

05 February 2025

Cecilia Henderson
Washington State Department of Ecology, Northwest Region
LUST Cleanup Project Manager
P.O. Box 330316
Shoreline, WA 98133

Subject: **Response to Ecology's request dated 10 December 2024**
7235 South 228th Street, Kent, WA

Dear Ms. Henderson:

Geosyntec Consultants, Inc. (Geosyntec) prepared this technical memorandum on behalf of Lumen Corporation (Lumen), in response to the Washington State Department of Ecology (Ecology) email dated 10 December 2024 for the former Kent Facility located at 7235 South 228th Street, Kent, Washington (the Site). The Site is registered with Ecology with Cleanup Site ID 15277, Voluntary Cleanup Project No. NW3291, and Facility Site No. 42743736. In the 10 December 2024 email, Ecology requested additional information to demonstrate cleanup level compliance using statistical analysis. This memorandum response is understood to supplement the previous *Addendum to the Closure Report* which was submitted to Ecology on 30 October 2024 and the *Closure Report* which was submitted to Ecology on 19 February 2024.^{1,2} The requested statistical analysis was conducted in response to the historical analytical result for soil sample B-13 collected at two feet below ground surface by Farallon Consulting LLC in December 2013, and which had a combined diesel range and oil range organics concentration of 3,010 milligrams per kilogram (mg/kg). The following section provides details of the evaluation of statistical analysis to demonstrate compliance for the Site.

Statistical Analysis

Based on Ecology's recommendation, the historical analytical result (combined diesel range and oil range organics) for the soil sample collected from B-13 was evaluated as part of a statistical analysis of Site soil sample results using the described Ecology Guidance for Remediation of Petroleum Contaminated Sites, Section 10.1.2 and additional guidance provided in Ecology's 1992

¹ Geosyntec, 2024a. *Tech Memorandum: Addendum to Closure Report for the Former Kent Facility*, 7325 South 228th Street, Kent, Washington. 30 October.

² Geosyntec, 2024b. *Closure Report*, Kent Facility, 7235 South 228th Street, Kent, Washington. 19 February.

Statistical Guidance for Ecology Site Managers.^{3,4} As noted in Section 10.1.2 of the Guidance for Remediation of Petroleum Contaminated Sites, under the Model Toxics Control Act (MTCA), a Site may demonstrate compliance for soil through a statistical evaluation if the following three criteria are met:

- The upper 95th percentile confidence limit on the true mean concentration at the site must be less than the soil cleanup level.
- Less than 10% of the samples can exceed the soil cleanup level.
- No single sample can be greater than two (2) times the soil cleanup level.

As shown in Table 1, the historical soil analytical dataset evaluated for statistical analysis consists of a total of 26 samples collected in 2013 and 2015, including the B-13 sample collected in December 2013. The B-13 sample was the only sample found in the evaluated dataset that exceeded the MTCA Method A Cleanup Level of 2,000 mg/kg for diesel range and oil range organics, representing 3.85% of the evaluated dataset (1 of 26 samples). The combined diesel range and oil range organics concentration of 3,010 mg/kg from the B-13 sample was also less than two times the soil cleanup level (4,000 mg/kg). This information demonstrates compliance with two of the three criteria discussed above.

To evaluate the remaining third criteria, calculations were conducted in accordance with the Statistical Guidance for Ecology Site Managers, specifically following Example 11 and the formula below.

$$UCL_{95} = \exp(\bar{y} + 0.5s_y^2 + \frac{s_y H_{95}}{\sqrt{n-1}})$$

where

\bar{y} = arithmetic mean of the n transformed values $y_i = \ln x_i$

s_y = standard deviation of the transformed data

n = the number of sampled values

H_{95} = tabled values from Land (1971, 1975) determined by n and s_y

³ Washington State Department of Ecology, 2016. *Guidance for Remediation of Petroleum Contaminated Sites*. Revised June.

⁴ Washington State Department of Ecology, 1992. *Statistical Guidance for Ecology Site Managers*. 1 August.

- The standard deviation of the transformed data (natural log of the combined diesel range and oil range organic concentrations) with 26 soil samples from the Site was calculated as 1.39 (Table 1). Non-detect concentrations of diesel range and oil range organics were utilized at one-half the practical quantitation limit.
- Using the calculated standard deviation value and the number of samples (26), the H_{95} value was determined as approximately 3.1 using the attached Figure A-1.

