

Watts Bar Nuclear Plant Unit 2 Completion Project

**Fourth
Quarterly Update to the
Estimate to Complete
February 2013 - April 2013
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**Nuclear
Construction**

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Section 1 - Executive Summary

The fourth quarterly review for TVA's Watts Bar 2 (WBN2) completion project reflects the progress made during a full year of work following the TVA Board of Directors approval in April 2012 of a revised Estimate to Complete (ETC) the project. Results of the quarterly review show performance continues to be consistent with the revised ETC.

In summary:

- Workers delivered good safety performance, maintaining the fiscal year-to-date recordable injury rate of 0.19, which is better than the goal of 0.47.
- Quality performance measured by the Quality Control (QC) Acceptance Rate remained high, improving to above 97 percent and better than the goal of 95 percent.
- Schedule performance continued to track to the most likely targets of June 2015 for fuel load and December 2015 for commercial operation. The current critical path schedule supports an earlier fuel load date in April 2015 and commercial operation in November 2015.
- The WBN2 project continued to trend within the overall project budget and had a favorable variance to the fiscal year (FY) 2013 authorized cash flow.
- No new risks were identified that currently compromise project completion.
- Regulatory and licensing issues remained the primary risks for the project.
- As a result of a work environment assessment conducted last quarter, actions were implemented to further improve the work environment and to support and sustain project completion. Specific actions focused on more effectively communicating information about the project and its progress; removing barriers so work can be done safer, better, and faster; and improving teamwork between Unit 1 and Unit 2 personnel to support the transition to a two-unit operating station.

Moving forward, the WBN2 team is focusing on effectively addressing challenges with work order (WO) packages that contain multiple systems and complex activities, controlling work scope, scoping the work to install electrical conduit and cable, system completion, open vessel testing (OVT), and preparing for dual unit operations.

Section 2 - Overview

Background

After TVA's Board of Directors approved resuming construction to complete WBN2 in August 2007, 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 problems and developed a new project ETC. The new ETC is based on a range of values for schedule and budget that were developed using the risks associated with meeting expectations. More information and additional details about the cause analysis, as well as the process that was used to develop the new ETC, can be found in the *Executive Final Report on the Estimate to Complete*:

http://www.tva.com/power/nuclear/pdf/wattsbar2_executive_etc.pdf

Based on the new ETC, on April 26, 2012, TVA's Board of Directors approved continuing toward completing and starting up Watts Bar Unit 2. The project's approved budget and schedule ranges are shown below.

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

Quarterly Performance Summary

As part of the new ETC, the WBN2 team provides a quarterly update in order to maintain the integrity of the estimate, as well as to provide transparency into project performance.

The project met its targets for safety, quality, cost, and schedule in the three months from February through April 2013. The cash flow forecasts for the project in FY 2013 are also expected to be met. Information illustrating project performance and explanations of the metrics used to measure that performance are provided in the remaining sections of this report.

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Key Milestones

Project team members achieved a number of milestones while meeting the quarterly targets. Those milestones include:

- Achieving more than 19.7 million hours without a lost-time incident;
- Performing activities in a manner that resulted in the QC acceptance rate improving to above 97 percent;
- Completing 350,121 hours compared to the plan of 334,204 hours, for a net gain of 15,917 hours;
- Releasing the first system - Service Air - from Construction for testing in over a year and stamping the system in accordance with American Society of Mechanical Engineering (ASME) standards;
- Completing a Nuclear Regulatory Commission (NRC) Problem Identification and Resolution inspection with no findings or violations;
- Receiving a Supplementary Safety Evaluation Report (SSER) providing regulatory review and approval of the Watts Bar Unit 1 and Unit 2 Fire Protection Report;
- Developing a new, simplified, and fully integrated schedule for installing electrical cables and identifying the scope of the electrical work to be completed - a critical activity for conducting the OVT milestone scheduled for spring 2014;
- Establishing a Project Performance Index (PPI) as a broad-based indicator to better measure project completion progress.

Project Risks

No new risks were identified during the quarter that compromise project completion. Previously identified risks and trends are shown at right.

Risk Area	February 2013 - April 2013	Risk Trend
Fukushima	High	Stable
Work Document Closure	High	Stable
Waste Confidence	High	Improving
Licensing Strategy	Moderate	Improving
Budget	Moderate	Improving
Schedule	Moderate	Stable
Overall	Moderate	Stable

Fukushima – The NRC continues its work to fully develop a final regulatory framework for the nuclear industry’s response to the Fukushima event. In the interim, the WBN2 team has developed a number of alternatives based on the regulatory information available and on input from the nuclear industry. Until the NRC completes its work, however, the risk stemming from Fukushima events remains high and stable.

Project Risks (continued)

Fukushima (continued)

During the quarter, TVA submitted information required by the NRC regarding company plans for responding to Fukushima-like events. The submittals also included TVA's plans for implementing FLEX strategies, which are industry-standard responses that use diverse and flexible emergency plans and portable equipment to increase protection against extreme events.

Key WBN2 activities in progress that address Fukushima concerns include:

- Engineering work is about 50 percent complete to determine necessary modifications at Cherokee and Douglas dams.
- Engineering work is about 65 percent complete to design permanent replacements for temporary flood barriers at four affected dams.
- The structural analysis of eighteen dams continues using updated flood and seismic criteria. Walk downs of the dams, new seismic hazard calculations, and new flood elevation calculations have been completed. Geotechnical exploration, which has been completed on eight dams, is in progress on ten more.
- Design engineering for a building to house FLEX equipment is approximately 90 percent complete; diesel pumps and portable generators have been procured.
- Designs are in progress for the physical installations of the FLEX equipment.
- The design of additional instruments to monitor water level in the spent fuel pool is about 50 percent complete and the instruments have been procured.
- Design is underway for a new condensate storage tank, replacing the old tank and capable of withstanding the effects of extreme events.
- A Seismic Probabilistic Risk Assessment is underway.
- Design and procurement continue for new communications equipment.

Work Document Closure – Building a nuclear power plant requires a significant amount of documentation to prove work is complete and meets regulatory and design requirements. Document closure involves verifying not only that the intended work scope was completed and properly documented, but also that the documentation meets the standards for completeness required for records that must be maintained for the life of the plant.

For a number of reasons related to the history of WBN2, work packages are large and complex, requiring additional effort to verify and establish requisite documentation and assurance of proper completion. Until the paper is closed, turnovers of plant systems cannot occur and there is risk of additional work scopes being identified.

The project has taken a number of steps to better drive capacity and closure of work documents, and to prioritize around critical project milestones. Consequently, throughout the quarter, the risk associated with work document closure continued to be high, but stable. Project management will continue to closely monitor performance in the challenging area of closing work documents given the critical path nature of this activity.

