SOLID WASTE ADVISORY COMMITTEE
Discussion Form
April 15, 2024

AGENDA ITEM 7: Landfill Monitoring and Maintenance

PRESENTER: Jeff Hegedus, Solid Waste Division Manager

BOARD ACTION: **Action Item** **Discussion** **☑ Information**

SIGNIFICANT POINTS OR EXECUTIVE SUMMARY

On April 2, 2024 SCS Engineers was awarded the contract for provision of continued landfill monitoring and maintenance services at the Coupeville solid waste landfill, as currently required by WAC 173-304. These requirements include financial assurance provision of approximately $2M and professional services of $160K annually. As part of this process, Island County will begin to assess the degree to which the landfill may be 'stabilizing,' and therefore the potential for elimination or reduction of requirements.

COMMITTEE ROLE / ACTION REQUESTED

ATTACHMENT(S)

- Preparing for Termination of Post-Closure Activities at Landfills
- 2023 Annual Landfill Monitoring Report

Addendum to

"Preparing for Termination of Post-Closure Activities at Landfills Closed Under Chapter 173-304 WAC"

Prepared August 2012, Revised January 2013

Landfill Owners, Operators and Jurisdictional Health Authorities:

In February 2011, the Department of Ecology (Ecology) published "Preparing for Termination of Post-Closure Activities at Landfills Closed Under Chapter 173-304 WAC" (Publication No. 11-07-006). That document provides Ecology's recommendations on information a landfill owner or operator could submit to make a case for ending post-closure care. This document provides more detail on the technical information expectations.

As required by WAC 173-304-407(8)(b and c), to end post-closure care, an owner/operator and professional engineer need to demonstrate that a landfill is stable by showing there is little or no settlement, gas production or leachate generation. This document attempts to answer the questions:

1. How should a facility measure settlement to show there is "little or no" settlement?
2. How should a facility monitor landfill gas to show there is "little or no" gas production?
3. How should a facility measure leachate to show there is "little or no" leachate generation?

Settlement

Ideally, an owner/operator will have surveyed a landfill's cap a few times through the post-closure period in order to show settlement has minimized. If such data does not exist, Ecology recommends an owner/operator conduct at least two benchmark surveys at least two years apart. When surveying, an owner/operator should:

- Use survey points from fixed points on the closure cap. An owner/operator should use permanent markers, such as a rod of rebar, to denote survey points – taking care not to punch holes through anti-infiltration layers or geomembranes.
- Measure one point for every 20,000 square feet and additional points to cover anomalies such as dead vegetation or depressions.
- Use equipment that is precise to within ½ inch.

A landfill is experiencing little or no settlement if:

- It has a uniform slope between 2% and 33% and generally maintains design slopes.
- Site inspections show no evidence of differential settlement.
- The settlement trend curve approaches a zero slope.
- Uniform settlement is less than ½ inch over a two-year period.

An owner/operator should submit information on:

- ✓ Type of survey.
- ✓ Images showing the location and number of survey points.
- ✓ Survey point markers used.
- ✓ Measuring equipment used, including its precision and accuracy.
- ✓ Dates and results of surveys.
- ✓ Trend curves.
- ✓ An explanation by the owner/operator and a professional engineer licensed in the state of Washington of how data shows the landfill is experiencing little or no settlement as described above.

After Post-Closure

Under Chapter 173-304 WAC, a facility no longer requires a solid waste permit when the solid waste permitting agency authorizes discontinuing post-closure activities. The operator should have recorded the presence of a landfill on the property with the county auditor at the time of closure. Requirements for recording are in Section 173-304-406(6):

> *"Maps and a statement of fact concerning the location of the disposal site shall be recorded as part of the deed with the county auditor not later than three months after closure. Records and plans specifying solid waste amounts, location and periods of operation shall be submitted to the local zoning authority or the authority with jurisdiction over land use and be made available for inspection."*

The solid waste permitting agency should ensure the operator makes that recording before conclusion of post-closure activities.

While there is no requirement for an operator to provide additional care of a facility after authorized by the permitting agency to end post-closure, the operator is still responsible to ensure the property remains in compliance with all applicable local and state requirements.

Landfill Gas

Ecology recommends an owner/operator measure landfill gas at a frequency approved in the post-closure plan at vents within the landfill, perimeter monitoring probes, vaults and enclosed spaces, and at landfill surfaces where plants are stressed or absent. When measuring gas, an owner/operator should:

- Use equipment that can measure to 0.1% methane.
- Calibrate and warm up equipment according to manufacturer instructions prior to each monitoring event.
- Close holes or cracks in vent pipes to prevent air intrusion and place probe far enough into vent pipes to avoid ambient air dilution (three or more feet of probe length should be fine).
- Monitor for a long enough time to remove air from equipment and get a stable reading, sometimes described in manufacturer instructions.
- Measure concentrations during periods of steady or falling barometric pressure to ensure gas is exiting the landfill.

A landfill is experiencing little or no gas production if:

- Gas concentrations at all monitoring points are below regulatory limits for the last eight consecutive sampling events, including:
  - On-site structures: 25% LEL (for methane, 25% LEL is 1.25% by volume)
  - Off-site structures, if applicable: 100 ppm methane
  - Property boundary: 100% LEL (for methane, 100% LEL is 5% by volume)
- Gas concentrations in vent pipes during periods of steady or falling barometric pressure are below 25% LEL for methane for the last eight consecutive sampling events
- Analysis of data shows statistically significant steady or declining trends in concentration.
- There are no ongoing requirements from the air permit authority beyond solid waste requirements.

There are situations where gas production is over 25% LEL at gas vent pipes, but a landfill otherwise appears to be stable. WAC 173-304 allows variances from rule requirements when "solid waste handling practices or location do not endanger public health, safety or the environment" and when compliance "would produce hardship without equal or greater benefit to the public." A variance from showing a facility meets the standard of little or no gas production may be appropriate. In such circumstances, Ecology recommends that the owner/operator place access controls and use restrictions on the property through an environmental covenant and submit proposed language in a variance request. WAC 173-304 places no restrictions on use of the property once a jurisdictional health department approves the ending of post-closure care so it is appropriate to prevent human contact if there is ongoing production of landfill gas.

An owner/operator should submit information on:

- ✓ Monitoring procedures, including equipment used and its precision, calibration procedure and frequency, equipment warm-up, placement of probe at each type of monitoring location and duration of measurements.
- ✓ Dates, times and the percent of explosive gases (i.e. methane) measured at each location.
- ✓ Barometric pressure with trend (rising, steady or falling) at the time of measurement. Go to weatherspark.com, or others, for this information. Specify source of pressure data.
- ✓ Statistically significant trend data.
- ✓ An explanation by the owner/operator and a professional engineer licensed in the state of Washington of how data shows the landfill is experiencing little or no gas production as described above.

Leachate Generation

Ecology recommends an owner/operator measure and complete statistical analyses on leachate or groundwater samples as described in approved sampling and analysis, quality assurance or post-closure plans. An owner/operator may show that a landfill is producing little or no leachate in many ways, depending on whether they collect leachate, discharge leachate, monitor lysimeters or monitor groundwater.

A landfill is experiencing little or no leachate production if:

- For landfills with leachate lagoons, volumes of liquids have reduced over time (at least two years of regular volume measurements) or accumulated liquids are primarily the result of precipitation falling on lagoons. Landfills that produce a slightly higher volume than would be expected from precipitation alone, but that evaporate naturally (no control equipment), may also be considered to be producing little leachate.
- For landfills linked with a discharge permit, the discharge permit authority no longer requires a discharge permit.
- For landfills with lysimeters, there have been no measurable amounts of liquid accumulation over the last two years of regular monitoring.
- For landfills with groundwater monitoring, there have been no recent or ongoing exceedances of Chapter 173-200 WAC criteria for parameters specified in approved post-closure plans from at least semi-annual groundwater monitoring. In addition, through statistical analyses, trend slopes have been zero or less over a statistically significant period (generally the latest eight consecutive sampling events) and groundwater data does not show other signs of potential negative landfill impacts. Generally, Ecology will not support ending post-closure care for any landfill with existing groundwater contamination. (Information regarding methods of analyses is available in "*Guidance for Groundwater Monitoring at Landfills and Other Facilities Regulated under Chapters 173-304, 173-306, 173-350 and 173-351 WAC*" available at https://fortress.wa.gov/ecy/publications/publications/1207072.pdf.)

An owner/operator should submit information on:

- ✓ Monitoring procedures, including equipment and measuring tools used.
- ✓ Dates and results of monitoring events.
- ✓ For landfills linked with discharge permits, information from the discharge permit authority that shows a discharge permit is no longer required.
- ✓ For groundwater monitoring, comparisons with Chapter 173-200 WAC criteria, statistical trend analyses, comparisons of upgradient and downgradient water quality data, and a discussion of any potential groundwater contamination.
- ✓ An explanation by the owner/operator and a professional engineer licensed in the state of Washington of how data shows the landfill is experiencing little or no leachate production as described above.

If you have questions about the above recommendations, please call your regional Ecology Waste 2 Resources Program staff. They would be happy to answer any questions or work with you on alternative ways to show stability if the above information is difficult or impossible to obtain.

2023 Annual Monitoring Report

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This 2023 Annual Monitoring Report for the Coupeville Solid Waste Facility located at 20062 State Route 20 in Coupeville, Washington, was prepared by Jovany Estrada and Daniel Venchiarutti, LHG and was reviewed by Greg Helland, LHG, of SCS Engineers.

