Technical Memorandum

TO: Michael Warfel, Washington State Department of Ecology

FROM: Jenny Green, EIT, and Clint Jacob, PE, LG

DATE: July 22, 2022

RE: **Addendum No. 1**
Work Plan, Enhanced Biotic and Abiotic Trichloroethene Degradation
Beckwith & Kuffel, Inc. Site
1313 South 96th Street
Seattle, Washington
Landau Project No. 1645001.040

Introduction

At the request of Beckwith & Kuffel, Inc. (B&K), Landau Associates, Inc. (Landau) prepared this technical memorandum, which summarizes the results of a remedial design investigation (RDI), presents recent groundwater monitoring data, and provides a work plan addendum for additional remediation activities to be conducted at the B&K property located at 1313 South 96th Street in Seattle, Washington (Site; Figure 1). A routine groundwater monitoring event was conducted in April 2022. The RDI was conducted between May 6 and July 1, 2022 to refine the extent of higher concentrations of chlorinated volatile organic compound (cVOC) contamination to be addressed by additional groundwater treatment at the Site. The RDI included groundwater, soil gas, and indoor air sampling.

Additional remedial action will focus *in situ* treatment on the areas with trichloroethene (TCE) concentrations in groundwater exceeding 100 micrograms per liter (µg/L). Both biotic (biological) and abiotic (chemical) degradation of TCE and its degradation products will be stimulated through direct-push injection of a treatment reagent, GeoForm™ Extended Release (a proprietary product from Evonik Active Oxygens, LLC). GeoForm Extended Release is a sulfate-enhanced version of the EHC® product, which was injected to borings on the Wooldridge Boats (WB) property in October 2020. Semiannual groundwater monitoring will be used to evaluate the treatment performance. All activities will be conducted as part of the Washington State Department of Ecology (Ecology) Voluntary Cleanup Program (VCP). The Site VCP project number is NW3119.

A detailed discussion of the treatment approach, a groundwater monitoring plan, and a health and safety plan (HASP) are provided in the Enhanced Biotic and Abiotic Trichloroethene Degradation Work Plan (Work Plan; Landau 2020) and are incorporated by reference.

Site Groundwater Monitoring

Semiannual groundwater monitoring was conducted on April 13, 2022 at 12 wells (Figure 2) for cVOCs and bioremediation parameters. Cumulative bioremediation data are provided in Table 1. Figure 3 presents a Site plan with current and recent groundwater monitoring data.

The results from April 2022 sampling indicate residual treatment in the vicinity of MW-7 from the previous LactOil® injection in January 2018 and continued treatment in the vicinity of MW-11 from the EHC injection conducted in October 2020. The most notable observation in the April data is the reduction of TCE concentrations with the concurrent production of *cis*-1,2-dichloroethene (cDCE) and ethane, but with very little production of vinyl chloride (VC; Table 1). The low VC concentrations combined with the higher concentration of ethane compared to ethene indicate that abiotic degradation due to emplacement of zero-valent iron (ZVI) during the October 2020 injection is the predominant degradation mechanism over biotic reductive dechlorination.

Remedial Design Investigation

The RDI at the Site consisted of a groundwater and vapor intrusion investigation. Further refinement of the extent of current TCE in groundwater at concentrations greater than 100 µg/L was required in order to design an additional direct-push injection of bioremediation reagents (Landau 2022). At Ecology's request, a vapor intrusion investigation was conducted, including the collection of soil gas samples from beneath buildings located near or over the TCE groundwater plume for comparison of results to soil gas screening levels protective of indoor air. Indoor air sampling was to be triggered if soil gas concentrations exceeded applicable screening levels.

Groundwater Investigation

An additional groundwater investigation was conducted in the vicinity of monitoring wells MW-8 and MW-12. Field investigation activities involved the collection of 11 depth-discrete groundwater samples (RDI-GW1 through RDI-GW11) within the confines of monitoring wells and prior borings. Borings were advanced to a depth of 15 feet (ft) below ground surface (bgs); samples were collected from temporary wells made of polyvinyl chloride (PVC) and featured 5-ft screens. Samples were analyzed at Analytical Resources, Inc. in Tukwila, Washington for TCE, cDCE, and VC by US Environmental Protection Agency (EPA) Method SW-846 8260D.

Vapor Intrusion Investigation

Three semi-permanent sampling ports (Vapor Pins®) were installed through each building slab for collection of a total of six sub-slab soil gas samples from beneath the B&K (BK-VP1 through BK-VP3) and WB (WB-VP1 through WB-VP3) buildings. The vapor intrusion investigation in the B&K building focused on the corner of the building closest to MW-8, where TCE in April 2022 was detected at a concentration of 327 micrograms per cubic meter (µg/m^3). The three soil gas sampling locations were in the southeast corner of the machine shop, with Vapor Pins located between immovable equipment. The vapor intrusion investigation in the WB building focused on the area in the northeast corner of the building around MW-12 where TCE concentrations in groundwater are the highest, with soil gas sampling locations approximately equidistant from the monitoring well. Samples were analyzed at Eurofins Aix Toxics in Folsom, California for TCE, cDCE, and VC by EPA Method TO-15. Soil gas results were compared to screening levels protective of indoor air (industrial setting).

Contaminant concentrations in soil gas exceeded applicable screening levels, so indoor air sampling was conducted in both buildings as soon as possible following receipt of the data. Indoor air samples were analyzed at ALS Environmental Laboratory in Simi Valley, California for TCE, cDCE, and VC by EPA Method TO-15 with selective ion monitoring (SIM) to achieve lower reporting limits.

Summary of Results

The RDI results defined the extent of remaining cVOC contamination at the Site and demonstrated that cVOC concentrations in indoor air were below acceptable risk levels. Groundwater, soil gas, and indoor air data from the RDI are provided in Tables 2, 3, and 4, respectively. TCE concentrations from the RDI groundwater, soil vapor, and indoor air sampling are also shown on Figure 3.

- In the 11 direct-push groundwater samples collected:
  - TCE was detected in all 11 samples and exceeded the Model Toxics Control Act (MTCA) Method C cleanup level (5 µg/L) in eight samples. Detected concentrations ranged from 1.09 to 378 µg/L; the maximum concentration occurred at RDI-GW3, located near MW-8 on the B&K property. The estimated extent of TCE at concentrations greater than 100 µg/L is shown on Figure 3.
  - cDCE was detected in 10 samples, but exceeded the MTCA Method C cleanup level (35 µg/L) cleanup level in only two samples (RDI-GW5 and RDI-GW11) located on the B&K and WB properties. Both sampling locations are near areas of the Site where bioremediation has been implemented; cDCE is a biodegradation breakdown product of TCE.
  - VC was detected in seven samples. Concentrations exceeded the MTCA Method C cleanup level (0.29 µg/L) cleanup level in four samples (RDI-GW2, RDI-GW3, RDI-GW10, and RDI-GW11). VC is also a TCE biodegradation product, and these sampling locations are near areas of previous bioremediation injections.
- In the six soil gas samples collected:
  - TCE was detected in five samples at concentrations ranging from 23 (estimated) to 5,200 µg/m^3. TCE in four samples (BK-VP1, WB-VP1, WB-VP2, and WB-VP3) exceeded the MTCA Method C cleanup level (67 µg/m^3), which triggered indoor air sampling in both the WB and B&K buildings.
  - cDCE was detected in only two samples. This compound does not have a MTCA cleanup level at industrial sites.
  - VC was detected in only one sample at a concentration of 2.8 µg/m^3 (estimated). It did not exceed the MTCA Method C cleanup level (95 µg/m^3).
- In the four indoor air and two ambient air samples collected:
  - WB building: TCE, cDCE, and VC were not detected in the ambient air sample outside of the WB building (WB-AA1) and were not detected in either of the indoor air samples (WB-IA1 and WB-IA2).

- B&K building: TCE was detected in an indoor air sample in the B&K building (BK-IA2) at a concentration of 0.044 µg/m^3.TCE was also detected in the B&K building ambient air sample (BK-AA1) at a higher concentration of 0.065 µg/m^3, negating the results of the indoor air sample. Concentrations of cDCE and VC were not detected in the B&K building indoor air samples.

Vapor Intrusion Evaluation

Although TCE concentrations detected in groundwater at monitoring wells in the vicinity of existing site buildings exceeded the non-residential short-term vapor intrusion screening level for groundwater of 31 µg/L (Ecology 2022) and TCE concentrations in four of the six soil vapor samples exceeded the screening level, TCE and its breakdown products were not detected in indoor air of either building. This vapor intrusion evaluation shows no unacceptable risk for occupants of the WB or B&K buildings.

Implementation of Additional Treatment

To overcome the difficulty of injecting liquid amendments at this Site, *in situ* treatment will be stimulated through direct-push injection of a slurried powder substrate that will stimulate both biotic and abiotic degradation of TCE and its breakdown products. The degradation processes are explained in detail in the Work Plan (Landau 2020).

The additional treatment described in this Work Plan Addendum will be the second high-pressure injection of biotic and abiotic substrates at the Site. The first injection was performed in October 2020.

Injection Substrate

The substrate selected for the first direct-push slurry injection at the Site (October 2020) was EHC from Evonik Active Oxygens, LLC (formerly PeroxyChem, LLC; Landau 2020). EHC contains micro-scale ZVI, controlled-release food grade organic carbon, nutrients, and a food-grade binding agent. The organic carbon and ZVI stimulate concurrent and complementary biotic and abiotic degradation of TCE and its breakdown products to non-toxic end products. In addition to EHC, the injection substrate also contained 4 percent by weight of LactOil, which is an emulsified vegetable oil and ethyl lactate product that mixes easily with water and provides an additional and longer-lasting source of organic carbon.

An enhanced substrate was selected for the second direct-push slurry injection at the Site. The enhanced substrate is GeoForm Extended Release (GeoForm ER) also from Evonik Active Oxygens, LLC. GeoForm ER is an advanced formulation of EHC, where a fraction of the ZVI is replaced with soluble ferrous sulfate. The ferrous sulfate forms reactive iron sulfide minerals and also serves to sulfidate the ZVI, providing a protective coating against water corrosion to prolong the reactivity of the ZVI surface. GeoForm ER is reportedly easier to inject due to its increased fraction of soluble

substrate (Telesz 2022). Additional electron donor substrate will be provided using the Newman Zone® emulsified vegetable oil (EVO) product from RNAS Remediation Products, Inc.

Treatment Areas and Injection Grids

Injection of GeoForm ER and EVO will occur in three areas of the site where TCE groundwater concentrations exceed 100 µg/L, as characterized by monitoring wells and RDI groundwater samples. Injection points will generally be spaced approximately 8 ft apart in offset rows for a reduced effective spacing along the northerly groundwater flow path. These three areas consist of one injection grid on the B&K property and two on the WB property (one inside and one outside of the building), as shown on Figures 5 and 6 and described below:

- **B&K** – The injection grid on the B&K property is located to the north and west of the former excavation and targets TCE concentrations in groundwater in the vicinity of monitoring well MW-8. Additional injection points will be placed in a line on the Sea Mar side of the property boundary to treat the east edge of the plume. A total of 40 points are planned to target this area of contamination. Injection at these 40 points will target the interval from the water table (approximately 8 ft bgs) to 20 ft bgs.
- **WB, indoors** – An injection grid inside the WB building will target TCE concentrations in groundwater in the vicinity of monitoring well MW-12.
- **WB, outdoors** – A second injection in the area north of the WB building will target continued treatment in the vicinity of monitoring well MW-11. This area was first injected with EHC in October 2020. The new injection points will be located between the previous points. The treatment area on the WB property will occur in the vicinity of MW-12 and extend to the north into the original EHC treatment area to target TCE concentrations in groundwater exceeding 100 µg/L. Additional injection points will be placed in a line on the Sea Mar side of the property boundary to prevent migration of contamination to the east (Figure 6). Injection points will generally be spaced approximately 8 ft apart in offset rows to increase the likelihood that emplaced GeoForm ER will overlap between borings in adjacent rows. A total of 33 points are planned to target this area of contamination. Injection at these 33 points will target the interval from the water table (approximately 8 ft bgs) to 25 ft bgs. These borings will be deeper, as the WB property is 4 to 5 ft higher in elevation than the B&K property.

