



Memorandum from the Office of the Inspector General

January 30, 2013

Janet C. Herrin, WT 7A-K

**REQUEST FOR MANAGEMENT DECISION – AUDIT 2012-14567 – BUILDING AND
INFRASTRUCTURE FAILURE RISKS**

Attached is the subject final report for your review and management decision. You are responsible for determining the necessary actions to take in response to our findings. Please advise us of your management decision within 60 days from the date of this report.

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 or wish to discuss our findings, please contact me at (865) 633-7450 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

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OIG File No. 2012-14567



Office of the Inspector General

Audit Report

To the Executive Vice
President and Chief
Administrative Officer,
Administrative Services

BUILDING AND INFRASTRUCTURE FAILURE RISKS

Audit Team
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Audit 2012-14567
January 30, 2013

ABBREVIATIONS

CPP	Challenged Properties Program
ERM	Enterprise Risk Management
FAM	Facilities Asset Management
FAP	Facilities Asset Preservation
FCI	Facilities Condition Index
FM	Facilities Management
FPP	Facilities Programs and Projects
FY	Fiscal Year
MS	Muscle Shoals
TVA	Tennessee Valley Authority

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MEMORANDUM DATED JANUARY 16, 2013, FROM JANET C. HERRIN TO
ROBERT E. MARTIN



Audit 2012-14567 – Building and Infrastructure Failure Risks

EXECUTIVE SUMMARY

Tennessee Valley Authority's (TVA) Facilities Management (FM) business unit is part of the Administrative Services strategic business unit and is responsible for managing TVA's facilities portfolio and providing services across TVA such as building maintenance and grounds and property management. Within FM, Facilities Programs and Projects manages efforts for facility renovations, upgrades, major repairs, energy efficiency, sustainability, and other facilities' needs. These efforts include TVA's Facilities Asset Preservation (FAP) Program, which was designed "to ensure core facility related assets are maintained in a condition to satisfy their intended operational capabilities."ⁱ The FAP team is responsible for gathering asset information, identifying deficiencies, recommending corrective actions, and implementation planning of approved projects.

TVA's facilities asset portfolio includes over 34 million square feet of gross space in about 3,446 structures, and a small number of these properties are not in use. From 2009 to 2011, FM identified 19 underutilized properties. Two of these properties, former coal plants, were decommissioned in 2011.ⁱⁱ A third property, part of TVA's Muscle Shoals reservation, is being mitigated under an extensive redevelopment project, which includes the November 2012 TVA Board of Directors approval of the possible sale of 1,000 acres of the Muscle Shoals property. In addition, TVA established the Challenged Properties Program (CPP) in March 2012 to develop strategies for proper handling of underutilized or vacant properties.

Because of the importance of proper maintenance to the safe, efficient, and effective operation of assets, we initiated this audit to evaluate TVA's efforts to identify and mitigate risks associated with its buildings and infrastructure. As of July 2011, TVA's Enterprise Risk Management identified the risk of building and infrastructure failures among other safety risks and the FAP Program as the primary strategy to mitigate these risks. This audit was undertaken to evaluate TVA's risk mitigation strategy and identify opportunities for reducing risks, including risk exposures from underutilized properties, to acceptable levels. Specifically, our audit objective was to determine if FM adequately designed the FAP Program to identify and mitigate risks of building and infrastructure failures and whether the FAP Program operates effectively as designed.

In summary, our audit disclosed FM's FAP Program is adequately designed to identify and mitigate the risks of building and infrastructure failures, and FM's processes for remediating identified risks are reasonably effective. However, we found TVA's risk exposure from building failures is elevated because the identified risks exclude underutilized properties, and FAP funding has not been

ⁱ TVA-SPP-28.5, Asset Preservation, Rev. 0001, effective 04/15/2011, §2.0 Scope.

ⁱⁱ The properties were decommissioned while FM was part of the former Power System Operations organization.



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adequate to address the risks in the long term. We also identified opportunities to improve some FAP Program and related FM processes.

- The FAP Program contributes to risk reduction by mitigating some of the worst building conditions in TVA's asset portfolio. Although the FAP Program has addressed many failing building conditions, the historical FAP budget has not been sufficient to effectively reduce TVA's overall building maintenance backlog. From fiscal year 2008 through 2012, FAP funding averaged \$24.4 million per year. During the same period, additional facilities-related projects; covering a variety of maintenance for baseline work, safety, energy programs, and major modifications; averaged \$14.4 million per year. Compared to industry benchmarks, which indicate maintenance of TVA's facilities portfolio should range between \$87 million to \$174 million per year, TVA's average nongeneration repairs and maintenance funding of \$39 million per year falls short of minimum industry targets by \$48 million per year. As a result, TVA mitigation efforts do not provide overall stewardship that could reduce deferred maintenance backlogs and extend building life cycles. Hence, TVA has a high level of risk in the long term that buildings may substantially deteriorate or fail before they can be remediated.
- TVA risk exposures from building failures go beyond the scope of TVA's FAP Program. Underutilized properties owned by TVA pose risks of liabilities from potential contamination or compromises to public safety. Since CPP was formed, lead responsibility for this program has been uncertain as is apparent from the lack of property information recorded since 2011. Although TVA mitigated three underutilized properties in the last 2 years, remaining properties could deteriorate to an unusable, unsafe, or unrecoverable condition. For example, two TVA-owned sites in North Alabama were reported as dilapidated and likely subject to breaches or misuse. Because these properties could become dangerous or eyesores, TVA risks hazards to public safety or further damage to public image. Sale of seven underutilized properties could realize an estimated \$13 million in gross proceeds, which could offset remediation and disposal costs. A process owner is needed to advance the work defined under CPP, a program that will be needed more strategically as TVA reduces future reliance on coal generation.
- The FAP Program delivers an effective process for remediating identified risks; however, some processes could be strengthened to improve program efficiency and effectiveness. Based on interviews with various TVA personnel and survey results, we identified many good FAP Program attributes, as well as concerns about the program. TVA personnel were mostly complimentary of the FAP Program and described a good process for evaluating the highest priorities and addressing critical needs within the money allotted. There were



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high levels of satisfaction among plant representatives with work quality from roofs, windows, recoated ceilings, elevator upgrades, and repaving projects.