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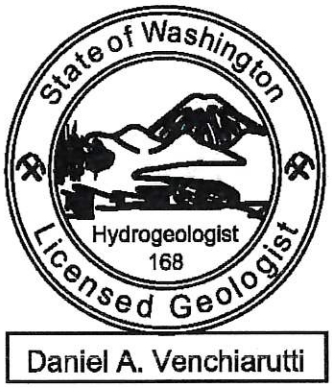

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1.0 INTRODUCTION

This Annual Report provides a summary of the field and laboratory results for the 2023 post-closure environmental monitoring activities conducted at the Island County Coupeville Solid Waste Facility (CSWF) located at 20062 State Route 20 in Coupeville, Washington. Environmental monitoring activities completed over the 2023 reporting period included sampling and analysis of groundwater (monitoring wells and nearby water supply wells), monitoring of landfill gas (LFG) probes, and source control operations including stormwater collection and LFG well management. This work was conducted in accordance with the *CSWF Groundwater Sampling and Analysis/Quality Assurance Plan* (SAP/QAP, version 1.1) dated April 2018 and the *Landfill Gas Monitoring Plan* dated September 2002, modified in 2005 and 2008 (SCS Engineers).

Post-closure groundwater monitoring is performed at the CSWF, consistent with the requirements of WAC 173-304. In 2017, the CSWF proposed a groundwater monitoring optimization program intended to enhance the effectiveness of the sampling regime. The updated monitoring program provides for quarterly water quality sampling at 11 CSWF groundwater wells. An additional 16 monitoring wells are also sampled on a semi-annual basis (during the second and fourth quarter events). The updated program is documented in the 2018 CSWF SAP/QAP (revision 1.1).

Due to administrative constraints, Island County suspended CSWF compliance monitoring for the first quarter 2023. Over the remaining compliance year, 27 groundwater wells were monitored the second and fourth quarters of 2023, while 11 groundwater wells were monitored during the third quarter event. The environmental monitoring and sampling activities during 2023 were performed by SCS Engineers and SCS Field Services.

1.1 REPORT CONTENTS

The 2023 Annual Monitoring Report includes and describes:

- Background and site description (including figures of site location and facility layout).
- A summary of the 2023 monitoring effort.
- Measurement of groundwater levels at the sampled monitoring wells.
- LFG monitoring at
  - 10 subsurface perimeter probe locations (44 points) and
  - 2 probe locations within onsite buildings (two points within the scale house/office).
- Groundwater field measurements and sample collection for monitoring and water supply wells.
- An evaluation and summary of the 2023 groundwater elevation/flow direction, field monitoring, and analytical data.
- A summary of the 2023 LFG monitoring results.
- A summary of the contaminant source control operation results.
- A comparison and summary of 2023 analytical data to regulatory criteria.
- A geochemical evaluation of recent (2023) groundwater conditions.

- A summary of historical (previous 5 years) groundwater elevation, field monitoring, and analytical data.
- Groundwater hydrographs.
- Times series graphs for select analytes.
- Short and long term groundwater statistics.
- Documentation of field monitoring and sampling activities from 2023.
- A summary of analytical data validation and analytical laboratory data reports.
- Recommendations developed from the evaluation of site conditions.

1.2 SUMMARY OF RESULTS

1.2.1 Groundwater

Groundwater monitoring results reported for the CSWF over the 2023 compliance year remain generally consistent with those previously observed at the site. Water quality within or immediately adjacent to the closed waste disposal areas continues to be influenced by detectable concentrations of several volatile organic compounds (VOCs, primarily vinyl chloride), as well as certain inorganic compounds, general chemistry parameters, and field parameters. However, natural attenuation of the groundwater contamination observed at the CSWF continues, with reduced concentrations of the primary landfill contaminants in monitoring wells situated 400 to 750 feet downgradient of the disposal areas.

Vinyl chloride is the most notable site contaminant at the CSWF, with groundwater exceedances being historically reported as far downgradient as monitoring wells E4S/E4D (approximately 400 feet northeast from the landfill edge). However, during recent years vinyl chloride has typically been absent in the CSWF wells situated beyond the immediate vicinity of the landfill. Groundwater samples collected from Aquifer 2 "sentinel" wells E9D and E10D, situated hydrologically downgradient of the observed vinyl chloride plume, have never reported detectable levels of VOCs (with the exception of three suspected laboratory artifact results that were reported during the First Quarter 2021 monitoring event). Overall, the 2023 monitoring results continue to corroborate the findings of past groundwater assessment and modeling efforts which concluded that VOCs originating from the CSWF disposal cells are naturally attenuating beneath the facility, and that vinyl chloride has not, and will not in the future, migrate beyond County property.

Groundwater quality criteria for specific conductivity, total dissolved solids, total nitrate/nitrite, arsenic, iron, manganese and vinyl chloride were exceeded in one or more wells during 2023. The WAC 173-200 groundwater criteria for vinyl chloride was exceeded in four Aquifer 1 monitoring wells (E1D, E2S, E6D and N2S) and two Aquifer 2 well (E2D and E6D) during the reporting year. These results are consistent with past monitoring at the facility. However, it is notable that vinyl chloride was not detected in near-refuse well E7D during the reporting year.

Landfill closure and source control activities continue to influence most temporal trends in chemical concentrations (both long term and short term, as identified by the statistical summaries and time series plots). Observed trends generally indicate that concentrations of the primary groundwater contaminants of concern (iron, manganese and vinyl chloride) are stabilized or have been gradually decreasing over the past several years. An increasing short term concentration trend was observed for specific conductivity in Aquifer 2 well E6D. However, as illustrated on the time-series graphs

provided in Appendix C, this short term increasing trend does not represent a large concentration change.

Groundwater elevations at the site have been stable or gradually increasing over the past five years. The groundwater flow directions within Aquifer 1 and Aquifer 2 remain consistently towards the east-northeast and north-northeast, respectively. The average groundwater flow velocity over 2023 in Aquifer 1 was estimated to be higher (1.21 ft/day) than that calculated for Aquifer 2 (0.112 ft/day).

1.2.2 Landfill Gas Probes

LFG monitoring was conducted at approximately 45-day intervals between April and December 2023. LFG probe monitoring results continue to indicate that LFG (represented by combined methane and carbon dioxide) remains present in the soils surrounding the landfill. Similar to past compliance years, carbon dioxide was the predominant component of LFG detected over the 2023 compliance period. Depressed oxygen levels (less than ambient concentrations) were also reported in most of the gas probes during the year. Depressed oxygen is associated with the displacement of air by LFG.

LFG regulatory requirements only apply to the methane component due to its explosive and flammable nature. Throughout the 2023 monitoring period, the CSWF remained in compliance with the regulatory threshold limits for methane in soils at the property boundary (less the 5 percent by volume) and inside of onsite structures (less than 1.25 percent by volume).

1.2.3 Contaminant Source Control Operations

Engineering controls aimed at reducing the source of contaminants to groundwater were implemented at the CSWF in 2005. These controls included stormwater collection from an upgraded drainage system at the interface of the municipal solid waste (MSW) and construction, demolition and land-clearing (CDL) debris fill areas. The stormwater drainage and collection system was designed to reduce infiltration into the CDL wastes and limit the potential production of leachate. The engineering controls also included an enhanced LFG control system featuring improved gas extraction from the refuse mass by adding vertical extraction wells, and the addition of a soil vapor extraction (SVE) system to recover LFG from the vadose zone surrounding the landfill.

A total of 11,833 gallons of stormwater runoff from the closed MSW landfill and CDL landfill covers was pumped from the collection system sump near monitoring well C1S during 2023 and discharged to the infiltration pond west of the disposal areas. Cumulatively, a total of 322,343 gallons of stormwater have been diverted from this area since the fall of 2005. This stormwater previously infiltrated into the subsurface near the CDL disposal area and may have contributed to leachate generation from the CDL waste.

Between November 22, 2005 and December 27, 2023, the LFG extraction system operated an average of 4.90 hours per day and the SVE system operated an average of 9.50 hours per day. These operational times are managed to balance extraction rates with the gas generation rate. The existing LFG extraction system operations continue to remain effective for controlling LFG generated within the refuse mass, thereby providing source control of LFG migration to the vadose zone. Similarly, the SVE system appears to be successful in extracting LFG from the surrounding vadose zone, thereby providing an additional measure of source control for potential groundwater contaminants.

2.0 BACKGROUND AND SITE DESCRIPTION

Detailed information regarding the site layout and history as well as the hydrogeologic setting may be found in the *Preliminary Hydrogeologic Study and Engineering Evaluation*, prepared by SCS Engineers (January, 2002), as well as the *Conceptual Model Summary Technical Memorandum*, also prepared by SCS Engineers (January, 2004). The following provides a summary of this information.

2.1 LOCATION AND OPERATIONAL HISTORY

The CSWF is located at 20062 SR-20, approximately 1.5 miles east of Coupeville, on Whidbey Island, Washington (Figure 1). The landfill-related features of the CSWF include two closed MSW disposal areas and one closed CDL debris disposal area. These waste disposal areas are referred to as follows:

- City MSW Landfill (1946 - 1977)
- County MSW Landfill (1971 - 1992)
- County CDL Landfill (1992 - 2002)

The City MSW Landfill was operated (by the Town of Coupeville) as a burning dump from 1946 to 1969 and as a landfill from 1969 to 1977. It occupies approximately 3 acres on the west side of the property. The depth of waste is estimated to be 10 to 20 feet deep based on typical waste disposal practices from that time period. Waste disposal quantities for the City MSW Landfill are not available. The City MSW Landfill has no liner system and the cover system consists of native soils with grass vegetation.

The County MSW Landfill operated from 1971 to 1992. It occupies approximately 11 acres on the south side of the property. The depth of waste is estimated to be 20 feet deep on the west half of the fill area and approximately 50 feet deep on the east half based on historical waste disposal practices and the preceding mining (quarry) activities. The County MSW Landfill has no bottom liner system. The cover system for the County MSW Landfill consists of the following from top to bottom: grass vegetation, 6 inches of topsoil, 18 inches of drainage sand, composite 8 oz/yd2 non-woven geotextile / 250 mil HDPE drainage net /8 oz/yd2 non-woven geotextile, 60 mil HDPE textured geomembrane, and 18 inches of foundation sand.

