



Memorandum from the Office of the Inspector General

September 21, 2012

Robert M. Deacy, Sr., LP 5D-C

REQUEST FOR FINAL ACTION – AUDIT 2011-13781 – LESSONS LEARNED AT
LAGOON CREEK COMBINED CYCLE PLANT

Attached is the subject final report for your review and final action. Your written comments, which addressed your management decision and actions planned or taken, have been included in the report. Please notify us within one year from the date of this memorandum when final action is complete.

Information contained in this report may be subject to public disclosure. Please advise us of any sensitive information in this report that you recommend be withheld.

If you have any questions, please contact Scott M. Norris, Senior Auditor, at (865) 633-7331 or Lisa H. Hammer, Director, Operational Audits, at (865) 633-7342. We appreciate the courtesy and cooperation received from your staff during the audit.

Robert E. Martin

Robert E. Martin
Assistant Inspector General
(Audits and Evaluations)
ET 3C-K

SMN:DBS

Attachment

cc (Attachment):

James R. Dalrymple, LP 3K-C
Micheal B. Fussell, WT 9B-K
Kimberly S. Greene, WT 7C-K
Peyton T. Hairston, Jr., WT 7B-K
Joseph J. Hoagland, WT 7C-K
Tom Kilgore, WT 7B-K
Richard W. Moore, ET 4C-K
Emily J. Reynolds, OCP 1L-NST
Robert B. Wells, WT 9B-K
OIG File No. 2011-13781



Office of the Inspector General

Audit Report

To the Senior Vice President,
Generation Construction

LESSONS LEARNED AT LAGOON CREEK COMBINED CYCLE PLANT

Audit Team
Scott M. Norris
Michael L. Lane

Audit 2011-13781
September 21, 2012

ABBREVIATIONS

BFN	Browns Ferry Nuclear Plant
COO	Chief Operating Officer
CT	Combustion Turbine
FGD&C	Fossil Generation Development and Construction
FPG	Fossil Power Group
GC	Generation Construction
JCC	John Sevier Combined Cycle Plant
LCC	Lagoon Creek Combined Cycle Plant
NUS	New Unit Services
SBU	Strategic Business Unit
SPP	Standard Programs and Processes
SVP	Senior Vice President
TVA	Tennessee Valley Authority

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

BACKGROUND..... 1

OBJECTIVE, SCOPE, AND METHODOLOGY 3

FINDINGS 4

 CRITERIA TO IDENTIFY LESSONS LEARNED IS LACKING 4

 PROCESS IMPROVEMENTS COULD BE MADE 7

 MECHANISMS FOR REVIEW 8

 USE OF LESSONS LEARNED BETWEEN ORGANIZATIONS..... 9

RECOMMENDATIONS 10

MANAGEMENT’S RESPONSE AND OUR EVALUATION..... 10

APPENDIX

MEMORANDUM DATED SEPTEMBER 5, 2012, FROM ROBERT M. DEACY, SR., TO ROBERT E. MARTIN



Audit 2011-13781 – Lessons Learned at Lagoon Creek Combined Cycle Plant

EXECUTIVE SUMMARY

As the nation's largest public power system, Tennessee Valley Authority (TVA) utilizes a variety of generation sources to provide power. Among those are TVA's natural gas/oil-fired facilities, which include combustion turbine plants. TVA's portfolio of natural gas/oil-fired facilities as of September 30, 2011, consisted of 13 facilities with a total of 98 units capable of producing approximately 8,200 megawatts of electric power. These facilities represent a mixture of assets that were purchased or leased by TVA and assets that were constructed under contract with TVA. Construction of facilities such as these is the responsibility of the Generation Construction organization, previously known as Fossil Generation Development and Construction.

The Fossil Generation Development and Construction organization was established in fiscal year 2009 and subsequently renamed Generation Construction (GC) during a recent reorganization within TVA. GC is responsible for, among other things, large construction projects for all non-nuclear generation groups. The New Unit Services group within GC is responsible for all new, non-nuclear generation. Most of the work performed by New Unit Services is for the design, procurement, and construction of simple-cycle and combined-cycle combustion turbine plants, including the Lagoon Creek Combined Cycle Plant (LCC) located near Brownsville, Tennessee, and John Sevier Combined Cycle Plant (JCC) located near Rogersville, Tennessee.

