
2013 ANNUAL REPORT CEDAR HILLS REGIONAL LANDFILL

JUNE 2014



Department of Natural Resources and Parks
Solid Waste Division

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JUNE 2014

Thanks to following staff members for their contributions

Laura Belt
Mike McEwen
Tom Theno
Toraj Ghofrani

Prepared by:

Engineering Services Section
Solid Waste Division

June 24, 2014

2013 ANNUAL REPORT
CEDAR HILLS REGIONAL LANDFILL
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1 – CD	Bill Lasby, Supervisor Solid Waste, Rodent, and Zoonotic Disease Program Environmental Health Services Division Public Health – Seattle & King County 401 Fifth Avenue - Suite 1100 Seattle, WA 98104-1818
1 - CD	Madeline Wall, P.E. Environmental Engineer WA State Dept of Ecology Northwest Regional Office 3190 - 160th Avenue SE Bellevue, WA 98008-5452
1 – CD	Claude Williams, P.E., Engineer II Puget Sound Clean Air Agency 1904 Third Avenue – Suite 105 Seattle, WA 98101
1	Pat D. McLaughlin Division Director King County Solid Waste Division 201 So. Jackson St., Suite 701 Seattle, WA 98104-3855
1	Kevin Kiernan, P.E. Assistant Division Director King County Solid Waste Division 201 So. Jackson St., Suite 701 Seattle, WA 98104-3855
1	Bill Berni Operations Manager King County Solid Waste Division 16645 – 228 th Avenue SE Maple Valley, WA 98038
1	Victor O. Okereke, Ph.D., P.E., DEE Engineering Services Manager King County Solid Waste Division 201 So. Jackson St., Suite 701 Seattle, WA 98104-3855
1	Zahid Khan, P. E. Managing Engineer King County Solid Waste Division 201 So. Jackson St., Suite 701 Seattle, WA 98104-3855
1	Laura Belt, P.E. Engineer III King County Solid Waste Division 201 So. Jackson St., Suite 701 Seattle, WA 98104-3855

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CEDAR HILLS REGIONAL LANDFILL
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EXECUTIVE SUMMARY

This 2013 Annual Report for Cedar Hills Regional Landfill addresses the requirements of WAC 173-351-200 (11). The main body of the report provides facility information, analysis of the remaining capacity, financial assurance for closure and post closure, and a summary and evaluation of the environmental monitoring and settlement at the site. The final section of the main body provides the certification for the report. Attachments to the report provide more information and detail to support the analyses summarized in the main body of the report.

In the fall of 2011 methane was detected at two landfill gas probes on the west property boundary. In 2012, seven landfill gas extraction wells were installed along the western edge of the landfill. After these wells began operating, no methane has been detected along the property line. In the fall of 2012, additional wells were installed to allow testing to verify coverage. Influence testing of the extraction wells occurred in 2013.

On December 7, 2013 a break in the pipeline delivering landfill gas from the North Flare Station to the landfill gas to energy plant was discovered. Initially, neighbors had notified 9-1-1 when an odor was noticed around 6:00 p.m.; however the KCSWD weekend supervisor was notified later, about 8:15 p.m. The flow to the pipeline was shut down by about 10 pm. Over the next two weeks the pipeline was repaired and pressure tested. Additional monitoring procedures were established and the pipeline was returned to service on December 22, 2014.

Other corrective action responses are described in this report in response to identified issues on Department of Public Health, Seattle King County inspection reports and Air Operating Permit conditions deviations.

The groundwater quality summary is provided in the Executive Summary in Attachment D, 2013 Groundwater Data Evaluation. Groundwater quality remained consistent with historical monitoring data.

The current capacity analysis indicates that the remaining capacity of Cedar Hills Regional Landfill at the current revised tonnage forecast is 16.5 years (13.5 years current airspace + 3 years recovered from settlement). The financial assurance section identifies the funding plan through closure and 30 years of post-closure maintenance. The updated CHRLF Plan of Operations will incorporate the standards for post closure care in WAC 173-351-500 (2).

SECTION 1 - OVERVIEW

The King County Solid Waste Division (KCSWD) owns and operates the Cedar Hills Regional Landfill (CHRLF) in eastern King County for the disposal of municipal solid waste generated in the County, exclusive of the cities of Seattle and Milton. It is a 940-acre site located at 16645 228th Avenue Southeast, off Cedar Grove Road, three miles north of Maple Valley, six miles east of the City of Renton and about four miles south of the City of Issaquah. In addition to the landfill, the site contains Passage Point, a transitional housing facility; a landfill gas-to energy facility owned and operated by Bio Energy (Washington) LLC (BEW); a right-of-way for a natural gas pipeline and numerous power transmission line rights-of-way.

Filling operations are continuing in Area 7. Area 7 is anticipated to have capacity through 2017. Area 8 is currently in design. The current schedule will prepare Area 8 to begin receiving waste when Area 7 reaches the planned capacity.

This report includes a compilation of activity summaries and system evaluations associated with the following:

- Landfill capacity;
- Financial assurance cost estimates for closure and post-closure;
- Changes to landfill operations, and
- Environmental monitoring program, including a summary of groundwater, surface water, leachate and landfill gas monitoring results and exceedances.

Purpose

This annual report is submitted pursuant to the provisions of the Washington State Criteria for Municipal Solid Waste Landfills, Operating Criteria - Annual Reports (WAC 173-351-200(11)) and the Cedar Hills Regional Landfill Operating Permit, Section XII - Reporting Requirements, Part B - Annual Report and Permit Renewal Application. The Washington Department of Ecology (WDOE) form required for submittal of this report is included in this section.

The 2014 Application for Municipal Landfill Permit Renewal form was completed and transmitted to the DPHSKC in January 2014. This document is included in Attachment C.

SECTION 2 - FACILITY INFORMATION

Facility information can be found in the attached tonnage Annual Report.

ANNUAL REPORT MUNICIPAL SOLID WASTE LANDFILL

FACILITY NAME: Cedar Hills Regional Landfill	CALENDAR YEAR OF REPORT: 2013	PERMIT NUMBER: PR0015736	FACILITY ID: 385
FACILITY LOCATION (street address): 16645 228 th Avenue SE, Maple Valley, WA	COUNTY: King		
FACILITY CONTACT (name): Pat D. McLaughlin, Division Director, Solid Waste Division	FACILITY PHONE: 206-477-4501		
FACILITY CONTACT MAILING ADDRESS (if different): 201 S Jackson St, Suite 701, Seattle, WA 98014-3855	FACILITY CONTACT PHONE (if different):	FACILITY CONTACT EMAIL: pat.mclaughlin@kingcounty.gov	
Did you operate in <u>2013</u> ? <input checked="" type="checkbox"/> Yes If yes , proceed to next section and complete the form. <input type="checkbox"/> No If no , answer the following questions, sign and date the last page, and submit. This completes your reporting obligations. When did you stop operations? _____ Do you plan to restart? <input type="checkbox"/> No <input type="checkbox"/> Yes When? _____			
AMOUNTS AND TYPES OF WASTE DISPOSED PER YEAR			
PLEASE CHECK IF DISPOSED		AMOUNT DISPOSED Please check: <input type="checkbox"/> Cubic Yards or <input checked="" type="checkbox"/> Tons	
<input checked="" type="checkbox"/> Municipal/Commercial Solid Waste	808,549		
<input type="checkbox"/> Construction/Demolition Waste			
<input type="checkbox"/> Yard Waste (disposed)			
<input type="checkbox"/> Food Processing Waste (disposed)			
<input type="checkbox"/> Landclearing Debris			
<input checked="" type="checkbox"/> Industrial Waste	551		
<input type="checkbox"/> Inert Waste			
<input type="checkbox"/> Wood Waste			
<input type="checkbox"/> Ash (other than special incinerator ash)			
<input type="checkbox"/> Dredged Materials			
<input type="checkbox"/> Sewage Sludge			
<input checked="" type="checkbox"/> Asbestos	63		
<input type="checkbox"/> Petroleum Contaminated Soils			
<input type="checkbox"/> Other Contaminated Soils			
<input type="checkbox"/> Tires (disposed)			
<input checked="" type="checkbox"/> Medical Waste	0.6		
<input type="checkbox"/> Other (specify):			
<input type="checkbox"/> Other (specify):			
Total*	809,165		

