



Memorandum from the Office of the Inspector General

September 22, 2010

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

**FINAL REPORT – INSPECTION 2008-12283-08 – REVIEW OF TVA’S PLANS FOR
OFF-SITE TRANSPORTATION AND DISPOSAL OF ASH FROM KINGSTON**

Attached is the subject final report for your review and action. Your written comments, which address your management decision and/or actions taken, have been included in the report. Please notify us when final action is complete.

The Office of the Inspector General (OIG) contracted with Marshall Miller & Associates, Inc., to conduct this review. All work pertaining to this review was conducted by Marshall Miller. The OIG relied on Marshall Miller’s processes and procedures for quality control in the attached 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, please contact Gregory R. Stinson, Project Manager, at (865) 633-7367 or Gregory C. Jaynes, Deputy Assistant Inspector General, Inspections, at (423) 785-4810. We appreciate the courtesy and cooperation received from your staff during this review.

Robert E. Martin

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

GRS:NLR
Attachment
cc: See page 2

Robert M. Deacy, Sr.
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September 22, 2010

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OIG File No. 2008-12283-08

Mr. Eddie Dorsett, Phill-Con Services

Review of Ash Transportation and Disposal Plans

Dated September 22, 2010

Tennessee Valley Authority Kingston Fossil Plant (KIF)
Harriman, Tennessee



Prepared for:



**TVA Office of the Inspector General
Knoxville, Tennessee**

Prepared by:



Project No.: TVA104-04

September 2010

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TITLE PAGE

Title of Report

Review of Ash Transportation and Disposal Plans
Tennessee Valley Authority Kingston Fossil Plant
Harriman, Tennessee

Effective Date of Report

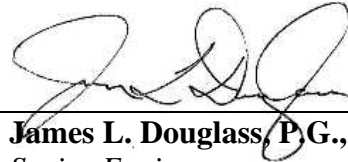
September 22, 2010

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EXECUTIVE SUMMARY

Marshall Miller & Associates, Inc. (Marshall Miller) was asked to review the *Transportation and Disposal Plans* prepared by the **Tennessee Valley Authority (TVA)** in response to the ash release that occurred on December 22, 2008 at its **Kingston Fossil Plant (KIF)** located in Harriman, Tennessee. In addition, Marshall Miller determined if appropriate steps are being taken to minimize the environmental impacts and if regulatory requirements are being met. In summary, Marshall Miller found that TVA is taking appropriate steps to minimize the environmental impacts of transporting ash from KIF to the Arrowhead Landfill in Perry County, Alabama. Furthermore, no significant deficiencies in documents reviewed, regulatory requirements, or in the landfill operations were found. Specifically, Marshall Miller found at the Arrowhead Landfill that the (1) ash removal and rail car wash systems and procedures appear to be adequate for minimizing the potential for residual ash to enter the nearby surface water, (2) storm water management practices appear to be effective for segregating and managing storm water runoff, (3) roads, work, and vegetated areas appear to be maintained such that sediment runoff is minimized, (4) surface water features in the immediate vicinity did not exhibit signs of excess sedimentation, debris build-up, or other potential adverse impacts that could be associated with a landfill, and (5) leachate management and disposal practices appear to minimize, to the extent practicable, the potential for off-site exposure from ash constituents.

While Marshall Miller did not find significant deficiencies in the operation of the landfill, several areas were noted where improvements could be made. The *Rail Yard and Landfill Best Management Practice Plans* do not effectively describe and document the actual activities, procedures, equipment and operations that were observed during Marshall Miller's site visit on April 21, 2010. The *Spill Prevention Control and Countermeasures Plans* appear to provide adequate protection; however, the Plans do not include spill volume estimates for certain spill scenarios, secondary containment for mobile tankers, and locations for spill kits and equipment. Lastly, Marshall Miller noted one of the National Pollutant Discharge Elimination System discharge points is located at a point that could be affected by runoff from land that is not part of the landfill. This issue had already been identified and is currently being addressed by the landfill owner.



TVA management agreed with the recommendations and we concur with their planned and completed actions. However, TVA management needs to provide an updated *Landfill Spill Prevention Control and Countermeasures Plan* to address the relocation of fuel tanks from the rail yard to the landfill. This plan will be needed to close this item. Management's complete substantive comments are included in the Appendix of this report. TVA management also provided some administrative and clarifying comments for our consideration. These technical comments were reviewed and incorporated as appropriate.



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MEMORANDUM DATED JULY 27, 2010 , FROM ROBERT M. DEACY TO
ROBERT E. MARTIN



Item 1: INTRODUCTION AND BACKGROUND

In response to an ash release that occurred on December 22, 2008, at the **Kingston Fossil Plant (KIF)** located in Harriman, Tennessee, the **Tennessee Valley Authority (TVA)** entered into an Administrative Order and Agreement on Consent (Order) with **US Environmental Protection Agency (EPA)** Region IV on May 11, 2009, which directs all response activities under the Comprehensive Environment Response, Compensation, and Liability Act (CERCLA). The Order imposes requirements for TVA to ensure proper management and disposal of the recovered ash in a Resource Conservation and Recovery Act Subtitle D landfill. The intent of the review conducted by **Marshall Miller & Associates, Inc. (Marshall Miller)** is to evaluate whether TVA's disposal efforts are reasonable and meet the objectives of the Order.

