Closure Plan, Rev. 4

Tanners Creek Fly Ash Pond

Facility Name: Tanners Creek Plant
Fly Ash Pond Complex

Facility Location: 800 AEP Drive, Lawrenceburg, IN

Facility County: Dearborn

Facility Solid Waste Permit No: N/A

Owner:
Tanners Creek Development, LLC.
1515 Des Peres Rd., Suite 300
St. Louis, MO 63131
p. 314-835-2878

Prepared by:
S&ME, Inc.
6190 Enterprise Court
Dublin, OH 43016

October 18, 2017
Revised June 26, 2018
Revised October 12, 2018
Revised March 14, 2019

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EnviroAnalytics Group
Environmental Engineers

March 15, 2018

IDEM Solid Waste Permitting
ATTN: John Hale
IGCN 1101
100 North Senate Ave
Indianapolis, IN 46204-2251

RE: **Tanners Creek Fly Ash Pond Capping/Closure Plan**
Response to Comments

Dear Mr. Hale,

On behalf of Tanners Creek Development, LLC, current owners of the subject site, EnviroAnalytics Group, LLC (EAG) is providing the attached response to comments made on the capping and closure plan for the fly ash pond (FAP) located on the site, west of Tanners Creek, and north of the Ohio River.

Should you have any questions or require any additional information, please do not hesitate to contact me via phone (314-835-2822) or email (pkennedy@enviroanalyticsgroup.com). Thank you for your time and effort regarding this site.

Sincerely,

Patrick Kennedy

Patrick Kennedy
EnviroAnalytics Group LLC

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Solid Waste Land Disposal Facilities
Signatures and Certification Statements for Requested Additional Information

329 IAC 10-11-3(d) requires that the signatory of a solid waste land disposal facility permit application and of other information requested by or on behalf of the Commissioner (including the supplemental information requested by our office for your solid waste land disposal facility permit application) sign the following certification statement:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further certify that I am authorized to submit this information."

Tom Roberts
APPLICANT'S SIGNATURE

3/15/2019
DATE

THOMAS ROBERTS
APPLICANT'S NAME TYPED

Note: It is not necessary to submit this form if an equivalent signed certification statement is incorporated into your submittal.

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March 14, 2019

EnviroAnalytics Group
1515 Des Peres Rd, Suite 300
St. Louis, MO 63131

Attention: Mr. Patrick Kennedy

Reference: Responses to IDEM 12/3/18 RAI
Fly Ash Pond Closure, Tanners Creek

Mr. Kennedy:

In accordance with your request, S&ME has prepared responses to each the comments within the IDEM Insufficient Response to Request for Additional Information (RAI) letter dated December 3, 2018. The RAI was written based on the Fly Ash Pond Closure Plan dated June 26, 2018; portions of the June 2018 were revised and re-submitted on October 12, 2108.

In the paragraphs which follow, the IDEM comments are in normal font and responses to each comment follow in *Italic Blue* font.

Reviewer: Michelle Lu

1. Discuss how the proposed cap, dewatering techniques, and material stabilization methods contribute to achieving each of the performance criteria given in 40 CFR 257.102(d)(1) and (2),

   Response: The infiltration of liquids into the ash is minimized through the installation of a modern closure cap system that will cover all the ash materials and will extend beyond the lateral extent of the subsurface liner system of the Fly Ash Pond. The closure cap system includes a geocomposite drainage layer overlying a flexible membrane liner which fully covers the exposed ash surface. Additionally, surface water runoff controls were sized and protected for potential erosion based on H&H analyses for a localized 100-year storm event. Comprehensive narratives for the calculations supporting the closure design are included in each individual calculation packages included in Attachment V.

   When completed, the Fly Ash Pond Closure will not impound any water. Surface water runoff, by design, will concentrate in the drainage channels on a temporary basis during storm events where it will be routed to two heavily armored downdrains. The storm water conveyance features will include substantial erosion protection to minimize erosion and future maintenance.

Both Global and Veneer stability analyses of the closed configuration of the pond have been completed. The analyses indicate adequate factors of safety will be achieved for the closed configuration

Closure activities include establishment of a vegetative cover which will serve to minimize maintenance of the cover system. Additionally, geosynthetic elements of the cover system are protected by burial.

