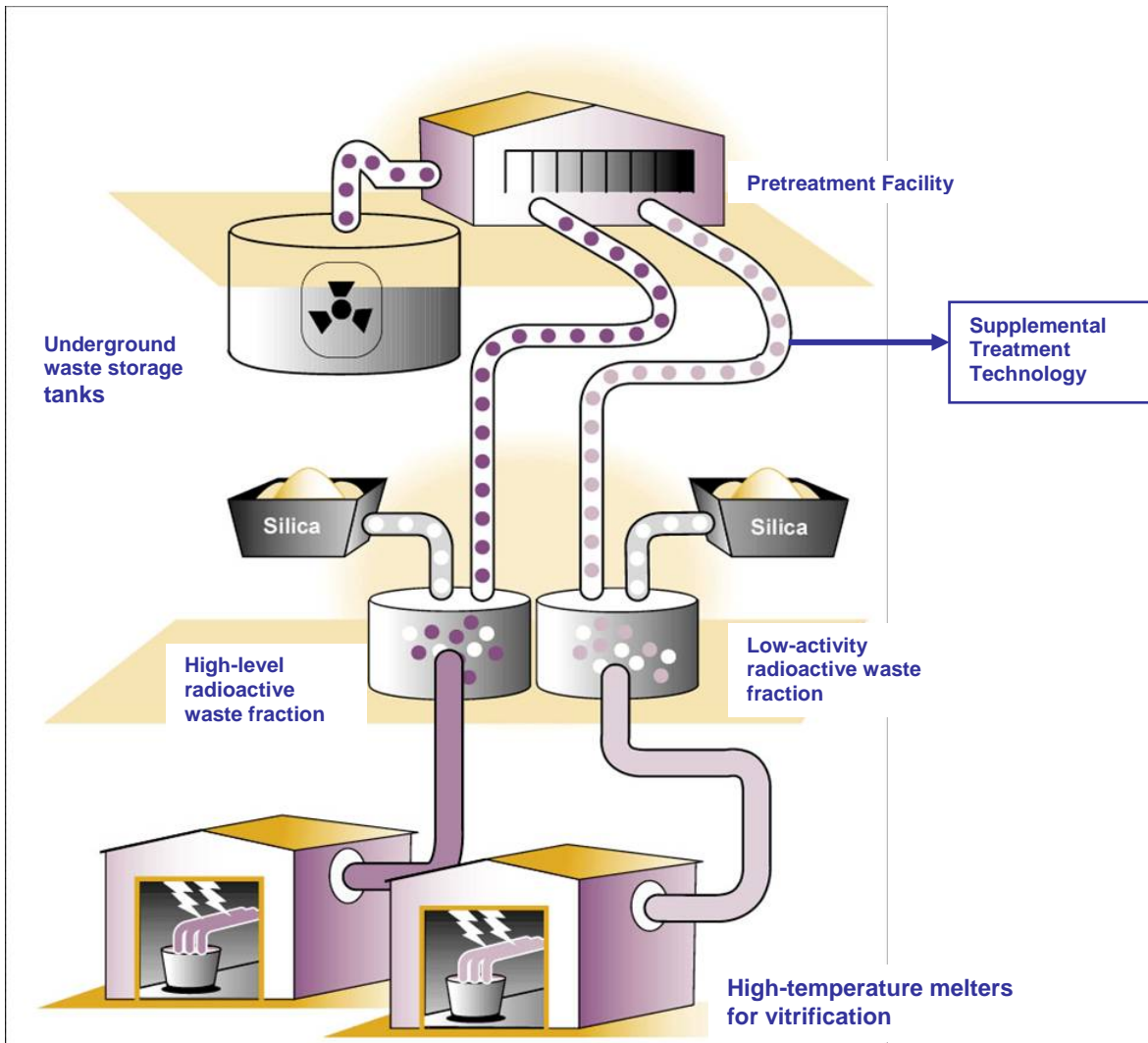


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ACRONYMS

BNI	Bechtel National, Inc. (Bechtel)
BOF	Balance of Facilities
DCMA	Defense Contract Management Agency
DOE	U.S. Department of Energy
DOE-HQ	U.S. Department of Energy – Headquarters
EAC	Estimate At Completion
EVMS	Earned Value Management System
FY	Fiscal Year
HLW	High-Level Waste [Facility]
LAB	Analytical Laboratory
LAW	Low-Activity Waste [Facility]
ORP	Office of River Protection
PT	Pretreatment [Facility]
USACE	U.S. Army Corps of Engineers (Corps)
WTP	Waste Treatment and Immobilization Plant

EXECUTIVE SUMMARY

The Hanford Waste Treatment Plant is the largest and most complex environmental remediation project in the Department of Energy. The plant is essential to clean up of radioactive wastes located on the Hanford Site in the State of Washington.

DOE is fully committed to ensuring successful management of the project by resolving technology issues, developing more credible cost and schedule estimates, and exercising improved project management and controls. As presented throughout this quarterly report, a number of management initiatives and activities have been incorporated to ensure a long-term framework is in place to enable successful execution of this project. The report provides a current status summary of these initiatives in management oversight, technical flow sheet capability, and building a credible cost and schedule baseline. In addition, the report presents the status of overall project completion, overall project costs, and a breakdown of costs for engineering, procurement, and construction.

The Secretary of Energy is personally engaged and committed to successful management and execution of this project in a world class manner. He meets regularly with senior principals of Bechtel National Inc., the Waste Treatment Plant contractor, to discuss the Department's concerns and expectations for ongoing project performance.

The Department has retained a broad range of external, distinguished senior professionals from private industry, academia and other Government agencies to thoroughly review the key elements of the Waste Treatment Plant including technology, cost and schedule, project management, project controls, and earthquake seismic criteria. Specific accomplishments to date include:

- An independent expert team, sponsored by a non-profit firm, performed an After Action Fact Finding Review to better understand the root causes associated with management problems at the Waste Treatment Plant. Their report was delivered in January 2006. The team concluded: cost and schedule controls were inadequate to establish and maintain a credible baseline; adequate project management oversight, resources, and processes had not been in place; technology resources had not been adequate to address first-of-a-kind problems; "optimism" all too often replaced "realism" within projections; management of safety issues in design had not received adequate attention; complexity had increased over time and unanticipated issues had continued to impact the project.
- An independent external team of experts, the External Flowsheet Review Team, completed a comprehensive review of the entire Waste Treatment Plant process flowsheet and throughput as defined in the contract requirements. Their report was delivered on March 17, 2006. The team concluded that all the issues identified have solutions and do not require new technology, but that resolution of the issues will require commitment of additional operations, engineering, and research and development resources. Efforts are already underway to resolve these issues.
- The U.S. Army Corps of Engineers is independently reviewing the latest revision to the structural design criteria and its incorporation of interim seismic criteria. Also, the Corps

is managing the drilling of additional boreholes at WTP to confirm the margin of conservatism in the horizontal and vertical responses to earthquakes that have been selected for WTP's design. Drilling is expected to begin in summer 2006.

