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July 29, 2022

Mr. Tim Mullin
Washington State Department of Ecology
SWRO Toxics Cleanup Program
300 Desmond Drive Southeast
Lacey, Washington 98503

RE: Confirmation Soil Sampling Work Plan
BNSF – Former Cummings Oil Lease Site
908 Northwest Kerron Avenue, Winlock, Washington
VCP Project No: SW0775
Facility/Site ID: 3151688
Cleanup Site ID: 2247

Dear Mr. Mullin:

Thank you for providing the Washington State Department of Ecology's (Ecology's) Opinion on a Cleanup Letter for the Former Cummings Oil Lease Site (Site), dated March 17, 2021 (Letter). The Letter states that, "Ecology has determined that no further remedial action is likely necessary to clean up contamination at the Site," and requests the steps described below to achieve no further action (NFA). Note that BNSF responses are presented as alphabetical sub-bullets below each Ecology request presented in bold and italics.

1. ***Page 2, second paragraph – Ecology requests information related to future property use that could trigger any requirements under Washington Administrative Code (WAC) 173-340-360(2)(d), WAC 173-340-440, or a vapor intrusion evaluation for a proposed building.***
 - a. There is no proposed change in land use. The Site (Parcel 039140000000) is zoned as commercial retail, is not currently used for residential use, and is not under evaluation for rezoning (Lewis County 2022).
 - b. The BNSF request for an NFA determination does not rely on the use of institutional controls.
 - c. BNSF does not propose to build any structures on the Site.
2. ***Page 2, second to last paragraph – "Ecology requests available electronic copies (e.g., portable document format [PDF]) of any reports submitted prior to Farallon's Tank Closure Report, dated March 11, 2010."***
 - a. BNSF has reviewed all available public records and solicited requests for information from Farallon Consulting regarding prior reports.
 - b. BNSF submitted all available electronic copies of reports submitted before the March 11, 2010 report.
3. ***Page 3, Section 1, last paragraph, last sentence – "Groundwater data suggests that concentrations in soil have likely degraded, but confirmatory soil sampling is necessary to verify current concentrations of Site hazardous substances at locations of historical residual soil impacts."***
 - a. BNSF has prepared this Confirmation Soil Sampling Work Plan (Work Plan) to address the potential for residual soil impacts.
4. **Section 4, Cleanup – Ecology requested confirmation soil sampling at the locations listed below to verify that cleanup standards are met for soil:**

- ***“At least one confirmatory soil sampling location within the footprint of three of the four former ASTs. One test pit was advanced beneath what appears to be former AST #2.”***
 - a. Based on compiled historical soil sampling data, impacted soil is not present in several of the recommended areas. No staining was observed along the aboveground piping near the ASTs at the time of investigation and excavation.
 - b. Analytical results for sample TP-1 are presented in the enclosed Work Plan.
 - c. Following a call with Tim Mullin and BNSF on July 28, 2022, BNSF agreed to collect sample between AST #3 and AST #4.
- ***“At least one confirmatory soil sampling location beneath the former pumphouse and each of the former piping runs leaving the former pumphouse.”***
 - d. At the time of excavation, no staining was identified in areas of aboveground lines and piping runs.
 - e. One confirmation soil sample will be collected from the former pumphouse area.
 - f. One confirmation soil sample will be collected from under the piping run that connected the pumphouse to the underground storage tanks and overhead fuel racks.
- ***“Excavation extent sampling locations EX1-NSD1, EX1-NSD3, EX1-WSD2, and WX1-WSD4. Confirmatory soil sampling at these locations will need to be as close as is feasible to these historical excavation extent locations. However, the excavation was filled with quarry spalls, so sampling techniques and locations may need to be adjusted.”***
 - g. Excavation Area 2 (EX2) overlaps with AST #2. Samples collected from EX-2 were less than the applicable MTCA Method A CULs for benzene and gasoline-range organics (GRO). All areas where exceedances of CULs were excavated, with the exception of boring B9 (2005, 0 to 8 feet below ground surface [bgs]) and sidewall sample locations EX1-NSD1, EX1-NSD3, EX1-WSD2, and EX1-WSD4 (2008, 6 feet bgs).
- ***“Boring B9”***
 - h. One confirmation soil sample will be collected in the area of the estimated location of boring B9.
- ***“Two shallow soil locations along the southern edge of stormwater conveyance along the northern portion of Property (between the former aboveground lines and pumphouse and the stormwater conveyance). This is in order to confirm that Site runoff did not impact the stormwater conveyance.”***
 - i. One confirmation soil sample will be collected in the area between EX1-WSD2 and the stormwater conveyance lines.
 - j. Two samples will be collected at one location between the north sidewall locations (EX1-NSD1 and EX1-NSD3) and the stormwater conveyance system. One sample will be approximately 0.5 to 1 foot bgs and the other will be collected at 5 feet bgs.

In response to the letter referenced above, the enclosed Work Plan describes the proposed field activities to be completed in support of NFA determination. Please let us know if Ecology concurs with these responses and Work Plan.

Sincerely,

Alexander Lesher

Alexander Lesher, EIT
Senior Engineer

Clint Miller

Clint Miller PhD, PG, LG
Senior Project Manager

ENCLOSURES

Attachment 1 Confirmational Soil Sampling Work Plan

REFERENCE

Lewis County. *Lewis County GIS Web Map*. <https://parcels.lewiscountywa.gov/> Accessed June 20, 2022.

Confirmational Soil Sampling Work Plan

Former Cummings Oil Lease Site Winlock, Washington

VCP Project No: SW0775

Facility/Site ID: 3151688

Cleanup Site ID: 2247

Prepared for

Washington State Department of Ecology
SWRO Toxics Cleanup Program
300 Desmond Drive Southeast
Lacey, Washington 98503

On Behalf of

BNSF Railway Company
605 Puyallup Avenue South
Tacoma, Washington 98421

July 29, 2022

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Table 2	Sample Requirements for Soil (embedded)

FIGURE

Figure 1	Site Plan Showing Proposed Confirmational Soil Sampling Locations
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ATTACHMENTS

Attachment A	Site-Specific Health and Safety Plan
Attachment B	TRC Standard Operating Procedure 003 – Soil Sampling

ABBREVIATIONS AND ACRONYMS

Abbreviation/

Acronym

Definition

AST	Aboveground storage tank
bgs	Below ground surface
BNSF	The BNSF Railway Company
BTEX	Benzene, toluene, ethylbenzene, and total xylenes
CUL	Cleanup level
Ecology	Washington State Department of Ecology
IDW	Investigation-derived waste
MTCA	Model Toxics Control Act
NFA	No Further Action
PID	Photoionization detector
TRC	TRC Environmental Corporation
UST	Underground storage tank

1.0 BACKGROUND

TRC Environmental Corporation (TRC) prepared this Work Plan (Work Plan) on behalf of BNSF Railway Company (BNSF) to document the proposed field activities in support of a no further action (NFA) determination for the Former Cummings Oil Lease Site (Site) located at 908 Northwest Kerron Avenue in Winlock, Washington (Figure 1). This Work Plan was prepared in response to Ecology's opinion letter dated March 17, 2021 (Ecology 2021).

The Site is an industrial property that was formerly used as a bulk fuel storage facility from approximately 1925 through 1976. In 2008, four aboveground and one underground fuel storage tanks (ASTs and USTs, respectively) were removed along with approximately 330 cubic yards of petroleum-contaminated soil, overhead fuel racks, the pumphouse, and aboveground piping (Figure 1). No staining was observed under the aboveground piping runs during excavations. All buildings, USTs, ASTs, and associated piping have been removed. The property is an unoccupied gravel lot used for temporary equipment staging. There are no foreseeable land use changes for this property.

Per direction from Ecology's site manager, Mr. Tim Mullin, BNSF implemented Ecology's recommendations to obtain a NFA determination (email communication Sept. 25, 2019). Recommended activities included quarterly groundwater monitoring for all wells during the third quarter of 2019 and analyzing samples from MW-3 for diesel-range organics (DRO) and oil-range organics (ORO) using the Northwest Total Petroleum Hydrocarbons-Diesel (NWTPH-Dx) method with and without silica gel cleanup (SGC). The *2019-2020 Groundwater Monitoring Summary Report* (TRC 2020a) was submitted to Ecology in June 2020 as well as a formal request for an NFA determination was (TRC 2020b).

Ecology determined that no further remedial action was necessary for groundwater and the Site would be categorized as "no further action likely." Ecology stated that "Groundwater data suggests that concentrations in soil have also likely degraded, but confirmatory soil sampling is necessary to verify current concentrations of Site hazardous substances at locations of historical residual soil impacts" to achieve NFA (Ecology 2021). The following sections describe how TRC will address Ecology's confirmational sampling requests.

1.1 Objectives

The objective of this Work Plan is to collect additional soil samples to verify that the direct contact and vapor intrusion pathways are incomplete in support of an NFA determination. Historical data (maps, analytical data etc.) and operational activities were reviewed in comparison with the requested sample locations (see Figure 1). Historical soil data are compiled in Table 1. The proposed soil sampling locations are provided on Figure 1 and outlined below.

- One sample from under the former pumphouse.
- One sample from under the piping run that connected the pumphouse to the underground storage tanks (USTs) and overhead fuel racks.
- One sample in the area of the estimated location of boring B9.

- One sample in the area between the estimated location of EX1-WSD2 and the stormwater conveyance lines.
- One sample in the area between former ASTs #3 and #4.
- Two samples collected at one location between the estimated north sidewall locations (EX1-NSD-1 and EX1-NSD-3) and the stormwater conveyance system.

Based on historical analytical results, soil samples will be analyzed for gasoline-range organics (GRO) and benzene. For each sampling location, one sample will be collected approximately at 2.5 feet bgs and another sample collected at 5 feet bgs. Ecology recommends completing the confirmation soil sampling investigation at a time of seasonal minimum for the groundwater table.

Based on evaluation of soil data, DRO confirmational analyses are not warranted as no historical exceedances of the Model Toxics Control Act (MTCA) Method A Industrial (Table 745-1) cleanup levels (CULs) for DRO / ORO were detected in soil samples collected following excavation. Soil impacted with DRO, toluene, ethylbenzene, and xylene was successfully removed in all areas of concern during the 2008 excavation. This screening analysis of historical soil samples is documented on Table 1.

2.0 INVESTIGATION TASKS

A Site-specific Health and Safety Plan (HASP) for investigation activities as required by the Code of Federal Regulations (CFR) Title 29 1910.120 and by the Washington State Department of Labor and Industries will be prepared prior to commencing any field activities. The HASP is a document that establishes safety objectives, anticipates job hazards, provides implementation of a hazard communication and injuries/illness prevention program, and establishes policies and procedures to be followed in both routine and emergency situations. A copy of the Site-specific HASP is included in Attachment A.

2.1 Utility Clearance

Prior to performing subsurface work, Washington One Call Service will be notified to identify publicly owned subsurface utilities. The notification will be initiated a minimum of 3 business days prior to scheduled field activities. In addition, a required utility clearance will be completed with the Northwest Utility Notification Center (NUNC), BNSF's Network Control Center (signal and telecom), BNSF water services, electrical services, mechanical department and via private locator service to clear the pre-marked proposed boring locations. A ground-penetrating radar (GPR) survey will be employed to determine the presence of subsurface utilities.

2.2 Soil Sampling

Borings will be advanced using a hand auger to a depth of 5 feet bgs (Figure 1). Soil samples will be field-screened for potential impacts using visual and olfactory indicators, sheen testing, and a photoionization detector (PID). Soil conditions will be documented at the surface and every 2.5 feet bgs.

Soil samples will be collected at 2.5 and 5.0 feet bgs using a slide hammer sampling device with a brass sleeve to collect the specific interval to be sampled. This method will minimize volatilization of any potential hydrocarbons in soil samples. A portion of soil from each sample interval will be placed in a new resealable plastic bag, disaggregated, and allowed to equilibrate. Headspace within the bag will be measured for the presence and relative concentration of volatile organic compounds (VOCs) using a calibrated PID. PID measurements will be recorded on the soil boring logs at the interval from which the sample was collected. All soil samples will be collected in accordance with Standard Operating Procedure 003 as described in Attachment B.

If potential impacts are observed through field screening at the surface or at 2.5 feet bgs, the shallower soil sample will be submitted for laboratory analysis. Surface soil samples will automatically be submitted for laboratory analysis from the two sample locations along the stormwater conveyance line to confirm that Site runoff did not impact the stormwater conveyance. Samples will be placed into iced coolers with an internal temperature of 4 degrees Celsius or lower and transported to a Washington State-accredited laboratory, following standard chain-of-custody procedures. Sample analyses, container types, preservatives, and holding times for soil samples are summarized in Table 2 below.

