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Engineering & Environmental Services

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DEPARTMENT OF ECOLOGY

July 20, 2011

1165.001.01.001

Mr. Charles Luckie
Waste Management, Closed Sites Division
9300 SW Barney White Road
Port Orchard, Washington 98367

**2011 FINAL COVER INVESTIGATION AND EROSION REPAIR REPORT
LEACHATE GENERATION REDUCTION CONSTRUCTION PROJECT
CLOSED OLYMPIC VIEW SANITARY LANDFILL
KITSAP COUNTY, WASHINGTON**

Dear Charles:

PES Environmental, Inc. (PES) is pleased to present this report to Waste Management Closed Site Division regarding investigative work and erosion repairs performed in 2011 by PES at the Olympic View Sanitary Landfill (OVSL). This work was completed under Change Order 6 to our contract titled, "Leachate Reduction Construction Contract."

Final Cover Investigation Background

A 14-inch diameter landfill gas conveyance header (LFG header) was installed in waste along the east, south and west sides of the composite-lined OVSL. In 2009, during installation of a geomembrane-lined ditch along the east perimeter of the landfill, PES discovered that the final cover system may not have been re-constructed properly after a LFG header was installed in waste below the final cover system. Details of what was found and how it was repaired are provided in PES's report titled, "Construction Report, Leachate Reduction Construction Contract, Closed Olympic View Landfill," originally issued December 23, 2009 and updated by PES in December 2010.

The previous work to minimize leachate production at the landfill had slowed, but not completely stopped leachate production; it was deemed possible that there were other sources of surface water infiltration into the lined landfill. It was also deemed possible that one of those sources could be other areas where the final cover was re-constructed above the perimeter LFG header, such as the south and west perimeters of the composite-lined landfill. If the final cover system in these areas was not re-constructed appropriately, breeches in the composite final cover could be allowing surface water to flow into waste within the lined area.

Investigation

On May 31, June 1 and June 2, 2011, PES investigated the condition of final cover along the south, west, and a small portion of the east landfill perimeter above the installed alignment of

the LFG Header. The investigation was accomplished by excavating 10 backhoe pits through the existing final cover soil to expose the underlying geosynthetic final cover system. The installed geosynthetic final cover system consists of the following components listed below from top to bottom:

- Geocomposite Drainage Layer
- Geomembrane Barrier (upper component of composite cover)
- Geosynthetic Clay Liner (GCL) (lower component of composite cover)

The location of the test pits were determined based on an as-built drawing of the LFG header alignment provided to PES by Waste Management. The drawing, which is included in Attachment 1, is titled, "2008 Landfill Gas System Expansion, Landfill Gas Control System, Olympic View Sanitary Landfill." The drawing was prepared by SCS Engineers, and is dated August 2008.

The backhoe test pits were oriented perpendicular to the orientation of the existing buried LFG header, as shown on the drawing in Attachment 1, and excavated through the final cover soil to expose the geocomposite drainage layer. A typical test pit was 50 to 60 feet long and 4 feet wide, with the buried LFG header located at approximately the mid-point along the length of the test pit.

In all 10 test pits, PES found no indication that the final cover had been removed to install the LFG header, or that the final cover geosynthetics were otherwise disturbed, removed, repaired, or damaged in any way. Seams for the geocomposite panels were oriented down the slope (perpendicular to the slope contours), which is consistent with the orientation you would expect for the initial installation. If the final cover was removed at some point to install the LFG header, we would have expected to see seams in the geocomposite that ran parallel to the LFG header pipe, but in no case did we find that condition. In four test pits, a 20-foot long knife-cut was made through the geocomposite to investigate the geomembrane barrier condition. In all four cases, a textured geomembrane was found directly under the geocomposite, and in one case we found a geomembrane seam that was also oriented down the slope, which again would be consistent with the initial geomembrane installation. In the other six test pits, short (less than 12-inches) slits were cut through geocomposite to confirm the geomembrane was in place, which it was.

Where the 20-foot long slits were cut in the geocomposite, a 2-foot wide strip of new geocomposite was installed directly under the knife-cut between the geocomposite and geomembrane as a means of repairing the geocomposite.

Based on the findings in the 10 backhoe pits, we conclude that the geosynthetic final cover on the north, west, and small portion of the east side of the landfill was installed after installation of the LFG header, and that this area is not a source of leakage through the final cover system that could be contributing to continued leachate production at the site.

Erosion Repair

During the winter of 2010 and 2011 storms caused minor erosion damage at the landfill. Most of this damage occurred as a result of a 24-hour, 7-inch rainfall that occurred in December of 2010. The damage generally involved soil erosion and displacement of erosion control rock in drainage ditches. The drawing in Attachment 1 indicates areas where erosion repair was completed. In general the work involved installing, or replacing erosion control rock in areas where the existing erosion control rock had eroded or was displaced.

