
Watts Bar Nuclear Plant Unit 2 Completion Project

Fifth Quarterly Update to the Estimate to Complete May 2013 - July 2013

Published October 2013



Nuclear
Construction

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Section 1 - Executive Summary

The fifth quarterly review for TVA's Watts Bar 2 (WBN2) completion project reflects the progress made during the 15 months of work that have followed the TVA Board of Directors approval in April 2012 of a new Estimate to Complete (ETC) for the project.

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

With bulk construction in the final phase, the physical plant is approximately 80 percent complete. During the quarter, WBN2 augmented work processes, oversight, monitoring, and other project functions to facilitate the transition from bulk work and to increase the support for system completion and testing. The project also continued to use a detailed, logic-driven schedule that includes a series of critical path milestones, such as Open Vessel component and logic Testing (OVT), hydrostatic testing, integrated leak rate tests, hot functional testing, and loading fuel.

In accordance with the schedule, specific systems that must be completed and tested are tied to each milestone, and there is a 'waterfall' schedule for completing those systems in a logical sequence that supports each milestone. Throughout the quarter, work in progress on Unit 2 was completed according to the system completion 'waterfall' schedule.

The WBN2 team recognizes there are continuing challenges as it completes Unit 2. Those challenges include completing complex work and required documentation of work that is completed at a pace that maintains safety and quality and keeps the project on schedule; performing testing on shared Unit 1 / Unit 2 systems without impacting the safe and reliable operations of Unit 1; and addressing regulatory and licensing issues. Watts Bar 2 has experienced managers, skilled craft, and a plan that can identify, assess, and address challenges as they arise. The organization will adjust as necessary to facilitate the resolution of challenges and to achieve the understanding and alignment needed to protect Unit 1 - the operating unit - while supporting the safe and high quality completion of Unit 2 within budget and on time, and the successful transition to dual-unit operations.

Quarterly Summary Points

Exceeded more than 21.3 million work hours without a lost-time incident

Performed activities in a manner that resulted in a Quality Control acceptance rate of 96 percent

Met cost and schedule expectations

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

Released three plant systems ahead of schedule for pre-operational testing

Identified no new risks that affect project completion

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Section 2 - 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 revised project ETC. The new ETC is based on a range of values for schedule and budget that were developed with consideration of the risks associated with meeting project expectations.

On April 26, 2012, TVA's Board of Directors approved the budget and schedule shown below to complete WBN2.

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 new 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 Summary

The project continued to meet its targets for safety, quality, cost, and schedule in the three months from May through July 2013.

During the course of the quarter, the construction organization accelerated the completion of three systems in order to identify and resolve issues in the process, which helped reduce risk to the schedule for future system completions. As bulk work was completed through the quarter, efforts increasingly focused on the specific work required to complete systems and ready them for release for pre-operational startup engineering tests.

The majority of this system-specific work supports the project's first major milestone of OVT, which is scheduled to take place in spring 2014. That testing will involve pumping water through seven specific systems that are used when shutting down the reactor and supporting nuclear operations.

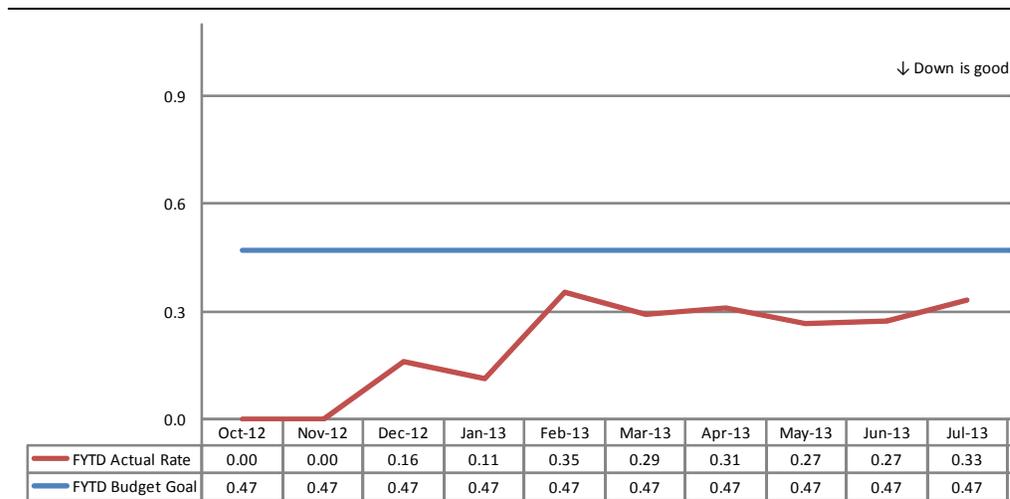
Detailed information illustrating project performance is provided in the remaining sections of this report.