- The U.S. Army Corps of Engineers is performing “over-the-shoulder” reviews of structural qualifications of the buildings, equipment, and piping to determine design adequacy to meet the 2005 interim seismic criteria. The Corps has not identified any major concerns to date.
- An independent external team of experts, the External Review Team, completed a thorough assessment of the Bechtel National, Inc., December 2005 Estimate At Completion to include assessing the resource loaded project cost, schedule, estimating methodology, contingency management, and overall project management system. Their report was delivered on March 31, 2006. The team estimated the project will cost \$11.3 billion (without fee) as compared to the December 2005 Estimate At Completion of \$10.5 billion; with a completion date for hot commissioning in mid-2018 as compared to the December Estimate At Completion (EAC) date of May 2017.
- Bechtel National, Inc. delivered an updated EAC to the Department on May 31, 2006, to reflect project changes, since 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 of hot commissioning for September 2019 as compared to the December 2005 EAC date of May 2017.
- The U.S. Army Corps of Engineers is providing a comprehensive independent validation review of Bechtel's Estimate At Completion, and is on track to complete the validation review of the project baseline cost, scope and schedule by late summer 2006.
- Bechtel National, Inc. plans to retain a core group of professionals from the two independent external teams to serve as consultants throughout the execution of the project.

The Secretary of Energy and Assistant Secretary for Environmental Management are actively ensuring that long-term management, project control systems, technical systems, business processes, and external reviews are in place and are being implemented effectively by experienced and capable federal and contractor personnel. The Congress, regional stakeholders, and U.S. taxpayers expect and deserve cleanup of the high-level waste at Hanford will be completed safely and expeditiously.

1.0 INTRODUCTION

The *Conference Report for Energy and Water Development Appropriations Act, 2006* (Report 109-275) called upon the Department of Energy “to report ... by December 1, 2005, on the actions taken to rectify the management failures of this [WTP] project ...and to report quarterly, beginning on January 1, 2006, on the activities and financial status of each of the subprojects with WTP.” The first report to satisfy this request was provided to the Congressional committees on March 24, 2006 and this is the second quarterly report.

Hanford’s Waste Treatment and Immobilization Plant (WTP) is a vital project for the U.S. Department of Energy (DOE) and the nation. The WTP will provide the means to clean up millions of gallons of radioactive waste at the Hanford Site, located in Washington State, and will be the world’s largest chemical-radioactive waste treatment facility. The overall WTP project objective is to build a facility with the capacity to treat and immobilize approximately 53 million gallons of radioactive waste stored in 177 underground storage tanks.

The WTP is a massive enterprise comprised of five separate facilities:

- Low-Activity Waste (LAW) Facility
- Analytical Laboratory (LAB)
- Balance of Facilities (BOF) – The BOF is made up of 20 support facilities
- High-Level Waste (HLW) Facility
- Pretreatment (PT) Facility

Each facility fulfills a key function in treating and immobilizing waste at the Hanford Site.

This Second Quarterly Report provides the current status of project management oversight, technical reviews, and cost and schedule baseline preparation. In addition, the report presents the status of overall project completion, costs for each facility, and a breakdown by phase for engineering, procurement, and construction.

2.0 SUMMARY OF MANAGEMENT AND OVERSIGHT ISSUES

Starting in July 2005, the Secretary of Energy has held several meetings with the principals of Bechtel National, Inc. (BNI), the contractor for the Waste Treatment Plant, and indicated his concern whether their firm will be able to complete the WTP within scope, cost and schedule baselines. The Secretary has insisted BNI demonstrate its world-class corporate commitment and project management capabilities to this critical project.

Further, the Secretary of Energy and the Assistant Secretary of Environmental Management are actively addressing issues raised within the After Action Fact Finding Review and other program reviews through a series of ongoing initiatives. The overall objective is to ensure the project is well-managed. The status of these initiatives follows:

- A senior-level oversight team at the Department's Headquarters has been established and is actively engaged in all facets of the project. The team is led by a certified Federal Project Director (Level 4) and comprised of individuals with specialized knowledge in cost estimating, scheduling, contracting, process flow-sheets and design/engineering. This team is charged with oversight, evaluation and management throughout the life of this project.
- The Assistant Secretary for Environmental Management directed the Office of River Protection (ORP) and Bechtel National, Inc. to adhere with strict compliance to the Department's project management requirements document, DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*, and the accompanying manual.
- Bechtel National, Inc. was directed to implement an Earned Value Management System (EVMS) that fully complies with the American National Standards Institute 748-A-1998. EVMS is a proven, industry standard management tool for planning and monitoring project performance.
- The Department continues to upgrade its project management capabilities by hiring experienced staff and certifying project managers in accordance with the Department of Energy's Project Management Career Development Program. The Federal Project Director for WTP was certified in December 2005. The Federal Project Director is filling three newly created GS-14/15 positions to serve as the leads for each of the main process facilities of WTP.
- The contracting and legal staff has been enhanced by the creation and filling of: a GS-15 Procurement Director, a GS-14 Contracting Officer, a GS-13 Contract Specialist, a GS-12/13 Organizational Property Management Officer, and a GS-14 Procurement Attorney.
- The Department has established a structured weekly and monthly reporting system and a quarterly review process. Senior officials, at the highest levels within the Office of Environmental Management (EM) and the Department of Energy, are receiving project status updates on a regular basis.

- The Department has engaged one of the Top-20 program management firms, as determined by *Engineering News Record*, to provide specifically targeted project management expertise, based on their expertise on large complex projects. The firm will provide three full-time equivalents to serve as a consultant to the Department's Headquarters and the Federal Project Director and the 60 person federal staff in the Office of River Protection, responsible for the WTP. This will include one full-time experienced expert and up to two full-time equivalents, in focused areas of expertise on an as-needed basis, to advise on methods to improve management and performance assessment. Authority and accountability remains with the Federal Project Director.
- Integrated Safety Management culture issues and Quality Assurance deficiencies have been identified recently in several project areas. The Department has responded with aggressive actions. Using the Department's nuclear safety enforcement authority under the Price Anderson Amendments Act, deficiencies have been investigated and a Notice of Violation for multiple Quality Assurance regulation violations has been issued. Using the Department's contractual enforcement authority, the fees available for Bechtel National, Inc. to earn have been reduced due to below-par safety management performance. EM Headquarters, the Department's Office of Price Anderson Enforcement, and the Office of River Protection are actively engaged in monitoring the Bechtel National, Inc. analysis of these issues and their corrective actions to address root causes of these concerns.

The Department of Energy senior managers are actively ensuring the above initiatives are being implemented effectively. These actions are designed to ensure proper management and business systems are in place and are being implemented effectively by experienced and capable federal and contractor personnel. The overall objective is to make certain project planning and execution is being well managed.

3.0 SUMMARY OF TECHNICAL REVIEWS

Expert Technical Flow Sheet Review

The Department instructed Bechtel National, Inc. to commission a team with a broad composition of external, distinguished senior professionals from private industry and academia to provide a thorough review of all technology aspects of the Waste Treatment Plant process and evaluate if the plant will operate as designed. This team submitted a final report on March 17, 2006, and the Department provided copies to Congressional committees.