Table 2
Sample Requirements for Soil

Analytical Parameter	Analytical Method	Container	Preservation Method	Holding Time
TPH as DRO and ORO	NWTPH-Dx w/SGC	4-ounce sample jar	Cool, 4°C	14 days to extraction; 40 days to analyze after extraction
TPH as GRO	NWTPH-Gx	40 mL vial	Methanol, Cool, 4°C	14 days to extraction; 40 days to analyze after extraction
BTEX	EPA Method BTEX 5035	40 mL vial, 4-ounce sample jar	Methanol, Cool, 4°C	14 days to extraction; 40 days to analyze after extraction

Notes:

°C	Degrees Celsius
BTEX	Benzene, toluene, ethylbenzene, xylenes
EPA	United States Environmental Protection Agency
NWTPH-Dx	Northwest Total Petroleum Hydrocarbon – Diesel Range Extended
NWTPH-Gx	Northwest Total Petroleum Hydrocarbon – Gasoline Range Extended
TPH	Total petroleum hydrocarbons

2.3 Sample Identification

Soil samples collected as part of this investigation will be assigned a unique identification code based on a consistent sample designation scheme. The sample containers will be labeled with unique alphanumeric sample identifiers (sample numbers) as follows:

SB-01-M:(Depth)

Where:

SB	Soil Boring
01	SB sequential number (e.g., SB-01, DP-02, etc.)
M	Media: S = soil
(Depth)	Depth in feet below ground surface (e.g., “:5”)

Sample numbers will be recorded in the field notebook, on sample container labels, and chain-of-custody forms. Other information that will be recorded on the sample container label:

- Time and date of sample collection;
- Initials of sampler(s);
- Laboratory analyses to be performed; and,
- Preservatives used.

2.4 Sample Handling

After collection, samples will be placed in coolers with enough bagged ice to maintain an internal temperature of 4°C for the duration of the sampling and transportation to the laboratory. Samples will be shipped or hand-delivered to the laboratory for analysis after sampling following standard chain-of-custody procedures.

2.5 Equipment Decontamination

Reusable sampling equipment will be decontaminated prior to use and between each sample location following the three steps noted below:

1. Wash in a solution of critical cleaning detergent and potable tap water.
2. Rinse with potable tap water.
3. Spray-rinse with distilled or de-ionized water.

2.6 Investigation-Derived Waste

Soil cuttings, decontamination fluids, and other investigation-derived waste (IDW) will be placed in a properly labeled 30-gallon DOT-approved steel drum (or equivalent), pending characterization for disposal. IDW will be manifested and transported by a waste disposal contractor to a BNSF-approved treatment, storage, and disposal (TSD) facility permitted to accept the material.

3.0 REPORTING AND DATA UPLOAD TO ENVIRONMENTAL INFORMATION MANAGEMENT SYSTEM

Upon receipt of all analytical results and field data, a report will be prepared describing the work performed, sampling methods, data evaluations, recommendations, and conclusions. Current analytical data generated by this sampling event will be uploaded to Ecology's Electronic Information Management (EIM) database.

4.0 REFERENCES

ASTM. 2021. "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)" Active Standard ASTM D2488.

Washington Department of Ecology (Ecology). 2021. "Re: Opinion on a Cleanup at the following Site" 17 March.

Washington Department of Ecology (Ecology). 2019. "SW0775 – BNSF Winlock" 25 September.

TRC Environmental Corporation (TRC). 2020a. *2019-2020 Groundwater Monitoring Summary Report*. 15 June.

TRC Environmental Corporation (TRC). 2020b. *Request for No Further Action Determination*. 29 June.

Tables

Table 1
Compiled Historical Soil Data Analysis
Confirmational Soil Sampling Work Plan
Former Cummings Oil Lease Site
Winlock, Washington

Sample Identification	Depth (feet)	Date	GRO ^a	DRO ^b	ORO ^b	Benzene ^c	Toluene ^c	Ethyl-benzene ^c	Total Xylenes ^c	Total Naphthalenes ^c	cPAHs ^d
Pre-Excavation Samples											
B5-0-4	0-4	11/2/2005	9.59	137	110	0.0643	<0.0657	0.209	0.523	Not Analyzed	Not Analyzed
B5-4-8	4-8	11/2/2005	372	75	<29.3	0.616	<0.255	2.09	4.37	Not Analyzed	Not Analyzed
B6-0-4	0-4	11/2/2005	1,790	178	<34.1	3.97	0.844	15.5	21.3	0.742	<0.0139
B6-4-8	4-8	11/2/2005	1,080	318	<28.9	3.28	<0.859	8.15	23.9	Not Analyzed	Not Analyzed
B7-0-4	0-4	11/2/2005	235	16.5	<31.7	0.28	<0.194	0.715	0.86	Not Analyzed	Not Analyzed
B7-4-8	4-8	11/2/2005	142	14.1	<35.3	0.227	<0.0532	0.35	0.272	Not Analyzed	Not Analyzed
B8-0-4	0-4	11/2/2005	<5.15	<12.8	<31.9	<0.0309	<0.0515	<0.0515	<0.103	Not Analyzed	Not Analyzed
B9-0-4	0-4	11/3/2005	607	305	<32.9	0.674	<0.516	1.74	3.75	Not Analyzed	Not Analyzed
B9-4-8	4-8	11/3/2005	70.9	179	<29.7	<0.269	<0.449	<0.449	<0.898	Not Analyzed	Not Analyzed
MW2A-6.0	5-6	12/19/2005	<2.89	<13.0	<32.4	<0.0173	<0.0289	<0.0289	<0.0578	Not Analyzed	Not Analyzed
MW2-7.0	7-8	12/19/2005	<2.72	<14.2	<35.4	<0.0163	<0.0272	<0.0272	<0.0543	Not Analyzed	Not Analyzed
Post-excavation SamplesE											
EX1-NSD1-6	6	7/29/2008	160	<25	<40	<0.02	0.52	1.05	1.16	Not Analyzed	Not Analyzed
EX1-NSD3-6	6	7/30/2008	295	<25	<40	0.84	3.62	1.61	6.2	Not Analyzed	Not Analyzed
EX1-WSD2-6	6	7/29/2008	222	1,860	<40	0.93	0.54	3.23	2.54	Not Analyzed	Not Analyzed
EX1-WSD4-6	6	7/30/2008	276	119	<40	1.53	1.6	3.2	5.31	2.3	<0.01
FD-0729086 (dup) ^e	6	7/29/2008	230	760	<40	0.44	0.52	2.82	2.73	Not Analyzed	Not Analyzed
EX1-NSD2-6	6	7/30/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX1-NSD4-6	6	7/31/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX1-ESD1-6	6	7/29/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX1-ESD2-6	6	7/30/2008	<10	<25	<40	<0.02	<0.10	<0.05	0.11	Not Analyzed	Not Analyzed
EX1-SSD1-6	6	7/29/2008	15	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX1-SSD2-6	6	7/30/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	<0.20	Not Analyzed
EX1-WSD1-6	6	7/29/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX1-WSD3-7	7	7/29/2008	10	<25	<40	<0.02	<0.10	<0.05	<0.15	<0.20	Not Analyzed
EX1-BTM1-8	8	7/29/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX1-BTM2-8	8	7/29/2008	11	<25	<40	<0.02	<0.10	<0.05	<0.15	<0.20	<0.01
EX1-BTM3-8	8	7/30/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	<0.20	Not Analyzed
EX2-NSD1-6	6	7/30/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX2-ESD1-6	6	7/30/2008	<10	130	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX2-SSD1-6	6	7/30/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX2-WSD1-6	6	7/30/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX2-BTM1-8	8	7/30/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX1-SP1	NA	7/28/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX1-SP2	NA	7/28/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX1-SP3	NA	7/28/2008	<10	<25	990	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX2-SP1	NA	7/30/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX2-SP2	NA	7/30/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX2-SP3	NA	7/30/2008	65	<25	<40	0.099	0.88	0.49	2.28	Not Analyzed	Not Analyzed
EX1-TP1-4	3	7/28/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
EX1-TP1-7	7	7/28/2008	15	<25	<40	0.18	0.16	0.39	0.53	Not Analyzed	Not Analyzed
EX1-TP2-8	8	7/29/2008	<10	<25	<40	<0.02	<0.10	<0.05	<0.15	Not Analyzed	Not Analyzed
MW-5-5	NA	8/4/2008	<6.32	<12.6	<31.6	<0.0379	<0.0632	<0.0632	<0.126	<0.0128	<0.0128
MTCA Method A Cleanup Levels ^f			30	2,000	2,000	0.03	7	6	9	5	0.1

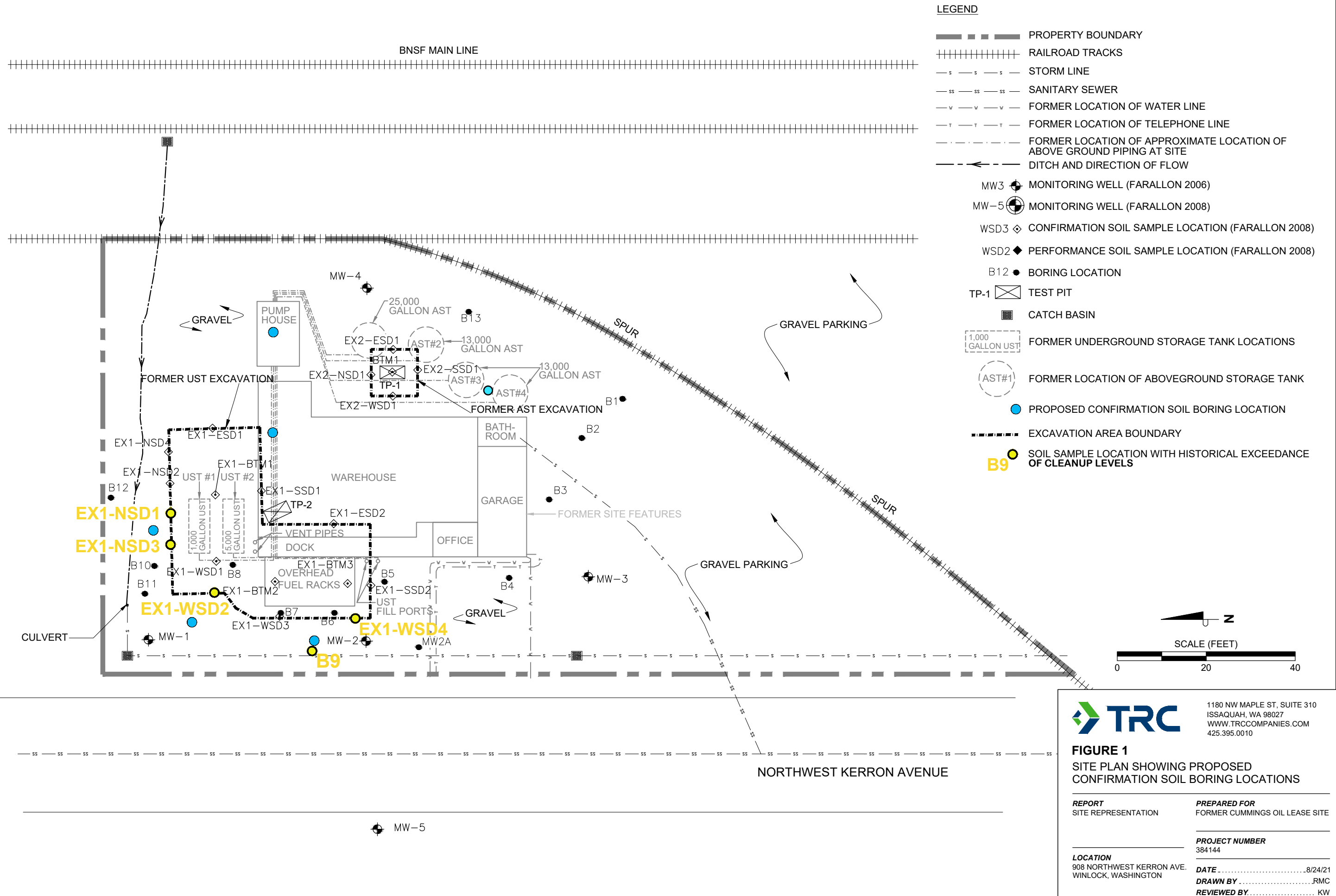
GRO and benzene concentrations are greater than two times their respective MTCA Method A soil cleanup levels in areas representative of current soils existing at the Site.

- Notes:
- All sample results in milligrams per kilogram.
 - Soil analytical results from soil borings B-5, B-6, B-7, and B-8 as well as EX-1 and EX-2 test pits and SPs are not included in analysis of compiled sample data as soil in this area was removed during 2008 excavation activities.
 - Bold** Sample result exceeds laboratory reporting limit.
 - Sample result exceeds cleanup level.
 - < Not detected at concentration greater than or equal to laboratory reporting limit.
 - a Analyzed by NWTPH-Gx.
 - b Analyzed by NWTPH-Dx.
 - c Analyzed by EPA Method 8260B.
 - d Analyzed by EPA Method 8270C.
 - e Quality Assurance/Quality Control duplicate sample. FD-072908 is a duplicate of EX1-WSD2-6 and is not included in analysis of compiled sample data.
 - f Model Toxics Control Act (MTCA) Method A Industrial (Table 745-1) and Unrestricted Land Use (Table 740-1) Cleanup Levels.

- Compounds:
- GRO Gasoline-range organics
 - DRO Diesel-range organics
 - ORO Oil-range organics
 - cPAHs Carcinogenic polycyclic aromatic hydrocarbons



Figures



Attachment A
Site-Specific Health and Safety Plan



**SITE SPECIFIC
HEALTH & SAFETY PLAN**

**2022 Confirmational Soil Sampling Site
Investigation**

BNSF Former Cummings Oil Lease Site
908 Northwest Kerron Avenue
Winlock, Washington, 98815

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1.0 INTRODUCTION

The purpose of this Health & Safety Plan (HASP) is to establish responsibilities, procedures and contingencies for the protection of TRC employees, contractors, visitors and the public while performing activities at the Former Cummins Oil Lease site. This site-specific HASP is to be implemented in conjunction with TRC's Health and Safety Management System.