Slurry Design

Powdered GeoForm ER will be mixed with water and EVO (Newman Zone; RNAS Remediation Products) to create a thick slurry similar to loose cement and injected under high pressure using a direct-push drill rig.

The injection slurry will be prepared using 24,000 pounds (lbs) of GeoForm ER powder, 6,700 gallons of potable water, and 500 gallons of EVO, resulting in 8,600 gallons of slurry with a manufacturer's recommended solids concentration of 30 percent by weight. This slurry design will result in the application of approximately 23 lbs of GeoForm ER powder per vertical foot of treatment interval. This application rate is the same as the application rate used for EHC during the October 2020 injection

north of the WB building. This design approximates the manufacturer's recommendation of 20 lbs of EHC per vertical foot of boring for very tight (clayey) formations (PeroxyChem 2017); the slightly higher application rate of 23 lbs per vertical foot reflects more permeable layers of sand interspersed with silt/clay at the Site.

Method of Injection

The slurry will be injected into borings advanced using a direct-push drilling rig equipped with special tooling for injecting the slurry under high pressure (e.g., 100 to 200 lbs per square inch). In contrast to liquid injections where fluid is pushed through the pore space of the soil formation, high-pressure slurry injection creates hydro fractures in the soil formation that are filled with slurry. Contaminated groundwater is treated as it comes into contact with substrate emplaced in these hydro fractures. Radial injection of GeoForm ER slurry occurs as the injection tooling is pulled up a few feet at a time from the bottom depth. This results in radial fans of slurry-filled hydro fractures filled with GeoForm ER over the vertical treatment interval that look something like an inverted feather duster.

The outside treatment areas are paved with asphalt. After drilling and injection, the surface at each outdoor boring location will be repaired by the driller with cold patch asphalt. Boring locations inside the WB building will be cored through the concrete slab and patched with quick-set concrete.

All work will be performed in accordance with the HASP included in the Work Plan (Landau 2020). The GeoForm ER and Newman Zone safety data sheets (Attachment 1) have been reviewed in preparation of this Work Plan Addendum and appropriate procedures for safety, handling, storage, and disposal will be followed.

Injection Schedule

Injection is scheduled to begin September 6, 2022 and is anticipated to be completed in 3 weeks. Prior to drilling, both a public and a private utility locate will be performed to identify all underground utilities present at the site, where possible. Locating non-conductible utilities is not part of this scope. Therefore, Landau is not responsible for repair costs associated with damage caused to non-conductible utilities for which the owner does not provide accurate location information.

Monitoring and Reporting

Semiannual groundwater monitoring will continue at the Site to evaluate treatment progress following the 2022 injection. Analytical methods, procedures, and sampling locations are specified in the Work Plan (Landau 2020). It is anticipated that the monitoring frequency will be reduced to annual following the first three post-injection sampling events.

Regulatory Next Steps

It is anticipated that remediation levels may be proposed for TCE and its breakdown products in the future as part of a focused feasibility study for the Site. The TCE remediation level is likely to coincide with, or be somewhat lower than, the 100 µg/L MTCA Method C cleanup level used in this technical memorandum to identify the areas to be actively treated through injection. Once the remediation level is achieved at Site monitoring wells, it is anticipated that the project will transition from the active treatment phase to a phase of monitored natural attenuation (MNA). At that time, a No Further Action (NFA) with institutional control (e.g., deed restriction regarding use of groundwater) determination will be requested from Ecology. Infrequent monitoring to support MNA will continue until cleanup levels are achieved at all monitoring wells. The use of remediation levels is described in Washington Administrative Code 173-340-355.

Use of This Technical Memorandum

This technical memorandum has been prepared for the exclusive use of Beckwith & Kuffel, Inc. (client) and applicable regulatory agencies for specific application to the enhanced biotic and abiotic TCE degradation project. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau, shall be at the user's sole risk. Landau warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. Landau makes no other warranty, either express or implied.

This document has been prepared under the supervision and direction of the following key staff.

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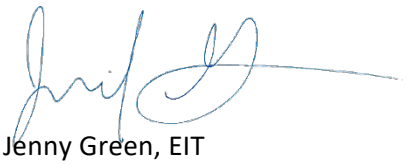

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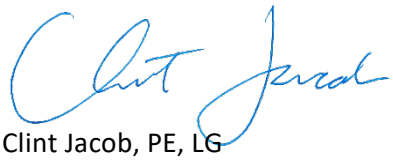

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Principal

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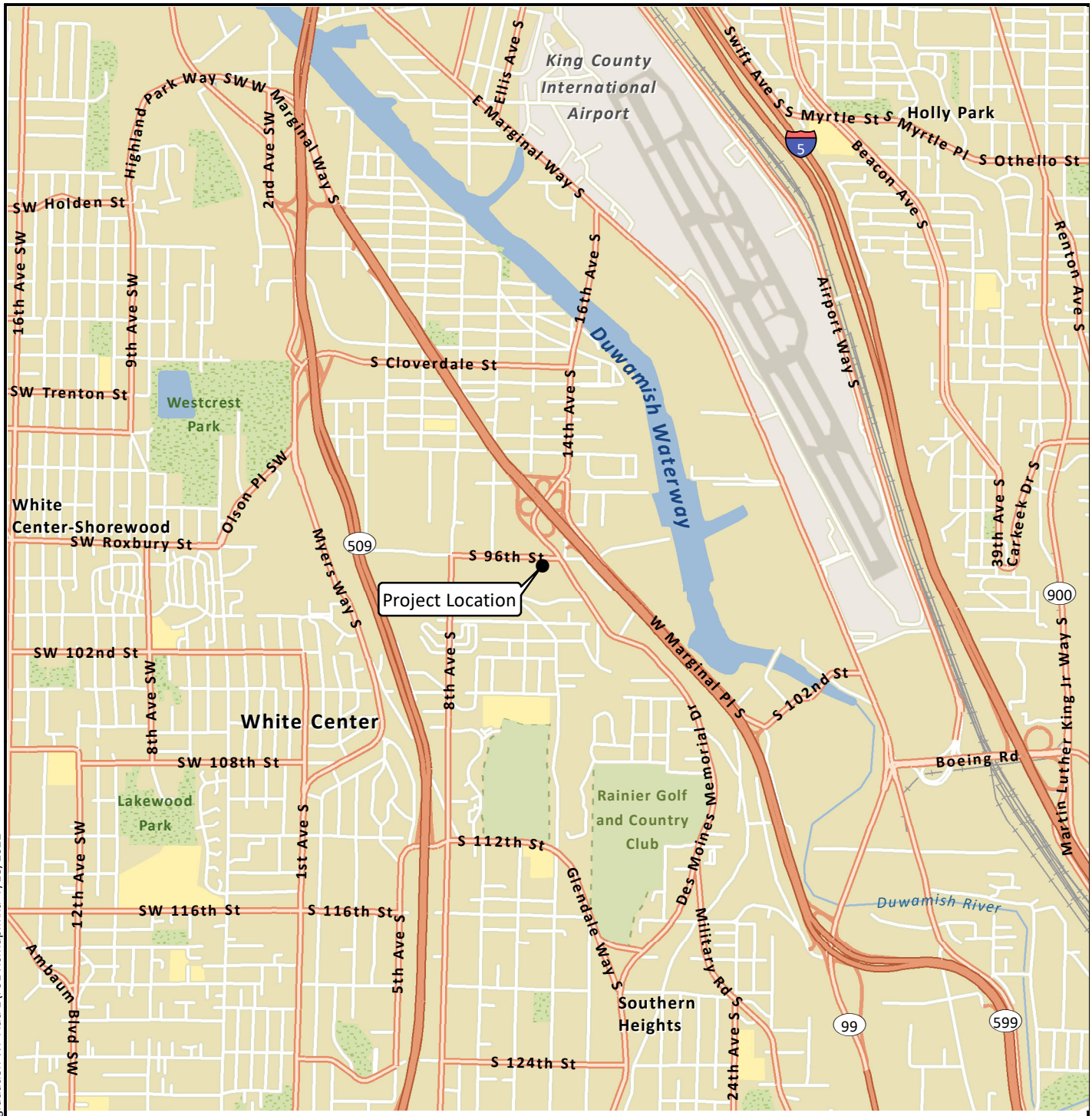
Telesz, S. 2022. Video Conference: "Call to Go Over Seattle Site - GeoForm ER vs EHC." From Stacey Telesz, Evonik Active Oxygens, LLC, to Jenny Green, Project EIT, Landau Associates, Inc. June 22.

Attachments

Figure 1: Vicinity Map
Figure 2: Chlorinated Volatile Organic Compound Sampling Results
Figure 3: Remedial Design Investigation and Recent Groundwater Monitoring Results
Figure 4: Proposed GeoForm Treatment Areas
Figure 5: Beckwith & Kuffel: Proposed GeoForm Injection Locations
Figure 6: Wooldridge Boats: Proposed GeoForm Injection Locations

Table 1: Bioremediation Data Summary
Table 2: Groundwater Analytical Results
Table 3: Soil Gas Analytical Results
Table 4: Indoor and Ambient Air Analytical Results

Attachment 1: Safety Data Sheets



Data Source: Esri.

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Beckwith & Kuffel, Inc. Seattle, Washington	**Vicinity Map**	Figure 1

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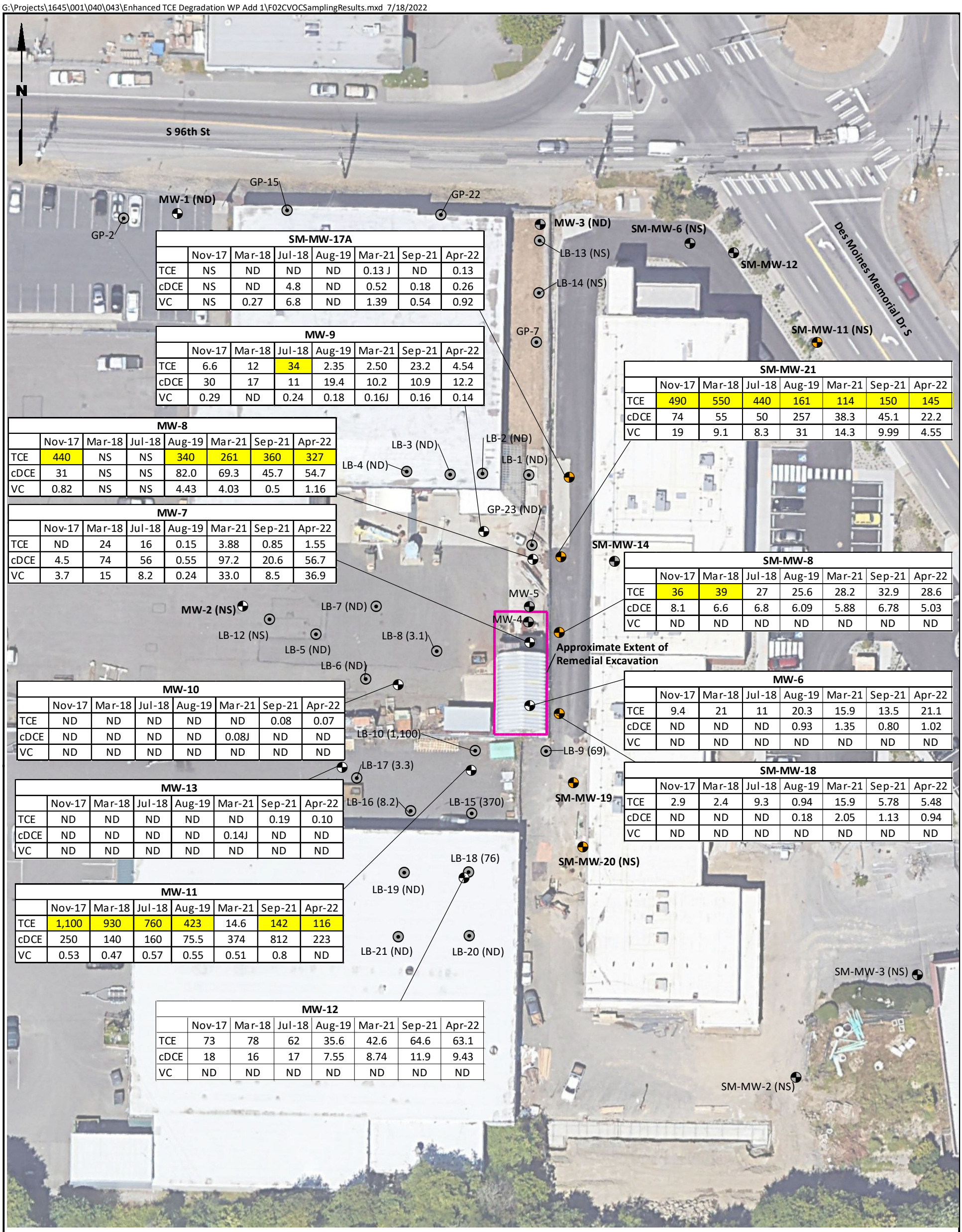

