Memorandum from the Office of the Inspector General

February 9, 2017

David W. Sorrick, LP 3K-C
Jacinda B. Woodward, MR 3H-C

REQUEST FOR FINAL ACTION – EVALUATION 2015-15345 – AMMONIA STAFFING AND TRAINING AT COAL PLANTS

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 for our recommendations, have been incorporated into the report. Please notify us when final actions are complete for the remaining recommendations. In accordance with the Inspector General Act of 1978, as amended, the Office of the Inspector General is required to report to Congress semiannually regarding evaluations that remain unresolved after 6 months from the date of report issuance.

If you have any questions or wish to discuss our findings, please contact John A. Jacosalem, Auditor, Evaluations, at (423) 785-4821 or E. David Willis, Director, Evaluations, at (865) 633-7376. We appreciate the courtesy and cooperation received from your staff during the evaluation.

David P. Wheeler
Assistant Inspector General
(Audits and Evaluations)
ET 3C-K

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Attachment
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OIG File No. 2015-15345

Office of the Inspector General

Evaluation Report

To the Senior Vice President, Power Operations and the Senior Vice President, Resources and River Management

AMMONIA STAFFING AND TRAINING AT COAL PLANTS

Evaluation Team
John A. Jacosalem
Alina A. Karpich

Evaluation 2015-15345
February 9, 2017

ABBREVIATIONS

Allen	Allen Fossil Plant
AUO	Assistant Unit Operator
Bull Run	Bull Run Fossil Plant
CFR	Code of Federal Regulations
Cumberland	Cumberland Fossil Plant
CY	Calendar Year
EPA	Environmental Protection Agency
Kingston	Kingston Fossil Plant
NOx	Nitrogen Oxide
OSHA	Occupational Safety and Health Administration
Paradise	Paradise Fossil Plant
PPE	Personal Protective Equipment
PSM	Process Safety Management
R&RM	Resources and River Management
RMP	Risk Management Plan
SCR	Selective Catalytic Reduction
TSP	TVA Safety Procedure
TVA	Tennessee Valley Authority

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APPENDIX

Evaluation 2015-15345 – Ammonia Staffing and Training at Coal Plants

EXECUTIVE SUMMARY

Why the OIG Did This Evaluation

The Tennessee Valley Authority (TVA) uses anhydrous ammonia in selective catalytic reduction systems to aid in the removal of nitrogen oxide, a by-product of burning coal. Anhydrous ammonia is hazardous when inhaled, ingested, or when it comes in contact with the eyes, skin, or mucous membranes. Based on safety risks associated with the handling of ammonia, we initiated an evaluation of the staffing and training of ammonia operations at TVA's coal plants that use ammonia. The objective of our evaluation was to determine the adequacy of staffing and training of ammonia operations at coal plants.

What the OIG Found

Based on our review of the training required by the Occupational Safety and Health Administration and the Environmental Protection Agency regulations, we determined the ammonia training provided by TVA addressed most of the federal training requirements; however, some elements[i] may not be addressed. We also found (1) some personnel had not completed all of the required training, and (2) training could be improved by adding hands-on and more frequent training. Additionally, based on interviews with plant personnel, we determined the staffing of maintenance personnel for ammonia systems was adequate at the four coal plants we reviewed. However, staffing for assistant unit operators (AUO) was inadequate or needed improvement at two of the four plants.

What the OIG Recommends

We recommend the Senior Vice President, Operations:

- Evaluate content of training provided to ensure compliance with federal regulations.
- Complete the assessment of differences between the corporate-level and plant-level training requirements and make changes as needed.
- Consider the addition of more frequent and hands-on training.
- Identify individuals who have not completed required training and take steps to expedite the training for those individuals.
- Evaluate ammonia operations staffing and add designated AUOs as appropriate.

[i] The Code of Federal Regulations is structured according to the following hierarchy: titles, chapters, parts, sections, and paragraphs that contain detailed, specific requirements. Elements, as referred to here, are subitems within a paragraph of the respective regulation section.

EXECUTIVE SUMMARY

TVA Management's Comments

TVA management stated they agreed with the findings and recommendations in this report and that actions have been, or will be, taken to address our recommendations.

