

Hanover

Engineering Associates Inc

August 31, 2012

Mr. Jack Cahalan, Manager
Lower Saucon Township
3700 Old Philadelphia Pike
Bethlehem, PA 18015

RE: Joint Municipal Landfill Committee
Minutes of August 23, 2012 Meeting
Hanover Project LS90-07

Dear Mr. Cahalan:

The Joint Municipal Committee between IESI Bethlehem Landfill and Lower Saucon Township met at the Landfill Office at 1:00PM on August 23, 2012. The meeting schedule was previously changed from the usual third Thursday of the month due to a conflict with Mr. Taylor's schedule.

Attending the meeting were:

Ms. Priscilla deLeon
Ms. Donna Louder
Mr. Allen Schleyer
Mr. Christopher Taylor, PG, HMI

AGENDA ITEMS

I. Status of Waste Activities

Monthly Tonnages:

	<u>May 2012</u>	<u>June 2012</u>	<u>July</u>
Municipal Solid Waste (total)	29,075.60	23,197.10	24,133.30
Construction and Demo (total)	6,345.10	7,404.10	6,355.30
Residual Waste (total)	3,136.80	2,117.40	3,638.20
Asbestos	[12.40]	[70.00]	[52.50]
Out of state-total (percentage)	[23,862.40](61%)	[15,839.90](48%)	[20,047.80](59%)
TOTAL	38,557.50	32,718.60	34,126.80
Recycled Tonnage (percent from Lower Saucon Twp.)	6.50 (82%)	0.00 (74%)	0.00(79%)

- NOTES:
1. The tonnage for 'Asbestos' is included in the tonnage for 'Residual Waste (total)' and is therefore shown in brackets.
 2. The 'Out of state -- total' tonnage figure has now been consolidated to include total tonnage from all waste categories, and is shown in brackets because it is included in the tonnage for the other categories.

<u>Form U Submittals</u>	<u>Waste</u>	<u>Approval Date</u>
V & T Painting	Spent blasting media	07/10/12
City of Newark – Hayes Park	Non-petroleum contaminated debris	07/26/12
Ford Motor Company	Non-petroleum contaminated soil	07/31/12
City of Bethlehem WWTP	Petroleum contaminated soil	Withdrawn
Fibermark	Non-petroleum contaminated soil	Submitted 08/13/12

There was a general discussion on the Form U submittal that was withdrawn for the City of Bethlehem WWTP. Mr. Schleyer stated that the WWTP personnel elected to dispose of the waste elsewhere when concerns about this waste were raised during the normal review process.

II. Annual Groundwater Trend Analysis

- The 3rd Quarter 2012 Quarterly Groundwater Report sampling is scheduled to take place during the week of September 17, 2012.
- The Annual 2011 Groundwater Trend report was submitted prior to June 30, 2012.

III. Correspondence and Reports

- Form U Submittals to PADEP and Lower Saucon Township
- Abatement System Report
- Annual Groundwater Trend analysis
- 2Q12 PADEP Facility Report
- 2Q12 PADEP Groundwater Report

Ms. deLeon asked if there were any red flags in any of the inspection reports. Mr. Schleyer responded no.

IV. Landfill Operations

- Department of Environmental Protection Inspections
 - July 11, 2012 – B. Easley, M. Mott: air quality inspection
 - July 12, 2012 – S. French: Engineer's meeting
 - July 26, 2012 – B. Bham: meeting
 - July 31, 2012 – W. Govern: site inspection
 - August 9, 2012 – S. French, J. Spaide: cell construction inspection
 - August 16, 2012 – A. Schweitzer, B. Easley: air quality inspection
 - August 21, 2012 – B. Easley, D. Fleckenstein, T. Redding: air quality inspection
 - August 23, 2012 – B. Easley, D. Fleckenstein, T. Redding: air quality inspection

Mr. Taylor asked what triggered so many air quality inspections. Mr. Schleyer responded that he didn't know. He added that there were three (3) inspectors who looked through three (3) years of records and performed a very thorough file review. He stated that everything was in order.

