

TECHNICAL MEMORANDUM E-7

To: North Carolina Department of Environment and Natural Resources
ATTN: Qu Qi, P.G., Hazardous Waste Section
Jackie Drummond, Solid Waste Section
FROM: Seaboard Group II and City of High Point
SUBJECT: Technical Memorandum No. E-7
Date: April 10, 2013

Seaboard Group II and City of High Point (Parties) hereby request that the construction schedule contained in the Remedial Action Settlement Agreement (RASA) Scope of Work, as modified by several earlier Technical Memoranda (including the most recent, TM E-6), be further extended. Despite their best efforts and due to circumstances beyond the Parties' control, certain key components of the treatment system (System) have not been completed due to requisite process changes that are in progress, making full operation impossible at this time.

As you are aware, this system has been subject to a series of delays in achieving sustained operation. The Parties retained an automation contractor in early 2012 and undertook the development of completely new hardware and software to manage the System process and provide the necessary alarm and interlock functions. This was addressed earlier in TM-E6, and was necessitated by the fact that the original equipment manufacturer, Purifics ES, Inc. of London, Ontario, Canada (Purifics), failed to provide a complete and fully functioning remedial system as specified in their proposal and in violation of their contractual obligations. Purifics has also refused to return to the project and complete their scope of work after repeated requests and demands.

At this time, the work has been completed by the new automation contractor. By December 31, 2012, as specified in TM E-6, all of the necessary automation software and hardware had been prepared, installed and tested, and the Parties commenced an initial startup. Because this System requires a phased startup, the initial testing required that city water be pumped through the system from Lift Station 1 (LS-1) to Lift Station 2 (LS-2) and then into the remaining components in the main treatment system. That test commenced in early January 2013. Unfortunately, that initial test revealed certain deficiencies in the control system requiring additional programming and testing. That work was authorized immediately and has now been completed.

While the System was shut down, the Parties decided to collect and analyze samples to determine the metals content of the leachate and groundwater to estimate the rate of sludge generation in order to anticipate the metals removal system maintenance requirements. Historically, the iron content of the leachate was reported to be in the 10- to 20-mg/l range. However, this sample event showed results much higher, in the 100- to 150-mg/l range. The

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Parties reviewed work done shortly after the Remedial Investigation was completed and the RI Report submitted to DENR to evaluate methods to address iron fouling in the lines running from LS-1 to LS-2. That work indicated sequestration, chelation and ion exchange treatment were not practical, but that aeration was an option worth considering. The option of doing nothing was also considered in that early work when the iron level was thought to be in the lower range (10- to 20-mg/l). It was concluded in the earlier work that a startup without any iron removal being performed at LS-1 was a viable concept in order to determine how long the system would operate without fouling of the LS-1 to LS-2 transfer piping. To ensure the lines could be reopened, provisions were installed to clean the LS-1 to LS-2 transfer lines.

The Parties undertook an investigation in March 2013 to determine:

1. What is the cause of the increased iron levels;
2. What needs to be done to reduce the iron levels before the transfer from LS-1 to LS-2;
3. What effect does the pH have on the iron levels;
4. What effect does aeration have on the VOCs in the transfer liquid; and
5. Does the iron in solution function effectively to drive a Fenton's reagent reaction and reduce some of the 1,4-Dioxane at LS-1.

To perform this evaluation, the Parties had samples of the leachate from the six leachate tanks (LCHT 1 through 5 and the NIS Sump), groundwater from the landfill recovery wells (RWLF) and SIS wells and groundwater from PWDR-1 collected and analyzed by a state certified laboratory. A pilot study was then performed to evaluate certain objectives of the investigation.

The conclusions from the investigation were as follows:

1. The cause of the increase in iron in the leachate was undetermined. There are several possible theories as to the causes, including that there was undetected sample dilution of the earlier leachate samples, or that there is some seasonal effect on the iron levels and several other possible causes. However, because finding the exact cause was not as important as determining how it should be addressed, the Parties deferred this portion of the study.
2. The pilot study revealed that aeration alone did not significantly reduce the iron levels in the LS-1 transfer liquid (a combination of leachate and the RWLFS and SIS wells). In fact, after two hours of aeration simulating fine bubble diffusion the iron was essentially the same as before aeration. However, it did reduce the VOC levels significantly. It also had very little effect on the BOD₅ or COD, but did have a positive overall effect on the VOC reduction. This will reduce the overall load on the air stripper in the main treatment system and increase the overall system destruction and removal efficiency (DRE).
3. The pilot study also revealed that a second aeration for two hours followed by filtration to 50 microns did have a significant effect on the iron and VOC levels. The only VOC remaining in the post filter effluent was acetone, and the iron was reduced to less than

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0.25 mg/l. The study indicated that, other than to drive a Fenton's reaction, lowering the pH of the liquid had no positive effect. It also revealed that raising the pH had very little effect on the liquid. There was indication that a Fenton's reaction may have a beneficial effect in reducing the 1,4-Dioxane concentration at a lower pH.

