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**

FISCAL YEAR 2007

YEAR END REPORT
HANFORD SITE, WASHINGTON

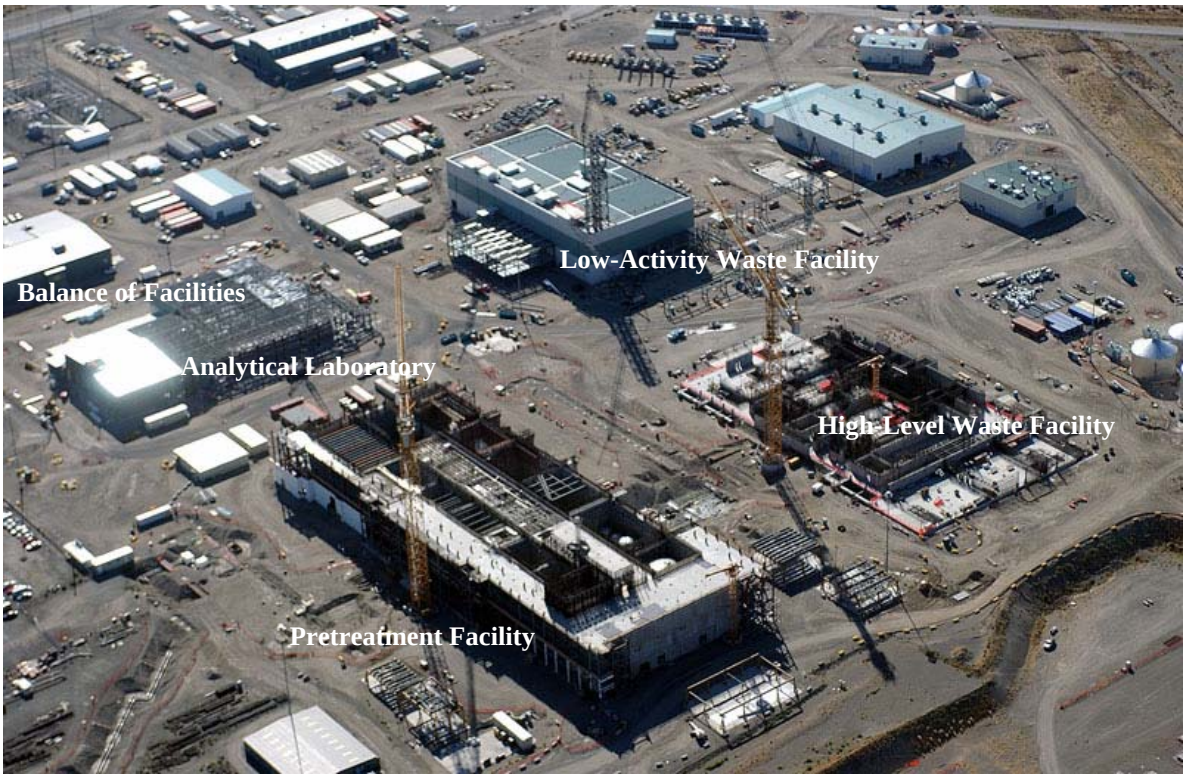


TABLE OF CONTENTS

FIGURES

TABLES

ACRONYMS

ACWP	Actual Cost of Work Performed
AFA	antifoam agent
ANSI	American National Standards Institute
BCP	baseline change proposal
BCWP	Budgeted Cost of Work Performed
BCWS	Budgeted Cost of Work Scheduled
BNI	Bechtel National, Inc.
BOF	Balance of Facilities
CGD	commercial grade dedication
CPI	cost performance index
CV	cost variance
cy^3	cubic yard
DCMA	Defense Contract Management Agency
DNFSB	Defense Nuclear Facilities Safety Board
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
EAC	Estimate at Completion
EFRT	External Flowsheet Review Team
EIA	Electronic Industries Alliance
EVMS	Earned Value Management System
FY	fiscal year
HEME	high-efficiency mist eliminator
HEPA	high-efficiency particulate air
HLW	High-Level Waste [Facility]
HPAV	hydrogen in piping and ancillary vessel
HVAC	heating, ventilating, and air conditioning
IRP	Issue Response Plan
ITS	important-to-safety
LAB	Analytical Laboratory
LAW	Low-Activity Waste [Facility]
lf	linear foot
NASA	National Aeronautics and Space Administration
NEPA	*National Environmental Protection Act of 1969*
OE	Office of Price Anderson Enforcement
ORP	Office of River Protection
PCW	Process Cooling Water System
PEP	Pretreatment Engineering Platform
PNNL	Pacific Northwest National Laboratory
PT	Pretreatment [Facility]
QA	quality assurance
RGM	revised ground motion
SPI	schedule performance index
SQR	supplier quality representative
SSR	summary structural report
SV	schedule variance
TRA	Technology Readiness Assessment
TRL	Technology Readiness Level
TSG	Technology Steering Group
USACE	U.S. Army Corps of Engineers
WTP	Waste Treatment and Immobilization Plant

1.0 INTRODUCTION

The Conference Report accompanying the Energy and Water Development Appropriations Act, 2006 (H. R. Conference Report No. 109-275) requested the U.S. Department of Energy (DOE) "…report by December 1, 2005, on the actions taken to rectify the management failures of the Waste Treatment and Immobilization Plant (WTP) Project, and to report quarterly, beginning on January 1, 2006, on the activities and financial status of each of the subprojects within WTP." This WTP Year End Report provides the status of the project as of the end of the fourth quarter of fiscal year (FY) 2007.

This report also satisfies a request of the Senate Appropriations Committee Report 109-274 accompanying the Energy and Water Appropriations Bill, 2007 (H.R. 5427) that states "the Committee directs the Department to submit a quarterly report to the Committee on Appropriations describing all interactions between the Department and the Defense Nuclear Facilities Safety Board (DNFSB) regarding the WTP. The report should include, but not be limited to, issues resolved, issues unresolved and corrective actions taken by the Department." The report provides a snapshot of the WTP Project performance utilizing the contractor's Earned Value Management System (EVMS) and Financial Reporting system. Also included are key job-site accomplishments in the third and fourth quarters FY 2007 and planned activities for the first and second quarters FY 2008. The report also covers project challenges and initiatives in the areas of project planning and management, contractor performance, resolution of technical issues, certification of revised seismic ground motion criteria, certification of the project's EVMS, early commissioning of the Low-Activity Waste (LAW) Facility and support facilities, Analytical Laboratory (LAB), and Balance of Facilities (BOF), and engagement with the DNFSB.

The WTP Project is vital to DOE's mission 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 design and build the facilities and systems 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 comprising five separate facilities:

- Low-Activity Waste (LAW) Facility;
- Analytical Laboratory (LAB);
- Balance of Facilities (BOF) – made up of 23 facilities, subsystems, and common areas;
- High-Level Waste (HLW) Facility; and
- Pretreatment (PT) Facility

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

DOE is fully committed to ensuring successful management of the WTP Project by exercising prudent project management and controls, executing and maintaining a credible cost and schedule baseline, resolving technology issues, and recruiting highly experienced personnel to plan, execute, and oversee this all-important project.

2.0 FINANCIAL STATUS – AS OF SEPTEMBER 30, 2007

Table 1 presents the December 2006 Performance Baseline for the WTP Project that was approved by DOE in accordance with DOE Order 413.3A, *Program and Project Management for the Acquisition of Capital Assets*. The Performance Baseline assumes consistent annual funding of $690 million from FY 2007 through construction and commissioning completion.

Table 1. December 2006 Performance Baseline ($M)

Performance Measurement Baseline	$8,786
Management Reserve/Contract Contingency/Fee	$2,278
Total, Contract Scope Cost	$11,064
Project Contingency	$1,014
Other Project Cost	$135
Transition Cost (from Privatization Contract)	$50
Total Project Cost	**$12,263**

DOE has received from the WTP contractor, Bechtel National Inc. (BNI), a series of adjustments to the Performance Measurement Baseline in the amount of $652 million. These adjustments were anticipated at the time of the Performance Baseline approval in December 2006, but they were only rough estimates and/or based on Monte Carlo (a multi-iteration, statistical technique) risk analysis for the costs. The proposed adjustments were initiated to resolve issues resulting from an external technical review of the WTP process flowsheet (see pp. 33), implement facility capacity modifications in the PT Facility, and initiate completion, startup, and commissioning of the LAW Facility, BOF, and LAB if pretreated tank farm waste is available. Note that the funds for these proposed adjustments will be drawn against Management Reserve and/or Project Contingency pools (approximately $3.2 billion in total of which only about one quarter has been utilized to date). Contingency use is tracked and reported monthly to DOE. These proposed adjustments and strategies have not resulted in a change to the Performance Baseline Total Project Cost of $12.263 billion that was approved in December 2006.

2.1 FY 2007 Funding and Commitments

Table 2 displays the total available obligated funding of $871 million for FY 2007, which includes $690 million of FY 2007 new budget authority less $69 million holdback for EVMS certification, and $250 million of FY 2006 uncosted, but committed, carryover. With the WTP about to enter its core-peak construction period over the next several years, along with the recent resumption of construction at the HLW and PT Facilities, it is imperative that the project retain all available funds including the $69 million EVMS certification holdback, and any recent project yearly carryover funds as near future planned spending is expected to climb above the $690 million yearly allocation.

Table 2. FY 2007 Funding and Commitments

Funding	Dollars (in millions)
FY 2006 Uncosted Carryover	$250
FY 2007 New Budget Authority	$690
FY 2007 Obligated to WTP Project*	$621
Total FY 2007 Available Obligated Funding	$871
FY 2007 Actual Cost	$551
Final FY 2007 Obligated Uncosted	$320
BNI's Termination Liability**	$145
Current S/C and PO Commitments***	$150
Labor Carryover for Oct 2008 BNI Labor	$25
S/T - Current & Estimated Commitments	$320
Total - Uncommited Carryover Funds	**$0**

* Reflects 10% ($69M) holdback for EVMS Certification Language

** BNI termination liability includes: BNI Labor ($50M), and termination liability for suppliers/subs and leases ($95M)

*** BNI commitments to subcontractor work in progress, equipment in fabrication, materials on order, and long-lead items that will be needed over the next few years

2.2 FY 2007 Spending

Table 3 displays the actual FY 2007 spending amount of $551 million for the BNI contract and technical support to the DOE, Office of River Protection (ORP) as reported in DOE's financial system.