- TVA personnel also identified criticisms and frustrations with FAP, such as the lack of information on FAP Program boundaries and difficulties with oversight of contractor activities working on FAP projects and post-installation issues. We noted improvements could be made in program processes and use of tools related to sharing of lessons learned, follow-up on projects scoped by FM, project tracking, and information included in facilities asset and project records. Although the majority of FAP projects are completed within the scheduled timeframe, about 1 in 4 FAP projects in progress or completed in FY 2012 did not have actual start dates and over one-half of the projects did not include a prioritization ranking. Accurate and complete records are needed to properly track project statistics and support project selection. In addition, the FM asset portfolio application, Tririga, contains data errors and inadequate access controls and has not been fully deployed for use in FM. Adequate security measures are needed to reduce the risk of compromise to TVA's facilities asset portfolio.

We recommend TVA's Executive Vice President and Chief Administrative Officer, Administrative Services, take actions to: (1) determine the level of risk exposures TVA can accept from continued building deterioration and provide adequate program funding where possible; (2) identify a process owner or cross-functional team to identify, manage, and mitigate underutilized properties according to CPP guidelines; (3) improve program communications to better define FAP Program boundaries and update and coordinate with sites where projects are scheduled or ongoing; (4) leverage or develop tools to centralize asset information, project planning and prioritization, facilities conditions, and lessons learned; and (5) obtain the resources necessary to complete Tririga deployment and address weaknesses in the database.

In response to our draft report, TVA management agreed with our findings and provided comments, which are included in this report. See the Appendix for TVA's complete response. We agree with TVA's plans, which are important for addressing some of the issues identified in our report. However, TVA management's plans do not include specific tasks and a timeline for completing corrective actions, which are necessary for effectively addressing our recommendations.

BACKGROUND

Tennessee Valley Authority's (TVA) Facilities Management (FM) business unit is part of the Administrative Services strategic business unit and is responsible for managing TVA's facilities portfolio and providing services across TVA such as building maintenance and grounds and property management. Within FM, Facilities Programs and Projects (FPP) manages efforts for facility renovations, upgrades, major repairs, energy efficiency, sustainability, and other facilities' needs. These efforts include TVA's Facilities Asset Preservation (FAP) Program, which was designed "to ensure core facility related assets are maintained in a condition to satisfy their intended operational capabilities."¹ The FAP "team is responsible for gathering asset information, identifying deficiencies, recommending corrective action, and implementing planning of approved projects."² FAP is intended for facility-related assets identified for TVA's long-term needs and not assets directly involved with power generation, transmission, flood control, or navigation.³

TVA's facilities portfolio includes over 34 million square feet of gross space identified in about 3,446 structures as of September 5, 2012. The facilities portfolio does not include square foot estimates for about 391 TVA buildings such as switch houses, combustion turbine plants, small offices, warehouses, storage buildings, and public-use structures. The structures without square foot estimates total about 11 percent of TVA's facilities asset portfolio.

TVA's facilities portfolio also includes some properties that are not in use. From 2001 to 2011, FM identified 19 underutilized properties. Two of these properties, former coal plants in Bowling Green, Kentucky, and at the Watts Bar site in Tennessee, were decommissioned in 2011.⁴ A third property, part of TVA's Muscle Shoals (MS) reservation, is being mitigated under an extensive redevelopment project. In November 2012, the TVA Board of Directors approved the possible sale of 1,000 acres of the MS property included in the redevelopment project. In addition, TVA established the Challenged Properties Program (CPP) in March 2012 to develop strategies for proper handling of underutilized or vacant properties within TVA and to consider options for reuse, disposal, or retention for risk mitigation or demolition among other activities.

In a 2012 historical assets survey, TVA obtained assessments of 44 sites with possible historic structures to support Cultural Compliance initiatives. These assessments contain updated property information that could be useful for many

¹ TVA-SPP-28.5, Asset Preservation, Rev. 0001, effective 04/15/2011, §2.0 Scope.

² *Ibid.*, §3.1.3 TVA FAP Program Team.

³ One exception to the FAP scope falls under the subprogram Coatings and Corrosion Control to provide protective coatings on assets with corrosion issues including plant and process equipment such as transmission towers, hydro intake gates, and precipitator steel.

⁴ The properties were decommissioned while FM was part of the former Power System Operations organization.

purposes including general building conditions, types of construction and materials used, detailed descriptions, and photographs.

The FAP workgroup prepares an annual master plan to identify project priorities over a 5-year period and longer. Projects are identified in each of the five FAP subprograms including:

- Building Envelope, such as roofs, windows, and siding.
- Building Systems, such as elevators, lighting, and heat and air-conditioning systems.
- Architectural Systems, such as walls, floors, and ceilings.
- Roads, Parking, and Grounds, such as paved areas.
- Coatings and Corrosion Control for plant and process equipment.

Projects are ranked by mission importance, observed condition, and potential impacts. Asset importance ratings range from high to low depending on the severity of disruption anticipated from asset failure, the potential for serious accidents, and consequences of regulatory noncompliance. Observed asset condition factors include age and amount of usage, life expectancy, level of preventive maintenance, and existing environmental conditions. Potential impacts are scored for health and safety, ability to conduct business, number of people, environment, and TVA public image. Projects are then selected from the prioritized list for the annual plan within the limits of the FAP Program budget. In addition to FAP projects, FM manages and tracks facilities maintenance projects to address safety, energy efficiency, baseline maintenance, and major building modifications.

As of July 2011, TVA's Enterprise Risk Management (ERM) listed safety risks as a "medium" risk level. Within the broader safety risks, ERM defined the risk of building and infrastructure failures as "Backlog of projects to repair/replace facility related assets results in risks to transmission/generation assets and employee/contractor safety. Some buildings are over 60 years old and numerous building systems are at the end of their life." Emerging issues included lighting, wall failures, elevators, roofing, and siding. ERM identified the FAP Program as the primary strategy to mitigate these risks.