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Safety

Safety performance for the quarter remained strong. WBN2 workers exceeded 21.3 million work hours without a lost-time incident. The Recordable Injury Rate¹ performance continued to be better than goal, as shown in the graph below.

Watts Bar Unit 2 Recordable Injury Rate
(Fiscal Year 2013)



This sustained, beneficial performance is the result of pre-emptive activities that have been consistently carried out during the course of the year. This includes senior management involvement with craft safety teams, communication directly to craft, and continued support for the Tri-Lateral Safety Alliance intervention program. Also, the number of low-level safety incidents is closely monitored because this could be a precursor to a serious safety incident.

Improvement plans implemented by Bechtel to address a number of lower level safety incidents resulted in:

- More effective use of the project’s Corrective Action Program (CAP) to capture actions and identify trends; and
- Improved employee knowledge of safety trends, lessons learned, and safety expectations.

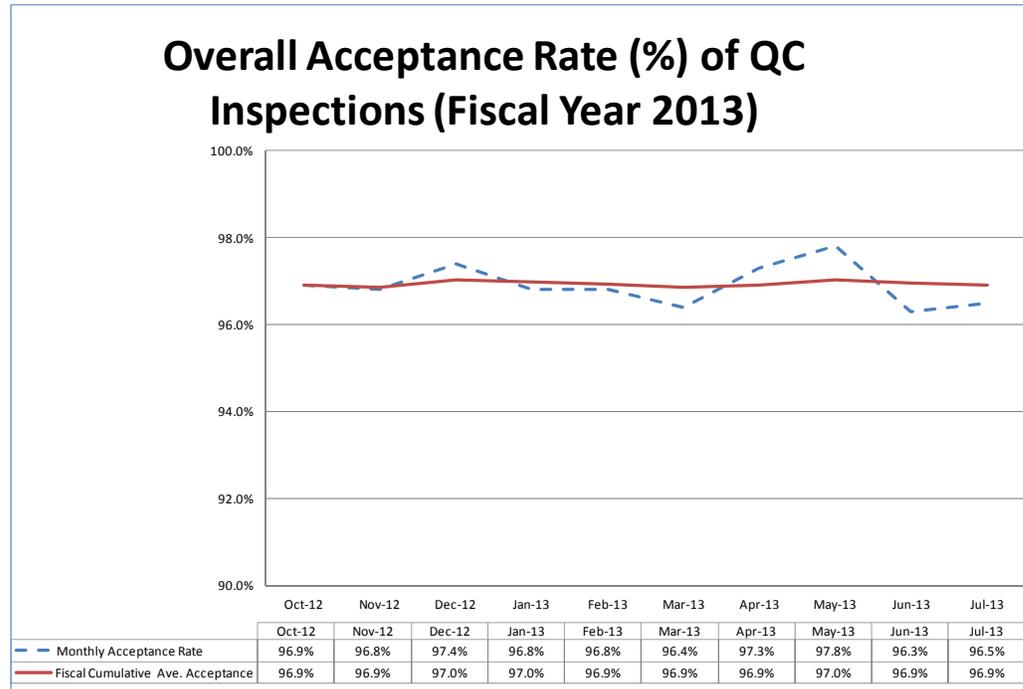
¹ Recordable Injury Rate is a rate-based measure of employee safety. It tracks the number and types of work-related injuries reported by TVA employees and contractors through TVA’s record keeping system for safety statics.

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Quality

The quality of WBN2 work remains high as measured by the Quality Control (QC) acceptance rate (see the chart below). This rate indicates the percentage of work that has passed the QC inspection process and shows that over 96 percent of work presented for inspection met quality control requirements.

Oversight activities carried out by both TVA and Bechtel Quality Assurance did not identify any significant issues during the quarter. Issues identified that have low safety significance in the areas of material control, housekeeping, training, and documentation in closed work orders (WO) are being resolved through the CAP.



Cost

The project is trending within the ETC range approved by the Board in April 2012.