Work Document Closure (continued)

While a number of WOs have been added largely due to changes in scoping brought about by the transition from doing bulk construction to doing work guided by system completion, many have been cancelled, or completed and closed this FY. This quarter has seen a net reduction in the creation of additional WOs brought about by significant progress in finishing electrical scoping, re-evaluating previous work scope, and placing additional controls on adding scope.

By the end of April, 2,795 construction WOs were closed FYTD. The FYTD target to support an early December 2014 fuel load date is 3,425 such closures, so performance is at the level needed to support the ETC fuel load date.

Closures supported the early release of system 33 and are tracking for early release of three more systems during the next quarter.

Capacity is in place and resources will be aligned as needed to support schedule-driven work document closure demands.

Waste Confidence – The NRC is in the process of revising a “Waste Confidence Decision,” which is a generic determination that spent nuclear fuel can be managed on site after a plant is shut down and until a permanent repository is established. A federal court invalidated NRC’s initial “Waste Confidence Decision” by ruling that the earlier decision failed to fully comply with the requirements of the National Environmental Policy Act. The revised Waste Confidence rule is scheduled to be issued and approved by October 2014.

The WBN2 team continues to closely follow this issue and considers the associated risk as high since it has the potential to impact the final licensing process for the project. The risk is expected to be reduced to moderate later this year as the NRC achieves milestones toward final approval of the revised Waste Confidence rule.

Licensing Strategy Implementation – Overall, the risk to the project from known licensing issues is considered to be moderate and improving. The reduction in risk is the result of the continued implementation of a strategy to address myriad regulatory and licensing challenges and to improve the quality and timely completion of licensing documents.

One area of focus is resolving hydrology issues. Public meetings on hydrology were held between January and April 2013 specifically to discuss flood safety margins related to the plant design and licensing requirements, as well as future installation of additional capability to mitigate potential threats from extreme flooding that goes beyond the plant’s design base.

A second area of focus is dispositioning 541 specific Inspection Planning and Scheduling (IP&S) items the NRC has determined it must inspect and close before fuel can be loaded into WBN2. Most of the IP&S items to be closed are legacy issues. The NRC has closed about 48 percent of these items to date; this represents an increase in closure of seven percent this FY. According to the NRC, an additional thirty-four IP&S items will be closed in the upcoming inspection report, resulting in a total closure to date of 53 percent. The remaining items are scheduled for completion concurrent with turning systems over for operation.

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Licensing Strategy Implementation (continued)

During the quarter, TVA achieved a significant milestone in the process of obtaining an operating license for WBN2 when the NRC issued SSER 26 which documents the NRC's review and approval of the Watts Bar Unit 1 and Unit 2 Fire Protection Report that was submitted for review last quarter. The report provides detailed information that establishes the plant is designed and operates in a manner that conforms to the regulations and requirements for addressing and mitigating hypothetical fires.

The NRC identified three apparent violations associated with the Commercial Grade Dedication (CGD) Program that is used to provide reasonable assurance that components purchased from commercial suppliers can perform their intended safety functions. The apparent violations were the subject of escalated enforcement action for which the NRC proposed a civil penalty in the amount of \$70,000. Comprehensive actions at WBN2 to address the issue have included aligning the process with industry standards and updating and revising CGD packages to meet standards. A large percentage of the items in question have been reviewed and tested. Through April 2013, no issues had been found to challenge a component's ability to perform its safety function, nor are any significant issues expected.

In the previous quarterly update, it was noted the NRC was drafting two new rules that could potentially impact the WBN2 licensing schedule. The rules, which involved responses to station black out and nuclear fuel cladding, have been rescheduled into FY 2016 and should no longer impact the WBN2 project.

Budget – Overall, the budget risk is considered to be moderate and improving. This is the result of project-to-date spending, managing cost-related risks, and the use of additional and more comprehensive monitoring of cost status as the project transitions from bulk work to work guided by system completion and testing.

While project-to-date spending has been less than planned and schedule performance has been slightly better than planned, the project increased the FY cash flow by \$62.6 million over the baseline \$500 million forecast for a total FY expenditure of \$562.6 million. The cash flow was increased to better align expenditures with priorities. The priorities include accelerating engineering completion activities, developing methods of applying ASME nuclear quality standards to certain work, and increasing the staffing levels of construction workers in order to support early completion, testing, and turnover of selected systems to operations.

Cost-related risks that were added to the budget remained acceptable and well within available contingency resources, with approximately 22 percent of the project cost risk contingency allocated to date.

The project recognized that as the transition to system turnover and testing began, the Cost Performance Index (CPI) used to measure how efficiently work was being performed would degrade in its ability to accurately reflect progress.

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Budget (continued)

In response, WBN2 personnel established and began using a new monitoring tool during the quarter. The new indicator - the PPI - provides more comprehensive monitoring of overall project cost. Project elements that make up the broad-based indicator include construction, engineering, work closure, startup, system completion, operations, Fukushima responses, hydrology-related actions, and overall project support functions. The PPI is trending to an ETC range of \$3.74 billion to \$3.96 billion.

Schedule – Risks to the schedule did not significantly change, resulting in the overall schedule risk being considered moderate and stable.

The project began transitioning from bulk construction during the quarter to focus on completing systems and readying them for release for testing. The sequence of system turnover is guided by a series of milestones required to obtain a license to operate the unit.

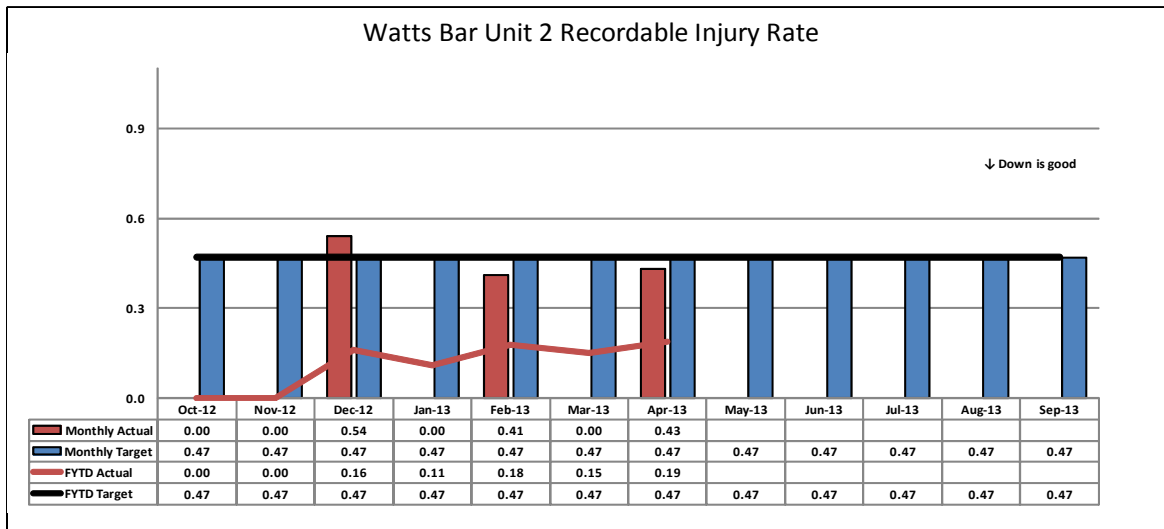
One of the milestones is Open Vessel Component and Logic Testing, which involves pumping water through seven specific systems that are required for operating and shutting down the reactor and supporting reactor operations. These systems must be ready for testing later this year and they are the focus of work at this time.