Table 3. Actual Spending of Funds for FY 2007

Actual Spend	Dollars (in millions)
BNI invoices and accruals	$537.6
S/T: Bechtel National Inc.	**$537.6**
Seismic analysis, technical and estimate reviews as well as technology support to ORP:	
U.S. Army Corps of Engineers (USACE) - Structural Design Reviews	$0.2
Pacific NW National Lab (PNNL) - Boreholes and Seismic Analysis	$6.9
WTP Project Technical & Project Controls Support to ORP	$4.0
Savannah River National Laboratory (SRNL)	$2.4
S/T: ORP Technical Support	**$13.6**
Total Spend	**$551.2**

Note: These figures have been rounded and are based on ORP invoices received and accruals through the end of the month (September).

2.3 FY 2007 Cost Status

The total cost to date for the WTP Project is $3,935 million, which includes all BNI costs ($3,691 million), BNI fee paid ($54.5 million – for completed performance milestones, $48.5 million - provisional), technical support ($91 million), and FY 2001 transition costs ($50 million). Table 4 provides a quarterly breakout of BNI-only planned spending for FY 2007, and BNI-only actual cost through September 2007 as established by the ORP Financial Office. This includes the invoices to date, plus estimated incremental progress since the last invoice.

Table 4. BNI-Only Financial Spend ($M) – Quarterly

	Q1 FY 2007		Q2 FY 2007		Q3 FY 2007		Q4 FY 2007		FY 2007 Cumulative Total	
Facilities	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	4Q Actual
Total	**113**	**109.5**	**145**	**114.7**	**132**	**129.3**	**162**	**184.1**	**552**	**537.6**

3.0 BNI PROJECT STATUS – AS OF SEPTEMBER 30, 2007

Tables 5 through 11 provide project status based on reports from the BNI Project Controls' EVMS. The EVMS data are reported against the December 2006 cost and schedule baseline.

3.1 EVMS Cost Status

DOE has directed BNI to implement an EVMS that fully complies with American National Standards Institute/Electronic Industries Alliance (ANSI/EIA) 748-A-1998, *Earned Value Management*. The system has been reviewed by a nationally recognized firm that specializes in training and implementing EVMS. On March 4, 2008, the Secretary of Energy certified the BNI WTP EVMS. The Department is in the process of notifying Congress of that action.

Table 5 provides the cumulative Actual Cost of Work Performed (ACWP) as recorded by BNI for each of the five facilities during FY 2007, a forecast of FY 2007 year-end spending, and percentage of actual cost as compared to the current Budget At Completion (excludes management reserve). These costs exclude any fees paid to BNI. Also, for procurements, the EVMS establishes specific progress events which will be obtained in order to "earn" performance. There are typically four to eight progress events that would determine performance obtained, whereas the Financial Office considers estimates of incremental progress between milestones. Thus, the BNI-only EVMS status will have costs less than those estimated by the Financial Office, as shown in Table 4.

Table 5. BNI-Only EVMS Status ($M) – Facility Percent

Facilities	Budget At Completion Estimate (Sep07)*	Total Spent through FY 2006 (ACWP)	Actual Spent through FY 2007 (4th Qtr)	
			Total ACWP**	% Spent
Low-Activity Waste	1,385	726	894	65%
Analytical Lab	549	140	205	37%
Balance of Facilities	917	363	416	45%
High-Level Waste	2,480	769	843	34%
Pretreatment	4,030	1,215	1,318	33%
Total	9,361	3,214	3,676	39%

* These values represent the original BAC of $8,786M plus approved baseline change proposals (BCP).
** Total EVMS ACWP does not include: fee, transition or technical support costs.
Note: May be differences in totals due to rounding.

3.2 EVMS Performance Data

Tables 6 and 7 present performance data at the facility level by monthly and cumulative earned value data by facility for the third and fourth quarters of FY 2007. EVMS data are represented by the following performance measures:

Budgeted Cost of Work Scheduled (BCWS) – the "Plan"
Budgeted Cost of Work Performed (BCWP) – what was accomplished or "Earned"
Actual Cost of Work Performed (ACWP) – what the work "Cost"

Schedule performance is tracked using the following indices:

Schedule Variance (SV) = BCWP – BCWS; the comparison of work planned versus work performed. A positive SV means that more work has been performed or "earned" than was scheduled, while a negative SV denotes that less work was performed than was scheduled, thus being "behind" schedule. Generally, a positive SV is a positive gauge for the project schedule performance.

Schedule Performance Index (SPI) = BCWP/BCWS; the ratio of the work performed over the work planned. A SPI greater than 1.0 indicates being "ahead" of schedule, while a SPI of less than 1.0 would indicate being "behind" schedule. Generally, an SPI greater than 1.0 is a positive gauge for the project schedule performance.

Cost performance is tracked using the following indices:

Cost Variance (CV) = BCWP – ACWP; the comparison of the cost of the work performed versus the actual cost of the work performed. A positive CV means that it cost less to accomplish the work performed than was estimated, while a negative CV denotes that it cost more to accomplish the work performed than was estimated. Generally, a positive CV is a positive gauge for the project cost performance.

Cost Performance Index (CPI) = BCWP/ACWP; the ratio of the estimated cost of the work performed over the actual cost of the work performed. A CPI greater than 1.0 indicates being "under" cost, while a CPI less than 1.0 would indicate being "over" cost. Generally, a CPI of 1.0 or greater is a positive gauge for the project cost performance.

Table 6 represents the monthly earned value data at the end of each month for the third and fourth quarters of FY 2007.

Table 6. BNI-Only Monthly Earned Value Data ($ in thousands)

Month	BCWS	BCWP	ACWP	SV	SPI	CV	CPI
Apr 07	(37,196)	(25,700)	(21,304)	11,496	0.69	(4,396)	1.21
May 07	49,280	57,895	36,507	8,615	1.17	21,388	1.59
Jun 07	37,558	37,277	44,107	(281)	0.99	(6,830)	0.85
3Q FY07	49,642	69,472	59,310	19,830	1.40	10,162	1.17

Month	BCWS	BCWP	ACWP	SV	SPI	CV	CPI
Jul 07	44,787	40,983	47,337	(3,804)	0.92	(6,354)	0.87
Aug 07	72,468	74,177	79,988	1,709	1.02	(5,811)	0.93
Sep 07	57,028	49,697	47,100	(7,331)	0.87	2,597	1.06
4Q FY07	174,283	164,857	174,425	(9,426)	0.95	(9,568)	0.95

Note: These values represent BCWS/BCWP/ACWP as reported in BNI's monthly cost reports.

Table 7 provides cumulative earned value data, by facility, at the end of each month for the third and fourth quarters of FY 2007.

Table 7. BNI-Only Cumulative Earned Value Data ($ in thousands)

Fac/Month	BCWS	BCWP	ACWP	SV	SPI	CV	CPI
LAW	830,651	786,583	802,297	(44,068)	0.95	(15,714)	0.98
LAB	197,261	175,332	171,898	(21,929)	0.89	3,434	1.02
BOF	403,788	417,176	387,603	13,388	1.03	29,573	1.08
HLW	811,131	807,972	792,268	(3,159)	1.00	15,704	1.02
PT	1,228,899	1,255,291	1,267,074	26,392	1.02	(11,783)	0.99
Apr 07	3,471,730	3,442,354	3,421,140	(29,376)	0.99	21,214	1.01
LAW	805,951	786,896	824,072	(19,055)	0.98	(37,176)	0.95
LAB	183,265	176,609	181,918	(6,656)	0.96	(5,309)	0.97
BOF	403,939	401,454	392,521	(2,485)	0.99	8,933	1.02
HLW	831,416	825,327	799,868	(6,089)	0.99	25,459	1.03
PT	1,296,438	1,309,963	1,259,267	13,525	1.01	50,696	1.04
May 07	3,521,009	3,500,249	3,457,646	(20,760)	0.99	42,603	1.01
LAW	813,964	805,887	842,375	(8,077)	0.99	(36,488)	0.96
LAB	185,105	178,474	187,537	(6,631)	0.96	(9,063)	0.95
BOF	409,207	403,527	395,483	(5,680)	0.99	8,044	1.02
HLW	837,811	829,591	805,419	(8,220)	0.99	24,172	1.03
PT	1,312,480	1,320,047	1,270,939	7,567	1.01	49,108	1.04
Jun 07	3,558,567	3,537,526	3,501,753	(21,041)	0.99	35,773	1.01
LAW	826,062	813,716	856,073	(12,346)	0.99	(42,357)	0.95
LAB	186,858	185,444	191,024	(1,414)	0.99	(5,580)	0.97
BOF	413,423	406,005	402,324	(7,418)	0.98	3,681	1.01
HLW	851,473	842,457	810,384	(9,016)	0.99	32,073	1.04
PT	1,325,539	1,330,887	1,289,286	5,348	1.00	41,601	1.03
Jul 07	3,603,355	3,578,509	3,549,091	(24,846)	0.99	29,418	1.01
LAW	844,796	835,871	879,769	(8,925)	0.99	(43,898)	0.95
LAB	191,994	191,378	199,017	(616)	1.00	(7,639)	0.96
BOF	414,406	410,887	412,328	(3,519)	0.99	(1,441)	1.00
HLW	877,313	867,493	832,300	(9,820)	0.99	35,193	1.04
PT	1,347,313	1,347,056	1,305,663	(257)	1.00	41,393	1.03
Aug 07	3,675,822	3,652,685	3,629,077	(23,137)	0.99	23,608	1.01
LAW	866,260	846,999	894,566	(19,261)	0.98	(47,567)	0.95
LAB	198,918	197,211	205,291	(1,707)	0.99	(8,080)	0.96
BOF	418,600	417,292	416,675	(1,308)	1.00	617	1.00
HLW	880,587	876,790	842,196	(3,797)	1.00	34,594	1.04
PT	1,368,486	1,364,089	1,317,449	(4,397)	1.00	46,640	1.04
Sep 07	3,732,851	3,702,381	3,676,177	(30,470)	0.99	26,204	1.01

Note: May be differences in totals due to rounding.