The 95th UCL using the formula above and solving for unknowns was determined as 538.45 mg/kg (combined diesel range and oil range organics) which meets the remaining criteria as the determined value is below the MTCA Method A Cleanup Level for soil of 2,000 mg/kg. The Site is thus in compliance with soil cleanup standards in accordance with the demonstrated statistical evaluation.

Closing

We thank you for your time and review of this memorandum. If you have any questions, please contact Dave Parkinson (206.496.1446) or Dustin Jensen (206.496.1451) at your convenience.

Sincerely,



Dave Parkinson, Ph.D., L.G. (WA)
Principal



Dustin Jensen, L.G. (WA)
Senior Geologist

Enclosures:

Table 1 – Soil Sample Data for Statistical Analysis

Figure A-1 – Upper 95% Confidence Limits for a Lognormal Distribution (H Values)

Copies (Electronic, Unless Otherwise Noted):

Joseph Robertson, Regional EHS Manager, Lumen

Table 1
Soil Sample Data for Statistical Analysis
Former Lumen Kent Facility
Kent, Washington

Location	Sample Identification	Sampled by	Date Collected	Depth Collected (feet)	NWTPH DX			Transformed Data
					DRO (mg/kg)	ORO (mg/kg)	SUM of DRO +ORO ¹	
B-6	B6-5.2-5.5-120613	Farallon	12/6/2013	5.5	<66	680	713	6.569
B-7	B7-1.5-2.0-120613	Farallon	12/6/2013	2.0	<30	<61	45.5	3.818
B-9	B9-4.0-122013	Farallon	12/20/2013	4.0	<28	<56	42.0	3.738
B-10	B10-2.0-122013	Farallon	12/20/2013	2.0	<34	120	137	4.920
	B10-4.0-122013	Farallon	12/20/2013	4.0	<36	220	238	5.472
B-11	B11-2.0-122013	Farallon	12/20/2013	2.0	<33	<66	49.5	3.902
	B11-4.0-122013	Farallon	12/20/2013	4.0	<35	<71	53.0	3.970
B-12	B12-2.0-122013	Farallon	12/20/2013	2.0	<29	<57	43.0	3.761
	B12-4.0-122013	Farallon	12/20/2013	4.0	<32	<63	47.5	3.861
B-13	B13-2.0-122013	Farallon	12/20/2013	2.0	210	2,800	3010	8.010
	B13-4.0-122013	Farallon	12/20/2013	4.0	49	560	609	6.412
B-14	B14-2.0-122013	Farallon	12/20/2013	2.0	<30	<60	45.0	3.807
	B14-4.0-122013	Farallon	12/20/2013	4.0	<35	120	138	4.924
B-15	B15-2.0-122013	Farallon	12/20/2013	2.0	<38	360	379	5.938
	B15-4.0-122013	Farallon	12/20/2013	4.0	<28	<55	41.5	3.726
B-16	B16-4.0-122013	Farallon	12/20/2013	4.0	<32	<65	48.5	3.882
B-17	B17-2.0-122013	Farallon	12/20/2013	2.0	<28	<56	42.0	3.738
	B17-4.0-122013	Farallon	12/20/2013	4.0	<35	<70	52.5	3.961
TP-1	TP1-4.0-122013	Farallon	12/20/2013	4.0	<48	410	434	6.073
TP-2	TP2-4.0-122013	Farallon	12/20/2013	4.0	83	660	743	6.611
CL1	CL1-7.5	Geosyntec	8/5/2015	7.5-8.5	6.7	43	49.7	3.906
CL2	CL2-7	Geosyntec	8/5/2015	7-8	7.5	17	24.5	3.199
CL3	CL3-7	Geosyntec	8/5/2015	7-8	<4.6	29	31.3	3.444
CL4	CL4-7	Geosyntec	8/5/2015	7-8	5.4	<12	11.4	2.434
CL5	CL5-8	Geosyntec	8/5/2015	8-9	4.8	<12	10.8	2.380
CL6	CL6-9	Geosyntec	8/5/2015	9-10	7.9	31	38.9	3.661

Notes:

Bold results denote detected concentrations

Highlight exceeds Washington State Model Toxics Control Act (MTCA) Method A Cleanup Level