The report confirms the Waste Treatment Plant has an essential role in cleaning up the Hanford Site and concludes the Plant can operate as designed, if an issue associated with line plugging is resolved. The report identifies seventeen major concerns and eleven potential areas of concern which, when resolved, will provide a significantly improved expectation for successful operation of the plant. The team concluded the issues can be addressed and will not require any new technologies. Bechtel and the Department are committed to addressing these issues and fixes already are underway. Bechtel has prepared a Project Response Plan, managed by a senior Bechtel corporate engineer, to develop technical resolutions and implementation in a thorough and timely manner. Bechtel plans to retain a core group, to include members of this team, to serve as consultants throughout the execution of the project.

Independent Seismic Reviews

In February 2005, the Department developed interim seismic criteria based on agreement with the Defense Nuclear Safety Board on ground motion values. Bechtel National, Inc. used the interim seismic criteria to check the engineering calculations for the designs already completed and the structures already built. Bechtel National, Inc. submitted to the Department a revision to the structural design criteria, which incorporates the Department's current best understanding of the seismic hazard at Hanford and the Waste Treatment Plant as well as the assumptions from the interim seismic criteria. The U.S. Army Corps of Engineers (USACE) completed review of this proposed revision to determine if it adequately incorporates the interim seismic criteria, and their comments were incorporated. On June 28, 2006, the Department forwarded this latest revision to the structural design criteria to the Defense Nuclear Facilities Safety Board, with the expectation that this resolves two of the issues (seismic ground motion and structural engineering) raised by the Board in their October 17, 2005, letter to the Department.

The Department retained the U.S. Army Corps of Engineers to proceed with drilling at least one deep borehole to confirm the geophysical properties of the layers of bedrock below the WTP. The analysis of the geophysical properties will confirm the margin of conservatism in the horizontal and vertical responses, at the WTP due to earthquakes, selected for the design of the WTP. Drilling is scheduled to begin in the summer 2006.

Independent Over-the-Shoulder Structural Review

The U.S. Army Corps of Engineers has been performing "over-the-shoulder" reviews of structural qualifications of the buildings, equipment, and piping to determine the adequacy of the design to meet the interim seismic criteria developed in 2005. To date, the Corps has performed detailed onsite reviews, has not identified any major structural design concerns at this time, and is continuing to participate in the resolution of comments.

4.0 STATUS OF COST AND SCHEDULE BASELINE – AS OF MAY 31, 2006

Bechtel National, Inc. was directed to provide to the Department a revised detailed Estimate At Completion (EAC) for the project by December 2005. The Department instructed Bechtel to commission an independent external team comprised of senior management and subject matter experts from private industry, academia, and Bechtel corporate management to review the December 2005 EAC. The scope of the review included the resource loaded project cost, schedule, estimating methodology, contingency management, and overall project management system.

The team completed their report on March 31, 2006, and the Department provided copies to Congressional committees. The report concluded the execution plan as written in the EAC is compliant with the project contract. However, the strategy for transitioning to long-term operations could be made more effective. The team also indicated the December 2005 EAC is comprehensive and substantially correct as the project looked in late 2005, but it has been overtaken by emerging events. These events include disposition of the issues raised by the independent external technical and cost review teams and the available funding for FY 2006.

Bechtel National, Inc. delivered an updated EAC to the Department on May 31, 2006, to reflect project changes, since 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 estimates completion of hot commissioning for September 2019 as compared to the December 2005 EAC date of May 2017.

The Department retained the U.S. Army Corps of Engineers to provide a comprehensive independent review of Bechtel's EAC in order to validate the project baseline cost, scope, and schedule. The Corps retained a number of recognized industry experts to work alongside their senior federal staff. An interim status report, submitted by the Corps in March 2006 and provided to Congressional committees, identified no major concerns with the December 2005 Bechtel cost estimate, schedule or its basis. The Corps' validation report, which will evaluate Bechtel's May 2006 EAC, is scheduled for completion by late summer 2006.

Table 1 displays the changes in total project cost for each of the five WTP facilities from the March 2003 baseline, the December 2005 EAC and the May 2006 EAC.

Table 1. Changes in Total Project Cost by Facility

Facility	Mar 2003 Contract Baseline	Dec 2005 EAC	May 2006 EAC
Low-Activity Waste	988	1,192	1,331
Analytical Laboratory	352	421	494
Balance of Facilities	508	682	918
High-Level Waste	1,389	2,076	2,243
Pretreatment	1,619	3,169	3,463
Late adjustments (fuel oil, forward pricing rate, temporary lab, etc.)	0	196	337
Total Estimate At Completion	4,856	7,736	8,786
Contingency	550	1,041	1,651
Total Forecast At Completion	5,406	8,777	10,437
Technical and Programmatic Risk Assessment	100	1,760	1,116
Total Project Cost (w/o fee)	5,506	10,537	11,553

5.0 FINANCIAL STATUS – AS OF MARCH 31, 2006

The total funding available for FY 2006 is \$618 million, which includes \$521 million of FY 2006 New Budget Authority and \$97 million of FY 2005 Uncommitted Carryover.

Table 2. Available Funding for FY 2006

Funding	Dollars (in millions)
FY 2006 New Budget Authority	\$521
FY 2005 Uncommitted Carryover	97
Total	\$618

The planned spending of the available \$618 million, outlined in Table 3, is split between funding for Bechtel National, Inc. activities and other activities funded directly by ORP in support of the project. The \$97 million in carryover was assigned to the Bechtel National, Inc. contract (as shown in Table 4 below) for a total of \$580 million. There is \$38 million of FY 2006 appropriation utilized for the other WTP activities outlined in Table 3.

Table 3. Planned Spending of Funds for FY 2006

Planned Spending	Dollars (in millions)
Bechtel National, Inc.	\$580
Seismic analysis, technical and estimate reviews as well as technology support	
<ul style="list-style-type: none"> • U.S. Army Corps of Engineers – Cost Validation Review • U.S. Army Corps of Engineers – Structural Design Reviews • U.S. Army Corps of Engineers – Boreholes and Seismic Analysis • Department Reviews/External Validations • Savannah River National Lab Technical Support 	<p style="text-align: right;">\$4 \$5 \$19 \$6 \$4</p>
Total	\$618

Table 4 provides the quarterly status for costs. For the first two quarters of FY 2006, the actual amounts are provided as compared to the plan. For the last two quarters, the current forecast is provided as compared to the plan. The actual spending for the first quarter is in line with the plan. However, for the second quarter, the amount spent was \$38 million less than planned due to delays in design and certain procurements for Low-Activity Waste and Pretreatment Facilities. However, the forecast for the third and fourth quarters is to exceed the plan with an increase in engineering effort for designs and increased procurement of materials.