Summary Explanation of Variances – The following gives a summary explanation of the variances for the project-to-date (or cumulative) schedule variance (SV), and cost variance (CV).

Cumulative CV – September 2007: Cost Variance = +$26.2 million
Cost Performance Index (CPI) = 1.01

Cumulative SV – September 2007 Status: Schedule Variance = ($30.5 million)
Schedule Performance Index (SPI) = 0.99

Cumulative Cost Variance Analysis

Cumulative CV decreased from $35.8 million at the end of the third quarter to $26.2 million through September 2007. Continued favorable cumulative CV includes good performance in Construction Craft for concrete, structural steel, piping, and equipment installation. Plant Equipment cost performance continues to be favorable due to awarded purchase order values below budget. A significant driver for the cumulative favorable CV of $26.2 million is good performance in the following control accounts:

- $7.6 million in all PT Crafts control accounts
- $8 million in all HLW Crafts control accounts
- $1 million in BOF Crafts control account
- $1.5 million in BOF Subcontracts control account

In addition to favorable construction CVs, the Plant Equipment, Acquisition and Shared Services, and Process Engineering and Technology control accounts are experiencing favorable performance. This is primarily driven by purchase order values less than budgeted and staffing levels below planned. Staffing under runs should diminish as open positions are filled and the project ramps up (resumption of PT and HLW Facilities construction).

Control accounts experiencing unfavorable CV include:

- Engineering Design LAW ($6.5 million) CV is not recoverable because engineering production and efficiencies are not likely at this late stage of completion. A detailed plan of the to-go scope is being developed to increase visibility and ensure timely completion.
- Plant Material control accounts ($4.5 million) for LAB Plant Material; the unit prices for received and paid quantities of pipe and structural steel are above the composite budget rates. The Estimate at Completion (EAC) has been revised to reflect this. Material Management and Estimating are completing a pricing reevaluation of the steel and piping commodities.

Cumulative Schedule Variance Analysis

The overall cumulative SV through this reporting period is an unfavorable $30.5 million with an SPI of 0.99. The major contributors to the SV were spread over multiple functions and facilities.

Favorable Variances include:

- Construction ($3 million) contracts in HLW, LAB, and PT are ahead of schedule.
- Commissioning ($1.3 million) advance procurement of annual process modeling software licenses.
- Other significant contributors are PT Engineering at $594,000; LAW Engineering at $421,000; LAW Plant Material at $558,000; LAB Plant Material at $721,000; LAW's F.D. Thomas Construction subcontract at $426,000; HLW Construction Craft Civil at $550,000; and LAB Construction Craft at $651,000.

Major drivers of unfavorable SV include:

- Research and Technology due primarily to External Flowsheet Review Team (EFRT) issues ($5.1 million) and shortage of piping craft personnel and Pretreatment Engineering Platform (PEP) installation preparation delays ($2.5 million).
- Engineering Design delays in Plant Space modeling for heating, ventilating, and air conditioning (HVAC) ($2.5 million), hydrogen in piping and ancillary vessels (HPAV), and EFRT work ($2.1 million).
- Plant Equipment LAW ($8 million) process system variance and vendor quality issues; HLW ($2.4 million) driven by engineering and procurement delays; PT Facility ($5.2 million) driven by delays in review and approval of revised the Autosampling System; LAB ($1.6 million) due to re-design of the hot cell lab lighting system; and BOF ($562,000) driven by vendor delays in Glass Former Storage Facility equipment. Some of these variances will be recovered in FY 2008. Additional oversight has been initiated at vendor locations.
- Construction LAW ($1.5 million) material procurement and craft delays. Material procurement is expected to begin in November/December 2007, and liner plate installation will begin in November. The late procurement of material will not push any of the liner plate installation activities. Piping sequencing cleanup and variance is being addressed by identifying areas to expand work fronts and improve working methods.

3.3 Facility Completion Status

Table 8 displays the project design, procurement, and construction status of each of the five facilities. The percentages are based on the 2006 Performance Baseline that was approved by DOE on December 22, 2006.

The WTP design is approximately 74 percent complete, procurement is 44 percent complete, and construction is approximately 32 percent complete.

The reconstituted nuclear construction infrastructure at WTP, represented by thousands of engineers and onsite craft labor, has overcome numerous technical obstacles, such as the degradation of the United States industrial nuclear component fabrication capability. WTP personnel have successfully installed about 170,700 cubic yards of concrete, 10,756 tons of structural steel, 328 tons of HVAC ducting, 39 miles of piping, 49 miles of conduit, and 34 miles of cable and wire.

Table 8. Percent Complete by Facility Through 4Q, FY 2007

Facilities	Design (Hours)	Procurement (Dollars)	Construction (Hours)
Low-Activity Waste	94%	64%	53%
Analytical Lab	88%	42%	48%
Balance of Facilities	75%	46%	57%
High-Level Waste	82%	41%	22%
Pretreatment	68%	39%	25%
Facility Subtotal	77%	44%	32%
Common/Distrib Hours/Dollars	68%	Incld Above	Incld Above
Total WTP Completion Status	74%	44%	32%

Note: Percent complete information is based on earned hours/dollars.

3.4 Design Status

Table 9 provides the status of the facility design progress through the end of the fourth quarter of FY 2007. Progress on design tasks are measured on a person-hour basis. Design percent completes are based on the number of engineering hours earned divided by the total budgeted engineering hours for that facility.

Table 9. Facility Design Status (Hours – Thousands)

Facilities	Total Budget At Completion Estimate (Sep 2007)	Total Hours Earned through FY 2006 (actual)	Total Hours Earned through (4Q, FY 2007)		Forecast Earned Hours through FY 2007	
			Hours	% Complete	Hours	% Complete
Low-Activity Waste	1,567	1,360	1,475	94%	1,467	94%
Analytical Lab	477	390	421	88%	418	88%
Balance of Facilities	778	538	584	75%	591	76%
High-Level Waste	2,513	1,896	2,055	82%	2,054	82%
Pretreatment	4,292	2,710	2,902	68%	2,918	68%
Facility Subtotal	9,627	6,895	7,437	77%	7,448	77%
Common Engineering Hours	6,407	3,889	4,373	68%	4,386	68%
Total Design	**16,034**	**10,785**	**11,809**	**74%**	**11,834**	**74%**

Note: Differences in totals are due to rounding.

3.5 Procurement Status

Table 10 provides the status of the facility procurement progress through the end of the fourth quarter of FY 2007. 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.

Table 10. Procurement Status ($M)

Facilities	Total Budget At Completion Estimate (Sep 2007)	Total Dollars Earned through FY 2006	Total Dollars Earned to Date (4Q, FY 2007)		Forecast Dollars Earned through FY 2007	
			Dollars	% Complete	Dollars	% Complete
Low-Activity Waste	624	354	399	64%	401	64%
Analytical Lab	183	56	76	42%	75	41%
Balance of Facilities	375	158	172	46%	171	46%
High-Level Waste	968	366	398	41%	389	40%
Pretreatment	1,623	568	625	39%	639	39%
Total	**3,773**	**1,501**	**1,670**	**44%**	**1,675**	**44%**

Note: Differences in totals are due to rounding. Percentages are based on total allocated hours.

3.6 Construction Status

Table 11 provides the status of the facility construction progress through the end of the fourth quarter of FY 2007. Construction progress is measured in number of craft hours earned associated with the quantity of commodities installed.

Table 11. Construction Status (Craft Hours - Thousands)

Facilities	Total Budget At Completion Estimate (Sep 2007)	Total Earned through FY 2006	Total Hours Earned to Date (4Q, FY 2007)		Forecast Earned Hours through FY 2007	
			Hours	% Complete	Hours	% Complete
Concrete	710	624	681	96%	684	96%
Steel	319	206	247	78%	253	79%
Piping	606	163	269	44%	296	49%
Electrical	570	108	149	26%	146	26%
Equip/Other	761	153	238	31%	236	31%
Total Low-Activity Waste	**2,967**	**1,254**	**1,585**	**53%**	**1,615**	**54%**
Concrete	235	172	213	91%	189	81%
Steel	80	1	70	87%	61	76%
Piping	172	64	71	41%	82	47%
Electrical	117	4	5	4%	5	4%
Equip/Other	220	29	37	17%	36	16%
Total Analytical Lab	**824**	**270**	**395**	**48%**	**373**	**45%**
Concrete	444	256	297	67%	287	65%
Steel	74	13	17	23%	17	23%
Piping	547	267	294	54%	293	54%
Electrical	362	130	157	43%	152	42%
Equip/Other	937	536	590	63%	594	63%
Total Balance of Facilities	**2,364**	**1,201**	**1,355**	**57%**	**1,343**	**57%**
Concrete	3,251	1,214	1,241	38%	1,285	40%
Steel	583	40	46	8%	41	7%
Piping	977	25	26	3%	26	3%
Electrical	764	61	62	8%	62	8%
Equip/Other	1,413	112	152	11%	138	10%
Total High-Level Waste	**6,988**	**1,452**	**1,527**	**22%**	**1,552**	**22%**
Concrete	3,796	2,042	2,069	55%	2,077	55%
Steel	914	119	124	14%	136	15%
Piping	3,529	268	275	8%	275	8%
Electrical	1,011	66	70	7%	66	7%
Equip/Other	1,505	161	197	13%	187	12%
Total Pretreatment	**10,755**	**2,656**	**2,735**	**25%**	**2,741**	**25%**
Concrete	8,435	4,308	4,502	53%	4,437	53%
Steel	1,970	380	504	26%	471	24%
Piping	5,832	787	934	16%	911	16%
Electrical	2,825	368	443	16%	419	15%
Equip/Other	4,836	990	1,214	25%	1,158	24%
Total Construction	**23,898**	**6,833**	**7,597**	**32%**	**7,396**	**31%**

Note: Differences in totals are due to rounding. Field distributable craft hours are included in the numbers above.