See the Appendix for TVA management's complete response.

BACKGROUND

The Tennessee Valley Authority (TVA) uses anhydrous ammonia in selective catalytic reduction (SCR) systems to aid in the removal of nitrogen oxide (NOx), a by-product of burning coal. Specifically, ammonia is introduced into the SCR system to decrease the amount of NOx emissions.[1] Anhydrous ammonia is an extremely irritating compound that poses risks to humans through various types of exposures. Ammonia is hazardous when inhaled, ingested, or when it comes in contact with the eyes, skin, or mucous membranes.

In addition to employee safety risks, ammonia can pose a threat to public health and safety. The Occupational Safety and Health Administration (OSHA) classifies ammonia as a highly hazardous chemical that presents a potential for a catastrophic event when stored in quantities greater than 10,000 pounds (or 5 tons). As of November 2016, TVA had five coal plants with SCR systems using ammonia that meet this threshold: Allen Fossil Plant (Allen), Bull Run Fossil Plant (Bull Run), Cumberland Fossil Plant (Cumberland), Kingston Fossil Plant (Kingston), and Paradise Fossil Plant (Paradise).

AMMONIA TRAINING

For all ammonia systems exceeding the 10,000-pound threshold, OSHA requires establishment of a Process Safety Management (PSM)[2] program and the Environmental Protection Agency (EPA) requires establishment of a Risk Management Plan (RMP).[3] Both the PSM and RMP must include: (1) training requirements for ammonia operations and (2) periodic assessments of the program. OSHA and EPA training requirements cover several areas such as: (1) the operating process with emphasis on specific safety and health hazards, (2) emergency operations including shutdown, (3) safe work practices applicable to the employee's job tasks, and (4) emergency planning and response training that includes safe evacuation of the facility in cases of emergency and active emergency response.

TVA has established corporate-level guidance to address the PSM and RMP regulatory requirements—TVA Safety Procedure (TSP), TVA-TSP-18.219, Process Safety Management and Risk Management Program—that "establish[es] requirements for preventing or minimizing the consequences of catastrophic release of toxic, reactive, flammable, or explosive chemicals." Also, TVA coal plants began developing plant-level PSM/RMP programs beginning in 2002, as plants began utilizing ammonia. The plant-level PSM/RMP programs have additional training requirements not identified in the corporate-level TSP. Specifically, the plant-level programs require (1) annual training for ammonia operations and maintenance personnel as opposed to a 3-year requirement by the

[1] NOx is linked with a number of adverse effects on the respiratory system.

[2] OSHA 29 Code of Federal Regulations (CFR) 1910.119, "Process Safety Management of Highly Hazardous Chemicals."

[3] EPA 40 CFR 68, "EPA Chemical Accident Prevention Provision."

TSP and (2) an additional self-study module for assistant unit operators (AUO) who handle ammonia.

AMMONIA OPERATIONS STAFFING

Ammonia operations personnel include AUOs and maintenance personnel from various crafts (e.g., pipe fitters, electricians, machinists, and instrument mechanics). AUOs perform day-to-day ammonia operations, including performing inspections, preparing paperwork, and scheduling and unloading truck deliveries. AUOs typically purge and clear ammonia lines prior to the performance of maintenance work on ammonia systems. Maintenance personnel perform maintenance work on ammonia systems.[4] As a result, maintenance personnel have less potential exposure and danger.

Based on safety risks associated with the handling of ammonia, we initiated an evaluation of the staffing and training of ammonia operations at TVA's coal plants.

OBJECTIVE, SCOPE, AND METHODOLOGY

The objective of our evaluation was to determine the adequacy of staffing and training of ammonia operations at coal plants. The scope of our evaluation included four TVA coal plants: Allen, Bull Run, Cumberland, and Paradise. Kingston was excluded from the scope of our evaluation because a recent Office of the Inspector General Organizational Effectiveness evaluation[5] at Kingston previously identified ammonia operations as an area needing improvement.