The use of proper health and safety procedures in accordance with applicable OSHA regulations shall be required during site work. The procedures presented in this HASP are intended to serve as guidelines. They are not a substitute for sound judgment by site personnel.

1.1 Key Companies Involved in Project

CUSTOMER OR CLIENT: BNSF
DESIGN ENGINEER: N/A
CONTRACTOR: TRC
SUBCONTRACTOR: N/A

1.2 Scope of Work

The proposed work will be performed by TRC and will include but may not be limited to the following activities:

- ☐ Perform public and private utility locate at all proposed confirmational soil sampling locations.
- ☐ Perform soil sampling for laboratory analysis at five proposed locations.
- ☐ Retain excess sample spoils, hand auger cuttings, and decontamination fluids in properly labeled DOT-approved 55-gallon drums.

2.0 SITE INFORMATION

This HASP considers the physical, chemical, and biological hazards that may be encountered during work activities at the site. Operations associated with this HASP will be conducted in accordance with the scope of work and approved design drawings/specifications.

Summary information for this project is provided in the following table:

Table 1: Site Information

Anticipated Work Period:	Confirmational Soil Sampling will be completed in one day
Site description (see Attachment A for site location map):	The Site is a vacant, gravel covered lot used as parking for local businesses. It was formerly used as bulk fuel storage facility.
Approximate depth to groundwater:	One to five feet below ground surface.
Contaminants of concern (see Attachment B)	Total petroleum hydrocarbons as diesel-range organics (DRO), oil-range organics (ORO), and gasoline-range organics (GRO); benzene, toluene, ethylbenzene, and xylenes (BTEX) in groundwater.

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3.0 ROLES & RESPONSIBILITIES

Contact information and names of key project personnel are listed below. A description of their responsibilities follows.

Table 2: Key Project Personnel and Contact Information

Role	Name	Contact Information
TRC Project Manager/Supervisor	Alexander Leshner	Cell: (425) 287-0154
TRC Field Manager	Josh Bernthal	Cell: (425) 241-5400
TRC Site Safety Officer (SSO)	Eric Stata	Cell: (425) 273-7681
TRC Assistant Site Safety Officer (Assistant SSO)	N/A	Cell: N/A
BNSF Project Representative	Scott MacDonald	Office: (253) 591-2678
TRC Site Safety Officer or Assistant Safety Officer must report all site incidents immediately to the TRC Project Manager		
Contractor/Subcontractor Personnel		☒ NA
☐ Contractor / ☐ Subcontractor Company Name:		
Site Safety Officer (SSO)	TBD	
Assistant Site Safety Officer (SSO)	TBD	
TRC PM/Supervisor must report all incidents INVOLVING PERSONAL INJURY immediately to:		
TRC Human Resources Manager	Suzanne Micallef	Office: (978) 656-3628
TRC PM/Supervisor must report all incidents NOT INVOLVING PERSONAL INJURY within 24 hours to:		
TRC National Safety Director	Mike Glenn	Office: (949) 727-7347 Cell: (949) 697-7418
TRC ECR Safety Coordinator	Dave Sullivan	Office: (978) 656-3565 Cell: (978) 758-2809

3.1 TRC Project Manager/Supervisor (and assistant)

- ☐ Overall responsibility for development of a complete and accurate HASP. The HASP shall account for all foreseeable hazards.
- ☐ Responsible for the management and technical direction of all aspects of the project.
- ☐ Ensure the completion of periodic site inspections.
- ☐ Conduct incident investigations.
- ☐ Delegate responsibility for field implementation of the HASP to TRC Site Safety Officer.

3.2 Site Safety Officers (SSO) – TRC & Contractor Personnel

- ☐ Responsible for the daily implementation of the HASP.
- ☐ Ensures HASP is available onsite and that the plan is understood and signed by all personnel entering the site. (See **Attachment F** "Safety Compliance Agreement").
- ☐ Conducts (or coordinates the completion of) Tailgate Safety Meetings and ensures documentation of these meeting is available for review.
- ☐ Uses JSAs to emphasize hazards and protective measures discussed in the HASP.

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- ☐ Communicates any revisions to the scope of work or HASP to affected personnel and Project Manager/Supervisor.
- ☐ Implements emergency response procedures.

3.3 Assistant Site Safety Officer (Asst SSO) – TRC & Contractor Personnel

- ☐ In the event the SSO is not on site, the Assistant SSO will assume the responsibilities of the SSO.
- ☐ It is TRC's intent to have a TRC SSO or Assistant SSO available onsite during work activities. On the occasion neither person are physically onsite, they will be available by phone or pager. See "Table 2: Key Project Personnel and Contact Information".

3.4 TRC Employees

- ☐ Responsible for understanding and complying with this HASP, including the JSAs.
- ☐ Are required to participate in daily Tailgate Safety Meetings prior to commencement of site work.
- ☐ Each employee must acknowledge an understanding of the HASP by signing the "Safety Compliance Agreement" (See **Attachment F**) on a daily basis.

3.5 Visitors / Regulatory Agents

- ☐ Visitors / regulatory agents will be provided an overview of the basic site safety information. A copy of this HASP will be made available for review.
- ☐ All visitors are required to sign-in on "Safety Compliance Agreement" (See **Attachment F**) each time they enter the project site.
- ☐ Visitors / regulatory agents should be escorted by a TRC or designated contractor employee and should not be allowed to move about the site alone.

4.0 COMMUNICATION

Communication is an important aspect of project safety and this HASP. There are several processes incorporated in this HASP to ensure communication of health and safety hazards.

- ☐ Pre-job project planning meetings to discuss the scope of work and potential hazards
- ☐ Site walk downs with the TRC workgroup, subcontractors and the customer/client.
- ☐ Development of site-specific HASP and JSAs.
- ☐ Communication and acknowledgement of understanding of HASP & JSAs by signing the "Safety Compliance Agreement" (See **Attachment F**) at the start of each day. Additional communication is needed if conditions change or when changing tasks.
- ☐ Daily tailgate meetings emphasizing that hazard assessment is a continuous process, and any potentially unsafe actions or condition are to be communicated immediately to the SSO.
- ☐ Near misses are to be communicated to the onsite staff and Project Manager by the SSO and reported on the near miss form (**Attachment I**). The near misses will be discussed during the next tailgate meeting to ensure all onsite staff are aware of the near miss.
- ☐ Communicating results of field observations/audits. Visual observations are to be conducted daily by the SSO. Periodic field observations will also be recorded on the TRC Site Safety Observation Form (**Attachment G**). Results from either observation will be communicated during Tailgate Safety Meetings.

5.0 REVISIONS TO HASP

If a situation arises where the HASP requires revision, the following options are available:

- ☐ Except in the case of emergency situations, no deviations from the HASP may be implemented without the prior notification and approval of the TRC Site Safety Officer (SSO) and the Project Manager/Supervisor.
- ☐ If HASP revisions are minor (i.e. not involving significant changes to the scope of work, associated hazards or PPE requirements), the TRC Site Safety Officer (SSO) can make hand-written revisions to the HASP in the field. HASP Revisions must then be communicated to affected personnel and the Project Manager/Supervisor.

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☐ If HASP revisions are substantial (i.e. involving significant changes to the scope of work, associated hazards or PPE requirements), the TRC Site Safety Officer (SSO) must consult with the Project Manager/Supervisor before making revisions. The TRC Site Safety Officer (SSO) can make hand-written revisions to the HASP in the field. HASP Revisions must then be communicated to affected personnel and the Project Manager/Supervisor. It is up to the discretion of the Project Manager/Supervisor whether a revised HASP will be reissued to replace the original HASP on the work site.

6.0 HAZARD ASSESSMENT

Hazard assessment is essential for establishing hazard prevention measures. Below is a list of potential physical, chemical and biological hazards associated with various TRC project sites. Not all hazards apply to this site-specific HASP. In addition, the list is not all-inclusive and may require additional hazards associated with a particular project/site to be added.

Please check, or add applicable hazards or hazardous tasks, hazards associated with the scope of work described in this HASP (Section 1.2). A JSA shall be developed to address each of the indicated hazards or hazardous tasks. JSAs are included in **Attachment E** of this HASP.

6.1 Physical Hazards

- ☐ Excavation & trenching (where personnel will be entering the excavation)
- ☐ Heavy equipment (not drilling related)
- ☐ Drilling
- ☐ Overhead lines
- ☐ Working within a high voltage area
- ☐ Underground utilities
- ☐ Energy control – lock out / tag out
- ☐ Flammable atmospheres (> 10% LEL)
- ☒ Traffic - vehicular and pedestrian
- ☒ Trips, slips & falls
- ☒ Head, foot, eye, and back injuries
- ☐ Falling objects
- ☐ Working from elevated surface (greater than 6 feet); fall protection / fall arrest
- ☐ Ladders use
- ☒ Sharp objects
- ☐ Welding hazards
- ☐ Confined spaces
- Equipment
 - ☐ Electrical equipment (including powered hand tools)
 - ☐ Hydraulic equipment
 - ☐ Pneumatic equipment
- Non-Powered Hand Tools
 - ☒ Cutting equipment (non-powered)
 - ☒ Hammers, shovels, screwdrivers
 - ☐ _____ (Additional equipment)

6.2 Chemical Hazards

- ☒ Refined Petroleum products / waste oil
- ☐ Asbestos
- ☐ Serpentine Soils

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☐ PCE, TCE (in groundwater)

☐ Ozone

☐ Hydrogen Sulfide

☐ Heavy metals

☐ Landfill Gases

☒ Environmental samples, soil cuttings, decontamination water, dust (nuisance, silica)

☐ Industrial chemicals

6.3 Biological Hazards

☐ Noise Exposure

☐ Heat Stress

☒ Cold Stress

☒ Weather - heat, cold, rain, fog

☐ Poisonous Plants

☒ Animals/Insects

☐ Misc. Pathogens

7.0 GENERAL SAFETY RULES

This section presents general safety rules for all persons working at the project site. Failure to follow safety protocols and/or continued negligence of health and safety policies will result in expulsion of a worker or firm from the site and may result in termination of employment.

1. Horseplay, fighting, gambling or the possession of firearms is not permitted.
2. Work shall be well planned and supervised to prevent injuries. Supervisors shall assure that employees observe and obey safety rules and regulations.
3. An employee reporting for work who, in the opinion of his supervisor, is unable to perform his assigned duties in a safe and reasonable manner shall not be allowed on the job.
4. No employee shall be assigned a task without first having been instructed on proper methods, including safety training, of carrying out the task. Any employee who feels they have not received proper instruction shall notify their supervisor prior to carrying out the task.
5. Injuries and accidents shall be reported immediately to the immediate supervisor, who will then report it to the SSO.
6. There shall be no consumption of food or drink in operational areas of the site. Hands should be thoroughly cleansed prior to eating.
7. Smoking is not permitted on the site.
8. When personnel are conducting hazardous operations, there shall be at least one other person (buddy system) on duty in the immediate area as a backup in case of emergency.
9. Wear required personal protective equipment (PPE) in the workplace when appropriate and/or when specified in the site-specific health & safety plan. Loose clothing and jewelry should not be worn when operating machinery.
10. Do not operate any machinery if you are not authorized or qualified to do so. If unsure how to operate a machine or perform any assigned task, ask the Project Manager/Supervisor before proceeding.
11. Do not operate motorized equipment until proper training and certification has been provided (e.g. forklifts, etc.)
12. No one shall knowingly be permitted or required to work while the employee's ability or alertness is so impaired by fatigue, illness or other causes that it might unnecessarily expose the employee or others to injury.

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13. Alcohol and drugs are strictly prohibited on any TRC premises, customer property, and/or in Company vehicles. Employees shall not report to work under the influence of drugs or alcohol. Employees are prohibited from possessing, using, manufacturing, distributing, dispensing, selling or purchasing illegal drugs or other controlled substances (as defined under federal and state law).

8.0 BNSF-SPECIFIC SAFETY REQUIREMENTS

Site activities must be performed in accordance with client-specific requirements and procedures. Details are provided in the following subsections.

8.1 BNSF Contractor Safety Action Plan

Prior to mobilizing to the site to begin work, TRC shall complete and submit BNSF's Contractor Safety Action Plan found at contractororientation.com. The completed safety action plan shall be sent to the BNSF project representative and a copy maintained on-site by the Project Manager and SSHO.

8.2 Job Safety Briefing

Before beginning any task, a complete job safety briefing will be conducted with all individuals involved with the task, and again if the task changes. If the Task is within 25 feet of any track, the job briefing must include the BNSF flagman. All TRC, subcontractor, and lower-tier subcontractor employees will receive safety instruction from TRC's SSHO or a qualified representative prior to the start of any project. TRC and its subcontractor supervisor will review the safety guidelines contained in **Attachment K** to familiarize their employees with safety issues that exist when working in a railroad environment. Quick Reference Guides (QRGs) are available in **Attachment K** for BNSF specific requirements and applicable industry and federal standards. This should be reviewed at least weekly, and immediately with any new employee(s) coming on the job. It is the responsibility of the SSHO to instruct employees on these guidelines and to require their compliance. The primary exposures and life-saving processes will be discussed during the job safety briefing. These include:

- Line of Fire
- Pinch Points
- Ascending/Descending
- Walking/Path of Travel
- Life-Saving Processes
 - o 4444
 - o AED/First Aid
 - o Evacuation Route

8.3 Personal Protective Equipment

All personnel working at the Former Cummins Oil Lease site will be required to wear OSHA approved safety glasses with side shields, hard hats, reflective traffic safety vests (ANSI Class II or higher and orange), and above the ankle, lace-up, safety toed boots with a defined heel. Office employees restricted to office work will not be required to comply.