Project-to-date spending has increased, driving the Fiscal Year 2013 cash flow by \$62.6 million over the baseline \$500 million budget for a total fiscal year expenditure of \$562.6 million.

The spending was increased to better align expenditures with priorities. The major priorities were to increase the staffing levels of engineering and construction workers in order to support early completion, testing, and turnover of selected systems to operations. This is the result of the project transitioning from mostly bulk construction work to a higher portion of work guided by system completion and testing.

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Schedule

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 fuel load date of June 2015, followed by commercial operation in December 2015.

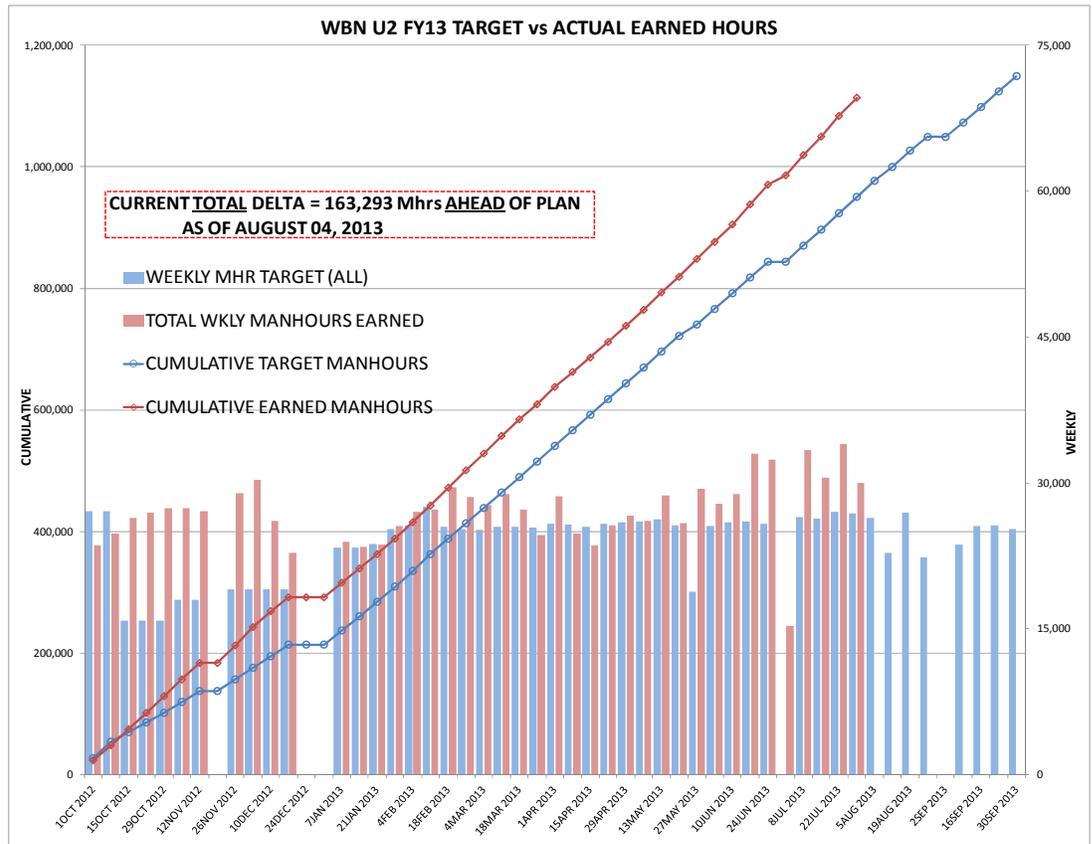
The schedule of critical path milestones supports a more aggressive fuel load date of April 2015 and a November 2015 date for commercial operation.

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

During the quarter, the project

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

Three systems required for OVT - System 67 – Essential Raw Cooling Water, System 70 – Component Cooling Water, and System 84 – Flood Mode Boration - were completed by Construction this quarter and released for pre-operational testing ahead of schedule.



