Watts Bar Nuclear Plant
Unit 2 Completion Project

Ninth
Quarterly Update to the
Estimate to Complete
May - July 2014

Published October 2014

Nuclear
Construction

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Section 1 - Executive Summary

The ninth quarterly update of TVA's Estimate to Complete (ETC) for Watts Bar Nuclear Plant Unit 2 focuses primarily on the activities between May and July, 2014.

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 full flow, integrated, open vessel testing (OVT) of Watts Bar Unit 2 safety systems, which is the first in a series of major project milestones.

System-specific construction work continued to support testing for future milestones. Those milestones include primary cold hydrostatic testing, secondary hydrostatic testing, hot functional testing, integrated leak rate testing, and fuel load. The schedule is organized to complete construction work to enable system testing in a sequence that supports each milestone.

Quarterly Summary Points

Safely worked over 28 million work hours without a lost-time incident

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

Met cost and schedule expectations

Continued to track to a most likely target of December 2015 for commercial operation

Released four more plant systems for pre-operational testing

Turned three systems over to Operations – service air, feedwater secondary treatment, and flood mode boration

Identified no new risks that would affect project completion

The Unit 2 team has experienced challenges and recognizes there will be additional challenges as the project moves forward. These 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 start up testing;
- Preparing for and transitioning to dual-unit operations; and
- Addressing regulatory and licensing issues.

The Unit 2 organization is adjusting as necessary to facilitate the resolution of challenges and risks. The organization is also aligning itself to support the continued reliable operation of Unit 1 while delivering the safe and high quality completion of Unit 2 within budget and on time — and to transition Watts Bar successfully to dual-unit operations.

Section 2 - Background

In August 2007, TVA's Board of Directors approved resuming construction to complete Watts Bar Unit 2. However, the project did not fully 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 Estimate to Complete 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 May to July, 2014.

The project successfully completed full flow, integrated OVT of Watts Bar Unit 2 safety systems, which is the first in a series of major project milestones.

OVT involved adding almost 185,000 gallons of water over a 23-minute period. This testing of the emergency core cooling systems was performed to confirm the systems operate as designed to deliver water to the reactor vessel.

During the quarter, construction was completed on the containment air return, demineralized water and cask decontamination, ice condenser, and reactor coolant systems.

As systems are released for pre-operational startup testing, the pipes, structures, and components that make up the systems are cleaned, flushed with water, inspected, and prepared for various component, performance, and acceptance tests. Major components, such as motors and power operated valves, are tested individually prior to testing the overall system. Temporary test fixtures are installed to conduct pressure boundary integrity testing (called hydrostatic testing) on systems that will contain pressurized fluids. Temporary test instrumentation is installed and fluid flow balance measurements are made. Upon successful completion of the system acceptance tests, the system is turned over for subsequent control by the Unit 2 Operations staff.

Some of the additional project accomplishments for the quarter were:

- Verified the completion of six systems previously released for pre-operational testing;
- Turned three systems over to Operations – service air, feedwater secondary treatment, and flood mode boration;
- Turned over the Unit 2 cooling tower area to Operations;

- Completed uncoupled runs of the reactor coolant pump motors;
- In response to Fukushima, the project completed construction of the FLEX Equipment Storage Building and new auxiliary feedwater supply tank, along with completing FLEX procedures and required operator training; and
- Hosted numerous visits by key stakeholders including the media; federal, state, and local political leaders; and the Chairman of the Nuclear Regulatory Commission (NRC).

In addition, the NRC closed 31 Inspection Planning and Scheduling (IP&S) items. Watts Bar Operations Training accreditation was renewed by the National Nuclear Accrediting Board, and the World Association of Nuclear Operators (WANO) Pre-Startup Review (PSUR) Team leads conducted a pre-visit for an assessment to be conducted later in the summer.