Overall, the remaining hours scheduled to complete WBN2 continue to be less than the number of hours predicted in the new ETC, with schedule performance continuing to track to a most likely date to load fuel in June 2015, with a target for commercial operation in December 2015. The schedule of critical path milestones supports a more aggressive fuel load date of April 2015 and a November 2015 date for commercial operation.

Section 3 - Quarterly Estimate to Complete Results by Category

Safety

Safety performance for the quarter remained good. WBN2 workers exceeded more than 19.7 million work hours by the end of the quarter without a lost-time incident. The Recordable Injury Rate performance continued to be better than goal, as shown in the graph below.



This sustained performance is the result of activities that have been consistently carried out during the course of the year. For example:

- Workers intervene to protect teammates from unsafe activities as part of a safety intervention program developed by the Tri-Lateral Safety Alliance.
- Workers submit safety suggestions and effectively identify job hazards in order to improve workplace safety.
- Positive reinforcement of safe performance is provided, like presenting the “Safe Worker of the Month” award.
- There is an active, employee-led safety team with management sponsorship.
- Safety information is disseminated across the project via various media, including through a craft safety newsletter.

Another area addressed was the number of low-level safety incidents which was higher than desired. Because this could be a precursor to a serious safety incident, Bechtel implemented a safety improvement plan in April. The plan identifies four areas for concentrated improvement:

- Leadership and involvement by managers and supervisors;
- Communication and coordination;
- Employee involvement and engagement;
- Identification of barriers and opportunities.

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Safety (continued)

An assessment team identified specific items within each area for targeted improvements, and action plans were developed and responsible individuals assigned for each item. Results of the increased focus will be provided in the next quarterly update.

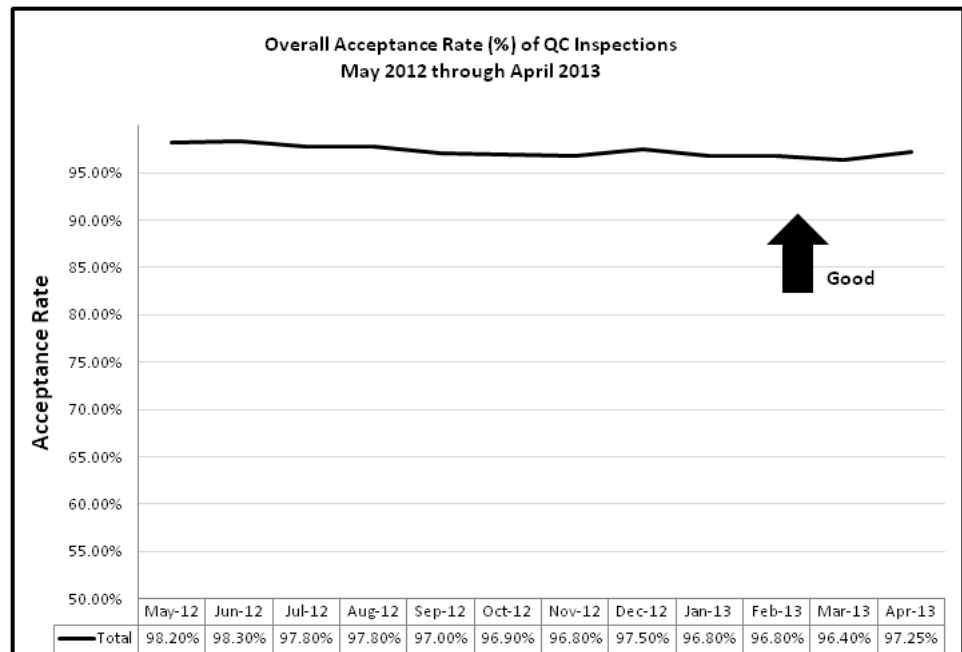
Quality

The quality of WBN2 work remains high as measured by the QC acceptance rate. This rate indicates the percentage of work that has passed the QC inspection process.

Oversight activities carried out by both TVA and Bechtel Quality Assurance (QA) did not identify any significant issues during the quarter. Some issues having low safety significance were identified in the CGD Program, ASME III program activities, QC performance, the turnover process, and the Corrective Action Program (CAP). These issues were entered into the project’s CAP and are being addressed.

In March, QA completed an audit of the ASME III QA Manual activities that are conducted by TVA, Bechtel Power Corp., Bechtel Construction Operations Inc., and PCI Energy Services, LLC. The audit also looked at the implementation of TVA’s Pre-Service Inspection Program.

The audit team concluded that overall the project personnel satisfactorily implemented program requirements and that WBN2 ASME III activities met QA and regulatory requirements. The audit team identified deficiencies in establishing and maintaining ASME III staging areas. This issue was entered into the CAP for resolution along with several other deficiencies and recommendations.



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Cost

Overall cost performance for WBN2 continued to be better than projected in the new ETC and remained within the overall budget.

Previously, WBN2 had reported construction cost and progress using CPI, the standard industry metric, which is an indicator of how efficiently work is being performed against the plan.

During the quarter, as the project transitioned from installing bulk commodities to doing work according to system turnover and testing, the CPI was replaced with the PPI, a more comprehensive metric for monitoring performance cost. The PPI integrates and adjusts overall project factors such as risk, budgets, schedules, difficulty of work, productivity, and other aspects of doing work according to system turnover and testing. The PPI also captures contingency funds that have been allocated to date and predicts the potential scope of future contingency activities along with schedule and cost impacts.