The County CDL Landfill operated from 1992 to 2002. It occupies approximately 4 acres immediately adjacent to the north side of the County MSW Landfill. A portion of the County CDL Landfill overlaps the north side of the County MSW Landfill. Waste is estimated to be up to 40 feet deep based on historical filling activities. The County CDL Landfill has no liner system and has a soil cover consisting of 12 inches of native soil (installed in 2002) and 12 inches of soil with high clay content (installed in 2004). The CDL Landfill accepted inert materials including uncontaminated soils, brick, concrete, sand, and glass, as well as other construction and land clearing debris, including some organic materials such as wood. Past inspections by Island County Public Health (ICPH) suggested that small quantities of unacceptable materials may have been disposed of at the CDL Landfill.

The CSWF also includes an asbestos landfill situated in the north-central portion of the disposal area. In addition to landfilling, other features of the CSWF include a transfer station, a moderate risk waste handling station, a recycling collection area, a septage biosolids treatment plant, and various county storage facilities. During 2018, an extensive expansion of the CSWF biosolids treatment facility was completed. All of the CSWF facilities are situated on approximately 90 acres of land

owned by the County. A site plan illustrating the general layout of the facility is presented on Figure 2.

2.2 TOPOGRAPHY AND CLIMATE

The site is situated on a wooded terrace, approximately one mile south of Penn Cove. Although the ground surface comprising the developed areas of the property remains level, the site lies in the vicinity of several large glacial kettle depressions. The elevation of the facility is approximately 200 feet above mean sea level.

Site climate is characterized by cool, moist winters and dry, warm summers which are characteristic of the Puget Sound Lowlands. Temperature extremes are moderate due to maritime influences from the adjacent Puget Sound, Strait of Juan de Fuca, and nearby Pacific Ocean. Precipitation is typically less than most areas in the Puget Sound region due to the site's location relative to the leeward side of the Olympic Mountains, which generate a rain shadow effect. The site receives an average annual rainfall of just over 21 inches, according to historical records.

2.3 LOCAL AND REGIONAL HYDROGEOLOGY

The Preliminary Hydrogeologic Study and Engineering Evaluation completed by SCS (January, 2002) identified two primary water-bearing zones and two confining (or semi-confining) layers beneath the CSWF. Regionally, groundwater flow in the upper aquifer (Aquifer 1) is reported to generally trend toward the east-northeast. Groundwater in the underlying aquifer (Aquifer 2) appears to flow in a more north-northeasterly direction. South of the site, the regional groundwater flow direction has a southeasterly component. Groundwater flow beneath the site likely has a vertical component, with water moving from shallowest to deepest zones across the semi-confining layers. The difference in hydraulic head between the upper and lower aquifers beneath the site is reported to be approximately 12 feet.

3.0 GROUNDWATER

Quarterly groundwater monitoring at the Island County Solid Waste Facility commenced in 1985. Groundwater monitoring has included both monitoring wells (constructed specifically for groundwater monitoring) and nearby small-scale water supply (pumping) wells. Since its inception, the monitoring program has evolved to include both onsite and off-site well locations, as well as an expanded parameter suite. As previously noted, an optimized groundwater monitoring program was implemented at the CSWF during the first quarter 2018. Groundwater monitoring wells on the CSWF property are outfitted with dedicated low-flow sampling pumps.

The current groundwater monitoring network includes ten locations with paired shallow and deep monitoring wells, 11 single completion monitoring wells (three shallow, eight deep), and five water supply wells. Well W1D remains in the groundwater monitoring network, but paired shallow monitoring well (W1S) is not currently being monitored due to an insufficient amount of water in the well for sampling. Replacement well N1SR also remains in the groundwater monitoring network, although this well appears to be completed in a perched zone which may not be hydraulically connected (at least directly) with the groundwater monitored by other wells at the site. A summary of the CSWF Aquifer 1, Aquifer 2 and pumping wells (and their installation dates) is provided in the exhibit below. The locations of the wells within the monitoring network are also illustrated on Figure 2.

Exhibit 1. CSWF Groundwater Monitoring Well Network (Installation Year)

Aquifer 1 Wells	Aquifer 2 Wells	Pumping Wells
C1S (2002)	E2D (1997)	DNR (1964)
E1D (1997)	E3D (2001)	WRI (1976)
E1S (1997)	E4D (2008)	S7 (1979)
E2S (1997)	E5D (2013)	DOT (1981)
E4S (2008)	E6D (2013)	STP (1993)
N1SR (2005)	E7D (2013)	
N2S (1997)	E8D (2013)	
N3S (1997)	E9D (2016)	
NE1S (2002)	E10D (2016)	
S10S (2003)	N1D (1997)	
S11S (2003)	N2D (1997)	
SE1D (2003)	N3D (1997)	
SE1S (2002)	N5D (2002)	
	N5S (2002)	
	NE1D (2002)	
	S11D (2003)	
	W1D (1997)	
	W2S (2002)	

A summary of the Aquifer 1, Aquifer 2 and water supply wells groundwater monitoring schedule is provided in Exhibit 2. Water quality monitoring at the CSWF is performed on a quarterly basis at nine (9) Aquifer 2 groundwater wells and two (2) water supply wells. Two of these Aquifer 2 wells (E2D and E4D) are only sampled for VOCs during the first and third quarter events. An additional, nine (9) Aquifer I wells, six (6) Aquifer 2 wells, and one water supply well are monitored semi-annually (during the second and fourth quarters). One Aquifer 1 well (E1S) is only sampled for nitrates during these semi-annual events. As previously noted, compliance monitoring was not performed at the CSWF

during the first quarter 2023 due to County admistrative constraints. Over 2023 compliance period, groundwater monitoring was performed by SCS Engineers in April, July, and October.

Exhibit 2. CSWF Groundwater Monitoring Schedule

Monitoring Frequency	Groundwater Monitoring Wells		Water Supply Wells
	Aquifer 1 Wells	Aquifer 2 Wells	
Quarterly Event [1]		E2D* E4D* E5D E6D E7D E8D E9D E10D N2D	DNR WRI
Semi-Annual Event (Additional wells sampled during the Second & Fourth Quarters)	E1D E1S** E2S E4S N2S N3S NE1S S10S S11S	E3D N1D N3D N5D NE1D S11D	DOT

* Wells E2D and E4D are only sampled for VOCs during the first and third quarter events.
** Well E1S is only sampled for nitrates.
1 Monitoring activities were not performed during the first quarter of 2023.

3.1 MONITORING ACTIVITIES

3.1.1 Water Level Measurements

As part of the routine groundwater monitoring program, static water levels at each well location were initially measured and recorded prior to initializing any well purging or groundwater collection procedures. Depth-to-water measurements (measured to the nearest 0.01 ft.) were obtained using an electronic water level indicator. Measurement results were recorded on field sampling logs and the resulting data were subsequently used to calculate groundwater elevations for each well location.

As part of the second (April) and fourth (October) quarter events, static water levels measured at all the water quality wells monitored were used for the semi-annual determination of groundwater flow characteristics.

3.1.2 Sample Collection and Analysis

Groundwater samples were collected during the quarterly events from the monitoring locations depicted on Figure 2. The groundwater monitoring wells were sampled using the low-flow sampling procedure outlined in the SAP/QAP. Each monitoring well is outfitted with a dedicated bladder pump. Purging was completed at flow rates of less than 500 milliliters per min (ml/min) until

indicator parameters (pH, temperature, specific conductance, turbidity and dissolved oxygen) stabilized according to the criteria stated in the SAP/QAP. Indicator parameters (except turbidity) were measured with a closed in-line flow-through cell to prevent atmospheric influences. Turbidity measurements were taken using a field-portable turbidity meter. After parameter stabilization, the flow-through cell was disconnected. Samples were collected by filling laboratory-prepared sample bottles directly from the pump discharge line (to prevent cross-contamination). Specific sampling procedures are outlined in the SAP/QAP.

Water supply well samples were obtained from the sampling taps situated at each wellhead's surface outlet immediately before the pressure tank and other appurtenances. The tap was allowed to discharge until the pump came on (verifying that the water being sampled came from the well and not a storage or pressure tank) and indicator parameters were allowed to stabilize according to the same criteria used for monitoring well sampling. After indicator parameters stabilized, the flow splitter was removed and samples were collected directly from the sampling tap at flow rates of approximately 500 mL/min. Specific sampling procedures are outlined in the SAP/QAP.

The objective of purging a water supply well is the same as with a monitoring well: to ultimately collect a sample representative of the groundwater in the aquifer rather than water in the well (or plumbing system). However, it should be recognized that data obtained from water supply wells may not be directly comparable to that obtained from the monitoring wells due to the differences in well construction and sampling method. Concentration averaging is also likely to occur from differences in the screen length and pumping rate for the water supply wells. The purpose of this sampling is simply to assess the quality of water at the water supply wells to verify usability of the water. In addition, a water flow meter was installed at non-potable water supply well DOT so that its water production could be recorded each time the location was sampled.

Groundwater samples were packed in coolers containing ice, stored, and transported under chain-of-custody protocols to Eurofins Laboratories (Eurofins) in Fife, Washington. Laboratory analytical data results were delivered to SCS Engineers in electronic formats.

The SAP/QAP calls for analyses including:

- Total dissolved solids by SM 2540C
- Chemical oxygen demand (COD) by SM 5220C
- Total organic carbon (TOC) by SM5310B
- Total alkalinity and bicarbonate alkalinity by SM 2320B
- Anions (sulfate and chloride) by method 300.0
- Total nitrate/nitrite and ammonia by methods 300/353.2/350.1
- Metals (arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, nickel, selenium, silver, thallium, vanadium, zinc, manganese, and lead by method 6020A; iron, calcium, magnesium, potassium and sodium by method 6010B
- Volatile organic compounds (VOCs) by method 8260B/8260SIM (or equivalent)

The SAP/QAP also calls for field Quality Assurance/Quality Control (QA/QC) samples, including collection of one duplicate sample and VOC trip blanks during each quarter.

