
Watts Bar Nuclear Plant Unit 2 Completion Project

**Eleventh Quarterly Update to the
Estimate to Complete
November 2014 - January 2015**

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**Nuclear
Construction**

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Section 1 - Executive Summary

The 11th quarterly update of TVA's Estimate to Complete (ETC) for Watts Bar Nuclear Plant (WBN) Unit 2 focuses primarily on the activities between November 2014 and January 2015.

Performance during the quarter continued to be consistent with the ETC, and project targets continued to be met for safety, quality, cost, and schedule.

The project successfully completed hydrostatic testing of the steam generator secondary (steam) side and connected side systems, began cooldown of the ice condenser system, and released three key systems – Main Steam, Feedwater, and Auxiliary Feedwater – for component testing that are required for hot functional testing (HFT). This test will bring the unit to normal operating temperature and pressure to simulate plant operations and demonstrate that major systems will perform their intended functions.

Challenges mentioned in the previous quarterly report remain. The project team continues to focus attention and resources to look ahead, to anticipate issues and plan contingencies, and to collaborate with the plant operating staff to continue safely progressing toward unit operations. Primary challenges include:

- Testing Unit 2 systems that share components with Unit 1 without jeopardizing the safe and reliable operations of Unit 1;
- Completing the release of plant systems for pre-operational startup testing during a compressed time period while maintaining safety and quality standards;
- Constructing and testing systems in shared spaces, higher than expected equipment failures and repairs, and productivity issues during startup testing;
- Preparing for and transitioning to dual-unit operations; and
- Addressing regulatory and licensing issues.

Quarterly Summary Points

No lost time incidents for the quarter - since July 2010, over 31 million work hours have been achieved

Performed activities in a manner that resulted in a Quality Control acceptance rate of 97.5 percent

Met cost and schedule expectations set forth in the ETC

Released seven more plant systems for startup testing

Turned one system over to Operations – Containment Vent Air Cleanup Units

Identified no new risks that would affect project completion

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Section 2 - Background

In August 2007, TVA's Board of Directors approved resuming construction to complete WBN Unit 2. However, the project did not subsequently meet expectations for schedule or budget.

In August 2011, a new management team performed a root cause analysis of the issues responsible for the schedule and budget problems and developed a revised ETC for the project.

The revised ETC is based on a range of values for both schedule and budget. As part of its effort to develop the ranges, the team considered risks and obstacles that could hinder meeting project expectations.

On April 26, 2012, the TVA Board of Directors approved the budget and schedule shown below to complete Unit 2.

Watts Bar 2	Aggressive	Most Likely	Upper Range
Completion Cost	\$4.0 Billion	\$4.2 Billion	\$4.5 Billion
Commercial Operation	September 2015	December 2015	June 2016

Note: More information and additional details about the cause analysis, as well as the process that was used to develop the revised ETC, can be found in the Executive Final Report on the ETC posted on this link: http://www.tva.com/power/nuclear/pdf/wattsbar2_executive_etc.pdf

Section 3 - Quarterly Performance

The project continued to meet overall targets for safety, quality, cost, and schedule in the three months from November 2014 to January 2015.

A significant accomplishment during the quarter was the successful completion of hydrostatic testing of the secondary (steam) side of the steam generators with the connected steam and feedwater piping, allowing the final American Society of Mechanical Engineers (ASME) certification and N-Stamping of the reactor coolant system and all major components. Additionally, preliminary testing was completed and cooldown of the Unit 2 Ice Condenser system commenced in preparation for initial ice loading.

The completion of hydrostatic testing on the secondary side of the steam generators allows significant progress on final ASME Certification of the nuclear unit, confirming the unit has been constructed to meet the most stringent of industry standards.

The team also completed construction on the following systems: Upper Compartment Coolers, Auxiliary Feedwater Control, Control Rod Drive, Containment and Auxiliary Building Cranes, Main Steam, Feedwater, and Auxiliary Feedwater.