GC maintains a database of lessons learned from projects on its SharePoint site. A lesson is defined as some useful knowledge or sense that results from direct experience. Lessons learned involve collecting information on events and incidents that either positively or negatively impacted the conduct or performance of a project. Lessons learned can be used for future projects to prevent repeated issues and improve subsequent performance, such as other projects similar to LCC and JCC.

Because of the potential usefulness of a sound lessons learned process in completing generation construction projects effectively and efficiently, we reviewed the lessons learned process used during the construction of LCC. The audit objective was to identify lessons learned and how those lessons are being or can be applied to subsequent construction projects. The audit also focused on the lessons learned process rather than just substantive testing of lessons from one project to the next because the process review approach added more value in the audit team's opinion.

We determined GC has a process in place for lessons learned management, and during the audit, TVA issued TVA-SPP-34.016, Project Lessons Learned Management, which provides beneficial guidance on the roles and responsibilities of project teams in regards to managing lessons learned.



Audit 2011-13781 – Lessons Learned at Lagoon Creek Combined Cycle Plant

EXECUTIVE SUMMARY

However, we identified some potential areas of improvement in the GC process. Specifically, we determined (1) there is no documented criteria or review process for determining what is or is not a lesson learned, (2) the process for documenting lessons learned could be improved, and (3) there are no mechanisms to reasonably assure project teams are reviewing lessons learned from previous projects or relevant lessons learned are incorporated into the project's scope.

We also determined improvements can be made in sharing lessons learned across TVA organizations.

We recommend the GC organization:

- Develop and document criteria for determining if issues are in fact lessons learned and/or best practices.
- Ensure the database is complete with all lessons learned, including those presented to TVA's Chief Operating Officer and best practices from positive experiences to promote repeat application in future projects.
- Develop and implement a process for screening new and edited lessons learned for reasonableness, consistency, completeness, and other target qualities.
- Systematically require all fields to be populated when submitting a lesson learned or initiate a process to track down the missing information. Also, manage database integrity by removing the entries that do not include a problem description or ensuring the problem description is completed.
- Develop mechanisms to provide reasonable assurance that project teams (1) review the database for lessons learned from previous projects and (2) incorporate relevant lessons learned into the project's scope. One option would be for the project team to sign-off on the project process checklist that these activities were completed.
- In cooperation with other organizations, develop an entity-wide repository to capture the details of lessons learned across TVA organizations so that those outside the originating organization can also benefit from the experiences.

TVA management generally agreed with our recommendations and has taken or is taking actions to address these recommendations. See the Appendix for TVA's complete response.

BACKGROUND

As the nation's largest public power system, Tennessee Valley Authority (TVA) utilizes a variety of generation sources to provide power. Among those are TVA's natural gas/oil-fired facilities, which include combustion turbine (CT) plants. CTs are generally compared to jet engines in how they operate: they draw air in at the front of the unit, compress it, mix it with fuel, and ignite it. The hot combustion gases then expand through turbine blades connected to a generator to produce electric power. A simple-cycle CT is configured to capture useful energy for power generation from the expansion of those hot combustion gases. A combined-cycle CT is configured to pass the products of combustion through a heat recovery steam generator, which converts this useful energy to steam. This steam is then used in a steam turbine to produce additional electric power, increasing the combined-cycle's efficiency over that of the simple-cycle.

TVA's portfolio of natural gas/oil-fired facilities as of September 30, 2011, consisted of 13 facilities with a total of 98 units capable of producing approximately 8,200 megawatts of electric power. These facilities represent a mixture of assets that were purchased or leased by TVA and assets that were constructed under contract with TVA. Construction of facilities such as these is the responsibility of the Generation Construction organization, previously known as Fossil Generation Development and Construction (FGD&C).

The FGD&C organization was established in fiscal year 2009 and was subsequently renamed Generation Construction (GC) during a recent reorganization within TVA. GC is responsible for, among other things, large construction projects for all non-nuclear generation groups. The New Unit Services (NUS) group within GC is responsible for all new, non-nuclear generation. Most of the work performed by NUS is for the design, procurement, and construction of simple-cycle and combined-cycle CT plants, including the Lagoon Creek Combined Cycle Plant (LCC) located near Brownsville, Tennessee, and John Sevier Combined Cycle Plant (JCC) located near Rogersville, Tennessee.