8.4 Fouling Tracks

Train or equipment movement should be expected on any track, in any direction, at any time. Work will not be performed at less than 25 feet from the centerline of any track without a BNSF representative present to provide track protection, unless the track is protected by other approved means and work has been authorized by the BNSF Railroad representative in charge of the project.

Do not walk between rails or foul track, except when duties require, and proper protection is provided. When necessary to cross tracks, look in both directions and keep a minimum of 25 feet from the nearest end of stationary rail equipment. Do not crawl under or between rail cars. Under certain conditions, trains and equipment can approach without being heard. Proper attention and protection are essential to personal safety when working near railroad tracks.

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8.5 Blue Signal Protection

Proper Blue Signal Protection is vital for the safety of mechanical employees making repairs to rail equipment. Clear understanding and absolute compliance to the rules is the only certain way to insure your safety.

Blue Signal Protection provides for the protection of railroad workers while inspecting, testing, repairing, or servicing rolling equipment. Without proper protection, workers would be exposed to potential serious injury or death from moving equipment.

Make sure you know the proper Blue Signal Protection procedures for the type of equipment you are working on and the location of the equipment. Obviously, we cannot cover every situation in this briefing. However, always keep in mind the following key points:

8.5.1 *On Main Track*

- A blue signal must be displayed at each end of the rolling equipment.

8.5.2 *On Other than Main Track*

- Protection must be provided by switches or derails lined against movement onto the track and secured with an effective locking device. In addition, a blue signal must be displayed at or near each switch or derail.
- Where derails are used, they must be positioned at least 150 feet from the rolling equipment to be protected.
- Derails may be positioned no closer than 50 feet from the end of rolling equipment on designated engine servicing tracks or car shop repair tracks where the speed is limited to no more than 5 mph.
- Protection also may be provided by remote control switches as long as the proper procedures are followed.

8.5.3 *Blue Signal Protection Visible to Engineer*

In addition to providing the protection listed above, the following also must be in place:

- A blue signal must be attached to the controlling engine.
- A blue signal must be visible to the engineer or employee controlling the engine.
- The engine must not be moved.

8.6 Work Protection

If work protection is provided, every employee must know:

- Who the BNSF qualified flagman is, and how to contact him/her;
- Limits of the work protection;
- The method of communication to stop and resume work;
- Entry into work limits when designated.

When track protection is required, a Daily Job Briefing Field Documentation Card (**Attachment K**) will be completed daily by the entire field crew including subcontractors. All field crew must understand the track protection that is being provided.

Note: Individuals or equipment entering work limits that were not previously job briefed must notify the flagman immediately and be given a job briefing if working less than 25 feet from the centerline of the track.

8.7 Riding on Equipment

Riding on rail equipment is prohibited unless authorized by the BNSF Railroad representative in charge of the project.

8.8 Underground Utilities/Excavation

TRC must obtain the specific approval of the responsible BNSF Project Representative prior to excavating. See **Attachment K** for the specific Quick Reference Guide (QRG) for Clearing Underground Utilities. It is TRC's responsibility to contact a one-call service at least 48 hours prior to work and provide

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appropriate notification to other companies who may have underground utilities in an area to be excavated. The BNSF Project Representative will work with TRC to make sure that appropriate personnel, including BNSF Signal, Telecommunications, Structures, and Track employees, are contacted at (800) 533-2891 to determine whether there are any underground communication lines, electrical lines, or pipes in an area to be excavated. Work within 25 feet of track will require a pre-excavation meeting with BNSF Signals and Telecommunications. The form entitled *Underground Cable Location & Acknowledgement* (**Attachment N**) must be completed by TRC prior to initiating excavation work. This does not preclude the calling of the "One Call" system.

Work is NOT to proceed where there is doubt regarding the location of underground obstructions, including utilities. TRC shall facilitate a meeting with BNSF facility personnel who may have knowledge of unmapped utilities, previous underground excavations, or provide utility maps from onsite archives. Prior to any boring work on Railroad property, TRC shall initiate a privately contracted utility locate service before conducting any intrusive work. The private utility locate service is used to review and confirm the presence/absence of utilities as well as be escorted by TRC to perform physical survey of area to visually identify above surface structures or "signs" of utilities. All utilities located must be flagged with appropriate colors (see Table 4 below). Virtual maps or photographs housed on electronic devices are not considered appropriate substitutes for clearly marked and preserved locations in the field. Geophysical methods shall be used to verify marked utilities and potentially identify unmarked or unmapped utilities. If any excavation extent shall come within 3 feet of a marked utility, a manual excavation shall be performed, or all attempts to relocate the proposed location shall be made.

Table 4: Utility Coloring per ANSI Z535.1

Utility/Service	Color	Type of Lines or Materials
Survey Markings or Excavation Extent	Pink or White	Known extents of construction or survey. White to be used to identify extent of excavations for visually showing utility services where digging will commence.
Electrical	Red	Electrical power line (above and below ground), cables, conduit, lighting cables in PVC or shielded lines
Gas	Yellow	Natural Gas, Petroleum Gas & Liquids, Steam in Steel or Fiberglass
Communications	Orange	Phone, Internet, Cables, Conduit, Low voltage relay lines in PVC or shielded lines
Potable Water	Blue	Residential or Industrial in PVC, Steel, Iron lines
Reclaimed Water	Purple	Non-Potable Water in PVC, Steel, Iron lines
Sewage	Green	Raw sewage or stormwater in Steel, Iron Ductile, Concrete

TRC shall explore the proposed location for such work with air-knife/hydro-knife and vacuum equipment, or hand tools to a depth of at least five (5) feet below the surface of the ground to determine whether pipeline or other structures exist below the surface, provided; however, that in lieu of the foregoing, TRC shall have the right to use suitable detection equipment or other generally accepted industry practice (e.g., consulting with the Underground Services Association) to determine the existence or location of pipelines and other subsurface structures prior to drilling or excavating with mechanized equipment. Should TRC request, by giving thirty (30) working days in advance of requested entry, Railroad will provide TRC any information that it has in its possession concerning the existence and approximate location of underground utilities and pipelines in the proposed location of such work and, prior to any such boring, TRC will review all such material to preclude TRC's fouling any existing pipelines or structures. Railroad does not warrant the accuracy of information relating to subsurface conditions and TRC's operations will be subject at all times to the liability provisions of the contract. Should an underground line, pipe, or other obstruction be unexpectedly encountered, immediately discontinue excavation activities and contact the responsible BNSF Project Representative and TRC incident reporting line. Where the obstruction is a utility, and the owner of the utility is known, then the owner of the utility will be immediately notified, as well.

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8.9 Heavy Equipment

All heavy equipment must be equipped with roll-over protection and contain lockable battery disconnects. Do not leave unattended equipment within 25 feet of the track centerline, unless obtaining specific approval from the responsible BNSF Project Representative. Under no circumstances is equipment to be left where it is within 8' 6" of the track centerline, or otherwise it could be struck by a train or on-track equipment.

8.10 Damage to BNSF Railroad Property

Any damage to BNSF Railroad property will be reported immediately to the BNSF representative in charge of the project. Any vehicle or machine contact with a track, signal equipment or structure (bridge) that could result in derailment will be reported by the quickest means possible to the BNSF Railroad representative in charge of the project or the respective System or Network Operations Center. Emergency numbers are to be obtained from the BNSF Railroad representative in charge of the project, prior to the start of any work, and posted at the job site for the duration of the project.

8.11 Passing Trains

When a train is approaching, personnel or equipment working less than 25 feet from the centerline of the track will stop work and move as far away from the track as practical, until the ENTIRE train has passed. This assures the train engineer that the train has been seen and it is safe to proceed. Failure to do this could result in the engineer placing the train into an emergency that could result in damage to the train and delay to railroad traffic. After notification by the BNSF Railroad flagman that no other trains are within the working limits, work may then resume. If a train is stopped on a track, work can only be performed that is beyond 8 feet of the nearest rail of the track the train is on. No work within 8 feet of the nearest rail can be performed. In passing around the ends of standing cars, engines, roadway machines, or work equipment, leave at least 20 feet between yourself and the end of the equipment. Do not go between pieces of equipment if the opening is less than one railcar length (50 feet).

NOTE: Some projects may require a different procedure. In these cases, the BNSF Railroad representative in charge of the project will advise TRC of the proper work procedure adjacent to passing trains.

Violent arm, flag, or flashlight movement while trains are passing indicates an emergency (requires trains to stop) and must not be done unless an emergency exists. NEVER stand with your back to a moving train. Metal banding and other components sometimes break during shipment and can swing out several feet from the train.

8.12 Stepping or Sitting on Rails

Stepping, walking, or sitting on the top of rail is prohibited. The railhead becomes very slick from oil buildup and presents a slipping hazard.

8.13 Confined Space Entry

BNSF does not allow the downgrading of the following permit-required confined spaces:

- Permit-required spaces associated with environmental treatment systems, including sanitary sewer systems, and above ground storage tank.
- Permit-required confined spaces that are entered vertically with workers subsequently moving significant distances horizontally, in a direction away from the entry point, for example below grade pipe tunnels.

In addition to the Pre-Entry/Entry Requirements specifically required by applicable OSHA standards, which includes applicable training and certification. BNSF has the below listed specific requirements. TRC will:

- Obtain from the responsible BNSF Project Representative a *Confined Space Identification Form* specific to each permit-required confined space that is to be entered during the course of a project. This form lists the known or suspected hazards of the permit-required confined space.
- Use a Confined Space Entry Permit system.
- Coordinate entry operations with affected BNSF personnel where appropriate.
- Provide and use its own air monitoring and rescue equipment.

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- Determine that outside emergency responders are available and equipped to handle rescues that may require entry into a confined space.
- Provide the responsible BNSF Project Representative with copies of closed-out permits.
- Advise the responsible BNSF Project Representative of any hazards encountered or created that were not listed on the space specific *Confined Space Identification Form*.

8.14 Fall Protection

BNSF requires fall protection equipment to be worn when on railroad bridges where the distance to the top of the deck to the ground or water surface below is 12 feet or more. While this is the cited FRA Bridge Worker Safety Standard, this policy is less restrictive than both the OSHA and TRC fall protection requirements of six feet. As a result, all TRC personnel will don a personal fall protection system when exposed to unprotected falls of six feet or more.

8.15 Games, Reading or Electronic Devices

While on duty, do not:

- Play games.
- Read magazines, newspapers, or other literature not related to duties.
- Use cellular or mobile telephones, or similar hand-held electronic devices for voice communications, emailing, performing any electronic text retrieval or entry, or accessing a web page when:
 - o On the ground within four feet of the nearest rail of a track; and
 - o On, under, or while involved with the operation or movement of equipment or machinery (e.g. cranes, loaders, forklifts, intermodal hostlers, etc.).
 - o Exception – Mechanical employees not involved with the operation or movement of equipment or machinery and within 4 feet of the nearest rail of a track may use cellular phones for business-related voice communications when Blue Signal Protection is established on that track.
 - o Use personal electronic devices (cellular telephones, notebook computers, laptops, e-books, etc.) for other than business purposes, except when located in a predetermined place of safety during break periods and not performing duties.

While driving a BNSF-owned or rented vehicle (off rail), do not:

- Use cellular or mobile telephones, or similar hand-held electronic devices for voice communications in other than hands-free mode. Manually enter or read text from cellular or mobile telephones, or similar hand-held electronic devices (e.g., e-mailing, performing any electronic text retrieval or entry, accessing a web page, etc.).
- Dial or answer cellular or mobile telephones by pressing more than a single button when operating a commercial motor vehicle.
- Use notebook computers, laptops, or similar devices. The display screen of such devices must be closed or off.

Employees must be aware of and comply with any local, state, or federal laws governing use of wireless equipment while driving (e.g., laws banning use of wireless phone while driving).

While occupying the control compartment of on-track equipment including Hy-Rails (on rail), do not:

- Use cellular or mobile telephones, or similar hand-held electronic devices when the equipment is in motion.
- Use the instant messaging feature of Smart Mobile Client (SMC) when the equipment is in motion.

While occupying the controlling cab of a moving train or engine:

- Employees' and/or supervisors' cellular telephones must be turned off and earpieces removed from the ear.
- Exception - Cellular telephones may be used for mechanical or technical evaluations of locomotives or locomotive systems on a moving train; prior to using the device, a job safety briefing must be held with all assigned members of the train crew and all must agree how communications can safely take place.

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- Cellular telephones may be used when the train or engine is stopped. Prior to using the device, a job safety briefing must be held with all assigned members of the train crew and all must agree how the use of the device can safely take place.
- Other electronic devices (not capable of voice communication) may be used only as duties require. Prior to using such device, a job safety briefing must be held with all assigned members of the train crew and all must agree how the use of the device can safely take place.

9.0 PERSONAL PROTECTIVE EQUIPMENT

TRC and contractor personnel are required to wear PPE appropriate for the task and potential physical, chemical and biological exposures. Selection of PPE is based on hazard assessment (i.e. JSAs) and air monitoring.