4.0 FACILITY ACTIVITY AND PLANNING – AS OF SEPTEMBER 30, 2007

The accomplishments for the third and fourth quarters of FY 2007 are provided for each facility, along with the plans for the first and second quarters of FY 2008. Photographs for each facility provide visual confirmation of construction accomplishments.

4.1 Low-Activity Waste (LAW) Facility – 01-D-16A

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

Figure 1. Low-Activity Waste Facility – September 2006

Figure 2. Low-Activity Waste Facility – September 2007

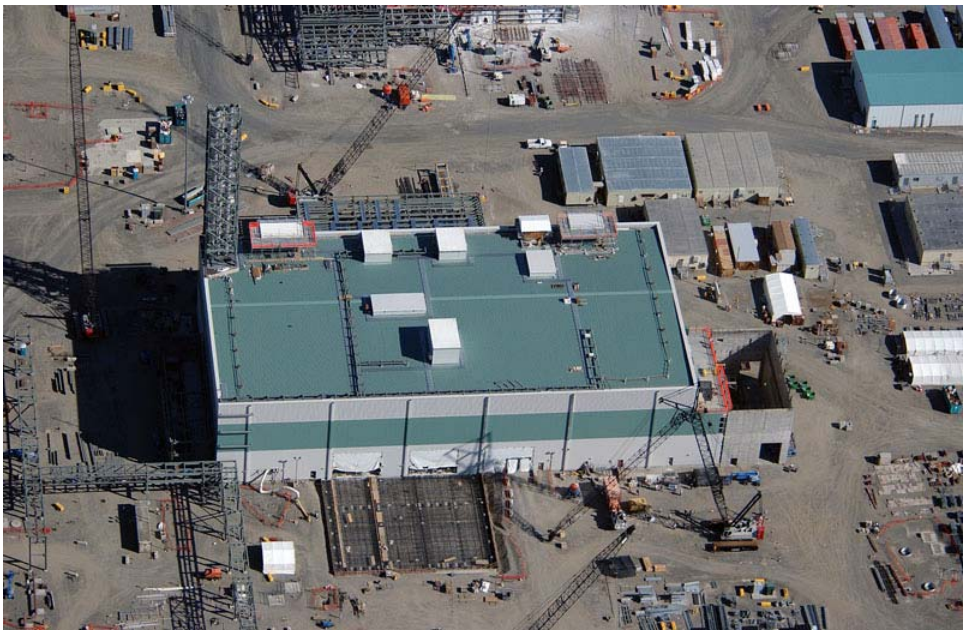


Figure 3. LAW Control Room and Office Annex

Accomplishments for the Third and Fourth Quarters of FY 2007

- Placed last concrete placement for the LAW main facility
- Erected container import bay structural steel four months earlier than baseline
- Completed production piping isometric design; issuing over 320 Rev. 0 isometric drawings (4,900 linear feet [lf])
- Awarded construction subcontract for installation of process area partition walls
- Received spare melter fused cast refractory
- Received (64) in-cave closed circuit TV camera assemblies
- Fabricated and delivered over 170 tons of structural steel
- Fabricated and delivered over 5,300 lf of process piping
- Installed 40,000 lb of HVAC duct at +48’ elevation
- Completed Annex steel erection
- Completed import bay slab concrete placement
- Initiated installation of mechanical handling container import conveyor system
- Placed over 880 cubic yards (yd^3) of concrete and erected over 350 tons of structural steel
- Installed over 5,600 lf of process piping
- Installed over 850 lf of electrical tray and 7,800 lf of conduit

Plans for the First and Second Quarters of FY 2008

- Install permanent equipment access hatches on roof penthouses
- Pour melter assembly pads concrete
- Receive container finishing line swab and monitoring system
- Receive container finishing line jib crane
- Receive melter heater power supplies

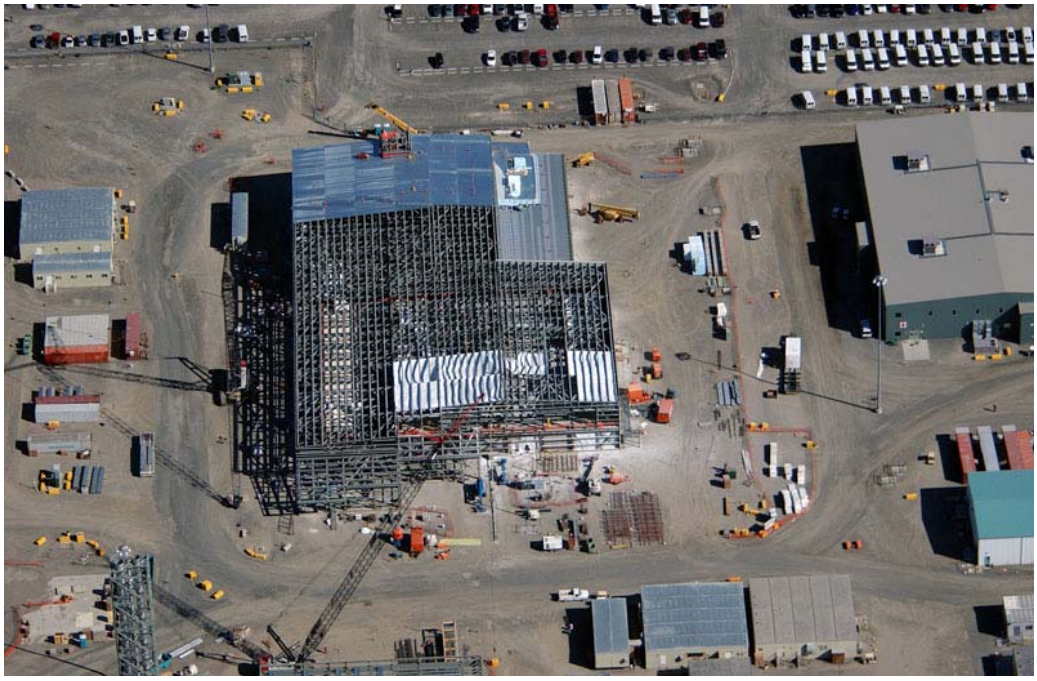
- Complete Annex steel elevated slab concrete placement, and initiate siding and roofing installation
- Issue melter gallery and offgas caustic scrubber platform designs
- Receive non-important-to-safety (ITS) uninterrupted power supply electrical equipment (+28’ elevation)
- Receive Plant Service Air System receiver
- Receive four finishing line jib cranes
- Receive four electrical non-ITS motor control centers (+3’ elevation)
- Complete import bay steel erection
- Set Process Cooling Water System cooling water pumps and heat exchangers (+28’ elevation)
- Mobilize subcontractor and start installation of pour cave insulated liner plate
- Mobilize subcontractor and start installation of process area partition walls

4.2 Analytical Laboratory – 01-D-16B

The LAB 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 4. Analytical Laboratory – September 2006

Figure 5. Analytical Laboratory – September 2007



Accomplishments for the Third and Fourth Quarters of FY 2007

- Completed placement of all concrete on second floor; this will allow installation of commodities and large air handling units
- Completed installation of the hot cell monorail
- Completed primary structural steel erection and elevated slab concrete placement; celebrated this accomplishment with a steel "topping out" media event June 12, 2007
- Initiated facility siding and roofing installation
- Staged 12 HVAC air handling units (+17' elevation)
- Completed hot cell HVAC header installations
- Completed hot cell fire protection header installation; began general facility installation
- Initiated general facility bulk floor coating applications (southeast 0' elevation)
- Placed over 830 yd^3 of concrete and erected over 300 tons of structural steel
- Fabricated over 25,700 lb of HVAC duct and installed over 8,950 lb

Plans for the First and Second Quarters of FY 2008

- Complete installation of fire protection piping in main portion of facility
- Complete all Mechanical Handling System engineering
- Complete installation of roofing and exterior siding
- Issue over 3,000 lf of piping isometric design
- Receive the hot cell trolley linear motor/cart
- Initiate assembly of facility stack (steel and HVAC)
- Complete siding and roofing to support release of interior areas for bulk commodity installations

4.3 Balance of Facilities (BOF) – 01-D-16C

The BOF comprises approximately 23 support facilities/subsystems and common areas encompassing the remaining elements of the WTP, including the Glass Former Storage Facility, Chiller Compressor Plant, and Water Treatment Plant.

Figure 6. Chiller Compressor Plant – Air Dryers Installed

Figure 7. Commodity Racks and Steam Pipe Installation

Accomplishments for the Third and Fourth Quarters of FY 2007

- Received five Chiller Compressor Plant compressor/dryer skids
- Initiated Fire Water System completion activities
- Continued piping and electrical commodity installation in Chiller Compressor Plant and Water Treatment Facility
- Erected over 85 tons of pipe rack steel
- Installed over 250 lf of waste transfer coax piping and 360 lf of pipe rack steam piping

Plans for the First and Second Quarters of FY 2008

- Receive standby diesel generators
- Receive Glass Former Storage Facility control panels; initiate receipt of first silos and hoppers
- Complete pipe rack steel installation between LAW and LAB
- Complete Steam Plant construction

Table 12 provides the status for the 23 support facilities, subsystems, and common areas that constitute the scope of BOF. The "Common Scope" comprises mostly design work that is common to the facilities**.** "Site Work" consists of the general earthwork and utilities across the site and between facilities, and is not associated with a particular facility. Note that several facilities are fully designed and constructed. The percent complete for some of the facilities may have decreased from the last report due to an increase in the BOF facilities work scope to allow commissioning and operations of LAB and the LAW Vitrification Facility.