To achieve our objective, we:

- Reviewed TVA processes and procedures, as well as related guidance and regulations in order to gain a better understanding of requirements for staffing and training.
- Interviewed OSHA and EPA representatives, TVA Resources and River Management (R&RM) personnel, and plant management to gain a better understanding of ammonia regulations and program requirements.
- Compared relevant OSHA and EPA ammonia regulations to TVA-TSP-18.219 training requirements and the corresponding training materials to determine if TVA met the requirements of the regulations. Compared TVA-TSP-18.219 training requirements to plant-level training requirements to identify any differences between the requirements.
- Interviewed a judgmentally selected sample of ammonia operations personnel (consisting of 17 AUOs who perform ammonia operations duties and

[4] The ammonia system includes the storage farm and equipment, liquid supply lines, vaporization skids, and injection lines into the SCR.

[5] Evaluation 2015-15329, Kingston Fossil Plant Organizational Effectiveness, March 10, 2016.

15 maintenance personnel who could perform maintenance work on ammonia systems)[6] to determine if they felt there were any gaps in staffing and/or training. The scope of the evaluation was limited to the current perceptions of employees obtained through interviews we conducted from December 2015 through February 2016.

- Reviewed training records for calendar years (CY) 2013-2015 for (1) the 17 AUOs we interviewed and (2) a random sample of 79 of 307 (approximately 25 percent) maintenance personnel to determine if ammonia operations personnel completed the training listed in the TSP and plant-level training requirements.

This evaluation was performed in accordance with the Council of the Inspectors General for Integrity and Efficiency's *Quality Standards for Inspection and Evaluation*.

FINDINGS

Based on our review of the training required by OSHA and EPA regulations, we determined the ammonia training provided by TVA addressed most of the federal training requirements; however, some elements[7] may not be addressed. We also found (1) some personnel had not completed all of the required training, and (2) training could be improved by adding hands-on and more frequent training. Additionally, based on interviews with plant personnel, we determined the staffing of maintenance personnel for ammonia systems was adequate at each plant. However, there was inadequate staffing of AUOs at one plant and an opportunity for improvement at another plant.

TRAINING FOR AMMONIA OPERATIONS

We determined the ammonia training provided by TVA addressed most of the OSHA and EPA training requirements; however, some elements may not be addressed. We also found (1) some personnel had not completed all of the required training, and (2) training could be improved by adding hands-on and more frequent training.

[6] Bull Run, Cumberland, and Paradise use designated AUOs for unloading ammonia while Allen employs AUOs for unloading ammonia on a rotational shift basis. We interviewed all 6 of the designated AUOs at Bull Run, Cumberland, and Paradise, and 11 of the 22 AUOs at Allen.

[7] CFRs are structured according to the following hierarchy: titles, chapters, parts, sections, and paragraphs that contain detailed, specific requirements. Elements, as referred to here, are sub-items within a paragraph of the respective regulation section.

Ammonia Training Provided by TVA Addressed Most Federal Regulations; However, Some Elements May Not Be Addressed

OSHA and EPA regulations require TVA to provide training that covers (1) operating processes, (2) emergency operations, (3) safe work practices, and (4) emergency planning and response training. To address these areas, TVA-TSP-18.219 lists three required courses: Unescorted Coal and Gas Site Access, Ammonia Awareness, and Mechanical Integrity.[8] Additionally, the TSP requires training for emergency response as outlined in OSHA regulations.[9]

We compared training requirements in the TVA-TSP-18.219 and the corresponding training materials (e.g., training presentations, lesson plans, procedures, and course descriptions within the plants' training materials) with the training requirements contained in OSHA and EPA regulations. Based on our review of the training materials and additional documentation provided by TVA,[10] we determined the training provided addressed most of the federal training requirements; however, some training elements pertaining to operating procedures and personal protective equipment (PPE) were not addressed.

Training provided by each plant generally addressed required operating procedure elements such as safety and health considerations, safety systems and their functions, and safe work practices to control hazards during operations. However, required training elements regarding the operating phase and operating limits were lacking; specifically, training for required subelements such as temporary operations, normal shutdown, and startup following a turnaround or after an emergency shutdown. Additionally, PPE training provided by each plant generally addressed elements such as when and what PPE is necessary and the limitations of PPE; however, training regarding how to properly wear PPE as well as the proper care, maintenance, useful life, and disposal of PPE was lacking.