OBJECTIVES, SCOPE, AND METHODOLOGY

Because of the importance of proper maintenance to the safe, efficient, and effective operation of assets, we initiated this audit to evaluate TVA's efforts to identify and mitigate risks associated with its buildings and infrastructure. This audit was undertaken to evaluate TVA's risk mitigation strategy and identify opportunities for reducing risks, including risk exposures from underutilized properties, to acceptable levels. Specifically, our audit objective was to determine if FM adequately designed the FAP Program to identify and mitigate

risks of building and infrastructure failures and whether the FAP Program operates effectively as designed. To achieve our objective, we:

- Obtained an understanding of the FAP Program by reviewing TVA-SPP-28.5, Asset Preservation, and interviewing the FAP staff.
- Obtained an understanding of CPP by reviewing TVA-SPP-16.10, Challenged Properties Program, and interviewing TVA staff in FM and Economic Development.
- Interviewed business unit representatives assigned to participate in FAP planning.
- Reviewed the FAP Program FY 2012 Master Plan and FM projects cost history.
- Conducted a survey of Operations business units to gauge FAP Program successes.
- Selected a nonstatistical sample of sites to visit where we could observe mitigation effectiveness.
- Interviewed plant managers and maintenance supervisors during site visits.
- Conducted limited reviews of project details in FM's project tracking application, Projects Module.
- Reviewed data on buildings and structures from TVA's asset portfolio.
- Researched industry best practices and benchmarks related to deferred building maintenance, investing in infrastructure, fiscal exposure from maintenance backlogs, and asset condition metrics.

Our survey of Operations groups was sent to 88 individuals representing Generation plants (Coal, Gas, and River Operations), nuclear sites, and Transmission Service Centers. We requested responses to 12 questions related to FAP projects and building maintenance concerns. After receiving 22 responses, we concluded this low response rate (25 percent) could not be relied on to represent conditions across the TVA fleet. Instead, we utilized the information provided as anecdotal evidence of FAP Program results and suggestions for program improvement.

Our criteria for selecting sites to visit was to include sites (1) where FAP projects were ongoing, completed, or planned; and (2) from each of the major operational organizations, including Generation (Coal and River Operations), Nuclear Power Group, Energy Delivery, and TVA corporate. During our audit, we visited two coal plants, seven hydro plants, one nuclear site, two Transmission Service Centers, a substation, one corporate office location, and TVA's MS reservation. Due to the nature of our sampling methodology, the results of our sampling work could not be projected to the entire population.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that 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.

FINDINGS

In general, we found FM's FAP Program is adequately designed to identify and mitigate the risks of building and infrastructure failures, and FM's processes for remediating identified risks are reasonably effective. However, we did find TVA's risk exposure from building failures is elevated because the identified risks exclude underutilized properties, and FAP funding has not been adequate to address the risks in the long term. In addition, we identified opportunities to improve some FAP Program and related FM processes.

TVA RISK EXPOSURE FROM BUILDING FAILURES IS ELEVATED

Although the FAP Program has addressed numerous failing and poor building conditions, the historical FAP budget has not been sufficient to effectively reduce TVA's overall building maintenance backlog to a sustainable level. As maintenance is deferred for longer periods of time and buildings continue to age, conditions further deteriorate and require more resources to restore facilities to good condition.

The FAP Program contributes to risk reduction by mitigating some of the worst building conditions in TVA's asset portfolio. For example, masonry walls failed in 2007 at two coal plants (stairwells at Allen and control room at Johnsonville) posing serious safety issues. FAP projects repaired these walls using contingency funds targeting "emergent" issues. From 2007 to 2010, FAP projects repaired walls at three other coal plants (Gallatin, Paradise, and Shawnee) and four hydro plants (Fort Loudon, Fontana, Guntersville, and Pickwick) to prevent further collapses. Costs of these efforts exceeded \$1 million. FAP staff stated similar repairs were made at Cherokee, Douglas, Kentucky, and Watts Bar Hydro Plants; and wall repairs are planned at Wilson Hydro Plant for fiscal year (FY) 2013.

From FY 2008 to 2012, FAP Program costs averaged approximately \$24.4 million per year. During this period, about two-thirds of the FAP Program effort has focused on TVA's oldest building assets supporting Coal, Gas, and River Operations, as shown in Figure 1 on the following page. Costs for facilities projects in addition to FAP averaged \$14.4 million per year for the same 5-year period including about \$5 million per year funded by other strategic business units. Collectively, TVA's facilities-related projects average \$39 million per year.

