
Watts Bar Nuclear Plant Unit 2 Completion Project

Fourteenth Quarterly Update to the Estimate to Complete August - October 2015

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**Nuclear
Construction**

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**Watts Bar Unit 2 Completion Project
Quarterly Update to the Estimate to Complete, August - October 2015**

Section 1 - Executive Summary

The 14th and final quarterly update of TVA’s Estimate to Complete (ETC) for Watts Bar Nuclear Plant (WBN) Unit 2 focuses primarily on the activities from August to October, 2015. During this period, the Nuclear Regulatory Commission (NRC) issued an Operating License to Unit 2 based upon the substantial completion of construction and testing of the major systems, structures, and components important to nuclear safety and the readiness of the plant staff to operate the unit.

Performance during the quarter continued to be consistent with the ETC, and project targets continued to be met for safety, quality, and schedule. Final project costs are trending just above the \$4.5 billion upper range, however there is little risk of significant additional cost considering the completion status of the unit and the issuance of the operating license.

Significant progress was made in operational testing of plant systems, as the Hot Functional Testing (HFT) and the Containment Integrated Leak Rate Testing (CILRT) were completed in August, and the Integrated Safeguards Test was completed in September.

Remaining challenges are the completion of pre-operational testing of support systems, punchlist item completions, and the release of those systems to operations for surveillance testing and operability in support of fuel loading. Current forecasts are for fuel loading to begin in December 2015.

Quarterly Summary Points

No lost time safety events during this period in 2.5 million man-hours

Performed activities in a manner that resulted in a Quality Control acceptance rate of over 98 percent

Completed the release of systems for startup testing

Released 28 more systems to Operations

An Operating License was issued to Watts Bar Unit 2 on October 22 by the Nuclear Regulatory Commission

Section 2 - Background

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

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

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

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

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

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

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Section 3 - Quarterly Performance

The project continued to meet overall targets for safety, quality, and schedule in the three months from August to October 2015.

Among the significant accomplishments in this quarter, HFT, which operated the Reactor Coolant and Secondary Side systems at their design pressures and temperatures, was completed in August. CILRT, which demonstrated the capability to “contain” the energy and radiological release from a design basis accident, was also completed in August. Integrated Safeguards Testing, which was the final demonstration that plant safety-related systems can provide their intended functions by injecting simulated accident signals and observing proper response of the emergency core cooling systems and their support systems, was completed in September.

After fuel load and assembly of the reactor vessel, the Power Ascension Testing program will gradually increase reactor power as key parameters, indications, and controls are monitored and a series of tests are performed to show the control systems will respond properly in transient conditions.

An Operating License was issued on October 22 for WBN Unit 2 by the NRC based on the substantial completion of the systems, structures, and components important to nuclear safety and the readiness of the permanent plant personnel to operate a second unit. Station personnel are currently readying the necessary systems to support fuel load into the reactor in December.

In addition:

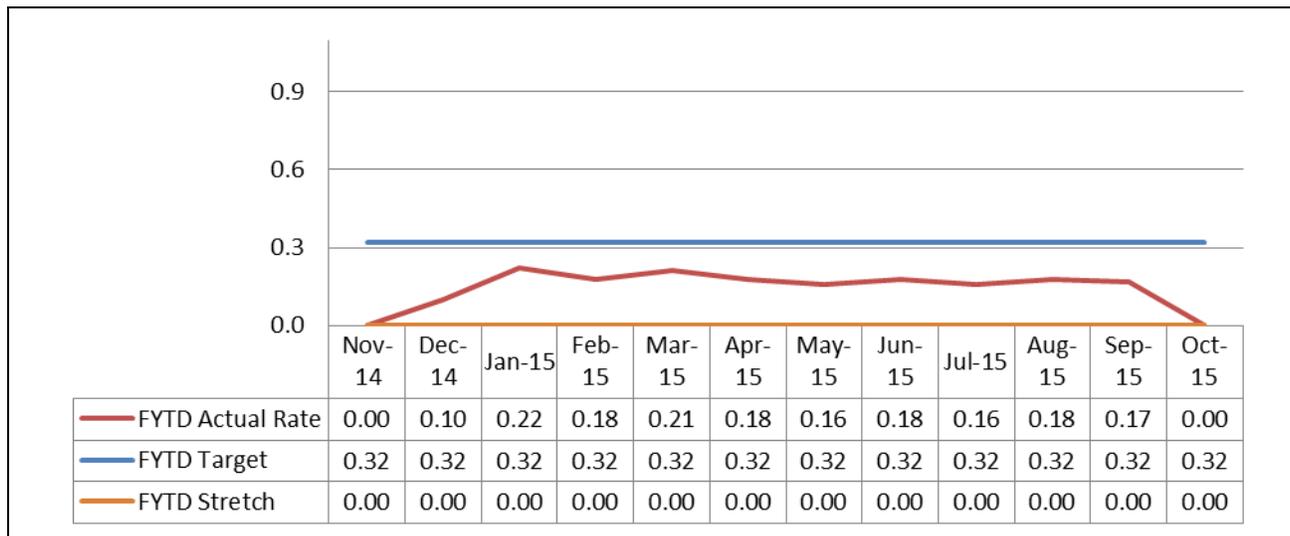
- All remaining systems were released from construction to Startup for component and pre-operational testing
- Twenty-eight systems were released to operations following completion of testing
- A media briefing to announce the receipt of the Operating License was held on October 22.
- Briefings and tours were provided to an NRC commissioner and other NRC officials in late October.

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Safety

The Unit 2 WBN project completed Fiscal Year 2015 with a recordable incident rate (RIR) of 0.17 compared to a goal of 0.32. Between July 2010 and May 2015, the WBN team reached over 33 million work-hours without a lost incident before a worker required surgery for an injury. Since then, the WBN Unit 2 team has earned over 2 million hours without a lost time injury. The project continues to maintain focus on and drive safe work practices to ensure safety remains the overriding priority.

Watts Bar Unit 2 Recordable Injury Rate



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

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

Between August 2015 - October 2015

- Over 1800 interventions were performed by craft safety teams and the Tri-lateral Safety Alliance which is made up of TVA, represented crafts, and contract partners.
- Over 1500 management observations were documented, of which all of them focused on error prevention tools and their use by the employees.

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Quality

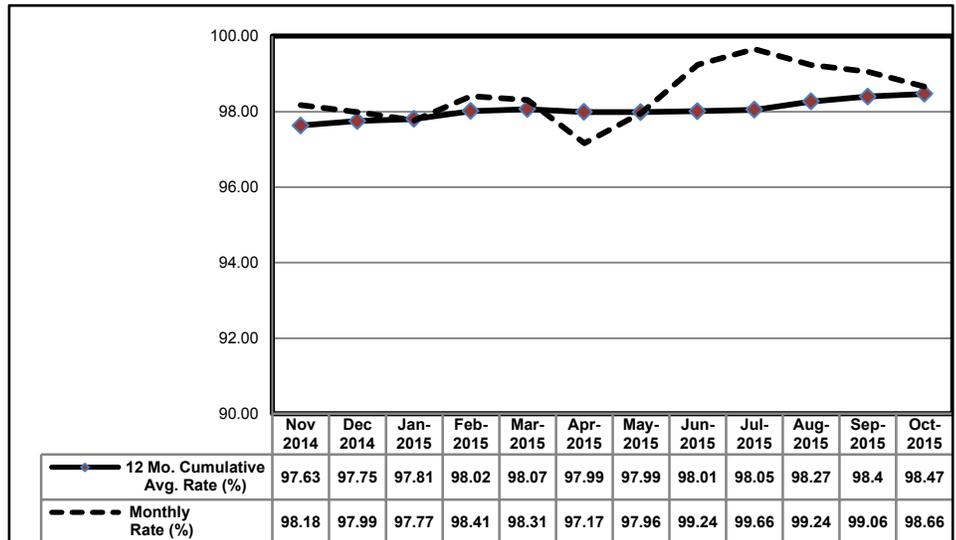
The quality of WBN Unit 2 work remains above goal as measured by the Quality Control (QC) Acceptance Rate (shown on the chart at right). Each month, this rate measures the percentage of work that passes the QC inspection process on the first inspection.