9.1 PPE required by all personnel at all times on the site:

- ☒ Hard Hat
- ☒ Safety Shoes/Boots
- ☒ Safety Vest (Orange)
- ☒ Eye Protection - ☒ glasses ☐ goggles ☐ face shield
- ☐ Hand Protection - ☐ Kevlar ☐ nitrile ☐ other _____
- ☐ Hearing Protection
- ☐ Respiratory Protection - ☐ APR Particulate ☐ APR Chemical cartridge ☐ other _____
- ☐ Protective Clothing - ☐ Tyvex ☐ Nomex ☐ Coveralls ☐ other _____

9.2 Additional PPE, which should be available at all times on the site:

- ☐ Hard Hat
- ☐ Safety Shoes/Boots
- ☐ Safety Vest
- ☐ Eye Protection - ☐ glasses ☐ goggles ☐ face shield
- ☒ Hand Protection - ☒ Kevlar ☒ nitrile ☐ other _____
- ☒ Hearing Protection
- ☒ Respiratory Protection - ☐ APR Particulate ☐ APR Chemical cartridge ☒ Face Mask (Pandemic/Covid-19)
- ☐ Protective Clothing - ☐ Tyvex ☐ Nomex ☐ Coveralls ☐ other _____

10.0 RESPIRATORY PROTECTION

For operations that require the use of a respirator, the TRC and Contractor SSOs must verify that field personnel are medically approved to use respiratory equipment, fit tested, and trained in the proper use of respirators. Only respirators that are NIOSH/MSHA approved are to be used.

Respiratory protection is mandatory if workers are required to complete tasks within a hazardous atmosphere. According to OSHA, a hazardous atmosphere is defined as:

- ☐ Flammable gas, vapor, or mist in excess of 10% of LEL.
- ☐ Atmospheric oxygen is below 19.5% or above 23.5%.
- ☐ When concentration of a known contaminant is greater than the permissible exposure limit (PEL).
- ☐ Airborne combustible dust exceeds its LEL (approximated when dust obscures vision at a distance of 5 feet or less).

If conditions warrant, air monitoring may be required to verify the presence or absence of a hazardous atmosphere. Air monitoring is to be conducted whenever a situation or condition arises that could reasonably result in a hazardous atmosphere.

10.1 Air-Purifying Particulate Respirators

Employees involved in construction and earthmoving operations that result in nuisance dust and particulates may use air-purifying respirators. These are commonly referred to as “dust masks” and do not require fit testing. Particulate respirators can be used in situations where nuisance dust and particulates are the only contaminants posing an inhalation hazard. Particulate respirators are not to be used in oxygen deficient atmosphere or if hazardous levels of gas/vapor contaminants are also present.

A high efficiency particulate air (HEPA), P100 respirator should be used in place of commercially available “dust masks”.

10.2 Air-Purifying Gas/Vapor Respirators

TRC employees and Contractors are required to wear half-face, air-purifying respirators with the appropriate chemical cartridge under the following circumstances:

- ❑ When concentration of a known contaminant continuously exceeds permissible exposure limit (PEL) time-weighted average or the threshold limit value (TLV) time-weighted average.
- ❑ When volatile organic compound (VOC) vapors in the work area continuously exceed the threshold limit value-time-weighted average (TLV-TWA) for gasoline (300 parts per million [ppm]) or other chemicals of concern as shown in **Attachment B**.
- ❑ When, at any time, VOC vapors in the work area exceed the threshold limit value - short-term exposure limit (TLV-STEL) for gasoline (500 ppm) or other chemicals of concern shown in **Attachment B**.

See **Attachment B** for additional information and regulatory exposure limits for chemicals of concern at this site.

Air purifying respirators (APRs) with chemical cartridges can be used under the following conditions:

- ❑ If the oxygen concentration is between 19.5% and 23.5%.
- ❑ If chemical contaminants have been identified.
- ❑ The toxic concentrations are known and the respirator cartridges are effective in removing the contaminants.
- ❑ The respirator and cartridges are NIOSH/MSHA approved.
- ❑ The contaminants have noticeable warning qualities such as odor and visibility characteristics including color.

In the event workers are required to wear air purifying respirators (APRs) with chemical cartridges, the following requirements must be met:

- ❑ The TRC or Contractor SSO must verify that workers are:
 - Medically approved (within one year) to use respiratory protection.
 - Fit-tested for the specific respirator to be used.
 - Trained in the proper use and limitations of the respirator to be used.
- ❑ Contractors must provide proof of the above to the TRC SSO, upon request.
- ❑ If an employee or contractor has not cleared by the SSO to use a respirator, they will not be assigned tasks that may potentially expose them to contaminants.
- ❑ Personnel with interfering facial hair are not permitted to wear respirators and shall not be permitted in areas where respiratory protection is required.

10.3 Air-Supplied Respirators

Air-supplied respirators, such as SCBA or airline, full-face respiratory protection, are not anticipated to be required at the site. This level of respiratory protection is utilized in oxygen deficient atmospheres or atmospheres considered to be at or above immediately dangerous to life and health (IDLH) levels. These conditions will only occur in rare, if any, circumstances such as confined space entry or emergency situations. The use of air-supplied respiratory protection is not permitted without approval and guidance from the Project Manager.

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11.0 AIR MONITORING

Air monitoring may be required to verify the presence or absence of a hazardous gas/vapor atmosphere whenever a situation or condition arises that could reasonably result in a hazardous atmosphere.

Based on OSHA's definition of a hazardous atmosphere, there are 4 different hazards that require monitoring. The table below describes the type of hazard, what air monitoring equipment to use and what levels constitute a hazard. The information provided in the table does not take into consideration all the possible variations of hazardous atmosphere; however, it will provide guidance when determining the presence of a hazardous atmosphere. Any questions or concerns should be directed to the SSO before work begins.

Table 3: Air Monitoring Guidance

Hazard	Appropriate Air Monitoring Equipment	Hazardous Levels	Comments
Flammability	Combustible gas indicators (CGI) are direct-reading instruments; measures % LEL and oxygen.	>20% of the LEL during cold work >10% of the LEL during hot work	Since many flammable vapors are heavier than air, be sure to take readings at ground level in addition to readings in the breathing zone. Hot work be suspended if CGI readings exceed 10% of LEL. All work discontinued if LEL >20% Explosive hazard, evacuate area. Notify Project Manager and Office Safety Coordinator.
Oxygen deficiency or abundance	Same as above or an Oxygen Meter	<19.5% and >23.5%	Concentrations >23.5% may present an increased flammability hazard.
Exceeding permissible exposure limit (PEL)	Photoionization detector (PID) can detect organic and inorganic vapors/gases	Varies depending on chemical. See Attachment B for hazardous levels of common chemicals	It is impossible to differentiate the different chemicals using a PID meter. However, the PID will indicate whether chemicals are present and at what levels. Measurements taken within worker's breathing zone will be used to determine respiratory protection requirements.

Airborne combustible dust is not anticipated at the work site.

When conducting, air monitoring the following actions should be considered:

- ☐ Be familiar with the proper use and limitations of the air monitoring equipment to be used.
- ☐ Ensure air-monitoring equipment (TRC's or otherwise) is in working order and has been properly calibrated. The TRC SSO is to document verification of calibration (i.e. in a field logbook).
- ☐ Clearly document the results of air monitoring, including:
 - Equipment name / type and calibration data
 - Date, time and site location of air monitoring (use a site map to clarify the locations of readings).
 - Indication of what is being measured (LEL, oxygen, or ppm)
 - Results of the air monitoring
- ☐ Measurements for volatile organics should be taken at low point where vapors could accumulate.
- ☐ Measurements taken to determine the need for respiratory protection should be taken within the worker's "breathing zone", keeping in mind the worker's closest proximity to the hazard source.
- ☐ An individual should never enter a confined area or excavation in order to conduct initial air monitoring. Instead, actions should be taken to lower the air monitoring equipment into the area to

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indicate the presence (or absence) of a hazardous atmosphere. Most air monitoring equipment has audible alarms.

- ☐ In the event that CGI readings on the site exceed 10 percent of the LEL, hot work will be suspended until the source can be eliminated or controlled. Work will be shut down and the Office Safety Coordinator and Project Manager will be notified if CGI readings exceed 20% of the LEL.

12.0 SITE CONTROL

The primary objective of site control is to minimize the exposure to potentially hazardous substances and/or situations. Supervision and controlling access to the work site is necessary to protect site personnel, visitors and the public.

For this site, the following areas will be designated as hot, warm and cold zones:

Hot Zones: Within 5 feet of the monitoring well

Warm Zone: ☒ NA

Cold Zone: Outside the hot zone

For the purposes of this HASP, site control will be discussed under two circumstances: (1) work involving physical hazards and (2) work involving chemical hazards.

In either case, site control areas are to be clearly identified and communicated by the SSO. The hot zone must be clearly identified and should be isolated with cones, barricades, or high visibility caution tape. In addition, sufficient area also must be available to conduct operations while providing a protective buffer for persons and property outside the controlled areas.

☒ Work involving Physical Hazards

Work does not involve direct contact with hazardous substances. However, if the scope of work primarily involves physical hazards (i.e. vehicular traffic, heavy equipment operation, etc.), the establishment of a warm zone is not necessary. Instead, a hot zone must be established to surround all the physical hazards. The hot zone area shall provide enough room and buffer to protect both workers and the public. A cold zone is established outside the hot zone to allow "support" activities to be conducted in a safe location.

☒ Work involving Chemical Hazards

The concept of site control and the establishment of hot/warm/cold work zones are intended for work involving the exposure (or potential exposure) to hazardous chemical concentrations. Under these circumstances, the purpose of work zones is two-fold: 1) minimize the exposure to potentially hazardous substances and 2) minimize the spread of hazardous substances outside the immediate work area through decontamination procedures.

A brief overview of site control work zones is provided below:

Hot Zone ☐ Where personnel may be subject to chemical or physical hazards. ☐ Where known or suspected contamination exists and may also be where equipment operation and/or environmental sampling will take place. ☐ To be clearly identified and should be isolated with cones, barricades, or high visibility caution tape. ☐ Large enough to provide sufficient room and buffer to protect both workers and the public.
Warm Zone ☐ Located between the hot and cold zones; beginning at the edge of the hot zone and extends to the cold zone. ☐ Utilized as a control point or corridor for persons entering or exiting the hot zone. ☐ Where personnel and equipment are decontaminated.
Cold Zone ☐ Located outside the hot zone where administrative and other support functions are located. ☐ Where adverse exposure to contaminants and physical hazards are unlikely.

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12.1 Decontamination

The purpose of decontamination is to: (1) remove chemical containments from personnel and/or equipment and (2) significantly reduce the spread of chemical contaminants beyond the hot/warm zone.

Decontamination is intended to occur within the warm zone. Depending on the project, there may be a need to decontaminate both personnel and equipment. The decontamination process should be appropriate to the chemical hazards present. For example, refined petroleum contaminated soil on work boots/shoes may only require physical removal of the soil with a sturdy brush. However, decontamination of equipment (i.e. drilling augers) may require additional steps to ensure contaminants are not spread beyond the hot/warm zones. Heavy equipment (i.e. excavators, trucks used for waste transportation, etc.) may require a combination of steps, including the placement of gravel at the entrance/exit of the site.

12.1.1 Personnel Decontamination Procedures:

Remove contaminated items (i.e. gloves) in an "inside out" manner. Contaminated garments are to be placed in designated plastic bags or drums prior to disposal or transfer offsite.

12.1.2 Equipment Decontamination Procedures:

Equipment that has been in contact with water or material from the site (such as the interface probe) will be decontaminated before each sampling location in a Liquinox and de-ionized water solution and rinsed twice in clean de-ionized water. Decontamination solution and rinse water will be captured in a container and disposed with the investigation-derived waste.

12.2 Site Security

Appropriate security measures will be established in coordination with the site owner/operator and communicated to site personnel. The objective of these measures is to (1) protect the public from potential exposure to physical/chemical hazards; (2) avoid public interference with personnel and safe work practices; and (3) prevent theft or vandalism of equipment at the site.

Site specific security measures include: ☒ NA

13.0 PERSONNEL TRAINING

TRC and contractor personnel are required to acknowledge their understanding and willingness to comply with this HASP before admission to the site by signing the "Safety Compliance Agreement" (See **Attachment F**).

Site specific training requirements are indicated below:

☒ TRC Personnel shall meet the training requirements specified in the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard [29 CFR 1910.120(e) and CCR Title 8 Section 5192(e)].

☐ Kinder Morgan Contractor Safety Videos

☐ ConocoPhillips

☐ ExxonMobil

☐ Refinery Training

☒ Railroad Training:

☐ UPRR Contractor Orientation

☒ BNSF Contractor Orientation

☐ Cal Train Contractor Orientation

☐ "FRA Roadway Worker" Training (work within 25' of track)

14.0 MEDICAL PROGRAM

TRC has established a medical surveillance program to assess, monitor, and help protect the health of employees, in particular, employees who may be exposed to potentially hazardous substances during site work. Personnel undergo medical examinations as follows:

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- ❑ **Initial:** Pre-employment / prior to any assignment involving work in a hazardous or potentially hazardous environment. The initial examination is used to establish a baseline picture of health against which future changes can be measured, and to identify any underlying illnesses or conditions that might be aggravated by chemical exposures or job activities. This exam also certifies whether an employee is medically fit to wear a respirator.
- ❑ **Periodic:** At least once every 12 to 24 months (depending on the employee's involvement in field activities) to measure changes in health status. This exam certifies whether an employee is still medically fit to wear a respirator.
- ❑ **Upon notification:** As soon as possible upon notification by an employee that they have developed signs or symptoms indicating possible overexposure to hazardous substances, or in response to an injury or exposure during an emergency situation.
- ❑ **Exit:** At termination of employment.

15.0 EMERGENCY RESPONSE PLAN

The TRC SSO (depending on which is present) will have controlling authority during an emergency. In the SSO's absence, the Alternate SSO will be in charge.