SM-MW-17A							
	Nov-17	Mar-18	Jul-18	Aug-19	Mar-21	Sep-21	Apr-22
TCE	NS	ND	ND	ND	0.13 J	ND	0.13
cDCE	NS	ND	4.8	ND	0.52	0.18	0.26
VC	NS	0.27	6.8	ND	1.39	0.54	0.92

MW-9							
	Nov-17	Mar-18	Jul-18	Aug-19	Mar-21	Sep-21	Apr-22
TCE	6.6	12	34	2.35	2.50	23.2	4.54
cDCE	30	17	11	19.4	10.2	10.9	12.2
VC	0.29	ND	0.24	0.18	0.16J	0.16	0.14

SM-MW-21							
	Nov-17	Mar-18	Jul-18	Aug-19	Mar-21	Sep-21	Apr-22
TCE	490	550	440	161	114	150	145
cDCE	74	55	50	257	38.3	45.1	22.2
VC	19	9.1	8.3	31	14.3	9.99	4.55

MW-8							
	Nov-17	Mar-18	Jul-18	Aug-19	Mar-21	Sep-21	Apr-22
TCE	440	NS	NS	340	261	360	327
cDCE	31	NS	NS	82.0	69.3	45.7	54.7
VC	0.82	NS	NS	4.43	4.03	0.5	1.16

MW-7							
	Nov-17	Mar-18	Jul-18	Aug-19	Mar-21	Sep-21	Apr-22
TCE	ND	24	16	0.15	3.88	0.85	1.55
cDCE	4.5	74	56	0.55	97.2	20.6	56.7
VC	3.7	15	8.2	0.24	33.0	8.5	36.9

SM-MW-8							
	Nov-17	Mar-18	Jul-18	Aug-19	Mar-21	Sep-21	Apr-22
TCE	36	39	27	25.6	28.2	32.9	28.6
cDCE	8.1	6.6	6.8	6.09	5.88	6.78	5.03
VC	ND	ND	ND	ND	ND	ND	ND

MW-10							
	Nov-17	Mar-18	Jul-18	Aug-19	Mar-21	Sep-21	Apr-22
TCE	ND	ND	ND	ND	ND	0.08	0.07
cDCE	ND	ND	ND	ND	0.08J	ND	ND
VC	ND	ND	ND	ND	ND	ND	ND

MW-6							
	Nov-17	Mar-18	Jul-18	Aug-19	Mar-21	Sep-21	Apr-22
TCE	9.4	21	11	20.3	15.9	13.5	21.1
cDCE	ND	ND	ND	0.93	1.35	0.80	1.02
VC	ND	ND	ND	ND	ND	ND	ND

MW-13							
	Nov-17	Mar-18	Jul-18	Aug-19	Mar-21	Sep-21	Apr-22
TCE	ND	ND	ND	ND	ND	0.19	0.10
cDCE	ND	ND	ND	ND	0.14J	ND	ND
VC	ND	ND	ND	ND	ND	ND	ND

SM-MW-18							
	Nov-17	Mar-18	Jul-18	Aug-19	Mar-21	Sep-21	Apr-22
TCE	2.9	2.4	9.3	0.94	15.9	5.78	5.48
cDCE	ND	ND	ND	0.18	2.05	1.13	0.94
VC	ND	ND	ND	ND	ND	ND	ND

MW-11							
	Nov-17	Mar-18	Jul-18	Aug-19	Mar-21	Sep-21	Apr-22
TCE	1,100	930	760	423	14.6	142	116
cDCE	250	140	160	75.5	374	812	223
VC	0.53	0.47	0.57	0.55	0.51	0.8	ND

MW-12							
	Nov-17	Mar-18	Jul-18	Aug-19	Mar-21	Sep-21	Apr-22
TCE	73	78	62	35.6	42.6	64.6	63.1
cDCE	18	16	17	7.55	8.74	11.9	9.43
VC	ND	ND	ND	ND	ND	ND	ND

Legend

MW-12 Monitoring Well (Landau)
SM-MW-11 Monitoring Well (Sea Mar)
MW-4 Former Monitoring Well
LB-1 Former Direct-Push Boring

Boring Name — LB-16 (8.2) — Maximum TCE concentration detected in groundwater grab sample collected at time of drilling (2016)

MW-12				
	Nov-17	Mar-18	Jul-18	
TCE	73	78	62	

- Monitoring Well Designation
- Sampling Date
- Detected Concentration (µg/L)

└ Detected Analyte

0 50 100
Scale in Feet

Data Source: Sea Mar; Google Earth Imagery.

Notes

1. Highlighted results exceed the 31 µg/L short-term TCE vapor intrusion screening level.
2. All detected concentrations are reported in micrograms per liter (µg/L).
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

cDCE = *cis*-1,2-dichloroethene
ND = not detected
NS = not sampled
TCE = trichoroethene
VC = vinyl chloride

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Beckwith & Kuffel, Inc.
Seattle, Washington

Chlorinated Volatile Organic Compound Sampling Results

Figure 2

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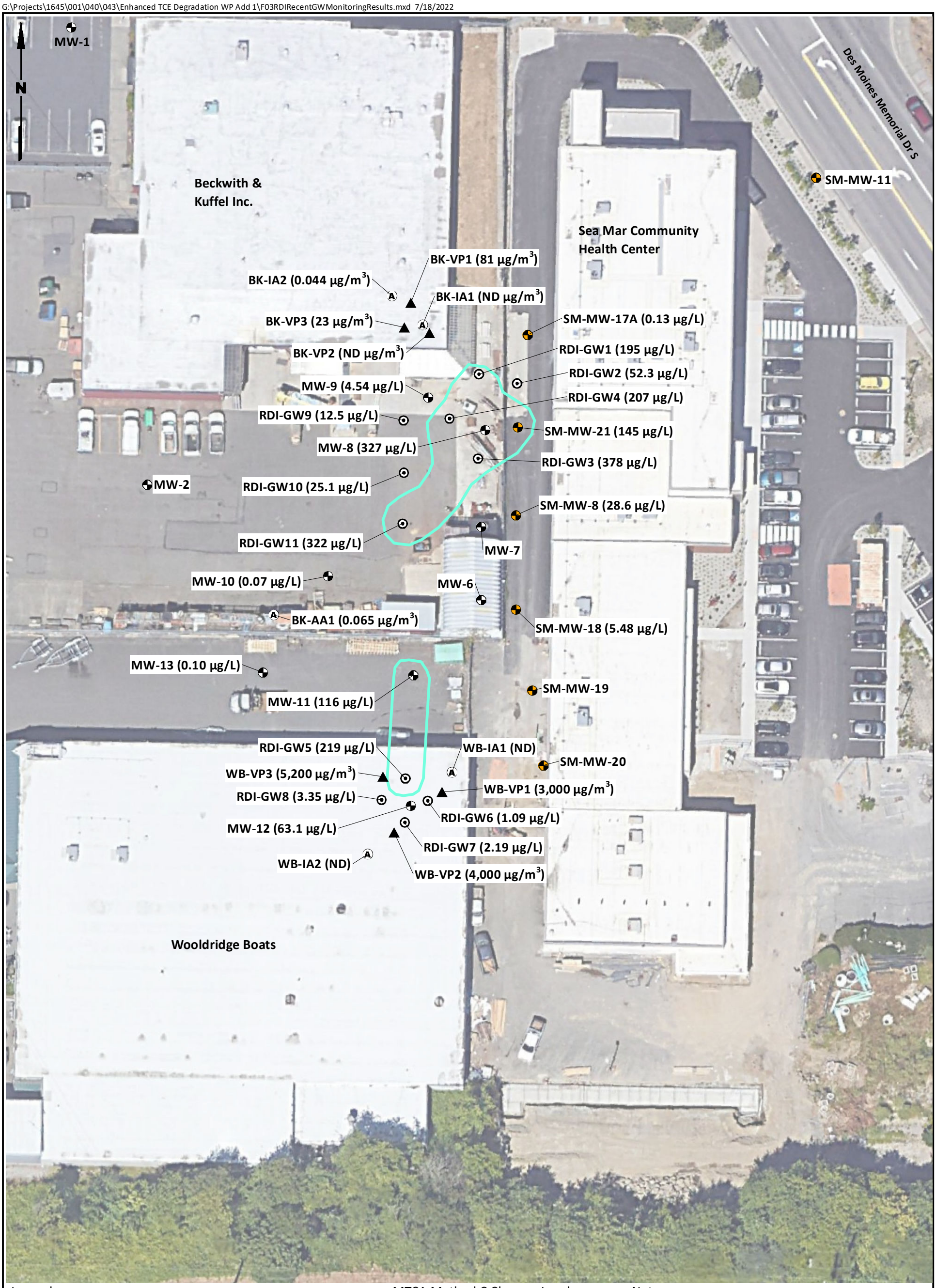

Legend

- Ambient/Indoor Air Sample Location
- Groundwater Sample Location
- Soil Gas Sample Location
- Monitoring Well (LAI)
- Monitoring Well (Sea Mar)
- Approximate Area of TCE >100 µg/L

MW-12 (63.1 µg/L)
Sampe ID — TCE Concentration

0 40 80
Scale in Feet

MTCA Method C Cleanup Levels

Groundwater = 5.0 µg/L
Soil gas = 67 µg/m3
Indoor air = 2.0 µg/m3

Notes

1. Groundwater monitoring at existing site wells performed in April 2022. RDI sampling performed in May-July 2022.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Sea Mar; Google Earth Imagery.

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Beckwith & Kuffel, Inc.
Seattle, Washington

RDI and Recent Groundwater Monitoring Results

Figure 3

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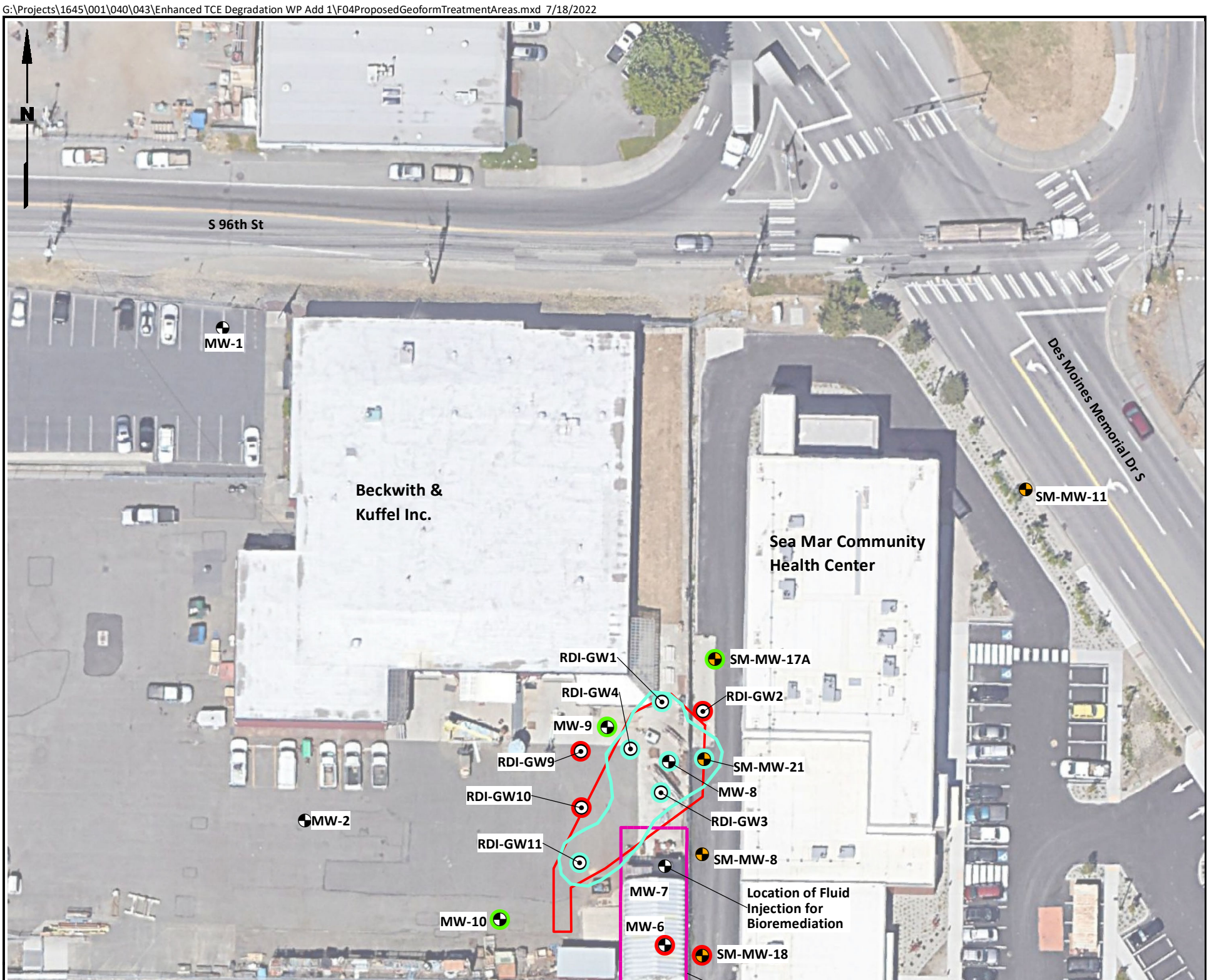