The following work was completed and is referenced by number and area shown on the drawing in Attachment 1.

1. Area 1 – Existing crushed concrete (3/4-inch minus) installed in this 2 percent sloped ditch was displaced by stormwater. The crushed concrete was replaced with 2 to 4-inch sized erosion control rock.
2. Area 2 – Existing 3 to 6-inch rounded erosion control rock installed at a drop inlet was displaced. The rounded erosion control rock was replaced with 4 to 8-inch angular erosion control rock. An additional layer of 16-ounce geotextile was placed over the existing geocomposite drainage layer and under the 4 to 8-inch angular erosion control rock to provide additional puncture protection for the geocomposite/geomembrane lined ditch.
3. Area 3 – An over-steepened slope had eroded. The area was re-graded to flatten the slope.
4. Area 4 – A short section of steep ditch eroded. The steep areas were lined with 4 to 8-inch erosion control rock, and flatter areas entering and exiting the ditch were lined with 2 to 4-inch erosion control rock.
5. Area 5 – A ditch at the outlet of a culvert had eroded. The ditch was re-graded, lined with a layer of 16 oz non-woven geotextile, and covered with 4 to 8-inch rock at the culvert outlet, and 2 to 4-inch erosion control rock downstream of the larger rock.

In addition to the erosion problems discussed above, two small areas of final cover began to show indications of instability and sloughing of the surface soil. These areas are just east, and outside of the final cover repair work completed by PES in 2010, and is identified as Area 6 on the drawing in Attachment 1. These areas were no greater than 500 square feet in total area, and did not appear to be increasing in size as of June of 2011. The cause of this slope failure is undetermined, but was likely due to the soil cover becoming saturated and unstable during the 7-inch rainfall event.

PES performed the following work to repair the areas of sloughing surface soil cover:

- Installed approximately 300 lineal feet of 4-inch diameter geotextile-wrapped perforated ADS drainage pipes in trenches excavated to the base of the final cover soil;

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- Placed the perforated pipes in direct contact with the geocomposite drainage layer and at a slope to drain into an existing stormwater control ditch;
- Backfilled the trenches; and
- Re-graded and compacted the sloughed soil cover.

Other Work


On June 2, Waste Management requested that we bring in some crushed concrete for repairing pot holes in roads near the flare station. A total of 32 tons of crushed concrete were brought to the site. Half of the tonnage was spread in an approximate 4-inch loose layer over the road at the southwest corner of the site, and the remaining tonnage was stockpiled near the flare. Waste Management indicated that they would use their equipment to grade and compact the crushed concrete placed on the road.


Photographs of the work described in this letter are contained on the disc provided in Attachment 2.

If you have any questions regarding this letter report, please call 425-478-2628.

Sincerely,

PES ENVIRONMENTAL, INC.


for: Michael G. Stewart
Senior Construction Manager


Daniel A. Balbiani, P.E.
Principal Engineer

Cc: Mr. Steve Richtel

Enclosures:

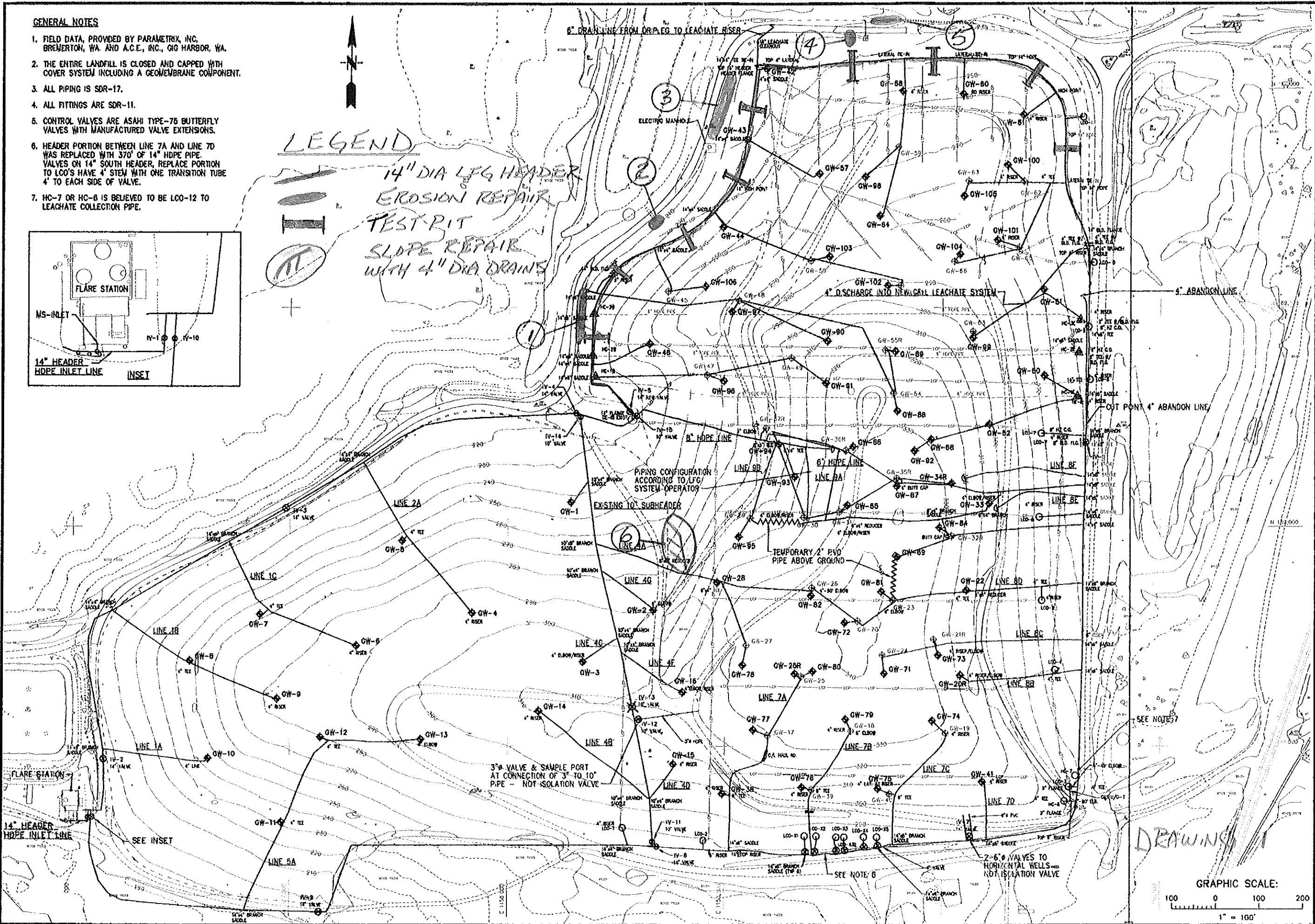
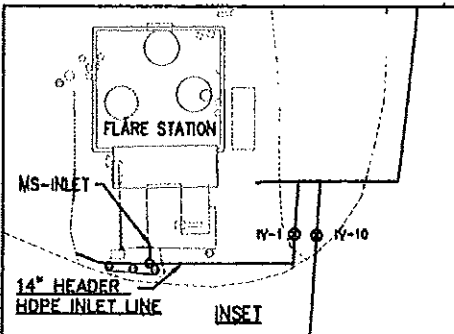
Attachment 1, Drawing showing areas of 2011 work
Attachment 2, 2011 photos

GENERAL NOTES

1. FIELD DATA, PROVIDED BY PARAMETRIX, INC. BREWERTON, WA. AND A.C.E., INC., GIG HARBOR, WA.
2. THE ENTIRE LANDFILL IS CLOSED AND CAPPED WITH COVER SYSTEM INCLUDING A GEOMEMBRANE COMPONENT.
3. ALL PIPING IS SDR-17.
4. ALL FITTINGS ARE SDR-11.
5. CONTROL VALVES ARE ASAHI TYPE-76 BUTTERFLY VALVES WITH MANUFACTURED VALVE EXTENSIONS.
6. HEADER PORTION BETWEEN LINE 7A AND LINE 7D WAS REPLACED WITH 370' OF 14" HDPE PIPE. VALVES ON 14" SOUTH HEADER, REPLACE PORTION TO LCO'S HAVE 4" STEM WITH ONE TRANSITION TUBE 4' TO EACH SIDE OF VALVE.
7. HC-7 OR HC-8 IS BELIEVED TO BE LCO-12 TO LEACHATE COLLECTION PIPE.

LEGEND

- 14" DIA LFG HEADER
- EROSION REPAIR
- TEST PIT
- SLOPE REPAIR WITH 4" DIA DRAINS



DATE	REVISION	NO.
	ISSUED FOR CLIENT REVIEW	

SHEET TITLE
GAS CONVEYANCE PIPING PLAN

PROJECT TITLE
2008 LFG SYSTEM EXPANSION
LANDFILL GAS CONTROL SYSTEM
OLYMPIC VIEW SANITARY LANDFILL



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PROJECT NO.	DATE	SCALE	APP. BY	CHK. BY
072000001				

DATE: AUGUST 2008
SCALE: AS SHOWN
DRAWING NO.: C2