3.2 RESULTS

3.2.1 Groundwater Elevations

Groundwater elevations in the Aquifer 1 (shallow aquifer) during 2023 ranged between 64.47 (NE1S in October) to 85.48 (W1S in April) feet above mean sea level (msl). Aquifer 2 (deep aquifer) groundwater elevations recorded over the same period ranged from 48.80 (E10D in July) to 60.78 (S11D in October) feet above msl. Groundwater elevations at the CSWF do not appear to show strong seasonal fluctuations in response to changes in precipitation recharge. Depth-to-water measurements and calculated groundwater level elevations from the routinely monitored CSWF wells completed in Aquifer 1 and Aquifer 2 are presented in Tables 1A and 1B, respectively. Hydrographs of the CSWF groundwater elevations are provided for Aquifer 1 and Aquifer 2 on Figures 3 and 4, respectively.

As illustrated on Figures 3 and 4, groundwater elevations at the CSWF appear be gradually rising in most of the Aquifer 1 and Aquifer 2 wells over the past five years. Barring a few anomalous elevation values (likely due to inaccurate field measurement), the majority of the observed 5-year increasing elevation trends remain within a 0.5 to 2.0 foot range depending on well location.

Groundwater surface elevation maps were prepared (refer to Figures 5A/B and 6A/B) for Aquifer 1 and Aquifer 2. These figures display the potentiometric surfaces and groundwater flow directions observed during April and October 2023. Little change was noted in groundwater flow direction over the course of the 2023 compliance period.

The groundwater elevation surface maps for Aquifer 1 (Figures 5A and 6A) depict a generally easterly flow direction. The average hydraulic gradient for Aquifer 1 was generally consistent throughout the reporting year. The calculated gradients for Aquifer 1 during April and October 2023 averaged 0.01374 feet/feet. Assuming an effective porosity of 25 percent and an average hydraulic conductivity of 22.0 feet/day (as determined from grain size analysis of the sandy soils found in the screened intervals of wells NE1S, S10S, and SE1S), the groundwater flow velocity calculated for Aquifer 1 during 2023 averaged 1.21 feet/day.

The groundwater elevation surface maps for Aquifer 2 (Figures 5B and 6B) depict a flow direction to the north-northeast. Hydraulic gradients calculated for Aquifer 2 during April and October 2023 averaged 0.0039 feet/feet. Assuming an effective porosity of 33 percent and an average hydraulic conductivity of 9.40 feet/day (determined from grain size analysis of the sandy soils found in the screened intervals of landfill wells NE1D, N5D, and S11D), the average groundwater flow velocity during 2023 in Aquifer 2 was calculated to be 0.112 feet/day.

Water supply well water levels were not measured and are not reported because water levels cannot be guaranteed to be representative of static conditions (due to unknown pumping schedules). The water meter installed at pumping well DOT indicated that 301 gallons of non-potable water (reportedly used for road application or fire fighting) had been pumped from this well between October 2022 and October 2023.

3.2.2 Water Quality

Measurement of field parameters and results from laboratory analyses for general chemistry and metals for 2023 are presented in Tables 2A through 2C. Results from laboratory analyses for VOCs

are presented in Tables 3A through 3C. A summary of VOC detections is also provided in Table 4. Field documentation for the 2023 groundwater monitoring events is presented in Appendix A.

3.2.2.1 Field Parameters

Field parameters were recorded during the monitoring events and documented on field forms (included in Appendix A). A summary of field parameter results for Aquifer 1, Aquifer 2 and the water supply wells is provided by Tables 2A, 2B and 2C, respectively. The range of monitored field parameters recorded at the CSWF over the reporting year is presented below in Exhibit 3, along with a brief assessment of these 2023 results.

Exhibit 3. 2023 Range of Field Parameters

Field Parameter	Range of Measurements	Notes
Dissolved Oxygen (DO)	0.19 to 12.38 mg/L	Anaerobic conditions continue to be observed in the majority of CSWF wells, and at similar ranges as reported during past monitoring years. Aquifer 2 reported the greatest range in DO, ranging between 0.69 to 12.38 mg/L. Several of the July DO results were in excess of 9.0 mg/L, and are suspected instrument artifacts. Water supply wells generally reported <6 mg/L DO levels.
Oxidation-Reduction Potential (ORP)	-175 to 349 mV	ORP values varied widely across the site in Aquifer 1, Aquifer 2 and the water supply wells. Negative ORP levels appear to be more prevalent at downgradient and cross-gradient well locations.
pH	2.30 to 8.17 SU	pH values were similar those reported in past monitoring years with the majority of Aquifer 1, Aquifer 2 and the water supply samples reporting levels between 6.5 to 7.8 standard units (SU). An anomalous pH measurement (2.3 SU) recorded at N5D during April is suspected to represent a faulty measurement.
Specific Conductance (SC)	282 to 1,677 µS/cm	Aquifer 1 and Aquifer 2 wells reported similar range of SC measurements (between 880 to 1,677 µS/cm and 282 to 1,655 µS/cm, respectively). Water supply wells reported a narrower SC range between 301 to 891 µS/cm. Higher SC typically occurred in the near refuse wells.
Temperature	9.6 to 15.6 ^{0}C	Varies seasonally at all well locations, and appears to largely represent ambient air temperatures during sample collection.
Turbidity	0.3 to 139 NTU	Generally low across the site (0.3 to 11 NTU). Elevated measurements have been reported for Aquifer 1 well E1D (139.3 and 33.15) since the installment of a new pump in Q2.

Field parameters recorded over the 2023 reporting year remained within the typical ranges, similar to those reported in previous monitoring years.

3.2.2.2 General Chemistry

The general chemistry analytical results for the 2023 monitoring period are also summarized in Tables 2A through 2C. The range of monitored general chemistry parameters recorded at the CSWF over the reporting year is presented below in Exhibit 4, along with a brief assessment of the 2023 results.

Exhibit 4. 2023 Range of General Chemistry Parameters

Parameter	Range of Measurements	Notes
Total Alkalinity	58 to 760 mg/L	Total Alkalinity at the CSWF is principally composed of bicarbonate (HCO_3). Aquifer 1 alkalinity ranged from 250 to 670 mg/L, while Aquifer 2 alkalinity ranged from 58 to 760 mg/L. Water supply wells reported a narrower alkalinity range of 290 to 370 mg/L. The highest values were observed in E1D and E5D.
Ammonia	ND to 0.29 mg/L	Ammonia was not reported in any of the Aquifer 1 wells during the 2023 compliance year. This parameter was sporadically detected at low concentrations in several Aquifer 2 wells and water supply wells DOT and WR-1. The highest result was reported in WR1 during April.
Calcium	21 to 190 mg/L	A similar range of calcium detections were observed in the Aquifer 1 and Aquifer 2 wells, while the water supply wells reported generally lower (65 to 89 mg/L) calcium results. Higher concentrations were generally observed in Aquifer 1 (E1D, E2S, N4S and E4S) and Aquifer 2 (E2D and E5D) wells proximal to the waste cells.
Chemical Oxygen Demand (COD)	ND to 21 mg/L	COD was detected twice at wells E7D and DOT with detections at 11 mg/L and 21 mg/L, respectively.
Chloride	3 to 120 mg/L	A slightly higher range of chloride results were reported in the Aquifer 2 wells compared to the Aquifer 1 and water supply wells. The 250 mg/L groundwater quality criterion for chloride was not exceeded during the 2023 compliance year.
Fluoride	ND to 0.22 mg/L	Low fluoride levels were sporadically detected in three Aquifer 1 wells (N2S, N3S and S11S) and two Aquifer 2 wells (E10D and S11D)
Magnesium	3 to 110 mg/L	Higher concentrations were generally observed in wells situated near refuse, including Aquifer 1 well E1D and Aquifer 2 wells E2D, N5D and N1D. The water supply wells reported a smaller range of magnesium detections ranging between 44 to 53 mg/L.
Potassium	3.1 to 15 mg/L	Potassium was detected at low concentrations in the majority of CSWF groundwater samples. Similar ranges were reported in Aquifer 1 (5.4 to 9.6 mg/L) and Aquifer 2 (3.1 to 15 mg/L). Water supply wells reported potassium levels ranging between 5.5 to 7.1 mg/L.
Sodium	15 to 80 mg/L	Sodium levels were consistently low across the CSWF, with Aquifer 1 (19 to 43 mg/L) and Aquifer 2 (15 to 80 mg/L) reporting a similar range of sodium concentrations. Sodium levels in the water supply wells were slightly lower ranging between 25 and 35 mg/L.
Sulfate	5 to 140 mg/L	Higher sulfate concentrations were generally observed in wells situated near refuse, including Aquifer 1 well E1D and Aquifer 2 well N1D. Water supply wells reported sulfate concentrations ranging between 24 and 60 mg/L.

Total Dissolved Solids (TDS)	52 to 1,100 mg/L	Total dissolved solids (TDS) was reported at concentrations ranging between 52 (E7D in April) and 1,100 mg/L (E1D in January) over the compliance year. Aquifer 1 and Aquifer 2 wells reported TDS ranges of 480 to 1,100 mg/L and 52 to 980 mg/L, respectfully. The April E7D result was noted to be anomalously low, and may represent a sampling/analytical artifact. Water supply wells reported lower TDS concentrations, ranging between 410 and 740 mg/L.
Nitrate/Nitrite	ND to 35 mg/L	Aquifer 1 reported the greatest range of nitrate/nitrite detections (from ND to 35 mg/L). As noted in past years, this parameter was most elevated in S10S (35 mg/L during April), but routinely exceeded 5 mg/L in six of the remaining Aquifer 1 wells. The 10 mg/L groundwater quality criterion was exceeded at least once in Aquifer 1 wells E1S, E2S, E4S, N3S, NE1S, and S10S over the reporting year. As noted in past compliance years, these nitrate/nitrite detections are suspected to be related to non-landfill sources.
Total Organic Carbon (TOC)	ND to 3.2 mg/L	TOC ranged between <1.0 and 2.1 mg/L in the Aquifer 1 wells, <0.5 to 3.2 mg/L in the Aquifer 2 wells, and 0.8 to 2.1 mg/L in the water supply wells. The highest TOC results are typically observed in Aquifer 2 well N1D.