* Detailed breakdown of special wastes received available on request

DID YOU RECEIVE MATERIALS FOR RECYCLING? <input type="checkbox"/> Yes <i>(Please specify on pages 3-4.)</i> <input checked="" type="checkbox"/> No			
ADDITIONAL INFORMATION (please check if attached): <input type="checkbox"/> Attach results of ground water monitoring in accordance with WAC 173-351-415(1) <input type="checkbox"/> Attach applicable financial assurance information in accordance with WAC 173-351-600 <input type="checkbox"/> For landfills with RD&D allowances, attach report showing progress toward project goals and a summary of monitoring and test results in accordance with WAC 173-351-710(3)(e)			
Are you open to the public? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Tip fees (Attach schedule if available): <u>attached</u>	
REMAINING PERMITTED CAPACITY: In tons: <u>6,515,000</u> Estimated Date of Closure: <u>2024, or when filled</u>		Are you planning an expansion this year? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
ENERGY RECOVERY FROM LANDFILL: Power Produced Annually <u>2.5 million BTUs</u> kilowatt hours			
During the reporting year, were there any changes in your management practices that would impact your operations? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (specify) <u>Stage 1 of Area 7 closure completed. Break in gas delivery pipeline from flare station to gas-to-energy plant was repaired and tested, a new monitoring procedure was implemented and the line was returned to service.</u> Are there any new solid waste activities planned at your site for this calendar year? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (specify) _____ _____ Planned start date: _____			
DID YOU RECEIVE MATERIALS FOR DISPOSAL FROM:	WHERE FROM	TYPE OF WASTE	ESTIMATE AMOUNT <input type="checkbox"/> Tons or <input type="checkbox"/> Cubic Yards
Out of County? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Out of State? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Out of Country? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
PREPARED BY: Pamela Badger, Environmental Programs Managing Supervisor		DATE: 3/27/2014	PHONE: 206-477-5213
EMAIL: Pamela.Badger@kingcounty.gov			

(Pages 3-4 submitted under separate cover)

NOTE: Please ONLY fill in this chart if you collected materials for RECYCLING or COMPOSTING

AMOUNTS AND TYPES OF MATERIALS COLLECTED FOR RECYCLING OR COMPOSTING

PLEASE CHECK IF RECEIVED FOR RECYCLING or COMPOSTING	COMMERCIAL Please check: <input type="checkbox"/> Cubic Yards/Year or <input type="checkbox"/> Scaled Tons/Year	RESIDENTIAL Please check: <input type="checkbox"/> Cubic Yards/Year or <input type="checkbox"/> Scaled Tons/Year	TOTAL AMOUNT RECEIVED Please check: <input type="checkbox"/> Cubic Yards/Year or <input type="checkbox"/> Scaled Tons/Year
<input type="checkbox"/> Newspaper			
<input type="checkbox"/> Corrugated Paper			
<input type="checkbox"/> Mixed Waste Paper			
<input type="checkbox"/> Container Glass			
<input type="checkbox"/> PET Plastics			
<input type="checkbox"/> HDPE Plastics			
<input type="checkbox"/> LDPE Plastics			
<input type="checkbox"/> Other Recyclable Plastics			
<input type="checkbox"/> Aluminum Cans			
<input type="checkbox"/> Tin Cans			
<input type="checkbox"/> Ferrous Metals (iron, steel)			
<input type="checkbox"/> Nonferrous Metals (excluding aluminum cans)			
<input type="checkbox"/> Appliances (white goods)			
<input type="checkbox"/> Electronics (computers, CPUs, hard drives)			
<input type="checkbox"/> Electronics (monitors, TVs)			
<input type="checkbox"/> Tires (collected)			
<input type="checkbox"/> Asphalt			
<input type="checkbox"/> Concrete			
<input type="checkbox"/> Construction/Demolition			
<input type="checkbox"/> Wood Waste			
<input type="checkbox"/> Landclearing Debris			
<input type="checkbox"/> Yard Debris			
<input type="checkbox"/> Food/Food Scraps			
<input type="checkbox"/> Textiles (rags, clothing)			
<input type="checkbox"/> Co-Mingled Recyclables (specify):			
<input type="checkbox"/> Other (specify):			
Total			

NOTE: Please ONLY fill in this chart if you collected materials for RECYCLING or COMPOSTING

DESTINATION AND FINAL USE OF OUTGOING MATERIALS COLLECTED FOR RECYCLING or COMPOSTING

MATERIAL	OUTGOING AMOUNT <small>Please specify tons or cubic yards.</small>	DESTINATION FACILITY <small>Please specify name, city, state.</small>	FINAL USE <small>Please specify: disposed, recycled, reused, composted, treated, burned for energy, stockpiled, etc.</small>
PREPARED BY:		DATE:	PHONE:
EMAIL:			

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Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.*

CALENDAR YEAR 2013 RECYCLING REPORT

Facility Name:	Cedar Hills Regional Landfill
Facility Location:	16645 228th Ave SE, Maple Valley WA
County:	King
Permit Number:	PR0015736
Facility ID:	385
Facility Contact:	Pat D. McLaughlin, King County Solid Waste Division Director
Facility Contact Mailing Address:	201 S. Jackson St., Suite 701, Seattle WA 98104-3855
Facility Phone:	(206) 296-4466
Facility Contact E-Mail:	Pat.McLaughlin@kingcounty.gov
Prepared by:	Bill Reed, Project Program Manager III
Date:	4/1/2014
E-Mail:	Bill.Reed@kingcounty.gov
Phone:	(206) 477-5285

Materials collected for recycling and composting (scaled tons per year)

	Commercial	Residential	Total	Destination Facility	Final Use
Corrugated Paper	-	-	-	International Paper, Kent	Recycling
Mixed Waste Paper	-	-	-	International Paper, Kent	Recycling
Container Glass	-	-	-	RockTenn, Renton	Recycling
PET Plastics	-	-	-	RockTenn, Renton	Recycling
HDPE Plastics	-	-	-	RockTenn, Renton	Recycling
Other Recyclable Plastics	-	-	-	RockTenn, Renton	Recycling
Aluminum Cans	-	-	-	RockTenn, Renton	Recycling
Tin Cans	-	-	-	RockTenn, Renton	Recycling
Container Glass	-	-	-	Republic Services, Seattle WA	Recycling
PET Plastics	-	-	-	Republic Services, Seattle WA	Recycling
HDPE Plastics	-	-	-	Republic Services, Seattle WA	Recycling
Other Recyclable Plastics	-	-	-	Republic Services, Seattle WA	Recycling
Aluminum Cans	-	-	-	Republic Services, Seattle WA	Recycling
Tin Cans	-	-	-	Republic Services, Seattle WA	Recycling
Ferrous Metals (iron, steel)	-	-	-	Metals Express, Pacific WA	Recycling
Appliances (white goods)	0.31	4.81	5.11	Total Reclaim, Seattle WA	Recycling
Electronics (monitors, TVs)	0.13	2.08	2.21	Total Reclaim, Seattle WA	Recycling
Wood Waste	-	-	-	Cedar Grove, Maple Valley WA	Composting
Yard Debris	-	-	-	Cedar Grove, Maple Valley WA	Composting
Wood Waste	-	-	-	Cedar Grove, Everett WA	Composting
Yard Debris	-	-	-	Cedar Grove, Everett WA	Composting
Other	-	-	-		
TOTAL	0.44	6.89	7.33		

SECTION 3 - LANDFILL CAPACITY ANALYSIS AND LANDFILL DEVELOPMENT STATUS

3.1 - Capacity Analysis

The current Operating Permit for the CHRLF limits the maximum elevation of the landfill to 788 feet above mean sea level (msl) and airspace capacity is calculated based on the maximum elevation.

Landfill airspace capacity is a function of refuse settlement; the more settlement, the more landfill airspace capacity is conserved. While settlement does not create additional airspace, it allows airspace to be reused. The settlement is affected by a number of factors including the waste compaction, composition, moisture content, future diversion for reuse and recycling and the utilization of material for daily cover and operating surfaces. There are several approaches for predicting landfill settlement and none is exact. CHRLF settlement and related airspace capacity recovered from it is estimated through historical survey recordkeeping and the additional operating life is noted as a footnote in Table 2.

Attachment A provides an analysis of landfill capacity used and the remaining capacity at the site. Results of the analysis are summarized in Tables 1 and 2. Additional capacity included in the footnote for Table 2 is calculated based on observed settlement in Areas 5 and 6. Additional capacity available from recoverable soil cover is not included in this analysis. KCSWD will continue to monitor and adjust forecasts to include both increased capacity due to settlement and anticipated tonnage coming to the facility.

Table 1 – AIRSPACE CAPACITY

Waste Disposal Area	Airspace Capacity at Permitted Elevation¹ (cubic yards)	Remaining Airspace Capacity (cubic yards)
Area 5	8,395,000	858,000 ²
Area 6	6,767,000	871,000 ²
Area 7	8,819,000	6,194,000 ²
Total Remaining Airspace Capacity		7,923,000
<small>1. Per the current operating permit. 2. Remaining airspace capacity is based on the September 10, 2013 aerial photography compared with the final grading plan for Areas 5, 6 and 7. Due to the timing of flights, more recent aerial photography was not available when this report was written.</small>		

Table 2 – ESTIMATED OPERATING LIFE

Waste Disposal Area	Current Remaining Airspace Capacity (cubic yards)	Remaining Operating Life (years)
Area 5	858,000	.7
Area 6	871,000	.7
Area 7	6,194,000	5.1
Area 8	8,500,000 ⁴	7.0
Estimated Remaining Airspace Capacity & Life		13.5⁵
1. Estimated Airspace Capacity with <i>Anticipated Future Settlement</i> includes additional airspace that is expected to be gained due to settlement between now and the time that the area is filled. 2. Through 2018 the Operating Life is based on refuse being placed at 1500 pounds per cubic yard and a 4-year weighted average of 957,000 tons per year. 3. From 2019 to 2028 the Operating Life is based on refuse being placed at 1500 pounds per cubic yard and a 9-year weighted average of 914,000 tons per year. 4. Area 8 airspace capacity from the Final Environmental Impact Statement 2010 Site Development Plan. 5. Settlement is anticipated to recover another 3 years of capacity from Areas 5, 6, 7 and 8.		