Legend

- Groundwater Sampling Location
- Monitoring Well (Landau)
- Monitoring Well (Sea Mar)
- Proposed GeoForm ER Treatment Area
- Approximate Area of TCE >100 µg/L
- EHC Treatment Area

TCE Concentrations

- Below 5 µg/L Cleanup Level
- Above 5 µg/L Cleanup Level
- Above 100 µg/L

Notes

1. Groundwater monitoring at existing site wells performed in April 2022. RDI sampling performed in May-July 2022.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Sea Mar; Google Earth Imagery.

0 50 100

Scale in Feet

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Beckwith & Kuffel, Inc. Seattle, Washington	**Proposed GeoForm Treatment Areas**	Figure 4

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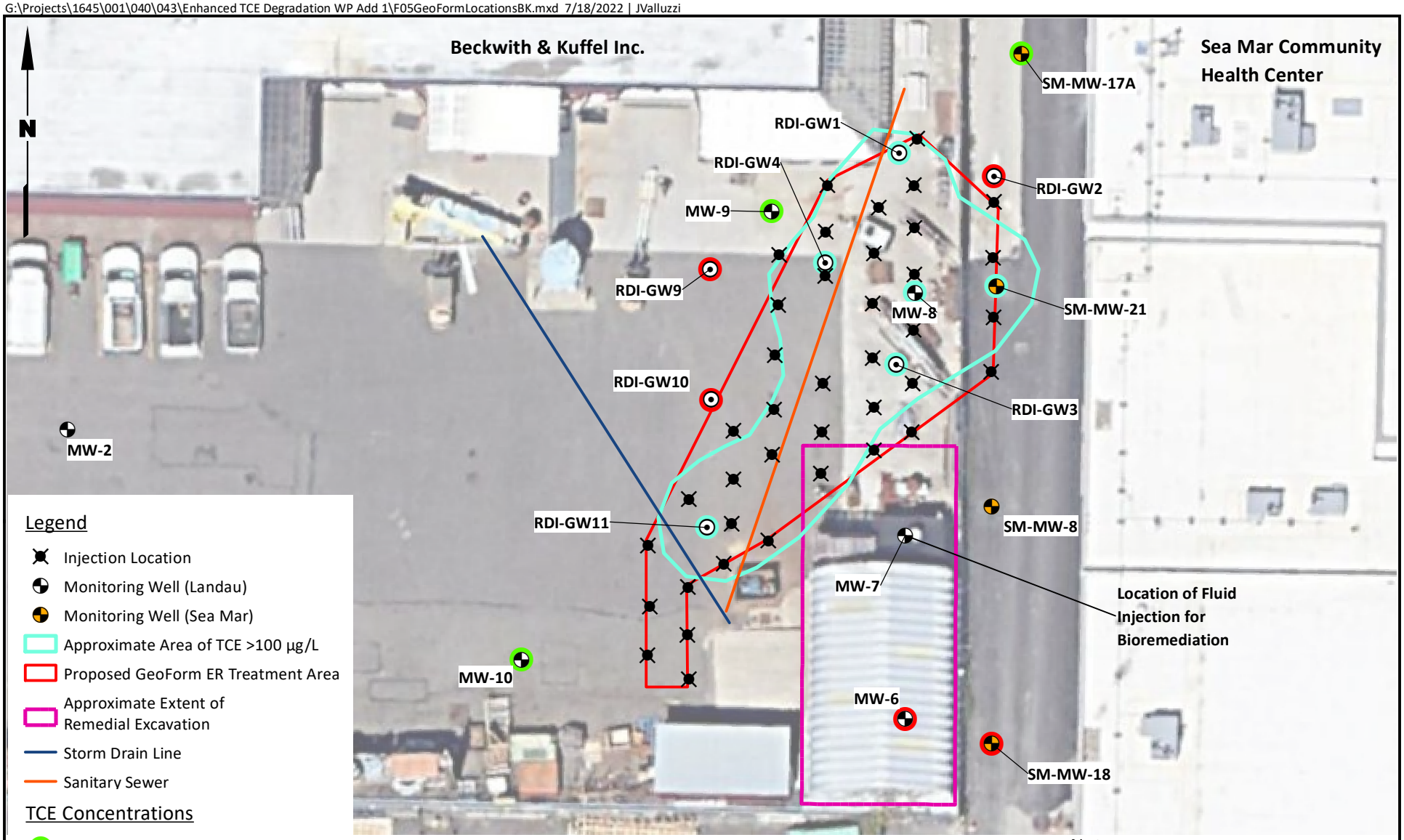

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Sea Mar; Google Earth Imagery

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Beckwith & Kuffel, Inc.
Seattle, Washington

Beckwith & Kuffel:
Proposed GeoForm Injection Locations

Figure
5

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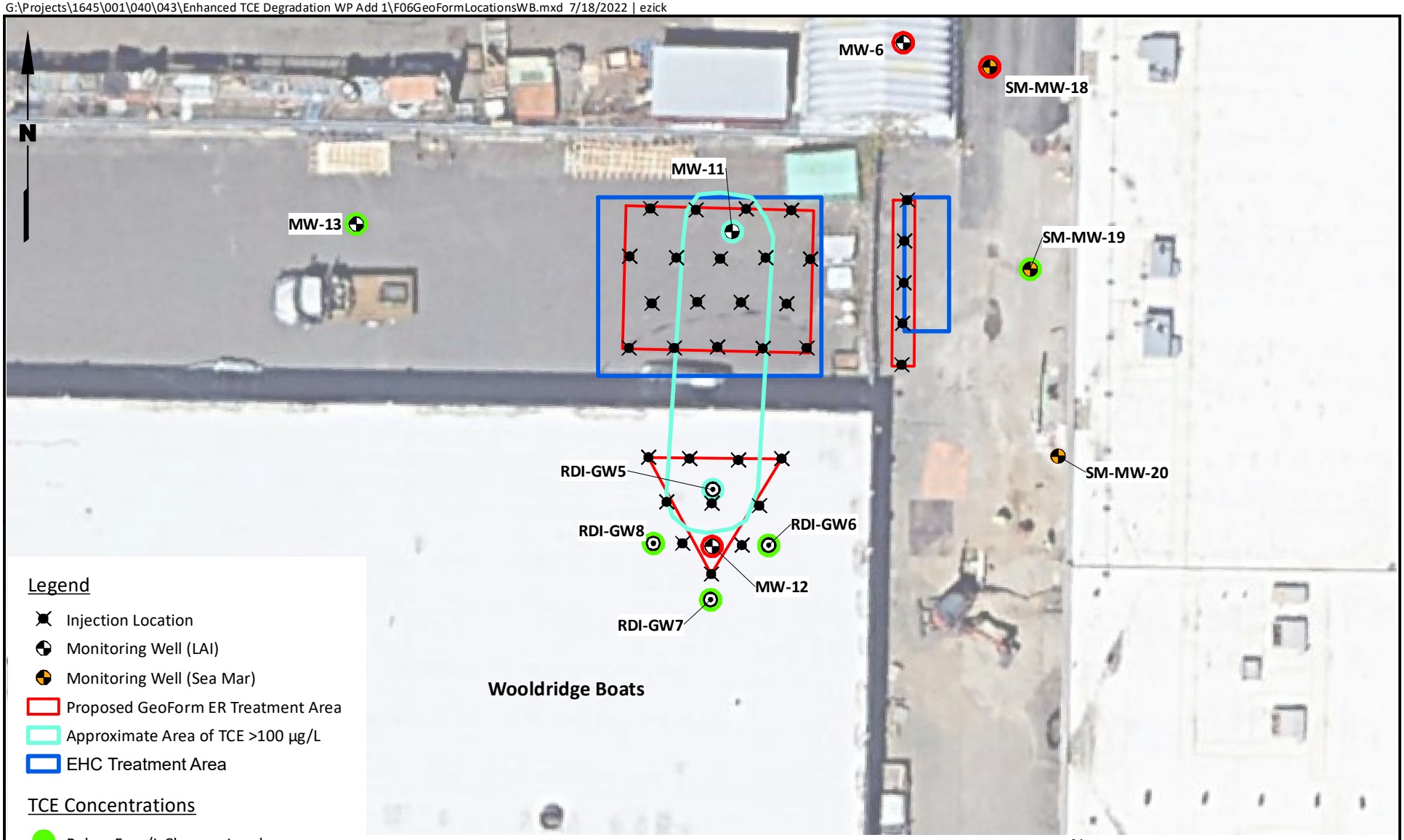

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Sea Mar; Google Earth Imagery