Additional project accomplishments for the quarter included:

- An independent assessment, led by former Nuclear Regulatory Commission (NRC) and Institute of Nuclear Power Operations (INPO) executives, performed in preparation for the upcoming Operational Readiness Assessment Team (ORAT) inspection by the NRC, found no significant issues in the preparations for dual-unit operations.
- One system – Containment Vent Cleanup Units – was turned over to the site's operating organization.
- Numerous briefings and tours were provided to stakeholders such as federal, state, and local officials; TVA customers; and media representatives.

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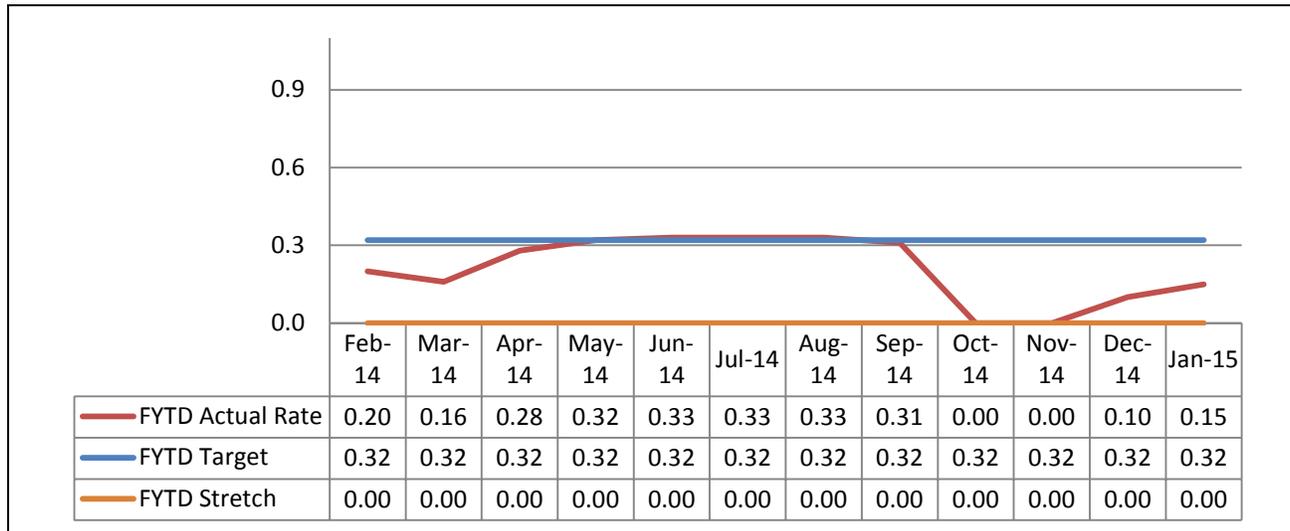
Through the use of structured daily review meetings, and in close coordination with a dedicated response team, new issues are being assessed promptly and corrective actions are being planned and executed.

More information illustrating project performance is provided in the following sections.

Safety

Safety is the highest value and the overriding priority for TVA and WBN. During the quarter, Unit 2 personnel continued to work safely. Since July 2010, Unit 2 employees have exceeded over 31.4 million work hours without a lost-time incident, a significant accomplishment. As the chart below shows, the current Recordable Injury Rate is lower than target.

Watts Bar Unit 2 Recordable Injury Rate



Unit 2 workers continue to identify potential risks and stay safe by:

- Maintaining awareness of changing plant conditions as systems are turned over to the operating unit;
- Using the Tri-lateral Safety Alliance intervention process when necessary to prevent teammates from engaging in behaviors that put themselves and others at risk; and
- Closely monitoring low-level safety incidents and communicating those among project personnel, along with safety experiences from across TVA and the industry.

Between November 2014 - January 2015

- Over 429 interventions were performed by craft safety teams and the Tri-lateral Safety Alliance which is made up of TVA, represented crafts and contract partners.
- Over 4100 management observations were documented, of which over 1600 focused on error prevention tools and their use by the employees.

