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MEMORANDUM

To: Timothy Hassett
Hercules, Incorporated

From: Charles Coney
Eco-Systems, Inc.

Date: October 3, 2008

Re: Sludge Sample Analyses
Hattiesburg, Mississippi

At your request, Eco-Systems has conducted sampling of sludges from the wastewater impoundment and the wastewater holding tank and submitted those samples for analysis. The purpose of the sludge sampling effort was to characterize the sludge for disposal as part of the forthcoming sludge removal project. In general, the sampling was conducted and the samples were analyzed according to information supplied by Hercules. Initial sampling was conducted on July 1, 2008, and re-sampling of one area was conducted on July 30, 2008 and September 4, 2008. Samples were submitted to TestAmerica Laboratories, Inc. (TestAmerica) of Savannah, Georgia for analysis. A split of the sample collected on July 30, 2008 was also submitted to Bonner Analytical and Testing Company (BATCO).

Background

Hercules began conducting improvements to the Hattiesburg facility in 2006. These improvements include removing unused facilities from the site. Since facility operations no longer require on-site wastewater treatment, wastewater at the site is being discharged, under permit, to the municipal wastewater treatment system. Since the existing wastewater impoundment basin and wastewater holding tank are no longer necessary, Hercules has contracted for the removal and disposal of the sludges contained in the two structures. Following removal of the sludges, the holding tank and structures associated with the impoundment basin will be demolished and removed. The remaining excavations will be backfilled, graded, and landscaped. Prior to backfill of the impoundment, confirmation sampling will be conducted to ensure that soil containing concentrations of constituents above regulatory limits has been removed.

Hercules notified the MDEQ of their intent to close the impoundment basin and holding tank in a letter dated April 22, 2008. In response to the notification, the MDEQ requested in a letter dated June 8, 2008 additional information regarding the closure operations including a request for Hercules to characterize the sludge prior to generation. The sludge sampling reported in this memo was conducted in response to the request from the MDEQ.

Historical Sampling and Analysis

Sludge samples from the site have been analyzed on seven other occasions since 1990. Six of these samples were collected from the wastewater treatment basin, and one sample was collected from the sludge disposal pits, which are located in the northwestern portion of the site. The analyses conducted for the seven samples included TCLP VOCs, SVOCs, and metals. Analysis for TCLP pesticides, herbicides, and PCBs, reactivity, corrosivity, and ignitibility was also conducted on five of the seven samples. Concentrations of benzene, 1,1-dichloroethene, chlorobenzene, 2-butanone, chloroform, methyl phenols, cresols, dieldrin, barium, cadmium, chromium, lead, and selenium have been detected in one or more samples at concentrations less than their respective TCLP limits. Other tests for hazardous characteristics (corrosivity, reactivity, and ignitibility) have not indicated that the sludge is hazardous. Historical analytical results are attached.

Samples Collected July 1, 2008

During the initial sampling, three composite samples were collected. Samples SS-1 & SS-2 were collected from the wastewater impoundment, and sample SS-3 was collected from the wastewater holding tank. Samples SS-1 and SS-2 were each composed of 5 aliquots collected from the perimeter of the wastewater impoundment. The aliquots for sample SS-1 were collected from the west end of the impoundment, and the aliquots for SS-2 were collected from the east end of the impoundment. The western end of the wastewater impoundment, which is the influent end of the impoundment, is approximately one quarter of the total area of the impoundment and is separated from the eastern end of the impoundment by a baffle. The baffle slows the flow of wastewater through the impoundment, which forces heavier solid material to precipitate. Consequently, sludge on the west side of the baffle generally has a higher solid content than sludge on the eastern side of the baffle. Much of the sludge on the western side of the baffle is also covered by resinous cap of dried sludge ranging from approximately six inches to one foot in thickness. Aliquot locations for SS-1 and SS-2 are shown on the attached Figure 1.

Sample SS-3 was composed of two aliquots collected from the platform on the western rim of the tank and one aliquot collected from the platform on the eastern rim of the tank.

Each sample aliquot was collected with a decontaminated hand auger. The samples were collected by pushing the hand auger through the upper, relatively solid, surficial sludge and then, to the extent practical, vertically mixing the aliquot location. This was accomplished by pumping the hand auger from the surface to the base of the sludge or the limit of the auger rods, whichever was shallower. After mixing, the aliquot was collected and placed on clean plastic sheeting. Aliquots were composited in the field using stainless steel spoons and placed in laboratory supplied containers. Samples collected on July 1, 2008 were analyzed according to the TCLP for VOCs, SVOCs, Pesticides, PCB, Herbicides, and Metals, and also for reactive cyanide, reactive sulfide, pH (corrosivity) and percent solids.

Analysis for sample SS-1 detected 1.3 mg/L of benzene in the leachate. Per federal regulations, if TCLP benzene concentrations are 0.5 mg/L, or above, the waste is considered hazardous by the characteristic of toxicity. Benzene was detected in sample SS-2 at a concentration of 0.21 mg/L and was not detected in sample SS-3. Chloroform was also detected in the sample collected from SS-1 at a concentration of 0.19 mg/L, which is less than the TCLP limit of 6 mg/L. Other VOCs were not detected in the three samples.