Under this task, Marshall Miller met with and participated in teleconferences with various representatives of **TVA Office of the Inspector General (OIG)**, TVA, **Phill-Con Services LLC (PCS)**, **Phillips and Jordan (P&J)**, and their consultants, conducted a site inspection of the Arrowhead Landfill in Perry County, Alabama, on April 21, 2010, and reviewed the various documents prepared by TVA, PCS, and **Alabama Department of Environmental Management (ADEM)**.



Item 2: PEER REVIEW OF TRANSPORTATION AND DISPOSAL PLANS

TVA's methodology for evaluating transportation and disposal alternatives are outlined in the *Offsite Ash Disposal Options Plan* dated June 29, 2009, and the *Ash Loading Test Evaluation* dated May 28, 2009.

In February 2009, TVA issued a Request for Proposals (RFP) to identify and select disposal facilities for ash recovered from the time-critical areas, (i.e., the Emory River). TVA received over 25 proposals for ash disposal, but most were eliminated from further consideration for a variety of reasons, including, the facility was located too far from KIF, the landfill did not meet Subtitle D requirement, or the facility would take too long to get permitted. The evaluation also considered local landfills that were within 60 miles of KIF, but due to concerns about road damage resulting in increased truck traffic and the increased risk of accidents; only those facilities with rail service were further considered.

Three facilities with rail access, the Arrowhead Landfill in Perry County, Alabama, Veolia-Taylor County Landfill in Georgia, and the Hazleton Mine Reclamation site in Pennsylvania, were further evaluated. The Hazleton facility was removed from consideration as its owner would not commit to installing a liner.

Pilot tests were initiated at the remaining two locations in May 2009 using various lining methods and loading and unloading methods by representatives from P&J (loading and disposal), **Veolia Environmental Services** (disposal only), and **MACTEC** (loading only). Based on the loading tests, the "Ash Loading Test Evaluation" recommended using burrito liners during wet weather and a tarp system during dry weather for transportation. The tarp system was later proven to be ineffective; therefore, it is Marshall Miller's understanding that TVA only uses the burrito liner. Additionally, TVA uses a polymer that is sprayed on top of the ash in the rail cars that effectively caps the ash to control water from splashing. Unloading evaluations were also conducted, which indicated that both facilities were able to efficiently handle the ash safety and at the necessary volume. The Arrowhead Landfill was ultimately selected due to lower cost. The *Offsite Ash Disposal Options Plan* also points out the economic benefits to Perry County as a result of the Arrowhead Landfill receiving the ash, as well as the strong support from local



elected officials. The plan does not indicate that these factors were a consideration for awarding the disposal contract to the Arrowhead Landfill.

In summary, the methods employed by TVA for loading and transporting the ash appear to be effective in reducing the potential for environmental impacts during transportation to the Arrowhead Landfill. Marshall Miller is not aware of any releases (dust, etc.) that have occurred during transportation.



Item 3: OPERATIONAL HISTORY OF ARROWHEAD LANDFILL

The Arrowhead Landfill is owned by **Perry Uniontown Ventures, LLC (PUV)** and is operated by PCS, which is an affiliate of P&J. The permit holder is **Perry County Associates, LLC (PCA)**. TVA began shipping ash to the facility in May 2009 under an Advanced Authorization agreement with P&J. The contract between P&J and TVA was finalized in September 2009.

The official landfill name in the permit documents is Perry County Associates Landfill (herein referred to as the Arrowhead Landfill), and the current permit will expire on July 5, 2011. The landfill was initially permitted in July 2006 and began receiving waste in October 2007. Initially the majority of the waste disposed at the landfill was construction and demolition waste from the northeastern United States, which was shipped by rail. The original permit allowed for 7,500 tons per day (tpd). On July 20, 2009, the permit was modified to increase daily allowed tonnage to 15,000 tpd and to increase the service area.

According to the Quarterly Report of Volume for the first quarter of 2010, the landfill receives a daily average of approximately 6,570 tpd of out-of-state waste (i.e., ash) and 110 tpd of municipal solid waste. However, ash unloading operations typically cease during heavy precipitation or lightening events, so this figure is misleading as it assumes the unloading occurs seven days a week. When rain days are removed, the actual volume of ash disposed daily is approximately 11,000 tpd. As of April 28, 2010, the landfill has received slightly more than two million tons of ash.

On January 26, 2010, PUV and PCA filed a bankruptcy petition seeking protection under Chapter 11 of the federal bankruptcy code. TVA and PCS personnel indicated during interviews with OIG and Marshall Miller that monies are still being deposited in the post-closure fund and paid to Perry County. As of the issuance of this report, the bankruptcy has not been settled and operations at the landfill are continuing as normal. TVA does not feel that the bankruptcy process will affect the continued disposal of ash in the landfill as the ash represents the primary source of revenue for the facility.



Item 4: PEER REVIEW OF LANDFILL OPERATIONS

The peer review of the Arrowhead Landfill operations is based on Marshall Miller's review of relevant documents provided by TVA, P&J, and on the ADEM Website, and observations made by Marshall Miller staff during a site visit on April 21, 2010.

The site reconnaissance included the disposal and rail yard transfer operational areas, the interconnecting haul road, National Pollutant Discharge Elimination System (NPDES) outfall locations, the borrow pit within the future Tract 3 cell area, and the section of Cahaba Road along the southern boundary of the Arrowhead Landfill property.