For the past 12 months, the cumulative average acceptance rate is 98.47 percent.

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

Also during this reporting period, American Society of Mechanical Engineers (ASME), Section III, Final N-5 Code Data Report approval was obtained by Bechtel Power Corporation for the last two ASME systems: System 64 - Ice Condenser Containment and System 90 - Radiation Monitoring.

Watts Bar Unit 2 Quality Control Acceptance Rate



Cost

The project is trending to a total cost between \$4.5 billion and \$4.6 billion. Final project cost will depend on progress made through fuel load and power ascension testing, taking into consideration the credit for power generation during testing and commissioning. Pre-operational testing is essentially complete, which significantly reduces the risk of a cost impact from large equipment failure. The project was given approval for a \$4.55 billion target in October and has a reporting protocol in place should forecasts begin to exceed that target.

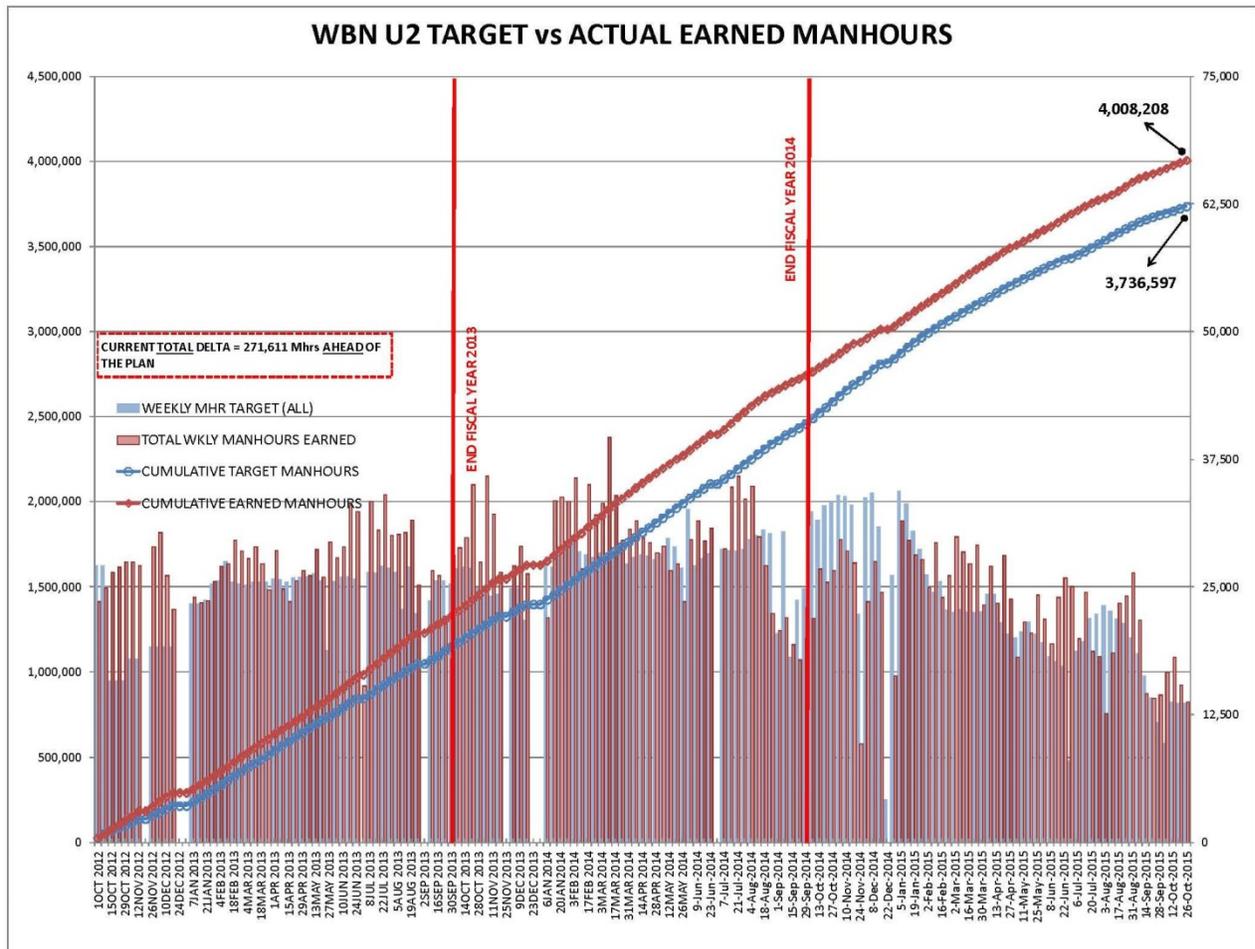
Demobilization plans are being implemented, including staffing reductions and removal of temporary facilities.