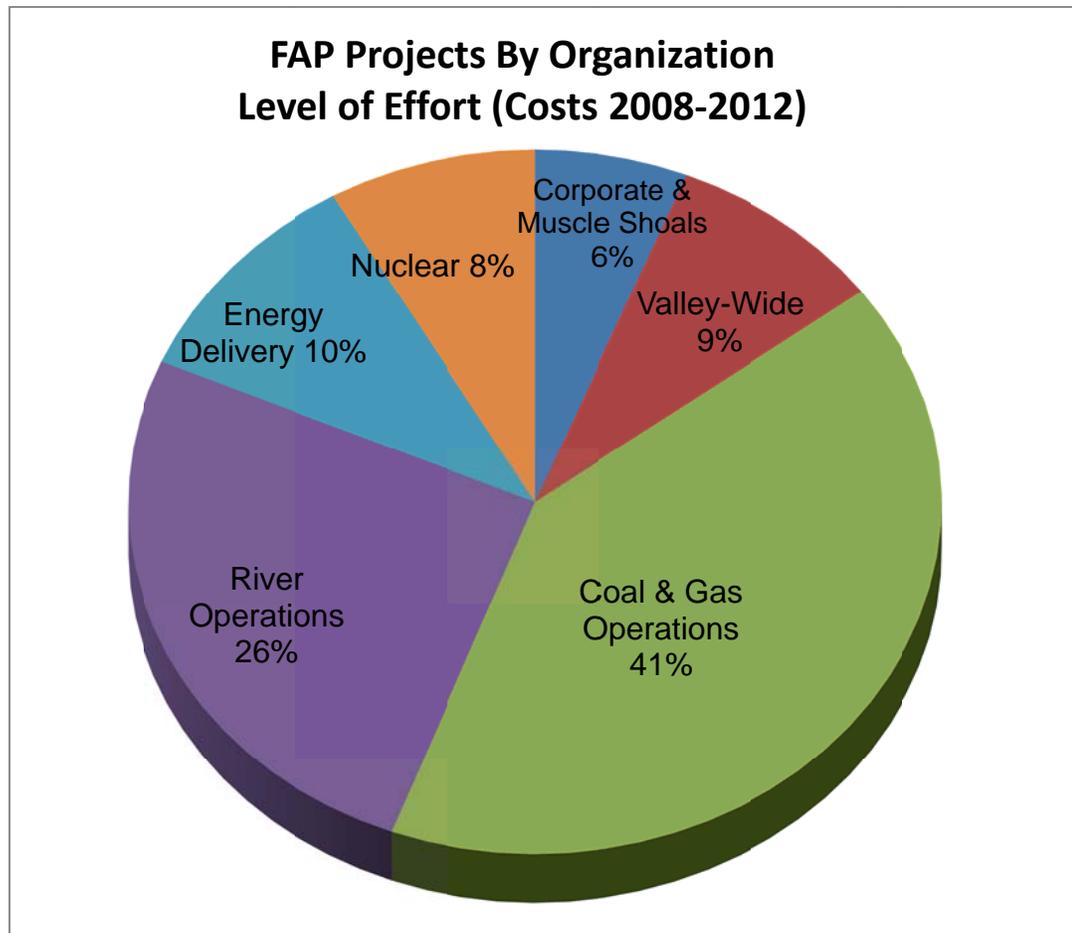


Figure 1

However, industry benchmarks indicate budgets for maintenance and repair of facilities should target 2 to 4 percent of portfolio replacement value. At the low end of this range, sometimes called the “catch up” stage, maintenance backlogs can be maintained, and further deterioration is abated. At the high end of the range, backlogs are reduced with the goal of exceeding expected asset life cycles. This level of effort ensures buildings are assets in the portfolio and do not become liabilities. In other words, a facilities portfolio of TVA’s size should be maintained at a target range between \$87 and \$174 million per year.⁵ Therefore, average TVA annual facilities maintenance funding falls short of minimum industry targets by \$48 million per year. Based on historic funding levels, TVA facilities maintenance efforts fall into a low range of investment that partially addresses the current maintenance backlog but does not provide overall maintenance stewardship that could prevent increases in maintenance needs and additions to the backlog. FPP managers agreed that improving the material condition of facilities involves a 2.5 to 3.5 percent investment in operations and

⁵ Based on an estimate of costs to replace TVA’s facilities asset portfolio, we calculated the 2 to 4 percent target range using 33.9 million square feet of gross building area, increased by 11 percent to allow for undetermined square footage in existing TVA buildings, and an average construction cost of \$116 per square foot based on RS Means industry standards. Depending on the factors used, the target range could be significantly higher than our estimate.

maintenance. By not meeting the lowest recommended spending level, FM does not address the deferred maintenance backlog, the number of projects will continuously increase, and FM cannot extend useful lives of assets included in the maintenance backlog. Maintenance funding at TVA's current low levels can also strain baseline maintenance work and increase day-to-day costs of operations.

FAP Program spending over the last 5 years totaled approximately \$122 million and was funded at 69 percent for operations and maintenance projects and 31 percent for capital improvements. Figure 2 provides historical trends by subprogram for the last 5 years.

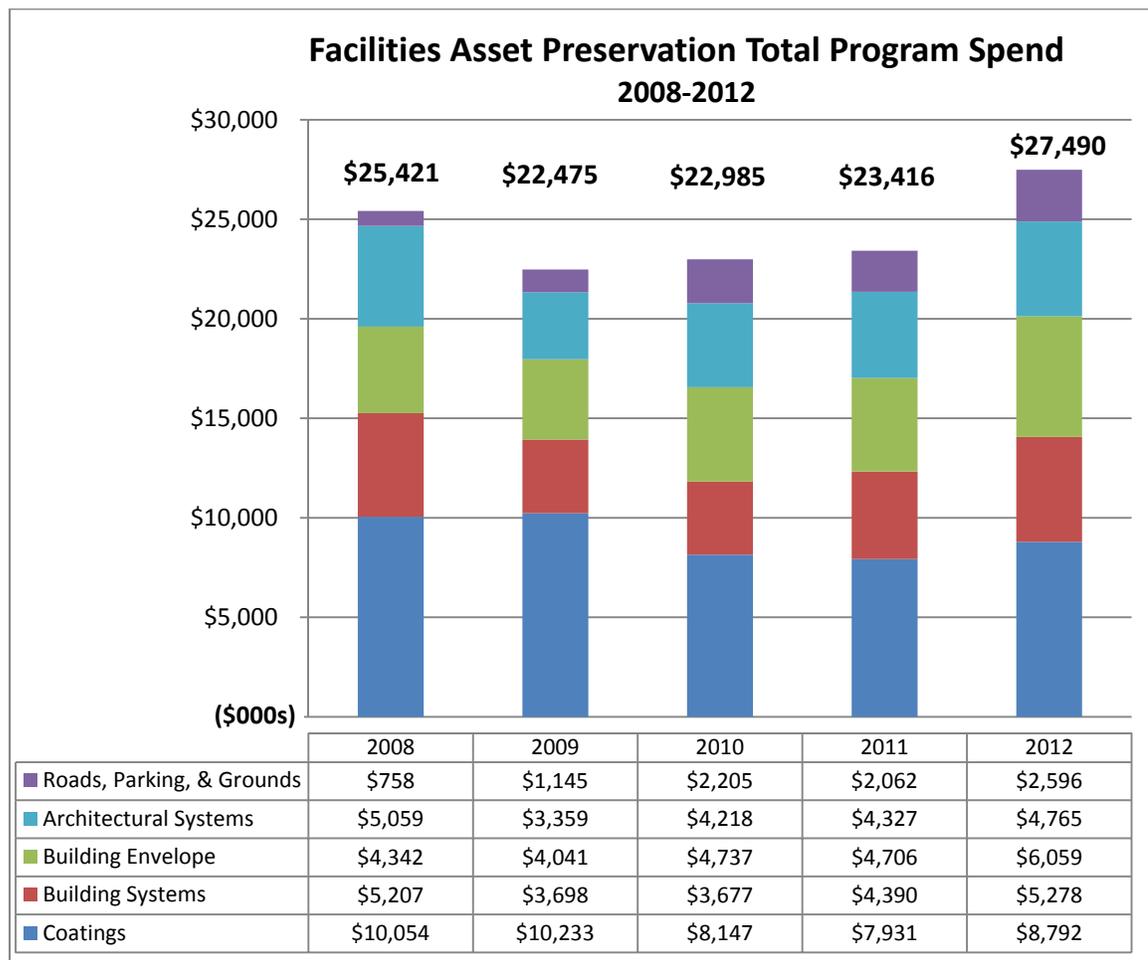


Figure 2

The FAP Master Plan for FY 2012 estimated approximately \$491 million was needed to address FAP projects through FY 2017 and beyond. Funding needs were projected to increase annually over the planning period and by FY 2017, the funding need was projected to be \$48 million, which is 73 percent higher than the planned FY 2012 funding level of \$28 million. Figure 3 shows the trend of project estimates predicted for the FAP Program through FY 2017.