- Host Municipal Inspection
 - July 11, 2012 – Chris Taylor
 - July 19, 2012 – Chris Taylor
 - August 3, 2012 – Chris Taylor
 - August 7, 2012 – Chris Taylor
- Bethlehem Renewable Energy (BRE) and Flare Operations

The following is an update to the Gas Turbine Generator/Flare activity. We had the following LFG shutdowns at Bethlehem Landfill. Auto-valves closed as designed for each shutdown of the flare. No odors were noted or odor complaints received by Bethlehem Landfill during the outage events. BRE is currently shutdown for equipment repairs and beginning a startup phase. The flare is currently the primary gas collection control system.

July 16, 2012	Flare shutdown	09:27	Low temperature
	Flare startup	09:32	Duration 5 min
	Flare shutdown	11:26	Low temperature
	Flare startup	12:50	Duration 1 hr 24 min

All shutdown information is provided to the PADEP.

Mr. Schleyer stated that they are still working out the bugs at BRE. Mr. Taylor asked Mr. Schleyer specifically what he was being told by BRE personnel about the progress of work at the BRE plant. Mr. Schleyer responded that they're finding a vibration problem with the generator. Mr. Taylor asked if BRE personnel are still coordinating their start-up schedule with Mr. Schleyer to his satisfaction. He stated that they were.

During the inspection after the meeting, Mr. Schleyer pointed out the gas feed rate paper chart at the landfill flare control panel, and explained that dips in the feed rate depicted on the chart reflected times when the BRE plant was performing trial runs and therefore drawing gas away from the landfill flare. He further explained that the BRE plant had performed trial runs at fifty percent (50%) capacity, and that this is how they discovered the vibration problem with the generator. He stated that BRE is actively consulting experts in order to assess and fix the problem.

- Well Sampling
 - The 3rd Quarter 2012 Quarterly Groundwater Monitoring sampling is scheduled to take place during the week of September 17, 2012.

During the inspection following the meeting, free access to the monitoring wells along the north slope road was visually confirmed by driving the road.

- North Slope
 - The North Slope sedimentation traps are functional.
 - The North Slope perimeter road is accessible.

The condition and accessibility of the road was inspected by driving the road following the meeting. The entire length of the road was found to be passable by four wheel drive vehicle. Mr. Taylor noted one (1) area, at the western end of the road, containing ruts approximately six inches (6") deep that he asked Mr. Schleyer to repair.

- Abatement System Operations
 - The abatement system continues to operate and discharge to the Bethlehem Waste Water Treatment Plant.
- Gas Collection
 - The Bethlehem Renewable Energy plant is currently in a start-up phase and the landfill flare is the primary gas collection and control system.

During the inspection following the meeting, Mr. Taylor confirmed that the landfill flare was operating and viewed the control panel that displayed the gas feed rate (2226 scfm) and burning temperature (1632 °F).

- Leachate Collection

Flow rates continue to be monitored and reported.

Following is a summary of the work history and developments:

- IESI submitted the report from Mieser and Earl, Inc. on December 23, 2008, to DEP and Lower Saucon Township evaluating the various tests that were performed to locate the source of the elevated detection zone flows as outlined in their May 7, 2008 Work Plan. Lower Saucon Township has forwarded their comments on the December 23, 2008 report to DEP.
- IESI has completed welding of approximately 1,200 L.F. of the secondary line to the primary liner along the northern end of Cell 3-D while the anchor trench was open and prior to completing the weld, a 2½-inch rain event occurred. A spike in the leachate collection/detection flow may be observed.
- IESI will retest the gabion stormwater channel over Cell 3-C and discharging into sedimentation Pond 4 for possible infiltration into the detection zone by flooding the channel on September 24, 2009.
- The capping of the remaining five (5) acres of Phase III has been completed.
- IESI provided an updated report on their LMC investigation to DEP and Lower Saucon Township November 2009. The reports in part indicated that:
 1. LMC 7 does not appear to be affected by rainfall since the northern Cell 3 anchor trench cap/liner welding occurred.
 2. LMC 8 still spiking from rainfall events.
- The next investigation will be to the integrity of the liner under gabion channel in Cell 3-C which will occur in the 1st Quarter 2010. IESI is looking for a seven to ten (7-10) day window with no rain for a meaningful evaluation. IESI received authorization for the Gabion Channel Work Plan from DEP on December 22, 2009.
- The investigation of the integrity of the liner under the gabion downchannel located in Cell 3C began April 10, 2010. The southern-most end of the gabion channel was excavated down to the anchor trench as well as to the east and west of the channel along the anchor trench. Toe drains above the primary liner were replaced and the primary and secondary liners were welded together in the excavated areas. The gabion channel and piping leading to Basin 4 were reconstructed. IESI will continue to