ND: defined as parameter results below the laboratory reporting limit. It should be noted that J-flagged detections (approximate results reported at concentrations below the MRL) are included in the summary date tables (see Table Appendixes).

General chemistry parameters detected over the current compliance year remained within the typical ranges, similar to those reported in previous monitoring years.

3.2.2.3 Metals

Metals results for the 2023 reporting year are summarized below. Five metals, including beryllium, lead, selenium, silver, and thallium were either not detected or only sporadically reported above their respective laboratory reporting limits. Accordingly, these five metals have been excluded from the discussion below. The range of total metal detections reported at the CSWF over the compliance year is presented below in Exhibit 5, along with a brief assessment of the 2023 results.

Exhibit 5. 2023 Range of Total Metals Parameters

Total Metal	Range of Measurements*	Notes
Antimony	0.13 to 2.1 µg/L	Low levels of antimony were detected in Aquifer 1, Aquifer 2 and water supply wells. The highest concentrations were reported in Aquifer 2 well E7D (0.55 to 2.1 µg/L).
Arsenic	0.58 to 22 µg/L	Aquifer 1 arsenic concentrations varied from 1.2 to 15 µg/L. Aquifer 2 arsenic levels ranged between 0.58 and 22 µg/L. Water supply wells reported arsenic concentrations ranging between 2.9 and 7.1 µg/L. The highest arsenic results were observed at Aquifer 2 well E9D.
Barium	16 to 95 µg/L	Low barium concentrations were observed in most CSWF wells. Aquifer 1 and water supply wells reported a narrower range of barium concentrations (27 to 66 µg/L and 19 to 32 µg/L, respectably). Aquifer 2 reported slightly higher barium levels ranging between 16 and 95 µg/L. No site-wide or seasonal trends are apparent.
Cadmium	ND to 0.37 µg/L	Aquifer 1 cadmium detections ranged from 0.06 to 0.17 µg/L. Aquifer 2 cadmium concentrations ranged between 0.05 and 0.37 µg/L. Water supply well WR-1 reported 0.12 µg/L cadmium during the July event.

Chromium	ND to 13 µg/L	Aquifer 1 chromium detections ranged between 0.23 and 13 µg/L. Chromium detections in Aquifer 2 wells varied between 0.17 and 2.0 µg/L. Water supply wells reported chromium detections ranging from 0.17 to 3.9 µg/L.
Cobalt	ND to 3.6 µg/L	Cobalt was detected at least once above the reporting limit in Aquifer 1 wells E1D and Aquifer 2 wells E7D and N1D at concentrations ranging from 0.30 to 3.6 µg/L. The highest concentration was observed at Aquifer 1 well E1D in April. Cobalt was only detected in water supply well WR1.
Copper	ND to 130 µg/L	Copper was reported in Aquifer 1 wells E1D, E2S, and NE1S. Aquifer 2 wells reported concentrations ranging to 11 µg/L (at E7D). Copper was also detected in the water supply wells at concentrations ranging from 0.6 to 130 µg/L.
Iron	ND to 2,200 µg/L	Iron detections ranged between 63 and 2,200 µg/L. Iron was reported in excess of the 300 µg/L groundwater quality criterion at least once in the majority of the Aquifer 2 wells. Water supply wells reported iron concentrations ranging between 110 and 770 µg/L. It should be noted that higher than typical iron levels reported for certain wells during the October event may be related to higher sample turbidity.
Manganese	ND to 610 µg/L	Aquifer 1 wells reported manganese detections varying between 0.17 and 470 µg/L. Aquifer 2 manganese detections ranged from 2.6 to 610 µg/L. Water supply well DOT reported a manganese concentration of 180 µg/L during the April and October events. The highest manganese levels were reported in Aquifer 2 well E6D.
Nickel	ND to 20 µg/L	Nickel detections in the Aquifer 1 wells ranged between 0.88 and 20 µg/L. Aquifer 2 nickel detections showed the least variation, ranging between <1 and 7.5 µg/L. Water supply well nickel detections ranged from <1 and 15 µg/L.
Vanadium	ND to 20 µg/L	Vanadium was detected at low concentrations in five Aquifer 1 wells at concentrations ranging between 0.64 and 20 µg/L. Vanadium was reported in Aquifer 2 wells E2D, E7D, E10D, N2D and N5D at concentrations ranging to 5.8 µg/L. Water supply wells DNR and WR1 detected vanadium at concentrations ranging between 2.4 and 5.9 µg/L.
Zinc	ND to 580 µg/L	Low zinc concentrations (ranging to 16 µg/L) were sporadically detected in several of Aquifer 1 groundwater wells. Aquifer 2 reported zinc at concentrations ranging to 490 µg/L (at well E7D IN October). All of the water supply wells reported zinc detections ranging between 9 to 580 µg/L. The highest zinc result was reported at water supply well DOT (580 µg/L) during the third quarter event, and represent an anomalous detection.

* Metals results are being reported in micrograms per liter (µg/L) for Exhibit 5 and Tables 2A, 2B and 2C at the request of Ecology Solid Waste.

ND: defined as parameter results below the laboratory reporting limit. It should be noted that J-flagged detections (approximate results reported at concentrations below the MRL) are included in the summary date tables (see Table Appendixes).

The total metals results observed at the CSWF during 2023 compliance period largely remained within typical ranges, similar to those reported in previous monitoring years.

3.2.2.4 Volatile Organic Compounds

Tables 3A through 3C present the volatile organic compound results obtained over the reporting period. Table 4 summarizes the VOCs that were detected during 2023 in the routinely monitored groundwater wells. A total of 13 VOCs were detected in groundwater samples collected from the CSWF monitoring wells during compliance year. However, the majority of these compounds were only

sporadically detected at low concentrations in a single well or during a single sampling event, and are suspected to represent field or analytical artifacts. Four VOCs including 1,1,1-trichloroethane, 1,1-dichloroethane, trichlorofluoromethane and vinyl chloride were the most frequently reported. The range of VOC detections reported at the CSWF over the compliance year is presented below in Exhibit 6, along with a brief assessment of the 2023 results.

Exhibit 6. 2023 Range of Volatile Organic Compounds

Field Parameter	Range of Measurements	Notes
1,1,1–Trichloroethane	ND to 0.44 µg/L	1,1,1-Trichloroethane was detected in three Aquifer 1 wells (E1D, N2S and S10S) at concentrations ranging between 0.025 and 0.41 µg/L). Two Aquifer 2 wells (E2D and N3D) reported concentrations between 0.03 and 0.44 µg/L). 1,1,1-Trichloroethane was not detected in any water supply wells.
1,1-Dichloroethane	ND to 0.24 µg/L	1,1-Dichloroethane was detected in one Aquifer 1 well (N2S at concentrations of 0.19 and 0.24 µg/L). Four Aquifer 2 wells (E2D, E7D, N2D and N5D) reported concentrations ranging between 0.02 and 0.20 µg/L).
Trichlorofluoromethane	ND to 3.8 µg/L	Trichlorofluoromethane was detected at seven CSWF locations during 2023, including four Aquifer 1 wells (E2S, N2S, N3S, and S10S) and three Aquifer 2 wells (E2D, E7D and N2D). Aquifer 1 detections ranged between 0.99 and 3.8 µg/L, while Aquifer 2 levels ranged between 0.49 and 3.2 µg/L. The most elevated trichlorofluoromethane levels occurred in downgradient well S10S.
Vinyl Chloride	ND to 13 µg/L	Vinyl chloride was detected above the 0.02 µg/L reporting limit in three Aquifer 1 wells (E1D, E2S, and N2S) and two Aquifer 2 wells (E2D and E6D)) over the compliance year. The majority of these wells are located within or immediately adjacent to the disposal areas. The most elevated vinyl chloride levels were detected in well E2D (ranging from 9.7 to 13 µg/L).

ND: defined as parameter results below the laboratory reporting limit. It should be noted that J-flagged detections (approximate results reported at below the MRL) are included in the summary date tables (see Table Appendixes).

The remaining Aquifer 1 or Aquifer 2 monitoring wells downgradient of the former disposal areas, including the two downgradient Aquifer 2 "sentinel wells" (E9D and E10D) situated near the downgradient facility border, did not report any VOC detections during the 2023 compliance period. With the exception of isolated, low-level, J-flagged detections of chloromethane and cis-1,2 dichloroethylene (both DNR during October) and benzene and styrene (both in WR1 during July), VOCs were not reported in the water supply wells monitored over the compliance period. Consistent with previous results, the majority of the VOC detections occurred in wells that are located within or immediately adjacent to the disposal areas.

3.2.2.5 Groundwater Data QA/QC

All analytical data reported by the primary testing laboratory (Eurofins Fife, WA) over the 2023 compliance year was subjected to QA/QC evaluations. The QA/QC evaluations were performed as outlined in the SAP/QAP, and included the collection and analysis of field duplicates and trip blanks. The QA/QC evaluation also provided for a detailed review of the laboratory data, including sample handling, holding times, and laboratory performance analyses including duplicates, blanks, matrix

spikes, matrix spike duplicates and surrogate recoveries. Data quality issues were not identified in the majority of the analytical data sets reported during the current compliance period. Data flags have been appended to the 2023 testing results as appropriate. The 2023 data were determined to be acceptable for the intended purposes. Appendix B contains the data validation reports and the laboratory data packages for the reporting year.

3.2.3 Groundwater Quality Criteria Comparison

All analytical results were compared to the water quality criteria for groundwater of the state of Washington (Chapter 173-200 WAC) and to Federal primary and secondary MCLs. A summary of WAC 173-200 criteria and Federal MCL exceedances for the 2023 reporting year can be found on Table 5. Water quality criteria for seven analytes were exceeded during the compliance period as shown below in Exhibit 7.