3.2 - Landfill Development Status

The development status of the landfill is summarized in Table 3. Closed Areas are refuse Areas closed in accordance with pertinent regulatory requirements and not currently scheduled to receive additional waste. The Area 5 and Area 6 top surfaces have interim covers that will be maintained until the completion of the last remaining lifts.

Table 3 – STATUS OF LANDFILL AREAS¹

Landfill Area	Closed Area Size (acres)	Open Area Size (acres)
Main Hill	84.4	0.0
Southeast Pit	9.6	0.0
South Solid Waste Area	30.6	0.0
Central Pit	5.5	0.0
Area 2/3	22.2	0.0
Area 4	60.4	0.0
Area 5	9.2 ² 37.1 ³	31.4
Area 6	25.18 ² 37.4 ³	30.1
Area 7	5.1 ³	50.4
Area 8	Not Developed	Not Developed
1. Areas are net final cover plan view surfaces or as otherwise noted. 2. Final cover surface area. 3. Interim final cover surface area.		

SECTION 4 - FINANCIAL ASSURANCE ANALYSIS

The KCSWD maintains a landfill reserve fund (LRF) account for new area development, closure, post-closure, and corrective action in accordance with WAC 173-351-600. The LRF receives monthly transfers from the KCSWD operating fund, which obtains about 94% of its revenue each year from customers paying the waste disposal fee for MSW brought into the KCSWD solid waste system. The transfer amount is set during the disposal rate approval process and adjusted annually. In 2013, the LRF contribution was \$12.21 per ton. The LRF includes funding for the revised new area development, closure and post closure maintenance cost estimates.

The LRF includes all currently identified projects and funds for unidentified projects further in the future. The post closure maintenance estimate is based on current costs for maintenance of the systems and is reviewed annually. The review considers whether there have been changes to the environmental control systems that would lead to changes in maintenance costs and any changes to current costs of maintenance. The review for this report did not identify any maintenance cost changes. The total project cost of post closure maintenance is then inflated to current year dollars and is used to forecast the future costs as described below. The detailed estimate from previous years is included in Appendix B.

Historically, a uniform 3% discount rate and 3% interest rate are used for each year until landfill closure. In 2009, a 6% discount rate was used, but has since returned to the historical 3% discount rate. As of 2011, based on recommendation of King County Auditor's Office, the policy has been changed to use the King County Office of Economic and Financial Analysis (OEFA) forecast for the interest rate, which was -0.70% for 2013. The interest rate will vary each year in accordance with the most recent forecast.

The current LRF rate is based on current status at the time the rate was adopted:

- [a] The current tonnage forecast.
- [b] The current interest rate set by OEFA, which is updated throughout the year. The interest rate is currently set at -1.14% on any monies invested over any future years in the fund.
- [c] The projected costs in each future year, for Closure, New Area Development, and Facility Improvements.
- [d] The assumption that waste receipt will stop in June of 2025, and final closure completed in 2027.
- [e] The prediction from the previous year that the requirement, at the completion of final closure will be \$2, 645,231 (2014 dollars) per year, if there is zero future inflation, to maintain the landfill for 30 years.
- [f] This annual funding need can be met with a trust fund of about \$46,900,000 as of December 2027.

The new area development costs and closure costs are forecast based on historical per acre costs. The schedule of activities for new area development and area closures is provided in Attachment B. The forecasted cost for corrective action includes in the near years the forecasted costs for

currently planned activities. The forecasted cost of unplanned future activities is included at a flat rate of \$200,000 annually.

The Post Closure Maintenance estimate used in the 2012 Rate Request was reviewed for 2013 and is included for this report. Detailed estimates of post closure maintenance costs are included in Attachment B. This estimate is reviewed annually for any significant changes and reviewed and updated in detail prior to any rate increase request.

KCSWD sent a letter to WDOE in 2012 regarding options for providing certification of the LRF funding. KCSWD has had no further discussions with WDOE or DPHSKC. When the correct mechanism has been identified, KCSWD will provide the certification required.

SECTION 5 - WASTE DISPOSAL QUANTITIES

The CHRLF received about 2,226 tons of municipal solid waste a day in 2012. Detailed information can be found on the tonnage Annual Report in Section 2.

SECTION 6 - SUMMARY OF 2012 GROUNDWATER, SURFACE WATER, LEACHATE AND LANDFILL GAS MONITORING RESULTS AND 2013 PROPOSED ENVIRONMENTAL MONITORING PROGRAM

6.1 - Summary 2012 Groundwater Monitoring Program

Groundwater monitoring is conducted in accordance with WAC 173-351-410 and reported here in compliance with WAC 173-351-415(1). A summary of groundwater data collected during the reporting year is presented in Appendix IV of Attachment D.

The Groundwater Monitoring Program is described in Section 6.2 of the 2004 CHRLF Hydrogeologic Report and in Attachment D of this annual report. Thirty nine (39) groundwater monitoring wells are used for monitoring groundwater elevations and geochemical sampling in the regional aquifer, and nine (9) for monitoring the perched saturated zones. Five (5) additional wells in the regional aquifer and fifteen (15) additional wells in the perched zones are monitored only for groundwater elevations. Detection monitoring wells are located down-gradient of, or lateral to, waste placement areas. Background characterization wells are located up-gradient of waste placement areas.

6.2 - Summary Surface Water Monitoring Program

The surface water monitoring program is described in Section 6.1 of the May 2004 CHRLF Hydrogeologic Report. The goals of this program include the following elements:

- Monitor changes in water quality;
- Verify the effectiveness of leachate management facilities in controlling leachate discharges to surface water;
- Monitor the effectiveness of Best Management Practices (BMPs) per the Storm Water Pollution Prevention Plan (SWPPP); and

- Evaluate compliance with the Industrial Stormwater General Permit.

Surface water quality is monitored at twelve (12) strategic locations around the landfill. Surface water samples are collected monthly for characterization. CHRLF is covered by the State Industrial Stormwater General Permit (ISWGP), which establishes monitoring requirements and benchmark values for several parameters. The three discharge locations are monitored quarterly for compliance with the ISWGP. Permit compliance monitoring locations are at SW-N4 at the north end of the landfill, SW-GS1 at the south end and SW-SL3 at the discharge of the bioswale along 228th Avenue Southeast. Field and analytical surface water data is included in Appendix IV of Attachment D.

6.3 - Summary Leachate Monitoring Program

Leachate is analyzed for characterization and compliance with Wastewater Discharge Permit No. 7842-02. Leachate is sampled monthly at four stations for characterization and every other week at the Leachate Effluent Pump Station discharge point for compliance with permit conditions. Leachate characterization is a critical component of detection monitoring, enabling the detection of any potential for groundwater contamination by leachate. Leachate characterization also serves to assess pretreatment needs prior to discharge and to evaluate the effectiveness of pretreatment. Characterization includes all analytes that groundwater is analyzed for plus several analytes specifically related to wastewater characterization and treatment. Permit compliance samples are analyzed for metals concentrations to monitor compliance with discharge permit requirements and to calculate loadings.

Self-monitoring discharge permit reports are generated monthly and submitted to the King County Wastewater Treatment Division. Field and analytical leachate data for 2012 are included in Appendix IV of Attachment D.

6.4 - Summary Landfill Gas Monitoring Program

Landfill gas (LFG) monitoring is performed in accordance with provisions of WAC 173-351-200(4). A network of LFG monitoring probes has been installed at strategic locations and elevation intervals below the ground surface to measure LFG composition and pressure (see Attachment E). In general, there are two categories (defined by function) of probes at the CHRLF. Migration Monitoring Probes are primarily intended to verify that methane concentrations at the property boundary are not exceeding the lower explosive limit (LEL) for methane (typically 5 percent, by volume) and whether subsurface LFG is migrating into surrounding native soils. Interior LFG Monitoring Probes are used to evaluate and manage the performance of the LFG collection system and will indicate if any operational adjustments to the system are required.

Monitoring Probe Network: The installation history of the LFG monitoring probes at the CHRLF was described in the 2005 CHRLF Annual Report. The probes are either single or multiple completion probes. Information on the location, elevation, and installation date, and a description of each probe is provided in the Monitoring Plan figure included in Attachment E.

Parameters typically measured at the LFG monitoring probes include methane, oxygen and carbon dioxide concentrations and static pressure. Monitoring is performed quarterly for compliance with WAC 173-351, and monthly for operational indicators. Monitoring data results are included in Attachment E. Results from LFG migration monitoring for 2013 are discussed in Sections 8.1 and 8.3 of this report.

6.5 - Proposed Environmental Monitoring Program for 2014

Proposed changes to the environmental monitoring program include an updated Sampling and Analysis Plan (SAP). Modifications to the network of wells and frequency of sampling, intended to streamline monitoring and optimize resources while maintaining program efficiency and regulatory compliance. The updated SAP and the Cedar Hills Hydrogeologic Report will be submitted to DPHSKC for approval in 2014. Pending approval, environmental monitoring is expected to continue as in 2013.