The overall objective of the site reconnaissance was to make observations of the ash disposal process and facility operations as particularly related to storm water and air quality, as well as for any areas of interest noted during the documents review. Marshall Miller made observations on the following during the site reconnaissance:

- Ash transfer operations.
- Haul road conditions.
- Cell disposal areas.
- Storm water management practices.
- NPDES points.
- The roadside ditch along Cahaba Road.
- Air monitoring stations.

In general, the tour was inclusive in character; all requests to visit specific areas were granted, and access to all operational areas was granted.

4.1. OVERVIEW OF LANDFILL OPERATIONS

4.1.1. Ash Transfer Operations

Rail cars containing KIF ash are unloaded at the rail yard facility, and this operation was observed during the site visit. Unloading is accomplished using clamshell buckets, which



transfers the ash into trucks. Once empty, the rail cars are moved to the north track for cleaning. The interior and exterior are cleaned using pressurized water and staged for the return trip to KIF. The exterior wash water is collected in sumps and reused to wash the cars interiors. Also, the water used to wash rail cars exteriors is collected and routed to settling tanks and is not allowed to flow into the storm water ditch. Interior wash water is recirculated and reused for interior washing. This water is pumped from the cars using vac-trucks and passed through a series of settling tanks for solids removal before being reused. The settling tanks are frequently cleaned out, and the sediment is managed onsite as ash material.

During the loading process, Marshall Miller observed that small amounts of ash are unavoidably dropped on the work area surface, which is finished with compacted stone. Site representatives stated that a skid steer is used to remove this material at the end of each work day. Marshall Miller observed the skid steer in the work area and, although the work surface was not hard-paved with asphalt or concrete, it appeared that the landfill staff are able to remove the bulk of the spilled material using this procedure.

Since spilled material has the potential to enter storm water runoff, unloading operations are shut down during heavy precipitation events. Storm water from the transfer work area drains through ditches and sediment traps before discharging to an unnamed tributary to Tayloe Creek. PCS indicated that the sediment basins are routinely inspected and cleaned. The observed sediment basin on the south side of the rails appeared to be in good physical condition.

4.1.2. Haul Road Conditions

The haul road is reported to be about 10,000 feet in length and runs between the rail yard to the north and the disposal area to the south. The road is relatively wide, level, and appears to be in overall good physical condition. Marshall Miller did not observe signs of spilled ash or other municipal solid waste (MSW)-type debris along the length of the haul road. PCS personnel reported that the haul trucks are able to communicate with each other, and that loaded haul trucks are given the right-of-way over all other vehicles so that the potential for mishaps and spills is minimized. The haul road is frequently travelled by facility employees during the work day who



are instructed to report any observed spilled material. Any spilled material would be immediately cleaned by landfill staff.

4.1.3. Cell disposal areas

The cell disposal areas appeared to be built as designed and appeared to be well maintained and in good physical condition. Leachate collection pipes were evident along the cell perimeter. Signage identifying key components or other pertinent features was noted within the landfill areas. The roads and vegetated buffers appeared to be in generally good condition. Marshall Miller did not observe blowing, spilled, or stray ash or MSW in the disposal areas. One of the newly installed methane vent wells was observed and appeared to be functioning properly. Little odor was noted during the visit, and this observation was essentially limited to the area immediately adjacent to the MSW disposal cells.

4.2. NPDES PERMIT REVIEW

PCS maintains separate general NPDES permits for the rail yard and landfill areas. The landfill storm water discharges are authorized under General NPDES Permit authorization ALG160167 dated November 24, 2009. The rail yard storm water discharges are authorized under General NPDES Permit authorization ALG140902 dated November 24, 2009. This review contains information obtained from the NPDES permit documents, the Best Management Practices (BMP) and Spill Prevention Control and Countermeasure (SPCC) plans further discussed in [Section 4.3](#) of this report and the April 21, 2010 site visit.

Two discharge points (1 & 2) are identified in the Rail Yard Permit, both with Tayloe Creek listed as the receiving water. Point 1 is identified at the western end of the subject Property, and Point 2 is located along the eastern side of the property. The Rail Yard Permit discharge limitations for Point 1 are listed as DSN001 and DSN010; the discharge limitations for Point 2 are listed as DSN007. DSN001 applies to storm water from vehicle and equipment parking and maintenance areas. DSN007 applies to vehicle and equipment washing operations that do not use solvents. DSN010 applies to uncontaminated storm water from equipment maintenance, storage, petroleum storage and handling areas.



Two discharge points (1 & 2) are identified in the Landfill Permit authorization, and both list unnamed tributaries to Tayloe Creek as the receiving water. Outfall 1 is identified below a sedimentation basin at the eastern side of the subject property, while Outfall 2 is located below a sedimentation basin on the western side of the property. The Landfill Permit discharge limitations for Outfall 1 are listed as DSN001 and DSN003. The discharge limitations for Outfall 2 are listed as DSN001. DSN001 applies to storm water discharges which do not contain leachate from active or inactive landfills. DSN003 applies to uncontaminated storm water from equipment maintenance, storage, petroleum storage and handling areas. The monitoring requirements for each DSN are listed in Part IA of the NPDES permits. The following observations were made during the review of the permit coverage authorizations:

- The Rail Yard Location Map found in the permit documents shows Point 1 to be located at the southern property line, north of Tayloe Creek, while a drawing in Section 4.4 of the SPCC plan for the rail yard shows Point 1 to be in Tayloe Creek, offsite to the south on the landfill parcel. PCS indicated that the outfall is within Tayloe Creek. The maps should be revised to reflect the proper location.
- The Rail Yard Location Map and SPCC drawings indicate the Point 2 outfall is located in Tayloe Creek. USGS mapping suggests that outfalls located in Tayloe Creek would define watersheds that extend beyond the boundaries of the landfill parcel. For the rail yard, the location of storm water monitoring points located in Tayloe creek would not distinguish between offsite run-on storm water and rail yard storm water runoff. Under these conditions, the facility could assume liability for potential water quality issues in runoff from portions of the watershed that are beyond its control. Conversely, the water quality monitoring of a watershed substantially larger than the rail yard area could diminish the facility's ability to identify water quality impacts from the rail yard itself.