Dewatering and subgrade preparation are discussed in the responses to RAI Comments 1a through 1d below. Groundwater protection is discussed in the response to RAI Comment 2a and 2b below.

and address the following:

a. The closure plan states Phase 1 ash dewatering began in summer 2017. Please provide a detailed description of the ash dewatering techniques and procedures for both Phase 1 and Phase 2 Closure, and demonstrate free liquids will be removed from the ash before beginning installation of the final cover system (40 CFR 257.102(d)(2)(i)).

Response: A discussion of the previously performed and proposed ash dewatering techniques has been added to the Closure Plan Narrative. See Section 5.9 – Dewatering Procedures. Briefly stated, the dewatering is being completed by creating positive drainage in the upper basin. Surface water from the Upper Basin discharges to the Clear Water Pond and water is removed from the Clear Water Pond by pumping to the Main Ash Pond. The objective is to have no standing water in the Upper Basin and keep the Clear Water Pond in a nearly dry state. Once closure construction is initiated, dewatering will be as depicted on the drawings.

b. The federal rule at 40 CFR 257.102(d)(2)(ii) requires stabilization of the remaining wastes after dewatering, sufficient to support the final cover system. You have proposed compacting materials within five feet of the final subgrade in the fill areas to achieve at least 85% of the Standard Proctor maximum dry density. Please discuss how you are going to stabilize the remaining area.

Response: The surface of the Upper Basin currently exhibits a stable subgrade suitable for construction and support of the cover system. Long term, it is expected that the ash surface will remain stable as it will be protected from wetting by the cover. Furthermore, liquefaction analyses demonstrate that minimum value of safety factor have been met indicating the ash would remain stable under potential seismic events (Attachment V, Appendix C). These analyses are based on the condition of the ash at it currently is in and does not assume any improvement.

Additional fill placement is needed in some areas of the Fly Ash Pond to achieve final subgrade elevations in support of proper drainage requirements. Fill is necessary in the clear water pond area and the majority of the initial fill placement will be from placing ash and other fill materials at the leading edge of and into any remaining impounded water. Impounded water will be removed simultaneously with this filling effort. The upper 5 feet of ash/other materials will be compacted as fill placement nears final grade.

The ash and other materials that are planned to be placed in an "uncompacted" manner are expected to settle relatively quickly under the influence of overlying surcharge loads. Similar to the Upper Basin, the fill placed within the Clear Pond area will exhibit a stable nature for compaction equipment when the subgrade is within 5 feet of the final grade. No areas of unstable subgrade will be present directly beneath the cover system. This discussion has been added to Section 6.4 of the Closure Plan narrative.

c. Describe the procedures for excavating and back filling Borrow Area 4 that is adjacent to the Fly Ash Pond. Discuss how these construction activities will not de-stabilize the Fly Ash Pond, and how the stability of the Fly Ash Pond will be maintained since the Borrow Area 4 is in the 100-year flood plain. Also, excavation and filling of the borrow area may need additional approvals from other state and local agencies, such as the Indiana Department of Natural Resources.

Response: *A discussion of the Borrow Area Plan, prepared by others, has been added to the Closure Plan Narrative. See Section 5.10 – Borrow Area Plan. The borrow excavation will be wholly separate from the FAP Dikes and the excavation will not adversely impact FAP stability. Figure 1 below is a cross-section through the FAP and Borrow Area, which depicts the separation between the two areas. The bottom of the borrow excavation will be graded to drain but the excavation will not be re-filled and will impound water when the River floods. Any permit required for the borrow area will be obtained prior to excavation. The Erosion and Sediment Control Plan (by Stantec, 2017) depicts the proposed excavation grading. The drawings from this Plan have been included in the Subsurface Data Report (Attachment VI).*