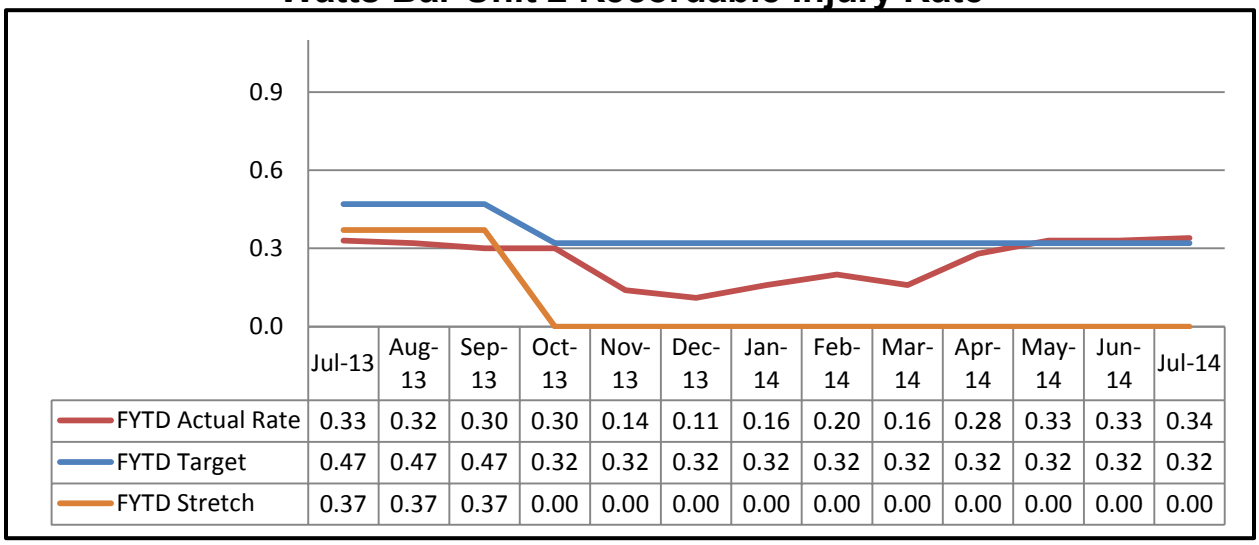
The project continued to strengthen its organizational response to emergent issues. Through the judicious use of daily structured review meetings, in close coordination with a dedicated response team, new issues were assessed promptly and corrective actions were planned and executed.

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

Safety

Safety is the highest value and the overriding priority for TVA and Watts Bar. During the quarter, Unit 2 personnel worked over 28 million work hours without a lost-time incident, a significant accomplishment. As the chart below shows, the Recordable Injury Rate[1] is slightly higher than target, but projected to be near target by the end of the fiscal year.

Watts Bar Unit 2 Recordable Injury Rate



	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14
FYTD Actual Rate	0.33	0.32	0.30	0.30	0.14	0.11	0.16	0.20	0.16	0.28	0.33	0.33	0.34
FYTD Target	0.47	0.47	0.47	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
FYTD Stretch	0.37	0.37	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Unit 2 workers will meet their targets by:

- Maintaining awareness of changing plant conditions as systems are turned over to the operating unit;
- Intervening when necessary to prevent teammates from engaging in behaviors that put themselves and others at risk; and
- Observing work in progress.

This quarter -
Over 748 interventions were performed by the craft safety teams and the Tri-lateral Safety Alliance made up of TVA, represented crafts, and contract partners.

Over 3,900 management observations were documented of which over 1,600 focused on human performance.