PCS stated that it had recently become aware of the issues above and had made an application to modify the NPDES Rail Yard Permit to correct this situation. The modified permit will have one NPDES outfall located on the tributary to Tayloe Creek that crosses through the rail yard. The proposed NPDES point is to be located immediately below the storm water discharge points from the ash transfer area and is to have a watershed that is substantially on Arrowhead Landfill property. PCS stated that it would provide a copy of the modified NPDES permit authorization to the OIG.



4.3. STORM WATER COMPLIANCE REVIEW

Landfill operations were reviewed with respect to compliance with environmental permit requirements and procedures that outline proper ash management and handling practices. Both NPDES permits require that BMP and SPCC plans be prepared as a condition of compliance, if applicable. Marshall Miller's review incorporated information obtained from observations made from available landfill documents and those made during the site visit. The available documents used to provide information for this review are summarized below:

- *Best Management Practices and Storm Water Pollution Prevention Plan for Perry County Associates Rail Facility* dated August 2009 (Rail Yard BMP Plan).
- *Spill Prevention Control and Countermeasure Plan for Perry County Associates Rail Facility* dated August 2009 (Rail Yard SPCC Plan).
- SPCC Plan Rail Yard Site Map dated August 2009.
- *Best Management Practices and Storm Water Pollution Prevention Plan for Perry County Associates Landfill* dated November 2007 and updated August 2009 (Landfill BMP Plan).
- *Spill Prevention Control and Countermeasure Plan for Perry County Associates Landfill* dated August 2009 (Landfill SPCC Plan).
- SPCC Plan Landfill Site Map dated August 2009.
- *Arrowhead Landfill TVA Fly Ash Disposal Safe Work Plan* updated February 10, 2010 (Safe Work Plan).

The NPDES General Permit requirements for SPCC and BMP Plan content are outlined in Part IV of each NPDES permit as discussed in Section 4.2. In broad terms, the purpose of SPCC and BMP Plans is to describe the facility and its operations, identify potential sources of storm water pollution, and recommend appropriate BMPs or pollution control measures to reduce the potential for discharges of pollutants in storm water runoff.

4.3.1. General Storm Water Management Observations

The landfill storm water management system appears to be constructed as illustrated on the facility drawings. General storm water is segregated and managed separately from leachate



or wash process water. Storm water ditches, channels, and basins appeared to be in good physical condition with storm water flow directed to flow only through designated discharge points. Unpaved surfaces appeared to be adequately vegetated or otherwise stabilized. Roads and equipment work areas appeared to be well maintained.

The landfill, haul road, and rail car operation areas appeared to be relatively neat and free of stray refuse and debris. A skid steer was observed removing the incidental ash spillage that occurs during rail car unloading operations.

Surface water body observations were made at two locations along Tayloe Creek and at one location at an unnamed tributary that passes through the rail yard area. No evidence of excess sedimentation, debris, distressed vegetation, and/or unusual staining was noted, and the surface water features were otherwise unremarkable in appearance.

A borrow pit was observed in the Tract 3 future cell area. Storm water is being managed in this area by self-containment; the pit was below grade and did not have a storm water outfall.

During the site visit, the PCS related to Marshall Miller that the ADEM and the EPA conducted a joint inspection of storm water conditions at both the landfill and rail yard unloading areas in February 2010. The findings identified some issues to be addressed by the landfill but resulted in no violations. PCS has prepared a response to the landfill area findings and is in the process of responding to the rail yard findings. Copies of these documents will be provided to the TVA, OIG, and Marshall Miller for review.

4.3.2. Rail Yard Operations

The following observations are made on the Rail Yard BMP Plan:

- The general character (i.e., loose bulk, containerized), types (i.e., non-hazardous, ash, MSW) and approximate quantities of waste material received are not described. The types of waste that are not accepted (i.e., hazardous, liquid) are also not described. The nature and volume of the material handled at the rail yard affects the types of BMPs to be implemented.



- General BMPs describing procedures for the handling of damaged or loose cargo so that potential storm water impacts are minimized are not outlined in the Rail Yard BMP Plan.
- The operational BMPs for the ash transfer process noted during the site visit are not described in the Rail Yard BMP Plan. These include the daily cleaning of incidental spills from the work surface and unloading operations shut-down during heavy precipitation events.
- The storm water sediment traps are identified as exterior residual washdown water BMPs but not also as overall storm water BMPs.
- The storm water sediment traps require routine maintenance to ensure that their storage capacity for settled particles is not exceeded. During the site visit, PCS stated that these structures are subject to routine inspection and maintenance; however, this is not clearly identified in the Rail Yard BMP Plan.
- The Safe Work Plan identifies safe work practices such as those for ash transfer, dust minimization and rail car movement. Many of the practices could also be considered operational BMPs for minimizing the potential for impacts to storm water runoff. The Safe Work Plan or its key components should be incorporated into the Rail Yard BMP Plan.
- BMP Plans typically identify the types and locations of equipment and supplies available to respond to spills of the material types handled by the subject facilities.