Table 4. Contractor Cost Status (\$M) – Quarterly for FY 2006

Facilities	FY 2005 Carry-Over	FY 2006 Appropriation	Q1 FY 2006		Q2 FY 2006		Q3 FY 2006		Q4 FY 2006		FY 2006 Total	
			Plan	Actual	Plan	Actual	Plan	Forecast	Plan	Forecast	Plan	Act/For
Low-Activity Waste	27	158	50	45	47	37	47	49	47	54	191	185
Analytical Lab	10	43	12	13	15	6	15	19	18	15	60	53
Balance of Facilities	8	63	18	18	17	15	14	20	18	18	67	71
High-Level Waste	26	89	30	35	23	21	23	28	28	31	104	115
Pretreatment	26	130	47	46	40	25	37	37	44	48	168	156
Total	97	483	157	157	142	104	136	153	155	166	590	580

Note: The separate control points were established for each facility as part of the FY 2006 appropriations bill. Fiscal Year 2005 funds were appropriated at the total project level with the flexibility of funding any of the five facilities. Also, the Bechtel available funding was reduced by \$10 million due to increased costs for drilling boreholes.

Table 5 provides the forecast for the percent complete for each facility at the end of FY 2006 based on the forecast of expenditures.

Table 5. Cost Status (\$M) – Facility Percent Complete for FY 2006

Facilities	Total Forecast At Completion (May 2006)	Total Spent through FY 2005 (actual cost to date)	Forecast through FY 2006 (Cumulative)	
			Cost	% Complete
Low-Activity Waste	1,635	559	744	46%
Analytical Lab	641	108	161	25%
Balance of Facilities	1,191	315	386	32%
High-Level Waste	2,727	669	784	29%
Pretreatment	4,243	1,088	1,244	29%
Total	10,437	2,739	3,319	32%

Note: "Total Forecast At Completion (May 2006)" costs include contingency, but do not include transition costs, contractor fee, and Technical and Programmatic Risks.

6.0 PROJECT STATUS - AS OF MARCH 31, 2006

The Waste Treatment Plant design is approximately 75 percent complete and construction is approximately 27 percent complete. The reconstituted nuclear construction infrastructure at WTP, represented by thousands of engineers and onsite craft labor, has overcome numerous first-of-a-kind technical obstacles. They have successfully installed about 161,000 cubic yards of concrete, 8,000 tons of structural steel, and 31 miles of piping. Construction completion and material and equipment procurements have been completed to varying levels for each of the five facilities. The Low-Activity Waste facility was “topped off”, which means structural steel was installed to the highest level for that facility. Except for a few lapses, for which corrective actions have been initiated, all of this work has been accomplished in compliance with nuclear quality-related standards and within a safe work environment.

Table 6 displays the project design, procurement and construction status of each of the five WTP facilities. The percentages are based on the “Total Estimate At Completion” (without contingency) which was provided in the May 2006 EAC.

Table 6. Completion by Facility as of March 31, 2006

Facilities	Design (Hours)	Procurement (Dollars)	Construction (Hours)
Low-Activity Waste	89%	55%	41%
Analytical Lab	85%	27%	29%
Balance of Facilities	84%	38%	44%
High-Level Waste	76%	37%	19%
Pretreatment	67%	38%	25%
Total WTP Completion Status	75%	40%	27%

6.1 DESIGN STATUS

The following table provides details on the design status of the Waste Treatment Plant and progress during the second quarter. Progress on design tasks are measured on a man-hour basis. These details are presented consistent with the progression of WTP design activities. Design begins with the specification of process flow-sheets for each of the five facilities. A general piping and instrumentation diagram for each facility is also developed. From this information, an overall layout for each facility can be determined, including footprint, elevators, and room segmentation. For each facility, detailed engineering begins at the foundation and basemat. It then proceeds upwards to increasing elevations (floors) until the facility roof. As the design moves upwards, the various craft disciplines (concrete placement, structural steel placement, piping installation, etc.) are developed in a sequence for construction at each level. That is, structural design including walls, doorways, penetrations and embeds proceeds first – followed by major components and connective piping (three dimensional layouts, welding, and support details). Subsequently, HVAC (heating, ventilating and air conditioning) ductwork and electrical lines are arranged and specified. The last major design activity is the control systems layout and logic.

Table 7. Design Status (Hours)

Facilities	Total Estimate At Completion (May 2006)	Total Hours Spent through FY 2005 (actual)	Forecast through FY 2006 (Cumulative)		Total Actual Hours Spent to Date (Q2, FY 2006)
			Hours	% Complete	
Low-Activity Waste	1,493	1,252	1,366	92%	1,325
Analytical Lab	449	363	395	88%	382
Balance of Facilities	627	501	548	87%	524
High-Level Waste	2,422	1,754	1,915	79%	1,830
Pretreatment	3,937	2,495	2,746	70%	2,645
Total	8,928	6,365	6,970	78%	6,706

6.2 PROCUREMENT STATUS

The following table provides details on the procurement status of the Waste Treatment Plant and progress during the second quarter. Procurement progress is measured on a dollar basis. Procurement entails the purchasing of all the building material and equipment needed to construct the plant such as: structural steel, concrete, piping, ductwork, electrical trays and cables, electronics, laboratory equipment, and specialized items.

Procurement of long-lead items is an early task on the project, since major specialized components can take up to several years from ordering to delivery. This is even more challenging considering there has been a severe decline in the number of nuclear quality qualified suppliers located in the United States over the last twenty years. Thus, numerous nuclear quality-related components need to be procured in the international market, which requires additional layers of attention and quality control throughout the purchasing process.

Procurement activities are sequenced so materials are supplied in support of the construction schedule and without constraining field progress. Materials and components are delivered, inspected and stored in the marshalling and/or laydown yards close to the construction site and are environmentally maintained until needed.

Table 8. Procurement Status (\$M)

Facilities	Total Estimate At Completion May 2006	Total Spent through FY 2005 (actual)	Forecast through FY 2006 (Cumulative)		Total Actual Dollars Spent to Date (Q2, FY 2006)
			Dollars	% Complete	
Low-Activity Waste	579	273	366	63%	319
Analytical Lab	182	41	57	31%	49
Balance of Facilities	389	136	164	42%	148
High-Level Waste	902	307	365	40%	332
Pretreatment	1,421	509	579	41%	540
Total	3,473	1,266	1,531	44%	1,388

6.3 CONSTRUCTION STATUS

The following table provides details on the construction status of the Waste Treatment Plant and progress during the second quarter. Construction completion is measured in number of craft hours. After general site preparation and grading are completed, construction on each of the three major process facilities begins with pouring of the basemat, which is located well below the site grade. Facility construction proceeds with erecting the structural members into floors, walls, doorways, embeds, penetrations, etc. Construction begins in the lower elevations and as it moves upwards major components are set and connective large piping is installed. This is followed by installation of ductwork and smaller bore piping (sometimes installed as pre-fabricated modules), HVAC (heating, ventilating and air conditioning) ductwork, and electrical trays and connectors. Next in line are the electrical and sensor control systems.

