

5 May 2020

Mr. Himanshu Mehta, P.E., Managing Director
Solid Waste Disposal District
Indian River County
1325 74th Avenue SW
Vero Beach, Florida 32968

**Subject: Transmittal Letter
Evaluation of Heartland Leachate Evaporator Pilot Study
Indian River County Landfill Facility
Vero Beach, Indian River County, Florida**

Dear Mr. Mehta:

Geosyntec Consultants, Inc. (Geosyntec) is pleased to submit the attached Technical Memorandum titled “*Evaluation of Heartland Leachate Evaporator Pilot Study, Indian River County Landfill*” to Indian River County (IRC), Solid Waste Disposal District (SWDD). Geosyntec was retained by SWDD to conduct an independent evaluation of a pilot study using thermal evaporation technology for the management of leachate from the IRC Landfill (IRCL or the Landfill) in Vero Beach, Indian River County, Florida. The pilot study was performed by Heartland Water Technology, Inc. (Heartland) in cooperation with the Indian River Eco District, LLC [IRED] under a separate award by SWDD.

The scope of the independent review of the pilot study results was to evaluate the following technical issues: (i) whether sufficient landfill gas (LFG) or another source of heat/energy was available to handle the IRCL leachate volumes; (ii) confirm whether volume reductions of 90% or greater could be achieved under site-specific conditions; (iii) evaluate the need to further process the residuals to pass the Paint Filter Liquids Test and Toxicity Characteristics Leaching Procedure (TCLP) requirements for disposal of these residuals at a solid waste landfill; and (v) re-evaluate/update the final system costs, originally developed by Geosyntec and presented in a technical memorandum dated 3 July 2019.

On-Site Pilot Setup and Operation

Prior to initiating the pilot study, Geosyntec confirmed with the Florida Department of Environmental Protection (FDEP) that no special or additional permits, including potential air permits, were required to conduct this on-site pilot study. Heartland mobilized their trailer-mounted pilot system to the IRCL and arrived at the Landfill on 24 January 2020. System set-up and commissioning started on that day and continued through 26 January 2020, with the actual pilot study commencing on Monday, 27 January 2020.

The pilot trial was operational between 27 January and 31 January 2020, with additional testing and trial conclusion performed on 3 February 2020. The Heartland crew demobilized from the IRCL facility on 4 February 2020, and the pilot trailer was picked up from the site on 6 February 2020.

Geosyntec Site Visit

Geosyntec, represented by Drs. Kwasi Badu-Tweneboah, P.E., and Herwig Goldemund, conducted a site visit at the beginning of the pilot trial during the afternoon of 27 January and the morning of 28 January 2020. Heartland's onsite crew, including Rick Boughner, Michael Grossman and Eric Johnson, introduced Geosyntec to the pilot trial setup and provided an overview of the evaporation process. Overall, Geosyntec got a good overview of the process and the Heartland crew was very knowledgeable and willing to answer any questions that Geosyntec had regarding the process.

Pilot Study Results

The following results can be summarized from the Heartland's Final Report for the pilot study:

- the pilot system was operational for a total of approximately 95 hours over the five-day trial period;
- a total of 5,000 gallons of landfill leachate was processed during the pilot study;
- approximately 87 gallons of concentrated residuals were generated during the pilot study; and
- >98% cumulative volume reduction was achieved during the pilot trial.

At the beginning of the pilot study, a representative of Indian River County Department of Utilities Services (IRCDUS) collected a sample of the raw leachate feeding into the pilot system. At the end of the pilot trial, a sample of the concentrated residuals was collected from the residual tote and analyzed for the same parameters as the raw influent sample. The samples were submitted to Pace Analytical Services, LLC (Pace Analytical) in Ormond Beach, FL, for chemical analysis. Following the conclusion of the pilot study, the approximately 87 gallons of concentrated residuals were stabilized with mulch available from an on-site (IRED) source. A sample of the "raw" mulch was also collected and submitted to Pace Analytical for TCLP testing prior to mixing with the concentrated residuals. The results of the analytical tests are discussed and included in the Technical Memorandum.

Evaluation of Pilot Study Results Against Key Performance Indicators

Volume Reduction (>93%) – The pilot study results demonstrated that a volume reduction of >98% was possible using site-specific leachate.

Required Maintenance / Downtime – Over the five-day trial period, the system was operating 99% of the time.

System Operating Expense – Antiscalent and antifoam additives were used during the pilot study to successfully minimize scale and foam formation.

Paint Filter Liquids Test and TCLP Criteria of Bound Residuals – Laboratory analytical results indicated that the mulch-stabilized residuals passed both the Paint Filter Liquids Test as well as the TCLP criteria to be classified as non-hazardous and could potentially be landfilled in a Class I solid waste landfill in Florida.

Characterization of Concentrated Residuals – Chemical characterization of concentrated residuals that were not stabilized with mulch triggered toxicity characteristic hazardous waste (HW) levels for the constituents arsenic and chromium. It is noted that IRED/Heartland maintain that their “complete process consists of processing from raw leachate to stabilized residual for disposal.”, and, as such, the intermediate stage of the concentrated residuals shouldn’t be an issue from a regulatory and permitting points of view according to Heartland.