The following observations are made on the Rail Yard SPCC Plan:

- The table on Page 9 lists the secondary containment for the two mobile maintenance trucks to be “Inspections.” Inspections alone do not ordinarily meet the general secondary containment requirement for onsite mobile tankers. The SPCC’s general secondary containment requirements do not prescribe a size for a secondary containment structure but do require that some sort of containment measures, diversionary structures or equipment be implemented to prevent spilled oil from escaping to navigable waters prior to cleanup.
- The spill scenarios listed under Section 6 should include spill volume estimates for spill types such as dropped transfer nozzles or tank overfills. This information is useful for sizing the spill kit(s) kept onsite.
- Section H identifies the onsite spill kit location, but does not mention the minimum size or spill capacity that is to be maintained. The maintenance shop where the spill kit is kept is not identified as such on the Site Map.

4.3.3. Landfill Operations

The following observations are made on the Landfill BMP Plan:

- The Landfill BMP Plan does not make reference to the storage and management of ash in the same manner as that of MSW.
- The operational BMPs for the 250,000-gallon leachate storage tank and the handling of leachate should be expressly identified in the Landfill BMP Plan.
- The haul road is principally located on the landfill tract and should therefore be covered by this BMP Plan. The haul road and associated operational BMPs are not identified in the Landfill BMP Plan.
- The Safe Work Plan identifies work practices such as the Haul Road Policy that could also be considered to be operational BMPs for the haul road. The Safe Work Plan or its key components should be incorporated into the Landfill BMP Plan.

The following observations are made on the Landfill SPCC Plan:

- The spill scenarios listed under Section 6 should include spill volume estimates for spill types such as dropped transfer nozzles or tank overfills. This information is useful for sizing the spill kit(s) kept onsite.
- Section 7.H does not identify the location of onsite spill kit or equipment. Also, the minimum size or spill capacity that is to be maintained is not stated. The location where the spill kit/spill equipment is kept is not identified on the Site Map.

4.4. LEACHATE MANAGEMENT

Any leachate generated by the ash is currently managed with the MSW-derived leachate as a combined waste stream. During an interview, PCS has indicated that leachate from newly constructed ash-dedicated cells can be segregated and managed separately, if needed. However during the early phases of ash and MSW disposal, while separated by soil covers, are disposed in the same cell and segregation is not possible. Leachate from the landfill is stored in a 250,000-gallon storage tank located onsite, where it is staged for transfer via tanker truck to the final treatment and disposal facility. Marshall Miller's document review and reconnaissance identified secondary containment for this storage tank. Leachate is currently treated at the City of Demopolis wastewater treatment plant (WWTP).



The agreement with the City of Demopolis allowed an average of 50,000 gallon per day (gpd), with no single day greater than 100,000 gpd. Historically, leachate generation reportedly was less than 25,000 gpd. However, during the recent winter, the region expected greater than normal precipitation. This factor, along with a revised operational requirement from ADEM that the facility handles run off from the ash as leachate, resulted in a significant increase in the amount of leachate generated with reported volumes of up to 50,000 gpd. Since the ash was originally approved as an alternative daily cover, runoff was treated as storm water. Leachate production is currently declining with the advent of dryer, warmer weather.

Leachate was sent to the City of Marion WWTP for a brief period between August 2009 and December 2009. When potential violations were noted at this facility by ADEM, leachate was no longer sent to this facility and the leachate shipments to the City of Demopolis WWTP resumed. Additionally, leachate was briefly sent to the Liquid Environmental Solutions facility in Mobile, Alabama and to another third party WWTP in Georgia. Both facilities reportedly stopped accepting leachate due to negative publicity.

Currently, the primary leachate management options are off-site disposal at the City of Demopolis WWTP and recirculation back into the landfill cells. Leachate recirculation is permitted under the appropriate weather conditions. The landfill recirculates leachate during warm, dry seasonal weather, as allowed under the limitations of its operational permit. A secondary management option for emergency and/or limited quantities is leachate solidification. Onsite leachate solidification basically consists of mixing the leachate with lime and then placing the material in the landfill cell. This process has been approved by ADEM. In general, the landfill uses this on an emergency or limited basis since the resultant material occupies landfill volume.

Leachate chemical quality data were reported in a laboratory report dated December 4, 2009. It is Marshall Miller's understanding that these data reflect the quality of leachate generated by the combined MSW/ash cells. The chemical data report detections of parameters such organic constituents, chemical oxygen demand, and organic nitrogen at levels which reflect



the combined waste stream. Otherwise the data appear to be unremarkable with respect to typical MSW leachate quality.

As a result of the increased leachate generation, ADEM required that the Arrowhead Landfill obtain a Significant Industrial Discharge (SID) permit for continued disposal at the City of Demopolis WWTP. The landfill was previously exempt from this requirement since it generated less than 25,000 gpd. The City of Demopolis, however, allowed its NPDES permit lapse by failure to reapply in a timely manner. As a result, the ADEM would not issue a SID permit to the landfill until the Demopolis NPDES permit is renewed. On April 22, 2010, the ADEM concurrently issued an NPDES permit to the City of Demopolis POTW and a SID Permit to the Arrowhead Landfill for leachate disposal at the Demopolis WWTP. The landfill's SID and the Demopolis NPDES permits both contain water quality parameters that must be routinely monitored for as a part of compliance, including a requirement for arsenic monitoring, a parameter that is considered to be indicative of TVA ash leachate chemical quality.