LANDAU ASSOCIATES

Beckwith & Kueffel, Inc.
Seattle, Washington

Wooldridge Boats:
Proposed GeoForm Injection Locations

Figure
6

Table 1
Bioremediation Data Summary
Beckwith & Kuffel, Inc.
Seattle, Washington

Sampling Location	Date Sampled	Elapsed Time (days)		Volatile Organic Compounds						Aquifer Redox Conditions						Treatment Indicators		
		Source Zone Electron Donor Injection	EHC Direct-Push Injection	PCE (µg/L)	TCE (µg/L)	cDCE (µg/L)	VC (µg/L)	Ethene (µg/L)	Ethane (µg/L)	DO (mg/L)	ORP (mV)	Methane (mg/L)	Nitrate-N (mg/L)	Sulfate (mg/L)	Iron II (mg/L)	TOC (mg/L)	Acetylene (µg/L)	pH
MTCA Method C Cleanup Level or ARAR[a]				5	5/31[b]	35	0.29	--	--	--	--	--	--	--	0.3[c]	--	--	--
MW-12	11/7/2017	-77		--	**73.0**	**18.0**	ND	ND	ND	0.69	47.1	ND	1	53	NA	3.6	ND	6.74
	3/22/2018	58		--	**78.0**	**16.0**	ND	ND	ND	0.58	92.9	ND	1.1	48	ND	4.1	ND	6.39
	7/2/2018	160		--	**62.0**	**17.0**	ND	ND	ND	--	--	ND	1.1	51	--	3.8	ND	--
	8/28/2019	582	-414	--	**35.6**	**7.55**	ND	ND	ND	0.49	18	0.00279	0.607	46.8	ND	2.69	ND	6.88
	3/9/2021	1141	145	--	**42.6**	**8.74**	ND	ND	ND	2.09	154.7	0.0035	ND	31.3	0.0	2.72	ND	6.44
	9/30/2021	1346	350	--	**64.6**	**11.9**	ND	ND	**1.33**	0.59	108.2	0.00614	0.106	36.1	0.0	3.01	ND	6.27
	4/13/2022	1541	545	--	**63.1**	**9.43**	ND	ND	ND	2.13	168.8	0.00115	0.150	35.7	0.0	2.6	ND	6.21
MW-13	11/7/2017	-77		--	ND	ND	ND	ND	ND	1.77	51.8	ND	ND	130	--	2.8	ND	6.46
	3/22/2018	58		--	ND	ND	ND	ND	ND	0.36	85.0	ND	ND	93	ND	3.6	ND	6.34
	7/2/2018	160		--	ND	ND	ND	ND	ND	0.36	84.5	0.020	ND	120	ND	4.3	ND	--
	8/28/2019	582	-414	--	ND	ND	ND	ND	ND	5.34	48.0	0.0163	ND	106	ND	3.55	ND	6.31
	3/9/2021	1141	145	--	ND	**0.14**	ND	ND	ND	3.98	-23.9	0.017	ND	68.2	0.0	3.35	ND	6.34
	9/30/2021	1347	351	--	**0.19**	ND	ND	ND	ND	0.41	16.4	0.034	ND	114	0.0	4.23	ND	6.29
	4/13/2022	1541	545	--	**0.10**	ND	ND	ND	ND	1.33	167.0	0.191	ND	95.8	0.0	4.06	ND	5.77
SM-MW-19	9/12/2016			--	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--
	11/7/2017	-77		--	ND	ND	ND	ND	ND	0.69	35.6	ND	17	220	--	1.5	ND	6.41
	3/22/2018	58		--	ND	ND	ND	ND	ND	0.39	104	ND	12	160	ND	1.9	ND	6.36
	7/2/2018	160	-836	--	ND	ND	ND	ND	ND	0.39	104	ND	18	180	ND	6.1	ND	--
MW-11	11/7/2017	-77		--	**1,100**	**250**	**0.53**	ND	ND	--	--	ND	0.5	140	--	5.4	ND	--
	3/22/2018	58		--	**930**	**140**	**0.47**	ND	ND	0.64	65.2	ND	0.7	110	ND	3.2	ND	6.32
	7/2/2018	160		--	**760**	**160**	**0.57**	ND	ND	0.64	65.2	0.050	0.87	84	ND	3.1	ND	--
	8/28/2019	582	-414	--	**423**	**75.5**	**0.55**	ND	ND	4.30	52.7	0.019	1.07	207	ND	3.46	ND	6.42
	3/9/2021	1141	145	--	**14.6**	**374**	**0.51**	**3.70**	**19.2**	0.86	-86.2	9.920	ND	4.95	1.4	157.4	ND	6.49
	9/30/2021	1346	350	--	**142**	**812**	**0.8**	ND	**51.2**	0.43	-46.3	4.230	ND	92.2	4.0	3.68	ND	6.37
	4/13/2022	1541	545	--	**116**	**223**	ND	**1.54**	**22.6**	1.29	126.7	6.69	ND	140	3.0	5.81	ND	5.92
MW-10	11/7/2017	-77		ND	ND	ND	ND	ND	ND	0.72	43.4	ND	ND	74	--	6.9	ND	6.66
	3/22/2018	58		ND	ND	ND	ND	ND	ND	1.73	124	ND	ND	49	1.5	5	ND	6.69
	7/2/2018	160		ND	ND	ND	ND	ND	ND	1.73	124	0.020	ND	65	1.5	5.4	ND	--
	8/28/2019	582	-414	--	ND	ND	ND	ND	ND	4.54	91.1	0.00224	ND	65.3	ND	2.46	ND	6.60
	3/9/2021	1141	145	--	ND	**0.08**	ND	ND	ND	0.86	-31.5	ND	ND	45.2	0.0	2.07	ND	6.70
	9/30/2021	1347	351	--	**0.08**	ND	ND	ND	ND	6.6	7.7	0.005	ND	56.2	0.0	2.29	ND	6.60
	4/13/2022	1541	545	--	**0.07**	ND	ND	ND	ND	0.50	91.5	ND	ND	57.3	0.0	2.07	ND	6.20

Table 1
Bioremediation Data Summary
Beckwith & Kuffel, Inc.
Seattle, Washington

Sampling Location	Date Sampled	Elapsed Time (days)		Volatile Organic Compounds						Aquifer Redox Conditions						Treatment Indicators		
		Source Zone Electron Donor Injection	EHC Direct-Push Injection	PCE (µg/L)	TCE (µg/L)	cDCE (µg/L)	VC (µg/L)	Ethene (µg/L)	Ethane (µg/L)	DO (mg/L)	ORP (mV)	Methane (mg/L)	Nitrate-N (mg/L)	Sulfate (mg/L)	Iron II (mg/L)	TOC (mg/L)	Acetylene (µg/L)	pH
MTCA Method C Cleanup Level or ARAR[a]				**5**	**5/31[b]**	**35**	**0.29**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**0.3[c]**	**--**	**--**	**--**
MW-6	2/20/2014			--	**85**	**2.17**	ND	--	--	--	--	--	--	--	--	--	--	--
	5/21/2014			--	**18.9**	ND	ND	--	--	--	--	--	--	--	--	--	--	--
	8/22/2014			--	**88.6**	**2.99**	ND	--	--	--	--	--	--	--	--	--	--	--
	9/30/2016			--	**16**	ND	ND	--	--	--	--	--	--	--	--	--	--	--
	11/7/2017	-77		--	**9.4**	ND	ND	ND	ND	--	--	ND	ND	29	--	2.4	ND	--
	3/22/2018	58		--	**21**	ND	ND	ND	ND	2.95	124	ND	0.5	31	ND	4	ND	6.35
	7/2/2018	160		--	**11**	ND	ND	ND	ND	2.95	124	ND	0.26	35	ND	3.2	ND	--
	8/27/2019	581	-415	--	**20.3**	**0.93**	ND	ND	ND	1.76	79.1	0.00425	ND	34.7	ND	2.79	ND	6.53
	3/9/2021	1141	145	--	**15.9**	**1.35**	ND	ND	ND	0.38	-15.9	ND	ND	22.4	0.0	2.61	ND	6.60
	9/30/2021	1347	351	--	**13.5**	**0.80**	ND	ND	**1.73**	0.22	62.7	0.0286	ND	25.7	0.0	2.63	ND	6.31
	4/13/2022	1541	545	--	**21.1**	**1.02**	ND	ND	ND	0.80	69.8	ND	ND	29.8	0.0	2.46	ND	6.10
SM-MW-18	11/18/2017	-66		--	**2.9**	ND	ND	ND	ND	3.69	100	ND	14	310	--	1.8	ND	--
	3/22/2018	58		--	**2.4**	ND	ND	ND	ND	1.16	122	ND	12	330	0.5	1.6	ND	6.88
	7/2/2018	160		--	**9.3**	ND	ND	ND	ND	1.16	122	ND	9.1	360	0.5	1.8	ND	--
	8/27/2019	581	-415	--	**0.94**	**0.18**	ND	ND	ND	1.65	41.3	ND	1.7	307	ND	2.31	ND	6.83
	3/9/2021	1141	145	--	**15.9**	**2.05**	ND	**1.92**	**5.64**	0.51	-9.6	0.00891	0.100	156	0.0	1.69	ND	6.99
	9/30/2021	1346	350	--	**5.78**	**1.13**	ND	ND	**2.62**	0.77	113.1	0.00666	0.228	186	0.0	1.75	ND	6.55
	4/13/2022	1541	545	--	**5.48**	**0.94**	ND	ND	**2.27**	0.61	135.1	0.00931	0.118	182	0.0	1.71	ND	6.55
MW-7	2/14/2014			--	**1.94**	**297**	**95.8**	--	--	--	--	--	--	--	--	--	--	--
	5/21/2014			--	ND	**143**	**34.5**	--	--	--	--	--	--	--	--	--	--	--
	8/22/2014			--	ND	**30.0**	**8.19**	--	--	--	--	--	--	--	--	--	--	--
	9/30/2016			--	**300**	**50.0**	**3.30**	--	--	--	--	--	--	--	--	--	--	--
	11/7/2017	-77		--	ND	**4.50**	**3.70**	ND	ND	--	--	4.000	6.1	53	--	9.8	ND	--
	3/22/2018	58		--	**24.0**	**74.0**	**15.0**	ND	ND	1.78	160	1.700	1.4	18	3.0	10000	ND	5.25
	7/2/2018	160		--	**16.0**	**56.0**	**8.20**	ND	ND	1.78	159	2.000	ND	20	3.0	180	ND	--
	8/27/2019	581	-415	--	**0.15**	**0.55**	**0.24**	ND	ND	9.07	3505	4.810	ND	ND	5.5	251.3	ND	6.75
	3/9/2021	1141	145	--	**3.88**	**97.2**	**33.0**	**18.7**	**14.4**	0.34	-60.4	2.330	ND	25.7	3.0	9.07	ND	6.75
	9/30/2021	1347	351	--	**0.85**	**20.6**	**8.5**	**21.7**	**34.1**	0.2	-55.5	1.450	ND	14.7	4.0	7.35	ND	6.73
	4/13/2022	1541	545	--	**1.55**	**56.7**	**36.9**	**20.7**	**8.13**	0.41	73.6	0.899	ND	18.0	4.0	4.89	ND	6.50

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Bioremediation Data Summary
Beckwith & Kuffel, Inc.
Seattle, Washington

Sampling Location	Date Sampled	Elapsed Time (days)		Volatile Organic Compounds						Aquifer Redox Conditions						Treatment Indicators		
		Source Zone Electron Donor Injection	EHC Direct-Push Injection	PCE (µg/L)	TCE (µg/L)	cDCE (µg/L)	VC (µg/L)	Ethene (µg/L)	Ethane (µg/L)	DO (mg/L)	ORP (mV)	Methane (mg/L)	Nitrate-N (mg/L)	Sulfate (mg/L)	Iron II (mg/L)	TOC (mg/L)	Acetylene (µg/L)	pH
MTCA Method C Cleanup Level or ARAR[a]				**5**	**5/31[b]**	**35**	**0.29**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**0.3[c]**	**--**	**--**	**--**
SM-MW-8	3/7/2016			--	**20.0**	**5.50**	ND	--	--	--	--	--	--	--	--	--	--	--
	6/30/2016			--	**33.0**	**7.00**	ND	--	--	--	--	--	--	--	--	--	--	--
	11/28/2017	-56		--	**36.0**	**8.10**	ND	ND	ND	3.12	113	ND	1.4	120	--	1.6	ND	--
	3/22/2018	58		--	**39.0**	**6.60**	ND	ND	ND	--	--	ND	1.9	130	3.5	2.4	ND	--
	7/2/2018	160		--	**27.0**	**6.80**	ND	ND	ND	3.72	96.6	ND	1.5	120	3.5	1.6	ND	--
	8/27/2019	581	-415	--	**25.6**	**6.09**	ND	ND	ND	2.67	24.6	1.310	--	--	ND	--	ND	6.78
	3/9/2021	1141	145	--	**28.2**	**5.88**	ND	ND	ND	1.35	-3.4	0.598	--	--	0.0	--	ND	6.90
	9/30/2021	1346	350	--	**32.9**	**6.78**	ND	ND	ND	9.69	84.6	0.417	--	--	0.0	--	ND	6.82
	4/13/2022	1541	545	--	**28.6**	**5.03**	ND	ND	ND	--	--	0.0771	0.555	152	--	1.89	ND	--
MW-8	11/7/2017	-77		--	**440**	**31.0**	**0.82**	ND	ND	0.44	17.1	0.020	ND	78	--	3.1	ND	6.98
	8/28/2019	582	-414	--	**340**	**82.0**	**4.43**	ND	ND	2.19	-36.7	0.453	ND	86.9	ND	3.92	ND	6.91
	3/9/2021	1141	145	--	**261**	**69.3**	**4.03**	ND	ND	0.28	-30.8	0.423	ND	60.0	1.8	3.24	ND	6.86
	9/30/2021	1347	351	--	**360**	**47.4**	**0.50**	ND	ND	0.22	8.6	0.153	ND	79.9	0.5	3.22	ND	6.88
	4/13/2022	1541	545	--	**327**	**54.7**	**1.16**	ND	ND	0.38	114.0	0.0887	ND	80.7	0.4	3.04	ND	6.52
MW-9	11/29/2016			--	**78.0**	**12.0**	ND	--	--	0.28	-41.4	--	--	--	3.45	--	--	6.87
	11/7/2017	-77		--	**6.60**	**30.0**	**0.29**	ND	ND	1.03	-30.3	0.250	ND	40	NA	6.60	ND	6.66
	3/22/2018	58		--	**12.0**	**17.0**	ND	ND	ND	1.43	132	0.120	ND	45	3.5	6.40	ND	6.71
	7/2/2018	160		--	**34.0**	**11.0**	**0.24**	ND	ND	1.43	132	0.070	ND	42	3.5	2.00	ND	--
	8/28/2019	582	-414	--	**2.35**	**19.4**	**0.18**	ND	ND	4.95	-54.1	0.671	0.11	32.5	3.5	7.70	ND	6.60
	3/9/2021	1141	145	--	**2.50**	**10.2**	**0.16**	ND	ND	0.55	-19.1	0.768	ND	24.5	2.5	5.70	ND	6.62
	9/30/2021	1347	351	--	**23.2**	**10.9**	**0.16**	ND	ND	0.48	-57	0.869	ND	32.7	3.4	5.03	ND	6.45
	4/13/2022	1541	545	--	**4.54**	**12.2**	**0.14**	ND	ND	0.55	116.7	0.486	ND	33.7	3.4	5.66	ND	6.35
SM-MW-21	11/18/2017	-66		--	**490**	**74.0**	**19.0**	ND	ND	1.78	-320	0.050	ND	48	--	2.6	ND	--
	3/23/2018	59		--	**550**	**55.0**	**9.10**	ND	ND	0.15	47.5	0.070	ND	54	ND	2.6	ND	6.71
	7/2/2018	160		--	**440**	**50.0**	**8.30**	ND	ND	0.15	47.5	0.070	0.19	65	ND	2.6	ND	--
	8/27/2019	581	-415	--	**161**	**257**	**31.0**	ND	**2.92**	8.35	18.1	2.540	ND	16.5	1.0	3.87	ND	6.55
	3/9/2021	1141	145	--	**114**	**38.3**	**14.3**	**3.81**	**8.18**	0.35	28.4	0.795	ND	37.8	0.0	2.82	ND	6.72
	9/30/2021	1347	351	--	**150**	**45.1**	**9.99**	ND	3.03	0.63	-3.1	0.295	ND	52.7	0.5	2.66	ND	6.79
	4/13/2022	1541	545	--	**145**	**22.2**	**4.55**	ND	1.26	0.50	137.8	0.107	ND	34.6	0.6	2.14	ND	6.57