In March 2007, TVA published an environmental assessment that stated the organization was investigating the use of CTs (simple-cycle and combined-cycle) to address growing power demands and expanded regulatory requirements. In the same month, the TVA Board of Directors approved the purchase of a brownfield site¹ adjacent to TVA's existing Lagoon Creek Simple Cycle Plant.

In August 2007, the Board approved a maximum budget of \$396 million for the LCC project, and construction began in August 2008. The budget was increased in January 2010 to \$445 million and again to \$474 million in September 2010, before commercial operation began later the same month. The actual LCC project cost through March 2012 was approximately \$466 million, \$70 million over

¹ A brownfield site has existing, disturbed acreage as opposed to a greenfield site, which is undisturbed.

the initial TVA Board-approved budget. However, GC stated in benchmarking data that LCC at the time had the cheapest cost per kilowatt to construct when compared to the plants included in the benchmark.

In June 2009, the Board approved a project maximum of \$850 million for construction of JCC, and the budget was set at \$817.5 million. The facility began commercial operation on April 30, 2012, adding approximately 880 megawatts of generating capacity to the TVA system. According to TVA, the facility was built for under \$790 million, more than \$30 million under budget, and began commercial operation 1 month ahead of schedule.

GC maintains a database of lessons learned from projects on its SharePoint site. A lesson is defined as some useful knowledge or sense that results from direct experience. Lessons learned involve collecting information on events and incidents that either positively or negatively impacted the conduct or performance of a project. Lessons learned can be used for future projects to prevent repeated issues and improve subsequent performance, such as other projects similar to LCC and JCC.

During the construction of LCC, TVA did not have a standard programs and processes (SPP) document specifically dedicated to managing lessons learned but instead had multiple SPPs² that applied to lessons learned. However, in October 2011, TVA issued TVA-SPP-34.016, Project Lessons Learned Management, for all new projects with total costs greater than \$250,000.

Both the collective SPPs and the newer governing document set the expectation that the project team will document lessons learned for each project, and those lessons learned will be applied to the next comparable project. The process to accomplish those objectives was strengthened with TVA's governing document by including the following guidance:

- TVA lessons learned will be documented and applied to other projects.
- Activities for formal lessons learned sessions should be included in the project schedule during all phases.
- All project participants are expected to identify lessons learned throughout the project, not just at the end.
- The strategic business unit (SBU) should maintain a lessons learned repository.
- During initiation, the project team should complete a broad review of lessons learned from projects of similar size, complexity, and scope to incorporate best practices and develop risk mitigation strategies.

² The SPPs were reissued in October 2011 as TVA-SPP-34.012, Project Baseline Management; TVA-SPP-34.013, Risk and Contingency Management; and TVA-SPP-34.017, Project Closure, to supersede TVA-SPP-34.001, TVA-SPP-34.002, and TVA-SPP-34.004, respectively.

- During planning, the project team should complete a detailed review of lessons learned specific to project planning elements and adjust the project plan and preliminary scope, schedule, and costs.
- Before and during execution of scheduled activities, the project team should complete a focused review of lessons learned on key project activities to capture improvement opportunities and identify action-specific areas of risk.

OBJECTIVE, SCOPE, AND METHODOLOGY

Because of the potential usefulness of a sound lessons learned process in completing generation construction projects effectively and efficiently, we reviewed the lessons learned process used during the construction of LCC. The audit objective was to identify lessons learned and how those lessons are being or can be applied to subsequent construction projects. The audit also focused on the lessons learned process rather than just substantive testing of lessons from one project to the next because the process review approach added more value in the audit team's opinion.