Total methyl phenols, which are SVOCs, were detected in the three sludge samples at concentrations ranging from 0.18 mg/L in sample SS-3 to 0.72 mg/L in sample SS-2. Methyl Phenols are not listed in 40CRF 261.24, therefore the maximum concentration for toxicity characteristic is not available.

Pesticides, PCBs, herbicides, and metals were not detected. PH ranged from 5.59 in sample SS-1 to 6.89 in sample SS-3. Reactive cyanide and sulfide were not detected.

Sample Collected July 30, 2007

At the request of Hercules, Eco-Systems conducted re-sampling of SS-1 to confirm the presence of benzene at concentrations above the TCLP limit in the western end of the wastewater impoundment. Sample SS-1-073008 was composited from five aliquots that were collected in approximately the same locations as the previous sample SS-1-070108. (The last 6 digits of the sample I.D. are the collection date.) Sample SS-1-073008 was submitted to TestAmerica for analysis of VOCs by the TCLP. A split of the sample was also submitted to BATCO for the same analysis.

Analytical results of the sample split submitted to TestAmerica detected benzene at a concentration of 0.44 mg/L. Analytical results of the sample split submitted to BATCO detected benzene at a concentration of 0.586 mg/L. Other VOCs were not detected in either split of sample SS-1-073008.

Samples Collected September 4, 2008

After consideration of previous sludge sample analytical results, a third sampling event was conducted to investigate whether benzene concentrations detected in previous samples collected from the western end of the wastewater impoundment were the result of influence from aliquots collected from a localized area of elevated benzene concentration. During the third sampling event, six samples, SS-5 through SS-10, were collected from discrete locations, which are shown on Figure 1. Samples collected from each of the six locations were mixed vertically, as described for the July 1, 2008 sampling event. The six discrete samples were submitted to TestAmerica for analysis of VOCs by the TCLP.

Benzene concentrations detected in the samples are shown in the Table 1. Benzene concentrations in samples SS-5, SS-6, and SS-8 are above the TCLP limit for benzene.

Benzene concentrations in samples SS-7, SS-9, and SS-10 are below the TCLP limit for benzene. Carbon tetrachloride and chloroform were also detected in sample SS-8 at concentrations less than TCLP limits for those compounds.

TABLE 1
SUMMARY OF TCLP BENZENE ANALYTICAL RESULTS
Samples Collected September 4, 2008

Location	Date Collected	TCLP Benzene (mg/L)
SS-5	9/4/2008	**5.5**
SS-6	9/4/2008	**3.2**
SS-7	9/4/2008	0.4
SS-8	9/4/2008	**3.2**
SS-9	9/4/2008	0.043
SS-10	9/4/2008	0.062
Average Concentration[1]	-	**0.626**
TCLP Limit		0.5

1 - Logarithmic mean

Backfill Material

The excavation that remains after sludge removal and demolition of the wastewater impoundment will be backfilled with soils obtained from an onsite source located in the (describe area of site) portion of the site. In order to characterize potential fill materials, a soil sample from the proposed fill excavation area was collected on August 26, 2008 and submitted for analysis of VOCs, SVOCs, pesticides, herbicides, and PCBs. One VOC, tetrachloroethene, was detected at a concentration of 0.017 mg/kg, which is less than the TRG (restricted use) for tetrachloroethene of 18.2 mg/kg. SVOCs, pesticides, herbicides, and PCBs were not detected in the soil sample collected from the proposed fill excavation area.

Conclusions

Historical analytical results for samples collected between 1990 and 2001 do not indicate that wastewater sludge from the site is characteristically hazardous.

Analytical results for the samples collected from the east end of the wastewater impoundment and from the wastewater holding tank (SS-2 and SS-3) were submitted by Hercules to the MDEQ on September 15 & 18, 2008. Based on these analytical results, the MDEQ approved the waste streams represented by SS-2 and SS-3 for disposal in the Pine Belt Regional Landfill. The approval was provided in a letter dated September 19, 2008 from the MDEQ to the landfill. A copy of the letter is attached.

Based on the analytical results of the discrete samples collected from the western end of the wastewater impoundment on September 4, 2008, there would not appear to be a discrete area of the western end of the wastewater impoundment that is the source of the benzene detected in the earlier, composite samples.

The proposed source for backfill material to be used in the wastewater impoundment area appears suitable for use on site.

Recommendations

It is recommended that confirmation samples be collected from the excavation remaining after demolition of the wastewater impoundment. Confirmation soil samples should be collected from the sidewalls and bottom of the excavation and analyzed for benzene. If benzene is detected at concentrations above the applicable TRG in one or more confirmation samples, additional excavation may be necessary. If saturated soils are encountered in the excavation created by demolition of the wastewater impoundment, a sample of the water from the pit should be submitted for analysis in lieu of soil samples from the bottom of the excavation.

Attachments

Attachment A Historical Analytical Results
Attachment B Figure 1
Attachment C Analytical Results - July 1, 2008
Attachment D Analytical Results - July 30, 2008
Attachment E Analytical Results - September 4, 2008
Attachment F Analytical Results - Backfill Material
Attachment G MDEQ Approval Letter

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Conclusions

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