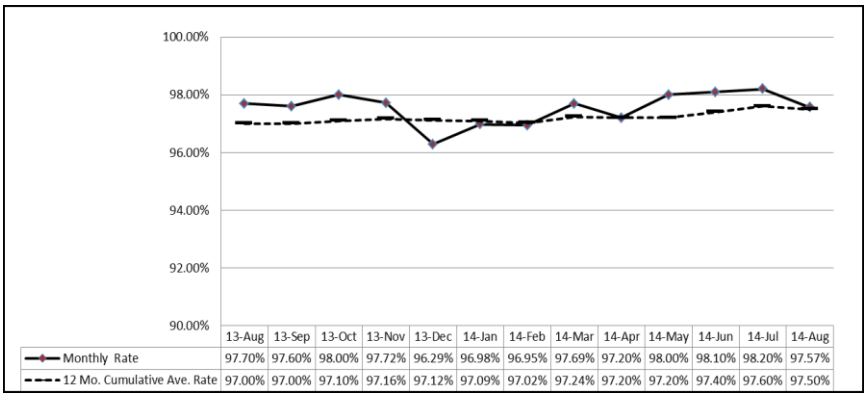
A key emphasis of the Unit 2 completion project is to intervene at any time to ensure safety. The Unit 2 team closely monitors low-level safety incidents and communicates those among project personnel, along with safety experiences from across TVA and the industry. This helps workers identify potential risks so they can take actions to keep themselves safe.

Quality

The quality of Watts Bar Unit 2 work remains high as measured by the Quality Control (QC) acceptance rate (see the accompanying chart). This rate measures the percentage of work that passes the QC inspection process on the first inspection during each month. For the past 12 months, the cumulative average acceptance rate is 97.5 percent.

Quality Assurance (QA), both TVA and Bechtel, 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.

Watts Bar 2 Quality Control Acceptance Rate



	13-Aug	13-Sep	13-Oct	13-Nov	13-Dec	14-Jan	14-Feb	14-Mar	14-Apr	14-May	14-Jun	14-Jul	14-Aug
Monthly Rate	97.70%	97.60%	98.00%	97.72%	96.29%	96.98%	96.95%	97.69%	97.20%	98.00%	98.10%	98.20%	97.57%
12 Mo. Cumulative Ave. Rate	97.00%	97.00%	97.10%	97.16%	97.12%	97.09%	97.02%	97.24%	97.20%	97.20%	97.40%	97.60%	97.50%

Significant highlights from this report period include:

- Field observations of the in-field performance of component testing, system flushing, reactor vessel upper internals lift, and preparations for primary cold hydrostatic testing;
- Continued oversight of Bechtel QA/QC activities with no significant findings;
- Successful completion of the annual QA Independent Audit of Watts Bar Unit 2 Nuclear Construction QA, including the implementation of American Society of Mechanical Engineers (ASME) Owner's Manual responsibilities, with no audit findings; and
- Successful completion of the annual Bechtel QA Audit of ASME III activities with no audit findings.

Cost

During the quarter, the project continued to trend to a completion cost of between $4.0 billion and $4.2 billion, which is on target and within the most likely range estimate included in the ETC. This is consistent with meeting the most likely commercial operation date of December 2015.