To achieve our objective, we:

- Obtained and reviewed SPPs for information regarding policies, procedures, and control activities that applied to lessons learned. However, we performed limited testing of specific controls that were within the scope of our objective.
- Interviewed various members of GC management to obtain information related to lessons learned and associated processes.
- Obtained and reviewed the list of lessons learned that GC self-identified for the LCC project.
- Visited LCC to interview various plant personnel to obtain potential lessons learned not previously documented.
- Obtained and reviewed monthly progress reports dated February 2008 through September 2010 that were provided to TVA by the LCC contractor in order to identify potential lessons learned.
- Requested GC personnel to identify LCC lessons that were applicable to the JCC project, resulting in a population of 50 identified lessons.
- Selected a sample of 31, or 62 percent, of the population of 50 LCC lessons using nonrandom selection methods. The lessons were not prioritized with high, medium, low, or any other means of rank; therefore, the audit team judgmentally selected the sample based on the audit team's perceived ability to validate the lesson was actually applied.³ The sample was selected in order to determine if those specific lessons were applied during the JCC

³ To illustrate, the audit team did not perceive that it could easily validate that JCC used stainless steel rather than copper for underground instrumentation; therefore, that lesson was not selected as part of the sample.

project. The results of our testing are not projected over the population of lessons learned because a random sampling methodology was not used.

- Visited the JCC construction site to obtain documentation for the sampled lessons and explanations for the lessons that GC indicated were not applicable to JCC, as mentioned above.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. We do not express an opinion on TVA's internal control structure because this audit was not designed to identify all material weaknesses in GC's lessons learned program.

FINDINGS

During the LCC project, multiple SPPs provided guidance on managing lessons learned including TVA-SPP-34.004, Project Closure, which states that lessons learned should be documented in an SBU database and TVA-SPP-34.002, Risk and Contingency Management, which recommends that project teams review lessons learned from similar projects. We determined GC has a process in place for lessons learned management, and during the audit, TVA issued a new procedure dedicated to the process of project lessons learned management, which provides beneficial guidance on the roles and responsibilities of project teams in regards to managing lessons learned.

However, we identified some potential areas of improvement in the GC process. Specifically, we determined (1) there is no documented criteria or review process for determining what is or is not a lesson learned, (2) the process for documenting lessons learned could be improved, and (3) there are no mechanisms to reasonably assure that project teams are reviewing lessons learned from previous projects or that relevant lessons learned are incorporated into the project's scope. In addition, we determined improvements can be made in sharing lessons learned between organizations.

Criteria to Identify Lessons Learned is Lacking

As previously stated, during construction of LCC, TVA did not have an SPP specifically dedicated to managing lessons learned. According to GC personnel, multiple SPPs⁴ contained verbiage related to managing lessons learned, and collectively, they represented TVA's policy in the area at the time construction was underway. However, none of these documents contain criteria as to what should or should not be documented as a lesson learned. Without documented

⁴ The SPPs included TVA-SPP-34.001, Project Baseline Management; TVA-SPP-34.002, Risk and Contingency Management; and TVA-SPP-34.004, Project Closure, which have since been superseded by TVA-SPP-34.012, TVA-SPP-34.013, and TVA-SPP-34.017, respectively.

criteria to assist in the judgment of determining lessons learned, the database may include entries that are not applicable to its intended function and may exclude relevant items. In that case, the database may not serve its purpose effectively.

To capture lessons learned during the LCC project, various members of GC and the engineering, procurement, and construction contractor held group sessions near the end of the LCC project prior to demobilization. The Project Manager generally facilitated these sessions, and the participants discussed particular areas of the project to determine what could have been done better while a designated team member captured the information to be added to GC's database of lessons learned. These lessons were then uploaded to the SharePoint site.

During the course of the audit, TVA issued TVA-SPP-34.016, Project Lessons Learned Management, effective October 1, 2011, that specifically serves as the governing document for managing project lessons learned. GC subsequently issued FGDC-SPP-34.000, Project Process, effective December 1, 2011, that describes project manager responsibilities for collecting and incorporating lessons learned and being familiar with the governing document but does not contain criteria as to what constitutes lessons learned.

In order to determine whether some lessons had not been identified or included in the database, we reviewed TVA and contractor documentation and interviewed various GC and Fossil Power Group (FPG) personnel. As described below, not all lessons learned were included in the GC database.