Table 12. Balance of Facilities Percent Completes

Facility	Engineering % Complete	Construction % Complete	Scheduled Completion Date
Guard House Facility	100.0%	100.0%	Complete
Erected Tanks - Process/Potable	100.0%	99.0%	Complete
Maintenance Shop	100.0%	100.0%	Complete
Warehouse Building	100.0%	100.0%	Complete
Fire Water Pump House Facility	98.0%	95.0%	Jul 2008
Steam Plant Facility	100.0%	98.0%	Jul 2009
Water Treatment Building	99.0%	63.0%	Aug 2009
Non-Dangerous, Non-Radioactive Effluent Facility	96.0%	73.0%	Sep 2009
Cooling Tower Facility	99.0%	95.0%	Oct 2009
Fuel Oil Facility	100.0%	92.0%	Oct 2009
Switchgear Building	93.0%	73.0%	Dec 2009
BOF Switchgear Building	92.0%	66.0%	Dec 2009
Chiller Compressor Plant	98.0%	82.0%	May 2010
Anhydrous Ammonia	22.0%	0.0%	Jan 2011
Glass Former Storage Facility	91.0%	11.0%	Mar 2011
Simulator Facility	100.0%	86.0%	Mar 2011
ITS Switchgear Building	95.0%	83.0%	Nov 2011
Balance of Facilities Common Scope	55.0%	26.0%	Dec 2011
Failed Melter Storage	14.0%	2.0%	Feb 2012
Diesel Generators Facility	52.0%	0.0%	Jan 2012
Administration Building	11.0%	0.0%	Nov 2014
Wet Chemical Storage Facility	63.0%	0.0%	Jan 2016
Site Work	91.0%	49.0%	Jun 2016

4.4 High-Level Waste (HLW) Facility – 01-D-16D

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

Figure 8. High-Level Waste Facility – Complete Slab at Southwest Corner

Figure 9. High-Level Waste Facility – Rebar on East Side

Accomplishments for the Third and Fourth Quarters of FY 2007

- Completed confirmation of revised ground motion spectra (RGM) based on deep borehole drilling, collection of soil samples, measurements of seismic velocity characteristics, and re-evaluation of logic-tree analysis; received Secretarial certification to Congress on the final seismic ground motion on August 9, 2007
- Resumed HLW construction based on Secretarial certification and completion of construction readiness review on August 20, 2007
- Placed first concrete slab (332 yd^3) after construction resumed on September 23, 2007
- Awarded fabrication of electrical joggles for up to 14' elevation
- Issued all (~700) electrical and piping joggle drawings for 37' elevation
- Completed shaker table test for seismic qualification for safe-change high-efficiency particulate air (HEPA) filter assemblies
- Issued equipment location drawings for +72' and +91' elevations
- Released construction concrete drawings for 0 to14' walls without holds
- Completed all rebar calculations for slabs at 14' elevation
- Received 26 electrical pipe joggles needed for construction
- Received 15,000 ft of spooled pipe in FY 2007 compared to plan for approximately 9,000 ft
- Completed electrical grounding layout for 72' elevation
- Completed seven chapters of HLW summary structural report and submitted to DNFSB towards resolution of seismic issues

Plans for the First and Second Quarters of FY 2008

- Complete testing of melter cave/crane/power manipulator
- Award fabrication of electrical joggles for up to 14' elevation
- Complete HVAC environmental qualification calculation for loss of cooling condition
- Receive carbon bed adsorbers, a primary component of the offgas system
- Issue purchase awards for canister racks
- Release purchase order hold for Thermal Catalytic Oxidizer skids
- Release purchase order for melter cave shield doors fabrication modifications
- Release purchase order for feed preparation vessel agitators
- Place concrete for 3 slabs-at-grade and 5 wall sections between 0' to 14' elevations (~1,200 cy)

4.5 Pretreatment (PT) Facility – 01-D-16E

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

Figure 10. Excavation Work near Pretreatment Facility

Figure 11. Pretreatment Facility – Southside Transfer Line Work

Accomplishments for the Third and Fourth Quarters of FY 2007

- Issued design for 3,200 tons of steel to be fabricated (77’ elevation)
- Initiated design for capacity modifications
- Completed soil and structure interaction analysis for the PT Annex Building
- Completed fabrication and delivery of two shield doors
- Completed rebar calculations for 56’ elevation slab

Plans for the First and Second Quarters of FY 2008

- Issue jumper design with holds – Area 1
- Issue jumper conceptual design and stress analysis – Area 24
- Complete concrete placement in facility stairway treads
- Complete readiness assessments for construction resumption
- Resume concrete wall placements in December 2007
- Resume structural steel placements in December 2007
- Complete cable tray design 0’ to 28’ elevations
- Complete revised ground motion embed calculations for 56’ to 77’ elevations
- Complete fabrication and delivery of Pretreatment Engineering Platform (PEP)
- Fabricate and deliver structural steel for 0’ to 28’ elevations
- Complete pulse jet mixer multiple overblow testing and issue final report

5.0 PROJECT ISSUES – AS OF SEPTEMBER 30, 2007

5.1 Certification of Earned Value Management System

Issue: DOE directed BNI to implement a certified EVMS that complies with the ANSI/EIA-748 standard. The *John Warner National Defense Authorization Act for Fiscal Year 2007* (Public Law 109-364; 120 Stat.2510), Section 3120, includes a limitation of funds, pending the certification by the Secretary of Energy, "that the DCMA has recommended for acceptance the earned value management system used to track and report costs of the Waste Treatment and Immobilization Plant." This limited obligation or expense of no more than 90 percent of the funds available for the project.

Discussion: The Fiscal Year 2007 Congressional language was amended in the National Defense Authorization Act for Fiscal Year 2008, Section 3115, *Modification of Limitations on Availability of Funds for Waste Treatment and Immobilization Plant.* Specifically, paragraph (2) of Section 3120(a) of the *John Warner National Defense Authorization Act of Fiscal Year 2007* is amended by (1) striking "the Defense Contract Management Agency has recommended for acceptance" and inserting "an independent entity has reviewed"; and (2) inserting "and that the system has been certified by the Secretary for use by a construction contractor at the Waste Treatment and Immobilization Plant" after "Waste Treatment and Immobilization Plant."

In November 2006, BNI underwent an EVMS certification review conducted by the DCMA against the 32 elements of ANSI/EIA-748. The EVMS review resulted in eight corrective action requests, three major and five minor, plus three continuous improvement opportunities. In February 2007, the WTP Contractor, BNI, submitted their Corrective Action Plan for review. In May 2007, Tecolote Research, Inc., a nationally recognized firm now contracted by DOE to conduct EVMS certifications, conducted a follow-up review, and delivered its report to DOE on July 2, 2007. Tecolote has indicated that all of the previous DCMA findings have been successfully resolved and the EVMS meets the intent of the ANSI standard.

Outlook: On March 4, 2008 the Secretary of Energy certified the BNI WTP EVMS. The Department is in the process of notifying Congress of that action.

5.2 Certification of Final Seismic and Ground Motion Criteria

Issue: There is concern as to when the seismic and ground motion criteria will be considered final. Congressional language states that the construction on the PT and HLW Facilities may not resume until the "Secretary of Energy certifies to the Congressional Defense Committees that the final seismic and ground motion criteria have been approved by the Secretary and that the contracting officer for the Waste Treatment and Immobilization Plant Project has formally directed that the final criteria be used for the final design of the Pretreatment Facility and the High-Level Waste Facility."

Discussion: A number of key actions have been implemented to move towards finalizing the seismic and ground motion criteria: issuance of the WTP *Structural Design Criteria*, Revision 10, and the drilling of deep boreholes and collection of soil characterization data under the project site.

Structural Design Criteria, Revision 10. *Structural Design Criteria*, Revision 10, issued in December 2005, provides requirements and guidance that implements the interim ground motion criteria. Revision 10 was established through consultation with the DNFSB.

Deep Borehole Project. To determine the margin of conservatism in the current estimate of the RGM criteria, DOE conducted a program of deep borehole drilling to collect soil characterization data and confirm the geophysical properties of the layers of bedrock below the WTP. The Deep Borehole Project was conducted from June 2006 to October 2006. Three deep boreholes and one corehole were drilled into the basalt bedrock and sedimentary interbeds that underlie the Hanford Site to the appropriate depths (~ 1,400 ft). Each borehole accessed the basalt zone through steel-cased entry holes that were drilled to isolate bedrock from shallower sediments. Downhole seismic testing began in October 2006 and was complete in March 2007. Geophysical and seismic measurement tools were deployed in the deep boreholes to obtain critical data and seismic measurements. The analysis of the geophysical properties in May 2007 confirmed the margin of conservatism in the horizontal and vertical responses at the site selected for construction of the WTP, due to earthquakes.

Pacific Northwest National Laboratory (PNNL) performed the analysis, and issued its final report in June 2007. DOE reviewed PNNL evaluations through a team of experts and developed the "Basis" document for the Secretarial certification in July 2007. The DNFSB was briefed on the report. Based on these reports, the Secretary of Energy certified the existing RGM as the final seismic and ground motion criteria for the WTP Project on August 9, 2007.

Based on the Secretarial certification, WTP was allowed to resume construction after completing a readiness review to ensure safe construction. Construction activities resumed at the HLW Facility on August 23, 2007, and the first concrete slab was placed (after resumption) on September 20, 2007. Currently, the PT Facility is undergoing its readiness review.

5.3 Nuclear Safety Culture

Issue: DOE has been monitoring BNI progress in response to shortcomings in the WTP nuclear safety and quality culture, previously identified within reviews by ORP Safety and Quality Assurance (QA) staff and the DOE Office of Price Anderson Enforcement (OE).