SECTION 7 - SUMMARY OF LANDFILL PERSONNEL TRAINING PROGRAM

The KCSWD implements a Landfill Training Program that ensures that landfill personnel comply with the Certification requirements of WAC 173-300-060. Employees with earned SWANA Landfill Certification as Manager of Landfill Operations (MOLO) are listed below in Table 5.

Table 5 – 2013 MOLO CERTIFIED STAFF

NAME	TITLE	DATE OF CERTIFICATION
John Hills	Lead Equipment Operator	Certified through 2015
Lenny Kuzaro	Lead Equipment Operator	Certified through 2013
Rusty Bogart	Landfill Gas Crew	Certified through 2015
Chris Gavigan	Assistant Operations Manager	Certified through 2015
Wally Grant	Interim Landfill Operations Supervisor	Certified through 2016
Nigel White	Transportation Supervisor	Certified through 6/28/2013

SECTION 8 - EVALUATION REPORTS

8.1 - Summary of Emergency or Corrective Actions Taken in 2013

8.1.1 Landfill Gas Corrective Action

On December 7, 2013 a break in the gas pipeline delivering landfill gas from the North Flare Station to BEW was discovered. Initially, neighbors had notified 9-1-1 when an odor was noticed around 6:00 p.m.; however the KCSWD weekend supervisor was notified later, about 8:15 p.m. The weekend supervisor and landfill supervisor reported to the site, located the break and isolated the pipeline. Regulatory agencies were notified on December 9th and the pipeline was repaired on December 10th. A pneumatic pressure test was performed on December 9th which showed no leaks from the pipeline. A second pneumatic pressure test was performed on December 19th, also utilizing helium as a tracer. No leaks were found. Helium was detected the length of the pipeline indicating that the helium diffused through the HDPE pipeline material.

An Additional Testing and Monitoring Plan for the North Flare Station to BioEnergy Washington Plant was developed and implemented. This plan requires for monitoring of the pipeline using a combustible gas meter and installation of a subroutine control program that continuously compares flow at BEW to flow from the North Flare Station. If a difference of 20% or greater is detected and the static pressure falls at the North Flare Station to less than 6 inches water column, the flare station, including blowers shuts down and a landfill gas operator is called to report to the site.

On December 22nd, with the additional monitoring in place, the pipeline was returned to service.

The KCSWD has taken additional measures in response to this event. Communication protocols with the KCSWD and to external agencies and neighbors have been reviewed with staff to ensure that if unanticipated events occur communications are efficient and effective and that all parties receive the necessary information. The length of the pipeline is monitored with a combustible gas meter weekly. Ambient air monitoring for methane, oxygen and hydrogen sulfide at the east fence line was conducted from December 27, 2013 to February 24, 2014 to identify any remaining issues. A root cause investigation to determine the cause of the break is ongoing. The results of this investigation will inform any future improvements to the pipeline.

8.1.2 Leachate Discharge Permit Corrective Action

In August 2013, KCSWD staff collected a sample at the leachate aeration ponds that resulted in a nickel loading of 1.32 lb./day, which resulted in an exceedance of the loading limit of Wastewater Discharge Permit 7842-01. The cause of this exceedance is due to the operational issue of pumping too many gallons per day on late summer days when the leachate is very concentrated due to months of low or no rainfall. A new procedure has been developed at CHRLF to let Wastewater Operators know how much wastewater can be pumped during months with low rainfall. The new system correlates the volume of wastewater that may be discharged with the concentration of sampled parameters. No further corrective actions were required.

In October 22, 2013, King County Industrial Waste Program (KCIW) issued Wastewater Discharge Permit No. 7842-02 for CHRLF, superseding Wastewater Discharge Permit No. 7842-01. Subsequent to the issuance of this permit there were some confusion regarding the *24 Hour Composite Sample Collection Method* and wastewater monitoring at Manhole (MH) R10-51 location, instead of MH R10-52.

On March 17, 2014, KCSWD explained that the current location of the MH R10-52 is in the middle of the street and therefore unsafe to use for sampling. Due to the proximity of the two manholes and the absence of any other inflow, MH R10-51 is a safe and representative location for monitoring KCSWD's wastewater quality.

Additionally, it was clarified that in the future KCSWD would discharge based on operational need when adequate wastewater is collected in the Aeration Leachate Lagoons and that sampling methodology will be better explained to clearly demonstrate the use of a Flow-Proportionate Sampling Technique.

8.1.3 Inspection Reports Responses

In 2012, inspection reports from DPHSKC identified one violation at the site. This identified violation and the corrective actions taken are identified below.

Date	Violation Identified	Corrective Measures Taken
February 10, 2012	Litter present above the daily soil cover on Area 7 and west of the west perimeter road.	Increased litter crew activity in these areas, and installed debris fencing in Area 7 northwest of the active area.

8.1.4 Title V Deviation Reports

KCSWD reports deviations from the Title V Air Operating Permit in monthly Deviation Reports. In 2013, KCSWD filed three Deviation Reports: in April, November, and December for non-compliance with respect to receiving of asbestos package, ripped geomembrane cover, surface emissions exceedances. In each case KCSWD took preventive measures to correct the situation. The deviation and preventative measures taken for each event is listed below.

Month	Instance	Preventative Measures Taken
• April 2013	Asbestos package received that was not in compliance with the permit requirements. No waste clearance taken.	Asbestos package buried by Landfill Staff following the permit terms and conditions and with permission from the PSCAA.
• December 2013	Gas delivery pipeline to Bio Energy (WA) plant was broken on December 7 th . Geomembrane cover ripped off in Area 6 during utility work.	PSCAA and Seattle –King County Public Health was notified. Pipe was repaired, tested, and returned to operation. Cover material has been repaired and reported to PSCAA.
• December 2013	Surface Emissions monitoring found methane concentration of 835 ppm at the well # A6IW4006.	PSCAA has been notified. Well joint has been fixed and corrected.

Also in 2013, KCSWD filed 7 Deviation Reports: in January, April, May, June, July, November, and December for air intrusion and oxygen-nitrogen exceedances in several monitoring gas probes. KCSWD adjusted the flow rate and the applied vacuum to control the air intrusion and the oxygen-nitrogen exceedances and prevented these deviations to result in violations, as listed below.

Month	Deviation	Preventative Measures Taken
• January 2013	Oxygen concentration exceeded 5% in well # A6IW4005.	Flow rate was adjusted down to control for air infiltration.
• April 2013	Oxygen concentration exceeded 5% in well # A6IW4005	Flow rate was adjusted down to control for air infiltration.
• May 2013	Oxygen concentrations exceeded 5% for the following wells: A6IW4006, A7L0201E, A7L0202E, A7L0202W	Flow rate was adjusted down to control for air infiltration.
• June 2013	Oxygen concentrations exceeded 5% in well# A6IW4004	Flow rate was adjusted down to control for air infiltration.
• July 2013	Oxygen concentrations exceeded 5% in the following wells: CHE00066, CHE00E1A, CHE GL SE 1, CH E GL SE 2, CH E GL SE 4, and A6IW4005	Flow rate was adjusted down to control for air infiltration.
• November 2013	Oxygen concentrations exceeded 5% in the wells# A6IW4005 and A6L1201E.	Flow rate was adjusted down to control for air infiltration.

Month	Deviation	Preventative Measures Taken
<ul style="list-style-type: none"> December 2013 	Oxygen concentrations exceeded 5% in the well# A6IW4006	Flow rate was adjusted down to control for air infiltration.

Beginning on March 9, 2011, Puget Sound Clean Air Agency granted King County an exception for wells 9S and 9N in Area 5 to be operated above the limit of 131°F. This allowed for increased gas extraction in Area 5. Below are the instances that these the 9S well was operated above 131°F. These instances are not considered deviations.

Month	Instance	Preventative Measures Taken
<ul style="list-style-type: none"> April 2013 	Temperature exceeded 131°F in 1 instance in Well A5E00H9S.	Well monitored daily, with particular attention to temperature as well as carbon monoxide (CO) readings in accordance with the exception granted by PSCAA.
<ul style="list-style-type: none"> July 2013 	Temperature exceeded 131°F in 1 instance in Well A5E00H9S	Well monitored daily, with particular attention to temperature as well as carbon monoxide (CO) readings in accordance with the exception granted by PSCAA.
<ul style="list-style-type: none"> December 2013 	Temperature exceeded 131°F in 1 instance in well A5E00H9S.	Well monitored daily, with particular attention to temperature as well as carbon monoxide (CO) readings in accordance with the exception granted by PSCAA.

8.2 - Evaluation of Surface and Groundwater Monitoring Data

8.2.1 - Surface Water Monitoring Data

The CHRLF operates under the Industrial Stormwater General Permit (ISWGP) number WAR000756. Three discharge points are monitored in compliance with the ISWGP. These points are SW-N4 to the north, SW- GS1 in the south, and SW- SL3 along 228th Avenue SE.