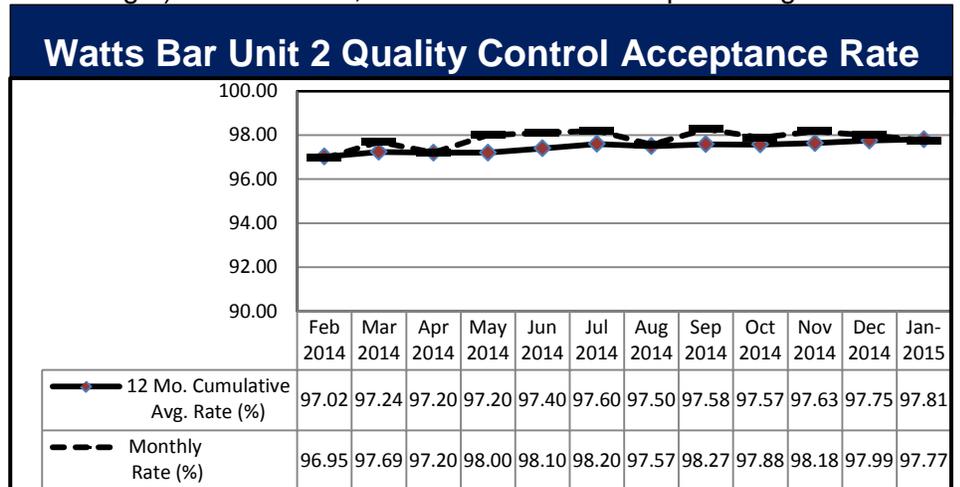
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Quality

The quality of WBN Unit 2 work remains above goal as measured by the Quality Control (QC) acceptance rate (shown on the chart at right). Each month, this rate measures the percentage of work that passes the QC inspection process on the first inspection.

For the past 12 months, the cumulative average acceptance rate is 97.81 percent.

The Quality Assurance organization continues to provide oversight of the system turnover process, testing program, and engineering and construction document closure with a focus on the conduct of pre-operational testing.



Also during this report period, ASME Section III Final N-5 Code Data Report approvals were obtained by Bechtel Power Corporation (BPC) for the following systems: Station Drainage, Chemical and Volume Control, Reactor Coolant System, Containment Spray, Residual Heat Removal, Control Rod Drive, Upper Head Injection, and Incore Instrumentation.

Cost

The project is trending to a total cost of \$4.3 billion, slightly above the most likely target established in the ETC but still within the target range.

A demobilization plan has been implemented as the project progresses through the remaining project completion major milestones. Staffing levels are continually monitored and reviewed against ETC expected levels. Over the quarter, reduction of office trailers and storage containers continued. The effective demobilization of the project is a key factor to meeting cost and schedule targets.

