



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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February 11, 2022

Yakima Health District
ATTN: Shawn Magee
Environmental Health Director
1210 Ahtanum Ridge Drive
Union Gap, WA 98903

RE: DTG Yakima Limited Purpose Landfill New Cell Development – Hydrogeology Comments

Dear Shawn,

The facility is regulated under Washington Administrative Code (WAC) 173-350, which establishes minimum functional standards that the Yakima Health District (YHD) must enforce to ensure compliance with a limited purpose landfill (LPL). After DTG Recycle (DTG) approached the Washington State Department of Ecology (Ecology) and YHD late last year with news that DTG expected to begin filling a new landfill cell in January, Ecology raised concern that a review could take some time and recommended discussions about the new cell as soon as possible. Since that time, Ecology has been conducting additional review of the available information related to the facility. Our comments from this review will come in the form of two letters. This letter addressing Hydrogeology and a second letter addressing Facility Operations and Engineering. We are taking this approach to get comments out as timely as possible.

The technical assistance provided below is based on the known information available to Ecology at the time of this writing. If there is additional documentation that DTG or the YHD can provide, it may help better inform Ecology. Upon review of any additional information, new technical assistance in the future may follow.

Background

The DTG-Anderson Limited Purpose Landfill is located on the north slope of Cowiche Mountain west of Yakima, WA in Yakima County. The landfill is regulated under WAC 173-350 and operates under the jurisdiction of YHD under permit HSW2019-00020. The facility also includes a Petroleum Contaminated Soils (PCS) Treatment Facility and a Material Recovery Facility (MRF) that also operates under the jurisdiction of YHD permits HSW2020-00001 and HSW2020-00003, respectively. This landfill does not have a bottom liner and includes two groundwater monitoring wells along the northern boundary of the facility.

DTG Anderson Limited Purposed Landfill New Cell Development Permit Application

After a significant amount of additional review of facility documentation and WAC 173-350, Ecology finds that the hydrogeologic characterization of the site, and the resulting groundwater monitoring network, fails to meet the requirements of WAC 173-350-500. This conclusion is based on review of:

- 2007 Geotechnical and Hydrogeologic Investigation Report (HWA 2007).
- The second submittal of the same report HWA 2007 report with no changes (HWA 2015).
- Review of data collected at the facility to date.
- Publicly available geologic information in the site vicinity.
- Correspondence letters:
 - *RE: Anderson Limited Purpose Landfill, Petroleum Contaminated Soils Site and Material Recovery Facility Application*, Washington State Department of Ecology, January 23, 2020.
 - *RE: DTG Yakima/Anderson Limited Purpose Landfill and Petroleum Contaminated Soil Site Application*, Washington State Department of Ecology, April 30, 2020.
 - *Review of DTG Limited Purpose Landfill permit application and the DTG Petroleum Contaminated Soil Remediation Facility permit application, both received on March 30, 2020*, Yakima Health District, May 18, 2020.

Ecology recommends additional work to gather more information regarding geologic and hydrogeologic characteristics under the existing and proposed new cell, and design a groundwater monitoring network, which meets the requirements of WAC 173-350-500.

Specifically, groundwater monitoring and site characterization required by WAC 173-350-500(2) includes a detailed list of items required for landfill site characterization. The requirements include investigation of faults, joints and fractures, unstable slopes and subsidence areas, a site specific borehole program, a site-specific flow path analysis, a well survey, site water balance calculation, and conceptual monitoring network design. Many of these items received cursory investigation in the 2007 and 2015 applications, but in many ways left more questions than answers. While we understand that addressing the items identified in this letter may seem like a burden for DTG and may impact the landfill's operation, the recommendations described below are intended to ensure compliance with the requirements of WAC 173-350, and to protect human health and the environment.

Hydrogeology

Per WAC 173-350-500, the groundwater monitoring network must have enough wells to yield representative samples and sufficient data to interpret groundwater flow paths during each sampling event. ***It does not appear, from the information that Ecology has on file, that the existing monitoring network is satisfactory to meet these regulatory requirements.***

The existing monitoring network is comprised of two monitoring wells along the northern boundary of the facility. These wells are presumed to be downgradient based on a potentiometric surface map provided as Figure 11 in HWA 2007. The potentiometric surface contour lines in this map were generated from data that spans 20 years and does not meet minimum quality control standards. This potentiometric surface contradicts the surface generated from concurrently collected water level data presented in Figure 10 of HWA 2007. Concurrently collected data indicates groundwater flow is toward the south in Figure 10, while Figure 11 indicates flow to the north. To date, no additional potentiometric surface maps or groundwater flow directions have been provided.