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Bioremediation Data Summary
Beckwith & Kuffel, Inc.
Seattle, Washington

Sampling Location	Date Sampled	Elapsed Time (days)		Volatile Organic Compounds						Aquifer Redox Conditions						Treatment Indicators		
		Source Zone Electron Donor Injection	EHC Direct-Push Injection	PCE (µg/L)	TCE (µg/L)	cDCE (µg/L)	VC (µg/L)	Ethene (µg/L)	Ethane (µg/L)	DO (mg/L)	ORP (mV)	Methane (mg/L)	Nitrate-N (mg/L)	Sulfate (mg/L)	Iron II (mg/L)	TOC (mg/L)	Acetylene (µg/L)	pH
MTCA Method C Cleanup Level or ARAR[a]				**5**	**5/31[b]**	**35**	**0.29**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**0.3[c]**	**--**	**--**	**--**
SM-MW-14	5/6/2016			--	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--
	6/30/2016			--	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--
	9/12/2016	-498		--	ND	ND	ND	--	--	--	--	--	--	--	--	--	--	--
	11/7/2017	-77		--	ND	**5.10**	**4.00**	ND	ND	--	--	3.50	6	54	--	9.9	ND	--
	3/23/2018	59		--	ND	ND	ND	ND	ND	0.52	66.4	ND	ND	74	ND	2.9	ND	6.90
	7/2/2018	160	-836	--	ND	ND	ND	ND	ND	0.52	66.4	ND	ND	65	ND	2.2	ND	--
SM-MW-17A	3/23/2018	59		--	ND	ND	**0.27**	ND	ND	0.46	63.2	0.780	ND	14	1.6	2.8	ND	6.48
	7/2/2018	160		--	ND	**4.80**	**6.80**	ND	ND	0.46	63.2	0.900	ND	13	1.6	3.0	ND	--
	8/27/2019	581	-415	--	ND	ND	ND	ND	ND	0.41	-51.8	0.121	ND	13.1	ND	3.28	ND	7.55
	3/9/2021	1141	145	--	**0.13**	**0.52**	**1.39**	ND	**11.0**	0.32	-71.3	3.140	ND	5.14	0.0	3.53	ND	7.71
	9/30/2021	1346	350	--	ND	**0.18**	**0.54**	ND	**2.7**	1.26	-84.1	2.990	ND	8.02	0.8	3.96	ND	7.11
	4/13/2022	1541	545	--	**0.13**	**0.26**	**0.92**	ND	**1.7**	0.50	111.2	2.450	ND	3.94	1.0	2.18	ND	6.85

Abbreviations & Acronyms:

ARAR = applicable or relevant and appropriate requirement
cDCE = *cis* -1,2-dichloroethene
DO = dissolved oxygen
ISCR = *in situ* chemical reduction
ug/L = micrograms per liter
mg/L = milligrams per liter
mV = millivolts
MTCA = Model Toxics Control Act
ORP = oxidation-reduction potential
PCE = perchloroethene
TCE = trichloroethene
TOC = total organic carbon
UIC = Underground Injection Control program
VC = vinyl chloride
WAC = Washington Administrative Code

Notes:

[a]Lowest applicable cleanup level or ARAR was selected.
[b]The lowest of the MTCA Method C cleanup levels and ARARs is 5 µg/L. The acute vapor intrusion screening level for TCE is 31 µg/L.
[c]Washington State Water Quality Criteria (WAC 173-200-040). Must be met per UIC Registration, February 25, 2020 (Site No. 33669).
-- = not analyzed or not measured
ND = not detected
Bold = detection
= exceeds the acute vapor intrusion screening level for TCE (see note b).
= exceeds applicable cleanup criteria

Table 2
Groundwater Analytical Results
Remedial Design Investigation
Beckwith & Kuffel, Inc.
Seattle, Washington

Sampling Location	Laboratory SDG	Sampling Date	VOCs by SW-846 8260D (µg/L)		
			Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride
RDI-GW1	22F0022	6/1/2022	**195**	**10.9**	**0.17 J**
RDI-GW2	22F0039	6/2/2022	**53.2**	**16.0**	**0.91**
RDI-GW3	22F0022	6/1/2022	**378**	**25.5 J**	**0.48 J**
RDI-GW4	22F0039	6/2/2022	**207**	**8.33**	**0.16 J**
RDI-GW5	22F0022	6/1/2022	**219**	**136**	**0.23**
RDI-GW6	22F0022	6/1/2022	**1.09**	**1.79**	0.20 U
RDI-GW7	22F0022	6/1/2022	**2.19**	0.20 U	0.20 U
RDI-GW8	22F0022	6/1/2022	**3.35**	**1.95**	0.20 U
RDI-GW9	22G0015	7/1/2022	**12.5**	**1.87**	0.20 U
RDI-GW10	22G0015	7/1/2022	**25.1**	**14.6**	**1.52**
RDI-GW11	22G0015	7/1/2022	**326**	**35.5**	**0.98**
MTCA Method C Cleanup Level (a)			5.0	35	0.29

Notes:

(a) Lower of noncancer vs. cancer cleanup levels. Also lower of cleanup level or ARAR.

Bold text indicates detected analyte**.**

Green shading indicates detected analyte exceeds applicable cleanup level.

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Acronyms/Abbreviations:

ARAR = applicable or relevant and appropriate requirements

µg/L = micrograms per liter

MTCA = Model Toxics Control Act

SDG = sample delivery group

VOC = volatile organic compound

Table 3
Soil Gas Analytical Results
Remedial Design Investigation
Beckwith & Kuffel, Inc.
Seattle, Washington

Sampling Location	Laboratory SDG	Sampling Date	VOCs by EPA TO-15 (µg/m^3)		
			Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride
BK-VP1	2205228	5/6/2022	**81 J**	**99 J**	**2.8 J**
BK-VP2	2205228	5/6/2022	**23 J**	**6.0 J**	1.8 U
BK-VP3	2205228	5/6/2022	4.0 U	2.9 U	1.9 U
WB-VP1	2205228	5/6/2022	**3,000**	5.6 U	3.6 U
WB-VP2	2205228	5/6/2022	**4,000**	10 U	6.8 U
WB-VP3	2205228	5/6/2022	**5,200**	15 U	9.8 U
MTCA Method C Cleanup Level (a)			67	NL	95

Notes:

(a) Lower of noncancer vs. cancer cleanup levels.

Bold text indicates detected analyte**.**

Green shading indicates detected analyte exceeds applicable cleanup level.

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Acronyms/Abbreviations:

EPA = US Environmental Protection Agency

µg/m^3 = micrograms per cubic meter

MTCA = Model Toxics Control Act

NL = not listed

SDG = sample delivery group

VOC = volatile organic compound

Table 4
Indoor and Ambient Air Analytical Results
Remedial Design Investigation
Beckwith & Kuffel, Inc.
Seattle, Washington

Sampling Location	Laboratory SDG	Sampling Date	VOCs by EPA TO-15 (µg/m^3)		
			Trichloroethene	cis-1,2-Dichloroethene	Vinyl Chloride
BK-IA1	P2202571	6/8/2022	0.034 U	0.034 U	0.034 U
BK-IA2	P2202571	6/8/2022	**0.044**	0.037 U	0.037 U
BK-AA1	P2202571	6/8/2022	**0.065**	0.035 U	0.035 U
WB-IA1	P2202571	6/8/2022	0.035 U	0.035 U	0.035 U
WB-IA2	P2202571	6/8/2022	0.032 U	0.032 U	0.032 U
WB-AA1	P2202571	6/8/2022	0.034 U	0.034 U	0.034 U
MTCA Method C Cleanup Level (a)			2.0	NL	2.8

Notes:

(a) Lower of noncancer vs. cancer cleanup levels.

Bold text indicates detected analyte

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

Acronyms/Abbreviations:

EPA = US Environmental Protection Agency

µg/m^3 = micrograms per cubic meter

MTCA = Model Toxics Control Act

NL = not listed

SDG = sample delivery group

VOC = volatile organic compound

ATTACHMENT 1

Safety Data Sheets

SAFETY DATA SHEET
GeoForm™ Extended Release

SDS # : GEOS
Revision date: 2021-10-14
Format: NA
Version 1.02

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier

Product Name GeoForm™ Extended Release

Recommended use of the chemical and restrictions on use

Recommended Use: Remediation of contaminated soil and groundwater

Restrictions on Use Use as recommended by the label.

Manufacturer/Supplier

Evonik Active Oxygens, LLC
2005 Market Street
Suite 3200
Philadelphia, PA 19103
Phone: +1 267/ 422-2400 (General Information)
E-Mail: Product-regulatory-services@evonik.com

Emergency telephone numbers

For leak, fire, spill or accident emergencies, call:
1 800 / 424 9300 (CHEMTREC - U.S.A.)
1 703 / 527 3887 (CHEMTREC - Collect - All Other Countries)
+1 303/ 389-1409 (Medical - U.S. - Call Collect)

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the 2015 Workplace Hazardous Materials Information System (WHMIS)

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2
Combustible dust	

GHS Label elements, including precautionary statements

EMERGENCY OVERVIEW

Warning

Hazard Statements
May form combustible dust concentrations in air
H315 - Causes skin irritation
H319 - Causes serious eye irritation

Precautionary Statements - Prevention
P264 - Wash hands thoroughly after handling
P280 - Wear protective gloves and eye/face protection
Keep away from all ignition sources including heat,sparks and flame.
Keep container closed and grounded.
Prevent dust accumulations to minimize explosion hazard.

P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313 - If eye irritation persists: Get medical advice/ attention
P302 + P352 - IF ON SKIN: Wash with plenty of water.
P332 + P313 - If skin irritation occurs: Get medical advice/ attention

Hazards not otherwise classified (HNOC)

No hazards not otherwise classified were identified.