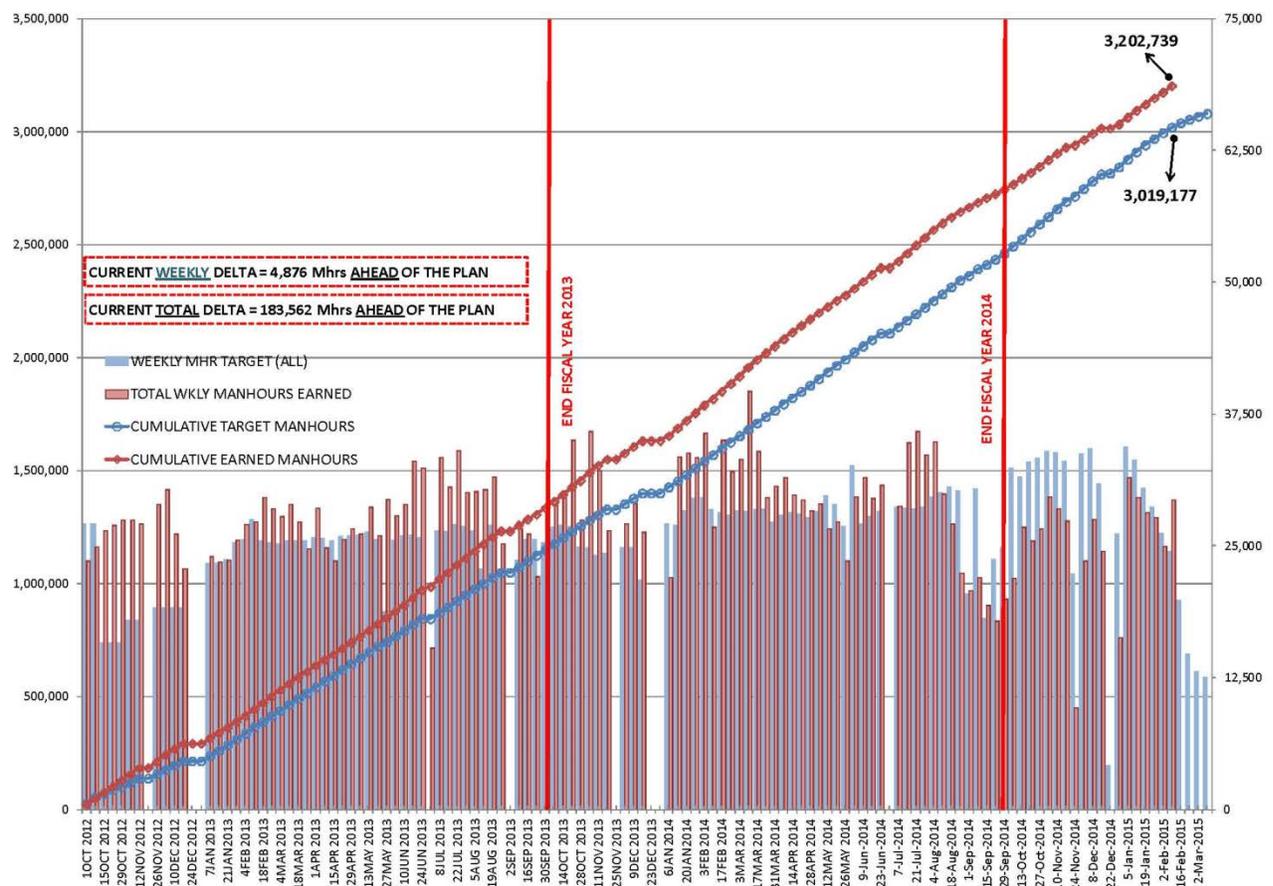
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Schedule

Based on current and targeted schedule performance, the project continues to track to the most likely commercial operation date of December 2015. Overall, the project consumed some margin in this period; however, performance against targets was improved in January and some margin remains to the ETC most likely date. Some of the delay was associated with construction completion and release of key systems for HFT. This is shown on the chart below which compares actual earned hours per week to the number of hours targeted to be earned.

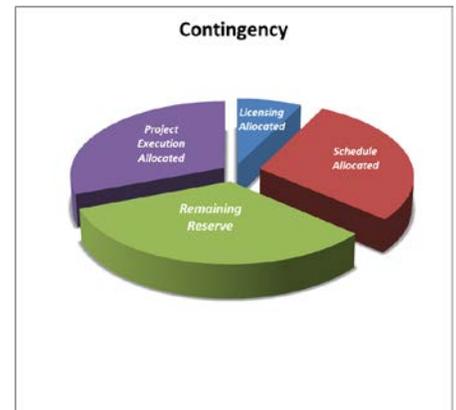
Watts Bar Unit 2 Target Versus Actual Earned Work Hours



Section 4 - Reserve Management

Project reserve money is available to fund risk management and risk occurrence, as well as unforeseen expenditures.

The chart to the right shows that the project continues to expend a moderate portion of the established reserve. The relative sizes of the total allocations from the reserve through the end of this quarter are shown in the chart.



Section 5 - Known Risks

There were no new significant risks identified during the quarter that might compromise project completion. A summary of notable risks is shown in the table below. Additional information on the risks follows.

Waste Confidence/Continued Storage

The NRC approved the “Waste Confidence Rule,” now called “Continued Storage of Spent Nuclear Fuel Rule.” As part of the approval, the NRC vacated the outstanding contentions related to the rule and has directed the Atomic Safety and Licensing Board to vacate contentions raised by external stakeholders.

On September 29, 2014, members of the Southern Alliance for Clean Energy (SACE) filed a contention in the WBN Unit 2 licensing proceeding, which had previously been terminated, challenging the NRC’s new rule.