Table 9. Construction Status (Craft Hours - Thousands)
(Continues on next page)

Facilities	Total Estimate At Completion May 2006	Total Spent through FY 2005 (actual)	Forecast through FY 2006 (Cumulative)		Total Actual Hours Spent to Date (Q2, FY 2006)
			Hours	% Complete	
Concrete	741	581	652	88%	605
Steel	281	151	219	78%	194
Piping	397	95	212	53%	147
Electrical	595	58	101	17%	78
Equip/Other	763	101	126	17%	121
Total Low-Activity Waste	2,777	986	1,310	47%	1,145

Facilities	Total Estimate At Completion May 2006	Total Spent through FY 2005 (actual)	Forecast through FY 2006 (Cumulative)		Total Actual Hours Spent to Date (Q2, FY 2006)
			Hours	% Complete	
Concrete	219	86	151	69%	120
Steel	75	1	13	17%	2
Piping	153	62	78	51%	74
Electrical	111	4	7	6%	5
Equip/Other	223	22	26	12%	27
Total Analytical Lab	781	175	275	35%	228
Concrete	423	244	268	63%	248
Steel	44	12	20	46%	14
Piping	429	164	221	51%	199
Electrical	319	107	128	40%	111
Equip/Other	1,265	498	578	46%	526
Total Balance of Facilities	2,480	1,025	1,215	49%	1,098
Concrete	3,132	1,048	1,079	34%	1,079
Steel	558	38	38	7%	38
Piping	880	21	23	3%	24
Electrical	775	44	45	6%	45
Equip/Other	1,213	45	91	8%	72
Total High-Level Waste	6,558	1,196	1,276	19%	1,258
Concrete	3,773	1,901	1,940	51%	1,937
Steel	898	64	70	8%	70
Piping	3,337	261	289	9%	286
Electrical	795	46	49	6%	49
Equip/Other	1,257	60	128	10%	109
Total Pretreatment	10,060	2,332	2,476	25%	2,451
Concrete	8,288	3,860	4,089	49%	3,989
Steel	1,855	266	359	19%	318
Piping	5,196	603	823	16%	730
Electrical	2,594	259	331	13%	288
Equip/Other	4,721	727	950	20%	855
Total Construction	22,654	5,715	6,552	29%	6,180

7.0 FACILITY ACTIVITY AND PLANNING - AS OF JUNE 26, 2006

Considerable on-the-ground progress has been achieved in the design and construction for each of the five WTP facilities. The accomplishments for the second and third quarters of fiscal year 2006 are provided for each facility, along with the plans for the fourth quarter. An aerial photograph for each facility provides a snapshot of construction accomplishment.

7.1 LOW-ACTIVITY WASTE FACILITY - 01-D-16A

The LAW Facility immobilizes (vitrifies) the low-activity fraction of the waste for onsite (Hanford) disposal.

Figure 2. Low-Activity Waste Facility



Accomplishments for 2nd and 3rd Quarters FY 2006

- Issued inspection criteria for installation of facility siding.
- Installed structural elements necessary for installation of siding.
- Received 12 air displacement slurry pumps for the melter feed vessels onsite.
- Received two melter process cell cranes that support maintenance on the melters.
- Received and permanently installed two melter electrical busses.
- Continued installation of roof decking at +68' elevation.
- Continued installation of Heating, Ventilating, and Air Conditioning ducts at -21', +3', and +28' elevations.
- Issue mechanical handling diagrams for container finishing handling.
- Install permanent crane over the wet process cells.

Plans for 4th Quarter FY 2006

- Start installing the roof panels by July 1, 2006.
- Set route release of control and instrumentation cable at -21' by July 31, 2006.
- Start installing the facility siding by August 26, 2006.

7.2 ANALYTICAL LABORATORY - 01-D-16B

The Analytical Laboratory provides analysis of the waste at different points throughout the treatment and immobilization process to validate the characteristics of the waste and to better optimize the processing of the waste.

Figure 3. Analytical Laboratory



Accomplishments for 2nd and 3rd Quarters FY 2006

- Continue preparation of shop drawings by the vendor for fabrication of the Analytical Laboratory structural steel.
- Placed concrete for the first two sections of the 13 ½' high east and west exterior hot cell walls.
- Place monorail air locks.
- First shipment of structural steel is forecast to be delivered onsite.
- Issue full steel and concrete design.

Plans for 4th Quarter FY 2006

- Complete basemat concrete placement by July 1, 2006.
- Issue complete electrical power raceway routing by July 30, 2006.
- Complete placement of hot cell roof by July 30, 2006.

7.3 BALANCE OF FACILITIES - 01-D-16C

The Balance of Facilities is made up of approximately 20 support facilities encompassing the remaining elements of the WTP, including the Glass Former Storage Facility, Chiller Compressor Plant, and Water Treatment Plant.

Figure 4. Chiller Compressor Plant



Accomplishments for 2nd and 3rd Quarters FY 2006

- Issued the Glass Former Storage Facility concrete foundation design.
- Received State of Washington Department of Ecology approval of Waste Permit Packages BOF-07 and BOF-08 for installation of the Liquid Effluent Retention Facility lines.
- Began installation of siding at the Chiller Compressor Plant; three sides (west, north, south) complete.
- Set up forms and installing rebar for the second set of concrete foundations for the utility rack pipe supports for the steam plant.
- Continued alignment, fit up, and welding of underground radiological transfer lines.
- Completed installation of the Water Treatment Plant Building shell.
- Performing factory acceptance test for the Water Treatment Plant mechanical equipment.
- Complete Chiller Compressor Plant structural steel installation.
- Set Water Treatment Plant equipment skids in building.
- Issue finished grading and drainage site drawings.

Plans for 4th Quarter FY 2006

- Complete Chiller Compressor Plant siding and roofing installation by July 15, 2006.
- Issue Glass Former Storage Facility bin/silo foundation design by July 30, 2006.

Table 10 provides the status for the 20 Support Facilities which comprise the Balance of Facilities.

Table 10. Design and Construction Status of Support Facilities – Percent (1)

Facility	----- Design -----		---- Construction ----	
	As of 31 Mar 06	End FY 2006	As of 31 Mar 06	End FY 2006
Site Work	80	80	52	55
Administration Building (2)	5	5	0	0
Cooling Tower Facility	99	99	96	96
Fire Water Pump House Facility	97	97	96	96
Fuel Oil Facility	98	98	76	96
Diesel Generators Facility (3)	45	55	0	0
Glass Former Storage Facility	80	85	0	30
Guard House Facility	100	100	100	100
Chiller Compressor Plant	96	96	46	60
Steam Plant Facility	99	99	93	93
Wet Chemical Storage Facility (3)	56	65	0	0
Water Treatment Building	93	93	53	60
Non-Dangerous, Non-Radioactive Effluent Facility	70	75	81	81
Switchgear Building	91	98	81	95
ITS Switchgear Building	72	72	27	27
Erected Tanks - Process/Potable	100	100	90	90
Failed Melter Storage Facility (5)	13	13	0	0
BOF Switchgear Building	90	95	66	75
Simulator Facility	98	98	93	93
Anhydrous Ammonia	7	50	0	0

Notes:

1. The nominal 95 percent complete is for everything except for finalizing control systems and software.
2. The Administration Building is a refurbishment of an existing facility (currently being used to house field design/construction oversight personnel), which is to be accomplished at the end of construction.
3. For the Diesel Generators Facility, the procurement for long-lead diesels will occur in FY 2007.
4. The Wet Chemical Storage Facility is next to the Pretreatment Facility. Construction will start after more progress is made on the Pretreatment Facility, to preclude interference.
5. The Failed Melter Storage is not needed till the end of the project.