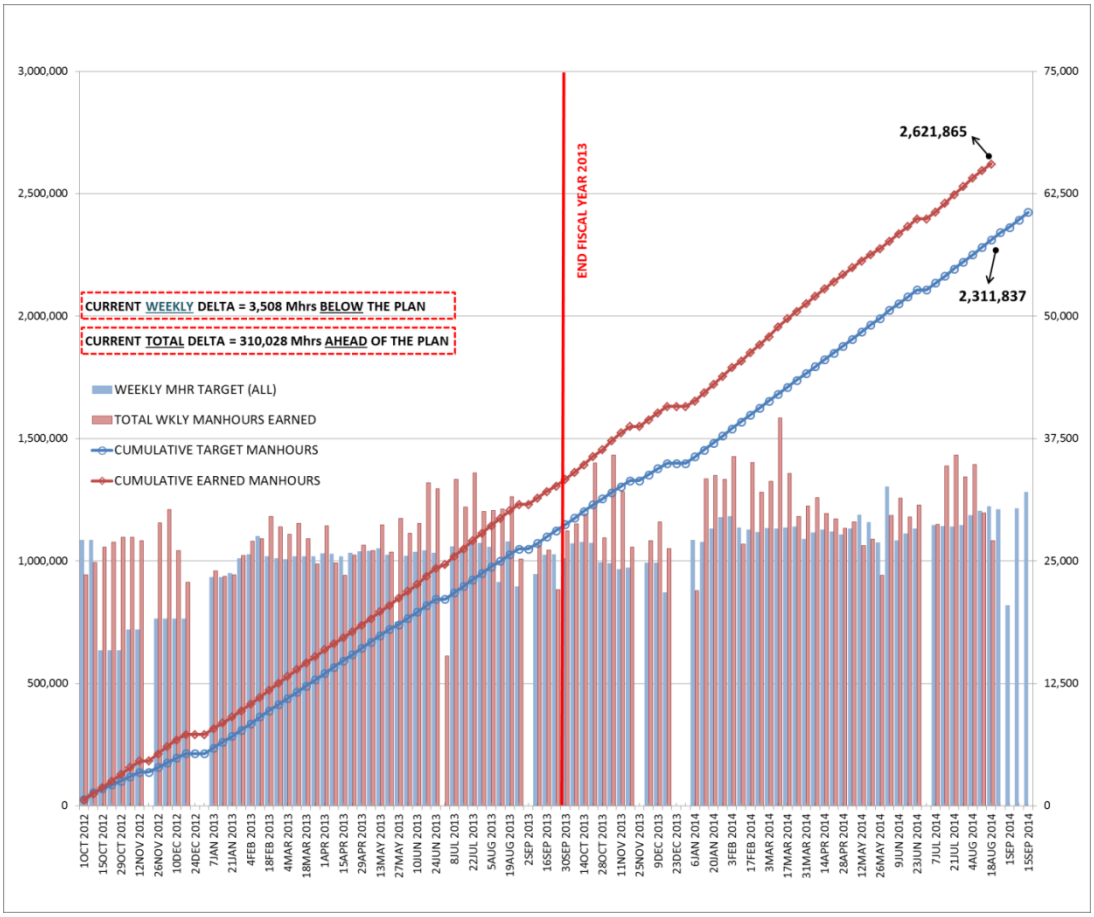
A workforce de-staffing plan was developed during the previous quarter and the project is reducing the workforce in a manner that is consistent with the plan. This is part of the project plan and is needed to ensure budget and schedule adherence.

Schedule

Based on current and targeted schedule performance, the project continues to track earlier than the most likely fuel load date of June 2015 and commercial operation in December 2015.

Overall, the project continued to earn more hours than targeted. This is shown on the chart below which compares actual earned hours per week to the number of hours targeted to be earned.

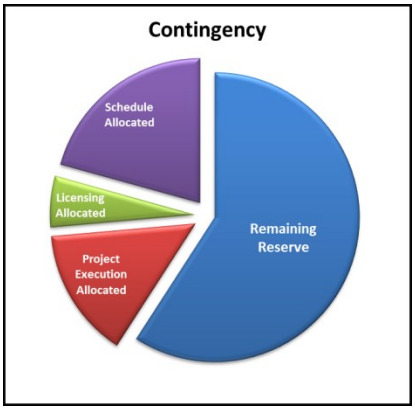
Watts Bar Unit 2 Target Versus Actual Earned Man Hours



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 as extracted portions in the chart.



Section 5 - Known Risks

In order to ensure a realistic perspective of risk, the project has emphasized risk identification and analysis during the critical transition to system testing.

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 to the right. Additional information on the risks follows.

Risk	Risk Trend
Waste Confidence	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

Waste Confidence

The NRC approved the "Waste Confidence Rule," now called "Continued Storage of Spent Nuclear Fuel Rule" and has directed the Atomic Safety and Licensing Board (ASLB) to vacate contentions raised by external stakeholders. The ASLB has vacated the contentions and disbanded in the proceeding related to the Watts Bar Unit 2 operating license.

The remaining action related to the Continued Storage of Spent Nuclear Fuel Rule is the NRC staff's comparison of the Generic Environmental Impact Statement to the Watts Bar Unit 2 Final Environmental Statement. This is expected to be complete by the end of November 2014.