SACE filed another petition with the Commission on January 28, 2015, demanding that the Commission direct the NRC Staff to supplement the Final Environmental Statement (FES) for WBN Unit 2, to incorporate by reference the NRC’s generic environmental impact statement (EIS) for continued spent fuel storage. TVA and the NRC Staff opposed the petition; however, a remaining action related to the Continued Storage Rule is the NRC Staff’s comparison of the Generic EIS to the WBN Unit 2 FES to ensure that potential environmental impacts are appropriately addressed.

<u>Risk</u>	<u>Risk Trend</u>
Waste Confidence/Continued Storage	Decreasing
Dual-Unit Operational Readiness	Stable
Closure of Licensing Issues	Stable
Documenting Completion of Work	Stable
Construction Completion	Stable
Cyber Security	Stable
Emergent Work and Verification	Stable
Startup Testing Delays	Increasing
Fukushima	Decreasing

Dual-Unit Operational Readiness

Actions to prepare for dual-unit operations continue. During this period, a team led by former NRC and INPO executives performed an assessment using the NRC’s inspection process for ORAT. No significant issues were identified in preparing for dual-unit operations, with 11 gaps to be closed and 18 recommendations. Progress on addressing those issues is monitored weekly.

Final preparations for dual-unit operations and the ORAT inspection continue. A challenge review board has been scheduled for the various WBN organizations with site senior

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management on operational readiness, including an effectiveness evaluation from the original transition plans, results from self-assessments, and the plans for the schedule window from HFT through commercial operations.

Closure of Licensing Issues

An area that continues to require focused attention is resolving inspection, planning, and scheduling (IP&S) items with the NRC. The IP&S items must be resolved before fuel may be loaded in Unit 2. The project has developed a concentrated approach to prioritize and streamline IP&S item closure activities and has made progress toward closure of the items. Over 80 percent of the items have been completed, and of the remaining open items, a significant portion of the inspection work has been performed.

Documenting Completion of Work

The quantity and complexity of documentation has challenged productivity, efficiency in verifying implementation completeness, and the ability to provide necessary closure documentation. The project has seen improvement as a result of changes made to ensure the quality and ease of completion of the required construction documentation. As the project has moved further into the startup and testing phase, comparable focus has been applied to documentation and closure of startup and testing activities to ensure similar positive results.

Construction Completion

Actions taken to make construction completion productivity improvements were helpful to maintain this risk stable during this quarter. Construction work for the Main Steam, Main Feedwater, and Auxiliary Feedwater systems was essentially complete during this period, and those systems were released so component testing could begin in parallel with final system completion and engineering paper closure. The remaining construction work required for HFT is being closely monitored in support of that milestone. Construction work for the ice condenser and the associated glycol cooling system was complete this period, which allowed for ice condenser cooldown ahead of its milestone date.

Cyber Security Requirement Implementation

The NRC has established requirements related to cyber security to help protect Critical Digital Assets (CDAs) – mainly systems and devices involved in the control and monitoring of plant systems – from being damaged or corrupted in a manner that might compromise their functions in support of nuclear safety. This quarter, the project completed its review of CDAs and planned the actions necessary to provide the required protections. Additionally, alignment was reached with the NRC extending the implementation of cyber security mitigating actions until Spring 2017. A cyber security inspection is scheduled for April 2015.

Fukushima

As a result of the events at the Fukushima Daiichi Nuclear Plant in Japan in March 2011, the NRC now requires U.S. nuclear plants to upgrade their facilities to provide diverse and portable means of supplying cooling water and AC power during an extended period of loss of offsite power and loss of normal access to the ultimate heat sink.

This project at WBN established a path forward that meets the NRC requirements, pending regulatory inspection and approval. This includes contingency equipment for the mitigation of a broad range of “outside the design basis” events, which is stored onsite, protected from earthquakes, floods, and other natural events, and separate from the installed equipment from the original design.

Startup Testing Delays

The project continues to experience delays resulting from startup testing activities. These delays are related to construction turnover delays, equipment failures, time needed to make repairs, longer times required for system flushing and cleaning, construction and startup personnel working in the same congested areas, and complications when testing systems common to Unit 1 and Unit 2. The organization responsible for pre-operational startup testing was modified to provide dedicated component testing groups, a “ready-ready” group to make sure test preparations and support needs have been completed, and a rapid response group to address testing issues. Production has improved as a result of the organization changes, and the project has focused on the early release of components and systems for testing so that equipment issues can be detected and corrected with minimal impact on the overall project.