7.4 HIGH-LEVEL WASTE FACILITY - 01-D-16D

The HLW Facility immobilizes (vitrifies) the high-level fraction of the waste for offsite disposal.

Figure 5. High-Level Waste Facility



Accomplishments for 2nd and 3rd Quarters FY 2006

- Performed facility structure temperature analysis to ensure the concrete temperature does not exceed the maximum allowable 150°F during normal operations.
- Issued piping and instrumentation drawings for the off-gas system.
- Progressing on 23 additional system diagrams.
- Continued structural analysis of the 0' level slabs, +0-14' walls and +14' slabs against the revised ground motion criteria.
- Issue the committed system design package for radioactive liquid waste disposal.
- Issue the committed system design package for instrument service air.
- Issue the committed system design package for the Process Vessel Ventilation system.
- Issue the committed system design package for High-Pressure Steam system.

Plans for 4th Quarter FY 2006

- Issue the committed system design package for Non-Radioactive Liquid Waste Disposal by August 30, 2006.
- Issue rebar calculations for three of +14' elevation slabs by September 30, 2006.
- Issue for construction 90 percent of corridor piping below elevation +14' for secondary off-gas and Process Vessel Ventilation system by September 30, 2006.

7.5 PRETREATMENT FACILITY – 01-D-16E

The Pretreatment Facility separates the tank waste into its low-activity and high-level waste fractions.

Figure 6. Pretreatment Facility



Accomplishments for 2nd and 3rd Quarters FY 2006

- Completed analysis of cesium ion exchange vessel; results show satisfactory performance against revised ground motion.
- Completed checking 25 percent of the design for the +56' and +77' elevation walls and found the design was adequate to withstand the revised seismic design criteria.
- Began evaluation process on increasing the size of the ultrafilters based upon recommendation from the Expert Review Team.
- Issued electrical routing drawings for the 0' elevation.
- Issued 100 percent of the electrical one-line diagrams for construction.
- Completed design packages for spent resin collection and dewatering process system.
- Successfully demonstrated 100-gallon production resorcinol formaldehyde resin at two facilities for a total of four 100-gallon lots.
- Continued preparation of double encased pipe for tie-in to BOF in south tunnel.
- Continued lay-up activities to support interim closure of PT facility.
- Complete revised ground motion piping stress analysis for the fifth black cell, inaccessible vault.
- Issue PT rebar calculations for one third of the +56' and +77' elevation walls.
- Complete hydrogen in piping and ancillary vessels study.
- Issue report on anti-foam degradation testing.

Plans for 4th Quarter FY 2006

- Complete an initial engineering study on the size of the ultrafilters by September 30, 2006.

8.0 PROJECT CHALLENGES

NUCLEAR SAFETY CULTURE

Bechtel National, Inc. has undertaken an initiative to improve the overall WTP project nuclear safety and quality culture. Many WTP employees were hired with little nuclear experience and not fully cognizant of the level of rigor expected on nuclear projects. The initiative is addressing procedure adequacy, procedure compliance, training, and management effectiveness. Senior management is actively involved in identifying and instilling those behaviors necessary to ensure safe, quality work is being conducted.

VENDOR QUALITY ASSURANCE

The capacity for domestic suppliers to provide primary equipment and bulk materials has substantially declined over the past 10 to 20 years. Very few U.S. suppliers are maintaining Nuclear Quality Assurance (NQA)-1 programs. Of the over 600 supplier quality programs reviewed by Bechtel National, Inc. (BNI) to date, only one in five could be qualified to meet nuclear standards. Foreign supplier quality assurance programs often lack adequate rigor. Once qualified potential suppliers are identified, quality issues are often discovered because of lack of rigorous implementation of their quality programs. Oversight of these suppliers has resulted in the expenditure of substantial project resources.

To date, WTP Project supplier quality experience has included the failure of suppliers to:

- recognize the supply of quality level materials and equipment may not be a business-as-usual condition;
- effectively implement, monitor, and assess their quality assurance programs;
- read, comprehend, and implement all purchase order requirements;
- recognize changes are authorized only through purchase order revisions or supplier deviation disposition requests; and
- pass and enforce purchase order requirements across all affected elements of the suppliers' organizations.

To address these quality problems, BNI has developed and implemented a quality assurance expectation presentation, where their quality assurance staff present to NQA-1 suppliers the quality assurance requirements, expectations, and lessons learned from WTP experience with suppliers. BNI has also enhanced supplier quality representative oversight to ensure work being performed meets the quality and technical requirements of the purchase orders. Even with these enhanced efforts and the early identification and resolution of many supplier deficiencies, procurement quality issues occur, resulting in material delivery delays or rework required once the material arrives on site.

Commercial grade (non-important-to-safety) procurements have required substantial supplier quality representative oversight in order for materials to meet purchase order requirements. Supplier quality representative oversight has, for some suppliers, included near full-time presence at the Hanford Site to ensure materials and workmanship meet purchase order requirements.

HYDROGEN IN PIPING AND ANCILLARY VESSELS

The radioactive constituents in the tank waste cause water in the waste to break down into hydrogen and oxygen. During an extended loss of power to the WTP, generated hydrogen could accumulate. If the hydrogen collects in sufficient quantities with a potential ignition source, the hydrogen could cause an overpressure and possibly cause the piping or ancillary vessels to fail. BNI is reviewing the design to determine where hydrogen has the potential to accumulate and is developing ways of assuring the hydrogen is collected safely so no harm to the facility, worker, or public would be experienced if a detonation should occur. Discussions have been held with the Defense Nuclear Facilities Safety Board staff on viable alternatives. Resolution is anticipated by the end of December 2006.

9.0 CONGRESSIONAL CONCERNS – AS OF JULY 19, 2006

9.1 FULL COSTING OF FISCAL YEAR 2006 AND 2007 FUNDS

Issue: In May 2006, the Government Accountability Office (GAO) predicted there would be uncommitted carryover from FY 2006 that would likely be available to offset a portion of the FY 2007 funding request. The GAO estimated the WTP costs in FY 2007 would be approximately \$510 million as compared to the requested amount of \$690 million.

Discussion: It appears the GAO used a straight-line projection based on the first six months of the year, and assumed nearly \$80 million would be available for FY 2007. It seems the premise of the GAO is during FY 2005 and FY 2006, the Department slowed construction on the Pretreatment and High-Level Waste Facilities to address technical and management problems. Further, the GAO expects this slowdown to continue through at least half of FY 2007 and possibly through FY 2008, resulting in uncommitted carryover from FY 2006.

Outlook: The Department is forecasting to commit all of the \$618 million available for FY 2006, as shown in the above *Table 4. Cost Status – Quarterly for FY 2006*.

9.2 CERTIFICATION OF EARNED VALUE MANAGEMENT SYSTEM (EVMS)

Issue: There is concern regarding when the earned value management system will be certified by the Defense Contract Management Agency. This concern has contributed to a proposal to limit the availability of funding.