- We reviewed the monthly progress reports provided to TVA by the LCC contractor for February 2008 through September 2010. We looked for issues not previously documented in GC's database but believed by the contractor to be impacting the project's critical path,⁵ and we identified 13 issues occurring on more than one monthly report. According to the LCC Project Manager and other GC personnel, most of the issues could be traced to (1) poor schedule management during the engineering and construction phases of the project and (2) the use of gray market⁶ equipment. The LCC Project Manager stated that NUS took measures to address those issues at the JCC project, although these two issues were not captured in GC's lessons learned database. The LCC Project Manager agreed that those issues should be captured in the database for future project reviews.
- In September 2010, the Senior Vice President (SVP), GC, presented an LCC project summary to TVA's Chief Operating Officer (COO) that included a list of lessons learned during the project. The same list of lessons learned was

⁵ Critical path is the sequence of project activities with the longest overall duration, which determines the shortest time to complete the project. The critical path duration is the project duration. A delay in completing an activity on the critical path directly impacts the project completion date (i.e., there is no float on the critical path).

⁶ Gray market equipment is equipment that is not purchased new from the original equipment manufacturer but instead was fabricated to be used at a site other than where it is actually being used.

included in the project closure presentation, which stated the lessons were applied to the JCC project and are applicable to most large, complex construction projects. However, as of March 20, 2012, those particular lessons learned were not documented in GC's lessons learned database.

- Positive lessons may not be captured as well. The project summary described previously included benchmarking data for capital cost of constructing combined-cycle plants. GC stated that LCC had the lowest construction cost per kilowatt of capacity when compared to the plants included in the benchmark, and the COO subsequently stated that LCC has performed strongly since going into service. However, GC's lessons learned database included few combined-cycle best practices or positive lessons learned aimed at capitalizing on positive experiences, such as the low cost presented to the COO. In fact, only two entries in the database were marked as best practices for combined-cycle projects; one relates to the proper storage of electrical motors to prevent damage from rainwater, and the second relates to the use of stay-form material versus other forming systems for concrete structures constructed below grade (or underground).
- We interviewed several GC and FPG team members to solicit comments on what could have been done better during the LCC project. One issue raised by multiple FPG interviewees related to poor communication between the construction organization, GC, and the operations organization, FPG, and the need to address potential operations concerns during construction. Conversely, the FPG Plant Manager at JCC described a positive experience when asked about the interface between the two organizations, which indicates improvement in this area from one project to the next.

The effect of not including all lessons learned, whether negative or positive, in the database is that future projects may not benefit fully from the experience of past projects. In response to the audit team's preliminary findings, the SVP stated the organization's main focus has been for GC project personnel to actively add lessons learned to the database for projects as they are being worked. The SVP asks at every Project Approval Board meeting if the lessons learned being presented have been loaded into the database. Many lessons learned that existed prior to the creation of the database have been added; however, the organization will evaluate whether other legacy lessons learned should be added. Although the SVP maintains that the lessons learned presented to the COO were generic in nature and for the most part are included in other procedures, it is our opinion the lessons presented to the COO should be included in the database so that as procedures and personnel change over time, the lessons are not lost. Regarding capturing positive experiences, the SVP stated the current process requires that good practices be included as lessons learned.

Process Improvements Could Be Made

We determined that GC has a process in place for lessons learned management; however, we identified some process areas that could be improved. The process could benefit from increased scrutiny and control of the lessons learned database. The details of these improvements are noted below.

Limited Process for Screening Lessons Learned

As described on page 3 in this report, we selected a sample of lessons learned from LCC that could apply at JCC. Before selecting the test sample, we asked the JCC Project Manager to identify lessons that did not apply to JCC from a list of 70 LCC lessons. The JCC Project Manager indicated 20 of the 70⁷ LCC lessons learned did not apply to JCC for various reasons including 7 entries that were not actually lessons learned and should have been screened out of the database. The JCC Project Manager stated some entries that should not have been considered lessons learned were 'general knowledge' such as gasoline-contaminated diesel fuel due to the wrong fuel being added to the equipment. Other entries that should not have been considered lessons learned represented actions that should not be done. For example, vent valves, drain valves, and some root valves have no means of stopping discharge should they leak. According to the JCC Project Manager, capping these valves is not a good practice because if the caps are under pressure, a potential safety hazard is created for anyone who doesn't know the caps are under pressure.