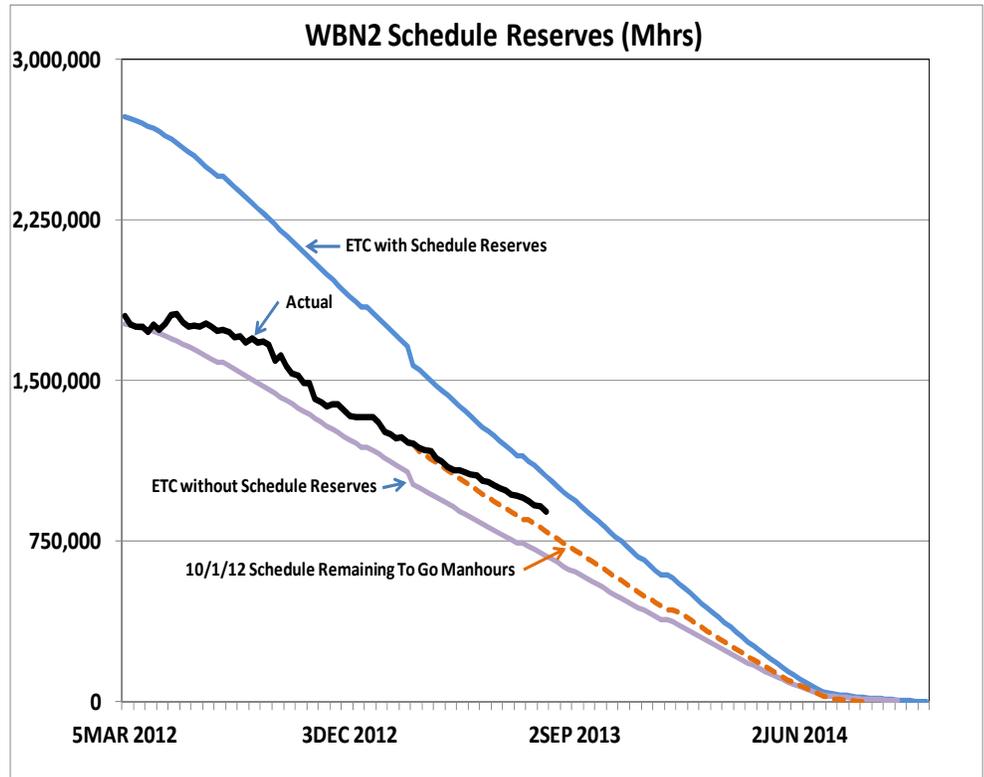
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The new ETC contains estimated work hours in reserve for many categories of uncertainties that could affect the schedule and completion date.

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 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.



Commodity Quantity Analysis

The project team reviews the quantity of physical commodities installed each quarter as a way to monitor progress at the project.

This quarter showed significant progress against key commodities in support of OVT systems.

Large bore and small bore piping hanger installation made significant progress in support of System 67 - Essential Raw Cooling Water, System 70 - Component Cooling Water, and System 62 - Chemical & Volume Control.

Cable installation improved this quarter, and a third of the forecasted quantities since the ETC was developed were completed.

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There were scope increases during the quarter that drove quantities higher in select areas. Large bore and small bore valves increased due to the need for valve replacements discovered during hydrostatic testing and modifications to the safety injection pumps.

This discovery also increased large and small bore piping welds required to install the valves. Installing small bore piping around existing piping congestion required longer than planned piping routes, thus driving required quantities higher.

Overall the commodity work-off met expectations this quarter, keeping the project on track to achieving critical system turnover dates.

Commodity Quantity Analysis

DATA AS OF: 7/28/2013

Commodity Description	UOM	Board Approved (As of 10/2/11) (A)	To Go as of July 28, 2013 (H)	Percent Reduction Since April 2012
Misc Steel	LB	109,855	24,138	78%
LB Pipe Weld	EA	322	200	38%
LB Hanger Install	EA	151	57	62%
LB Hanger Remove	EA	229	5	98%
LB Hanger Modify	EA	506	211	58%
SB Pipe	LF	2,043	732	64%
SB Weld	EA	2,959	1,043	65%
SB Hanger	EA	233	96	59%
SB Hanger Remove	EA	105	28	73%
SB Hanger Modify	EA	375	110	71%
LB Valve	EA	74	48	35%
SB Valve	EA	470	428	9%
Conduit	LF	43,992	17,866	59%
Conduit Support	EA	7,386	2,889	61%
Cable	LF	311,255	208,279	33%
Cable Terms	EA	33,386	9,090	73%
Instruments Mechanical	EA	1,941	320	84%
Tubing	LF	22,932	5,612	76%
Tubing Inspect	LF	20,556	3,899	81%
Instr SB Pipe	LF	10,967	2,673	76%
Instr SB Pipe Weld	EA	4,443	1,465	67%
Tubing Support	EA	3,965	641	84%
Instr SB Pipe Support	EA	2,589	702	73%
Duct Mods	EA	206	45	78%