15.1 Evacuation Protocol

Evacuation protocol, routes and assembly areas from the site will be established by the SSO and communicated to Field Personnel during the Tailgate Safety Meeting(s) prior to initiating work. In the event of an evacuation, personnel will meet at a pre-established assembly areas and the TRC SSO conduct a "head count" to see that everyone is accounted for. Contractor SSO is responsible for being able to provide an accurate head-count of contractor personnel.

15.2 First Aid & CPR

TRC employees and contractors with current First Aid and CPR certification and who are willing to provide First Aid and CPR will be asked to identify themselves at Tailgate Safety Meetings. Their names will be documented on the Tailgate Meeting Checklist (**Attachment F**).

15.3 Emergency Medical Assistance

A list of emergency medical assistance sources has been established as part of this HASP. **Attachment C** lists the names, locations, and telephone numbers of emergency response organizations in the vicinity of the project site. **Attachment D** includes a map to the nearest hospital(s) with an emergency room.

A vehicle shall be available onsite during work activities to transport injured personnel to the identified emergency medical facilities, if necessary. Company vehicles are to be equipped with a fire extinguisher and first aid kit.

15.4 Emergency Procedures

In the event of an accident, injury, or other emergency, remember to:

- ❑ Stop work and REMAIN CALM.
- ❑ Move personnel to a safe location (evacuation plan).
- ❑ Call 911 or notify other emergency facilities, as necessary.
- ❑ Address medical emergencies and apply first aid, if necessary.
 - Move injured or exposed person(s) from immediate area only if it is safe to do so.
 - If serious injury or life-threatening condition exists, call 911. Clearly describe the location, injury and conditions to the dispatcher. Designate a person to direct emergency equipment to the injured person.
- ❑ Contain physical hazards.
 - Act only if hazard is minimal and you are trained to deal with the situation. Otherwise evacuate and wait for emergency services to arrive.
- ❑ Notify SSO and initiate incident reporting procedures.

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- See page 2 of this HASP for contact information. In the event the SSO is not available, the order of notification should be 1) Assistant SSO, 2) TRC Project Manager and 3) HR Manager (if incident involves injury) or EHS Supervisor (if incident does not involve injury).
 - TRC SSO is to notify TRC Project Manager/Supervisor as soon as reasonably possible.
- ❑ Do not resume work until the SSO has determined it is safe to do so.

15.5 Non-Emergency Medical Assistance

If an injury does occur and it is not life threatening, then the employee or employee's supervisor/project manager should contact WorkCare within the first hour after an injury. WorkCare information is provided in **Attachment H**. This information will help assist the injured employee by connecting them with instant access to a medically qualified professional in order to provide guidance on appropriate first aid measures and medications.

15.6 COVID-19

BNSF and TRC guidelines for field activities conducted during the COVID-19 pandemic are provided in Attachment L along with a TRC-required questionnaire that must be completed at the start of any field work.

16.0 INCIDENT REPORTING

In case of an accident, TRC personnel are to immediately report the incident to their Project Manager/Supervisor and follow the TRC incident reporting procedures detailed in the TRC Health and Safety Management System. TRC's incident reporting/near miss form and vehicle accident form are available through the Project Manager/Supervisor and in **Attachment I**.

All incidents and near misses are investigated in accordance with TRC's Health and Safety Management System. The TRC Incident Report Form is to be completed and submitted to the TRC EHS Supervisor within 24 hours following any incident.

Contractor personnel are to report incidents to their SSO who is then required to report the incident to the TRC SSO, TRC Alternate SSO, or TRC Project Manager immediately.

Some important information to include when reporting an incident are:

1. A description of the event (including date and time)
2. Details regarding personal injury and property damage, if any.
3. Whether emergency services were notified (i.e., medical facilities, fire department, police department) and the basis for that decision. Including time and names of persons/agencies notified, and their response.
4. Clarify the need for and type of TRC support.
5. Immediate corrective action(s) taken.

16.1 BNSF Incident Reporting

Following report of a work-related injury or illness, the TRC Project Manager/Supervisor will promptly report the incident to the BNSF Railway Engineering project representative. The BNSF project representative will work with the TRC Project Manager to complete the BNSF Non-Employee Personal Injury Form and submit the form to the BNSF Railway Accident Reporting Center.

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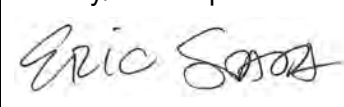
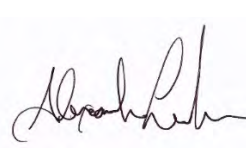
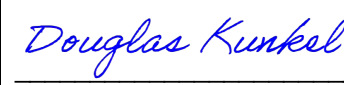
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17.0 HEALTH AND SAFETY PLAN (HASP) SIGNATURE PAGE

Job Safety Analysis Author	Date:	HASP Author	Date:
	11/04/21		11/04/21
_____	_____	_____	_____

Review/Approvals:

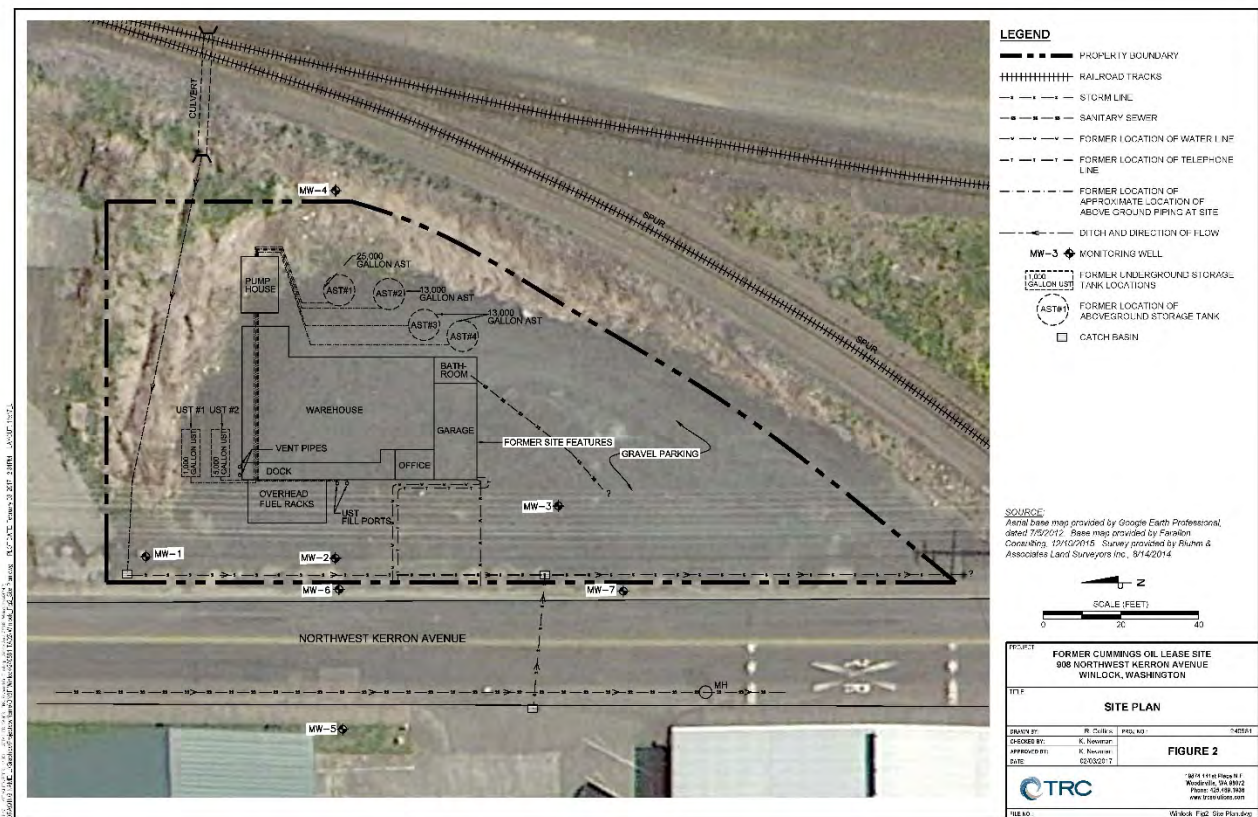
Site Safety Officer Facility/Field Supervisor	Date:	Project Manager/Supervisor*	Date:
	11/04/21		11/04/21
_____	_____	_____	_____
Local Safety Coordinator* ☐ NA	Date	EHS Supervisor/Safety Professional (CIH, CSP, other)*	Date
	11/8/21		
_____	_____	_____	_____

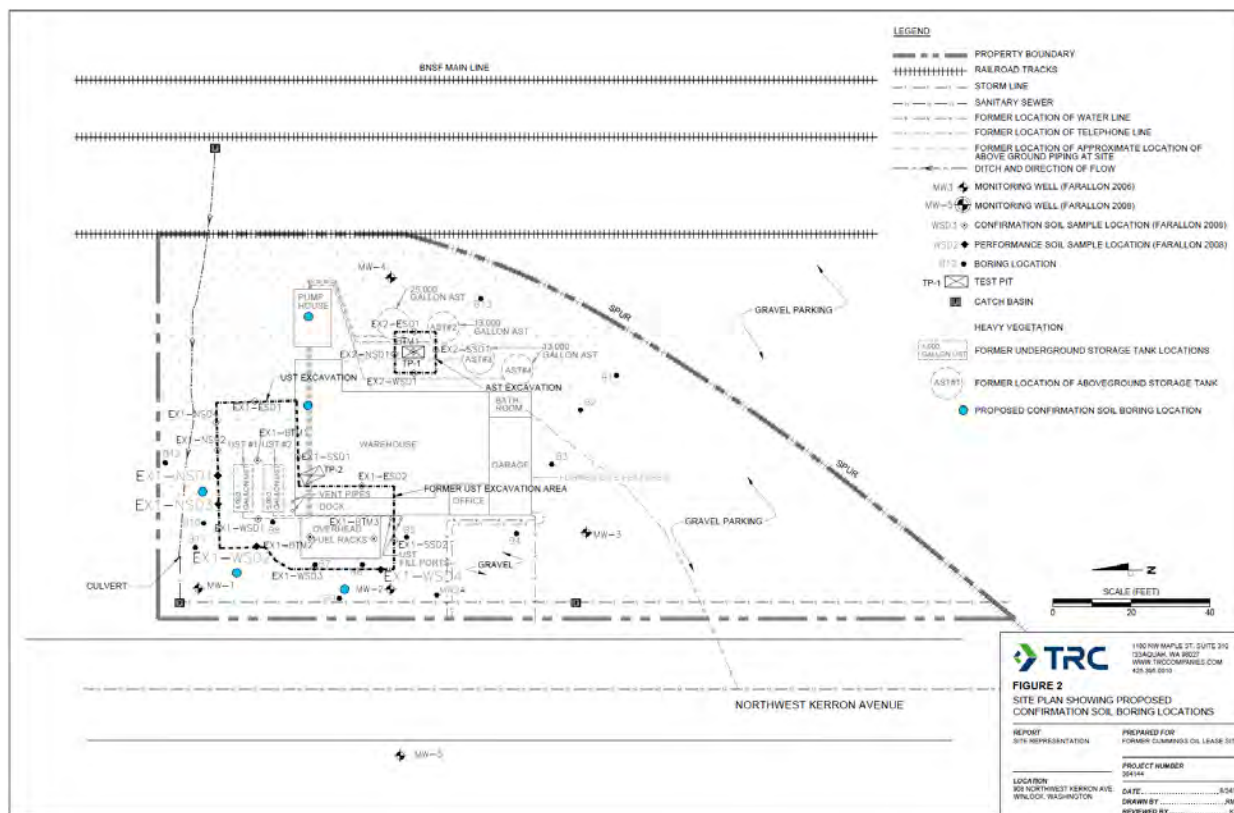
Additional Information or Instructions:

* Note: **For most projects, the Project Manager/Supervisor will review, approve and sign the HASP.** In the event the operations are beyond the normal scope of work, additional review is available upon the request from the PM/Supervisor. The Local Safety Coordinator is the first recourse for reviewing HASPs not involving high-risk operations. It is recommended that for HASPs involving high-risk operations (i.e. hazardous exposures to chemicals, large scale or deep excavations, confined space entry, etc.), the EHS Supervisor and/or a Safety Professional [Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP) or other professionally qualified person] be consulted for review of the HASP to ensure proper protective measures are being implemented.