Emergent Work and Verification of Released Systems

Levels of emergent work added into the schedule continue to be higher than desired. However, actions taken in the previous quarter have been effective in reducing the number of emergent work orders (WOs). Analysis indicated that only a small percentage of new WO's represented new scope, while the majority addressed timing, support, or emergent issues with planned work.

Section 6 - Project Oversight

Project Assurance

The volume of remaining work activities and continued Construction and Startup Test (SUT) group constraints to timely completion of work activities has increased the probability that the fuel load (FL) milestone date will be delayed beyond the ETC most likely date of June 2015. However, the ETC's most likely commercial operation date of December 2015 remains achievable with good results from power ascension testing, which is not subject to the same challenges of productivity and high failure rates as the construction and testing phases. Both Construction and SUT groups have large numbers of WO's that must be completed to support the HFT and the FL milestones. SUT WO's include performance of system clean plans, component tests, and system preoperational and acceptance testing.

The Project Assurance group is independent of the Unit 2 organization. The group is responsible for assessing various facets of project performance and reporting its findings to the Senior Vice President of Watts Bar Operations and Construction.

In an effort to improve Construction and SUT productivity, the project continues to manage scope growth and the addition of unplanned work items. They have also implemented actions to improve the efficiency of component tests and system clean plans. Collectively, these areas of project focus have constrained timely completion of work that has resulted in system turnover delays and the expenditure of the remaining pre-FL schedule margin that was originally contained in aggressive project schedules.

As of January 2015, the project was nearing construction completion of the three systems – Main Steam, Main Feedwater, and Auxiliary Feedwater – required for the HFT milestone that had the largest amount of remaining work. Verification of design implementation is in progress. During this quarter, the project also completed hydrostatic tests of the steam generators in early November and the Turbine Building main steam header in mid-December. Notable progress has been made in the pursuit of ASME Section III certification and N-Code stamping. Fourteen systems have been ASME certified and N-stamped, and there are fourteen systems remaining; the last of which is scheduled to complete in May 2015. Clean plan flushes for the Ice

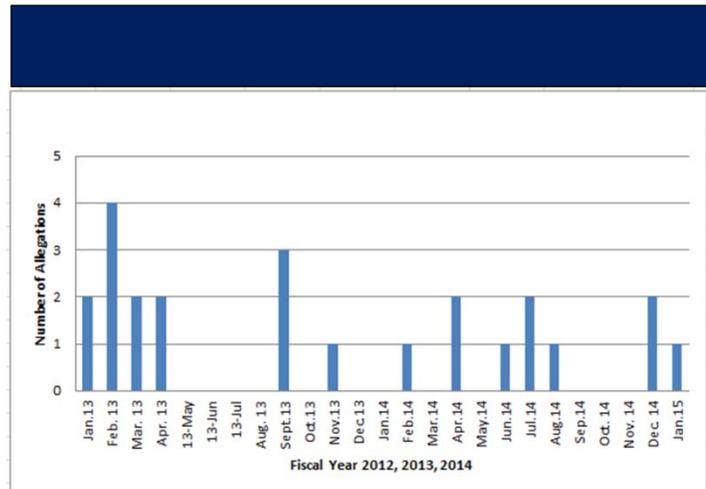
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Condenser System are in progress in preparation for Containment Building ice bay loading which is scheduled to begin in February.

Section 7 - Project Organizational Health

Nuclear Safety Culture

The number of concerns expressed during this reporting period was slightly lower than the previous reporting period. There were 39 last quarter and 35 this quarter. This was accompanied by a decrease in anonymous Problem Evaluation Reports (PERs) from the previous reporting period. Two NRC allegations were received during the month of December to end calendar year (CY) 2014 with a total of nine, which is significantly lower than CY 2013 total of 14. Additionally, one NRC allegation was received in January 2015 for a total of three allegations being received during this reporting period (see chart). None have been referred to TVA for investigation to date.