LB = Large Bore, SB = Small Bore, EA = each, LF = linear foot

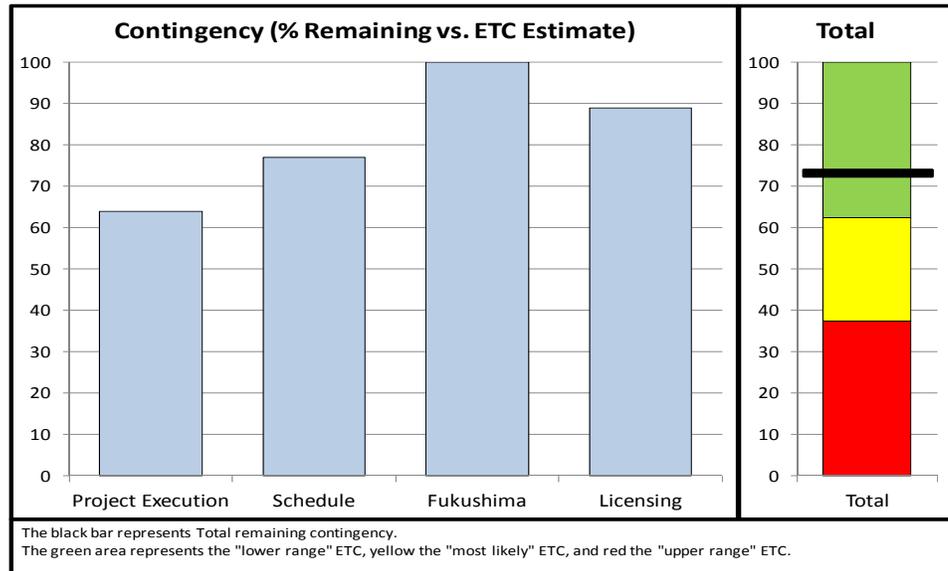
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Section 4 - Risk Management

As part of developing the new ETC, potential project risks were identified and categorized. Plans were developed to address those risks, and budgets assigned.

The amount of this contingency funding that is actually used is an indication of the effectiveness of the mitigation plans and whether additional effort and funding were required.

A risk register is maintained 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.

Section 5 - Known Risks

No new significant risks were identified during the quarter.

A summary of the status of existing risks is shown in the table at right. Additional information on the risks follows.

May - July 2013	Risk	Risk Trend
High	Dual-Unit Operational Readiness	Stable
Moderate	Fukushima*	Stable
n/a	Work Document Closure**	n/a
Moderate	Waste Confidence*	Improving
Moderate	Operating License	Improving
Moderate	Cost	Stable
Moderate	Schedule	Stable

* Not specific to Unit 2—affects all nuclear units

** "Work Document Closure" has been designated an issue rather than a risk—see "Improvements, Specific Issues and Challenges"

Dual-Unit Operational Readiness Risk

TVA's ability to transition Watts Bar to dual-unit operations is a challenge, resulting in this area being designated as a high risk. Its resolution is receiving a significant amount of attention by management.

The issues for the transition include adding staff, providing training, implementing processes and procedures to safely accept Unit 2 systems and plant areas for nuclear operations, reviewing or revising existing programs and procedures, and continuing to operate Watts Bar 1 safely and reliably.

TVA used lessons learned from the restart of Browns Ferry Unit 1 and other operational experience to develop a strategic approach to address the dual-unit operational readiness risk. This strategic approach employs the use of a Dual-Unit Operational Readiness Team (DUORT). This team has the structure, staff, and processes and procedures to facilitate integration and transition activities and help achieve safe and reliable dual-unit operations. This organization is the primary interface between the construction and operating organizations and is coordinating departmental, site, and corporate transition plans. The DUORT also has oversight of monitors and track metrics tied to staffing, procedures, engineering, revisions and additions to surveillance instructions and technical specifications, and licensing actions.

The DUORT is responsible for a strategy for successfully passing readiness reviews and inspections, ensuring the safe transfer of Unit 2 plant areas and systems from construction to operations, and coordinating the operational testing necessary to achieve dual-unit operations.

Other responsibilities carried out by the DUORT include ensuring operational differences are minimized, controlled, and documented, including effective operating plant personnel training. In addition, addressing issues that have the potential to affect progress in achieving dual-unit operations is critical, such as the capacity of the site organization to concurrently manage the transition while addressing other issues.