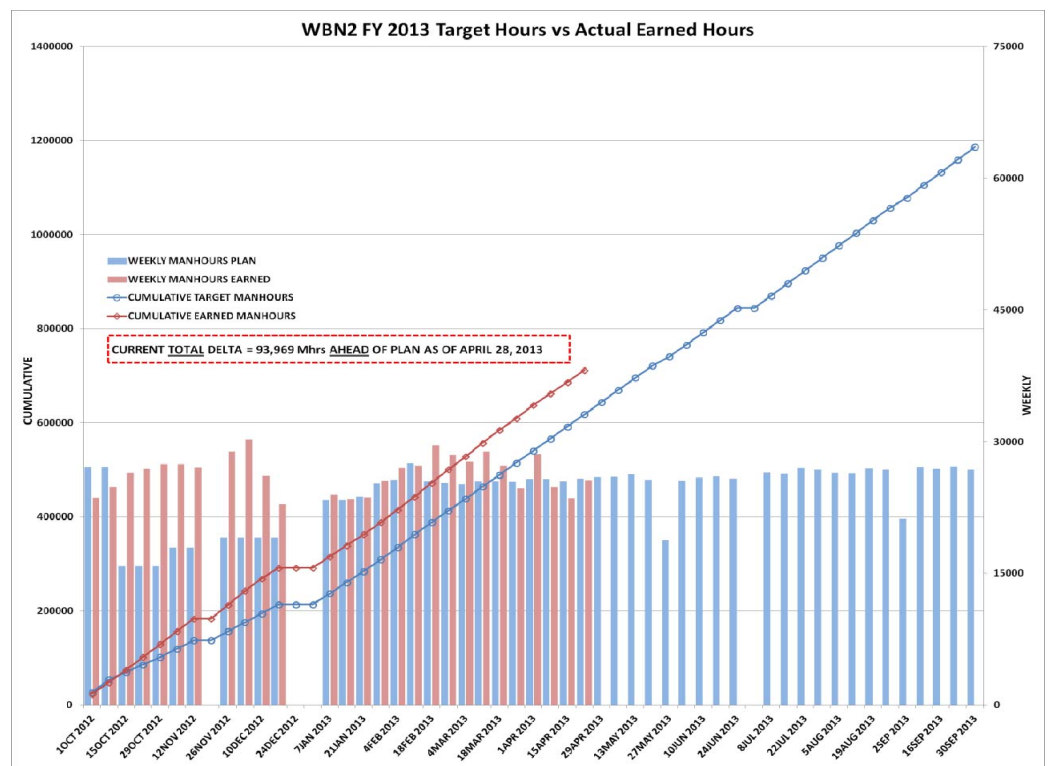
The PPI indicated a trend to cost at completion of \$3.74 billion to \$3.96 billion, which is within the ETC ranges.

The project increased its FY 2013 cash flow by \$62.6 million for a total expected expenditure of \$562.6 million. The cash flow was increased to better align expenditures with priorities previously discussed.

Schedule

Schedule performance met expectations for the quarter. Work hours earned through April were 93,969 greater than targeted. This indicates more progress was made toward completing schedule work than was planned.

The chart at right compares actual hours earned per week to the number of hours targeted to be earned.



Schedule (continued)

In addition, the project continued to refine the project critical path schedule with attention on systems related to OVT. The critical path schedule defines the activities and the sequence required to reach that milestone. Performance toward the critical path schedule to reach the OVT milestone indicates there is schedule margin relative to the “most likely” schedule approved in the ETC.

Schedule estimates also were made to account for equipment malfunctions, scope changes, and other unknowns that are to be expected in mega-projects of the size and complexity of WBN2. In fact, the new ETC contains estimated work hours in reserve for many categories of uncertainties that could impact the schedule and completion date.

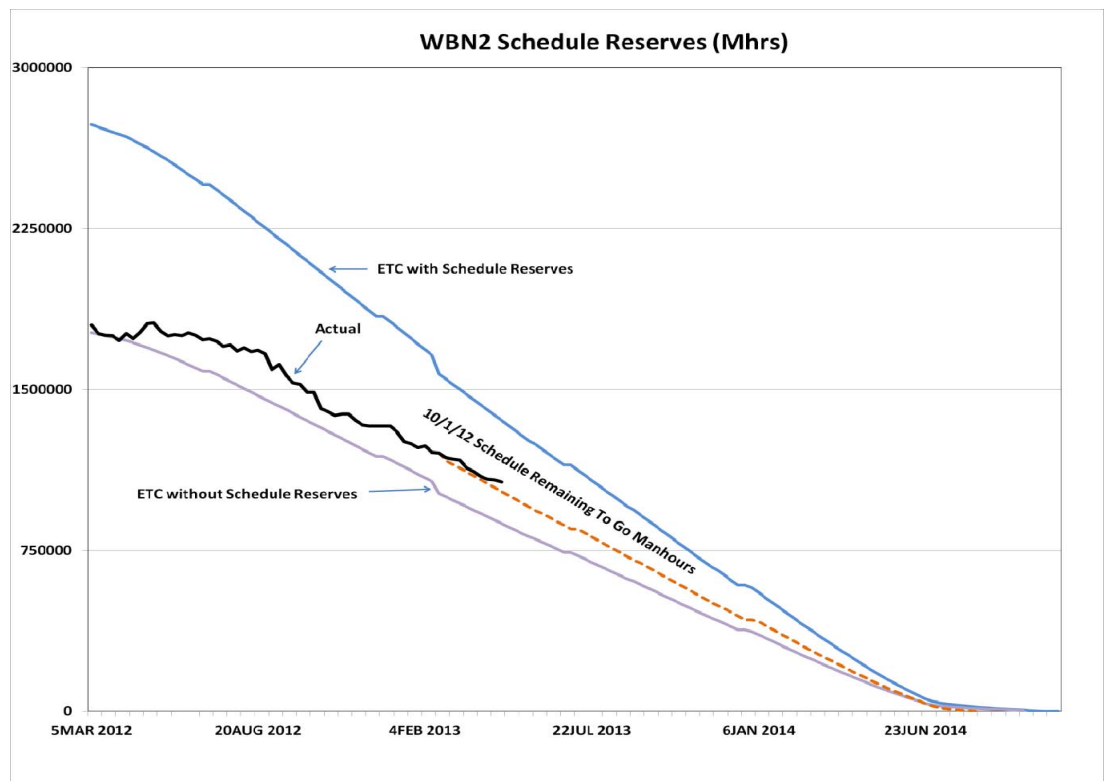
The chart to the right shows how the project is using these schedule reserves. The goal is to ensure the project continues to track between the “ETC without schedule reserves” and the “ETC with schedule reserves.”

The “actual” line indicates that the project is progressing through the schedule at a

pace that does not threaten using all the schedule reserves. This provides assurance that the schedule can be completed within the schedule approved in the ETC.

Currently, the schedule is on track to meet project completion milestones. Challenges are anticipated as the transition continues from bulk work to system turnover and testing at the same time the project is accelerating system completions.