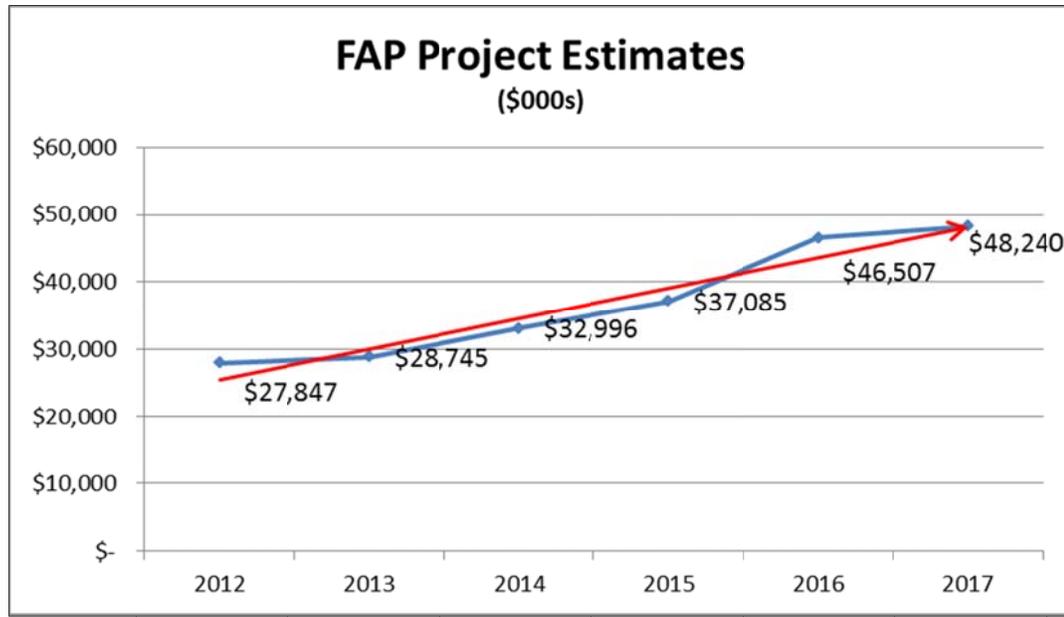


Figure 3

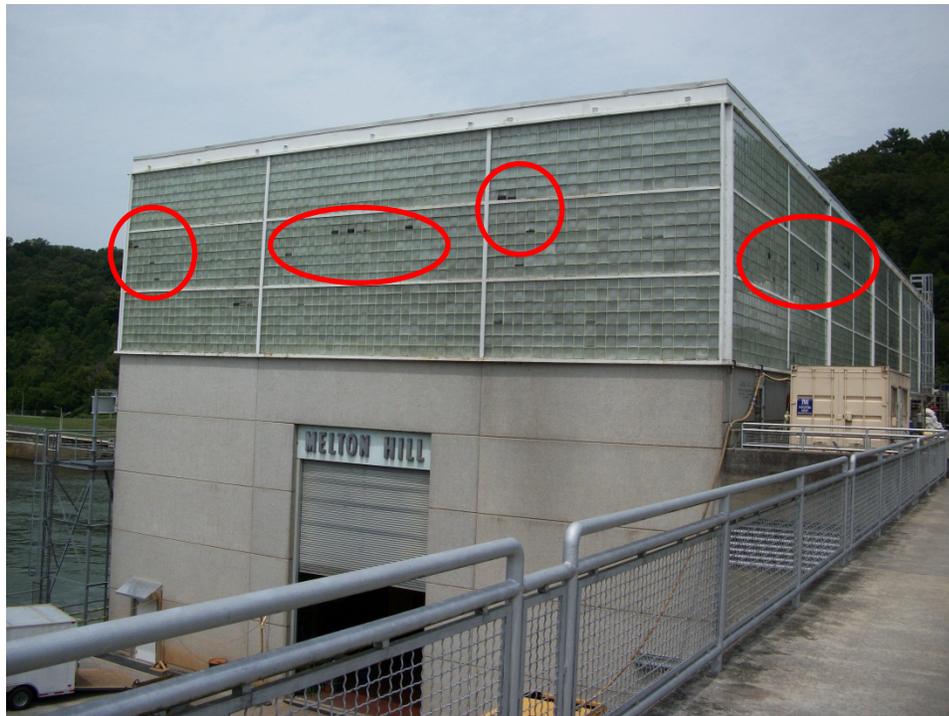
For purposes of updating the FAP Master Plan and selecting FY 2013 projects, FPP staff determined almost 95 percent of projects identified for planned FAP work addresses facilities assets or components in failed or poor condition. By constantly addressing only the worst conditions, FAP Program efforts address a portion of current maintenance backlogs but do not keep pace with potential rates of continued or additional building deterioration. As a result, TVA has a high level of risk in the long term that buildings will substantially deteriorate or fail before they can be remediated.

By comparison, a recent U.S. Department of Labor, Office of Inspector General, report⁶ showed that the Job Corps manages 125 centers nationwide with an average age of 42 years and the oldest being over 80 years old. To maintain these centers, the Job Corps received approximately \$108 million per year in appropriated funds from 2009 through 2011. Although some portion of this funding, along with other legislated funding, was used to acquire land and construct new centers,⁷ the Job Corps reported that the majority of the FY 2010 funding was used to improve facility conditions at its centers by reducing the backlog of repairs on existing buildings and disposing of surplus properties. The U.S. Department of Labor, Office of Inspector General, also reported the Job Corps deferred maintenance backlog as of FY 2011 was \$202 million. TVA funding has been about two-thirds less to maintain and repair a much larger facilities asset portfolio with deferred maintenance that is 2.4 times greater.