- monitor the LMC flows and prepare a report on the latest work performed.
- To date the flows into LMC-8 appear to have been substantially reduced since the repair in the first week of April 2010.
- As of this date the data appears to indicate that the repairs to the southern end of the gabion downchannel leading to Sedimentation Pond 4 and the toe drains running east/west at the southern most end of the gabion channel have caused a substantial reduction in the detection zone of LMC-8.
- The LMC-8 Detection Zone flow rate continues to be monitored. Existing data continues to show a substantial reduction in the flow rate.
- September/October 2010 – the recent rain events have shown influence on LMC-8. The committee is recommending that IESI investigate and consider extending the toe-drain, which was replaced in April along the toe of the southern slope and above Sedimentation Pond 4, to the east and west. Mr. Schleyer provided a summary of the remedial work completed to date to alleviate the high leachate flows being recorded in LMC-8. He reviewed the recent flow data, and stated his opinion that the remedial work has helped to reduce the overall flows. He stated his opinion that the flow data for 2010 indicates that the “response time” between a storm event and high flows observed in LMC-8 is less, and that the flows are of a shorter duration, since the work has been completed. He stated that he is monitoring the flow data and planning out the next step in the process, but is currently concentrating his efforts on the methane gas problem experienced at the residence at 2293 Applebutter Road. Ms. deLeon stated that Lower Saucon Township is very concerned about the high leachate flows, since these could indicate a tear in the landfill liner or other serious problem.
- February 2011: Discussion regarding monitoring results, as provided in the Third Quarter 2010 Quarterly Facility Report, revealed that samples taken from the leachate detection zone provided very similar chemical analyses to samples taken from the leachate collection zone. Mr. Schleyer indicated that IESI had recognized this correlation, and noted it in their cover letter for the report. Mr. Schleyer provided further explanation with regard to how the report is prepared, and noted that the drainage area for LMC-8 is Phase 3, Cell C, which was completed prior to IESI’s ownership of the facility.
- March 2011: Mr. Schleyer stated that rainy weather is necessitating working on erosion control, but that the toe-drain work is still at the forefront of his work plan. Ms. deLeon asked “What’s going on there” in reference to the high leachate flows documented in the leachate demand report. Mr. Schleyer stated that “stormwater is still getting in” and that they have an “open cell; rainwater is going directly in there”. Ms. deLeon stated that leachate flows jumped up starting February 11, 2011. Mr. Schleyer attributed this to a neighboring cell “filling up and overtopping” the short barrier between cells. He stated that LMC-8 serves Phase 3 Cell C, and that when this cell “fills up” with leachate, it causes the high flows documented in LMC-8, but also causes leachate to overspill to the adjacent Phase IV, causing high flows there also.
- April 2011: Mr. Schleyer noted that flows recorded in LMC 6 increased starting March 18, 2011, but that he is not sure exactly why other than to say it is stormwater-related. Mr. Schleyer stated that it is “the same scenario” as last month, with heavy rains every week that has his crews busy repairing leachate seeps and erosion rills.
- May 2011: Additional toe-drain drainage piping was constructed during the beginning of May. A final report will be completed and submitted to the PADEP and Township.