The project is focused on keeping schedule performance at or above target by continuing to develop and implement actions that sustain schedule performance.



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Schedule (continued)

Actions taken during the quarter included:

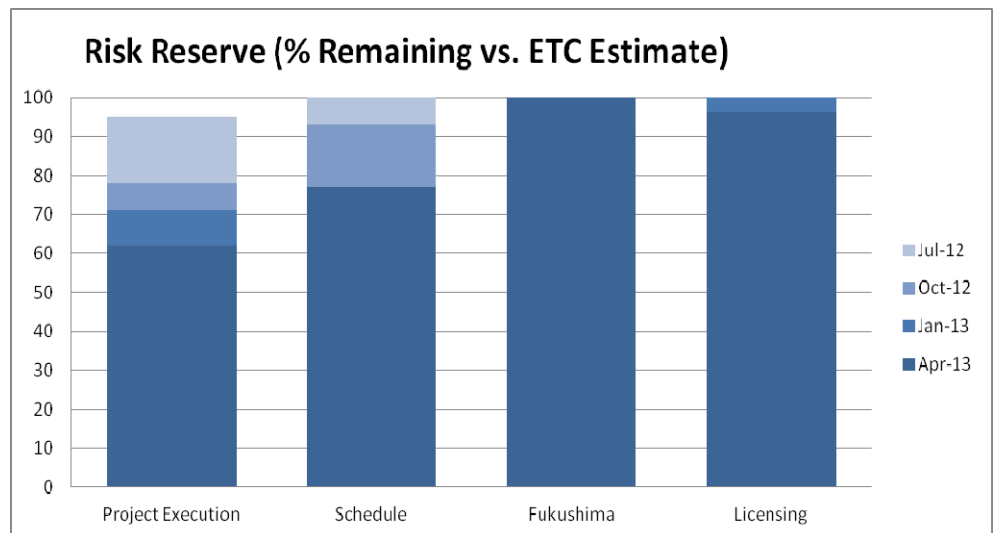
- Conducting daily schedule adherence meetings to identify and remove barriers, and to ensure accountability;
- Incrementally increasing craft staffing levels to match schedule loading;
- Maintaining an aggressive schedule target;
- Conducting twice-a-day meetings on progress, restraints and challenges associated with near-term critical path system turnovers;
- Daily monitoring of the project, system critical path tracking, construction field work completed, construction work released to testing, and work document closure.

Risk Management

Another goal of quarterly ETC updates is to understand how the project manages risks that could increase costs or extend schedules or both.

As part of developing the new ETC, potential project risks were identified and categorized and plans were developed to address them.

Each potential risk has a budget assigned in the ETC, and the amount of this contingency funding that is actually used acts as a measure of the accuracy of the mitigation plans or whether additional effort and funding will be required.



The chart above shows the current status of the risk reserve and the changes since the last ETC quarterly update.

The project actively maintains and manages a risk register to identify issues that may increase cost or delay the schedule. The probability of these issues occurring and potential consequences are evaluated and each issue is rated as high, moderate, or low risk. Risk mitigation plans have been developed for issues that are judged to pose a moderate or high risk to WBN2 completion.

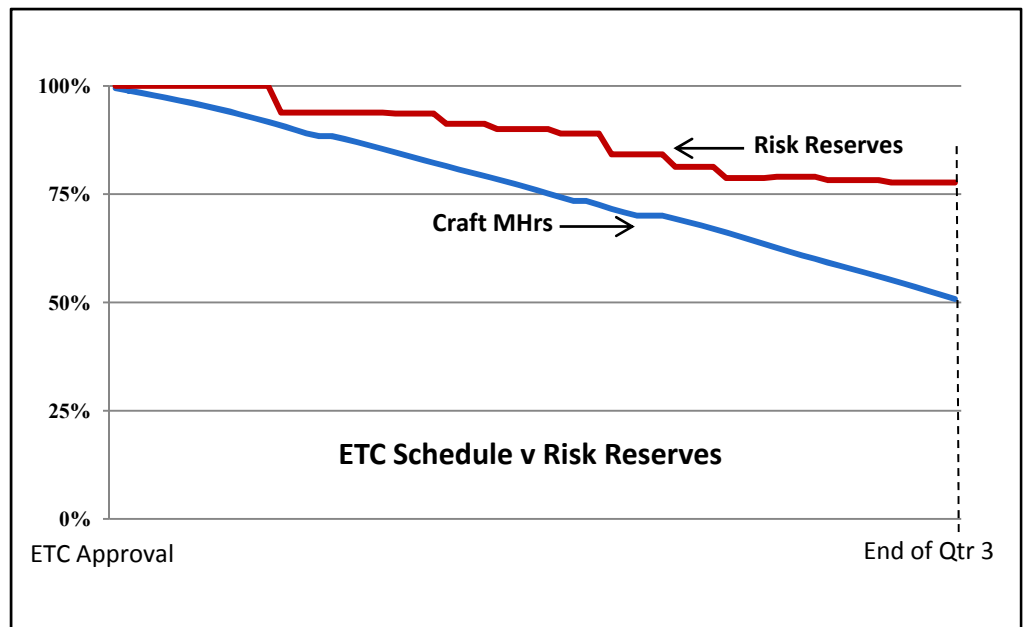
Risk Management (continued)

A number of items on the risk register have been closed as project work continues. Others, including those with the potential to impact other areas of TVA, have been forwarded to TVA's Enterprise Risk Management group.

Risk reserve funds are allocated through the Change Control Board (CCB) process, with about 78 percent of the fund available, which is well within the range expected and planned for in the new ETC. The amount of contingency funding allocated to date does not indicate a risk to the overall cost of the project as compared to the ETC.

In addition to analyzing the amount of risk reserves allocated, it is important to understand the rate at which risk reserves are allocated.

The chart at right correlates project schedule to allocation of risk reserves. This chart shows that risk reserves are being allocated at a slower pace than the project schedule progress, as shown by craft hours.



The chart normalizes risk reserves and craft hours to 100 percent at the approval of the ETC. This comparison gives assurance that assumptions in the ETC are valid regarding the rate of allocating risk reserves.

Commodity Quantity Analysis

The project team reviews the quantity of physical commodities installed each quarter as a way to monitor progress. Commodities for both planned and unplanned work are estimated and reviewed using a bottom up approach. For planned work, the estimates of completed commodities and quantities remaining are prepared using a database that identifies each commodity by WO and unique identifier. Estimates for unplanned work are prepared using information from the Engineering and Construction groups.

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Commodity Quantity Analysis (continued)

Overall, the pace of commodity installation during the quarter tracked to meet project completion milestones as scheduled.