⁶ U. S. Department of Labor, Office of Inspector General, Report 26-13-002-03-370 issued December 7, 2012.

⁷ The Job Corps opened one new center in 2011 and plans to open two new centers in 2013. The amount of \$250 million was appropriated under the American Recovery and Reinvestment Act for Job Corps construction and rehabilitation projects from FY 2009 through FY 2013.

During our site visits, we observed deteriorating conditions at several sites, some of which were not included in the FAP Master Plan either because the needs were not identified or because other priorities were higher risk. For example, photograph 1 below shows issues with exterior glass block walls at a hydro plant (Melton Hill near Lenoir City, Tennessee). Many blocks are broken, so they leak when it rains and freeze and break in the cold. In addition, photograph 2 on the following page illustrates substantial corrosion of an exterior steel roof plate at a neighboring hydro plant (Fort Loudon). These types of issues, when known, have to be prioritized within budget limits and in light of other buildings problems, such as leaking roofs, which need more immediate attention. As a result, repairs of the less urgent issues may be deferred indefinitely unless the program obtains the resources to support a more strategic and proactive approach to facilities maintenance.



Photograph 1



Photograph 2

Underutilized Properties Pose Additional Risks

TVA risk exposures from building failures go beyond the scope of TVA's FAP Program. Underutilized properties owned by TVA pose additional risks of liabilities from potential contamination or compromises to public safety. Due to TVA's 2012 reorganization and personnel changes, responsibility for CPP since its formation has been uncertain as is apparent from the lack of property information recorded since 2011. We gained no assurance that all TVA underutilized properties have been identified or plans are being made for proper handling in accordance with CPP guidelines. TVA has mitigated three underutilized properties, and we observed mitigation progress at two of those sites. The former Watts Bar Fossil Plant site was cleared and returned to what appeared to be greenfield status,⁸ although we did not verify completion of environmental remediation activities, such as the proper disposal of asbestos and lead-contaminated materials. In addition, TVA has made significant progress under the MS redevelopment project in remediating dilapidated conditions at the former Chemical Plant and Environmental Research Center properties on the MS reservation and preparing for possible disposal of some of the property. This property was described as the biggest and worst of TVA's challenged properties.

We were informed of two other sites in North Alabama that are significantly deteriorated and could pose liabilities to TVA. Specifically, two small properties called the Decatur Maintenance Base and the United States Coast Guard site

⁸ Greenfield status refers to a parcel of land that after industrial use is, in principle, restored to the conditions existing before the construction of the plant.

were reported as dilapidated, likely subject to breaches or misuse, containing possible environmental contaminants, and having no feasible possibility of being returned to functional use. Other abandoned properties could deteriorate to an unusable, unsafe, or unrecoverable condition possibly becoming dangerous or eyesores and risking hazards to public safety or further damage to TVA's public image. According to estimates FM obtained when identifying underutilized properties, sale of seven properties could realize an estimated \$13 million or more in gross proceeds, which could offset the costs of remediation, disposal, or other cleanup activities. A process owner is needed to advance the work defined under CPP. These efforts will become increasingly important as TVA moves to a more balanced operational portfolio and reduces reliance on coal generation. FPP staff expressed specific concern regarding responsibilities for repairs of coal plants after operations cease.

FAP PROGRAM PROCESSES COULD BE IMPROVED

The FAP Program delivers an effective process for remediating identified risks; however, some processes could be strengthened to improve program efficiency and effectiveness. Based on interviews with various TVA personnel and survey results, we identified many good FAP Program attributes, as well as concerns about the program. Further, we noted improvements could be made related to sharing of lessons learned, follow-up on projects scoped by FM, information included in the asset and project records, project tracking, and the Tririga application.

Compliments and Concerns from TVA Personnel

From our site visits, interviews, and program survey, we identified many good FAP Program attributes, and TVA personnel were complimentary of the FAP Program. Specifically, the program is a good process to evaluate the highest priorities, identify the critical needs, and work with the money allotted. In addition, FAP personnel have a "good handle" on program scope, particularly roofs and roads, and do what they say they will do while addressing Operations' biggest facilities maintenance needs. Some personnel stated pre-project meetings were beneficial for the projects to leverage work at other sites, coordinate with plant and contract partners, establish project expectations, consider environmental needs, allow for lead times to obtain plant access, and arrange for plant involvement. Survey responses indicated an 87 percent satisfaction rate with FAP projects, among those who responded,⁹ stating FAP projects worked well overall; and FAP staff provided good scheduling, coordination, communication, pre-project meetings, and work quality. There were high levels of satisfaction among plant representatives with work quality from roofs, windows, recoated ceilings, console replacements, elevator upgrades, repaving, and virtually every FAP subprogram.

⁹ As previously described in our report, the response rate to our survey was low and did not represent views across the operating business units but provided evidence of FAP Program results.

A recent positive program initiative is to shift to a Facilities Asset Management (FAM) strategy and possibly incorporating a facilities condition index (FCI) on asset health. The FAM strategy adopts a broader proactive view of facilities management and incorporates risk-based decisions. Accordingly, FPP staff outlined a multistep plan that begins with standardizing on portfolio square footage, establishing new metrics, integrating processes, collaborating with other FM groups, and executing a strategy for managing risk. The FCI metric is in line with industry standards and measures deferred maintenance needs against replacement value. The FCI could complement other measures used currently to prioritize assets for allocation of budgeted maintenance and repairs.

In addition, we observed professionalism among FAP staff, with a broad knowledge base and awareness of facilities conditions, and dedication to delivering high-quality work. The FAP team made efforts to coordinate work with other FM project managers and under the existing program, the team handles a heavy workload. Operations personnel added FAP has the right people doing the right upgrades, and FAP staff provide good working relationships with the plants.

Although mainly complimentary, TVA personnel interviewed or surveyed also identified some criticisms and frustrations with FAP. For example, respondents claimed there is “never enough money” requiring FAP to work first on the worst conditions. More funding is needed to address the many concerns and emergent issues and keep assets in shape like they should. Some individuals stated the Operations organizations do not understand FAP Program boundaries, which are confusing and not well defined or, in some cases, how the process works to obtain Facilities projects. Plants want to know where their responsibilities end and FM’s responsibilities begin; they need to know who owns what for repairs and improvements. Operations organizations also want to provide more input on FAP priorities and participate in the process for scoring and project selection. Oversight of contractors to work on facility issues can be a burden for sites that are understaffed and already have a full plate of responsibilities. A lot of areas require instruction for contractors such as training, safety, and daily job briefings. In some cases, specific issues required more attention. In particular, some survey respondents identified the need for more upfront planning on requirements, detail scope, and environmental concerns, and more communication on work progress.