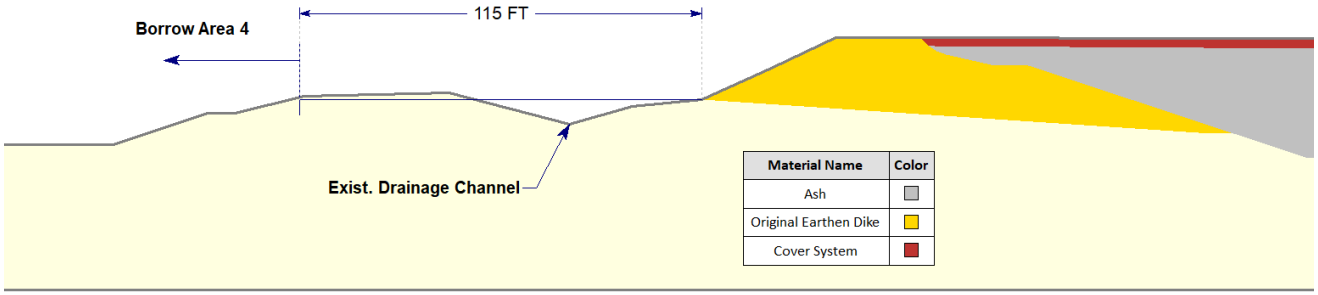

Figure 1: Cross-Section Through Fly Ash Pond and Borrow Area

d. We recommend using textured geomembrane in all areas, and not just the side slopes, to improve the friction coefficient and help minimize the need for further maintenance of the CCR unit (40 CFR 257.102(d)(1)(iii) and (iv)).

Response: *The analysis indicates that a textured geomembrane is not necessary on the relatively flat portions of the project. The minimum required interface friction angle needed to meet the minimum values of safety factors for the large, relatively flat area in the Phase 1 closure limits (upper basin) is less than 1° (Attachment V, Appendix D). Based on this requirement, a smooth geomembrane was specified for this area. Where interface friction is critical, a textured geomembrane has been specified. Additionally, the smooth and textured geomembranes have*

already been purchased and delivered to the site so that Closure Construction can begin without delay upon approval of the Closure Plan.

2. If there is the potential for infiltration of ground water into waste based on your response to comment #6 from IDEM Geology (below), please provide the following information regarding your plans to control, minimize, or eliminate such infiltration and potential releases to the maximum extent feasible under 40 CFR 257.102(d), *Closure performance standard when leaving CCR in place:*

   a. An evaluation of feasibility of closure measures to control, minimize, or eliminate ground water infiltration and potential for releases to the maximum extent feasible.

   Response: *The closure plan includes the dewatering of the ash basin and the elimination of surface water infiltration with a modern geosynthetic final cover system to be installed beyond the lateral extent of the existing liner located beneath the ash materials. These items will control and minimize groundwater infiltration and the potential for future releases. Construction of this type of final cover system has been demonstrated in the industry to be a best practice and feasible method of in-place ash closure and containment.*

   b. Describe how the closures are designed so that the measures to control, minimize, or eliminate ground water infiltration and potential releases from waste in contact with ground water will be conducted as part of closure.

   Response: *Infiltration of surface water into the ash will be controlled by installation of the geosynthetic membrane and drainage layer as part of final cover system. Release of water from the ash into the underlying groundwater will be controlled by 1) removal of ponded free water prior to installation of the cover system thereby lowing the head, and 2) the existing geosynthetic liner installed under the ash materials.*

   The groundwater level is normally below the level of the base of the ash liner so infiltration of groundwater into the ash is generally not a concern. However, on the rare occasions when the groundwater water level rises to above the level of the base of the ash, the bottom geosynthetic liner separates groundwater from the ash.

3. Update the closure and post-closure cost estimate to reflect the expected expenses of any additional measures taken during closure to control, minimize, or eliminate ground water infiltration and potential releases from waste in contact with ground water to the maximum extent feasible, and revised groundwater monitoring.

   Response: No additional measures are anticipated.