These results indicate that aeration alone has little or no effect on the iron level in the LS-1 transfer water; however, aeration at LS-1 has a beneficial effect on the process. It does strip some of the VOCs and precludes the potential domination of the liquid characteristics by the leachate, potentially causing it to become anaerobic. However, to avoid fouling of the transfer piping from LS-1 to LS-2, it will be necessary to determine a method to flocculate and settle or filter the iron in the LS-1 transfer liquid before it enters the transfer piping. This piping consists of two 2" HDPE pipes that flow up-hill from LS-1 to LS-2, presenting an ideal condition for settling and iron deposition. The results also indicated that a second stage of aeration followed by filtration before the liquid is transferred into the main treatment system also have a beneficial effect on the process by further reducing the loading on the air stripper and eliminating most of the iron and solids from the process. This reduces the loading on the "Metals Removal Vat" in the main treatment system and on the air stripper and advanced oxidation process when in operation. The results also indicated that by using iron as a catalyst and lowering the pH of the liquid, titration with Hydrogen Peroxide will reduce 1,4-Dioxane by the Fenton's reaction process. This may become important if the mass of 1,4-Dioxane entering the system exceeds the treatment system's capacity to destroy it. However, the reduction seen in this crude experiment was about 65%, and considerably more study would be needed to refine the process. The data was collected only for reference in the event it is determined at some later date that it may be beneficial to address some of the mass of 1,4-Dioxane earlier in the process.

Up until this point, the Parties have considered that they were in the 6-month testing and evaluation period, and that regardless of all the difficulties and delays they would complete the drawdown test and capture zone test and be ready to submit the Completion Report by June 30, 2013. Unfortunately, within the past few days we have determined that goal does not appear to be achievable. We have been informed of extended delivery times for system components that will press the schedule and likely make full startup by July 1, 2013 unachievable. The oversight consultants have therefore informed the Parties that submission of TM E-7 is needed to request an additional extension of time. The exact duration of the necessary extension cannot be determined until we confirm the delivery dates for the long-lead components, but to be safe the Parties request the schedule be extended until December 31, 2013.

This delay is also caused by the components supplied by Purifics. All of the valves and instrumentation Purifics installed were either the Canadian or the European models, and the manufacturers in North Carolina and their U.S.A. supply sources do not support those versions

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of the various components. Therefore, with every order it is necessary to either special order the component or to cross-reference and locate the U.S. equivalent. This has resulted in long lead times for modification or repair of several necessary components.

Some of the modifications are underway at this time. These include the installation of the aeration at LS-1, the installation of a new filter building near LS-2 and revisions to some piping to simplify and improve system flows. We have also modified the Metals Removal Vat to enhance solids removal and make it possible to add and properly mix treatment chemicals if that is necessary.

As documented herein, the Parties have used best efforts and expended substantial resources to remain on schedule. However, for reasons beyond the control of the Parties, the Parties must respectfully request that the schedule in the Scope of Work for placing the System into full operation be extended from July 1, 2013, to December 31, 2013. The requested extension to December 31, 2013 will allow six additional months to effect correction of the manufacturer's defects and deficiencies, test the System, perform the other tasks described in the "Remedial Action Pre-constriction Report" (ERM-NC, PC, December 28, 2009) and place the System into operation.

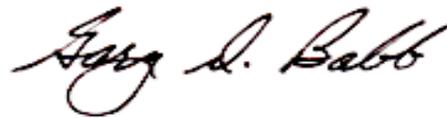
The Parties respectfully request approval of this extension to the construction schedule, and modification to the Scope of Work in the RASA. If there are any questions, or if we may be of any assistance this matter, please feel free to contact Jim LaRue at (281) 431-3571 or Gary Babb at (919) 325-0696.

Respectfully,

Seaboard Group II and City of High Point



James C. LaRue, Oversight Consultant
Seaboard Group II



Gary D. Babb, P.G., Oversight Consultant
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