ATTACHMENT A

SITE PLAN





ATTACHMENT B

OCCUPATIONAL HEALTH GUIDELINES AND TOXICOLOGICAL INFORMATION

Table B-1 OCCUPATIONAL HEALTH GUIDELINES AND TOXICOLOGICAL INFORMATION

Contaminant	ACGIH TLV-TWA (ppm)	NIOSH REL (ppm)	OSHA PEL (ppm)	STEL (ppm)	IDLH (ppm)	Routes of Exposure	Known or Suspected Carcinogen	Symptoms
Diesel (as Stoddard solvent)	for Diesel fuel/ Kerosene 14.4 (skin only)	Approx. 60-98	500	250-500 (NIOSH ceiling)	Approx. 3000- 5600	Inhalation, Ingestion, Contact	No	Irritation to eyes, skin, mucous membrane; dermatitis, headache, fatigue, blurred vision, dizziness, slurred speech, confusion, convulsions, aspiration, weakness, restlessness, incoordination
Gasoline	300	n/a	n/a	500 (ACGIH)	n/a	Inhalation, Absorption, Ingestion, Contact	Yes	Irritation to eyes, skin, mucous membrane; dermatitis, headache, fatigue, blurred vision, dizziness, slurred speech, confusion, convulsions, aspiration
Benzene	0.5	0.1	1	1 (NIOSH)	500	Inhalation, Absorption, Ingestion, Contact	Yes	Irritation to eyes, skin, nose, resp system; giddiness, headache, nausea, staggered gait, fatigue, anorexia, weakness/exhaustion, dermatitis
Toluene	50	100	200	150 (NIOSH)	500	Inhalation, Absorption, Ingestion, Contact	No	Irritation to eyes, nose; fatigue, weakness, confusion, euphoria, dizziness, headache, dilated pupils, tears, nervousness, muscle fatigue, insomnia, dermatitis
Ethyl benzene	100	100	100	125 (NIOSH& ACGIH)	800	Inhalation, Ingestion, Contact	No	Irritation to eyes, skin, mucous membranes; headache, dermatitis, narcosis, coma
Xylenes (o,m,p,)	100	100	100	150 (NIOSH & ACGIH)	900	Inhalation, Absorption, Ingestion, Contact	No	Irritation to eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait, nausea, vomiting, abdominal pain, dermatitis

OCCUPATIONAL HEALTH GUIDELINES AND TOXICOLOGICAL INFORMATION

TABLE KEY

ACGIH TLV-TWA	American Conference of Governmental Industrial Hygienists, Threshold Limit Value-Time Weighted Average
NIOSH REL Limit	National Institute of Occupational Safety & Health, Recommended Exposure Limit
STEL	Short Term Exposure Limit (BTEX STELs are by NIOSH)
OSHA PEL	Occupational Safety and Health Administration, Permissible Exposure Limit
IDLH	Immediately Dangerous to Life and Health
ppm	parts per million
CNS	Central Nervous System
n/a	not available (i.e., no value has been established)

DEFINITIONS

Threshold Limit Value: Threshold limit values (TLVs) refer to airborne concentrations of substances and represent conditions under which it is believed nearly all workers may be repeatedly exposed, day after day, without adverse health effects.

Threshold Limit Value - Time Weighted Average: The time weighted average (TWA) is a concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect. TLV-TWAs are established by the ACGIH.

Recommended Exposure Limit: Unless otherwise noted, the recommended exposure limit (REL) is a TWA concentration for up to a 10-hour workday during a 40-hour workweek. RELs are established by NIOSH to reduce or eliminate adverse occupational health effects.

Short Term Exposure Limit: A short term exposure limit (STEL) is defined as a 15-minute TWA exposure that should not be exceeded at any time during a workday. When compared to the REL (or TLV-TWA for ACGIH standards), the STEL allows the worker to be exposed to a higher concentration, BUT for a shorter period of time. Exposures above the REL up to the STEL should not be longer than 15 minutes and should not occur more than four times per day.

Permissible Exposure Limit: Permissible exposure limits (PELs) are TWA concentrations that must not be exceeded during any 8-hour work shift of a 40-hour workweek. PELs are established by OSHA (29 CFR 1910.1000).

Immediately Dangerous to Life and Health: Immediately dangerous to life and health (IDLH) values are established as concentrations from which a worker can escape within 30 minutes without suffering loss of life, irreversible health effects, or other deleterious effects that could prevent him/her from escaping the hazardous environment. The purpose of establishing an IDLH exposure concentration is to ensure that workers can escape from a given contaminated environment in the event of failure of respiratory protection equipment.

Known or Suspected Carcinogen Classification: ACGIH categories for carcinogenicity classification:

A1 – Confirmed Human Carcinogen – The agent is carcinogenic to humans based on the weight of evidence from epidemiologic studies.

A2 – Suspected Human Carcinogen – Human data are accepted as adequate in quality but are conflicting or insufficient to classify the agent as a confirmed human carcinogen; OR the agent is

carcinogenic in experimental animals at dose(s), by route(s) of exposure, at site(s), of histologic type(s), or by mechanism(s) considered relevant to worker exposure. The A2 is used primarily when there is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals with relevance to humans.

A3 – Confirmed Animal Carcinogen with Unknown Relevance to Humans – The agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that may not be relevant to human exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence does not suggest that the agent is likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

A4 – Not Classifiable as a Human Carcinogen – Agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of a lack of data. In vitro or animal studies do not provide indications of carcinogenicity which are sufficient to classify the agent into one of the other categories.

A5 – Not Suspected as a Human Carcinogen – The agent is not suspected to be a human carcinogen on the basis of properly conducted epidemiologic studies in humans. These studies have sufficiently long follow-up, reliable exposure histories, sufficiently high dose, or adequate statistical power to conclude that exposure to the agent does not convey a significant risk of cancer to humans; OR evidence suggesting a lack of carcinogenicity in experimental animals is supported by mechanistic data.

ATTACHMENT C

EMERGENCY SERVICES PHONE NUMBERS, DIRECTIONS, AND LOCAL AREA MAP

EMERGENCY SERVICES

EMERGENCY SERVICES FACILITY / LOCATION	TELEPHONE
Emergency Situation	911
WorkCare 24 Hour Non-Emergency Notification Number	1-888-449-7787
Providence Centralia Hospital 914 S Scheuber Rd. Centralia, WA 98531	(360) 736-2803
Poison Control Center: Emergency 24-Hour Hotline	(800) 876-4766
Office of Emergency Services: Hazardous Materials Spill Notification	(800) 852-7550

DIRECTIONS TO EMERGENCY ROOM

8/17/2016

908 Northwest Kerron Street to Providence Centralia Hospital - Google Maps

908 Northwest Kerron Street

Winlock, WA 98595

Get on I-5 N/US-12 W from WA-603 N and W Avery Rd

-  1. Head north on WA-603 N/Kerron Ave toward Laurel St
 Continue to follow WA-603 N 10 min (7.0 mi)
-  2. Turn right onto W Avery Rd 3.8 mi
-  3. Continue onto US-12 E 2.6 mi
-  4. Turn left to merge onto I-5 N/US-12 W toward Seattle 0.1 mi
-  0.4 mi

Follow I-5 N/US-12 W to Ellsbury St. Take exit 81 from I-5 N/US-12 W

-  5. Merge onto I-5 N/US-12 W 11 min (12.6 mi)
-  6. Take exit 81 for WA-507 N/Mellen St toward City Center 12.0 mi
-  0.6 mi

Continue on Ellsbury St. Take Cooks Hill Rd to S Scheuber Rd

-  7. Continue onto Ellsbury St 3 min (1.3 mi)
-  8. Turn left onto Mellen St 0.3 mi
-  9. Continue onto Cooks Hill Rd 0.2 mi
-  0.4 mi
-  10. Turn left onto S Scheuber Rd
 Destination will be on the left 0.1 mi

Providence Centralia Hospital

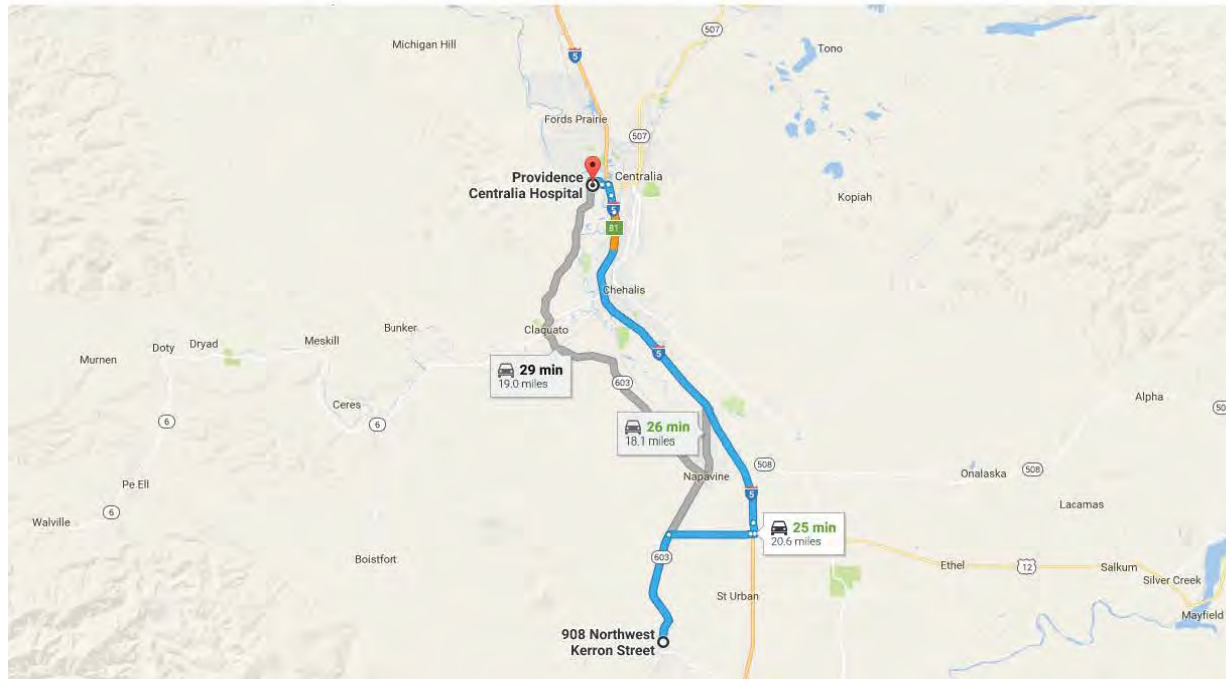
914 South Scheuber Road, Centralia, WA 98531

ATTACHMENT D

LOCAL AREA MAP
with route to hospital

908 Northwest Kerron Street to Providence Centralia Hospital - Google Maps

908 Northwest Kerron Street to Providence Centralia Drive 20.6 miles, 25 min
Hospital



ATTACHMENT E

JOB SAFETY ANALYSIS



Cold Illness Prevention Job Safety Analysis (JSA)

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) BNSF Former Cummings Oil Lease, Winlock, WA		DATE PREPARED FOR HASP: 11/04/21	☐ NEW ☒ REVISED
JSA WORK ACTIVITY (Description): Cold Illness Prevention		List of Contractor(s) and key work activity: TRC – Soil sampling with hand auger	
SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE
David Verret	Staff Geologist	ECR - Issaquah	
"TRC APPROVED" JSA DEVELOPMENT TEAM		POSITION / TITLE	APPROVAL
Doug Kunkel		PNW Office Safety Coordinator	11/8/21
Dave Sullivan		ECR Safety Director	
Mike Glenn		National Safety Director	
PERSONAL PROTECTION EQUIPMENT (PPE) QUICK SUMMARY Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")			
<u> R </u> REFLECTIVE VEST <u> R </u> HARD HAT <u> R </u> GLOVES: ANSI Cut Level 4 & 5 Kevlar <u> R </u> SAFETY GLASSES <u> </u> GOGGLES <u> </u> FACE SHIELD	<u> A </u> HEARING PROTECTION <u> R </u> SAFETY SHOES: <u>Protective Toe</u> <u> </u> 5pt. HARNESS / LANYARD PPE CLOTHING: <u> </u> Coveralls <u> </u> Tyvek Suit <u> </u> Nomex <u> </u> Other (specify):	RESPIRATORY PROTECTION: ☐ NA <u> A </u> Disposable Particulate Respirator (N95) <u> A </u> ½ face Air Purifying Respirator (APR) <u> </u> X Particulate Mask: ☒ PM100 ☐ PM95 <u> </u> X Cartridge: ☒ P100-Multigas ☐ <u> </u> Full face ARP; specify cartridge type: <u> </u> Air Supplied Respirator <u> </u> SCBA <u> </u> Air-line	Additional PPE/Notes:
Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.			
¹ JOB TASKS	² POTENTIAL HAZARDS	³ HAZARD CONTROLS (beyond wearing "Required" PPE)	
1) Working in wind chill temperatures > 30 to < 65 degrees F	a. Trench foot.	a1. Avoid having feet immersed in cold water at temperatures above freezing for long periods. a2. Avoid continuous exposure to a wet, cold environment, or actual immersion in water. a3. Take frequent short-breaks in warm dry shelters—self paced. a4. Perform work during the warmest part of the day. a5. Keep a change of clothing available in case work clothes becomes wet. Maintain a dry environment within the shoe. a6. Rotate your shoes every other day to allow them to dry thoroughly. a7. Avoid synthetic materials like rubber or vinyl, wear leather or cloth that can absorb moisture.	

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
¹ JOB TASKS	² POTENTIAL HAZARDS	³ HAZARD CONTROLS (beyond wearing "Required" PPE)
2) Working in temperatures < 30 degrees F or wind chill effects above freezing temperatures	a. Frost bite.	a1. Proper insulation (layered clothing to adjust to changing environmental temperatures). Keep clothing as dry as possible. a2. If possible, perform work during the warmest part of the day. a3. Take frequent short-breaks in warm dry shelters-self paced. a4. Avoid exhaustion and fatigue because energy is needed to keep the muscles warm. a5. Use the "Buddy System" for working outdoors.
3) Working in temperatures above freezing > 30 degrees	a. Hypothermia.	a1. Proper insulation (layered clothing to adjust to changing environmental temperatures). Keep clothing as dry as possible. a2. Perform work during the warmest part of the day. a3. Take frequent short-breaks in warm dry shelters-self paced. a4. Pay special attention to protecting feet, hands, face, and head. Up to 40% of body heat can be lost when the head is exposed.
ILLNESS TYPE	SYMPTOMS	PREVENTION AND FIRST AID
1. Frost bite	a. Skin first turns red, then purple, later becomes pale, then waxy-white and is cold to the touch. b. Skin of body part affected becomes hard, cold, stinging or aching followed by numbness; affecting nose, ears, cheeks, forehead, wrists, toes and fingers.	a1. Unless the frostbite was very mild, call for emergency for special instructions. a2. A worker with warm hands may help thaw other's worker hands or fingers merely by enclosing them within the palms and exerting a very gentle pressure. a3. Try to elevate worker extremity to improve blood circulation. b1. Act immediately, call for emergency. Move the worker to a warm area. Do not leave the worker alone. b2. Remove any wet or tight clothing that may cut off blood flow to the affected area and DO NOT RUB affected area.