- June 2011: Mr. Taylor asked if the toe drains have been carrying water to daylight (i.e. – has water been flowing out of the new outlets installed in May). Mr. Schleyer responded that there have been a few flowing out.
- July 2011: Ms. deLeon asked what the PADEP says about the LMC 8 work that was completed. Mr. Schleyer stated that they're okay with it, and that it's "everything we said we'd do". Mr. Taylor commented that we'll probably need up to one (1) year of data to evaluate the effectiveness of the work.
- August 2011: Mr. Schleyer confirmed that that he is still collecting leachate flow data. He stated that he is taking LMC 8 detection zone readings every other day to see if the recent heavy rain causes a "bump" in the data. He indicated that the flow data during rain events should be a good tell-tale sign of whether the toe drains are working. He stated that he wants to collect more data, through the wet season.
- September 2011: Mr. Schleyer acknowledged higher detection zone flows during the monitoring period reported herein. He stated that the toe drains are functioning, because he has seen water flowing from them, and noted the extreme rainfall conditions that occurred during this monitoring period.
- October 2011: Mr. Schleyer stated that the flows in LMC 8 still bounce up when it rains. Ms. deLeon asked if anyone has any other ideas (to remediate this problem). Mr. Schleyer responded no. During the inspection following the meeting, I observed water flowing from each of the toe drain outlets. It had just rained in the last twenty-four (24) hours preceding the inspection.
- November 2011: Mr. Taylor asked what specific steps IESI is taking to identify the source of the inflow creating high flows in LMC 8. Mr. Schleyer responded that they are monitoring flow rates versus rainfall.
- December 2011: Mr. Schleyer stated that, as part of the construction of new cell 4F, the anchor trench along the north side of adjacent Cell 4B was exposed in order to "attach" the old cell to the new cell. He stated that this exposure allowed water from rain events at that time to run right into the collection and detection zones, which caused a spike in the flow numbers for those zones in both LMC 7 and LMC 8. He stated that he expects the numbers to come down. Mr. Taylor asked if everything was buttoned up now (i.e. – no continuing exposure to stormwater). Mr. Schleyer responded that, yes, it was.
- January 2012: Mr. Taylor noted that secondary leachate flows continue to exceed 100 gallons per acre per day (G/A/D) through LMC-8, and are also elevated above normal levels for LMC-6 and LMC-7. Mr. Taylor asked Mr. Schleyer if he is still attributing these higher leachate flows to Cell F being open. Mr. Schleyer stated that, yes, he was.
- February 2012: Mr. Schleyer stated that the high leachate flow numbers are, in his opinion, still due to Cell F being open.
- March 2012: Mr. Schleyer stated that there was a misunderstanding between himself and Mr. Taylor, and that what he meant to say was that there was only one (1) week where the connection between Cell 4F and the adjacent cells were open, in order to fuse the liners together, and that there was a large rain event that week. He stated that in no way did he mean this condition was the continuous cause of high flows in LMC-8 (over many weeks).
- April 2012: Mr. Taylor noted that leachate flows are down overall, including secondary flows in LMC-8. Ms. deLeon asked if, regarding the leachate totals, did it help that it didn't rain much lately. Mr. Schleyer responded yes, and noted that LMC-8 is now down to 15 gallons per acre per day (secondary flows).

- May 2012: Mr. Taylor addressed the issue of secondary leachate flows in LMC-8 as one of the issues that is being tracked by him at the monthly landfill committee meetings, and reminded Mr. Schleyer that this is still an issue of concern with the Township. Mr. Taylor noted that flows were up in the last two (2) weeks due to increased rainfall, but still just under one-hundred gallons per acre per day in the last week of reporting.
- July 2012: Mr. Schleyer provided a description, using landfill plans, of which areas LMC 6, 7, and 8 drain. Mr. Schleyer stated that, in regard to LMC 8, that they've significantly reduced the infiltration into it, but it's not one-hundred percent. He stated that they've determined that stormwater is getting into the system, but that it still all gets collected and sent to the Wastewater Treatment Plant. Mr. Schleyer provided an explanation of work completed to date, including the toe drain work, re-sealing the liner and cap system, and installing clay as a sealer. He stated that a quick rain will give a little bump in the flow numbers, and that a soaking rain will cause a broad increase. Mr. Taylor stated that elevated secondary leachate flows in LMC-8 is an issue that is being tracked by him, and is still an issue of concern with the Township.

In accordance with direction received at the technical committee meeting on August 21, 2012, Mr. Taylor advised Mr. Schleyer that the Township Council had authorized the issuance of a letter to the PADEP documenting the Township's concerns with elevated flows in the leachate detection zone.

- Radiation Monitoring

- July 6, 2012: I-131
- July 17, 2012: I-131
- August 7, 2012: I-131
- August 21, 2012: TI-201 – driver had a medical test
- August 22, 2012: TC-99M

Level 1 isotopes were disposed of on site.

Ra-226 Construction and Demolition material continues to remain in the isolation area until directed from PADEP for off-site transport.

- Phase IV Construction Activities

- Phase IV D-Stage 3, Cell 4-B, and Cell F are currently the active disposal areas. Cell E Stage 1 is currently under construction.

Mr. Schleyer stated that they are working on the leachate collection lines and pump station for Cell 4E. During the inspection following the meeting, it was observed that the leachate collection lines had been installed in the protective gravel cover, and that the superstructure of the pump station was under construction.