Reviewer Geologist Bill Robinson

Please address the following comments developed from a geology review of your closure plan for the Tanners Creek Fly Ash Pond, dated October 19, 2017, and supplementary information dated March 20 and June 26, 2018. The geology review was conducted in light of the provisions of 40 CFR 257 Subpart D (CCR rule) that are adopted by reference under 329 IAC 10-9-1(b) and (c):

1. *Attachment — Ground Water Monitoring Plan (GWMP)* contains proposals for Phase I (Section 9.0) and Phase II (Section 10.0) ground water monitoring, and a Corrective Action Program (Section 12.0). The facility developed these proposals before the August 21, 2018 U.S. Court of Appeals decision referenced in the IDEM cover letter accompanying this geology enclosure. The Fly Ash Pond (FAP) is now subject to the ground water monitoring and corrective action requirements found at 40 CFR 257.90 through 257.99. Therefore, the facility needs to revise sections 9.0, 10.0, 12.0, and additional related sections, 11.0 (Increase Not Attributable to Landfill) and 13.0 (Ground Water Quality Standard) of the GWMP to comply with the requirements found in 40 CFR 257.90 through 257.99.

   Response: The Ground Water Monitoring Plan has been modified as requested.

2. According to the response to geology comment number 1 in our insufficient response letter dated May 10, 2018 (VFC #82539884, p. 6), the facility proposes to install additional nested ground water monitoring wells along the northeast side of the FAP for baseline, upgradient ground water quality monitoring, and water level monitoring.

   Please note upgradient and/or background ground water monitoring locations need to provide ground water quality samples that represent historical conditions unaffected by a CCR unit or facility activities that may contribute constituents of concern. Therefore, the facility needs to include suitable upgradient and/or background monitoring locations in the proposed ground water monitoring system based on these technical specifications.

   Response: The objective of the groundwater monitoring system is to determine if the Unit has adversely impacted the quality of the groundwater flowing beneath the Unit. This is accomplished by comparing the quality of the groundwater immediately up-gradient of the Unit to the quality of the ground water immediately down-gradient of the Unit. The revised proposed groundwater monitoring system is believed to be adequate for this purpose, see revised Ground Water Monitoring Plan.

   We generally agree with the proposed upgradient monitoring well locations. However, based on the limited data provided, it is unclear if the currently proposed locations will meet the above specifications. Additional locations may be necessary as future data become available.

   Response: The ground water monitoring system is believed to be adequate based on the currently available ground water data, see Subsurface Data Report. However, if future ground water data indicates a need for additional wells, the installation of additional wells can be discussed.

3. Table 4-1 Note 1 of the GWMP refers to the potential of ground water flow direction reversal at the proposed upgradient monitoring wells along the northeast side of the FAP. Table 4-1 Note 2 proposes to begin only collecting water level data from any of those northeast well(s) initially designated as upgradient,

following completion of eight quarters of baseline ground water sampling. Note 2 proposes to resume sampling any well meeting those criteria only if the facility identifies a ground water flow direction reversal at the well(s) during subsequent sampling events

The facility developed this proposal before becoming aware of the August 21, 2018 U.S. Court of Appeals decision referenced in the IDEM cover letter accompanying this geology enclosure. According to 40 CFR 257.94, the facility must conduct ground water monitoring at all of the wells comprising the ground water monitoring system, and the CCR rule makes no provision for switching to only water level monitoring at upgradient wells. The facility needs to revise the GWMP accordingly.

Response: The sampling plan has been revised, see revised Groundwater Monitoring Plan. All wells which are formally designated as part of the ground water monitoring system for the Unit will be sampled. Other wells/piezometers which are near the Unit but are not part of the groundwater monitoring system will be monitored for water levels only so that groundwater flow patterns can be better characterized.

4. Table 4-1 and Figure 1 of the GWMP refer to proposed nested monitoring well locations. The spacing between the currently proposed wells along the southwest, northwest, and northeast sides of the FAP averages about 600 feet and exceeds IDEM's recommended approximate 500-foot maximum distance for spacing between wells for CCR impoundments. Due to the high hydraulic conductivity and unknown dispersivity potential of the sand and gravel aquifer, along with the complex, dynamic hydrogeology in the FAP location, the facility needs to propose two to four additional nested monitoring well locations in order to achieve IDEM's recommended spacing in the range of 500 feet. The additional nested wells need to include locations distributed evenly along the southeast side of the FAP to more accurately characterize potential variations in ground water flow direction.