Other Information

CONTAINMENT HAZARD: Any vessel that contains wet product must be vented due to potential pressure build up from gases.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	CAS-No	Weight %
Ferrous Sulfate Monohydrate	17375-41-6	10 - 15
Iron	7439-89-6	40 - 50
Organic amendment	Proprietary	20 - 30%
Starch	Proprietary	< 10

4. FIRST AID MEASURES

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If irritation persists, call a physician.

Skin Contact Wash off with warm water and soap. In the case of skin irritation or allergic reactions see a physician.

Inhalation Remove person to fresh air. If breathing is difficult or if discomfort occurs and persists, obtain medical attention.

Ingestion Clean mouth with water and afterwards drink plenty of water. Get medical attention if symptoms occur.

Most important symptoms and effects, both acute and delayed May cause skin and eye irritation.

Indication of immediate medical attention and special treatment needed, if necessary Treat symptomatically

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media Carbon dioxide (CO_2). Dry chemical. Water spray. Foam.

Specific Hazards Arising from the Chemical Fine dust dispersed in air, in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

Flammable properties Not combustible

Hazardous Combustion Products Oxides of sulfur. Carbon monoxide.

Explosion data
Sensitivity to Mechanical Impact Not sensitive.
Sensitivity to Static Discharge Fine dust dispersed in air, in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

Protective equipment and precautions for firefighters As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Avoid contact with eyes. Use personal protective equipment. For personal protection see Section 8. Avoid dust formation. Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area).

Other For further clean-up instructions, call PeroxyChem Emergency Hotline number listed in Section 1 "Product and Company Identification" above.

Environmental Precautions Prevent entry into waterways, sewers, basements or confined areas.

Methods for Containment Maintain good housekeeping practices to avoid accumulation of settled dust, especially on overhead surfaces. Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry.

Methods for cleaning up Pick up and transfer to properly labeled containers. Take precautionary measures against static discharges. Avoid wetting dust and clean up as a dry powder with appropriate PPE for handling dry dusty materials; store in containers that keep material dry, segregated but allow to vent. The waste may be recovered and recycled.

7. HANDLING AND STORAGE

Handling Avoid contact with eyes. Avoid breathing dust. Wear personal protective equipment. Refer to Section 8. Minimize dust generation and accumulation. Keep away from open flames, hot surfaces and sources of ignition. Dry powdered material can build static electricity when subjected to the friction of transfer and mixing operations. Provide adequate precautions, such as electrical grounding and bonding, or inert atmosphere.

Storage Store in a well-ventilated place. Keep cool. Keep away from open flames, hot surfaces and sources of ignition. Any vessel that contains wet product must be vented due to potential pressure build up from gases.

Incompatible products Oxidizing agents. Strong acids. Strong bases.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines .

Chemical name	ACGIH TLV	OSHA PEL	NIOSH	Mexico
Ferrous Sulfate Monohydrate 17375-41-6	TWA: 1 mg/m³	-	-	-
salt	TWA: 10 mg/m³	-	-	Mexico: TWA 10 mg/m³

Chemical name	British Columbia	Quebec	Ontario TWAEV	Alberta
Ferrous Sulfate Monohydrate 17375-41-6	TWA: 1 mg/m³	TWA: 1.0 mg/m³	TWA: 1 mg/m³	TWA: 1 mg/m³
salt	TWA: 10 mg/m³	-	TWA: 10 mg/m³ inhalable	-

Appropriate engineering controls

Engineering measures Adequate engineering controls and/or personal protective equipment must be used to prevent contact with skin and eyes. Provide emergency on-site eyewash. Provide appropriate exhaust ventilation at places where dust is formed. Use grounding and bonding of dry handling equipment for pneumatics or free falling powder during processing in

enclosed systems. Use only appropriately classified electrical equipment and powered industrial trucks.

Individual protection measures, such as personal protective equipment

Eye/Face Protection Whenever airborn dust concentrations are high, appropriate protective eyewear, such as mono-goggles, should be worn to prevent eye contact.

Skin and Body Protection Wear suitable protective clothing. Protective shoes or boots.

Hand Protection Wear suitable gloves (tested to EN374): Nitrile rubber, Rubber/latex/neoprene or other suitable chemical resistant gloves.

Respiratory Protection Whenever dust in the worker's breathing zone cannot be controlled with ventilation or other engineering means, workers should wear respirators or dust masks approved by NIOSH/MSHA, EU CEN or comparable organization to protect against airborne dust.

Hygiene measures Do not eat, drink or smoke when using this product. Must have clean water available for washing in case of eye or skin contamination. Wash skin before eating, drinking, chewing gum, or using snuff. Shower after work. Remove contaminated clothing and wash before reuse. Wash all work clothing separately; do not mix with household laundry.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Brown Powder
Physical State	Solid
Color	Brown
Odor	Nearly odorless
Odor threshold	Not applicable
pH	6 - 8
Melting point/freezing point	No information available
Boiling Point/Range	No information available
Flash point	No information available
Evaporation Rate	No information available
Flammability (solid, gas)	Combustible material
Flammability Limit in Air	
Upper flammability limit:	No information available
Lower flammability limit:	No information available
Vapor pressure	No information available
Vapor density	No information available
Density	No information available
Specific gravity	No information available
Water solubility	Insoluble in water
Solubility in other solvents	No information available
Partition coefficient	No information available
Autoignition temperature	No information available
Decomposition temperature	No information available
Viscosity, kinematic	Not applicable (Solid)
Viscosity, dynamic	Not applicable
Explosive properties	Low level dust explosion hazard
Oxidizing properties	Not applicable

Other Information

Molecular weight No information available

0.92 g/cm³ (loose) / 1.13 g/cm³ (tapped)

10. STABILITY AND REACTIVITY

Reactivity None under normal use conditions.

Chemical Stability Stable under recommended storage conditions.

Possibility of Hazardous Reactions Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Product may form by-products during processing which can be toxic or potentially explosive such as hydrogen, hydrogen sulfide and carbon monoxide.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid Heat, flames and sparks.

Incompatible materials Oxidizing agents. Strong acids. Strong bases.

Hazardous Decomposition Products Thermal decomposition can lead to release of irritating and toxic gases and vapors: Hydrogen sulfide, Hydrogen gas, Sulfur oxides, Carbon oxides (COx),

11. TOXICOLOGICAL INFORMATION

Product Information

Product does not present an acute toxicity hazard based on known information.

LD50 Oral Iron Salt: > 670 mg/kg (mouse, 4-hr)
LD50 Dermal No information available
LC50 Inhalation No information available

Serious eye damage/eye irritation Irritating to eyes.
Skin corrosion/irritation Irritating to skin.

Sensitization Not expected to be sensitizing based on the components.

Chemical name	LD50 Oral	LD50 Dermal	LC50 Inhalation	NOAEL Oral Value
Iron (7439-89-6)	98600 mg/kg (Rat)			
Trade secret ()	= 8500 mg/kg (Rat)			
Viscosity modifier ()	6770 mg/kg (Rat)			

Information on toxicological effects

Symptoms No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Carcinogenicity Contains no ingredients above reportable quantities listed as a carcinogen.

Mutagenicity No known mutagenic or teratogenic effects.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

STOT - single exposure No information available.
STOT - repeated exposure No information available.

Aspiration hazard No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects Not expected to have significant environmental effects

Chemical name	Toxicity to algae	Toxicity to fish	Toxicity to Microorganisms	Toxicity to daphnia and other aquatic invertebrates
Iron		96 h LC50: = 13.6 mg/L (Morone saxatilis) static		48 h Daphnia magna EC50 = 8934.78 mg/l
Trade secret		96 h LC50: 220 - 460 mg/L (Leuciscus idus) static		24 h LC50: = 330 mg/L (Psammechinus miliaris)
Magnesium Hydroxide		96 h LC50: = 511.31 mg/L (Pimephales promelas) static		

Persistence and degradability The organic components are biodegradable and can be expected to contribute to BOD. Biodegradability does not pertain to inorganic substances.

Bioaccumulation Bioaccumulation is unlikely.

Mobility No information available.

Other Adverse Effects None known.

13. DISPOSAL CONSIDERATIONS

Waste disposal methods This material, as supplied, is not a hazardous waste according to Federal regulations (40 CFR 261). This material could become a hazardous waste if it is mixed with or otherwise comes in contact with a hazardous waste, if chemical additions are made to this material, or if the material is processed or otherwise altered. Consult 40 CFR 261 to determine whether the altered material is a hazardous waste. Consult the appropriate state, regional, or local regulations for additional requirements. Recovery/recycling recommended.

Contaminated Packaging Dispose of in accordance with local regulations.

14. TRANSPORT INFORMATION

DOT NOT REGULATED

TDG NOT REGULATED

15. REGULATORY INFORMATION

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories
This product is not subject to reporting under the Emergency Planning and Community Right-to-Know rule.

Clean Water Act
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA/EPCRA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

US State Regulations

U.S. State Right-to-Know Regulations
This product contains the following substances regulated under state Right-to-Know laws:

Chemical name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
salt					X
Trade secret			X		

California Proposition 65
This product does not contain any Proposition 65 chemicals

CANADA

Environmental Emergencies
This product contains no substances listed under Canada's Environmental Emergency regulations.

Canadian National Pollutant Release Inventory
This product contains no substances reportable under Canada's National Pollutant Release Inventory regulations.

International Inventories

Chemical name	TSCA (United States)	DSL (Canada)	EINECS/ELINCS (Europe)	ENCS (Japan)	China (IECSC)	KECL (Korea)	PICCS (Philippines)	AICS (Australia)	NZIoC (New Zealand)
Ferrous Sulfate Monohydrate 17375-41-6		H	H	X	H	H	H	X	X
Iron 7439-89-6	X	X	231-096-4	X	X	X	X	X	X
Organic amendment		X	281-689-7		X		X	X	X
salt					X		X	X	X
Starch	X	X	232-940-4	X	X	X	X	X	X

All ingredients are directly listed on the active TSCA Inventory

Mexico

Mexico - Grade Minimum risk, Grade 0

16. OTHER INFORMATION

NFPA	**Health Hazards** 1	**Flammability** 1	**Stability** 0	**Special Hazards** -
HMIS	**Health Hazards** 1	**Flammability** 1	**Physical hazard** 0	**Special precautions** -

Revision date: 2021-10-14
Revision note Manufacturer name changed.

Disclaimer

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Prepared By:

Evonik

End of Safety Data Sheet

SAFETY DATA SHEET

Newman Zone EVO

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS Standards, Australian WorkSafe, Japanese Industrial Standard JIS Z 7250:2000, and European Directives

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED):	***Newman Zone EVO***
SYNONYMS:	None known
CAS#:	Mixture
PRODUCT USE:	This product is used for soil and ground water remediation. It is formulated and processed using food grade additives, following packaging, sanitation and storage as required by Best Practices used for Food products.
CHEMICAL SHIPPING NAME/CLASS:	Non-Regulated Material
U.N. NUMBER:	None
MANUFACTURER'S NAME:	**RNAS Remediation Products**
ADDRESS:	6712 West River Road, Brooklyn Center, MN 55430
BUSINESS PHONE:	1-763-585-6191
EMERGENCY PHONE:	1-800-424-9300 (Chemtrec 24 Hr Service – Emergency Only)
DATE OF CURRENT REVISION:	January 16, 2016
DATE OF LAST REVISION:	July 16, 2015

2. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This product is a white liquid with a vegetable oil odor.
Health Hazards: Not expected to cause adverse health effects when used as intended. Prolonged or repeated exposure may cause irritation to skin. May cause irritation to eyes upon contact. Inhalation of vapors/sprays or mist may cause respiratory irritation. Ingestion of large amounts of this product may cause gastrointestinal irritation.
Flammability Hazards: This product is a Non-Flammable liquid with a flash point of >540°F (>282°C).
Reactivity Hazards: None known
Environmental Hazards: The Environmental effects of this product have not been investigated. Release of this product is not anticipated to have significant adverse effects in the aquatic environment.