According to personnel in TVA Safety and Environmental Training,[11] they are currently evaluating and working on standardizing the content of training across the coal fleet.

Some Personnel Had Not Completed Required Training

Our review of training records found some personnel had not completed the required training identified in TVA-TSP-18.219, as well as additional training requirements identified at the plants. As mentioned above, the TSP requires Unescorted Coal and Gas Site Access, Ammonia Awareness, Mechanical Integrity, and emergency responder training. The first two courses are required for plant access; therefore, we focused our review on Mechanical Integrity and

[8] Mechanical Integrity training—an 8-hour, instructor-led course that covers several areas, including: overview of the PSM/RMP, ammonia safety, an overview of ammonia unloading and storage, inspection of equipment and operation, and line breaking procedure.

[9] OSHA 29 CFR 1910.120(q), "Hazardous Waste Operations and Emergency Response," section "Emergency Response Program to Hazardous Substance Releases."

[10] Bull Run could not provide additional documentation or confirm if the elements were addressed verbally due to personnel changes.

[11] Safety and Environmental Training coordinates needs assessments, course design, development, and implementation of regulatory required training.

emergency response training, and the additional plant-level training requirements.

Mechanical Integrity Training

TVA-TSP-18.219 requires ammonia operations personnel to complete Mechanical Integrity refresher training every 3 years. We reviewed the training records for the 17 sampled AUOs (59 percent of the AUOs who work with ammonia), and 79 sampled plant maintenance personnel (approximately 25 percent of total maintenance personnel at the plants) to determine if they had completed the required training. We found 4 (24 percent) AUOs and 11 (14 percent) maintenance personnel had not completed the Mechanical Integrity training in CY2013-2015.

Additionally, periodic assessments[12] performed by TVA Safety Support[13] in 2015 found employees had not completed Mechanical Integrity training at Cumberland and Paradise, as described in Figure 1 below.

Figure 1: 2015 Periodic Assessment Findings Related to Ammonia Training

Plant	TVA Findings*
Cumberland	• Forty-five percent of maintenance personnel were overdue for Mechanical Integrity refresher training. • Only two crew members in one maintenance crew had received Mechanical Integrity training, although any of the crew members "could be dispatched to work on the ammonia system at any time." • Five Operations personnel were overdue for Mechanical Integrity refresher training that includes supervision personnel.
Paradise	• Several instances of expired training for Mechanical Integrity, but some were deployed or on medical leave and others included supervision personnel.
* As noted in the assessments.	

[12] The periodic assessments include program audits that require TVA to (1) certify it has evaluated compliance with the provisions of the regulation to verify that the procedures and practices developed under the standard are adequate and are being followed; (2) develop a report of the findings of the audit; and (3) promptly determine and document an appropriate response to each of the findings, and if there are deficiencies, document that they have been corrected.

[13] Safety Support provides governance and technical expertise for programs which include Industrial Hygiene, Regulatory Compliance, Health and Safety Committees, and maintenance of the Safety Manual.

Emergency Responder Training

AUOs at the coal plants were required to have the First Responder Operations level training that includes an initial training course and the annual refresher training. Because the scope of our review covered CY2013-2015 and the initial training could have been taken prior to 2013, we only reviewed training records for the annual refresher training. Our review of training records for the 17 sampled AUOs found 2 of the 17 (12 percent) AUOs had not completed the required annual refresher training for emergency responders.

One of these two AUOs was placed on a medical restriction; however, the proper paperwork to remove the AUO from emergency responder training was not completed until May 2016, which was after we had completed our testing of required training. Additionally, the medical restriction was put in place in 2014 and the AUO had last received the required emergency responder training in 2012, leaving a gap in the required training from 2013 when the medical restriction was not in place.

Insufficient and inconsistent training could increase the risk of (1) injury from ammonia exposure; (2) catastrophic events, such as fire or explosion resulting from an ammonia leak; and (3) potential noncompliance with federal regulations due to lack of training.