Groundwater data collected at the facility since 2006 indicates that groundwater elevation in MW-3 is consistently over 100 feet higher than the groundwater elevation in MW-2. Groundwater elevation in MW-3 also appears to exhibit much more short-term variability than MW-2. Water quality in these two monitoring wells is also distinct. Geologic cross section B-B' provided in HWA 2007 may indicate a significant discrepancy in the location of the Vantage Interbed at these two wells that was not explored. Thus, the available data suggests that these two wells may not be screened in the same aquifer and/or an unmapped geologic structure is present between them. In addition, no groundwater was encountered at Borehole BH-1 in spite of the fact that it was advanced considerably deeper than the boreholes for MW-2 and MW-3. HWA 2007 and HWA 2015 state that groundwater beneath the southern portion of the facility *“may discharge to another deeper aquifer, or flow to the west, and eventually north”*. HWA

2007 and HWA 2015 also state that “a flow boundary or discharge area likely exists somewhere between MW-2 and BH-1, possibly related to the thrust fault running under Cowiche Mountain”. Ecology can find no evidence that any attempt has been made to gather any additional information.

Review of USGS Wiley City 7.5' Quadrangle by Ecology indicates the presence of a “spring” or seep on the south side of Cowiche Mountain directly south of the facility, suggesting groundwater is present south of the facility and flowing to the south. Ecology acknowledges that the seep noted in this map may originate in a different aquifer, but the presence of seeps on the south side of the ridge could contradict the presumed groundwater flow direction. Ecology recommends that YHD work with DTG to further explore the hydrogeology at the site to ensure an adequate and complete site conceptual hydrogeologic model for the facility.

Since the design of the monitoring network must be based on accurate determination of groundwater flow direction, the existing monitoring network does not provide enough information to satisfy the regulatory requirements of WAC 173-350-500(3) Groundwater Monitoring –System Design.

Ecology recommends additional borings and monitoring well installation, and possibly the use of geophysical methods to investigate the presence or absence of potential geologic structures under the facility that may be causing this data gap.

Well Setbacks

Per WAC 173-350-400(3)(b), waste must be more than 1,000 ft from water supply wells. This facility has waste approximately 400 ft from a domestic well (denoted as Barnes '03 in HWA 2007). Based on the presumed groundwater flow direction in HWA 2007 and HWA 2015, the existing monitoring network appears to be inadequate for detection of groundwater contamination before it enters the Barnes '03 well. Ecology understands that the facility may have obtained a variance from this requirement for the current cell. However, at this time Ecology cannot support or recommend to YHD and DTG a variance for purposes of landfill expansion.

Ecology recommends an update to the landfill vicinity well survey for the proposed expansion cell to satisfy the requirement per WAC 173-350-500(2)(d). In addition, Ecology recommends installing a groundwater monitoring well between the facility and the Barnes '03 well on DTG's property and including it in the quarterly monitoring program to provide early notice of groundwater contamination to the user of Barnes '03.

Aquifer Characteristics

The aquifer performance test (APT) documented in HWA 2007 and HWA 2015, does not appear to have been conducted in a manner to yield enough meaningful information about the characteristics of the aquifer. Based on the saturated thickness of the aquifer being pumped, the appropriate monitoring well distance from the pumped well is expected to be in the range of 10 to 100 meters. The monitored wells during the test were more than 300 meters from the pumped well. In addition, the pumping duration may have been too short for drawdown to propagate to the monitoring wells. The design of the APT combined with the limited geologic information collected from lithologic logs at the site, appears to have resulted in poor quality APT data that sheds very little light on the hydrogeologic parameters of the aquifer, which makes estimates of groundwater velocity somewhat unreliable. Calculation of groundwater flow rate is required by WAC 173-350-500(2)(c) subsequent to significant additional exploratory drilling and site characterization.

Ecology recommends that at least one additional APT is conducted to properly estimate the hydraulic characteristics of aquifer(s) at the facility once additional monitoring wells are installed or the existence of a flow boundary is confirmed.

Groundwater Recharge

HWA 2007 and HWA 2015 discuss regional groundwater recharge from published sources but do little to evaluate recharge potential in the immediate vicinity of the site. The reports state that there is evidence that leakage from the Tieton Canal caused enough recharge to significantly raise water levels in nearby wells, suggesting a greater recharge potential than HWA 2007 and HWA 2015 acknowledge. While the arid climate in the area can greatly limit recharge, the presence of faults and/or fractures in the area can provide preferential flow paths that may greatly accelerate recharge.

Ecology recommends additional evidence be collected to provide more site-specific information related to recharge potential.

Faults and Geologic Structure

The hydrogeologic information outlined above suggests complex geology beneath the site as suggested by both HWA 2007 and HWA 2015. Geologic information in the area also suggest complex geology, including faults beneath the facility.

Geologic cross section C-C' provided in HWA 2007 and HWA 2015 fails to correlate the Vantage Interbed that was recorded in the drilling logs in BH-1, MW-2, and MW-3. The location of this unit corresponds to the lower limit of the first water-bearing unit encountered at the site and is

crucial to understand the hydrogeology of the site. In addition, no data has been collected at depth beneath the proposed or existing footprint of the waste. Again, Ecology recommends additional exploration at the site to create a conceptual site model that meets the requirements of WAC 173-350-500. Please note that the proposed and existing cells should be depicted on any cross sections that transect the cell locations.