- Complaints

- 07/09/12: A neighbor complained of a truck that made a left out of the landfill. The neighbor made the truck turn around and exit per the approved route. The driver received a warning.
- 07/10/12: A Steel City resident called Lower Saucon Township to complain he heard heavy equipment noise and back up alarms before 7:00 am. A return call to the resident was made, providing an explanation that IESI operating hours are from 6:00 am to 6:00 pm; and also that IESI was looking into an alternate OSHA approved

- back-up alarm for their equipment. Later IESI personnel went to the Steel City address and did not hear any noise from the landfill. It was noted that a contractor in the area was operating a skid-loader that had a back-up alarm. On 07/11/12 IESI personnel went to the resident's area and instructed the bull dozer to back up to the edge of Cell F. The alarm could be heard faintly.
- 07/25/12: A neighbor called to state that clumps of dirt came off of a brown garbage truck. It was determined to be a Raritan Valley Disposal (RVD) truck and RVD responded to the complaint.
 - 08/10/12: A neighbor on Skyline Drive complained of "natural gas odor". Sam Donato went to the house to investigate and could not detect any odor.
 - 08/15/12: A neighbor complained that a truck making a right turn from Shimersville Road onto Applebutter Road almost hit the car in front of him. The truck driver was given a written warning.

Ms. deLeon raised the issue of the written complaint letter from a neighboring couple that she received and distributed at the technical committee meeting on August 21, 2012. In short, the complaint states that garbage trucks have been using roads other than the designated route to access the landfill. Mr. Taylor asked about the timeframe of the violations that the letter referenced. Mr. deLeon stated that she had spoken to this couple that same morning, and they stated that it is still an ongoing problem. Mr. Taylor asked Ms. deLeon to relay to them that they must call the landfill and lodge a formal complaint each time they witness a violation in order to get the complaints on the record and so that driver warnings can be issued.

- Miscellaneous

- Mr. Taylor asked Ms. deLeon if she had anything further to report regarding her communications with the state related to the fact that the state is supposed to come in and inspect the landfill's truck scale annually. Ms. deLeon responded that she had spoken to someone at the state who confirmed that the state was supposed to conduct such inspections, and that she would continue to pursue this issue.
- As a follow-up to the work performed to repair damage from the heavy rainstorm that occurred on August 4, 2012, Mr. Schleyer stated that the existing eighteen inch (18") pipe at the end of the drainage swale was damaged during the installation of the thirty-six inch (36") pipe, and therefore had to be removed. During the inspection following the meeting, Mr. Schleyer provided a tour of the area where the stormwater had overtopped existing controls, causing the washout of debris onto Applebutter Road, along with an explanation of what happened and of his steps so far to prevent a reoccurrence. Mr. Taylor voiced his concern that a heavy rain in the near future could cause a reoccurrence, and urged Mr. Schleyer to complete grading and seeding work in this area as soon as possible.

Mr. Taylor raised the subject of the questions regarding this incident posed to Mr. Schleyer by Mr. Birdsall via e-mail dated August 17, 2012. Mr. Schleyer stated that he had turned the matter over to Martin and Martin, the landfill engineer, and that he preferred to wait to address the questions in a formal written response. Mr. Taylor stated that not all of the questions were engineering-related, and began a discussion on the matter. Mr. Schleyer stated that the landfill had just been closed when the rainstorm hit in the late afternoon on Saturday August 4, 2012, and that no landfill personnel were present on the scene. Mr. Schleyer was one (1) hour away from the landfill when he received news of the washout onto Applebutter Road, at which time he immediately began driving to the landfill and making calls from his cellular telephone to expedite a clean-up of the roadway. His understanding is that Lower Saucon Township police department personnel were the only officials on the scene,

having responded to the 911 call placed apparently by a passing motorist. Mr. Taylor asked Mr. Schleyer if he notified the PADEP of the incident. He responded that he had informed Susan French, engineer with the PADEP, of the incident and his response to it during a meeting with her several days later (during the beginning of the regular work week). Ms. deLeon told Mr. Schleyer that it is his job as the landfill operator to notify the Township and the PADEP of significant events, that the storm damage event qualified as such, and that he should have called.