Regulatory Risks

Obtaining the Operating License

Two areas of focus are resolving river-system hydrology concerns and resolving 542 specific Inspection Planning and Scheduling items that must be closed with the Nuclear Regulatory Commission (NRC) before fuel can be loaded in Unit 2. Progress is being made on both of these issues.

During the quarter, TVA achieved a significant milestone toward obtaining an operating license when the NRC issued Supplementary Safety Evaluation Report (SSER) 26 in May 2013. The SSER documents the NRC's review and approval of the Watts Bar Unit 1 and Unit 2 Fire Protection Report.

Fukushima

The NRC continues its work to fully develop a final regulatory framework for the nuclear industry's response to the 2011 Fukushima reactor accident in Japan. The project has established a path forward that meets NRC requirements to date, resulting in the risk being lowered to moderate and remaining stable.

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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 the 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 since it may affect the final licensing process for the project.

Cost Risk

Overall, the budget risk is considered to be moderate and stable. Cost-related risks added to the budget remained acceptable and well within available contingency resources.

Schedule Risk

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

Section 6 - Improvements, Specific Issues, and Challenges

There are five top priority initiatives with active improvement plans in progress. Those initiatives are CAP Improvements, Construction Productivity Improvements, Paper Closure, Change Paper Tracking System, and Pipe Hanger Improvement. Results to date include:

- Better readiness to perform work as the result of restructuring the Construction organization to establish a separate group responsible for planning / readiness;
- Numerous improvements in the WO process to streamline work processes and eliminate low-value activities;
- The simplification of the process for identifying scope gaps in WOs related to change orders;
- Improvements in WO closure and completion of closure reviews; and
- Significant improvement in the QC inspection acceptance rate for pipe hanger installation.

Electrical Cable and Conduit Installation

Earlier it became clear that electrical conduit and cable installation was a critical success factor in readying systems for testing. Therefore, a revised and detailed schedule for installing conduit and cable was developed. This schedule was used during the quarter with positive results. Construction management is closely monitoring these results on a daily basis and refining the implementation of this more detailed schedule.

The WBN2 team is developing the same level of detailed scheduling for electrical terminations and splices, which will also strongly affect completing systems in accordance with the established schedule.

Managing Trade-Offs to Remain on Budget and Schedule

Management expects to continue addressing trade-offs between expending additional overtime work and achieving milestones on time. Extra attention to close coordination between planning estimates, near-term accounting, and labor time management has allowed the project to stay within the fiscal year budget targets. This is expected to become even more challenging in the coming year.

Section 7 - Project Oversight

Through observations conducted, the WBN2 Project Assurance (PA) concluded, in general, that the project schedule and cost continue to support the new ETC.

During the month of June, three systems were turned over for pre-operational testing. WO completion and package closure rates were sufficient to support the early turnover of these systems; however, non-manual overtime averaged 27 percent during this time, driving increased costs for the month of June. The project team is incorporating lessons learned from these recent system turnovers to improve future performance.

The PA group is independent of the WBN2 organization. The group continually assesses various facets of project performance and reports those findings to the Senior Vice President of Watts Bar Operations & Construction.

Observations identified several opportunities for improvement. Associated recommendations were provided to WBN2 management and included the following focus areas:

- A craft productivity study was conducted as part of a joint effort between PA, the WBN2 Construction Productivity Group, and the McKinsey Group. Over a span of three weeks, the team collected data to understand and identify causes for production delays. Recommendations to enhance craft productivity were provided to the project team.
- As the project continues to transition from bulk construction to the system turnover phase, the Cost Performance Index and Schedule Performance Index will represent only a fraction of project performance, so a different metric is needed to track project cost and schedule performance. The Project Performance Index (PPI) is intended to provide a more comprehensive view of WBN2 project health and to increase the visibility of tasks that drive cost and schedule performance. Efforts to refine the various weighted components were ongoing during this time period. Project Assurance continues to work with the project team to help ensure that PPI is providing an accurate project status related to cost and schedule.
- In June 2013, WBN2 Construction established a new process for a Readiness Group to review electrical and mechanical work orders to ensure they are ready to work by the Production Group. The Readiness Group is made up of representatives from the craft, field engineers, planners, materials, and others, as needed. Recommendations associated with improving alignment with this new process were provided to the project team.