HWA 2007 and HWA 2015 note the presence of a thrust fault with a surface expression on the southern face of Cowiche Mountain and likely present under the facility. The Vantage Interbed occurs along the southern edge of the LPL with a northerly dip of approximately 7 degrees. Two windows of the Vantage Interbed have also been mapped outcropping down the slope north of the site, suggesting additional faulting in the immediate area. The Grande Ronde Basalt outcrops at the top of Cowiche Mountain with a reported dip to the north of approximately 7 degrees, but windows of the Grande Ronde basalt also outcrop at the bottom of the northern slope of the mountain, with the younger Frenchman Springs Member of the Wanapum Basalt Formation in between. The recorded elevation offset in the Vantage Interbed occurrence between MW-2 and MW-3 and the corresponding 150 ft potentiometric surface difference between the two wells also suggests significant geologic structure in the area that has not been identified or described. Review of aerial photography and LiDAR datasets by Ecology indicate the presence of a linear feature resembling a scarp on the northern edge of Cowiche Mountain that could be further evidence of faulting. The thrust fault on the south side of Cowiche Mountain has been previously mapped as an inactive fault, but data from the Pacific Northwest Seismic Network indicate a number of low magnitude shallow earthquakes have been recorded since 1977 along this fault, suggesting it is active. Geomorphology off the southeastern end of Cowiche Mountain appears indicative of mass wasting events, further suggesting complex geology in the immediate vicinity of the site that has not been adequately characterized with relation to landfill activity and groundwater occurrence and flow patterns. HWA 2007 and HWA 2015 both acknowledged the possibility of additional unmapped faults at the site that have the potential to influence groundwater flow patterns. The available information for the site indicates that there may be significant poorly described faults and/or folds at the site and groundwater flow direction has not been determined. The presence of faults and/or fractures beneath the facility may provide preferential flow-paths from the surface to groundwater or between aquifers.

Based on these findings, Ecology has concluded that the existing site conceptual hydrogeologic model and groundwater monitoring network may be inadequate to ensure protection of human health and the environment. Again, for these reasons, significant additional site characterization is recommended to ensure compliance with the requirements of WAC 173-350-500. Any drilling program should include the use of X-Ray Fluorescence (XRF) analysis to

differentiate basalt formations and provide more definitive information related to faulting and folding. Ecology recommends additional investigation at the site to fully characterize the geology and hydrogeology in order to ensure regulatory compliance and to protect human health and the environment.

Petroleum Contaminated Soils

This facility includes a petroleum contaminated soil (PCS) treatment facility. PCS is stockpiled at the site and spread over ground for treatment. The facility is unlined. The existing Groundwater Sample and Analysis Plan dated March 21, 2007 and prepared by HWA Geosciences, Inc. includes no petroleum constituents. WAC 173-350-500(4)(i) requires inclusion of any other pertinent constituents based on the site specific waste profile. Ecology is concerned that the current groundwater sampling and analysis plan does not include PCS related constituents.

Ecology recommends the facility groundwater sampling and analysis plan include gasoline, diesel, and oil petroleum hydrocarbon analysis and volatile organic compounds (VOCs) via EPA Method 8260 SIM to meet the WAC 173-200 Groundwater Quality Criteria.

Electronic Data Submittal

WAC 173-350-500(5)(d) requires that all groundwater monitoring data be submitted in an electronic form compatible with Ecology's database. To date, Ecology has not received groundwater monitoring data in electronic form.

Ecology recommends that the facility's Sampling and Analysis Plan be updated to meet this requirement.

Liner Design

YHD has recently asked for clarification from Ecology regarding the need for a liner in the new cell versus using the alternative liner design used in the existing cell as is currently planned. Because of the uncertainties associated with the hydrogeologic conditions at the facility, Ecology cannot recommend an alternative liner for the new cell at this time. Significant additional information is needed for DTG to provide reasonable assurance that an alternative liner will be protective of human health and the environment.

Conclusion

Based on Ecology's review of the available information, the HWA 2007 and 2015 reports have never satisfied the requirements WAC 173-350-500(2), 173-350-500(3), 173-350-500(4), or 173-

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350-500(5). Ecology recommends that YHD and DTG work together to address the deficiencies outlined above to bring the facility into compliance with WAC 173-350-500.

Ecology appreciates the opportunity to work through the issues outlined above with YHD. For technical related questions contact Luke Lemond, Regional Hydrogeologist at (509) 379-3961 or via email at luke.lemond@ecy.wa.gov.

Sincerely,

James Rivard (Signed Digitally During COVID-19 Telework Mandate)

Regional Manager
Solid Waste Management Program
Central Regional Office

CC: Ted Silvestri, YHD
Brandon Comfort, YHD
Luke Lemond, Ecology
Kimberly Greives, Ecology
Megan Rounds, Ecology
Ecology Records