Commodity quantity analyses approved by the CCB, or that were pending before the CCB as of April 30, resulted in the reduction or addition of quantities for some of the commodities listed as compared to the last quarter.

During the quarter, WBN2 management asked TVA's Office of the Inspector General (OIG) to review the bulk commodity work tracking process to identify gaps or weaknesses. The OIG review identified minor vulnerabilities in the

process, such as the potential for duplicating data entry and review, and recommended actions to eliminate them. WBN2 management responded with a corrective action plan with which the OIG has concurred.

Moving forward, commodity evaluations will continue on a quarterly basis and recommended adjustments will be presented to the CCB for approval. And, as the project transitions more into system completion, commodities will shift from bulk installation to system-related installation, resulting in the rate at which commodities are installed being determined by the project's critical path schedule.

Commodity Quantity Analysis				
Commodity Description	Unit of Measurement	Board Approved	To Go as of April 30, 2013	Percent Reduction Since April 2012
	<i>Large Bore (LB)</i>	<i>Small Bore (SB)</i>	<i>Each (EA)</i>	<i>Linear Feet (LF)</i>
Miscellaneous Steel	Pounds	109,855	26,554	76%
LB Pipe Weld Install	EA	322	172	47%
LB Hanger Install	EA	151	79	48%
LB Hanger Remove	EA	229	51	78%
LB Hanger Modify	EA	506	208	59%
SB Pipe Install	LF	2,043	414	80%
SB Weld	EA	2,959	672	77%
SB Hanger Install	EA	233	120	48%
SB Hanger Remove	EA	105	30	71%
SB Hanger Modify	EA	375	172	54%
LB Valve Install	EA	74	16	78%
SB Valve Install	EA	470	120	74%
Conduit Install	LF	43,992	11,287	74%
Conduit Support	EA	7,386	1,980	73%
Cable Install	LF	311,255	248,902	20%
Cable Terminations	EA	33,386	27,518	18%
Instruments Mechanical	EA	1,941	1,023	47%
Tubing Install	LF	22,932	16,712	27%
Tubing Rework	LF	20,556	4,048	80%
Instrumentation SB Pipe	LF	10,967	4,467	59%
Instrumentation SB Pipe Weld	EA	4,443	1,710	62%
Tubing Support	EA	3,965	1,697	57%
Instrumentation SB Pipe Support	EA	2,589	742	71%
Duct Modifications	EA	206	78	62%

Section 4 - Project Oversight

Project Assurance

Observations by Nuclear Construction's Project Assurance (PA) during the past three months generally conclude the project's indicators are appropriate and show work is being done in accordance with the approved budget and schedule.

The PA group is independent of the WBN2 organization and reports directly to the Senior Vice President of Nuclear Construction.

The PA group continually assesses all facets of project performance and reports to the findings of those assessments to the Senior Vice President of Nuclear Construction.

Several observations have emerged as a result of recent reviews by PA and have been provided to WBN2 management. The observations are as follows:

- There is an opportunity to better use and communicate industrial safety information to improve performance and help avoid complacency.
- Performance improvement plans and actions for construction work should be further refined and communicated with documentation in an integrated plan that includes specific metrics to measure progress and "touch-points"
- There is an opportunity to increase the direct craft resources in the daily schedule.
- There are gaps in the reporting of installed commodity quantity, particularly conduit and hangers.

The project team is currently investigating the issues and developing action plans. The PA organization will continue to track progress toward completing these actions.

Nuclear Construction Review Board

The Nuclear Construction Review Board's (NCRB) most recent report in April noted that the project took thorough and timely actions to address recommendations made in the previous NCRB report. The NCRB also stated that the project is making progress toward completion as demonstrated by:

- Moving from doing bulk construction work to doing work according to system completion and release for testing;
- Developing a critical path schedule that outlines the tasks required to complete and test systems and linking those systems to key milestones required for licensing and start up;
- Identifying and evaluating risks and using a risk management program to take actions to address the risks;
- Aligning the project leadership on direction, performance improvement, and metrics.

The NCRB is an independent oversight panel made up of industry experts from outside TVA.

The NCRB is charged with reviewing TVA's nuclear construction performance and providing their external, independent insight to the Senior Vice President of Nuclear Construction.

The NCRB's independence provides an unbiased review of project performance, and NCRB insights can form the basis for Nuclear Construction actions that ensure the project is meeting the objectives of the new ETC.

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Nuclear Construction Review Board (continued)

The NCRB recommendations that the project is addressing and tracking to closure are shown below.

Nuclear Construction Review Board Recommendations
It is critical that there is a thorough site-wide effort to load all the work activities needed to be done for licensing of Unit 2 into the last refueling outage opportunity in Unit 1 in 2014. Unit 1 Operations will be required to support Unit 2 startup testing. That support must be provided in parallel with the Unit 1 refueling outage and will add significant additional workload on Unit 1.
Performance improvement plans and actions for construction work should be further refined and communicated by documenting them in an integrated plan to include the specific metrics to measure progress and "touch-points." This plan will aid in evaluating the success of these improvements and whether they are contributing to key milestone and project completion.
Existing communications should be expanded beyond the management team to provide the general workforce with a sense of the current critical key milestone to which each work activity is linked.
Use the Performance Improvement Process to develop and implement an integrated plan to improve the rate of construction work order completion and sign-off with a focus on the work needed to turnover systems to Startup.
The TVA Quality Assurance organization should develop a comprehensive plan to list and integrate the areas to be assessed in order to support a decision of readiness for Unit 2 operation.
The Licensing organization should identify and align with the Nuclear Regulatory Commission on the scope and topics for the upcoming Advisory Committee on Reactor Safeguards meeting with as long a lead time as possible.
The planning for modifications to the dams related to the Watts Bar Nuclear Plant flood strategy should include actions to prevent violations of the current operating unit licensing basis during the completion of the modifications.
Work is underway to get Unit 1 managers more actively involved in the completion of Unit 2 and transitioning to dual unit operation. An efficient process with appropriate formal controls and sign-offs is required.
Ensure the planning for dual unit operation defines how open items resulting from final turnovers of systems and areas to operations will be tracked and resolved.
As startup testing increases, there will be an increased number of energized equipment and pressurized systems in Unit 2. Continue to brief and prepare the workforce for the changing work environment and hazards that result from operating plant conditions.
The Nuclear Construction Review Board agrees with the actions to restructure the Project Assurance & Construction Management organization and refocus the plans and goals for assessments and audits. The plan should include a linkage between areas to assess and the areas or causes of past project performance problems to ensure that the ability to early identify and prevent repeat problems is in place.
The Project Assurance & Support Services organization has strong independence of the project organizations. To be in keeping with industry best practices, Project Assurance & Support Services should explore an additional process for escalation and elevation of issues to the Chief Executive Officer level of TVA should the need arise.
Continue the process of evolving the PPI to ensure proper alignment with actual risk reduction/accomplishment targets.
The Employee Concern Program organization should determine where intensive work (e.g., cable pulling and terminations) is predicted to occur and target pulse the workers impacted to elicit concerns and issues as far in advance as practical.
The Employee Concern Program organization should define the criteria to measure effectiveness of the program and use in baseline self-assessments of the program.