Discussion: BNI has undertaken a Safety and Quality Initiative to improve the overall WTP Project nuclear safety and quality culture, and issues monthly reports that outline their progress. An update meeting between BNI and OE was held on August 28, 2006. At that time, BNI provided a greater level of detail regarding their initiative that demonstrated progress toward stated goals. However, DOE determined that BNI has not yet developed a comprehensive set of performance indices to measure continuous improvement nor have they committed manpower through a resource-loaded project plan for completion of this initiative.

Outlook: The ORP Office of Environment, Safety and Quality provides oversight of BNI activities through an extensive assessment process. A number of QA/quality issues have been identified by ORP staff through assessments, identified by BNI assessment activities, or disclosed through concerns identified by BNI employees. As required by ORP's assessment program, ORP reviewed the issues DOE identified during the update meeting described above in late November 2006. Due to the number and nature of these issues, the ORP management team determined additional assessments of the WTP QA Program and its implementation were necessary to better understand the extent of the quality-related issues at the WTP. Additional anticipated assessments include:

- HLW Program Review against Office of Civilian Radioactive Waste Management requirements
- Procurement Process

- Tailored Approach to Quality Assurance Requirements
- Corrective Action Program
- Commercial Grade Dedication Process
- Training Program
- Document Control
- Design Control

These additional assessments represent a strong commitment by ORP senior management to quality in fiscal and personnel resources. ORP recognizes that past nuclear projects, both Federal and commercial, have been adversely impacted due to ineffective or partially effective QA programs. ORP believes these assessments will go a long way to identify unknown weak programmatic areas, confirm the extent of condition for known problems, and develop the appropriate corrective actions for identified issues. Also included in actions taken by BNI relative to the development of performance metrics is the submittal of BNI's first quarterly report on performance objectives, measures, and commitments. As part of the annual Integrated Safety Management System declaration, BNI has submitted an improved set of performance objectives, measures, and commitments that will strengthen their overall ability to assess the effectiveness of their QA program.

5.4 Vendor Quality Assurance

Issue: ORP has identified QA issues with BNI suppliers and with the Engineering flow-down of quality, technical, and Authorization Basis requirements to suppliers.

Discussion: Over the last 3 years, ORP has performed 28 supplier inspections. During these visits, ORP inspectors review BNI oversight of the suppliers, the suppliers' quality and welding programs, and work in progress. Early on, these inspections identified a number of quality and welding program issues. BNI supplier oversight focused much of its attention on work in progress and final documentation of work prior to material being shipped and substantially less time on supplier quality and welding program implementation. Issues identified by ORP indicated additional oversight of supplier QA and welding programs was needed.

BNI took steps to address both these specific issues and improve overall BNI Supplier Quality Representative (SQR) performance. These steps included issuing SQR Alerts, implementing a checklist that details important areas to inspect; hiring a strong welding expert and electrical expert to perform inspections; and providing technical support and group training focused on BNI supplier oversight expectations, specifically addressing the issues being identified by ORP inspectors.

These actions have resulted in improved SQR oversight of procurement activities. However, other quality issues have been identified during these procurement inspections:

- BNI's commercial grade dedication (CGD) program was found to have significant technical and quality-related problems regarding the manner in which BNI Engineering was identifying critical design characteristics and specifying methods for verifying these characteristics. This issue resulted in BNI placing a management hold on CGD procurements while they developed and implemented adequate corrective actions to improve this program.

- A recent inspection identified significant problems with the way BNI implemented a quality (Q) procurement of high-efficiency mist eliminator (HEME) tanks.
- BNI recently discovered they had procured some "black cell" (cells where access will not be available after completion of construction) pipe spools without the specified volumetric examination (the applicable code required 5 percent random examination, which was performed, but contract Authorization Basis documents required 100 percent examination of pipe welds located in black cells).

Outlook: Although BNI's procurement quality oversight program has improved, engineering activities associated with procurement requirement flow-down to suppliers still requires improvement. BNI has taken significant steps to improve its CGD process; however, activities such as performing additional training, qualifying CGD engineers, and improving procedural guidance are still ongoing. BNI has documented the issues associated with the HEME procurement and the black cell pipe spool volumetric examination issues and is performing root cause analyses and extent-of-condition reviews to determine the corrective actions necessary to address these problems. ORP is closely monitoring BNI's actions to address these requirement flow-down issues. In addition to regular inspections, BNI will perform procurement "vertical slice" inspections that focus on requirement flow-down activities.

5.5 Design Freeze

Issue: The current process for managing design execution by ensuring that "upstream" designs are mature and stable prior to performing "downstream" design functions has not been effective in controlling design iteration and rework.

Discussion: BNI has implemented a "Design Freeze" system similar to that employed on its commercial projects to ensure that the engineering design proceeds in a logical fashion from defining design inputs; through system-level diagrams, arrangement drawings, and requirements-based, design-build equipment specifications; to detailed construction drawings. Under this system, the "upstream" portions of the design, such as design inputs, are finalized and "frozen" to limit later changes that have the potential to ripple through "downstream" detailed design elements and cause rework. Project changes have prevented upstream inputs from being truly "frozen." These changes include both DOE-directed contract changes (e.g., capacity modifications, resolution of EFRT issues, and resolution of technology maturity concerns), as well as design iterations caused by other internal BNI processes (e.g., integrated safety management reviews). As a result, the facility design has not progressed as planned, leading to increasing cost and schedule variances.

Outlook: DOE finalized anticipated contract changes with the potential to impact the design in March 2007. DOE and BNI have convened a joint Technical Steering Group (TSG) to expedite the closure of EFRT and technology maturity issues that have the potential to impact upstream design elements. DOE is engaging BNI in constructive dialogue regarding revisions to internal BNI processes that drive rework, and to define a split between Title II engineering activities (creating an initial constructible design) and Title III engineering activities (revisions to released designs to address emergent construction issues and operations requirements). Successfully implementing these process improvements will reduce design rework and improve engineering cost and schedule performance.

5.6 Waste Treatment and Immobilization Plant (WTP) Antifoam

An antifoam agent (AFA) is required to prevent foaming in five non-Newtonian feed tanks in the PT Facility that use mixing spargers during normal operations. Preliminary small-scale tests completed in December 2006 showed evidence the gas hold-up increased and release rates were retarded, which could pose a safety or secondary operational concern that might force a change in the current mixing strategy post-design basis event. The 1/4-scale prototypic testing is now complete and results show that the addition of AFA to waste simulant (AZ-101) has gas retention similar to clay without AFA. WTP safety strategy is based on clay data; therefore, no additional air compressors or frequent sparging is needed beyond what is currently planned. Furthermore, testing has confirmed, using small-scale test stand, that alternate AFA 1520 (currently used at Tank Farms) is a viable alternative. However, it requires a higher concentration to provide a similar effect. Testing has also confirmed, using bench-scale test stand, that iron-hydroxide is a key non-Newtonian component contributing to gas hold-up and that AZ-101 simulant is a bounding simulant. Testing was completed on September 27, 2007. Savannah River National Laboratory finished its analysis of data and provided its draft report to BNI three weeks ahead of schedule. Final reports were delivered to ORP on December 31, 2007. This issue is now closed.

6.0 DNFSB OPEN ISSUES – AS OF SEPTEMBER 30, 2007

The Assistant Secretary for Environment Management briefs the DNFSB monthly to discuss status of issues and concerns. DOE also participates in DNFSB meetings that include Safety-in-Design issues associated with the WTP.

The DNFSB provides in-depth safety and technical reviews and oversight of the project, and a number of issues have been raised and resolved. The DNFSB has a staff of over a hundred experienced technical experts both in the field at various DOE sites and in the Washington, D.C. office. The DNFSB has resident representatives at the Hanford Site to collect information relating to Board subjects of interest. DOE routinely provides documentation and access to DOE and contractor facilities and meetings in connection with Board or staff interests. The DNFSB held a series of public meetings (July 2006, March 2007) on incorporating safety-in-design for which briefings were presented relating to the WTP. In January 2007, three Board members and staff visited the site; BNI and ORP briefed the visitors on WTP matters of interest. DOE will continue to meet with the DNFSB on a regular basis to discuss issues, provide status of technical issues, and make available information as requested.

6.1 Hydrogen in Piping and Ancillary Vessels

Issue: There is concern regarding hydrogen detonations within WTP piping systems due to accumulations of hydrogen and oxygen (for water piping) or nitrous oxide (for slurry piping) in piping and ancillary (small) vessels at the WTP, and designing safety controls to mitigate such events. The potentially volatile gas mixtures will be radiolytically and chemically generated, and ignition of significant accumulations is conservatively assumed. Large in-pipe hydrogen gas detonations could result in significant releases of radioactivity from the facility or damage the production capability of the facility, so these events are prevented. Small detonations in small diameter piping have been shown by testing and analysis not to deform the piping, and are therefore permitted. These small events are expected to occur very infrequently.

Discussion: BNI has identified safety controls to address this concern. These include new and revised design features, and administrative controls to prevent the accumulation of hydrogen concentrations that could cause events large enough to deform the piping or ancillary vessels.

BNI has evaluated all pipe segments (approximately 14,200) initially thought to have the potential for such accumulation in the PT and HLW Facilities. Of these segments, approximately 9,300 were subsequently determined not to have potential for hazardous accumulation. Of the remainder, several categories exist:

- Approximately 1,500 segments required an engineered control to promptly purge or vent the segment, with most of these features already in the design.
- Approximately 1,400 segments accumulate gas mixtures so slowly that it would take over 1,000 hours to accumulate a large enough mixture to cause damage; administrative controls were adopted to remove these mixtures before that accumulation can occur.
- Approximately 2,300 piping segments were evaluated to determine whether a detonation would damage the piping (exceed elastic limits). Of these, only 23 pipe segments were found to require a design increase in the pipe wall thickness.

BNI used experimental data from work performed for the project by the California Institute of Technology (Professor J. Shepherd) to calculate pipe stresses that could damage the piping or

vessels. Dr. Ed Rodriguez independently reviewed the BNI work, and concurred with the evaluation. ORP has reviewed and accepted the analysis.