The absence of established criteria for determining if issues are lessons learned may lead to the inclusion of items that do not support the intended function of the database. In response to the audit team's preliminary findings, the SVP stated lessons learned are sometimes subjective, and the organization does not want to limit what project team members consider a lesson learned. Additionally, when a new lesson learned is added to the database, the Project Controls Senior Manager, GC, receives an e-mail alert to review the new lesson. However, the Project Controls Senior Manager stated he does not review the lessons in detail when he receives an e-mail alert, and he seldom questions what is submitted in order to avoid discouraging team members from submitting new lessons to the GC database.

Database Control Could Be Improved

GC maintains a database of lessons learned from projects on its SharePoint site. According to the Project Controls Senior Manager, lessons learned can be added to the database in two ways: (1) a user can access the GC Web site and submit a single item by populating a series of information boxes, or (2) a file containing multiple lessons learned can be compiled by the project team and uploaded to the database by a designated project controls team member. The Project Controls Senior Manager stated that GC did not want to limit people's ability to add lessons learned to the database but had restricted the ability to edit the database.

⁷ For our sample, we selected 31 lessons from a population of 50: the 70 LCC lessons less the 20 that were not applicable.

In order to evaluate the database restrictions, we submitted two test lessons through the SharePoint site, one of which did not have all fields populated. Both test lessons were immediately included in the list of lessons learned, and we edited one of the test submissions after it was included in the list of lessons learned. According to the Project Controls Senior Manager, the edit ability was restricted to two individuals when the organization was using Microsoft SharePoint 2007, but the organization upgraded to SharePoint 2010 and that security feature did not transfer. We provided our preliminary findings to the SVP, who stated the issue had been addressed. The SVP stated when a lesson learned is added to the database or edited, the Project Controls Senior Manager receives an e-mail alert to review the new or edited lesson. We subsequently attempted to edit a lesson prior to issuance of this report and were unable to do so.

We also identified lessons learned in the database that were missing pieces of information, such as a description of, and solution to, the problem, or the name and date submitted. The absence of key pieces of information (i.e., solution or person submitting) may prevent the organization from taking full advantage of the lesson. According to the SVP, many of the lessons learned were imported into the database from projects completed prior to the creation of the database, and most of those items did not have all of the key pieces of information.

Mechanisms for Review

We selected a sample of 31 from a population of 50 LCC lessons that were, according to GC personnel, applicable to the JCC project to determine whether these lessons were implemented at JCC. GC personnel provided evidence of implementation for 27, or 87 percent, of the sampled 31 lessons learned, which indicates a good performance at incorporating knowledge documented from LCC into the JCC project. According to GC, 2 of the 4 lessons were not implemented due to timing (i.e., the related process was already complete at JCC when the lesson was brought forward from LCC). GC did not respond to the audit team's requests for documentation of the remaining 2 lessons.

According to the Project Controls Senior Manager, the organization recently conducted a self-assessment that included two questions related to lessons learned:

1. Are you reviewing lessons learned in the planning stage of your project?
2. Are you documenting lessons learned in the database?

The Project Controls Senior Manager stated, of the eight responses received at the time, two of the respondents, or 25 percent, stated "no" to the above questions but indicated they would begin doing so on future projects. According to the Project Controls Senior Manager, there is no mechanism to reasonably assure project teams are reviewing lessons learned from previous projects or relevant lessons learned are incorporated into the project's scope.

The effect of project teams not reviewing the database for relevant lessons learned is that positive events may not be repeated and negative events may not be prevented. In response to the audit team's preliminary findings, the SVP stated TVA-SPP-34.016 requires project teams to review the lessons learned database for similar type projects and include applicable items in the project baseline and/or risk register. Additionally, periodic self-assessments are conducted to ensure compliance with the procedure. While we agree with this practice to improve compliance, in the audit team's opinion, self-assessments are primarily detective in nature and identify occurrences of noncompliance rather than prevent those occurrences.