US DOT SYMBOLS	CANADA (WHMIS) SYMBOLS	EUROPEAN and (GHS) Hazard Symbols
		None
Non-Regulated Material	Complies with WHMIS 2015	Signal Word: **None**

GHS LABELING AND CLASSIFICATION:
This product does not meet the definition of a hazardous substance or preparation as defined by 29CFR 1910.1200 or the European Union Council Directives 67/548/EEC, 1999/45/EC, 1272/2008/EC and subsequent Directives.
EU HAZARD CLASSIFICATION OF INGREDIENTS PER DIRECTIVE 1272/2008/EC:
None of the ingredients are listed in Annex VI
Substances not listed either individually or in group entries must be self classified.

Component(s) Contributing to Classification(s):
All Ingredients
GHS Hazard Classification(s):
None known

Hazard Statement(s):
None known

Precautionary Statement(s):
None known

HEALTH HAZARDS OR RISKS FROM EXPOSURE:
SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of overexposure for this product are by contact with skin or eyes, inhalation of vapors and ingestion. The symptoms of overexposure are described below.
ACUTE:
INHALATION: Not expected to cause adverse health effects when used as intended. Inhalation of vapors/mist/spray may cause respiratory irritation.
CONTACT WITH SKIN: Not expected to cause adverse health effects when used as intended. Prolonged and repeated contact may cause irritation to skin.
EYE CONTACT: Direct eye contact can cause irritation with redness, tearing and blurred vision.

INGESTION: Under normal conditions of intended use, this material is not expected to be an ingestion hazard. Ingestion of large quantities may cause gastrointestinal irritation, nausea and vomiting.
CHRONIC: None known

TARGET ORGANS: Acute: Skin, Respiratory System and Eyes **Chronic:** None known

3. COMPOSITION AND INFORMATION ON INGREDIENTS

Hazardous Ingredients:	WT%	CAS#	EINECS #	GHS Hazard Classification(s)
Food Grade Soybean Oil	45 - 55%	8001-22-7	232-274-4	None
Water	35 – 45%	7732-18-5	231-791-2	None
Food Grade Sodium-L-lactate	0 – 4%	867-56-1	212-762-3	None
Proprietary Food Grade Surfactant Blend	4 – 6%	Proprietary	Not Listed in ESIS	None
Sodium Bicarbonate	0 - 1%	144-55-8	205-633-8	None
Balance of other ingredients is less than 1% in concentration (or 0.1% for carcinogens, reproductive toxins, or respiratory sensitizers).				

NOTE: This product has been classified in accordance with the hazard criteria of 29CFR1910.1200 and the SDS contains all the information required by the CPR, EU Directives and the Japanese Industrial Standard *JIS Z 7250: 2000*.

4. FIRST-AID MEASURES

EYE CONTACT: If product enters the eyes, open eyes while under gentle running water for at least 15 minutes. Seek medical attention if irritation persists.
SKIN CONTACT: Wash skin thoroughly with soap and water after handling. Seek medical attention if irritation develops and persists.
INHALATION: If breathing becomes difficult, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention.
INGESTION: If product is swallowed, call physician or poison control center for most current information. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. Seek medical advice. Take a copy of the label and/or SDS with the victim to the health professional.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None known
RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

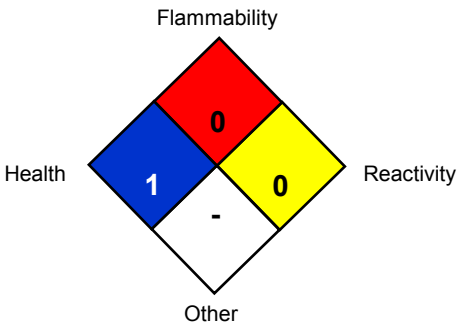
5. FIRE-FIGHTING MEASURES

FLASH POINT: Non-Flammable with flash point >540°F (>282°C)
AUTOIGNITION TEMPERATURE: Not Available
FLAMMABLE LIMITS (in air by volume, %): Lower NA Upper NA
FIRE EXTINGUISHING MATERIALS: Use fire extinguishing methods below:

Water Spray: Yes	Carbon Dioxide: Yes
Foam: Yes	Dry Chemical: Yes
Halon: Yes	Other: Any "C" Class

UNUSUAL FIRE AND EXPLOSION HAZARDS: Not considered a fire or explosion hazard.
Explosion Sensitivity to Mechanical Impact: No
Explosion Sensitivity to Static Discharge: No
SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

NFPA RATING SYSTEM



HMIS RATING SYSTEM

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD (BLUE)	1
FLAMMABILITY HAZARD (RED)	0
PHYSICAL HAZARD (YELLOW)	0

PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	See Sect 8		See Sect 8

For Routine Industrial Use and Handling Applications

Hazard Scale: **0** = Minimal **1** = Slight **2** = Moderate **3** = Serious **4** = Severe * = Chronic hazard

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Stop the flow of material, if this can be done safely. Contain discharged material. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Place in a proper container for disposal. Dispose of in accordance with U.S. Federal, State, and local hazardous waste disposal regulations and those of Canada and its Provinces, those of Australia, Japan and EU Member States (see Section 13, Disposal Considerations).

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Use good hygiene practices.

STORAGE AND HANDLING PRACTICES: Store in original container. Keep container closed when not in use. Store in a cool, dry location. Avoid freezing or extended storage in high temperatures and away from incompatible materials.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

Chemical Name	CAS#	ACGIH TLV	OSHA TWA
Blend of Food Grade Soybean Oil	8001-22-7	10 mg/m³ Oil Mists	15 mg/m³ Oil Mists
Food Grade Sodium-L-lactate	867-56-1	Not Listed	Not Listed
Proprietary Food Grade Surfactant Blend	Proprietary	Not Listed	Not Listed
Sodium Bicarbonate	144-55-8	Not Listed	Not Listed

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided above.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Not required when using this product. Maintain airborne contaminant concentrations below guidelines listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EU member states.

EYE PROTECTION: Safety glasses or goggles are recommended to avoid eye contact. If necessary, refer to U.S. OSHA 29 CFR 1910.133, Canadian Standards, and the European Standard EN166, Australian Standards, or relevant Japanese Standards.

SKIN PROTECTION: Wear impervious gloves for prolonged or repeated exposure as appropriate to task when using this product. If necessary, refer to U.S. OSHA 29 CFR 1910.138, the European Standard DIN EN 374, the appropriate Standards of Canada, Australian Standards, or relevant Japanese Standards.

BODY PROTECTION: Use body protection appropriate to task being performed. If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards.

9. PHYSICAL and CHEMICAL PROPERTIES

APPEARANCE (Physical State) and COLOR: This product is a white liquid with a vegetable oil odor.
ODOR: Slight
ODOR THRESHOLD: Not Applicable
pH: 7.0 – 9.0
MELTING/FREEZING POINT: Not Available
BOILING POINT: Not Available
FLASH POINT: >540°F / >282°C (For pure soybean oil)
EVAPORATION RATE (n-BuAc=1): Not Available
FLAMMABILITY (SOLID, GAS): Not Applicable
UPPER/LOWER FLAMMABILITY OR EXPLOSION LIMITS: Not Available
VAPOR PRESSURE (mm Hg @ 20°C (68°F)): Not Available
VAPOR DENSITY: Not Available
SPECIFIC GRAVITY: 0.98 – 0.99 @ 25°C
SOLUBILITY IN WATER: Dispersible in water
WEIGHT PER GALLON: 8.15 – 8.25 lb/gal
PARTITION COEFFICENT (n-octanol/water): Not Available
AUTO-IGNITION TEMPERATURE: Not Available
DECOMPOSITION TEMPERATURE: Not Available
VISCOSITY: 24 - 200 cPs @ 20°C

10. STABILITY and REACTIVITY

STABILITY: Stable under conditions of normal storage and use.
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition products include oxides of carbon.
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong oxidizing materials.
POSSIBILITY OF HAZARDOUS REACTIONS: Will not occur.
CONDITIONS TO AVOID: Incompatible materials

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:
No LD50 Data available for this product.
SUSPECTED CANCER AGENT: Ingredients within this product are not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, or CAL/OSHA and therefore are not considered to be, nor suspected to be, cancer-causing agents by these agencies.
IRRITANCY OF PRODUCT: No specific data available
SENSITIZATION TO THE PRODUCT: This product is not a skin and respiratory sensitizer
REPRODUCTIVE TOXICITY INFORMATION: No information concerning the effects of this product and its components on the human reproductive system.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.
ENVIRONMENTAL STABILITY: No specific data available on this product.
CHEMICAL EFFECT ON PLANTS, ANIMALS AND AQUATIC LIFE: This product is not expected to cause significant harm to plants, animals or aquatic life.
WATER ENDANGERMENT CLASS: Water endangering in accordance with EU Guideline 91/155-EWG – Not Determined.
SPECIFIC AVAILABLE COMPONENT INFORMATION: No additional data available at this time.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan.
EU Waste Code: Not determined

14. TRANSPORTATION INFORMATION

US DOT, IATA, IMO, ADR:

U.S. DEPARTMENT OF TRANSPORTATION (DOT) SHIPPING REGULATIONS: This product is classified (per 49 CFR 172.101) by the U.S. Department of Transportation, as follows.

PROPER SHIPPING NAME:	Non-Regulated Material
HAZARD CLASS NUMBER and DESCRIPTION:	None
UN IDENTIFICATION NUMBER:	None
PACKING GROUP:	NA
DOT LABEL(S) REQUIRED:	None

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER: None
RQ QUANTITY: None
MARINE POLLUTANT: The components of this product are not designated by the Department of Transportation to be Marine Pollutants (49 CFR 172.101, Appendix B).

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): This product is not considered as dangerous goods.

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): This product is not considered as dangerous goods.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This product is not considered by the United Nations Economic Commission for Europe to be dangerous goods.

15. REGULATORY INFORMATION

UNITED STATES REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The components of this product are subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act as follows: None
U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for the components of this product. The default Federal SDS submission and inventory requirement filing threshold of 10,000 lbs (4,540 kg) therefore applies, per 40 CFR 370.20.
U.S. CERCLA REPORTABLE QUANTITY (RQ): None
U.S. TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory or are exempted from listing.
OTHER U.S. FEDERAL REGULATIONS: None
CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Ingredients within this product are not on the Proposition 65 Lists.

CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: The components of this product are on the DSL Inventory, or are exempted from listing.
OTHER CANADIAN REGULATIONS: Not applicable.
CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS:
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all of the information required by those regulations.
CANADIAN WHMIS CLASSIFICATION and SYMBOLS: Complies with WHMIS 2015

EUROPEAN ECONOMIC COMMUNITY INFORMATION:

This product does not meet the definition of a hazardous substance or preparation as defined by the European Union Council Directives 67/548/EEC, 1999/45/EC, 1272/2008/EC and subsequent Directives.
See Section 2 for Details

AUSTRALIAN INFORMATION FOR PRODUCT: The components of this product are listed on the International Chemical Inventory list.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS: The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

JAPANESE ENCS INVENTORY: The components of this product are on the ENCS Inventory as indicated in the section on International Chemical Inventories, below.

POISONOUS AND DELETERIOUS SUBSTANCES CONTROL LAW: No component of this product is a listed Specified Poisonous Substance under the Poisonous and Deleterious Substances Control Law.

INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:
Asia-Pac: Listed or Exempt from listing
Australian Inventory of Chemical Substances (AICS): Listed or Exempt from listing
Korean Existing Chemicals List (ECL): Listed or Exempt from listing
Japanese Existing National Inventory of Chemical Substances (ENCS): Listed or Exempt from listing
Philippines Inventory of Chemicals and Chemical Substances (PICCS): Listed or Exempt from listing
Swiss Giftliste List of Toxic Substances: Listed or Exempt from listing
U.S. TSCA: Listed

16. OTHER INFORMATION

ABBREVIATIONS AND ACRONYMS:

EPA: United States Environmental Protection Agency
ARD: European Agreement concerning the International Carriage of Dangerous Goods by Road
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)

PREPARED BY: Paul Eigbrett – (**GHS MSDS Compliance PLUS)**
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The information contained herein is believed to be accurate but is not warranted to be so. Data and calculations are based on information furnished by the manufacturer of the product and manufacturers of the components of the product. Users are advised to confirm in advance of the need that information is current, applicable and suited to the circumstances of use. RNAS Remediation Products assumes no responsibility for injury to vendee or third party person proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Furthermore, RNAS Remediation Products assumes no responsibility for injury caused by abnormal use of this material even if reasonable safety procedures are followed.

END OF SDS SHEET