McKinsey and Associates

McKinsey and Associates, a management consulting firm, spent several weeks at the WBN2 project in March to independently assess the development of the PPI and recommend improvements based on the assessment.

The company identified that the CPI was an effective measure for managing construction, but was no longer effective for tracking performance as the project nears completion of mechanical work and major efforts switch to non-construction activities. A second recommendation regarded modifications to the PPI to enhance its usefulness. The project will make the suggested enhancements going forward.

Section 5 - Project Organizational Health

Improvement Initiatives

The WBN2 team is aligned to finding, analyzing, and correcting issues that could have an adverse impact on performance. The project is actively engaged in taking advantage of – and creating – opportunities for performance improvements, as demonstrated by continually validating what has been done, maintaining quality through constant assessment, and making changes when they are needed.

This quarter the project began making proactive changes and improvements in the WO process as the organization focused on scope identification, scope control, and production. Additional improvement initiatives are being evaluated as part of the project's transition to system completion and turnover.

The project also maintains a process for prioritizing, attacking, and monitoring corrective actions aimed at issues that adversely impact performance. There were six top priority initiatives with active improvement plans in work for WBN2 as of April 30.

- CAP Improvements
- Construction Productivity Improvements
- Paper Closure
- Change Paper Tracking System
- Pipe Hanger Improvement
- Electrical Field Engineering Improvement Effort

The Electrical Field Engineering Improvement Effort was identified and added this quarter. Improvement efforts are designed to make more effective use of field engineering resources to support craft productivity rather than being a barrier to production. Procedure improvements are being made that are designed to provide relief from low-value and time-consuming tasks. Many of the improvements have been implemented; those awaiting implementation are tracked in the Plan of the Day meeting.

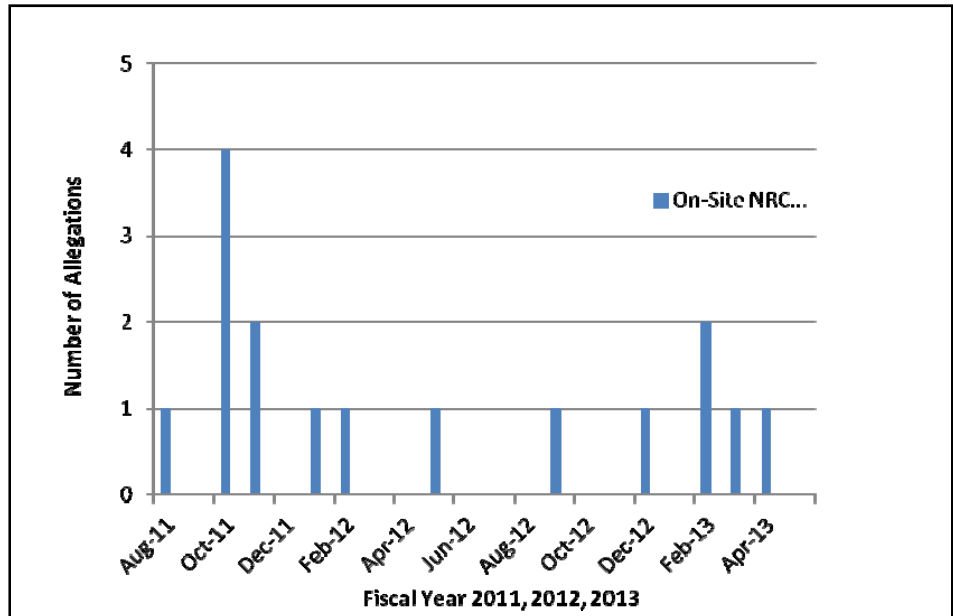
Nuclear Safety Culture

Construction of a nuclear power plant involves recognizing and adhering to special and unique requirements. Because nuclear safety is our overriding priority, the project must maintain an open environment that allows and encourages individuals to express concerns about nuclear safety and quality. Employees are encouraged to bring safety concerns directly to the management team for action and to document issues in the CAP.

Employees also have other avenues to express concerns that are independent of management. These avenues include the Employee Concerns Program (ECP), the TVA OIG, and the NRC. The number and nature of concerns raised via these independent avenues can be an indicator of the health of the organization.

Nuclear Safety Culture (continued)

Concerns expressed to the ECP rose between June and November of 2011, but declined through the remainder of FY 2012. The number of employee concerns raised in this quarter – 19 – is above the 12-month rolling average of 14.9. This can be explained in part by a layoff of some Bechtel personnel during the quarter and the addition of potential concerns expressed to the OIG being incorporated in the ECP totals beginning in March.



The trend of concerns raised to the NRC (shown at the right) is consistent with the ECP

trend observed during the quarter. The numbers for the quarter represent the referral of four allegations by the NRC to the site.

The trend in reporting concerns indicates that the project continues to provide an environment that fosters a willingness of workers to report issues. To further encourage the reporting of issues to project management, ECP representatives will focus on more planned direct communication or “pulsing” of workers involved in specific work activities to elicit concerns and issues. Efforts also are in progress to ensure workers are aware that two new Bechtel ECP specialist are now onsite and available to assist in resolving issues.

Work Environment Risk Assessment

As discussed in the last ETC update, a team conducted a risk assessment to identify improvement opportunities in the WBN2 work environment and what could potentially impact delivering the project safely, on time, and within budget.

This assessment was a collaborative effort that included team members from the OIG, TVA Training Development & Organizational Health, the ECP, and PA. The three areas identified for additional focus were:

- More effectively communicating information about the project and its progress;
- Removing barriers so work can be done safer, better, and faster;
- Improving teamwork between Unit 1 and Unit 2 personnel to support the transition to a two-unit operating station.

Work Environment Risk Assessment (continued)

Specific actions to address issues in each of these areas have been developed. A recommendation to improve project communications and increase knowledge was addressed by plans for developing a more robust face-to-face communication culture within the WBN2 project. The plans include delivering consistent key messages and project status to site personnel each month in meetings conducted in work areas. The first of these meetings were conducted in April and initial feedback was positive.

Project Completion Incentive Program

The four targets - safety, quality, cost, and schedule - for the WBN2 Project Completion Incentive Program (PCIP) remained on track through April.