Plant-Level Training Requirements Had Not Been Completed

Each of the coal plants has a RMP/PSM training matrix that lists training requirements for ammonia operations. During our evaluation, we reviewed the RMP/PSM training matrices and found the plant requirements to be more stringent than TVA-TSP 18.219. Specifically, the plants required (1) Mechanical Integrity training annually for AUOs and maintenance personnel as opposed to the 3-year requirement by the TSP and (2) an additional self-study module of operating procedures and daily inspections required for AUOs. According to an EPA representative, TVA could be held to the more stringent plant requirements.

To determine TVA's compliance with the plant requirements, we reviewed training records based on plant-level requirements and found:

- None of the 17 AUOs had completed the refresher training for Mechanical Integrity on an annual basis. Additionally, only 2 of the 79 maintenance personnel had completed the refresher training for Mechanical Integrity[14] training on an annual basis as required.
- None of the 17 AUOs completed the required annual self-study module.

TVA Safety Support performs periodic assessments based on the training requirements identified in TVA-TSP-18.219. In 2014, a site safety representative had informed Safety Support, along with other groups within R&RM that (1) there were discrepancies between TVA corporate-required and plant-required training

[14] For Allen, maintenance personnel were allowed to substitute Mechanical Integrity training with a Maintenance Integrity training, which was a class specifically geared towards maintenance personnel.

courses, and (2) inconsistency and confusion existed at the plants regarding which courses met the training requirements listed in the plant-level training requirements. However, Safety Support personnel indicated they were unaware of the plant-level training requirements and had not assessed compliance with the plant requirements. Personnel from TVA Safety and Environmental Training and TVA Environmental Permitting and Compliance[15] acknowledged the existence of plant-level training requirements and the disconnect between training required by the plants and TVA-TSP-18.219.

Having differing sets of training requirements for each plant increases risk of (1) confusion for the plants regarding periodic assessment expectations and (2) potential noncompliance with EPA's training and compliance audit regulation requirements. In response to our evaluation, TVA personnel in R&RM indicated the requirements are currently being evaluated in order to address this disconnect.

Personnel Indicated Training Could Be Improved

We interviewed 17 AUOs and 15 maintenance personnel to determine if they felt training for ammonia operations was adequate. AUOs and maintenance personnel stated they felt the training they received was generally adequate; however, 4 AUOs (24 percent) and 1 maintenance personnel stated the infrequency of training and the lack of hands-on, fieldwork training were a concern. For example, the maintenance employee indicated more frequent drills would help him not to second guess what alarms corresponded with particular chemical releases. AUOs also indicated discomfort with performing ammonia operations duties due to performing the work infrequently.

Additionally, a site safety representative expressed concerns regarding AUOs who transfer from one plant to another. AUOs who transfer between plants are only required to take the Mechanical Integrity refresher training and not the initial training of operations personnel. The safety representative indicated the Mechanical Integrity refresher may not be sufficient in meeting the regulation requirements of initial training because of differences in ammonia systems and specific training provided at each plant.

Implementing hands-on and more frequent training could increase personnel experience and confidence. Additionally, making improvements to the Mechanical Integrity refresher training could further decrease the risk of (1) injury from ammonia exposure and (2) catastrophic events, such as fire or explosion resulting from an ammonia leak.

[15] Environmental Permitting and Compliance provides oversight, consistency, and standardization in TVA's permitting and compliance activities, interactions with regulators, and alignment of environmental policy with line organization execution.

STAFFING FOR AMMONIA OPERATIONS

According to TVA, there is no regulation or TVA policy dictating ammonia operations staffing requirements. Therefore, it is left to the discretion of plant management to determine staffing needs. We interviewed 17 AUOs and 15 maintenance personnel at the plants to determine if the staffing of ammonia operations was adequate. Based on our interviews, we determined the staffing of maintenance personnel for ammonia operations was adequate at all four plants and the maintenance personnel indicated there were no gaps in staffing that could be improved for maintenance of ammonia systems. However, as discussed below, while staffing for AUOs was adequate at Cumberland and Paradise, improvements are needed at Allen and Bull Run.

Staffing of AUOs at Cumberland and Paradise Was Adequate
Based on our interviews, we determined staffing of AUOs at Cumberland and Paradise was adequate. Cumberland has one primary designated AUO and one secondary designated AUO for ammonia unloading. Paradise has two primary designated AUOs and one secondary designated AUO for ammonia unloading. Although AUOs at Paradise stated an additional designated AUO could be beneficial at their plant, AUOs at both plants indicated staffing was generally adequate.