Section 8 - Project Organizational Health

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. The avenues include the Employee Concerns Program (ECP), the TVA Office of Inspector General, and the NRC. The number and nature of concerns raised via these independent avenues can be an indicator of the health of the organization.

The quantity of new concerns in the ECP has had a steady increase of 19 in May, 24 in June, and 46 in July. The number of concerns is 32 percent higher than the previous three months, with the 12-month rolling average of 21.9 through July.

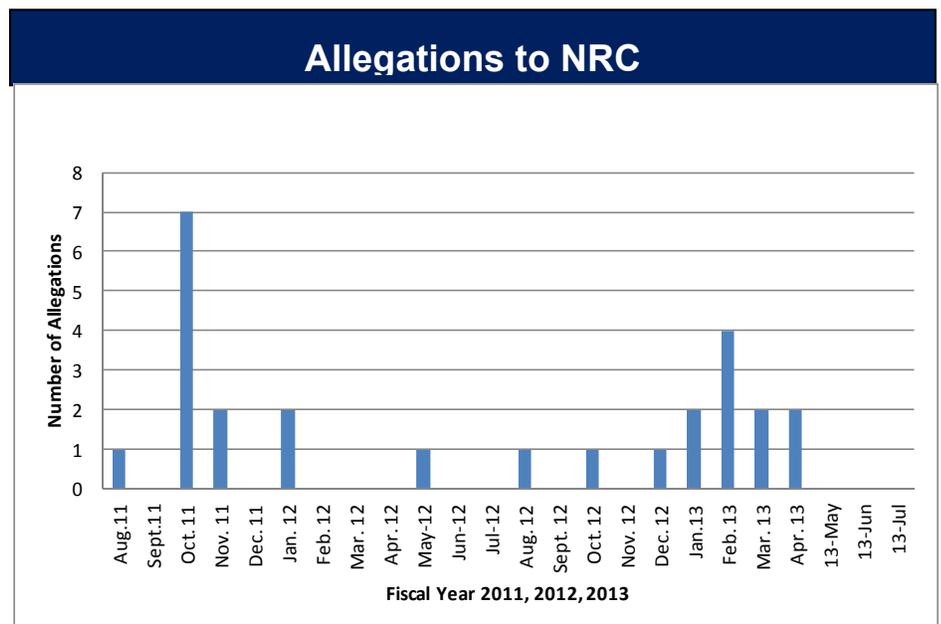
The spike increase in June aligns with an increased emphasis by management to encourage workers to use the ECP. Additionally, the reorganization of the WBN2 ECP was designed to allow direct focus and reporting to site management. The increase in ECP traffic also can be attributed to increased management attention on employee accountability and an increased emphasis on adhering to break / lunch times and reducing absenteeism, as well as adjusting worker shifts and hours as needed to support work activities.

Management and personnel issues continue to be the number one concern raised representing 80 percent of all concerns raised during May through July. In response, WBN2 project instituted a monthly trailer briefing conducted by management to add another pathway for communication with management.

The increase in ECP traffic coincides with a decrease in NRC allegations (as shown in the graph to the right) as no new allegations have been received since April.

A recent external assessment of the Safety Conscious Work Environment and Safety

Culture conducted in May of this year showed the overall WBN2 environment is supportive of workers reporting and pursuing safety concerns.



Project Completion Incentive Program

The four targets - Safety, Quality, Cost, and Schedule - for the WBN2 Project Completion Incentive Program remained on track through July.

The Project Completion Incentive Program encourages:

- 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 quality built in; and
- 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, cost-effective, and timely 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 9 - Going Forward

Moving forward, the WBN2 project will continue its transition from bulk construction to completing systems and readying them for release for operational testing. This sequence of system turnovers is guided by a series of milestones required to obtain a license to operate the unit.

Open vessel component and logic testing will mark the first time several important Unit 2 operating and safety systems are operated together. During the upcoming quarter, the construction organization will adjust work assignments and scheduled activities to complete the work on the systems by early December. The testing of these systems is required to support OVT, which is scheduled later in the spring of 2014.

Another focus for the upcoming quarter will be to both develop management ownership and implement the standards that are required to safely transition the site to dual-unit operations. The station must operate as one cohesive organization that focuses on safely and reliably operating Unit 1 while delivering Unit 2 safely, in a high quality manner, within budget, and on schedule; transitioning the site to dual-unit operations; and establishing the foundation for how the dual-unit facility will operate in the future.