For the landfill, the facility SID permit has assigned specific discharge concentration limitations to some of the parameters to be monitored. SID parameters with specific concentration limits on the table below are compared with the available leachate quality data discussed above, along with the Demopolis NPDES discharge limits.

Parameter	Leachate Concentration	Facility SID Permit IU 39-53-00144			Demopolis NPDES		
		Daily Min.	Daily Max.	Monthly Ave.	Daily Min.	Daily Max.	Monthly Ave.
pH (S.U.)	7.37	5.0	10.5	-	6.0	9.0	-
Arsenic (mg/l)	0.0632	-	0.162	0.104	-	-	Report
Oil & Grease (mg/l)	<5	-	150	100	-	-	-

4.5. GROUNDWATER

The "Report on Groundwater Quality Results and Statistical Analysis" for the first semi-annual sampling event for 2010 identified detections of acetone and 2-hexanone. These constituents have been detected previously and have been attributed to the use of paint on the



steel risers during monitor well construction. This conclusion was supported by ADEM in a review letter dated November 24, 2009.

Given that the landfill was permitted relatively recently (2006) and is a Subtitle D facility constructed in the Selma Chalk, a low-permeability geologic formation, it's unlikely that the detections originate from an anomaly such as this rather than from liner failure.

The groundwater analytical results included metals analyses with reported detection for barium. Previous sampling also reported detections for beryllium, chromium, copper, lead, nickel, vanadium, and zinc. The statistical report states that there is no evidence of contamination for these constituents. Arsenic was reported as not detected in the groundwater data.

4.6. AIR MONITORING

The ambient air monitoring program consists of three stationary monitoring locations. There are two monitors near the active landfill cells. The first of the two (Cell 1) is located between Cells 3 and 4 and the residences nearest to those cells. The Cell 1 monitor has been in operation since ash has been accepted by the landfill. The second monitoring station (Cell 2) is located between Cells 1 and 2 (the newly constructed cells) and the residences nearest to those cells. The Cell 2 monitor was placed in operation on January 29, 2010, prior to placement of ash in Cells 1 and 2. The Cell 1 and Cell 2 monitor locations were designed to monitor the potential impact of particulates near residences. The third monitor (Rail) is located near the rail loading and unloading operations to monitor particulates from the loading and unloading process. Each of the three monitors employs a TSI AM510 SidePack Aerosol Monitor (TSI AM510) to measure particle concentrations (PM₁₀) in the air. The monitoring results are compared to the EPA 24-hour average National Ambient Air Quality Standards (NAAQS) for PM₁₀ (0.150 mg/m³). To date PM₁₀ concentrations have been below the standard.

The TSI AM510 is a belt-mounted personal mobile monitor designed to evaluate worker exposure and was not intended for stationary ambient monitoring over a large site. While the monitors cannot be used to legally determine whether the ambient air meets National Ambient



Air Quality Standards set by EPA to protect public health, they can be used as a screening indication of whether the air quality will meet the PM₁₀ National Ambient Air Quality Standards.

4.6.1. Loading and Unloading, Worker Exposure Particulate Monitoring

The Safe Work Plan provided detailed provisions for minimizing workers' exposure to airborne ash:

- Currently the ash in rail cars is kept moist to prevent dust from becoming airborne while ash material is transferred to landfill trucks. The superintendent at the landfill cell monitors the condition of the ash during the landfilling operations. If any portion of the ash becomes dry enough to become airborne, the superintendent will direct the equipment operator to cover the dried ash with a small amount of cover material. If ash becomes airborne beyond the boundary of the cell, the superintendent will immediately stop the landfilling operations and cover all the deposited ash with cover material.
- According to the *Arrowhead Landfill Environmental Workplan (rev 11.30.09)*, at least one equipment operator and grounds personnel will be measured for his/her personal particulate exposure monthly. The personal samples will include respirable dust and silica as well as total dust. Samples will be collected using a Gilian personal sampling pump that will be calibrated with a primary standard before and after use. Respirable dust/silica samples will be collected using 10 mm nylon cyclones. If total dust levels are determined by lab analyses to be above 0.5 milligrams per cubic meter, the samples will be analyzed for arsenic and cadmium as well. Fitting of the monitor, record keeping and sample collection will be performed by the monitoring contractor. The monitoring contractor will provide a technician to conduct the personnel monitoring at the landfill. According to PCS, no exceedances have been noted.

4.7. OTHER ISSUES

Previously, it had been purported by others that the leachate had been illicitly discharged to a drainage ditch along the nearby Cahaba Road. During the site visit, Marshall Miller visited the area along Cahaba Road where this allegedly occurred. The area between the ditch and the landfill appeared to be sufficiently vegetated, with no signs of rilling, bare-earth channel flow or other erosion being noted. The ditch itself appeared to be predominantly overgrown with brush and grasses. No evidence of unusual dead or dying vegetation was noted.

A few places were noted along the ditch banks where bare earth was exposed to the surface. The exposed soil appeared to consist of light gray blocky material composed of weathered Selma Chalk. A faint light-colored staining was noted on the stems of some of the grasses within the channel. The coloration appeared to be similar to the coloration of the chalky soil that was noted to be exposed along the ditch banks. No evidence of excessive sedimentation, unusual discolorations, seepages or other suspect discharges to the ditch were observed by Marshall Miller during the April 2010 visit.