Dual-Unit Operational Readiness

Actions to prepare for dual-unit operations continue with good progress. A mock WANO PSUR was conducted in early June with no significant findings or other issues. This review was conducted by a team consisting of former Institute of Nuclear Power Operations (INPO), WANO, and industry leaders. The team was led by a former INPO vice president. Key actions from this review are being tracked by the project team and are on schedule to be resolved prior to the WANO PSUR in August.

The Dual-Unit Operational Readiness Team (DUORT) is transitioning into an oversight role by transferring responsibility of the remaining actions to the operating organizations in an orderly manner. With the completion of the organizational re-design and the refueling outage on Unit 1, the operating organizations are aligning their staffing for dual-unit operations. This will facilitate

preparations to accept system, area, and program turnovers and to plan the initial fuel loading and operations of Unit 2. The DUORT will continue to monitor progress and provide assistance to ensure the plan stays on schedule.

The Test Review Group, which is a subcommittee of the Plant Operations Review Committee, has begun to review the power ascension test procedures with all expected to be ready for use by the end of September 2014.

Closure of Licensing Issues

An area that continues to require focused attention is resolving 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. Approximately 79 percent of the items have been completed.

Documenting Completion of Work

The quantity and complexity of required documentation continues to present a challenge to productivity. The project has made many positive changes to ensure the quality and ease of completion of the required construction documentation.

Changes included unbundling complex or multi-system design or construction work packages to simplify the verification of the documentation; performing earlier quality checks of documentation during the work; and inspecting for specific, critical attributes of the documentation after the work is completed. Assessments and weekly metrics continue to demonstrate quality closure and closure rates sufficient to support the project schedule.

As the project moves further into the startup and testing phase, documenting closure of startup and testing activities will receive a comparable level of scrutiny and effort to ensure similar positive results.

Construction Completion

The Construction organization continues to focus on the turn-over of plant systems to startup testing, as well as activities that support the readiness for near-term, upcoming milestones of primary cold hydrostatic and secondary hydrostatic testing. Actions have been carried out to ensure appropriate oversight is given to managing activities related to scope control and construction project demobilization.

Cyber Security Requirement Implementation

The NRC has established requirements related to cyber security to help protect important information technology assets from damage perpetrated by malevolent entities. The requirements for cyber security at Unit 2 are in the final stages of planning and are being implemented. The NRC conducted a Cyber Security Inspection in July 2014. The results of this inspection are being addressed by the project team.

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.

The modifications project at Watts Bar, which has been designated as a pilot for the industry, has established a path forward that meets the NRC requirements to date, resulting in a lower risk. As a result, Unit 2 will be much more resilient to a broader range of unexpected environmental events.

The Watts Bar site has made significant progress in completing the required additions for both units. Specific accomplishments during the quarter include:

- Completed the FLEX Equipment Storage Building;
- Completed the new auxiliary feedwater supply tank;
- Completed FLEX procedures and required operator training; and
- Made significant progress on Unit 2 pipe taps and the 225 kVA diesel generator and 3 megawatt diesel generator installations.

Startup Testing Delays

The project continues to experience schedule delays from startup testing activities. These delays are related to equipment failures and the 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. Actions to address these issues include making scheduling and resources adjustments to allow the project to get into more testing sooner; embedding a rapid response engineering team in the startup group to help efficiently resolve issues; using subject matter expert teams with high impact, high-risk activities; and expanding the use of mock-ups and dry-runs of activities.

Emergent Work and Verification of Released Systems

Levels of emergent work added into the schedule continue to be higher than desired. Analysis indicated that only a small percentage of new work orders represented new scope, while the remaining work orders addressed timing, support, or breakage.

To ensure new scope is accurately identified before it is added into the schedule, the project dedicated resources to expedite the identification, initiation, and addition of scope appropriately required for systems to be used in primary cold hydrostatic testing, secondary hydrostatic testing, and hot functional testing.

In addition, work orders are being estimated and material needs identified so that the schedule is more accurate. The project is closely monitoring the system release process for the key systems required for the testing milestones and is ready to make further improvements as needed.