Staffing of AUOs at Allen Was Inadequate
Allen currently does not use designated AUOs for ammonia operations. Allen previously had a designated AUO until fall 2015 when management decided to switch to rotating shifts for ammonia operations. According to plant management, this would give all AUOs the opportunity to become comfortable with the process. AUOs at Allen work 5-week rotating shifts, meaning they are responsible for performing ammonia operations duties once every fifth week. Although 11 AUOs interviewed at Allen stated they generally felt comfortable addressing an ammonia-related emergency event, 5 of the 11 AUOs felt staffing for ammonia operations duties was inadequate. In addition:

- Four of the AUOs (1) mentioned having a dedicated AUO who could perform all ammonia operations duties would be beneficial and (2) indicated it was a safety issue because they do not perform the role on a regular basis.
- One AUO indicated the need for expertise in the case of an emergency.
- Three of the AUOs felt a dedicated AUO would assist maintenance with troubleshooting the ammonia system.

Additionally, maintenance personnel at each site, and specifically two from Allen, indicated it is more difficult to perform maintenance work on ammonia systems when there is not a knowledgeable dedicated AUO.

We noted the ammonia staffing concerns identified at Allen are similar to the concerns raised during the Kingston Organizational Effectiveness evaluation. Both plants use AUOs on a rotating schedule to staff ammonia operations instead of having dedicated AUOs. AUOs at Kingston expressed concerns

regarding AUOs' levels of expertise due to performing ammonia operations duties on a part-time basis. The Organizational Effectiveness evaluation noted rotational staffing used at Kingston could result in forced outages and equipment damage.

Opportunity for Improvement at Bull Run
We noted an opportunity for improvement by increasing the number of designated AUOs at Bull Run. Bull Run has one designated AUO for ammonia operations duties who works all ammonia deliveries around his schedule, including leave. This designated AUO indicated that he felt staffing was adequate. In addition, according to Bull Run management, if the primary designated AUO is unavailable, other available AUOs at the plant could handle ammonia unloading duties. Since the substitute AUOs could be unfamiliar or uncomfortable with ammonia operations duties, it would be beneficial to designate additional backup AUOs at Bull Run for ammonia operations duties.

RECOMMENDATIONS

We recommend the Senior Vice President, Operations:

- Evaluate content of training provided to ensure compliance with federal regulations.

  TVA Management's Comments – TVA management stated that training content was redesigned to ensure training material is delivered consistently and in alignment with both OSHA and EPA regulations. See the Appendix for TVA management's complete response.

- Complete the assessment of differences between the corporate-level and plant-level training requirements and make changes as needed.

  TVA Management's Comments – TVA management indicated that the plant-level training requirements were revised to reflect the corporate-level training requirements. See the Appendix for TVA management's complete response.

- Consider the addition of more frequent and hands-on training.

  TVA Management's Comments – TVA management stated that table-top/system walk-through drills conducted on a periodic basis will be incorporated into the plant-training plans and will include post-drill evaluations. See the Appendix for TVA management's complete response.

- Identify individuals who have not completed required training and take steps to expedite the training for those individuals.

  TVA Management's Comments – TVA management indicated that automated training notifications, which would now be tied to training

population by job code and site, would alert Plant Managers of employees who are overdue. Employees required to take the training have been updated in the Learning Management System. See the Appendix for TVA management's complete response.

- Evaluate ammonia operations staffing and add designated AUOs as appropriate.

  TVA Management's Comments – TVA management stated the Power Operations staffing plan is designed to ensure coal plants are adequately staffed for operating and maintaining critical systems, which includes ammonia systems. TVA indicated that past-year vacancies have been held open and filled with contractors in an effort to keep positions for employees at plants facing closure. See the Appendix for TVA management's complete response.

Auditor's Response – We concur with management's planned or completed actions and will verify completion prior to closing each recommendation.

February 2, 2017

David P. Wheeler, ET 3C-K

REQUEST FOR COMMENTS - DRAFT EVALUATION 2015-15345 - AMMONIA STAFFING AND TRAINING AT COAL PLANTS

Thank you for the opportunity to review and comment on the draft evaluation report. Comments from Power Operations are below. We agree with each recommendation provided in the report and associated facts and conclusions.