Item 5: CONCLUSIONS

Marshall Miller finds no significant deficiencies in documents reviewed or in the landfill operations at the Arrowhead Landfill. A summary of findings is provided below:

- The ash removal and rail car wash systems and procedures appear to be adequate for minimizing the potential for residual ash to enter the nearby surface water feature.
- Haul road policies and procedures at the landfill appear to be adequate for minimizing, as well as for addressing, potential haul truck accidents and associated ash spills.
- The storm water management practices appear to be effective for segregating and managing storm water runoff.
- PCS appears to maintain its roads, work, and vegetated areas such that sediment runoff is minimized.
- The surface water features in the immediate vicinity of the landfill did not exhibit signs of excess sedimentation, debris build-up, or other potential adverse impacts that could be associated with the landfill.
- Leachate management and disposal practices appear to minimize to the extent practicable the potential for off-site exposure from ash constituents.

TVA should consider the following recommendations:

- TVA should have a contingency plan in place for alternative disposal facilities should the Arrowhead Landfill be forced to close due to financial issues related to the bankruptcy.
- The Rail Yard and Landfill BMP Plans should be updated to more effectively describe and document the actual activities, procedures, equipment and operations that were evident during the site visit. Better details as outlined in Section 4.3 of this report will describe how the facility meets the NPDES BMP requirements, which in turn will outline how the landfill activities minimize the risk to the TVA.
- The SPCC Plans appear to provide generally adequate protection; however, the Plans should be reviewed and updated with respect to the items noted in Section 4.3 of this report as well as current EPA SPCC requirements.
- PCS should be, and is, taking action to correct the discrepancies in the Rail Yard NPDES permit authorization. Marshall Miller understands that the revised permit



authorization will have one outfall located along that Tayloe Creek tributary that crosses through the approximate center of the property. PCS should provide the TVA with a copy of the revised NPDES Permit authorization.

- There is additional risk associated with sending leachate to multiple endpoint facilities that could develop non-compliance concerns and potentially increase the risk exposure to TVA. When possible, PCS should consider shipping leachate to only one facility.

Marshall Miller appreciates the opportunity to provide these services to TVA OIG. If there are any questions, or if we can be of further assistance, please do not hesitate to contact us.

Management's Response – The Senior Vice President, Fossil Generation, Development and Construction, provided comments on a draft of this report and agreed to implement the recommendations.

In response to the recommendations, management provided the following comments:

- An action plan outlining the steps TVA would follow, responsibilities, and associated time frames should the Arrowhead Landfill become unviable has been developed and is ready for deployment.
- PCS will update the Rail Yard and Landfill BMP Plans, with a completion date of July 30, 2010.
- PCS will update the SPCC Plans, with a completion date of July 30, 2010. PSC has informed TVA that all applicable fuel tanks in the rail yard have been relocated to the landfill. Accordingly, there is no need to modify the Rail Yard SPCC plan to include these tanks.
- PCS has received a modified NPDES Permit from ADEM.
- PCS is shipping leachate to only one facility for processing at this time. While PCS maintains a listing of backup facilities that could receive leachate should the need arise, PCS intends to utilize these backup facilities only if the current disposal facility becomes unviable.



Management's complete substantive comments are included in the Appendix of this report. TVA management also provided some administrative and clarifying comments for our consideration. These technical comments were reviewed and incorporated as appropriate.

Auditor's Comments – We concur with TVA management's planned and completed actions. However, PCS has informed TVA that all applicable fuel tanks in the rail yard have been relocated to the landfill. Accordingly, there is no need to modify the Rail Yard SPCC plan to include these tanks. While this will address the Rail Yard SPCC plan, the Landfill SPCC will need to be modified to include the relocated tanks and that the location meets the general secondary containment requirements. TVA management will need to provide an updated Landfill SPCC for closure of this item.



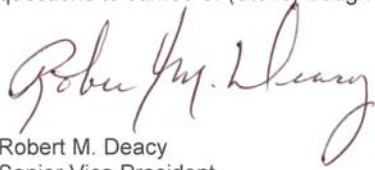
July 27, 2010

Robert E. Martin, ET 3C-K

**REQUEST FOR COMMENTS - DRAFT INSPECTION 2008-12283-08 - REVIEW OF TVA'S
PLANS FOR OFF-SITE TRANSPORTATION AND DISPOSAL OF ASH FROM KINGSTON**

Attached, please find TVA comments in response to your draft inspection report regarding off-site transportation and disposal of ash from Kingston Fossil Plant

We appreciate the opportunity to provide comments on this draft report. Please direct any questions to James S. (Steve) Baugh at (423) 751-6137.