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Schedule

Based on current and targeted schedule performance, the project is tracking to a commercial operation date in April 2016. Overall, the project earned man-hours exceeded the planned target as shown in the graph below, and the remaining work for overall completion of the project is primarily non-major system tests, punchlist items, and “cosmetics” (painting, insulation, site cleanup).

Watts Bar Unit 2 Target Versus Actual Earned Work Hours



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Section 4 - Reserve Management

Project reserves are allocated on an as-needed basis by the Senior Vice President of WBN Operations and Construction and are contained within the \$4.55 billion target.

Section 5 - Known Risks

The issuance of the Operating License effectively closed the project risks that were related to regulatory items. There were no new risks identified during this review period. A summary of all the risk items that were tracked follows.

Fire Protection Triennial Inspection Deficiencies

Issues related to the Fire Protection Triennial Inspection of the Dual-Unit Fire Protection report in December 2014 are essentially complete, with a few uncomplicated system modifications remaining. The NRC has approved the Fire Protection report for dual-unit operations.

Waste Confidence/Continued Storage

On October 22, 2015, the NRC issued its Record of Decision (ROD) regarding the issuance of an Operating License for WBN Unit 2. In the ROD, the NRC staff concluded that the revised rule and the impact determinations related to continued storage did not alter the NRC staff's recommendation in NUREG-0498, Supplement 2 "Final Environmental Statement Related to the Operation of Watts Bar Nuclear Plant Unit 2," that the adverse environmental impacts are not great enough to deny the option of issuing an Operating License for WBN Unit 2.

Dual-Unit Operational Readiness

The issuance of the Operating License supported the conclusion of the NRC's Operational Readiness Assessment Team that the plant organizations are prepared for dual-unit operations.

Closure of Licensing Issues

Licensing actions required for the Operating License were completed. Approximately 18 Inspection Planning and Scheduling items require completion to support fuel load. These items are on track to close in support of the fuel load schedule.

Documenting Completion of Work

Process improvements noted in previous reports continue to produce quality documentation with improved productivity. As the project moved further into the startup and testing phase, comparable focus has been applied to documentation and closure of startup and testing activities to ensure similar positive results.

Project back-end documentation and paper closure is integrated into the turnover, fuel load, and power ascension schedules. Processes and indicators have been established to track and monitor progress to avoid adverse project impacts.

<u>Risk</u>	<u>Risk Trend</u>
Fire Protection Triennial Inspection Deficiencies	Closed
Waste Confidence/Continued Storage	Closed
Dual-Unit Operational Readiness	Closed
Closure of Licensing Issues	Closed
Documenting Completion of Work	Closed
Construction Completion	Closed
Emergent Work and Verification	Closed
Startup Testing Delays	Closed
Fukushima	Closed

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Construction Completion

All remaining systems required for startup testing were construction completed and turned over to Startup during this period which closes the risk potential of construction productivity. Plans are being implemented for complete Bechtel demobilization by the end of the year. Site construction demobilization is well underway and is currently approximately 40 percent complete.