   Alternatively, the system design may exceed the recommended approximate 500-foot distance between wells if the facility provides IDEM detailed justification showing the hydraulic properties of the monitored aquifer are sufficient to allow the immediate detection of a release from any portion of the CCR units. The facility may quantify several aquifer properties to substantiate proposed lateral spacing of ground water monitoring wells, including aquifer grain sizes, hydraulic head pressures, homogeneous site-wide hydraulic conductivities, low seepage rates, and high transverse and vertical dispersivity values. The dispersivity values would likely be the most important data the facility could use to justify lateral well spacing greater than the recommended approximate 500 feet

   In addition, 40 CFR 257.91(b) states facilities must determine the number, spacing, and depths of ground water monitoring systems by a thorough characterization of the site-specific hydrogeological and aquifer properties listed under 40 CFR 257.91(b)(1) and (2). To justify the existing well spacing, the facility needs to show quantitatively, with the aquifer properties previously mentioned, that it would immediately detect a release from any portion of the CCR Units. Otherwise, the facility needs to install downgradient ground water monitoring wells at IDEM's recommended approximate 500-foot maximum distance intervals to assure the facility can accurately measure ground water quality and immediately detect any potential CCR releases

Response: The number, spacing, and locations of the down-gradient wells have been revised such that the spacing between the wells does not exceed 500 feet, see revised Ground Water Monitoring Plan.

5. Section 3.0 (Hydrogeologic Conditions) of the GWMP states lithologic descriptions of borings drilled adjacent to the ash pond document soils of lean clay and silty clay overlie the sand and gravel aquifer. However, the GWMP does not contain documentation showing the lateral continuity and thickness of the clay layer across the interior of the ash pond. Knowing the lateral continuity and thickness of the underlying clay layer is essential for understanding potential contaminant migration pathways, and it will benefit the design of any necessary closure measure involving the prevention of contaminant releases to the ground water. Therefore, the facility needs to document the lateral continuity and thickness of the clay layer across the interior of the ash pond either with adequate existing documentation or with an appropriate number of borings across the FAP with continuous lithologic sampling. The interior borings should include in-situ hydraulic conductivity testing and/or collection of Shelby tube samples of the clay layer for laboratory hydraulic conductivity testing.

Response: This comment has been addressed by expanding the data contained in the Subsurface Data Report Appendix of the Closure Plan (Appendix VI) to include Hydrogeologic information and discussion separate from the Ground Water Monitoring Plan. The expanded information and discussion were prepared using existing sub-surface information. The hydrogeologic conditions section of the revised Groundwater Monitoring Plan remains brief as the purpose of the GWMP is to describe the procedures and methods to be used for characterization of the ground water quality rather than describing the site conditions.

6. It is unclear whether ground water infiltrates the CCR of the FAP or any contiguous contaminated soils upgradient of the FAP on a continual or periodic basis. Such infiltration may be a source of releases, even after dewatering, grading, and capping of the impoundment. Therefore, the facility needs to explain how they will meet the criteria under 40 CFR 257.102(d)(1). Additionally, please provide the elevations of the seasonal high and low water table, the elevation(s) of the bottom of the waste, and the lithologic composition of soils adjacent to and below the FAP.

Response: Within the FAP, the lowest ash elevation is approximately El 458. Below the ash is a 20 mil PVC liner. Please refer to responses to Engineering Review Michelle Lu Item 1. In this document for further explanation.

Regarding the seasonal groundwater table, seventeen ground water flow maps are currently available (see Subsurface Information Report). The available mapping indicates that the ground water level is typically (14 of 17 dates of measured groundwater levels) below the bottom of the liner. The seasonal high and low water table, groundwater flow directions, and lithologic composition of the soils below and adjacent to the FAP are presented in the Subsurface Data Report.

We appreciate being of continued service at Tanners Creek. If you have any questions regarding this submittal, please do not hesitate to contact our office.

Sincerely,

S&ME, Inc.

Michael T. Romanello, PE
Project Engineer

Michael G. Rowland, PE
Senior Engineer