Use of Lessons Learned Between Organizations

TVA-SPP-34.004 stated lessons learned should be documented in an SBU database, and TVA-SPP-34.002 recommended project teams review lessons learned from similar projects. According to various TVA personnel, organizations generally differ in how they document and handle lessons learned. Rather than documenting lessons learned in a TVA-wide repository, GC documents lessons learned on its SharePoint site; whereas, Gas Operations, Coal Operations, and Nuclear Construction utilize Maximo. According to the JCC Project Manager, some information has been shared between GC and Nuclear Construction, but lessons learned have not been shared globally.

The audit team discussed with the JCC Project Manager how different organizations within TVA can benefit from one another. One example was noted during a different audit being conducted at Bellefonte Nuclear Plant by the Office of the Inspector General. Two senior managers at Bellefonte Nuclear Plant stated they saw a great work control process at JCC that provided a work package to workers when coming onto the job site, so they know exactly what they are accountable for each day. Another example of how different organizations can learn from one another was mentioned by the JCC Project Manager who stated the cooling towers at JCC and Browns Ferry Nuclear Plant (BFN) are similar, and BFN contacted JCC to discuss some related piping questions. BFN knew to contact JCC because of a third party outside TVA; the contractor at BFN had listed JCC as a reference where the same work had been completed. Additionally, the lessons learned from the project summary mentioned on page 5 of this report are broad-sweeping and could be beneficial to organizations other than GC. Further, the audit team interviewed several FGD&C and FPG team members to solicit comments on what could have been done better during the LCC project. We noted the general issues being raised by FPG, such as gray market equipment issues, were not included in GC's database of lessons learned, and while GC does not view the issues raised by FPG as lessons learned, the comments may have merit for other organizations.

The effect of not utilizing an entity-wide repository for lessons learned, positive or otherwise, is that future projects may not benefit fully from the wealth of experience TVA has amassed from past projects, and this void contributes to organizational silos. A consistent process used by all TVA organizations would aid in effectively taking advantage of lessons learned across TVA, not just at the

SBU level. In response to the audit team's preliminary findings, the SVP stated all TVA organizations have access to the GC SharePoint database, and SBU representatives of the Project Management Peer Team have seen a demonstration of the site. However, the audit team is of the opinion that it is less likely for those outside of GC to review a specific organization's database as compared to a centralized database containing all lessons learned that can be filtered in various ways.

RECOMMENDATIONS

We recommend the GC organization:

1. Develop and document criteria for determining if issues are in fact lessons learned and/or best practices.
2. Ensure the database is complete with all lessons learned including those presented to the COO and best practices from positive experiences to promote repeat application in future projects.
3. Develop and implement a process for screening new and edited lessons learned for reasonableness, consistency, completeness, and other target qualities.
4. Systematically require all fields to be populated when submitting a lesson learned or initiate a process to track down the missing information. Also, manage database integrity by removing the entries that do not include a problem description or ensuring the problem description is completed.
5. Develop mechanisms to provide reasonable assurance that project teams (a) review the database for lessons learned from previous projects and (b) incorporate relevant lessons learned into the project's scope. One option would be for the project team to sign-off on the project process checklist that these activities were completed.
6. In cooperation with other organizations, develop an entity-wide repository to capture the details of lessons learned across TVA organizations so that those outside the originating organization can also benefit from the experiences.

MANAGEMENT'S RESPONSE AND OUR EVALUATION

TVA management generally agreed with our recommendations and has taken, or is taking, the following actions:

- A lessons learned guide, including criteria for problems and best practices, has been added to the GC SharePoint.

- GC now requires certain fields be completed before a lesson learned can be submitted. In addition, lessons learned with no problem description have been removed from the database.
- A check sheet, which includes lessons learned, will be added to TVA-SPP-34.019, Project Process, scheduled to go into effect October 1, 2012.
- Through the Project Management Peer Team, all TVA organizations with projects are developing lessons learned databases similar to GC's. These will have common access through a TVA Project Management SharePoint site.

The Office of the Inspector General agrees with the actions planned and taken by TVA management.

With regard to our recommendation to include all lessons learned in the database, TVA management stated legacy lessons learned were previously added to the database in fiscal year 2011, and GC has no plans to add other legacy issues.