Other Improvements can be Made

We determined FAP staff informally discusses lessons learned from project experience at project review meetings, but this information is not documented or collected for sharing. The Office of the Inspector has previously reported¹⁰ lessons learned should be captured during all project phases to prevent repeated issues and improve subsequent project performance. Some TVA organizations use a lessons-learned database to document and facilitate information sharing, a feature which could benefit FAP and FM project execution. In response to our previous audit, TVA may develop an agency-wide tool for documenting lessons

¹⁰ Audit 2011-13781, Lessons Learned at Lagoon Creek Combined Cycle Plant, issued September 21, 2012.

learned. Sharing information also impacted non-FAP projects. For example, at one site we visited, post-installation problems needed more attention and remediating. A lesson from a project experience (an energy efficiency effort, not a FAP project) was identified when the contractor did not properly dispose of used lighting fixtures and bulbs. Pre-construction instructions needed to cover in more detail the responsibilities for cleanup, waste labeling and disposal, and what type of lighting would be needed. Well-documented lessons learned may have alerted the project manager to this need.

In addition to the FAP Program, we identified concerns related to other FM projects. Specifically, at two sites we visited, follow-up was needed on projects that FM scoped with work cost estimates, but the physical work was not performed. Some of these projects may require funding in addition to FM efforts. Additional communication with sites where proposals for work are submitted could close gaps in expectations and ensure initiatives important to sites receive needed support. Increased communication with business units could also reduce concerns when business decisions are impacted by the availability or condition of facilities.

Tools and Resources Used can be Improved

FAP relies on a variety of assessment activities to update asset conditions. We noted, in particular, the formal assessments conducted for key subprograms over roofs, elevators, and bridges. FAP contracts for assessment services related to roofs and elevators and stores assessment results in individual files and databases. In addition, FAP staff includes two civil engineers who regularly inspect and report on conditions of TVA's bridges. Use of these professional services provides reliable and current information on the specific assets included. FAP also collects facility condition updates from site visits and project walkdowns, informal communications with other FM staff and site personnel, and Dam Safety Inspection Reports on faulty road conditions. The 2012 historical assets survey could also provide updated information on building conditions.

However, the results of these assessments and informal communications were not being added to asset records and were not available to other personnel who could benefit from the information such as asset owners and FM personnel with other maintenance responsibilities. Use of a central repository to collect information on asset conditions, including assessment results, could facilitate information sharing and provide records archival to support FAP and other FM efforts.

FAP Project Tracking

We reviewed the projects and data in the FM Projects Module and determined the majority of FAP projects were completed within the expected project duration. For the 760 FAP projects with a status of "Closed Out" or "Completed Work – In Service" during the time period of FY 2007 through FY 2012, 560 of these FAP projects, or approximately 74 percent, were completed in a timely manner or within the number of days from scheduled start date to scheduled finish date. We did note, however, some date fields within Projects Module were not

populated preventing us from determining the timeliness of those projects. Specifically, out of 184 FAP projects that were either in progress or completed during FY 2012, actual project start dates were missing in 46, or about 1 in 4 projects. Actual dates are part of the project record that should be kept current in order to provide accurate project statistics.

We also identified some opportunities to consider for improvement of project tracking. More specifically, we noted about one-half of the FY 2012 FAP projects did not include a prioritization ranking. In addition, some projects lacked details on project scope, progress, and other comments. Since project notes are used to document project budget approvals, use and approval of change requests, project updates, such as comments on progress, decisions, and challenges, and project control reviews, including project prioritization in project records could provide an audit trail to the FAP Master Plan and support the rationale for project selection.

FM Facilities Asset Portfolio Repository Needs Support

To support FM strategic plans, FM is migrating building information to TVA's facilities asset portfolio application, Tririga. This information is also needed to support the new FAM strategy mentioned above which, according to plans, will begin with standardizing on square footage. To accomplish this goal, FM must have a reliable, complete, and accurate asset inventory. Although initially implemented in 2009, Tririga has not been fully deployed and does not currently provide the accuracy needed in a facilities portfolio.

At the time of our audit, FM had one full-time resource assigned to support Tririga, and deployment for use in FM had not been completed. Significant progress had been made on application functionality along with plans to implement a Human Resources/Tririga interface. The Tririga database contains data merged from the energy management group and the previous FM database. However, concerns about the data include possible duplicate records and missing square footage because, according to one source, "the baseline information was gathered over several years by multiple individuals resulting in inconsistencies and inaccuracies." As described in the Background section of this report, the facilities portfolio has no square footage for about 11 percent of the known building assets. In addition to data concerns, the Tririga application provided no access control to allow a view-only role without permissions to edit data. This condition violates basic security standards over access control and is particularly important when an application has multiple users and functions. Without appropriate security measures, TVA risks compromise of the information being stored for the entire facilities asset portfolio.

RECOMMENDATIONS

We recommend TVA's Executive Vice President and Chief Administrative Officer, Administrative Services, take actions to address the issues described in this report and improve the FAP Program, including:

1. Determine the level of risk exposures TVA can accept from continued building deterioration and provide adequate program funding where possible.
2. Identify a process owner or cross-functional team to identify, manage, and mitigate underutilized properties according to CPP guidance, considering protective measures to reduce risk exposures, potential future uses, possible sale where feasible, or demolition if appropriate and no viable use is identified.
3. Improve FAP Program communication to better:
 - Define and communicate FAP Program boundaries in particular to operations' organizations.
 - Update site representatives where projects are scheduled or ongoing to allow for adequate site planning.
 - Coordinate with sites on individual projects for contractor oversight and resolution of post-installation issues.
4. Leverage or develop tools to centralize asset information, project planning and prioritization, facilities conditions, and lessons learned. Consider options to:
 - Centralize condition assessment results, capture relevant information from other assessment initiatives like the historic structures survey, and update asset records either with assessment information or references to assessment results.
 - Provide a method for asset owners and other appropriate personnel to provide condition information or self-assessments related to their sites.
 - Document lessons learned in a repository for knowledge sharing.
 - Enhance Projects Module functionality or other centrally accessed tools to improve processes for project requests and prioritization. Ensure project documentation is complete including actual dates and project notes in Projects Module.
 - Implement data integrity checks for input and update processes such as requiring actual dates to be in the present or past, not the future.
5. Obtain the resources necessary to complete Tririga deployment and address weaknesses in the production database including the following steps to maximize accuracy and reliability and improve security:

- Correct data errors, complete data entry, and incorporate data from building and condition assessments.
- Add role-based access controls including a view-only role.
- Implement standard database security controls, including database auditing, with additional safeguards where needed.
- Request a vulnerability assessment and implement identified safeguards.