Exhibit 7. 2023 Groundwater Exceedances

Parameter	WAC 173-200 Groundwater Standard	Notes
Specific Conductance	700 µS/cm*	The WAC 173-200 and secondary drinking water standards for specific conductance were exceeded at least once during 2023 in 9 Aquifer 1 wells, 13 Aquifer 2 wells and three water supply wells.
Total Dissolved Solids (TDS)	500 mg/L*	The WAC 173-200 and secondary drinking water standards for TDS were exceeded at least once in 8 Aquifer 1 wells, 11 Aquifer 2 wells and three water supply wells. While some of the reported exceedances are likely due to effects from past waste disposal activities, many of the exceedances are thought to be due to natural water quality. Wells in central Island County routinely report TDS levels on the order of 500-800 mg/L.
Nitrate	10 mg/L*	The WAC 173-200 and primary drinking water standards for nitrate were exceeded at least once in four Aquifer 1 wells (E1S, E2S, E4S and S10S). Aquifer 2 well E2D also reported nitrate exceedance during the April and October event. Given the generally cross-gradient locations of the Aquifer 1 wells which have historically detected nitrate, most of these exceedances do not appear to be directly attributable to the CSWF waste disposal cells.
Arsenic	0.05 µg/L**	The WAC 173-200 groundwater quality criterion for arsenic was exceeded in the majority of CSWF groundwater monitoring and water supply wells. The primary drinking water MCL of 10 µg/L was also exceeded in each of the samples collected from Aquifer 2 wells E4D and E9D, and from the April sample from Aquifer 1 well E1D. The source of the elevated arsenic detections reported in downgradient well E9D remains unclear. However, given the significantly lower arsenic levels observed around and immediately downgradient of the CSWF waste cells, this detection does not appear to be related to the landfill.
Iron	300 µg/L *	The WAC 173-200 and secondary drinking water standards for iron were exceeded at least once in five Aquifer 2 wells (E5D, E6D, E8D, E10D, and N1D) and water supply wells DOT and DNR. Aquifer 1 well E1D also exceeded standards once during the October event. It should be noted that the water supply wells are not constructed to be environmental monitoring wells, and are prone to produce higher turbidity samples, which are considered to provide less representative groundwater results.

Manganese	50 µg/L*	The WAC 173-200 and secondary drinking water standards for manganese were exceeded at least once in 16 wells, including three Aquifer 1 wells, eleven Aquifer 2 wells, and water supply wells DOT and DNR.
Vinyl Chloride	0.02 µg/L	The WAC 173-200 groundwater criterion for vinyl chloride was exceeded at least once in four CSWF wells, including: three Aquifer 1 wells (E1D, E2S and N2S) and two Aquifer 2 well (E2D and E6D). Concentrations in Aquifer 2 well E2D also exceeded the primary drinking water MCL of 2 µg/L. Vinyl chloride was not detected in any of the water supply wells during 2023.

* Secondary MCL for this parameter is equal to the WAC 173-200 standard.
** Primary MCL for arsenic is 10 µg/L.

Groundwater quality exceedances observed at CSWF during 2023 compliance period remain generally similar to those reported during previous monitoring years. It should be noted, however, that vinyl chloride (a primary site contaminant) was not detected in near refuse, Aquifer 2 well E7D during the current reporting year.

3.3 EVALUATION OF GROUNDWATER QUALITY

3.3.1 Spatial Distribution

Groundwater analytical and field parameter results for the 2023 reporting year reflect the continuing influence of past waste disposal activities on groundwater quality at the CSWF. As reported during past compliance reports, groundwater wells within or immediately adjacent to the disposal area continue to report elevated concentrations relative to background conditions for the following parameters of interest:

- specific conductivity
- total dissolved solids
- nitrate/nitrite
- sulfate
- arsenic
- iron
- manganese
- vinyl chloride

These elevated parameter concentrations generally occur immediately adjacent to the unlined waste disposal cells (either due to leaching from the landfill, LFG, or simply mobilization due the landfill's presence). As previously reported for this site, the migration of these contaminants appears to be attenuating beneath the facility, as evidenced by the reduced concentrations of target analytes at monitoring wells located 400 to 750 feet downgradient of the disposal areas. The results continue to confirm that site contaminants remain confined to the County property.

Groundwater quality impacts are generally more pronounced in the shallow aquifer wells than in the deep aquifer wells. The primary exception to this statement is found in deep aquifer well E2D, which contains elevated concentrations of vinyl chloride among other constituents. However, it is noteworthy that vinyl chloride levels in the majority of Aquifer 2 wells appear to be gradually declining when compared to historical results. As previously noted, vinyl chloride was not detected in near refuse, Aquifer 2 well E7D during 2023. In addition, groundwater samples collected from downgradient "sentinel" wells E9D and E10D have never detected the presence of vinyl chloride.

3.3.2 Temporal Trends

Statistical analysis for parameters exceeding groundwater quality criteria (specific conductivity, total nitrate/nitrite, sulfate, TDS, arsenic, iron, manganese, and vinyl chloride) was performed for both short (most recent two years) and long (all available data) term data trends. A summary of statistical parameters and the Mann-Kendall Trend analysis for these eight parameters can be found in Table 6. In addition, time series diagrams (covering the last 5-years) for additional selected parameters of interest are provided in Appendix C. These analyses were performed using AquaChem (ver. 2014.1) software and modules of Microsoft Excel (ver. 2016).

As noted in previous monitoring reports, both increasing and decreasing long-term trends have been documented for these parameters throughout the CSWF. However, fewer short-term statistically significant trends are observed for the same Aquifer 1, Aquifer 2 and the water supply (WS) wells, as summarized below in Exhibit 8. These trends are generally similar to those reported during previous compliance years, and are overall indicative of stable groundwater conditions.

Exhibit 8. Summary of Short-Term (2022-2023) Concentration Trends

Parameter	Aquifer Type	Wells with Increasing Trends	Wells with Decreasing Trends
Specific Conductance	1	None	None
	2	E6D	None
	WS	None	None
Nitrate/Nitrite, total	1	None	None
	2	None	None
	WS	None	None
Sulfate	1	None	None
	2	None	None
	WS	None	None
TDS	1	None	None
	2	None	None
	WS	None	None
Arsenic	1	None	None
	2	None	None
	WS	None	None
Iron	1	None	None
	2	None	None
	WS	None	None
Manganese	1	None	None
	2	None	None
	WS	None	None
Vinyl chloride (not detected in WS wells)	1	None	None
	2	None	None

The absence of significant short-term (2 year) trends is also discernable in the 5-year time (2019-2023) series diagrams (C1 through C34) attached to Appendix C. As illustrated by these time-series charts, the short term increasing trend identified for specific conductance in E6D does not represent a substantial concentration change.

3.3.3 Groundwater Geochemistry

The geochemical character of groundwater collected from Aquifer 1, Aquifer 2 and the water supply wells during the 2023 semi-annual monitoring events was evaluated using the Piper diagrams and cation/anion balance tables attached to Appendix C. As shown on the Piper diagrams, the water samples obtained from Aquifer 1, Aquifer 2 and water supply wells typically exhibit similar geochemical signatures. As noted for past reporting years, these diagrams indicate that the dominant anion in the groundwater samples continues to be bicarbonate, while the cations are dominated by calcium and magnesium.

Groundwater cation/anion balance calculations were also used to assess the geochemical character of the water samples. Ideally, after the major anions and cations present in a sample are determined, the sum of the positive cations (in milliequivalents per liter [meq/L]) should approximately equal the sum of the negative anions (Hem 1986). All natural waters should be electroneutral; however, differences can arise between dissolved cations and anions in groundwater as measured by an analytical laboratory due to a number of factors including: presence of colloidal fractions, systematic error in preparation and analysis of samples, malfunction of/poorly calibrated equipment, major species omitted from analysis, the presence of unusually high concentrations of cations/anions, and not all ions present in water are included in the balance calculation. Due to these potential issues, differences in the ion balance can be difficult to assess for imbalances due to groundwater impacts.

The range of the sum of ions and balance of ions for the majority of the samples collected at the CSWF during the 2023 compliance period reported relative percent differences (RPD) ranging within (+/-) ten percent of neutral. However, balances outside of this range were reported at least once in 2023 at two Aquifer 1 wells (E4S and NE1S) and three Aquifer 2 wells (E5D, E7D and E9D) ranging between negative (-) 27.64 and 12.72 percent. Positive values indicate that the sum of the cations is greater than the sum of the anions. Ion balances outside a (+/-)ten percent RPD threshold may reflect the presence of ions outside the parameter suite being analyzed, possible errors associated with analytical limitations in the measurements, or potential low level impact from human activities at the site

4.0 LANDFILL GAS

A LFG migration control system, consisting of a perimeter air injection system (along the south, east, and west edge of the property) and a perimeter probe monitoring network was installed at the landfill in 1988 (Figure 7). The original gas migration control system was deactivated in May 2005, coincident with the activation of the existing LFG extraction wells (described below).

Currently, the County MSW and CDL landfills employ active gas collection and control measures which consist of a LFG extraction system and an SVE system as shown on Figures 8 and 9. A cross sectional view of these systems is shown on Figure 10. Each of these systems includes a series of extraction wells and a gas conveyance system. The LFG system also employs treatment through combustion in a flare. In early 2005, system upgrades included the addition of SVE wells, LFG extraction wells, replacement plumbing components, a new gas conveyance system, replacement of a condensate sump, and an upgraded flare control. An additional SVE well (VGW-9) was installed in 2008. New LFG extraction wellheads were placed on all of the vertical and horizontal extraction wells during 2014. The upgraded wellheads allowed for better flow adjustment control and accurate flow measurement during low flow conditions. New high efficiency blowers were installed for both the LFG system and the SVE system in 2015.