With regard to our recommendation to develop and implement a process for screening new lessons learned, TVA management stated the automatic alert is sent to the GC Project Controls Senior Manager “. . . for review for reasonableness, consistency, completeness, and other target qualities . . .” when a new lesson is added to the database. However, as previously stated in this report, the Project Controls Senior Manager stated he does not review the lessons in detail when he receives the e-mail alert and seldom questions what is submitted in order to avoid discouraging team members from submitting new lessons to the GC database. While we agree with the automatic alert being in place, we encourage GC to take further steps to ensure new lessons learned are reviewed.

September 5, 2012

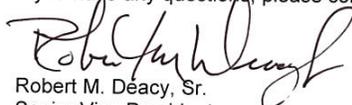
Robert. E. Martin, ET 3C-K

REQUEST FOR COMMENTS - DRAFT AUDIT 2011 13781 - LESSONS LEARNED AT
LAGOON CREEK COMBINED CYCLE PLANT

This is in response to your August 10, 2012 draft audit report on lessons learned at Lagoon Creek Combined Cycle Plant. We are in agreement with the six recommendations provided. Attached is a summary of actions initiated or completed, along with the date actions were completed or are planned to be completed.

Since all actions will be completed by October 1, 2012, we recommend closure of this audit.

If you have any questions, please contact Tim Hope, VP, New Unit Services, at 423-751-3500.



Robert M. Déacy, Sr.
Senior Vice President
Generation Construction

JMD:SSS

Attachments:

cc: (Attachments):

J. R. Dalrymple, LP 3K-C

J. M. Dodd, LP 5D-C

M. B. Fussell, WT 9B-K

K. S. Greene, WT 7C-K

P. T. Hairston, Jr., WT 7B-K

J. J. Hoagland, WT 7C-K

R. T. Hope, LP 5D-C

R. B. Wells, WT 9B-K

ATTACHMENT

AUDIT 2011 2011-13781 - LESSONS LEARNED AT LAGOON CREEK COMBINED CYCLE PLANT - RECOMMENDATIONS ACTIONS TAKEN

1. Develop and document criteria for determining if issues are in fact lessons learned and/or best practices.

A Lessons Learned guide, which includes criteria for problems and best practices, was posted on the GC SharePoint site on August 30, 2012. (Click [here](#) to see guide.)

2. Ensure the database is complete with all lessons learned including those presented to the COO and best practices from positive experiences to promote repeat application in future projects.

Legacy lessons learned were added to the database during FY11. There are no further plans to add other legacy lessons.

3. Develop and implement a process for screening new and edited lessons learned for reasonableness, consistency, completeness, and other target qualities.

An automatic alert is sent to the GC Senior Manager, Project Controls/PMO, for review for reasonableness, consistency, completeness, and other target qualities whenever a new lessons learned is added to the database. This alert was put in place in the spring 2012. Lessons Learned can only be edited by the GC Senior Manager, Project Controls/PMO, or his delegate.

4. Systematically require all fields to be populated when submitting a lessons learned or initiate a process to track down the missing information. Also, manage database integrity by removing the entries that do not include a problem description or ensuring the problem description is complete.

On August 24, 2012, the following fields were made required fields before a Lesson Learned can be submitted: Date Submitted, Title, Problem or Best Practice, Submitted By, Description, Functional Area, Solution, and Type Project. Lessons Learned with no problem description have been removed from the database. There is no plan at this time to remove legacy lessons learned that may not have other required fields completed.

-2-

5. Develop mechanisms to provide reasonable assurance that project teams (a) review the database for lessons learned from previous projects and (b) incorporate relevant lessons learned into the project's scope. One option would be for the project team to sign off on the project process checklist that these activities are complete.

A check sheet, which includes lessons learned, will be added to TVA-SPP-34.019, Project Process. This procedure is scheduled to go into effect 10/1/12. Compliance will be assessed as required by TVA-SPP-34.0.

6. In cooperation with other organizations, develop an entity-wide repository to capture the details of lessons learned across TVA organizations so that those outside the origination organization can also benefit from the experiences.

Through the Project Management Peer Term (PMPT), all TVA organizations with projects are developing Lessons Learned databases similar to GC's. These will have common access through a TVA Project Management SharePoint site. These sites are scheduled to be active by 9/30/12.