Robert M. Deacy
Senior Vice President
Fossil Generation Development & Construction
LP 5D-C

JAR:
Attachment
Cc (Attachment)
Peyton T. Hairston, Jr. WT 7B-K
Janet C. Herrin, WT 10D-K
Annette L. Moore, LP 3K-C
James S. Baugh, LP 4G-C
Mr. Eddie Dorsett, Phill Con Services
Robert B. Wells, WT 9B-K
Joyce L. Shaffer, WT 9B-K
OIG File No. 2008-12283-08

07/23/2010

REQUEST FOR COMMENTS - DRAFT INSPECTION 2008-12283-08 - REVIEW OF TVA'S
PLANS FOR OFF-SITE TRANSPORTATION AND DISPOSAL OF ASH FROM KINGSTON

- Suggested changes to body of report:
 - **3.0 Operational History of Arrowhead Landfill**, Paragraph 3, 2nd sentence.
 - Currently reads "However, ash unloading operations stop when it rains so this figure is misleading as it assumes the unloading occurs seven days a week."
 - Change to read "However, ash unloading operations typically cease during heavy precipitation or lightning events, so this figure is misleading as it assumes the unloading occurs seven days a week."
 - **4.4 Leachate Management**, Paragraph 1, 2nd sentence.
 - Currently reads "During an interview, PCS has indicated that leachate from ash-dedicated cells can be segregated and managed separately, if needed."
 - Change to read "During an interview, PCS has indicated that leachate from newly constructed ash-dedicated cells can be segregated and managed separately, if needed."
- Discussion on body of report:
 - **4.6 Air Monitoring**
 - The discussion in Section 4.6 concludes with the following sentence: "As a result, it appears that the current monitoring system may be considered a screening level tool and not indicative of air quality". Phillips and Jordan disagrees with this statement. Phillips and Jordan has compared PM10 data collected at the Arrowhead Landfill with data from the state of Alabama monitoring stations, which use Federal Reference Method (FRM) monitoring equipment and procedures and are operated in accordance with State and Local Air Monitoring Station (SLAMS) criteria. Phillips and Jordan has determined that Arrowhead Landfill PM10 data is consistent with both the long and short term record of official measurements made in Alabama, leading Phillips and Jordan to conclude that measurements taken by AM 510 devices at the Arrowhead Landfill are indicative of landfill air quality. Phillips and Jordan would welcome the opportunity to discuss this item with Marshall Miller and Associates.
- Comments on report conclusions:
 - TVA agrees with the conclusions in the report.
- Comments on report recommendations:
 - Recommendation 1: TVA should have a contingency plan in place for alternative disposal facilities should the Arrowhead Landfill be forced to close due to financial issues related bankruptcy.
 - TVA agrees with this recommendation.
 - TVA outlined the following contingency plan for alternative disposal facilities should the Arrowhead Landfill be unable to receive TVA Time-Critical coal ash to the Tennessee Department of Environment and Conservation (TDEC) in an April 26, 2010 letter to Paul Sloan, Deputy Commissioner:

1. "Should the Arrowhead Landfill or the onsite Gypsum Storage Area become unviable during this time, TVA will immediately begin negotiations with landfills we have previously evaluated internally (such as the Veolia Landfill in Georgia or local Tennessee Class 1 facilities) for disposal of the time critical and production ash, as well as gypsum."
 2. "While the ability to implement this alternate disposal plan within 30 days is dependent on many factors, TVA is committed to presenting a comprehensive alternative disposal plan with an implementation schedule for TDEC review within 30 days of losing the availability of either the Arrowhead Landfill or the onsite gypsum landfill."
- TVA has made a Management decision not to award a contingency contract for offsite storage of coal ash at this time, as over 2.8 million tons of coal ash have been transported to the Arrowhead Landfill. However, an action plan outlining the steps TVA would follow, responsibilities, and associated time frames should the Arrowhead Landfill become unviable has been developed and is ready for deployment.
- Recommendation 2: The Rail Yard and Landfill BMP Plans should be updated to more effectively describe and document the actual activities, procedures, equipment and operations that were evident during the site visit. Better details as outlined in Section 4.3 of this report will describe how the facility meets the NPDES BMP requirements, which in turn will outline how the landfill activities minimize the risk to the TVA.
1. TVA agrees with this recommendation.
 2. PCS will update the Rail Yard and Landfill BMP Plans, with a completion date of July 30, 2010. PCS has expressed their intentions to incorporate the majority of the Marshal Miller recommendations into the updated BMP plans. However, PCS is not willing to make the Rail Yard BMP plans specific to TVA coal ash only, as the landfill is permitted to receive multiple types and quantities of waste, and expects to do so following completion of the TVA contract. Accordingly, PCS does not plan to include types and quantities of waste material received in the modified Rail Yard BMP plan.
- Recommendation 3: The SPCC Plans appear to provide generally adequate protection; however, the Plan should be reviewed and updated with respect to the items noted in Section 4.3 of this report as well as current EPA SPCC requirements.
1. TVA agrees with this recommendation.
 2. PCS will update the SPCC Plans, with a completion date of July 30, 2010. PSC has informed TVA that all applicable tanks in the rail yard have been relocated to the landfill. Accordingly, there is no need to modify the Rail Yard SPCC plan to include these tanks.
- Recommendation 4: PCS should, and is, taking action to correct the discrepancies in the Rail Yard NPDES permit authorization. Marshall Miller understands that the revised permit authorization will have one outfall located along that Tayloe Creek tributary that crosses through the approximate center of the property. PCS should provide the TVA with a copy of the revised NPDES Permit authorization.
1. TVA agrees with this recommendation.
 2. PCS has received a modified NPDES Permit from ADEM.
 3. TVA has a copy of the modified NPDES Permit.

- ***Recommendation 5:*** There is additional risk associated with sending leachate to multiple endpoint facilities that could develop non compliance concerns and potentially increase the risk exposure to TVA. When possible, PCS should consider shipping leachate to only one facility.
1. TVA agrees with this recommendation.
 2. PCS is shipping leachate to only one facility for processing at this time. While PCS maintains a listing of backup facilities that could receive leachate should the need arise, PCS intends to utilize these backup facilities only if the current disposal facility becomes unviable.