The Employee Concerns Program (ECP) continues to monitor the reporting of issues to ensure personnel would use internal processes for reporting concerns by comparing the concern traffic and anonymous PERs to NRC allegation traffic. There is no indication that personnel would avoid using local processes for reporting concerns.

Concerns related to Management and Personnel (MP) type issues continue to be the highest contributor to the concerns received by both the Bechtel and TVA ECP. The high percentage of concerns related to MP issues emphasizes that continued diligence is needed in addressing manager/worker relationships. During the previous reporting period, ECP completed a pulse survey of 100 percent of personnel on WBN Unit 2 project with a participation rate of 46 percent. Of those who responded to the survey, 95 percent of all personnel would raise a nuclear safety or quality (NSQ) issue if one was identified; however, of the craft personnel who responded (604 personnel), 20 percent felt if they raised NSQ issue, they would suffer some form of retaliation. Based upon the information received, the following actions were put in place to address workers' fear of potential retaliation and the imposing demobilization of the workforce:

- Safety-Conscious Work Environment (SCWE) discussions were included in project update briefings.
- Bechtel ECP developed a training program with role play on respectful communications, building trust and a SCWE, and the supervisor's role. This training was provided to foremen, general foremen, and superintendents.

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In addition:

- TVA ECP continues random SCWE surveys, and where issues are identified, they are escalated to senior management for correction.
- ECP continues to strive for 100 percent employee contact upon exiting the site to ensure all personnel are afforded the opportunity to raise any concerns.
- Site senior management is briefed weekly on concern status, survey results, and anonymous PER trending, and actions are identified if necessary to address any adverse trends.
- ECP has worked with both TVA Human Resources and the contractor Human Resource representatives to ensure proposed adverse actions are not tied to personnel having raised concerns.
- A senior manager provides a weekly SCWE message during the Monday project review briefing and it is then cascaded to site personnel.
- Training was completed during the quarter for all hands on 10 CFR 50.7 (Employee Protection) and 10 CFR 50.9 (Completeness and Accuracy of Information).

Additionally, ECP identified a work environment within a contractor group onsite during this reporting period that potentially could result in individuals not feeling comfortable raising issues. This was escalated to contractor senior management to address, and a second pulsing survey and interviews were conducted. Instances of retaliation were not indicated but a general worker dissatisfaction was identified due to split shift and extended work hours. Corrective actions were put in place that included management question and answer discussions with affected workers. ECP will re-survey the affected work groups during the next reporting period to gauge the effectiveness of the actions taken.

Project Completion Incentive Program

Approximately 3,600 workers are eligible for the WBN Unit 2 Project Completion Incentive Program. Of these, approximately 1,050 have at least 4,000 hours; 700 have at least 3,000 hours; 575 have at least 2,000 hours; and 500 have at least 1,000 hours. These individuals have been assigned and dedicated to the project, and provided they remain with the project until their work is completed, they could receive an incentive payout proportional to the hours they have worked. For any incentive payout to be made to eligible participants, commercial operation must be certified by TVA by December 31, 2015, and the project must be completed at or below \$4.4 billion.

The incentive program was implemented in October 2012 to help ensure safety and achieve the construction timeline and budget of the ETC. The incentive program will be funded by savings realized by the project if it is completed in a safe, quality, cost-effective, and timely manner.

Section 8 - Going Forward

During the next quarter, work will continue to release plant systems for cleaning and testing. The primary focus of testing will be on the subsystems, structures, and components required to complete the systems necessary for HFT. This testing will operate the unit at full temperature and pressure to show proper operation of key systems and components.

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Licensing focus will be on final preparations for the NRC's ORAT visit in 2015. The results from the mock inspection discussed earlier in this report were favorable to dual-unit operational readiness; however, preparations and challenge reviews continue for WBN operational departments to ensure the inspection is completed with no significant issues.

The project continues its focus on completing construction activities and the implementation of the project demobilization plan. The plan will ensure that support structures and materials used during construction are removed, that permanent structures and site grounds are restored, and that staffing is reduced in a manner that will ensure effective project completion and successful transition to dual-unit operations.