Discussion: The current plan for the certification of the earned value management system is for Bechtel National, Inc. to have their training completed by June 2006, utilize the baseline from the May 2006 Estimate At Completion for June 2006 through September 2006 to track and report performance using the earned value management system. The Defense Contract Management Agency is scheduled to conduct a certification review beginning the end of September 2006. It is estimated the expected level of comments could be resolved over the next two months and certification received in December 2006. However, this does not allow for any contingency should the Agency have a scheduling conflict and not be able to start their review, or if their review should take longer, and/or the resolution of their comments take longer.

Outlook: The Department will continue its intent to have the EVMS certified by the end of calendar year 2006.

9.3 CERTIFICATION OF FINAL SEISMIC AND GROUND MOTION CRITERIA

Issue: There is concern as to when the final seismic and ground motion criteria will be implemented. This concern has contributed to a proposal to limit the availability of funding.

Discussion: The Department is completing the final seismic and ground motion criteria. On June 28, 2006, the Department forwarded the latest revision to the structural design criteria to the Defense Nuclear Facilities Safety Board, with the expectation that this resolves two of the issues

(seismic ground motion and structural engineering) raised by the Board in their October 17, 2005, letter to the Department. The Department is proceeding with drilling up to three deep boreholes to assist with corroborating the design margin. In parallel, the Department is developing a risk-informed decision making analysis. This analysis will evaluate the risk to the population surrounding the WTP, based on different magnitude earthquakes in order to determine the affects on risk.

Outlook: The Department will emphasize additional design work for all five facilities and enhance the pace of construction on Low-Activity Waste Facility, Analytical Laboratory and Balance of Facilities. These three facilities have not been affected by the revisions to the seismic criteria and only have minimal issues from the process flowsheet review. Construction on the Pretreatment and High-Level Waste Facilities is planned to resume in FY 2008.

9.4 UTILIZING A PROJECT MANAGEMENT AGENT

Issue: There is concern the Department plans to use a project management agent for the Waste Treatment and Immobilization Plant project.

Discussion: The Department has engaged a firm to assist the Federal Project Director with assessing the effectiveness of the WTP contractor's design, construction and commissioning activities. The firm is one of the top twenty firms providing program management services, as ranked by *Engineering News Record*. The firm will provide one full-time experienced expert and up to two full-time equivalents, in focused areas of expertise on an as needed basis, to advise on ways to improve management and assess performance.

The expert will have senior manager experience with the design and construction of large, complex projects. The expert will provide the Federal Project Director with a continuing assessment of the "health" of the project in meeting the scope, cost and schedule expectations of the Department. Based on the expert's experience with "early warning signs" such as those from the utilization rate of contingency, the implementation of the risk management system, and the maximizing of earned value management system, the expert will provide the Federal Project Director with an added level of proficiency.

Outlook: The Federal Project Director will remain accountable for the successful management of the project and will rely on the expertise of the technical, management, legal and contracting capability of the 60 person federal staff, with focused assistance from an experience project management firm.

9.5 RISING COSTS AND MANAGEMENT ISSUES

Issue: There is concern about rising costs and resolution of technical challenges associated with the design and construction of the Waste Treatment Plant, as well as the management of the project. Recent reviews have identified weaknesses of management within the Department, including contracting deficiencies, incomplete reporting, insufficient communication between Department of Energy Headquarters and the Office of River Protection, and the lack of ability to provide clear and timely direction to the contractor.

In the fall of 2005, there were concerns about the total cost of the WTP increasing to \$9.3 billion and start-up being delayed to 2015. In March 2006, the External Review Team recommended increasing the cost of the Hanford Waste Treatment Plant to \$11.3 billion, and the completion of hot commissioning extended to mid-2018. At an April 6, 2006 Congressional hearing, the subcommittee chair noted the drastic increase in the estimated cost and the dramatic increase in the schedule.

Discussion: There are a number of reviews to be completed by late summer 2006 which were initiated to assist the Department in establishing a sufficient level of confidence for the preparation of a revised baseline for the scope, cost and schedule for the project. An external firm completed an After-Action Fact Finding Review in January 2006, which focused on the causes of growth in project cost estimates, causes for the extension of schedule, weaknesses in the functional areas of staffing/organization structure, shortcomings of the project management policies, diminished reporting effectiveness between ORP and DOE headquarters, and deficiencies in the contract management of the WTP project.

An external industry team provided its report in March 2006, based on a critical independent assessment of the design to meet the throughput expectations of the contract. A second external industry team provided its report in March 2006, based on a critical independent assessment of the cost and schedule estimates for the project. The U.S. Army Corps of Engineers has been reviewing implementation of interim seismic criteria into the necessary revision of the structural design criteria, reviewing structural designs of the buildings for adherence to the interim seismic criteria, and validation of estimated cost and schedule to complete the project. The Department has evaluated many of the recommendations from these reports and is implementing them.

Outlook: The Department will have completed a number of reviews by external experts and organizations for the Waste Treatment and Immobilization project in calendar year 2006. The status of the resolution of issues and implementation of recommendations from these reviews will be provided in the quarterly status report to the Congressional committees.

9.6 UTILIZING A “FAST-TRACK,” DESIGN-BUILD APPROACH

Issue: There is concern the Department needs to follow nuclear industry construction guidelines and take a more conservative approach to design and construction activities that avoids carrying out these activities concurrently. There is apprehension continued use of a “fast-track”, design-build approach to complete the Waste Treatment Plant will lead to future significant design problems, as has been experienced to date.

Discussion: The design-build approach vests a single contractor with the responsibility to design, build and commission the WTP under a single contract. One entity is clearly responsible to assure the adequacy of design to meet project performance expectations; to assure construction meets design specifications; and to demonstrate, through commissioning, that performance expectations are met. This approach eliminates integration and accountability issues which arise with individual contractors being responsible for each phase of the work: design, construction and commissioning. Also, this approach eliminates the time to bid, evaluate and award the construction contract based on a completed design, and the need to bid, evaluate

and award a separate commissioning contract (this would be a design-bid-build-bid-commission approach). Under the design-build approach, the contractor can begin construction on portions of the facility where the design has been completed. But it does not require the design of the entire facility to be completed before construction starts, as would be the case for a design-bid-build approach. And the design-build approach allows a complex facility to be completed in a shorter time than if design was to be completed before construction started on each section.

Minimizing the time allotted between design completion and start of construction has been cited as a “fast-track” approach. This proved to be a weakness at WTP, where there was insufficient time between design completion and start of construction on certain features. This problem has been remedied. The contractor has acknowledged that time between feature design completion and start of construction was too short, and has committed to allot at least one year between design completion of a feature and start of construction on that feature.

Outlook: The Department will continue to mature the design and ensure there is a one year gap between when the design of a feature for a facility is completed and when the construction begins on that feature.

9.7 DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Issue: There is concern with the effectiveness of oversight by the Defense Nuclear Facilities Safety Board for the WTP project, and the timely resolution of issues and for this both the Department and the Board need to improve.

Discussion: The Defense Nuclear Facilities Safety Board provides in-depth safety and technical reviews and oversight of the project. A number of issues have been raised and resolved. The Board holds public meetings to provide a discussion of issues being addressed and provides an annual report to the Congress on their activities. The Board has a staff of over 100 experienced technical experts both in the field at the various Department sites and in the Washington, D.C. office.