Under the ISWGP, quarterly sampling is required for the following 12 parameters: BOD₅, total suspended solids, ammonia (total as N), alpha terpineol, benzoic acid, p-Cresol (4-methylphenol), phenol, zinc (total), pH, turbidity, copper (total), and oil sheen. Actual monitoring includes quarterly monitoring for these analytes at these three locations, as well as monthly monitoring for additional analytes at all locations. Field and analytical surface water data is included in Appendix IV of Attachment D.

Monitoring Station SW-N4 monitors discharges to Issaquah Creek. There were two exceedances of the ISWGP at SW-N4 in 2013, pH exceeded the monthly average in March and zinc exceeded the benchmark and daily limit in June.

Monitoring Station SW-SL3 monitors discharges to a series of roadside ditches that discharge to the Cedar River. Most of the storm water infiltrates along Cedar Grove Road. There were no exceedances of the ISWGP at SW-SL3 in 2013.

Monitoring Station SW–GS1 monitors discharges to a designated King County wetland with palustrine forested, palustrine open water, and palustrine emergent wetland classes. The wetland does not discharge to any fresh waters of the State nor does it contain key aquatic life uses. Exceedances of the ISWGP at SW-GS1 were for the turbidity benchmark in April and November and the monthly average for total suspended solids during November. Exceedances of the ISWGP for 2012 are listed in Table 6 below.

Table 6 – SUMMARY OF SURFACE WATER QUALITY CRITERIA EXCEEDANCES

Parameter	Units	Sampling Location	Sample Date(s)	Value	Regulatory Limit	Regulation
pH	Std. Units	SW-N4	3/19/2013	5.65	6.0 – 9.0 (monthly average)	ISGP
TSS	(mg/L)	SW-GS1	November	30.8*	27 (monthly average)	ISGP
Turbidity	NTU	SW-GS1	4/18/2013	27.2	25 (Benchmark)	ISGP
		SW-GS1	11/14/2013	62.5	25 (Benchmark)	ISGP
Zinc	µg/L	SW-N4	6/25/2013	322	200 (Daily Limit) 117 (Benchmark)	ISGP
ISWGP = Industrial Stormwater General Permit						
* Grab Sample, not averaged						

8.2.2 - Groundwater Monitoring Data

Groundwater at the Cedar Hills Regional Landfill occurs both in a regional aquifer and in perched zones. Aquifer recharge is entirely by precipitation. There are no seasonal variations in horizontal groundwater flow paths. Vertical hydraulic gradients are found in areas of high recharge and transmissive aquifer materials. The Regional Aquifer is the first continuously saturated zone beneath the landfill and serves as the earliest path for detection monitoring. Groundwater flowing onto the CHRLF site is of a highly variable character spatially and temporally.

Additional hydrogeologic characterization has been completed to further delineate regional aquifer flow and to refine and streamline the detection monitoring network to ensure adequacy and eliminate redundancy.

The primary recharge area for the regional aquifer is immediately across the south property line. Flow is radial from this center such that the flow across the south property line is oriented south to north. Flow moves northward under the property footprint. As the flow approaches the north third of the landfill property, recharge from the McDonald Creek drainage begins to influence the flow and the flow direction changes to the NE where flow lines converge and the gradient increases. This results in a convergent effect which concentrates flow into a relatively narrow corridor. The influence of McDonald Creek creates a localized flow path from west to east beneath the north portion of the property.

The groundwater data evaluation presented in Attachment D describes onsite groundwater flow (elevations, direction and velocity) and groundwater quality. Variations in chemical concentrations over time, and possible impacts to groundwater quality by surface activities are also presented.

Upgradient groundwater quality, especially in wells nearest the recharge zone, is profoundly affected by conditions and activities that have occurred on the adjoining Queen City Farms site. Groundwater CHRLF wells on the property border are impacted by chlorinated volatile organic compounds (CVOCs) from the Queen City Farms site. Presence of these contaminants and their migration is well documented in Attachment D and elsewhere. Data indicate that the CHRLF is acting as an attenuation zone for up-gradient CVOC impacts from the Queen City Farms site, reducing concentrations along the groundwater flow path.

Flow further downgradient under the CHRLF footprint and immediately downgradient of waste cells is influenced by landfill gas (LFG) in the unsaturated strata. This influence has altered water quality measurably. The presence of the LFG in the unsaturated strata is further confirmed as described in section 8.1.1. As flow continues further through the site mixing and attenuation processes return water quality similar to upgradient conditions.

Notably higher concentrations of chloride in the west to east flow paths underlying infrastructure in the north end of the site have decreased in recent samples yet remain elevated relative to other flowpaths. All wells in this vicinity will continue to be monitored and an investigation of conveyance facilities is in planning. As flow converges in the northeast, mixing and attenuation processes return water quality similar to upgradient conditions

Analytes exceeding State Groundwater Criteria (WAC 173-200-040 Table 1) and regularly detected in up-gradient wells include arsenic, and the chlorinated volatile organic compounds (CVOC) trichloroethene and vinyl chloride. Arsenic is also regularly detected in down-gradient samples; however, trichloroethene and vinyl chloride are not.

Additional analytes exceeding secondary standards are iron and manganese and pH. Secondary standards are non-mandatory Federal guidelines regarding aesthetic (taste, odor, or color) or cosmetic (causing tooth or skin discoloration) effects. Exceedances of these secondary standards occurred in both upgradient and downgradient wells. Exceedances are reported in quarterly reports.

Impacts from past landfilling practices have previously been recognized in several wells in the East Main Hill Perched Zone (MW-30A and MW-47) and the South Solid Waste Area Perched Zone (MW-101). Site improvements and engineered facilities have been effective in moderating some of the impacts to water quality. Trends for most contaminants in these perched zone wells have stabilized with the exception of parameters associated with landfill gas migration in monitoring well MW-47.

Investigations are underway to further evaluate residual perched zone impacts and the integrity and effectiveness of engineered facilities in closed, unlined landfill areas. A consultant to assist

in the investigations was secured in 2013. Specific actions will be identified with the assistance of the consultant and action plans will be submitted to PHSKC and WDOE in 2014.

In general groundwater quality in the regional aquifer leaving the site remains consistent with historical data.

8.3 - Evaluation of Gas Monitoring Data

See Attachment E for LFG probe monitoring data. According to WAC 173-351-200 (4) (a), the concentration of methane gas generated by the facility shall not; exceed 25 percent of the lower explosive limit (LEL) for methane in facility structures (excluding gas control or recovery system components), exceed the LEL for methane at the facility property boundary or beyond, or exceed 100 parts per million (ppm) by volume of methane in off-site structures.

The LFG compliance monitoring probes (LFG migration monitoring probes) are located along the perimeter of the landfill as shown in Attachment E. The rest of the probes are used to monitor LFG levels in the interior of the landfill and for transitional evaluation of LFG collection and extraction-specific facilities.

KCSWD has historically monitored landfill gas on a monthly or quarterly basis for compliance with WAC 173-351. In addition to this compliance monitoring, additional monitoring has occurred at the perimeter and interior probes to provide information to the LFG extraction system operators. All the monitoring data for the year for the perimeter compliance probes is included in Attachment E.

In 2012, corrective actions described in Section 8.1.1 were implemented in response to methane readings greater than the LEL at two west property boundary probes. These corrective actions primarily involved installation of seven LFG extraction wells along the western edge of the landfill area, outside of the liner system. Until the first several wells were installed near the end of January 2012, occasional methane exceedances continued in the two probes. After January 2012, with full operation of seven new extraction wells there were no further exceedances. An effort to test the influence of the wells in March 2012 resulted in an exceedance on western property boundary. Testing was immediately stopped, all wells were reopened and methane concentration decreased within hours. No other exceedances at any perimeter probes have been measured since. Later in 2012 and early 2013, additional borings were completed to assess influence and coverage of the west side extraction efforts. Of the 13 installed wells, eight are connected to active extraction and five are monitored regularly. LFG continues to be extracted from native soils at a low but steady rate and methane concentrations in the wells not connected to extraction is near zero.

Monitoring data collected as a result of the corrective actions in response to the December 7, 2013 pipeline break are discussed in Section 8.1.1.

8.4 - Evaluation of Leachate Monitoring Data and Volumes Generated

8.4.1 - Leachate Volumes

The recorded volumes of leachate discharged from the leachate aeration basins via the Leachate Effluent Pump Station (LEPS) are indicated in Table 7. The actual leachate volume generated within the landfill is not measured directly.

Table 7 – LEACHATE DISCHARGE DATA AND EXCEEDANCES FOR 2012 and 2013

Month	2013 Monthly Flow (million gallons)	2013 Number of Exceedances	2012 Monthly Flow (million gallons)	2012 Number of Exceedances
January	18.7382	0	29.69	0
February	12.6289	0	23.05	0
March	14.0836	0	31.13	0
April	23.8308	0	15.38	0
May	7.7777	0	11.62	0
June	5.6647	0	10.21	0
July	2.5902	0	6.81	0
August	3.6416	0	2.50	0
September	14.2926	0	2.02	0
October	17.975	0	12.36	0
November	14.731	0	27.72	0
December	14.5587	0	31.16	0
Total Discharged	150.513	0	203.65	0
Average. Monthly Discharge	12.54	0	16.97	0

Pursuant to the Industrial Waste Discharge Permit No. 7842-01, the Daily Maximum Discharge rate from the Leachate Effluent Pump Station (LEPS) is 3,500,000 gallons per day (gpd) or 3.5 million gallons per day (MGD). This permit expired on October 25, 2013 and was replaced with Industrial Waste Discharge Permit No. 7842-02 with the Daily Maximum Discharge limit lowered to 2,700,000 gpd. The Permit allows for periodic exceedance of this limit when weather conditions make it necessary. There were no exceedances of either of the permit daily limits in 2013.