Recommendations to Senior Vice President, Power Operations:

- Evaluate content of training provided to ensure compliance with federal regulations.

  Action: Training on the ammonia systems at TVA's coal plants complies with OSHA 1910 and includes Mechanical Integrity Training. System operations, including offloading, is governed by site specific procedures and are reviewed annually and referenced during training exercises. Safety and Environmental Training redesigned the training content as a way to ensure that consistent material was delivered. This was done with the concurrence of Power Operations (predominantly Engineering), Corporate Safety, and Corporate Environmental to align with both OSHA (29CFR) and EPA (40CFR) regulations. The new training consists of Computer Based Training (CBT) with both core and site specific material, plant walk down, and procedure review. The CBT has one Learning Management System (LMS) number while the walk down and procedure review each have an assigned LMS number per site which can be tracked. The training is assigned both by job code and site location in order to accurately reflect changing training populations. Safety and Environmental Training is working with the sites and the Coal Operations Manager Peer Team to update the training matrix in the site's Risk Management Plan (RMP) to accurately reflect the regulatory training requirements related to PSM/RMP/Mechanical Integrity.

- Complete the assessment of differences between the corporate-level and plant-level training requirements and make changes as needed.

  Action: There has been some confusion on the frequency that this training is required, with the Power Operations training plan requirement being every three years and the RMP requiring annual training. Both EPA and OSHA regulations define a three-year refresher for some of the requirements. For this reason, Safety and Environmental Training in concurrence with the Corporate Safety and Environmental organizations revised the RMP training matrix to reflect a three-year refresher period. Safety and Environmental Training is working with the sites and the Coal Operations Manager Peer Team to update the training matrix in the site's RMP to accurately reflect the regulatory training requirements related to PSM/RMP/Mechanical Integrity. By changing the

training matrix to three years, the sites have the flexibility to refresh as often as they deem necessary without creating regulatory risk of non-compliance with self-imposed frequencies in the RMPs. At this time, the sites are responsible for using the Management of Change process to update their RMP training matrices. It should be noted that regardless of whether or not the training frequency changes, the current matrices are being updated to accurately reflect assigned trainees and required frequencies which was a gap identified by the OIG. In addition, Safety and Environmental Training has proposed a new matrix for each site that accurately reflects all training requirements.

- Consider the addition of more frequent and hands-on training.

  Action: Power Operations will continue to evaluate our training programs for effectiveness and adjust as needed. Table-top/system walk-through drills are conducted on a periodic basis. These exercises are being incorporated into the plant training plans starting in January of 2017 and will include post-drill evaluations to measure effectiveness of the training. The periodic systems training also includes a hands-on component that involves a system walk-down.

- Identify individuals who have not completed required training and take steps to expedite the training for those individuals.

  Action: NH3 training is conducted in LMS and Plant Managers are alerted of employees who are overdue. Every effort is made to ensure training, particularly on critical systems such as NH3, is completed in a timely manner. Employees required to take the training have been updated in LMS. With the training requirements now tied to a training population by job code and site, automated features such as training notifications to individuals and supervisors are generated from LMS.

- Evaluate ammonia operations staffing and add designated AUOs as appropriate.

  Action: Power Operations staffing plan is designed to ensure our coal plants are adequately staffed for operating and maintaining critical systems such as NH3. Over the past year vacancies have been held open and filled with contractors (mostly former employees) in an effort to keep those positions for employees at plants facing closure. This has had an impact on resource levels. With the pending closure of Paradise 1 and 2, a surplus-to-fill exercise has been initiated which will distribute surplus employees across the coal fleet to fill vacancies. The majority of the surplus are AUOs and once directed to fill vacancies, will increase operations staffing levels to align with staffing plans. This exercise was scheduled to conclude on May 1 of 2017 however may be

delayed due to the current hiring freeze. Once the surplus-to-fill exercise is completed all coal plants will be at their allocated headcount with TVA employees.

If you have any questions or require any additional information, please do not hesitate to contact us.

David W. Sorrick
Senior Vice President
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