TVA MANAGEMENT'S COMMENTS AND OUR EVALUATION

TVA management agreed with our findings and provided comments in response to our draft report. TVA described plans to update funding proposals for the current FAM program, address challenged properties as part of its Strategic Real Estate Plan, and implement Tririga for managing TVA's real estate portfolio. See the Appendix for TVA's complete response. The OIG concurs with TVA's plans, which are important for addressing some of the issues identified in our report. However, in addition to these plans, actions are needed to fully address concerns with program communication and use of tools to support the program.

With regard to our recommendation to improve program communication, TVA management stated FAM personnel regularly meet with SBU executives and operating unit leaders, have attended meetings with plant management to review planned projects, and will continue to discuss project work as the year progresses. While we agree this process is crucial to program and project planning, we encourage additional steps to define and communicate program boundaries, to outline both FM and site responsibilities for building maintenance and repairs, and to coordinate upfront planning and oversight for projects being initiated at the sites.

With regard to our recommendation to leverage or develop tools, TVA management stated a second Tririga module is being developed as a repository for building assessment information with a module go-live by early FY 2015. TVA will also complete data and process mapping of existing portfolio information during FY 2013. We agree Tririga deployment is crucial to FAM success, and the planned mapping activities will support this process. However, we encourage steps to leverage functions in other tools and to accomplish the Tririga deployment at a date earlier than the 2-year plan described. Steps should be taken to provide a method for asset owners to self-report condition updates and project requests, which could be used to support program planning. Additional steps should be taken to capture asset and program information currently available from building assessments and lessons learned and to ensure completeness and accuracy of project data being entered in the FM Projects Module.

Finally, in response to our audit, TVA's plans do not include specific tasks or a timeline for completing corrective actions, which are designed to mitigate the risks of failing infrastructure and improve program effectiveness. These tasks and timeline are essential for effectively addressing our recommendations. The tasks may be incorporated within FAM, the Strategic Real Estate Plan, or other strategic efforts within FM responsibilities.

January 16, 2013

Robert E. Martin, ET 3C-K

COMMENTS - DRAFT AUDIT 2012-14567 - BUILDING AND INFRASTRUCTURE FAILURE RISKS

This responds to the Office of the Inspector General's draft audit report, Building and Infrastructure Failure Risks, dated December 20, 2012.

This audit found that TVA's Facility Asset Program (FAP) is "adequately designed to identify and mitigate the risks of building and infrastructure failures," that "FM's [Facilities Management's] processes for remediating identified risks are reasonably effective," and that the program is not adequately funded according to industry standards. We agree with these findings.

Our comments and the actions we have taken or plan to take in response to the recommendations included in the audit report are provided below.

Note: After the audit was initiated in January 2012, the Facility Asset Program transitioned to the Facility Asset Management (FAM) program and is referenced as such in this document.

Recommendation 1

Determine the level of risk exposures TVA can accept from continued building deterioration and provide adequate program funding where possible.

Comments/Actions:

Supply Chain/FAM is collaborating with the Enterprise Risk Management organization to develop a business case for additional funding to reduce the level of risk associated with failing infrastructure. This business case and an updated funding proposal, including funding to strengthen existing project controls and address additional project load and for new initiatives such as Energy and Sustainability, will be submitted as part of the FY14 business planning package. In addition, FAM will verify the importance of projects already in the queue based on facility condition and alignment with TVA's overall strategic direction for "core" facilities.

Recommendation 2

Identify a process owner or cross-functional team to identify, manage, and mitigate underutilized properties according to CPP guidance, considering protective measures to reduce risk exposures, potential future uses, possible sale where feasible, or demolition if appropriate and no viable use is identified.

Comments/Actions:

Property and Natural Resources (P&NR) owns the Challenged Properties Program (CPP) and will re-examine TVA's approach to re-purposing, demolition or sale of challenged properties as part of its Strategic Real Estate Planning effort.

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Recommendation 3
Improve FAP communication.

Comments/Actions:
FAM personnel meet regularly with SBU executives and operating unit leaders to understand and confirm organization operating needs. FAM program managers also have attended meetings with plant management to review all projects for the FY13-15 budget cycle and will continue to meet to discuss project work as the year progresses.

Recommendation 4
Leverage or develop tools to centralize asset information, project planning and prioritization, facilities conditions, and lessons learned.

Comments/Actions:
Tririga, an IBM-based real estate portfolio management platform was selected to centrally inventory and manage all buildings and property within the TVA real estate portfolio. One Tririga module for energy management already is in production within the Policy and Oversight organization, and a second module is being developed for use within FAM as a repository for building assessment information. This database will be used to develop building condition assessments, generate portfolio health reports, direct project activity and prioritization, drive portfolio improvements, and track lessons learned.

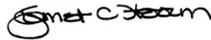
FM also will complete data and process mapping of existing portfolio information in FY13. This work will determine what funding and configuration changes are needed to move legacy data to Tririga in FY14 and support module go-live in late FY14 or early FY15 .

Recommendation 5
Obtain the resources necessary to complete Tririga deployment and address weaknesses in the production database to maximize accuracy, reliability and improved security.

Comments/Actions:
Funding to improve the Tririga database will be included in the updated funding proposal referenced in the response to Recommendation 1 above. The Strategic Real Estate Plan will include a process for data entry to accommodate changes or upgrades to facility assets across the Valley in terms of sales, leasing, renovations, and demolition.

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In FY13, FM also will request a vulnerability assessment of core asset information contained in the Tririga database along with recommendations regarding security and read-only access controls.



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