The PCIP is designed to ensure safety and that the construction timeline and budget remain on track by encouraging:

- Skilled workers to stay with the project, to complete their work as planned, and to move on to other jobs, ensuring that activities that will bring WBN2 into commercial operation can proceed in accordance with the target schedule;
- Completion of all work activities in a safe manner with high quality built in;
- A level of productivity that aligns with the construction schedule.

The incentive program is funded by savings realized by the project being completed in a safe, quality, timely, and cost-effective manner. For any incentive payout to be made, commercial operation must be certified by TVA by December 31, 2015 and the project must be completed at or below \$4.4 billion.

Section 6 - Going Forward

In the next quarter, the project will continue its transition from performing bulk construction work and will increase the activities needed to complete individual systems and to release them for testing. This transition shifts the project's priorities to identifying and controlling the scope of work and to promoting levels of production that will meet the schedule for achieving critical milestones. Key areas for focused attention in the next quarter to support the project's priorities are as follows.

Multi-System and Work Packages

The project team has been developing methods of simplifying design and construction packages that contain multiple systems and multiple components. Simplified packages are more readily scheduled, worked, and closed, and they support efforts to release single systems and segments for early testing.

Simplifying work packages prior to work requires unbundling the documents while maintaining technical, operational, and regulatory specifications, capturing operational experiences that directly benefit the work and can be incorporated into later efforts, and reworking construction schedules to reflect the simplified work. Unbundling multi-system and/or complex packages that are already in the field or have worked requires multiple partial closures and additional processes to assure that the scopes needed for the single system/segment have been completed even though the large package may remain open.

A new partial closure and release process was pilot studied around one train of the Residual Heat Removal System in order to assess the costs and benefits of unbundling, and identifying the best point at which to ASME stamp the system to transition to the non-construction mode of future work activities. The resultant unbundling and release process was then applied to the Essential Raw Cooling Water and the Component Cooling Water systems scheduled for this summer. The application of simplification and unbundling processes to other plant systems will continue throughout the duration of the project.

Scope Control

Continuing changes in scope impact actual and forecast costs, as well as the ability to complete systems and turn them over as scheduled. Even small changes in scope can have large impacts on the schedule if those changes alter the logical sequence of activities in the schedule and the plans for reaching critical milestones.

To strengthen the control and coordination of the scope of work during and after the transition to system completion, additional requirements have been developed governing how scope changes are included in WOs, problem evaluation reports, and in design necessitated by conditions in the field and captured in field change requests. These controls closely examine issues that could change or increase scope in order to validate the need for the change and determine the most efficient process for addressing it.

Watts Bar Unit 2 Completion Project

Quarterly Update to the Estimate to Complete, February - April 2013

The CCB that is charged with governing the addition, deletion, or modification of major work is applying more intense scrutiny to external initiatives that may affect the established scope of work. In addition, the existing scope is continually challenged and reviewed for validity and opportunities for more efficient implementation.

Electrical Conduit and Cable Completion Scoping

Early in the transition to performing the work required for completing individual systems and readying them for testing, it became clear that a revised and detailed schedule for installing conduit and cable was needed.

Building a schedule that provided a logical, buildable, and measurable sequence of activities required:

- Reviewing all the project's work documents to determine where conduit and cable were installed and where installation had not yet begun;
- Determining which existing cable needed to be removed and re-installed to support system completion;
- Reviewing and developing drawings – called cable trees – that provide a road map for installing conduit and cable in the field.

The revised schedule for electrical conduit and cable installation was completed during the quarter. The WBN2 team is developing the same level of detailed scheduling for electrical terminations and splices. This changing scope of work is incorporated in the overall schedule on a system-by-system basis in a controlled and monitored manner.

System Completion

The project has made good progress transitioning from bulk construction to system completion and turnover. This was aided by the selection of OVT as a project-wide milestone. Open vessel testing involves safety-related and operational systems that inject water into the reactor vessel. Completion of the activities leading to and comprising the OVT milestone will validate equipment performance, exercise completion processes, and drive significant safety and support systems to testing.

Several systems were targeted for early completion in order to test the readiness process, identify roadblocks, align the organization, and reduce project risks. The Service Air system was the first system taken through the enhanced turnover process during this past quarter, and the Essential Raw Cooling Water and the Component Cooling Water systems are scheduled for this summer.

The OVT group and System Completions group conduct daily reviews with construction and start-up organizations to monitor and support progress towards turnover and to adjust work priorities and schedules as needed to validate progress and assess current actions.

Open Vessel Testing

With OVT planned for spring 2014, the WBN2 team is focused on the supporting planning and WO activities that have been incorporated into the overall project schedule. Those activities include:

- Developing all the cable trees for the safety-related and operational systems that inject water into the reactor vessel and are required for OVT;
- Developing WO packages for installing electrical cables;
- Identifying all the activities that must be completed before cable installation begins, such as preparing, completing, and documenting WOs for putting in the conduit through which electrical cables are installed;
- Walking through the steps within each cable tree WO package to confirm the length of time and number of craft required to complete the work.

Unit 1/Unit 2 Integration

The Dual Unit Operational Readiness Team (DUORT) that was described in the previous ETC quarterly update is continuing with actions necessary to transition the operating unit and the construction unit at Watts Bar to a dual-unit operating site.

The DUORT has developed a strategy and procedures to lead the Watts Bar station to dual-unit operation and metrics to monitor progress in the station meeting targets and schedules. The team also has completed the first round of departmental transition self assessments and is using information gained from those critical reviews to develop actions to further the transition progress to dual unit operations.

The team's focus is on developing comprehensive site and corporate transition plans, as well as detailed schedules for upcoming regulatory inspections. Other areas of focus in the coming months include preparations to support pilot plant system and area turn over projects and the ongoing development of schedules and procedures to support the loading of fuel in Unit 2 and operational readiness testing. The DOURT also will continue to make facility improvements to support dual-unit operations, to create and populate dual unit online and outage work cycle plans, and to obtain necessary spare parts.

Section 7 - Closing

One year after TVA's Board of Directors approved continuing with the completion of WBN2 in accordance with a revised ETC, the project remains on track.

For the project to continue making progress at the right pace and complete the work that is left, working safely is paramount. Working to the best of the WBN2 team's abilities and working efficiently are next. The WBN2 team recognizes this, and for continued progress there must be validation of work that is accomplished, continual assessment and documentation of the way work is done, and a commitment to the principles that build respect, trust, and teamwork.

By doing these things, the WBN2 team will resolve issues and challenges that come with complex projects like the WBN2 completion project and do so in a manner that will deliver a safe, high quality nuclear unit that will operate for years to come.