The most significant outstanding technical concern is designing the associated pipe hangers and supports to withstand the associated reaction loads from these events. Because there is little experimental data regarding such loads, ORP has asked CalTech to conduct experiments in calendar year 2008 to measure prototypical detonation loads on pipe hangers and supports. BNI, and its subcontractor, Dominion Engineering, Inc., will use this data to benchmark its analysis.

Outlook: ORP approval of the piping and ancillary vessel safety controls discussed above is expected in December 2007. Follow-up experiments, analysis, and design of the associated pipe hangers and supports are expected to extend into early 2009. DOE briefed the DNFSB and their technical staff on the HPAV issue in January, March, and May 2007. DOE will continue to work with the Board as the remaining portion of this issue is resolved.

6.2 Fireproofing

Issue: The structural integrity of WTP facilities must be sustained during and after fire events, which could reduce the strength of some steel columns and beams. A design approach was implemented that provides fire protection for selected structural steel members based on their role in supporting the structure during and after a fire, instead of protecting every structural steel member. In October 2005, the DNFSB agreed that this strategy was acceptable provided it can reasonably be shown that unprotected structural members with reduced material properties due to a fire would not be relied upon to support the building.

Discussion: In response to DNFSB comments, the project developed technically sound methodology for identifying structural steel members that do not require fireproof coating. The BNI structural design criteria were modified to require the use of this method in the design to preserve facility structural integrity, confinement, and to protect ITS structures, systems, and components after accounting for degradation of the non-fireproofed steel members as the result of a fire. The design process includes conducting structural analyses that will address potential for some specific structural steel elements' failure without impacting the building structure or adjacent safety systems. Calculations consider increase in tributary areas for loading specific structural members, and increase in unrestrained lengths and spans of the fireproofed members due to loss of non-fireproofed members' support considered inactive during and immediately after a fire event. The design requirement also identifies additional load combination and stability evaluations required to be considered for the fire events. DNFSB technical staff have reviewed and commented on these design criteria.

Outlook: The updated design criteria and status of this issue, including forecasted calculation schedule was provided to the Board in a DOE letter, dated June 19, 2007. In October 2007, a revised forecast calculation schedule was provided to DNFSB staff. The schedule included updates to previous calculations checking the structural framing stability of LAW, anticipated for completion by the end of calendar year 2007; PT Facility structural calculation updates for elevations +56 feet and under, anticipated for completion by February 2008; and new calculations of HLW structural framing and roofing, anticipated for completion by December 2008 and August 2009, respectively.

6.3 Seismic Criteria/Summary Structural Reports

Issue: The DNFSB sent a letter to the Secretary of Energy, dated October 17, 2005, raising issues concerning the adequacy of the seismic and ground motion criteria. The DNFSB received a letter from DOE ORP dated June 28, 2006, regarding the ability of the design of the WTP facilities to withstand potential earthquakes. The letter requested that the DNFSB acknowledge that issuance of the WTP *Structural Design Criteria*, Revision 10, warranted closure of the ground motion criteria and structural engineering issues.

Discussion: The DNFSB stated its belief in a September 7, 2006, letter that the RGM criteria provides a reasonably conservative basis for validating the design of WTP and believes that the RGM criteria should be used to complete the design. DNFSB also stated that the structural design criteria provide a reasonably conservative basis for validating the existing design and construction of the plant. However, BNI is still developing the details of the application of the structural design criteria in the structural analysis and the structure's predicted response to the RGM. The details and results of these structural analyses are being provided in updates to the summary structural reports (SSR) for the HLW and PT Facilities. As a follow-up, the DNFSB has requested to review these details as soon as they are available.

Outlook: The structural engineering issues raised by the DNFSB will remain open until DOE ORP completes the SSRs in 2008. The DNFSB expects their review of the structural analysis to be reasonably straightforward. The HLW SSR was completed in November 2007, and the PT SSR was completed in December 2007. The documents were reviewed by DNFSB and their comments are currently being incorporated into the final version. To expedite DNFSB evaluations, DOE has been providing various chapters of the HLW and PT SSRs to the DNFSB staff as they are completed.

7.0 STATUS OF ISSUES FROM PROJECT REVIEWS – AS OF SEPTEMBER 30, 2007

7.1 External Review of Process Flowsheet

During the EFRT review conducted in 2006, hundreds of possible concerns were assessed. After evaluation, 28 issues remained. Of these 28, the EFRT defined a major (M) issue as one that will prevent meeting contract rates with commissioning and future feeds. A potential (P) issue could prevent meeting contract rates with commissioning and future feeds. The EFRT determined that the major issues must be fixed to ensure the WTP will meet design throughput for all presently identified feeds, and that fixing potential issues is necessary to provide additional assurance of meeting design throughput. Issue Response Plans (IRP) were prepared for each of the 28 EFRT issues, and the activities described in the IRPs completed.

Formal Issue Closure Record packages are being prepared under the guidance of the joint ORP/BNI Technology Steering Group (TSG) for these issues, and will be deemed resolved upon ORP approval of the closure packages before the end of the year. As of September 30, 2007, three of the issues have been formally closed by approval of closure records by the TSG and the BNI and ORP WTP Project Managers. The actual closure dates for the three closed issues and scheduled closure dates for those remaining are shown in Table 13.

The TSG has established a schedule to have closure records approved for 19 of the 28 EFRT issues by November 30, 2007. Some of the issues currently being addressed are as follows:

- M-12**, "**Undemonstrated Leaching Process." Installation of the Pretreatment Engineering Platform (PEP) to resolve this issue is scheduled to be complete in February 2008 (slipped from December 2007).
- M-1, "Plugging in Process Piping." The revised IRP has been approved by BNI and will be submitted to ORP for approval. The test loop is scheduled to be ready to begin testing on December 3, 2007.
- M-2, "Mixing Vessel Erosion." An updated test matrix has been proposed by BNI and is under review by ORP. The review is expected to be complete in mid-February 2008. The test plan includes variations in particle size and hardness, solids concentration, jet velocity and angle, and materials of construction for wear plates.
- M-3, "Inadequate Mixing System." The IRP is being revised to include the mixing issues identified in the Technology Maturation Plan. The revised IRP will be reviewed and approved by the TSG. Frequent meetings are being held between ORP and BNI to agree on the path forward.
- P-9, "Undemonstrated Sampling System." Plugging problems have continued during the prototypical sampler testing. Modifications to the sampling system design were made including a larger needle size and closer tolerances to avoid a crevice where solids can accumulate. The larger needle size caused holes in the septum that remained open. A hold has been placed on the testing to determine alternative approaches.

Table 13. Status of Issue Response Plans (as of November 2007)

Issue No	Issue Title	ORP Approval Date (2006)	Forecast Closure Date
M 7a	Lack of Spare LAW Melter	20-Nov	Nov-06(A)
M 7b	Lack of Spare HLW Melter	20-Nov	Nov-06(A)
P 3	Adequacy of Control Scheme	3-Jan-07	Dec-06 (A)
M 8	Limited Remotability Demonstration	16-Nov	Oct-07 (A)
M10	Critical Equipment Purchases	3-Jan-07	Oct-07(A)
M16	Misbatching of Melter Feed	13-Sep	Oct-07(A)
P10	Lack of Analysis of Silo Feeds	13-Sep	Oct-07(A)
P11	Incomplete Process Control design	18-Dec	Nov-07
M 9	Lack of Comprehensive Feed Testing in Commissioning	18-Dec	Oct-07(A)
P 1	Undemonstrated Decontamination Factor	13-Jul	Nov-07
M 5	Must Have Feed Prequalification Capability	22-Aug	Oct-07(A)
M10a	Questionable Column Design	9-Aug	Nov-07(A)
M11	Loss of WTP Expertise Base	14-Sep	Dec-07
M13	Ultrafilter Area and Flux	25-Sep	Dec-07
M14	Baseline IX resin	9-Aug	Oct-07(A)
P 2	Effect of Recycle on Capacity	29-Jun	Nov-07(A)
P 6	Questionable Cross-Contamination control	9-Aug	Oct-07(A)
P 7	Complexity of Valving	9-Aug	Dec-07
P 8	Effectiveness of Cs-137 Breakthrough Monitoring System	9-Aug	Oct-07(A)
M17	HLW Film Cooler Plugging	9-Aug	Feb-08
M 4	Designed for Commissioning Waste vs. Mission Needs	10-Oct	Nov-07(A)
M 6	Process Operating Limits Not Completely Defined	18-Oct	Dec-08
M 7	Inconsistent Short-term vs. Long-term focus	3-Jan-07	Nov-07(A)
P 4	Potential Gelation/Precipitation	18-Oct	Dec-08
M 2	Mixing Vessel Erosion	17-Nov	May-08
M15	Availability, Operability, and Maintainability	13-Jul	May-08
P 5	Inadequate Process Development	9-Aug	Jun-08
P 9	Undemonstrated Sampling System	9-Aug	Oct-08
M 1	Plugging in Process Piping	29-Jun	Dec-08
M12	Undemonstrated Leaching Process	13-Sep	Dec-08
M 3	Inadequate Mixing System Design	6-Sep	Mar-09

Note: (A) denotes “actual” closure date

7.2 WTP Capacity Enhancement Modifications

A key observation that resulted from the EFRT evaluation was the effectiveness of the PT Facility design to process the waste to meet mission capacity requirements. The team estimated it could take over 35 years to treat the Hanford Site tank waste if design and process flowsheet modifications were not made.

The treatment capability of the PT Facility is affected primarily by the design capacity (the rate at which the waste is processed) and the design availability (the percentage of time the facility is operational). The relative relationship of these two parameters (design capacity and design availability) results in a potential range of waste treatment capabilities and resultant waste treatment schedules.