8.4.2 - Leachate Monitoring Data

A compilation of leachate monitoring data is included in Appendix IV of Attachment D. There was one violation of the Industrial Wastewater Discharge Permit in 2013 for nickel loading as discussed in Section 8.1.2.

8.5 - Topographical Mapping and Landfill Settlement

See Attachment F for a current topographic map of the site and final grade plan of the active landfill area. Aerial topographic surveys are completed twice per year to enable the computation of the landfill airspace consumption rate and remaining capacity. Airspace utilization factors for the last eight years are summarized in Table 8.

8.5.1 - Area 5

Area 5 is permitted as a 14 lift landfill cell. As of August 10, 2005, lifts 1 through 12 had been completed and lift 13 was partially completed before operations were transitioned to Area 6. Interim cover was constructed over the top surface and settlement monitoring points were established.

8.5.2 - Area 6

Filling operations in Area 6 began on August 10, 2005 and were suspended on August 27, 2010. Area 6 is permitted as a 14 lift landfill cell. Lifts 9 and 10 were filled as a single thirty foot lift. Interim cover was completed in 2012.

8.5.3 - Area 7

Filling operations in Area 7 began on June 17, 2010. It is permitted as a seven lift cell with each lift being thirty feet.

Table 8 – LANDFILL AIRSPACE UTILIZATION FACTORS

Year	Tonnage	Total Airspace Consumed (cy)	Airspace Utilization Short Term Density (AUSTD) (lb/cy)	Average Soil Usage (cy/day)	Average Soil / Tonnage Ratio (cy/ton)	Average Soil / Airspace (cy/cy)
2006	998,871	1,564,508	1,277	486	0.178	0.113
2007	1,010,377	1,454,689	1,389	449	0.162	0.113
2008	930,617	1,270,613	1,465	481	0.189	0.138
2009	867,482	957,538	1,812	506	0.213	0.193
2010	830,909	1,183,488	1,404	507	0.223	0.156
2011	812,684	1,154,946	1,405	350	0.157	0.111
2012	811,270	989,515	1,639	304 ¹	0.137	0.112
2013 ²	610,339	723,105	1687	118	0.153	0.132

Footnote:

1 – Soil usage in 2012 includes estimated tonnage received from Bow Lake Transfer Station construction.

2 – Values for 2013 are for the first 3 quarters only.

The average airspace utilization short term density (AUSTD) over the last seven years was 1484 lb/cy. Operation practice have decreased soil usage over the years due to sustained use of alternative daily cover, rock recovery, improved compaction practices, utilizing 30 foot lifts and settlement. AUSTD decreased due to reduced compaction effort on the first lifts of Area 7, but have since increased. Soil usage decreased further in 2013 due to increased use of tarps for alternative daily cover.

8.5.4 - Settlement

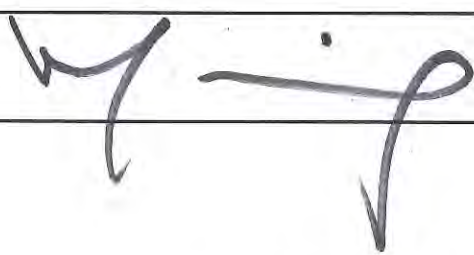
Settlement monitoring at CHRLF was started in 1992 and by 2005 seven monitoring locations had been established. More stations were added in 2007 while others were abandoned as a result of operational impacts. The effective total number of stations is currently nine. The monitoring locations, elevations and settlement data are included in Attachment F.

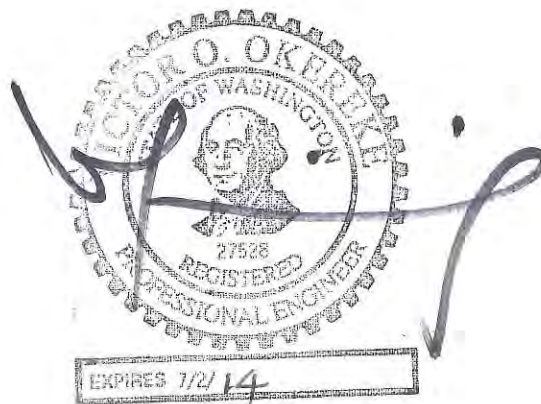
Annual settlement, which is dependent on refuse thickness and time, has varied from 0.22% to 3.79% of the refuse thickness. Total settlement at all stations was variable. The average settlement rate for 2013 was 1.01 ft/yr. It is anticipated that landfill settlement will continue, with older refuse areas settling at a comparatively slower rate than newer refuse areas.

SECTION 9 - CERTIFICATION

Annual Report and Groundwater Evaluation Certification

I certify in accordance with the requirements of WAC 173-351-400(c) (3), that the contents of Attachment D – Groundwater Evaluation of this document were prepared under my direction or supervision under a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Where applicable, some specific and related hydrogeologic portions have been duly certified by the responsible groundwater scientist. Based on my inquiry of the person(s) directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Name: Dr. Victor O. Okereke, P.E., DEE	Title: Manager, Engineering Services	Date: June 26, 2014
Mailing Address: Solid Waste Division Department of Natural Resources & Parks 201 South Jackson Street, Suite 701 Seattle, WA 98104-3855		Telephone Number: 206-477-5231
Signature:  6/26/14		



SECTION 10 - ATTACHMENTS

Attachment A - Remaining Capacity Analysis

Attachment B - Financial Assurance Estimates

Attachment C – Annual Permit Renewal Application
Disposal Fees

Attachment D - Groundwater Data Evaluation

- Appendix I Potentiometric Groundwater Surface Maps and Groundwater Velocity Calculations
- Appendix II Time-Concentration Plots
- Appendix III Trilinear Diagrams and Ion Balance Calculations
- Appendix IV Field and Analytical Data

Attachment E - Landfill Gas Probe Monitoring Program Information

Attachment F - Landfill topography, final grades for Areas 5, 6 and 7, settlement monitoring stations and graphs of settlement data points with lines and best fit curves

Attachment A

Remaining Capacity Analysis

Attachment A

Cedar Hills Regional Landfill Facility Airspace Analysis

Years of Operation	Refuse Area	Volume in Place (Cubic Yards) (except where noted)	Recorded or Projected Tonnage	Notes
1965 – 1986	Main Hill	18,300,000		
Early 1980's	Southeast Pit	525,000		
Mid 1970's	South Solid Waste	405,000		Deducted 120,000 cubic yards excavated in 2003
Subtotal for old unlined Areas		19,230,000	10,167,775	Refuse tonnage only
1986 – 1988	Central Pit	4,000,000		At time of fill
1988 – 1991	Area 2/3	9,150,000		At time of fill
Subtotal for Central Pit & Area 2/3		13,150,000	6,551,465	Refuse tonnage only
1991 – 1999	Area 4 (Closure Reports)	10,154,300	7,541,500	Refuse tonnage only
1999 – Closure	Area 5	8,394,846 ²	600,000 ¹	Projected
2005 – Closure	Area 6	6,767,143 ²	567,613 ¹	Projected
2010 – Closure	Area 7	8,818,887 ²	5,303,557 ¹	Projected
2018 – Closure	Area 8	8,627,500 ³	6,470,625 ¹	Projected
Subtotal for Areas 4, 5, 6, 7 and 8		43,168,939		
Estimated refuse only tonnage capacity for: Areas 5, 6, 7 and 8			12,941,795	
Grand Totals		75,548,939	37,202,535	
1. Estimated remaining tonnage capacity. This is based on a density of 1500 pounds per cubic yard. 2. Total volume capacity after placement of final lift. 3. Estimated capacity.				

Attachment B

Financial Assurance Estimates

2012 Post Closure Maintenance Cost Estimate for Cedar Hills Regional Landfill

This estimate was reviewed for 2013. The review is to identify any changes to assumption, new systems to be maintained, maintenance cost changes unrelated to inflation and other major impacts to the cost estimate. No changes were identified for 2013.

Background

WAC 173-351 requires owners and operators of Municipal Solid Waste Landfills (MSWLF) have a detailed written estimate, in current dollars, of the cost of hiring a third party to conduct post-closure care for the MSWLF unit or all MSWLF units in compliance with the post-closure plan developed under WAC 173-351-500(2).

The Post Closure Maintenance (PCM) estimates have been prepared for Cedar Hills Regional Landfill (CHRLF) for many years. These estimates are prepared based on historical levels of effort required for tasks that will continue through the post closure period and levels of effort required for similar tasks conducted at closed landfills currently maintained by the King County Solid Waste Division (SWD). These estimates are updated annually. The update for 2012 includes a review of the proposed activities and adjusts for activities that have changed based on changes to operation and maintenance practices utilized by SWD.