< = Analyte not detected at or above the PQL

-- Denotes sample was not analyzed

¹ - Non detect values are included at 1/2 the PQL for summation and calculations

Abbreviations:

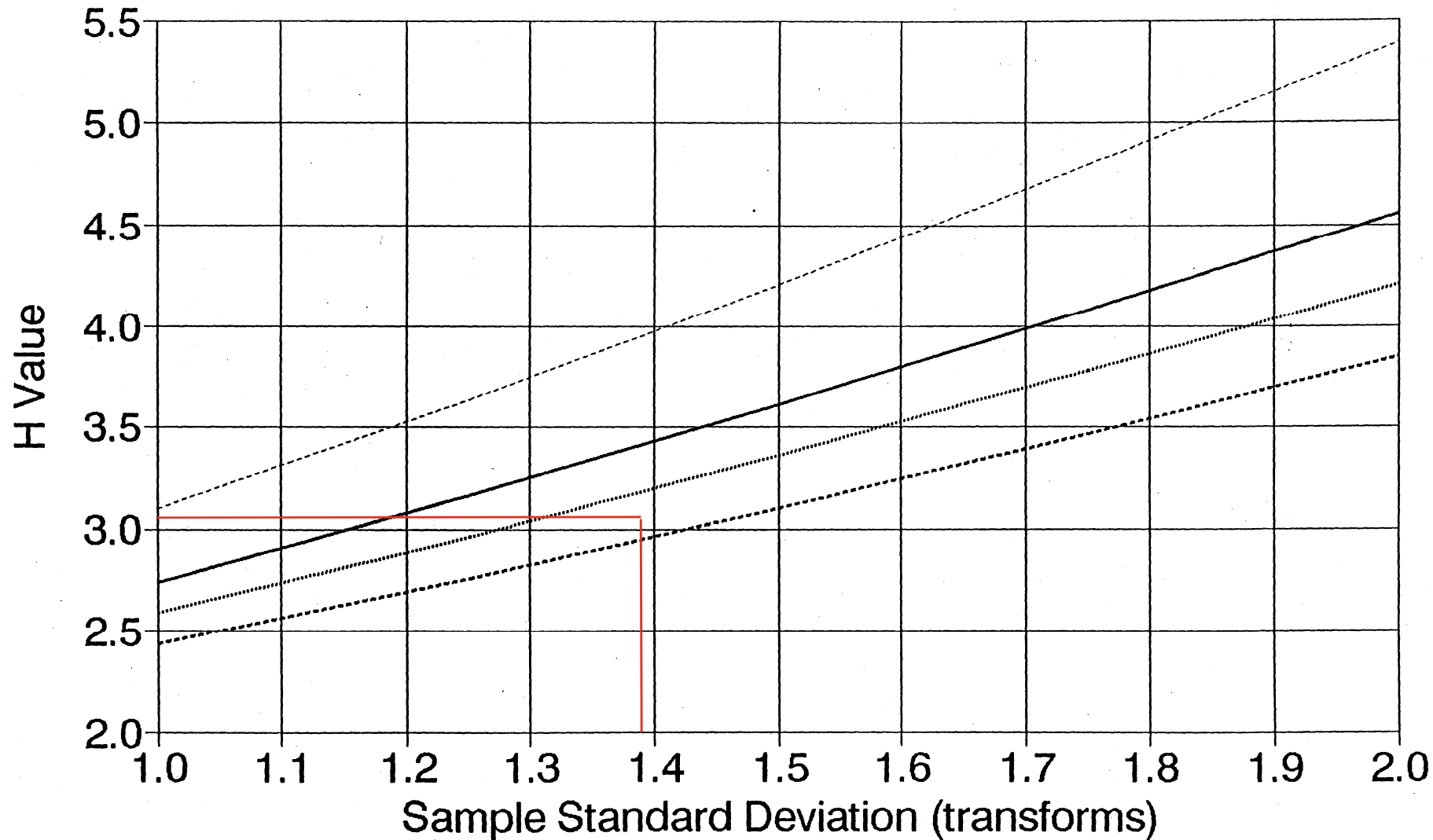
mg/kg - Milligrams per Kilogram

PQL - Practical Quantitation Limit

DRO - Diesel Range Organics

ORO - Oil Range Organics

Figure A-1. Upper 95% Confidence Limits
for a Lognormal Distribution (H values)



----- N = 10 — N = 15 N = 20 - . - . N = 30