Fukushima

The NRC has issued a safety evaluation approving the WBN approach to address a Fukushima type event. Additionally, the NRC has conducted an inspection that found implementation of the Fukushima response strategy was acceptable.

Startup Testing Delays

Major testing required for unit licensing has been completed.

Emergent Work and Verification of Released Systems

With the release of the remaining systems to the Startup group for testing and the completion of the major plant integrated tests, the risk item for emergent work is considered closed.

Section 6 - Project Oversight

Project Assurance

With the completion and release to startup of the significant systems for HFT, the demobilization of the Project Assurance organization was completed in April. This organizational transition was enabled by the project's focus shifting to testing completions – an area that is fully managed and executed by TVA leadership, with close oversight by the Senior Vice President of WBN Operations and Construction. Periodic meetings are being held with TVA executives and senior managers to discuss progress of the testing and overall project. Independent reviews of project progress and cost will be performed at the discretion of the Senior Vice President of WBN Operations and Construction.

Section 7 - Project Organizational Health

Nuclear Safety Culture

The number of concerns expressed during this reporting period showed a slight increase with 37 compared to 30 in the previous period. An increase in anonymous Condition Reports (CRs) was also observed: 10 this period versus 4 last period. There was one NRC allegation received during this quarter, and no Requests for Information were received from the NRC.

Concerns related to management and personnel (MP) type issues continue to be the highest contributor to the concerns received by both the Bechtel and TVA Employee Concerns Programs (ECP). The continuing demobilization process has been the focus of many MP concerns where employees voice their dissatisfaction with the work hours, staffing numbers, and the selection process for reduction-in-force (RIF) requirements. Other issues cited general work environment and worker morale. These are not considered abnormal for a project that is demobilizing the workforce, and the reports continue to be reviewed for issues which might affect the safety or quality of the unit.

ECP will be conducting exit interviews throughout the demobilization. ECP has seen a slight increase in concerns received during this exit process: 8 this quarter compared to 5 in the previous quarter. ECP evaluates the site termination report at the end of each month and if an exit interview form has not been completed, that individual is mailed the form offering them an additional opportunity to raise any issues they might have had while employed at WBN Unit 2.

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Thus far, approximately 93 percent of exiting employees have either been interviewed or have provided their input on the form.

Additionally, ECP continues the following activities to ensure issues or trends are identified early to ensure timely resolution:

- Participates in the WBN Nuclear Safety Culture Monitor Panel, which reviews site trends for collegial discussions on performance indicators
- Reviews concerns, CRs, and NRC allegations to ensure that a safety conscious work environment (SCWE) is maintained
- Briefs site senior management bi-monthly on concern status, survey results, and anonymous CR trending, and identifies actions to address any adverse trends
- Provides the weekly SCWE message to senior managers who rotate the responsibility of delivering that weekly SCWE message during the Monday project review briefing and it is then cascaded to site personnel
- Continues to work with Human Resources to ensure the adverse action process is completed prior to any adverse action taken. This is even more important as we complete demobilization to ensure RIFs are not associated with protected activity
- During demobilization, gives every departing employee an opportunity to express concerns

Project Completion Incentive Program

The Project Completion Incentive Program offered an incentive payout to eligible participants for commercial operations certified by December 31, 2015, with a cost at or below \$4.4 billion. A payout from this program will not be made based on project costs and commercial operation date being above their thresholds.

Section 8 - Going Forward

The remainder of the project schedule is essentially the Power Ascension Testing Program, which will load fuel, do final assembly of the reactor, initial reactor operations, and increase power in a deliberate manner while closely monitoring the performance of the key reactor and secondary side systems and parameters. After it is confirmed the unit is performing as designed, a series of plant transients and other operations will be simulated or performed to ensure the plant responds properly. The final test will be a unit trip from 100 percent power to demonstrate that the plant primary and secondary systems will automatically go to “hot standby” conditions. Once testing is complete, a brief run at 100 percent power will precede commercial operations.