Heat/Energy Source – The pilot study did not address the issue of the heat/energy source to be used during a potential full-scale evaporation system implementation on IRED property adjacent to the IRCL. According to Heartland’s April 2019 proposal included in Geosyntec’s 3 July 2019 memorandum, the evaporation of 20,000 gpd of leachate requires 315 scfm of LFG (50% methane).

Ultimate Management of Stabilized Residuals – Based on the results obtained during the pilot study, the stabilized residuals could be disposed in a Class I landfill in Florida (e.g., IRCL) as long as the full-scale evaporator is on the landfill property. Otherwise, appropriate permits may need to be obtained from the FDEP if the full-scale evaporator is located off-site. Permitting considerations are discussed further below.

Reevaluation of Costs – Geosyntec provided an in-depth evaluation of leachate treatment/management costs utilizing thermal evaporation and on-site treatment (combination of a membrane bioreactor [MBR] and reverse osmosis [RO]) in the 3 July 2019 memorandum. Based on this evaluation, Geosyntec calculated a total capital cost of approximately \$2.06 million and an annual operation and maintenance (O&M) cost of \$175,200 for the Heartland evaporator, which equates to about \$0.06/gal over a 10-year period for the evaporation of 20,000 gpd of leachate. These costs assumed that the evaporator unit would be built on the IRCL property and therefore

excluded two significant cost items: (i) a source of heat/energy (which was assumed to be LFG available at the Landfill); and (ii) residuals management (as it was assumed that un-stabilized residuals could be recirculated back into the Landfill as “leachate”).

While the pilot study did not provide additional information that would materially change the previously calculated leachate management/treatment costs (as most of these cost estimates were provided by Heartland), the previously excluded items of heat/energy source and residuals management could materially change the overall costs.

Evaluation of Permitting Implications

Air Permitting – Air permitting will need to be discussed with the FDEP Division of Air Resource Management (DARM). At a minimum, an application for both Title V Air Construction and Operation permits from DARM would be required. Geosyntec does not believe that this air permitting effort would pose an unsurmountable obstacle to the project.

Solid Waste Permitting and ERP Requirements – If an evaporator was proposed to be constructed and operated off-site, a solid waste permit as a waste processing facility will likely be required to address treatment of the leachate and management of the residuals. Therefore, it is suggested that solid waste permitting requirements be discussed with FDEP Tallahassee. SWDD will have to modify its solid waste operation permit, and specifically the Operations Plan, to include management of its leachate at an off-site facility and/or the acceptance and disposal of stabilized residuals from the evaporation process. The construction of the evaporator facility off-site may also require an environmental resource permit (ERP) depending on whether or not existing stormwater management facilities can be used for the evaporator.

Construction Permitting – Routine construction permitting will be required to develop an evaporator unit off-site. This includes construction and building permits required by local (e.g., IRC Engineering Department) and state agencies. There are no construction permitting implications for the IRCL or the SWDD for LFG since the LFG delivery infrastructure is already in place.

Conclusions

The IRED/Heartland Leachate Pilot Test was successful in demonstrating greater than 93% volume reduction and confirming with laboratory results that the residuals from the on-site treatment can be disposed in the IRC Landfill as they passed both the Paint Filter Test and the TCLP tests.

Recommendations

Geosyntec recommends the following:

Option 1:

- IRC and SWDD should negotiate with Heartland and IRED to get a clear answer of a narrow cost range for accepting and managing leachate from the IRCL to facilitate comparison with range of costs presented in Geosyntec's 3 July 2019 memorandum; this cost range should include an "all-in" per gallon price that considers management of 20,000 gpd of leachate over 10 years, including the ultimate disposal of the stabilized residuals.
- Heartland and IRED should provide significant assurance in the form of an approved permit or conceptual approval letter from FDEP that the evaporation process is a "complete process that consists of processing from raw leachate to stabilized residual for disposal" and therefore can be disposed at a Class I landfill in Florida; or
- Heartland should provide examples, including reference contact information, of similar off-site facilities that leachate from Class I municipal solid waste (MSW) landfills have been evaporated and the resulting stabilized residual sent back to the same MSW landfill for disposal.

Option 2:

- IRC and SWDD should issue a Request for Proposals (RFP) to invite vendors to propose leachate treatment of 20,000 gpd using Evaporation Technology either on the IRCL property or an off-site property using LFG or an alternative heat source. If a vendor proposes to build on an off-site property, then they should demonstrate the regulatory and permitting approvals for leachate treatment and residual disposal at a Class I landfill in Florida.

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Closure

Geosyntec appreciates this opportunity to offer our services. Please call the undersigned with questions you may have as you review this proposal.

Sincerely,



Herwig Goldemund, Ph.D.
Senior Scientist



Kwasi Badu-Tweneboah, Ph.D., P.E.
Principal

Attachment – Technical Memorandum

ATTACHMENT

Technical Memorandum