Outlook: The Department will include in the quarterly status report to the Congressional committees a description of interactions between the Department and the DNFSB.

9.8 REVISE CONTRACT INCENTIVES

Issue: There is concern about rising costs and resolution of technical challenges associated with the design and construction of the WTP, as well as with the management of the project. There is concern the Department must modify the WTP contract to reflect the revisions to the scope, a firm cost and schedule, appropriate performance incentive fees, and appropriate penalties for non-performance.

Discussion: The Department plans to develop a revision to the current scope, cost and schedule baseline, utilizing the input from the various reviews completed in 2006, as well as the validation report by the U.S. Army Corps of Engineers. In considering performance to date and challenges of completing the project, the Department will prepare appropriate performance incentives for

the contractor to complete design, construction and commissioning of the plant, within safety guidelines, meeting contract expectations and containing costs, while meeting schedule expectations.

Outlook: The Department is utilizing acquisition experts from the Department of Defense, Defense Acquisition University to assist with the evaluation of acquisition alternatives.

9.9 LIMITED FLEXIBILITY TO SHIFT FUNDS BETWEEN FACILITIES

Issue: The WTP project has five control points, one for each facility, and the limitation of transferring not more than \$5 million of funding between facilities within a fiscal year without a reprogramming action.

Discussion: The Department is troubled that the five control points unduly limit flexibility with a project of this size. During a fiscal year, the Department needs the ability to shift funding among the five facilities, as issues arise, such as: quality difficulties with suppliers requiring re-evaluation of their quality program, unusual weather conditions requiring a shift from exterior to interior work, etc. This may result in delays and/or reprogrammings.

Outlook: The Department will continue to work with the Congressional committees to develop an operating environment that balances accountability and flexibility for the project.

10.0 STATUS OF ISSUES FROM PROJECT REVIEWS – JUNE 30, 2006

10.1 After-Action Report Findings and Recommendations – Report Dated January 2006

In 2005, the Department's 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 Department's headquarters, and contract management.

The observations from the report are rolled-up below under major topics for which the Department has identified actions to resolve the underlying findings identified in the LMI report, 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) The Department tasked the U.S. Army Corps of Engineers to complete an independent validation of the most recent contractor project estimate at completion by summer 2006; 2) the contract did not initially include provisions of DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*. ORP modified the contract on November 15, 2005, to include DOE Order 413.3 as a project requirement; and 3) direction was provided to 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) The Department arranged for an External Review Team (ERT) to conduct a comprehensive review and analysis of WTP's cost and schedule baselines, with a focus on the contractors December 2005 Estimate At Completion. This 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 ERT recommended an additional \$1 billion in project costs and extend schedule by 18 to 24 months. This recommendation was incorporated in the May 2006 Estimate At Completion. 2) ORP has hired a risk assessment manager to advise the ORP WTP and 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 to 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 the Department's project management requirements; 3) reporting deficiencies in the area of earned value management systems 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 Departmental requirements of DOE Order 413.3 and the corresponding manual. 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 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 Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*. ORP modified the contract in November 2005 to include DOE Order 413.3 as a project requirement; 3) Several audits of the project's Earned Value Management System (EVMS) have been conducted. An EVMS certification review is scheduled for September 2006 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; and 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; and 2) the two major projects comprising the River Protection Project 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 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, two other contract specialists for the WTP, and the Director of Procurement. 2) In December 2005, the Assistant Secretary for Environmental Management 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 Waste Treatment Plan (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: The Office of Environmental Management has taken several actions to improve contract management. In December 2005, the ORP Site Manager issued a procedure to have each Federal Project Director, as the contracting officer's representative (COR), sign non-contract correspondence and the contracting officer (CO) sign contract correspondence. Similarly, the ORP Site Manager issued a procedure to ensure the CO, COR, 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' Office of Environmental Management (EM) and OECM staff, and only limited oversight of the contractor by ORP based on the commercial-nature of the contract. Further, there were limited ORP and EM manager-to-staff interactions which failed to allow either EM or OECM staff to perform functions of oversight or notify senior management of problems.

Actions and Status: At the site, ORP has established and filled six Facility Representative positions to the Waste Treatment Plant. These Facility Representatives are in the field on almost a daily basis overseeing delivery of materials and equipment, and construction. ORP has designated technical subject matter experts in key areas related to the WTP design, engineering and construction such as electrical, piping, and concrete. Finally, ORP has an Integrated Assessment Schedule for monitoring contractor activities for safety and quality that it updates on a periodic basis. At 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, stabilize 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 HQ advocate and oversight for the project. The Director, Office of Project Recovery, provides the Principal Deputy Assistant Secretary with updates every two weeks. 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: The Department is requesting funds to maintain necessary progress, and an efficient and effective number of construction personnel on-site.

10.2 External Review of Process Flow-sheet - Report Dated March 17, 2006

In October 2005, an External Flowsheet Review Team (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 Team completed their review and published their report. The report identified one 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 External Flowsheet Review Team issues. Proposed responses will be developed and, subject to the Department's approval, appropriate revisions will be made to the design, commissioning and/or the operating and maintenance procedures. Bechtel 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 resolution approach is given below. In some cases, where the resolution plans are similar, the issues are grouped together.

Major Issues:

1. Plugging in Process Piping: Develop a new Design Guide which will address flow velocity and plugging prevention requirements, and evaluate actual WTP design against the 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 which 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 assure 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 vs. Long-term Focus. Purchase spare LAW and HLW melter, and evaluate redesign of HLW melter head to optimize melter operation. Purchase spare LAW and HLW melter.
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 Cs-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 Cs-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. Socpe design changes and safety implications of using resourcinol formaldehyde with Superlig 644.
15. Availability, Operability, and Maintainability. Revise the Operations Research model and reliability, availability, 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 clean-out device.

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 under Major Issues above.
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 under Major Issues above.

Ion-Exchange

Issues identified as sub-items under item 10 of Major Issues.

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 Balance of Facilities 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.

10.3 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 Estimate at Completion issued by the contractor in December 2005, which was based on funding of \$626 million in FY 2006, continuing thereafter at \$690 million constant dollars per year.

The focus of the Team was to assess and comment on the:

- 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; and
- 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, accompanied by the status of the corrective actions.

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

Actions and Status: The Department has provided the WTP contractor with guidance as to the appropriate assignment of risks into management reserve, contingency or technical and programmatic risk assessment (TPRA), considering the recommendations from the Team. The contractor provided the May 2006 Estimate At Completion to the Department on May 31, 2006, which includes the revised assignment of risks. The U.S. Army Corps of Engineers’ validation of this estimate is expected by late summer 2006.

- Extending hot commissioning schedule to 4th Quarter Fiscal Year 2018 to account for funding limitations.

Actions and Status: The May 2006 Estimate At Completion has incorporated this recommendation.

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

Actions and Status: The After-Action report, directed by the Office of Engineering and Construction Management, 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 start-up and commissioning strategy to provide for:

- Hiring & training personnel to allow transfer to permanent operating staff;
- Increasing the staff to meet full operating requirements; and
- Developing operating, maintenance, and training programs tailored for candidates with varying experience levels.

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