Purpose

The purpose of this document is to provide the basis for the PCM estimate for 2012. This includes the underlying assumptions and the documented changes from previous years.

Major PCM Elements

All tasks from previous PCM estimates were reviewed to determine that all tasks are still necessary and that all necessary tasks are included. The itemized tasks were reviewed with SWD operations leads and or supervisors.

All tasks were reviewed to determine whether current estimates of levels of effort to complete the task are still current and to determine appropriate level of effort for any new tasks.

The estimate is based on tasks being performed by SWD staff or contractors in the same manner as currently performed. To compensate for the potential that all tasks may be performed by contractors, a project management cost was added to the overall estimate. The underlying assumption is that the cost of performing the work remains constant whether performed by SWD forces or contractors, but SWD would incur increased costs for managing contracts with the contractors.

The cost items in the PCM estimate include:

- Cover Maintenance & General Site Maintenance
 - Vegetation control
 - Geomembrane repair
 - Road maintenance

- Fence Repair
- Litter Control
- Grading
- Well Boot repair
- Leachate System Maintenance
 - Aerator repair and maintenance
 - Pump repair and maintenance
 - Leachate extraction well replacement
 - Periodic line cleaning
 - Air compressor repair and maintenance
- Stormwater System Maintenance
 - Stormwater conveyance system cleaning and maintenance
 - Catch basin cleaning and maintenance
 - Pond cleaning and maintenance
- Landfill Gas System Maintenance
 - Blower repair and maintenance
 - Flare repair and maintenance
 - Stack emissions testing
 - Routine testing and maintenance
- Environmental Monitoring
 - Groundwater and leachate samples
 - Laboratory analysis
- Electrical Utilities
- Permits
 - Operating Permit for Closed Landfill
 - Air Operating Permit
- Wastewater Utility Fees
- Project Management and Reporting
 - Sample collection
 - Data management
 - Reporting
 - Project Management
- Investigation and Remediation
- Project management costs for third party contractor
- Contingency

Key Assumptions for Cost Estimates

Several key assumptions were made regarding the cost estimates. These assumptions are outlined below.

- ❖ The post closure period will be thirty years in length, beginning when the closure is approved by the Seattle King County Department of Public Health.
- ❖ At the time of closure, BEW or equivalent facility will be operating to utilize the landfill gas generated at the site. The facility will have scheduled downtime for maintenance, requiring

use of the flares. The source testing requirement for this minimized use of the flares will be to test all flares once every five years.

- ❖ The closure project at the final closure will leave all systems in full working condition, with no anticipated major repairs.
- ❖ Support facilities and equipment currently located at CHRLF will either be relocated or will be supported through the another funding source..
- ❖ Leachate recirculation is not included in the estimate. It is expected that if leachate recirculation is implemented, this will represent a cost savings.
- ❖ Operating and maintenance costs are included in the hourly rates for equipment.
- ❖ Overhead costs for employees include all costs associated with providing resources for employees to perform their tasks, including supervision.
- ❖ Equipment required to perform tasks is included in task budgets, including pickups for supervisors and leads. Equipment costs are based on federal approved rates, as available and California State approved rates otherwise.
- ❖ The Industrial General Stormwater Permit (IGSWP) will no longer be in effect after closure and no surface water sampling will be required.
- ❖ The estimate is based on tasks being performed by SWD staff or contractors in the same manner as currently performed. To compensate for the potential that all tasks may be performed by contractors, a project management cost was added to the overall estimate. The underlying assumption is that the cost of performing the work remains constant whether performed by SWD forces or contractors, but SWD would incur increased costs for managing contracts with the contractors.
- ❖ Contingency – The contingency included in this estimate includes known unknowns such as responses to changes in groundwater quality or need to address landfill gas in native soil. This contingency assumes there will be one major investigation and remediation project during the thirty year closure period. This activity is projected from years 5 through 10. Additional contingency is included to address the management of the risk that the landfill gas and leachate systems may have a failure requiring extensive repair or replacement and is assumed at 25% of the maintenance cost of the leachate and landfill gas systems.
- ❖ Major cost items that have more uncertainty include a 5-10% estimating contingency. These items are maintenance activities that are currently performed and therefore have reliable cost projections to perform the work, but the frequency that will be required is less certain. Higher contingency is applied to systems that have had more variable maintenance costs.
- ❖ Unknown unknowns are not included in the contingency and are assumed to be covered by management reserves. Examples of potential unknown unknowns include remediation due to Queen City Farms, changes to regulations and natural disasters.

Assumptions specific to the tasks are included in the detail tables that provide the supporting documentation for the estimate.

Summary of Costs

The summary of costs is provided in the table below.

Cedar Hills Regional Landfill Post Closure Maintenance Cost Estimate				
Task Group	<u>Annual Costs</u>	<u>Contingency</u>	<u>Annual Amount</u>	<u>Basis</u>
Cover Maintenance	\$443,042	5%	\$461,833	Based on current estimated hours for PCM; updated wage and benefit rates
Leachate System Maintenance	\$168,046	10%	\$178,844	Based on current estimated hours for PCM; updated wage and benefit rates; reduced aerator repair and replacement to reflect historical; adjusted for reduced leachate production in PCM
Stormwater System Maintenance	\$356,431	5%	\$382,209	Based on current estimated hours for PCM; updated wage and benefit rates
Landfill Gas System Maintenance	\$206,050	10%	\$226,655	Based on current estimated hours for PCM; updated wage and benefit rates; assumes BEW or alternative utilizing all LFG; flares operating intermittently requiring source testing every 5 yrs
Environmental Monitoring	\$143,150	10%	\$144,000	analytical lab, weather station maintenance
Electrical Utilities	\$250,000		\$250,000	Based on current costs
Permits	\$5,000		\$5,000	Based on current permit costs
Project Management and Reporting	\$655,893		\$655,893	Includes project management, field staff for monitoring; database mgmt contract mgmt; field equipment
Project management costs for third party contractor	\$199,135		\$206,949	Assumes contractor can complete labor at same cost as KCSWD; KC assumes 9% cost to manage - contingency is inherent to labor tasks
Wastewater utility	\$250,000		\$250,000	Assume reduced to average of 100 MG per year over the 30 years
Base Estimate	\$2,666,748		\$2,761,382	
Contingency	\$260,191		\$268,041	Contingency based on 25% of leachate & LFG system maintenance plus one \$5M project occurring between years 5 and 10
TOTAL	\$2,926,938		\$3,029,424	

Exclusions

This estimate does not include costs of unknown risks. The risks addressed are identifiable and have some probability of occurring based on experiences at other closed sites. The estimate does not address the potential for the PCM period to extend beyond the minimum thirty years prescribed in the WAC 173-351.

Attachments

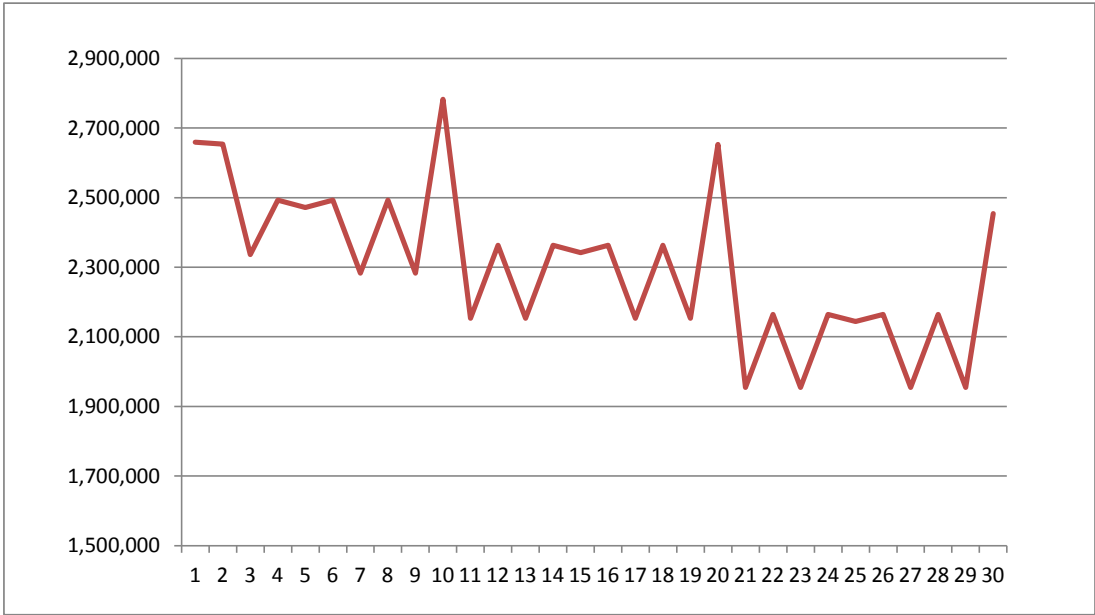
Distribution of Cost by Year
Project Management and Reporting Summary Costs
SWD Labor Costs by Task
Contract Costs by Task
Equipment Costs by Task
Landfill Reserve Fund Cash Flow