- Mr. Taylor made Mr. Schleyer aware of concerns raised by Ms. McNemar at the technical committee meeting on August 21, 2012 regarding the Well Location Plan being incomplete/out of date. Ms. deLeon stated that she wants the problem with inconsistency between site plans added as a comment in a letter to the PADEP that Hanover Engineering is preparing for Township review. Mr. Taylor stated that he would relay this message to Mr. Birdsall, but that the first draft of the letter had probably already been transmitted to the Township for initial review.
- Ms. deLeon raised her concern about the condition of the silt fence along the northern property line, and stated that a resident had reported sediment-laden runoff leaving the landfill to the north. Mr. Taylor requested that he be provided with good location information related to any such complaints so that he could investigate them in the field. During the inspection following the meeting, the condition of the silt fence along the northern property line was inspected, and Mr. Taylor directed Mr. Schleyer to repair several areas where the build-up of sediment was excessive and threatening to breach the silt fence.
- Ms. Louder asked about the remaining life expectancy of the landfill. Mr. Schleyer provided an explanation of this issue and stated that it was about three (3) to four (4) years.

V. Commercial Waste Vehicles

	<u>May 2012</u>	<u>June 2012</u>	<u>July 2012</u>
Total Trucks	3,221	2,942	3,015
Overweight	41	30	39
Warnings	32	20	24
Suspensions	9 (2>3%)	10 (6>3%)	15 (4>3%)
	2-TT	6-TT	4-TT

FL = front loader, RO = roll off, TT = tractor trailer, RL = rear loader,
DT = triaxle dump truck

A general discussion on the number and nature of overweight trucks followed. Ms. deLeon stated that she wants Mr. Schleyer to report, in terms of percentage, the amount that each truck is overweight, or at least the range of overweight percentages into which each truck falls.

VI. Correspondence

- Correspondence from Department of Environmental Protection
- No discussion.
- Correspondence to Department of Environmental Protection

- No discussion.
- Other Correspondences
 - No discussion.

VII. Township Activities/Township Staff Meeting Update

- Township correspondence to the Department of Environmental Protection
 - As noted above, Mr. Taylor advised Mr. Schleyer that Township Council had authorized the issuance of a letter to the PADEP detailing concerns with secondary leachate flows.
- Council Meeting IESI Issues
 - No discussion.
- Miscellaneous
 - No discussion.

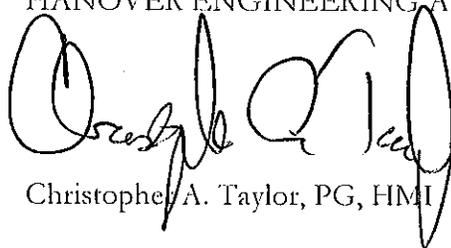
VIII. Establish Time for Next Meeting

1:00 p.m. September 20, 2012 at the Landfill Facility Office.

END OF MINUTES

Respectfully,

HANOVER ENGINEERING ASSOCIATES, INC.



Christopher A. Taylor, PG, HMI

cat:bls/rfr

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Enclosure(s)

cc: Ms. Priscilla deLeon (via e-mail)
Mr. Hazem Hijazi, PE (via e-mail)
Ms. Donna Louder (via e-mail)
Mr. Thomas Dittmar (via e-mail)
Mr. Allen Schleyer (via e-mail)
Ms. Laouressa J. McNemar, PE (via e-mail)
Mr. James B. Birdsall, PE (via e-mail)
Mr. Scott J. Brown, HMI (via e-mail)
Mr. Jacob A. Schray, HMI (via e-mail)
Mr. Rich Sichler (via e-mail)
Ms. Leslie Huhn (via e-mail)
Ms. Diane Palik (via e-mail)

BETHLEHEM LANDFILL
LEACHATE DEMAND REPORT

July 2012

<u>Location</u>	<u>Total gallons</u>
LMC-6	9,146
LMC-7	7,574
LMC-8	42,107
LMC-10	1,350,000
PS-1	368,518
PS-2	174,629
Phase-IV	543,147

Total LMC-10 Flow = LMC-6, 7, 8, Abatement Well System, Phase I and II, and LFG condensate. Phase-IV total from PS-1 and PS-2.

Total Discharge

LMC-10	1,350,000
Phase IV	<u>543,147</u>
TOTAL	1,893,147 gallons

Total Leachate

Leachate	102,507
Phase IV	<u>543,147</u>
TOTAL	645,654 gallons

LMC-10 Flow – Abatement System Flow = Leachate System Flow (gallons).
Abatement System Flow = 1,247,493 gallons (Neptune Flow meters)