Both the LFG and SVE systems operated normally throughout 2023.

4.1 COMPLIANCE MONITORING ACTIVITIES

LFG monitoring is conducted quarterly to provide an assessment of the subsurface landfill gas conditions at the site and to confirm compliance with regulatory criteria for subsurface methane concentrations. LFG monitoring procedures are detailed in the *Landfill Gas Monitoring Plan, 2008 Revision, Coupeville Solid Waste Facility*, prepared by SCS (April, 2008). The monitoring program activities involve recording primary LFG (methane and carbon dioxide) and depressed oxygen concentrations and relative soil pressures, if applicable.

The LFG probes that are currently monitored include:

- Perimeter Probes (11 total)
- Building Probes (7 total)
- On-site structures - Scale House (2 locations)

LFG probe and structure monitoring locations are illustrated on Figure 7. Note that many of the probe locations include a shallow and deep probe (S and D designations, respectively).

4.1.1 Field Procedures

LFG probes were monitored in the field using a single, portable, multi-gas analyzer. The portable gas analyzer measures methane and carbon dioxide with a dual wavelength infrared cell with a reference channel. Oxygen is measured with an electro-chemical cell and the pressure is measured with a transducer. The gas analyzer was calibrated prior to, and after, each monitoring event. Field monitoring was conducted in accordance with Section 4 of the Landfill Gas Monitoring Plan. Field activities were documented in the field logs. Both field and calibration logs are included in Appendix A.

General weather conditions were noted during and preceding each monitoring event. Atmospheric pressure fluctuations can influence LFG concentration and pressure in the probes. Higher LFG concentrations are typically observed at the end of significantly falling barometric pressure trend. To assist with interpreting these data, barometric pressure trends were noted prior to and during each LFG monitoring event. Barometric pressure trends recorded over the course of the 2023 sampling events are included in Appendix D.

4.2 RESULTS

The following results are organized by LFG monitoring location. Due to instrument limitations, concentrations of methane and/or carbon dioxide less than (<) 0.3 percent by volume are not considered significant given the sensitivity of the field instrument at low concentrations. The LFG monitoring results for 2023 are presented in Table 7.

4.2.1 Landfill Gas Probes

The probe results represent stabilized sampling conditions after purging at least one probe casing volume. Both stabilized readings and short-term readings of elevated pressures ("spikes") at a probe may indicate the potential presence of LFG within the landfill.

Methane (>0.3 percent by volume) was not recorded in any of the perimeter probes during 2023. The GP-30 location consists of a series of five probes which are completed within refuse and are where elevated methane concentrations are expected and have been historically observed. Methane concentrations during 2023 in these probes ranged widely, from 0.3 to 48.8 percent by volume.

Carbon dioxide was reported during 2023 in all LFG probes, ranging from less than 0.3 to 20.1 percent by volume. Depressed oxygen concentrations were recorded during the reporting period in all of the LFG probes at values ranging between 0.0 and 20.3 percent by volume. Seven subsurface probes (GP-13S, GP-17S, GP-2378, GP-6S/D, GP-S6S/D, GP-2098 and GP-W1) reported oxygen concentrations above 20.3 during 2023, with most probes only reporting a single elevated measurement. Representative relative (static) pressure measured in the perimeter LFG probes during 2023 ranged from -0.49 to +0.7 inches of water.

4.2.2 Structures – Scale House

Methane was not detected in the scale house/office during the 2023 monitoring events. Carbon dioxide was detected above 0.3 percent by volume (at 0.4 and 1.0 percent by volume) at the scale house and office during two events (third and fourth quarters) during 2023. Indoor oxygen measurements were observed to range between 20.4 and 20.9 percent by volume in this structure during the compliance year.

4.3 LANDFILL GAS EVALUATION

The production of LFG at the CSWF likely reached its peak between 1 and 3 years after waste disposal ceased (1978 for the Town of Coupeville Landfill, 1991 for the County MSW Landfill, and 2001 for the County CDL Landfill). Gas production is expected to be continuously declining due to the nature of the waste decomposition processes.

The dominant mechanism for LFG movement in the subsurface soils surrounding the CSWF is diffusion (movement from a high concentration to low concentration) due to the age of the waste and very low gas production. This method of LFG movement is much less pronounced as opposed to convective driven LFG movement (movement from high pressure to low pressure), which is predominant during active filling and within 10 years after filling has ceased. For the most part, the slow movement of LFG appears to allow the methane to oxidize before reaching the perimeter monitoring probes.

The 2023 monitoring results confirm that LFG (combined methane and carbon dioxide) remains present in the subsurface soils surrounding the historical disposal areas at relatively low and declining concentrations. Due to the age of waste, very low LFG production, and the method of LFG movement within the surrounding geologic formation (sandy/gravelly soils), methane is generally not observed at the compliance monitoring locations.

5.0 CONTAMINANT SOURCE CONTROL MEASURES

Contaminant source control systems operating at the CSWF include stormwater collection from the waste disposal areas, LFG extraction from the waste mass, and soil vapor extraction in the vadose soils beneath the landfill. The systems operated normally throughout 2023.

5.1 OPERATIONAL ACTIVITIES

5.1.1 Landfill Gas and Soil Vapor Extraction

Routine operations began at the upgraded LFG extraction system and SVE system on November 22, 2005 when the automated timers were installed for both the LFG and SVE systems. Blower motor hours for each system are manually recorded to track the operation of each system.

LFG and SVE system operations and monitoring activities consisted of obtaining field measurements of primary gas composition, gas temperature, well pressure (vacuum), system pressure, and flow from each of the LFG extraction wells, SVE wells, and blower inlets for each system. Monitoring is conducted approximately every 45 days. Adjustments are made as necessary to maintain anaerobic conditions for the LFG extraction wells. Monitoring of these systems is conducted to provide an assessment of the extraction system performance and effects of removing soil vapor from the vadose zone surrounding the disposal areas.

Between November 22, 2005 and December 27, 2023, the LFG extraction system operated an average of 4.90 hours per day and the SVE system operated an average of 9.50 hours per day, as summarized on Table 8. These operational times are intended to balance extraction with the generation of LFG. If extraction exceeds gas generation, oxygen may be pulled into the landfill, which could create a fire hazard. Furthermore, drawing oxygen into the system prevents the LFG treatment system (flare) from operating correctly. Excessive extraction of native soil gas could induce migration of LFG from the waste mass to native soil when LFG is not being actively extracted.

5.1.1.1 Monitoring Activities

Monitoring locations, LFG extraction wells, SVE wells, and blower inlets are shown on Figures 7 through 10. These locations are monitored for primary LFG constituents, gas temperature, well pressure, system pressure and flow. Adjustments to individual well extraction rates are conducted on an as needed basis to maintain anaerobic conditions.

The monitoring locations are designated as follows:

- Vertical LFG Extraction Wells (five locations prefixed by VGW-#)
- Horizontal LFG Extraction Wells (nine locations prefixed by HGW-#)
- Vertical SVE Wells (four locations prefixed by VGW-# NS)
- Blower Inlets (BL-LFG and BL-SV)

General weather conditions were noted during and preceding the monitoring events. As previously noted, atmospheric pressure fluctuations can influence gas concentrations and pressure in gas wells. Barometric pressure trends prior to sampling were recorded from the nearest available weather station (Appendix D).

5.1.2 Stormwater Collection from the Waste Disposal Areas

A stormwater drainage and collection system was installed in 2005 at the interface of the CDL/MSW landfills. The system collects stormwater runoff and water which has infiltrated into the cover soils of the MSW landfill. This water is then pumped into a ditch on the west side of the CDL landfill where it flows to an infiltration pond near the western property boundary. Discharge (in cubic feet) from the stormwater collection system sump (near monitoring well C1S) has been monitored weekly since October 25, 2005 by CSWF personnel, and continued through 2023.

5.2 RESULTS

5.2.1 Landfill Gas Collection from In-Refuse and Native Soil Extraction Points

The performance of the LFG and soil vapor extraction systems is shown on Figure 12. Operating parameter results for each system are summarized on Tables 9 and 10.

The LFG extraction system was operated under a daily intermittent cycle for a total of 32,019 hours between November 22, 2005 and December 27, 2023. Over this time the system has extracted an estimated 89,080,891 cubic feet of LFG from the refuse mass. The rate of extraction was initially at 120 standard cubic feet per minute (scfm), but has declined to an average of approximately 44.3 scfm during 2023, as extraction rates have converged with gas generation rates. The LFG composition at the blower inlet averaged 46.2 percent methane, 18.8 percent carbon dioxide, and 0.2 percent oxygen during 2023.

The SVE system operated under a daily intermittent cycle for a total of 62,499 hours from November 22, 2005 through December 27, 2023. During this time it has extracted an estimated 170,633,577 cubic feet of soil vapor/LFG from the native soil below the disposal areas. The rate of extraction was approximately 62.4 scfm during 2023. The soil vapor/LFG composition at the blower inlet averaged 5.8 percent methane, 15.6 percent carbon dioxide, and 1.4 percent oxygen in 2023.

5.2.2 Stormwater Collection from the Waste Disposal Areas

As summarized in Table 8 and Figure 11, over the period between October 25, 2005 and December 27, 2023, a total of 322,343 gallons of stormwater were pumped from the collection system sump and discharged to the infiltration pond west of the disposal areas. A total of 11,833 gallons of stormwater were pumped through the collection system during the 2023 reporting period.

5.3 EVALUATION OF CONTAMINANT SOURCE CONTROL OPERATIONS

5.3.1 Landfill Gas Collection from In-Refuse and Native Soil Extraction Points

The gas control system at the CSWF has been enhanced to provide additional source control of LFG (especially methane) and facilitate the removal of these gases from the vadose zone. Removal of LFG from the vadose zone also provides a measure of source control for groundwater quality. The gas flow rate has declined over the operating period to reflect the balancing of the LFG wells in an

attempt to achieve extraction at the same rate as gas generation. As this balancing (tuning) continues, source control (to prevent LFG from entering the vadose zone) will continue.