As reported in the last quarterly update, incomplete work and incomplete documentation had been discovered on some previously released systems. This has delayed both the testing and the release of these systems to the Operations staff. A revised turnover process continues to be implemented and provides comprehensive reviews and coding to ensure construction work is complete or specific known exceptions are approved prior to turnover.

Section 6 - Project Oversight

Project Assurance

Evaluations completed by the Project Assurance organization found that the project continues to track toward the ETC's most likely dates for fuel load of June 2015 and for commercial operation of December 2015.

Project Assurance observation reports completed during the quarter included the following items.

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

- Resource and schedule challenges exist in meeting aggressive system turnover schedules while performing scheduled activities associated with the hot functional testing milestone.
- Challenges were identified in meeting schedule dates for system pre-operational tests required for hot functional testing due to circuit board failures associated with Reactor Protection System instrument loop calibration activities.
- Improvements are needed in schedule durations for planning and installing system clean plan temporary flush modifications to minimize negative impact to schedule and rework.
- Implementing controls are needed to assure line managers are aware of budgeted overtime expense limits and are held accountable for unapproved variances.

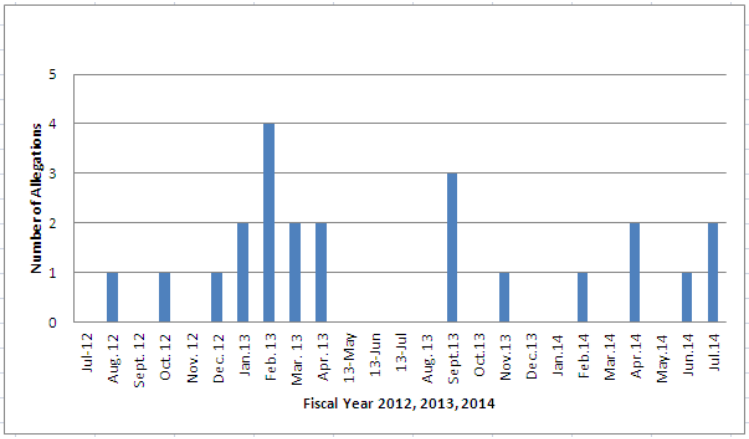
Section 7 - Project Organizational Health

Nuclear Safety Culture

Employee Concern Program (ECP) surveys of employees this quarter continue to indicate 98 percent of all personnel would raise a nuclear safety or quality issue if one was identified.

The number of concerns expressed during this quarter, however, was higher than the previous reporting period, which had also shown an increase from the prior quarter. The ECP experienced an increase in concern traffic and three allegations were submitted to the NRC. None of the allegations were referred from NRC to TVA for further investigation during this reporting period. The conclusion by the ECP is that the increase in concerns is partly due to the increased reduction of contractor personnel during the reporting period and perceived schedule pressure.

Allegations to the NRC



The receipt rate of technical concerns was consistent with the last reporting period and accounted for 25 percent of the concerns received. Concerns related to management and personnel issues continue to be the highest contributor to the concerns received in both the Bechtel and TVA ECPs.

The project continues to use a variety of methods to communicate with employees, reinforcing the need for working safely, explaining decisions and actions, and continually encouraging personnel to bring forward concerns.

Project Completion Incentive Program

Approximately 3,100 workers are eligible for the Unit 2 Project Completion Incentive Program. Of these, approximately 1,000 have at least 3,000 hours, 900 have at least 2,000 hours, and 600 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 support primary cold hydrostatic testing. This testing is designed to verify that welds, joints, pipes, and components in the Reactor Coolant System and associated high-pressure systems hold pressure and do not leak. These are important steps in the pre-operational startup tests that will verify the systems meet regulatory requirements before their control is turned over to the site Operations staff.

Once primary cold hydrostatic testing has been completed, the project will focus on preparations for secondary hydrostatic testing and hot functional testing.

Another area of focus for the project will be completing construction activities and the continued implementation of the project demobilization plan. The plan will help make sure that as the project is completed, construction support structures and materials are removed, permanent structures and site grounds are restored, and the de-staffing plan is implemented in a manner that will ensure effective project completion.