DRAFT PCM ESTIMATE FOR CEDAR HILLS REGIONAL LANDFILL

Updated 6/26/2014

Updated by VOO

PCM year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PCM Task Group																
Cover System Maintenance	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528
Leachate System Maintenance	94,111	119,111	94,111	119,111	129,111	119,111	94,111	119,111	94,111	238,111	94,111	119,111	94,111	119,111	129,111	119,111
Stormwater System Maintenance	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622
Landfill Gas System Maintenance	191,495	341,495	191,495	341,495	313,995	341,495	191,495	341,495	191,495	463,995	191,495	341,495	191,495	341,495	313,995	341,495
Environmental Monitoring	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650
Electrical Utilities	331,000	331,000	331,000	331,000	331,000	331,000	331,000	331,000	331,000	331,000	300,000	300,000	300,000	300,000	300,000	300,000
Permits	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Field Engineering	298,700	298,700	298,700	298,700	298,700	298,700	298,700	298,700	298,700	298,700	249,409	249,409	249,409	249,409	249,409	249,409
Project management and Reporting	320,571	320,571	320,571	320,571	320,571	320,571	320,571	320,571	320,571	320,571	271,280	271,280	271,280	271,280	271,280	271,280
Project management costs for third party contractor	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855
Wastewater utility	431,542	216,542	109,042	55,292	55,292	55,292	55,292	55,292	55,292	55,292	55,292	55,292	55,292	55,292	55,292	55,292
SUBTOTAL	2,602,073	2,562,073	2,279,573	2,400,823	2,383,323	2,400,823	2,225,823	2,400,823	2,225,823	2,642,323	2,096,241	2,271,241	2,096,241	2,271,241	2,253,741	2,271,241
Contingency	57,121	92,121	57,121	92,121	88,621	92,121	57,121	92,121	57,121	140,421	57,121	92,121	57,121	92,121	88,621	92,121
TOTAL	2,659,194	2,654,194	2,336,694	2,492,944	2,471,944	2,492,944	2,282,944	2,492,944	2,282,944	2,782,744	2,153,362	2,363,362	2,153,362	2,363,362	2,342,362	2,363,362



DRAFT PCM ESTIMATE FOR CEDAR HILLS REGIONAL LANDFILL

Updated 6/26/2014

Updated by VOO

PCM year	17	18	19	20	21	22	23	24	25	26	27	28	29	30
PCM Task Group														
Cover System														
Maintenance	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528	375,528
Leachate System														
Maintenance	94,111	119,111	94,111	238,111	94,111	119,111	94,111	119,111	129,111	119,111	94,111	119,111	94,111	238,111
Stormwater System														
Maintenance	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622	265,622
Landfill Gas System														
Maintenance	191,495	341,495	191,495	463,995	191,495	341,495	191,495	341,495	313,995	341,495	191,495	341,495	191,495	463,995
Environmental Monitoring	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650	134,650
Electrical Utilities	300,000	300,000	300,000	300,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Permits	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Field Engineering	249,409	249,409	249,409	249,409	200,117	200,117	200,117	200,117	200,117	200,117	200,117	200,117	200,117	200,117
Project management and Reporting	271,280	271,280	271,280	271,280	221,989	221,989	221,989	221,989	221,989	221,989	221,989	221,989	221,989	221,989
Project management costs for third party contractor	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855	153,855
Wastewater utility	55,292	55,292	55,292	55,292	55,292	55,292	55,292	55,292	55,292	55,292	55,292	55,292	55,292	55,292
SUBTOTAL	2,096,241	2,271,241	2,096,241	2,512,741	1,897,658	2,072,658	1,897,658	2,072,658	2,055,158	2,072,658	1,897,658	2,072,658	1,897,658	2,314,158
Contingency	57,121	92,121	57,121	140,421	57,121	92,121	57,121	92,121	88,621	92,121	57,121	92,121	57,121	140,421
TOTAL	2,153,362	2,363,362	2,153,362	2,653,162	1,954,780	2,164,780	1,954,780	2,164,780	2,143,780	2,164,780	1,954,780	2,164,780	1,954,780	2,454,580

Labor Costs by Task

<u>Task</u>	<u>Labor Costs</u>
Access & On Site Road Maintenance	\$11,273.31
Fence Repair & Vegetation Control	\$75,908.06
Litter or Illegal Dumping Pickup	\$2,292.11
Vegetation Control	\$53,297.56
Periodic Line Cleaning	\$60,073.12
Routine Maintenance	\$34,774.99
Stormwater Conveyance System Maintenance	\$86,967.09
Catch Basin and Grate Cleaning	\$19,235.47
Retention Basin Cleaning	\$52,925.51
TOTAL	\$396,747.22

Contract Cost by Task

<u>Task</u>	<u>Annual Cost</u>
Weather Station Maintenance	\$8,500
Grading	\$135,000
Drainage Improvements	\$38,175
Liner Repair	\$5,000
Well Boot Repair	\$7,500
Leachate Well Replacement	\$7,500
Leachate Well Replacement	\$7,500
Annual Pump Repair	\$12,500
Major Pump Replacement	\$7,000
Annual Aerator Repair	\$0
Aerator Replacement	\$12,500
Air Compressor Overhaul	\$900
Major Blower and Motor Replace	\$12,000
Flare Rehabilitation	\$100,000
Actuator Valve Replacement	\$1,000
Well Replacement	\$7,500
Stack Emissions Testing	\$16,000
	\$378,575

Equipment Costs By Task

<u>Task</u>	<u>Amount</u>
Access & On Site Road Maintenance	\$19,232
Fence Repair & Vegetation Control	\$85,350
Litter or Illegal Dumping Pickup	\$835
Vegetation Control	\$13,920
Periodic Line Cleaning	\$8,700
Routine Maintenance	\$16,318
Stormwater Conveyance System Maintenance	\$26,959
Catch Basin and Grate Cleaning	\$12,242
Retention Basin Cleaning	\$28,350
 TOTAL	 \$211,905

Attachment C

Application for Annual Permit Renewal Disposal Fees

Disposal Fees - King County Solid Waste Division

(Effective January 1, 2013.)

Disposal Fees	Basic Fee	Moderate Risk Waste Surcharge	WA State Refuse Tax (3.6%)	Total ¹
Per-ton fee	\$120.17	\$4.731	\$4.50	\$129.40
Minimum fee	\$19.43	\$1.81	\$0.75	\$22.00
Charitable organizations (To qualify, organizations must meet criteria in K.C.C. 10.04.020)				
Per-ton fee	\$92.55	\$4.73	\$3.50	\$100.78
Minimum fee	\$15.08	\$1.81	\$0.61	\$17.50
Special Waste Fees				
Per-ton fee	\$145.00	N/A	\$5.22	\$150.22
Minimum fee	\$23.20	N/A	\$0.84	\$24.04
Asbestos per-ton fee	\$175.00	N/A	\$6.30	\$181.30
Asbestos min. fee	\$28.00	N/A	\$1.01	\$29.01
Recycling Fees	Basic Fee		Total	
Appliances for recycling – limit three/load. No commercial appliances. Bow Lake, Enumclaw, Shoreline and Vashon only.				
Appliances w/refrigerant	\$30.00		\$30.00	
Other major appliances	\$10.00		\$10.00	
Clean wood for recycling Bow Lake, Enumclaw and Shoreline only.				
Per ton fee	\$75.00		\$75.00	
Minimum fee	\$12.00		\$12.00	
Electronics for recycling (CD, DVD & VCR players only) – limit ten/load Shoreline only				
CD, DVD & VCR players	\$5.00 each		\$5.00 each	
Fluorescent bulbs and tubes for recycling – Limit twelve of each type /load				
Bulbs or tubes	\$0.80 each		\$0.80 each	
Yard Waste for recycling Bow Lake, Cedar Falls, Enumclaw and Shoreline only.				
Per ton fee	\$75.00		\$75.00	
Minimum fee	\$12.00		\$12.00	
Unsecured Load Fee - \$25.00				

Disposal Fees - King County Solid Waste Division

Additional Information:

- **Garbage loads:** The minimum fee covers the first 320 pounds. Passenger cars are charged a per entry fee of \$22.00. All other vehicles, including station wagons, vans, mini-vans, pickup trucks, recreational vehicles, all-terrain vehicles, and sports utility vehicles are charged for the actual weight disposed, based on the per-ton fee.
- **Yard waste or clean wood loads for recycling:** The minimum fee covers the first 320 pounds. Passenger cars are charged a per entry fee of \$12.00. All other vehicles, including station wagons, vans, mini-vans, pickup trucks, recreational vehicles, all-terrain vehicles, and sports utility vehicles are charged for the actual weight disposed, based on the per-ton fee. Materials must be separated for recycling before arriving at the station.
- **Unsecured loads:** K.C.C. 10.12.040 requires a fee to be charged to all vehicles with unsecured loads arriving at any transfer station or landfill in King County. State law (RCW 46.61.655) requires loads to be secured on every street, road or highway in the state. An unsecured load is a load of solid waste that has not been secured with tarps, rope, straps, netting or chains to prevent the covering or any part of the load from becoming loose, detached or leaving the vehicle while the vehicle is moving. Gravity, speed and weight are not load-securing devices.