The primary systems in the PT Facility that limit waste treatment capacity are (1) ultrafiltration system, used to separate solids from liquids; (2) the ion exchange system, used to remove cesium-137 from the liquids processed through ultrafiltration; and (3) the caustic and oxidative leaching processes, used to limit the amount of aluminum and chromium in the high-level waste glass. This leaching process is also performed in the ultrafiltration system adding to the demands on the system. In response, DOE has directed BNI to perform a number of studies to identify options to increase the treatment capability of the plant. These include: increasing ultrafiltration surface area, enhancing mixing of waste streams, and providing capability to leach aluminum upstream of the ultrafiltration system; operating filtration and leaching at higher temperatures, thus adding the ability to remove waste heels from the process vessels; installing a light duty hot cell overhead maintenance crane in the PT Facility to support multiple maintenance activities; and enhancing the quality of hot cell valves to require less maintenance and provide for a longer operational life.

Two primary areas of focus, ultrafiltration and waste leaching operations, are being addressed with the design, construction, and commissioning of an integrated pretreatment test stand (referred to as the Pretreatment Engineering Platform [PEP]). The PEP is a 1:4.5 scale test of the WTP ultrafiltration system that will treat tank waste simulants during operation. The PEP is to be assembled on 16 skids that will be shipped from Carlsbad, New Mexico, to Richland, Washington. The last skid is scheduled to be shipped by February 2008, with testing scheduled for mid 2008. This testing is required to address issues associated with the system's caustic and oxidative leaching processes and system capacity. The above schedule reflects a two-month slip due to design modification of the prototypic vessels and the lack of technical resources to complete the instrument and control design.

These capacity modifications were recommended to be implemented by BNI and approved by ORP for the ongoing Contract modifications.

7.3 Hanford River Protection Project Low-Activity Waste Treatment: A Business Case Evaluation

DOE has prepared a business case report entitled *Hanford River Protection Project Low Activity Waste Treatment: A Business Case Evaluation* (Draft November 2007) that compares low-activity waste treatment technologies and approaches that could support an integrated strategy for treating (i.e., pretreating and immobilizing) radioactive waste stored in underground tanks at the Hanford Site.

The low-activity waste mass to be immobilized is approximately 10 times greater than the high-level waste mass to be immobilized. The WTP is estimated to be capable of only immobilizing approximately half of the low-activity waste in the same time period as the high-level waste can be pretreated and immobilized. As such, DOE is evaluating a number of supplemental low-activity waste immobilization technologies so as to complete the low-activity waste and high-level waste immobilization missions in the same time frame. Without supplemental low-activity waste immobilization, DOE estimates that the low-activity waste immobilization mission would continue for approximately 60 years following the start of full WTP operations in 2019; i.e., low-activity waste immobilization would not be completed until 2079. This report evaluates various options available to DOE to reduce the duration of the low-activity waste immobilization mission.

During the timeframe that the Business Case Evaluation was being prepared, the U.S. Government Accountability Office (GAO) also prepared and issued a report entitled

NUCLEAR WASTE: DOE Should Reassess Whether the Bulk Vitrification Demonstration Project At Its Hanford Site Is Still Needed to Treat Radioactive Waste (GAO-07-762, June 2007). The GAO report recommended that DOE (1) reassess the need for supplemental technology; (2) reassess the relative costs and benefits of demonstrating and deploying bulk vitrification (BV) compared to other strategies; and (3) report to Congress on the reassessment before requesting additional funding for the Demonstration Bulk Vitrification System Project. The U.S. House of Representatives Energy and Water Development Appropriations Bill for Fiscal Year 2008 requests DOE to "reassess the need for the BV project, as well as present a defined integrated strategy for low-level waste, and present this strategy to the House and Senate Committees on Appropriations."

The Business Case Evaluation includes seven business cases that evaluate four key questions that encompass the House Committee direction and GAO recommendations:

- Should DOE develop a means to supplement the WTP LAW Vitrification Facility?
- How do the costs and benefits of bulk vitrification compare with other potential supplemental low-activity waste immobilization strategies?
- What are the key elements in DOE's integrated Hanford low-activity waste pretreatment and immobilization strategy?
- Should that strategy include provisions for early low-activity waste immobilization and/or immobilization of a portion of the low-activity waste in the Hanford 200 West Area?

The Department maintains that the reduction of the low-activity waste mission duration will reduce the overall cost to complete the cleanup of the Hanford tank waste as well as reduce environmental risks associated with continued storage of wastes in the Hanford tanks. The seven business cases DOE is currently evaluating are depicted in Table 14.

The Business Case Evaluation also includes rough order of magnitude cost and schedule estimates for the various cases. This report is not intended as the basis for a decision but will serve as a key component in the decision making process. That decision requires environmental impact analysis now ongoing under the *National Environmental Protection Act of 1969* (NEPA), pursuant to the Tank Closure and Waste Management Environmental Impact Statement. Meanwhile, DOE will continue to refine the business case cost and schedule data and development work on several of the technologies under consideration in order to provide a better technical risk basis for eventual decisions on technology selection.

While the Business Case Evaluation report did not draw any specific conclusions, it will be used to support decisions that will lead to a path forward for addressing 50 percent of the low-activity waste. The Department's current approach is to conduct studies, evaluate alternative technologies, and conduct cold testing as needed to preserve future options for low-activity waste treatment. These activities will focus on cold testing of supplemental immobilization technologies, conceptual planning of an interim pretreatment system, feasibility of installing a third melter in the LAW Facility, and viability of an early startup of the LAW Facility. These activities will support and lead to a DOE decision on a strategy for pretreating and immobilizing the low activity waste.

Table 14. Summary Overview of the Low-Activity Waste Business Cases

Case*		Supplemental LAW Immobilization	Year Waste Immobilization Complete		Comments
			HLW	LAW	
1	A	None	2079	2079	All low-activity waste immobilized in WTP Low Activity Waste (LAW) Facility.
	B	None	2046	2079	Same as 1A but build 31 new Double Shell Tanks to store pretreated low-activity waste and complete pretreatment and high-level waste immobilization by 2046.
	C	Third LAW Facility Melter	2046	2059	Third melter installed in WTP LAW facility and all three melters upgraded to immobilize a total of 1,500 MT of sodium per year.
2		2nd LAW Facility in 200 East	2046	2046	Same assumptions for Cases 2 through 5. Only the low-activity waste immobilization technology changes.
3	A	BV in 200 East	2046	2046	
	B	3rd Melter in WTP LAW Facility and Bulk Vitrification (BV) in 200 East	2046	2046	
4		Cast Stone in 200 East	2046	2046	
5		Steam Reforming in 200 East	2046	2046	
6		Bulk Vitrification in 200 East and 200 West	2046	2046	BV in 200 West starts in 2014. BV in 200 East and WTP LAW start in 2019.
7		Bulk Vitrification	2046	2046	BV in 200 E and WTP LAW Facility both start in 2014.
*The WTP is located in the 200 East Area.					

7.4 Technology Readiness Assessment for the Waste Treatment and Immobilization Plant (WTP) Facilities

In November 2006, DOE initiated a Technology Readiness Assessment (TRA) of the WTP. A TRA is a process to determine the technical maturity (Technology Readiness Level [TRL]) of evolving technologies prior to incorporating them into systems or subsystems. TRLs provide an easy-to-communicate, common understanding of technology status. The TRA is useful for making decisions on the transition of technology from paper to laboratory to final application, for risk management, and for making funding decisions.

A standard scale for measuring TRLs was developed by the National Aeronautics and Space Administration (NASA) in the 1980s. The U.S. Department of Defense (DoD) has adopted the NASA scale and instituted the TRA process as part of its acquisition process for all new major systems. The NASA/DoD TRL scale ranges from 1 to 9, with 1 corresponding to the pre-conceptual paper stage, and 9 corresponding to full-scale operation. NASA and DoD use TRL 6 as the minimum for transitioning technology to system design and acquisition. The DOE WTP evaluation ensured consistency with NASA/DoD practices by adopting the DoD/NASA definitions, using the TRA process described in DoD's *Technology Readiness*

Assessment Deskbook[1], utilizing a TRL calculator developed by the Air Force, and engaging the help of the developer of the Air Force calculator.

The WTP TRA was divided into three pieces: (1) Low-Activity Waste Facility/Balance of Facilities/ Analytical Laboratory (LAW/BOF/LAB); (2) High-Level Waste (HLW) Facility; and (3) Pretreatment (PT) Facility. The TRAs were conducted from December 2006 through February 2007. The LAW/BOF/LAB report was completed and issued in March 2007. The HLW and PT reports were completed in August 2007.

DOE is preparing a Technology Maturation Plan that will document the steps that will be taken to mature all WTP critical technology elements to TRL 6. The plan will cover all technology maturity issues raised in the TRAs and in the External Flowsheet Review.

7.5 U.S. Army Corps of Engineers (USACE) Independent Validation Review of the May 2006 Estimate at Completion; Report dated August 28, 2006

DOE retained the USACE to provide a comprehensive independent review of BNI's May 2006 EAC, and to validate the project baseline cost, scope, and schedule. The USACE retained a number of recognized industry experts to work alongside their senior Federal staff. The focus of the validation was an evaluation of cost, schedule, project and program risk analysis, and management processes. A final qualified validation report of the May 2006 EAC was provided to DOE in August 2006, with inclusion of an additional $650 million, 3 months of schedule contingency, 8 recommendations, and 21 observations. A condition of the validation is the assumption of $690 million funding for FY 2007 and in the outyears. Most issues have been satisfactorily resolved with the exception of the following.

Value Engineering: The lack of a formal DOE requirement for a contractor value engineering program was identified. Value management will be addressed as part of the upcoming contract modifications, at which time the entire concept of fee incentives will be addressed.

Environmental Hazard Analysis: Several issues regarding the Environmental Hazard Analysis were identified. These areas of concern are being addressed as part of the renegotiation of the *Hanford Federal Facility Agreement and Consent Order* (a.k.a., Tri-Party Agreement) with representatives from Washington State. Once the renegotiation process is completed, the hazard analysis documentation will be made current.

[1] Department of Defense, *Technology Readiness Assessment (TRA) Deskbook*, May 2005, prepared by the Deputy Undersecretary of Defense for Science and Technology (DUSD(S&T)).