The LFG extraction system is successfully controlling LFG generated within the refuse mass, thereby providing source control of LFG migration to the vadose zone. The success of this system's operations is evident by:

- The volume of LFG removed from the landfill (89,080,891 cubic feet).
- Well coverage/influence over greater volume of refuse mass.
- Ability to adjust well extraction rates to match gas generation rates.
- The gas composition at the LFG blower inlet averaged 46.2 percent methane, 18.8 percent carbon dioxide, and 0.2 percent oxygen during 2023.

Similarly, the SVE system is successfully removing LFG from the vadose zone, and thereby providing an additional measure of source control for groundwater contamination. The success of this system's operations is evident by:

- The volume of soil vapor removed to date (170,633,577 cubic feet).
- The gas composition at the SVE blower inlet averaged 5.8 percent methane, 15.6 percent carbon dioxide, and 1.4 percent oxygen in 2023.

5.3.2 Stormwater Collection from Waste Disposal Areas

For every inch of rain that falls at the CSWF, as much as 1,000 gallons of stormwater may be pumped from the collection system sump near monitoring well C1S for discharge to the infiltration pond west of the disposal areas. A total of 11,833 gallons of stormwater was removed during the 2023 compliance year. Prior to this improvement, this surface runoff and infiltration water flowed into the CDL Landfill.

6.0 CONCLUSIONS

Groundwater and LFG monitoring results obtained from the CSWF over the 2023 compliance period remain generally consistent with those reported during previous compliance years. Vinyl chloride remains the primary contaminant of concern in site groundwater. The most elevated vinyl chloride detections are consistently reported in Aquifer 2 monitoring well E2D, which is situated on the eastern flank of the closed CDL/MSW disposal cells. Low level vinyl chloride exceedances are also reported in several of the Aquifer 1 wells located immediately downgradient of the waste disposal cells. Notably, Aquifer 2 well E7D, which has historically reported elevated vinyl chloride levels, did not report detectable concentrations of this VOC during 2023.

Vinyl chloride has remained absent in the CSWF wells situated beyond the immediate vicinity of the landfill. Groundwater samples collected from Aquifer 2 "sentinel" wells E9D and E10D, situated hydrologically downgradient of the observed vinyl chloride plume, have never reported detectable levels of vinyl chloride. These observations corroborate the findings of past groundwater assessment and modelling efforts which concluded that VOCs originating from the CSWF disposal cells are naturally attenuating beneath the facility, and that vinyl chloride has not, and will not in the future, migrate beyond County property. Vinyl chloride concentrations observed during 2023 remained stable or were slightly lower in most of the groundwater monitoring wells reporting detections. Overall, the 2023 results confirm that the continuation of the optimized groundwater monitoring program is warranted.

LFG monitoring results through 2023 continue to document the positive effects of removal of landfill gases from the vadose zone. Based on the estimated volume of LFG in the vadose zone and number of unaffected gas probes, continued operation of the LFG and SVE systems is recommended to remove gases from the vadose zone and achieve a balanced extraction rate for the LFG wells. Current levels of operating, monitoring and system balancing will need to be maintained to ensure the optimum performance of both the LFG and SVE systems, while preventing potential detrimental conditions such as air intrusion and pulling of LFG into the vadose zone.

SOLID WASTE ADVISORY COMMITTEE
Discussion Form
April 15, 2024

AGENDA ITEM 8: Compost Procurement Ordinance

PRESENTER: Jeff Hegedus, Solid Waste Division Manager

BOARD ACTION: **Action Item** **Discussion** ☑ **Information**

SIGNIFICANT POINTS OR EXECUTIVE SUMMARY

In support of reducing greenhouse gas emissions generated from the landfilling of waste organic materials, House Bill 1799 established new goals and requirements for diverting organic materials from landfills. House Bill 1799 mandates diversion of 75% of total organic waste by 2030, and an additional goal of diverting 20%, by volume, of landfill-bound edible food waste to rescue organizations by 2025.

As required by RCW 43.19A.120, *Use of compost products in projects*, local governments shall adopt a compost procurement ordinance to utilize compost products, when feasible. RCW 43.19A.150, *Cities and counties required to adopt a compost procurement ordinance-report,* implements RCW 43.19A.120.

As recommended by SWAC, BOCC has approved an amendment to Chapter 13.02A, *Solid Waste Disposal*, by adding a new section, Chapter 13.02A.085, *Compost procurement and use*, as attached.

COMMITTEE ROLE / ACTION REQUESTED

ATTACHMENT(S)

- Compost procurement ordinance and associated support documents

BEFORE THE BOARD OF COUNTY COMMISSIONERS
OF ISLAND COUNTY, WASHINGTON

IN THE MATTER OF AMENDING TITLE XIII, CHAPTER 13.02A -SOLID WASTE DISPOSAL OF THE ISLAND COUNTY CODE	ORDINANCE NO. C- 05 -24

WHEREAS, in support of reducing greenhouse gas emissions generated from the landfilling of waste organic materials, House Bill 1799 established new goals and requirements for diverting organic materials from landfills; and

WHEREAS, to successfully divert waste organic materials from being landfilled, the commercial demand for composted products, made from waste organic materials, must be increased; and

WHEREAS, to increase commercial demand for compost products, local governments are now required to utilize compost products, subject to conditions, in public projects; and

WHEREAS, both RCW 43.19A.120, *Use of compost products in projects*, and RCW 43.19A.150, *Cities and counties required to adopt a compost procurement ordinance-report*, now require that local governments shall adopt a compost procurement ordinance to utilize compost products.

NOW, THEREFORE,

IT IS HEREBY ORDAINED, in compliance with the new requirement, that the Board of Island County Commissioners hereby amends Chapter 13.02A, *Solid Waste Disposal*, by adding a new section, Chapter 13.02A.085, *Compost procurement and use*, as attached in Exhibit A, effective March 1, 2024.

ADOPTED this 19th day of March, 2024.

BOARD OF COUNTY COMMISSIONERS
ISLAND COUNTY, WASHINGTON

Jill Johnson, Chair

Melanie Bacon, Member

Janet St. Clair, Member

BOARD OF CO. COMMISSIONERS EST ISLAND COUNTY 1853 WASHINGTON

TITLE XIII – PUBLIC WORKS

Chapter 13.02A – Solid Waste Disposal

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13.02A.080 - Recycling.

Nothing in this chapter shall be construed to prohibit or inhibit waste recycling at reclamation sites so long as otherwise conducted in accord with applicable laws, rules, and regulations. A reclamation site shall be subject to permit requirements of the Health Department.

(Ord. R-80-86, November 3, 1986, vol. 26, p. 122)

13.02A.085 Compost procurement and use.

A. For the purposes of this section, 'compost' is 'composted material' as defined in RCW 70A.205.015(3), which is organic solid waste that has been subjected to controlled aerobic degradation at a solid waste facility. As further defined in RCW 43.19A.010(2), 'compost products' means mulch, soil amendments, ground cover, or other landscaping material derived from the biological or mechanical conversion of biosolids or cellulose-containing waste materials.

B. As per RCW 43.19A.120(1), when planning county-funded projects or soliciting and reviewing bids for such projects, county departments shall consider whether compost products can be reasonably utilized. Subject to subsection D of this section, should it be determined that compost products may be utilized, county departments shall implement the purchase and use of compost products.

C. As per RCW 43.19A.150(3), county departments shall plan for the potential use of compost, in any of the following categories, that are applicable to departmental operations and project types:

1. Landscaping projects;
2. Construction and postconstruction soil amendments;
3. Applications to prevent erosion, filter stormwater runoff, promote vegetative growth, or improve the stability and longevity of roadways; and
4. Low-impact development of green infrastructure to filter pollutants or to keep water on site, or both.

D. Notwithstanding subsections B and C of this section, county departments are not required to use compost products if:

1. Compost products are not available within a reasonable time;
2. Compost purchase prices are not reasonable or competitive;
3. Compost products that are available do not comply with existing purchasing standards and/or project requirements; and/or

4. Available compost products do not comply with federal or state health, quality, or safety standards.

E. As per RCW 49.19A.150(6), county departments shall give priority to purchasing compost products from parties that:

1. Produce compost products locally;
2. Are currently certified by a suitable nationally recognized organization (as determined by the county);
3. Are appropriately permitted, as may be required, by the applicable jurisdictional authority; and
4. Produce compost products that are derived from municipal solid waste compost programs and meet quality standards comparable to standards as adopted by the Department of Transportation or adopted by rule by the Department of Ecology.

F. County departments that use compost products for projects subject to this section shall report the following information to the Public Works Department/ Solid Waste Division by December 1 of each year:

1. The volume and cost of compost purchased in that year; and
2. The source or sources of the compost purchased by in that year.

G. As per RCW 43.19A.150(4), the Public Works Department/ Solid Waste Division shall develop strategies to inform residents about the value of compost and how the county uses compost products in its operations in the county's comprehensive solid waste management plan adopted pursuant to RCW 70A.205.045.

H. As required by RCW 43.19A.150(5), by December 31, 2024, and each December 31 of even-number years thereafter, the Public Works Department/ Solid Waste Division shall submit a report, covering the previous year's compost procurement activities, to the Department of Ecology that contains the following information:

1. The total tons of organic material diverted throughout the year;
2. The volume and cost of compost products purchased throughout the year; and
3. The source or sources of the compost products.

13.02A.090 - Unlawful disposal of solid waste.

A. It is unlawful for any person to dump or deposit or permit the dumping or depositing of any solid waste onto or under the surface of the ground or into the waters of this state except at a solid waste disposal site/interim handling facility for which there is a valid permit; provided that nothing herein shall prohibit a person from dumping or depositing solid waste resulting from his own activities onto or under the surface of ground owned or leased by him when such action does not violate statutes or ordinances or create a nuisance.