ILLNESS TYPE	SYMPTOMS	PREVENTION AND FIRST AID
2. Hypothermia	a. Uncontrolled shivering. b. Cool bluish skin. c. Dry tongue and thirst. d. Slurred speech. e. Clumsy movements, irritable, irrational or confused behavior.	- a1. Act immediately—Call for Emergency. - a2. Move the victim to a warm, dry area. Do not leave the person alone and DO NOT RUB the person's body. - b1. Loosen and remove any wet clothing and replace with warm, dry clothing or wrap the person in blankets. - c1. Administer warm, sweet drinks (sugar water or sports-type drinks) if victim is alert. - d1. Have the victim move their arms and legs to create muscle heat. - e1. Place warm bottles or hot packs in the arm pits, groin, neck, and head areas. Encourage the person to rest. - e2. Monitor closely.
3. Trench foot	a. Initially appears wet, soggy, white, shriveled. b. Sensations of pins and needles, tingling, numbness and then pain. c. Skin discoloration. Affected portions of foot and toes can appear gray and blotchy. d. Becomes cold, swollen, and waxy appearance. e. May develop blisters, open weeping or bleeding in more extreme cases.	- a1. Move individual with trench foot to a warm, dry area. - a2. Rewarm by exposing to warm air. - b1. Rewarm by exposing to warm air. - b2. Seek medical assistance as soon as possible. - c1. Seek medical assistance as soon as possible. - d1. Seek medical assistance as soon as possible. - d2. Elevate feet to reduce swelling. - e1. Seek medical assistance as soon as possible. - e2. DO NOT break blisters, apply lotions, massage, expose to heat, or allow to walk on injury.

PID—photoionization detector; LEL—lower explosive limit; PPE—Personal Protective Equipment; ANSI—American National Standards Institute

Field Notes:

LIMITATION: As part of TRC's EHS Policy, a JSA is provided by TRC for its employees. The purpose of a JSA is NOT to identify all hazards associated with a task, but to identify key potential hazards to get TRC and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. TRC recognizes that JSA's may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JSA if required. The JSA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under TRC's supervision. Similarly, all subcontractors are required to provide their own JSA(s) for their specialty prior to performing any work for TRC or its customers in accordance with TRC's EHS Policy; however, any unsafe condition or hazard not covered in any JSA is ultimately the direct responsibility of the person or entity performing the work.



Driving Company Vehicle Job Safety Analysis (JSA)

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) BNSF Former Cummings Oil Lease, Winlock, WA		DATE PREPARED FOR HASP: 11/04/21	☐ NEW ☒ REVISED
JSA WORK ACTIVITY (Description): Driving Company Vehicle		List of Contractor(s) and key work activity: TRC – Driving Company Vehicle	
SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE
David Verret	Staff Geologist	ECR - Issaquah	
TRC HEALTH AND SAFETY MANAGEMENT	POSITION / TITLE	APPROVAL DATE	
Doug Kunkel	PNW Office Safety Coordinator	11/8/21	
Dave Sullivan	ECR Safety Director		
Mike Glenn	National Safety Director		
PERSONAL PROTECTION EQUIPMENT (PPE) QUICK SUMMARY Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")			
☒ REFLECTIVE VEST ☐ HARD HAT ☒ GLOVES: Kevlar ANSI Cut Level 3 or 4 ☒ SAFETY GLASSES ☐ GOGGLES ☐ FACE SHIELD	☒ HEARING PROTECTION ☒ SAFETY SHOES: Protective ☐ Toe ☐ 5pt. HARNESS / LANYARD PPE CLOTHING: ☐ Coveralls ☐ Tyvek Suit ☐ Nomex ☐ Other (specify):	RESPIRATORY PROTECTION: ☐ NA ☒ Disposable Particulate Respirator (N95) ☐ ½ face Air Purifying Respirator (APR) ☐ Particulate Mask: ☐ PM100 ☐ PM95 ☐ Cartridge: ☐ P100-Multigas ☐ ☐ Full face ARP; specify cartridge type: ☐ Air Supplied Respirator ☐ SCBA ☐ Air-line	Additional PPE:
Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.			
1 JOB TASKS	2 POTENTIAL HAZARDS	3 HAZARD CONTROLS (beyond wearing "Required" PPE)	
1. Route Finding	a. Planned route is impassable	a1. Research with State and Local DOT for road closures. a2. Be observant of road signs, minimize distractions while driving, download area map for route finding if no signal is available.	
2. Following client and TRC driving safety policies	a. Collision, contract violations	a1. Review client and TRC driving policies for guidelines for safe vehicle operation while on client site and <i>en route</i> to client site. a2. Minimize distractions, park safely before using electronic devices, phones, or notebooks.	
3. Vehicle walk around and perimeter check	a. Being struck by moving vehicles or equipment onsite, slops, trips, falls.	a1. Visual verification that vehicle tires are in safe working condition and that there are no sharp objects or foreign debris under the tires. a2. Look and listen for other vehicle movement. a3. Look and listen for unwanted personal contact with other people. a4. Face the direction of oncoming traffic during check when possible.	

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
¹ JOB TASKS	² POTENTIAL HAZARDS	³ HAZARD CONTROLS (beyond wearing "Required" PPE)
4. Secure Cargo	a. Collision, loss of control, or damage to cargo from shifting.	a1. Any cargo must be secured with straps, ropes, and tie downs appropriate to the cargo mass, shape, and vehicle type. a2. Do not overload vehicle. a3. Make sure cargo will remain in place should a collision or loss of control happen
5. Operating Vehicle	a. Entering or exiting vehicle b. Adjusting vehicle controls c. Securing operator and passengers. d. Following safe speeds, speed limits, and passing e. Parking f. Secure Vehicle	a1. Use hand holds, steps, and other aids as appropriate to avoid slips and falls while entering or exiting vehicle. a2. Be aware of changing conditions around vehicle and on footwear that may cause loss of traction and a slip or fall. a3. Ensure that all appendages are away from pinch points before closing doors and windows. b1. Ensure that the seat and pedals are adjusted for comfortable and easy operation of controls. b2. Adjust mirrors to provide a clear view of outside of vehicle. b3. Adjust steering wheel, instrument cluster brightness, and other controls to provide clear sight, easy reach, and minimize distraction. e1. WEAR YOUR SEATBELT. The vehicle does not move until all seat belts are secured. e2. WEAR YOUR SEATBELT. The vehicle does not move until all seat belts are secured. d1. Follow a safe speed. Reduce speeds in rain, when the road is wet, when conditions may be icy, when the road is snowy, or visibility is reduced due to rain, snow, fog, or dust. d2. Do not exceed the speed limit. Follow the flow of traffic and watch for slower and faster vehicles. Keep right except to pass. d3. Plan lane changes in advance and perform your shoulder check before any move from current lane is started. Use your turn signal when changing directions. e1. Before parking, assess planned stopping location for hazards, traffic, and other potential problems. e2. Whenever possible, back into a parking spot so that you can see traffic and hazards when leaving. e3. Ensure vehicle is properly shut down: Turn off wipers, turn down climate control, engage parking brake, place transmission in park, turn down radio, and shut off ignition. e4. When exiting vehicle, check mirror, and shoulder check before opening door. Use your opposite hand (reach across your body) to engage the door latch so that you are facing the way the door is opening to check for hazards and clearance, and you have a hand free to control the opening door. f1. Secure vehicle before leaving. Check windows are up, doors are shut, valuables have been removed, parking brake and transmission park are engaged, ignition is off, and the vehicle is locked.



Driving Company Vehicle Job Safety Analysis (JSA)

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
LOCATION(S) WHERE HAZARD IS TO BE EXPECTED		
³ HAZARD CONTROLS (beyond wearing "Required" PPE)		
1.	a.	a.
2.	a.	a.
3.	a.	a.

PID—photoionization detector; LEL—lower explosive limit; PPE—Personal Protective Equipment; ANSI—American National Standards Institute

Field Notes:

LIMITATION: As part of TRC's EAP a JSA is provided by TRC for its employees. The purpose of a JSA is NOT to identify all hazards associated with a task, but to identify key potential hazards to get TRC and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. TRC recognizes that JSAs may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JSA if required. The JSA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under TRC's supervision. Similarly, all subcontractors are required to provide their own JSA(s) for their specialty prior to performing any work for TRC or its customers in accordance with TRC's EAP; however, any unsafe condition or hazard not covered in any JSA is ultimately the direct responsibility of the person or entity performing the work.



Hand Augering Job Safety Analysis (JSA)

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) BNSF Former Cummings Oil Lease, Winlock, WA		DATE PREPARED FOR HASP: 11/04/21	☐ NEW ☒ REVISED
JSA WORK ACTIVITY (Description): Hand Auger		List of Contractor(s) and key work activity: TRC – Hand Auger Activities	
SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE
David Verret	Staff Geologist	ECR - Issaquah	
TRC HEALTH AND SAFETY MANAGEMENT		POSITION / TITLE	APPROVAL DATE
Doug Kunkel		PNW Office Safety Coordinator	11/8/21
Dave Sullivan		ECR Safety Director	
Mike Glenn		National Safety Director	
PERSONAL PROTECTION EQUIPMENT (PPE) QUICK SUMMARY Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")			
<u>R</u> REFLECTIVE VEST <u>R</u> HARD HAT <u>R</u> GLOVES: ANSI Cut Level 4 & 5 Kevlar <u>R</u> SAFETY GLASSES <u> </u> GOGGLES <u> </u> FACE SHIELD	<u>A</u> HEARING PROTECTION <u>R</u> SAFETY SHOES: <u>Protective Toe</u> <u> </u> 5pt. HARNESS / LANYARD PPE CLOTHING: <u> </u> Coveralls <u> </u> Tyvek Suit <u> </u> Nomex <u> </u> Other (specify):	RESPIRATORY PROTECTION: ☐ NA <u>A</u> Dust Mask <u>A</u> ½ face Air Purifying Respirator (APR) <u> </u> <u>X</u> Particulate Mask: ☒ PM100 ☐ PM95 <u> </u> <u>X</u> Cartridge: ☒ P100-Multigas ☐ <u> </u> Full face ARP; specify cartridge type: <u> </u> Air Supplied Respirator <u> </u> SCBA <u> </u> Air-line	Additional PPE/Notes: As per defined in the job/site specific Health and Safety Plan (HASP) wear PPE at all times when performing site work.
Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.			
¹ JOB TASKS	² POTENTIAL HAZARDS	³ HAZARD CONTROLS (beyond wearing "Required" PPE)	
1) Set-up	a. Lack of concentration or focus. b. Fire and explosion. c. Electric shock/ electrocution.	a1. Review all plans (HASP, Work, Utility, Site Plans, etc.), logs, and field notes prior to starting a new task. Identify daily tasks and required personnel actions. a2. Conduct safety tailgate meeting with subcontractor personnel prior to beginning work activities. Explain the site safety hazards and work precautions outlined in the HASP and obtain signatures indicating the HASP was discussed. b1. No smoking or open flame. Periodically monitor ambient air concentrations with PID/LEL Meters. Shut down job and move personnel and equipment upwind if hydrocarbon concentrations are HASP defined action levels. b2. Deploy 2-20lb ABC Fire extinguishers in accordance site safety officer's direction. c1. De-energize all circuits/power sources and follow TRC's <u>CP005 Lockout-Tagout Program</u> for circuits within 3-feet of boring location or 10-feet' of overhead utilities.	

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
¹ JOB TASKS	² POTENTIAL HAZARDS	³ HAZARD CONTROLS (beyond wearing "Required" PPE)
1) Cont'd	d. Being struck by moving vehicles or equipment onsite. e. Bad organization creating confusion and hazard. f. Unauthorized personnel in exclusion zone.	d1. Always wear safety vest, establish eye contact with operators utilizing flaggers where appropriate. d2. Vehicles shall use reverse beepers or flaggers. d3. Create an exclusion zone at least 10-feet beyond the limits of the boring to limit access to staging/work area using snow fencing, barricades, delineators, cones and/or caution tape. d4. Face the direction of oncoming traffic during work activities when possible. e1. Identify staging area with good lateral and vertical access for loading and unloading of trucks. f1. Use visitor check-in log and allow no-one in exclusion area without proper PPE (as defined on this JSA) and training documentation (e.g., HAZWOPER, other as defined in the HASP).
2) Hand Augering	a. Contact with subsurface water, gas, electrical, and/or fiber optic lines in the vicinity of drilling locations. b. Slips, trips, and falls. c. Soil cross contamination. d. Cut/pinched fingers or toes; and strained muscles. e. Noise. f. Flying particles, dust and hazardous substances from clearance activities. g. Exposure to impacted soil or groundwater.	a1. If unknown lines or obstructions are encountered, stop drilling and notify PM. Do not undermine any utilities. b1. Spread absorbent to soak up any pools of water that accumulate during drilling. b2. Maintain a clean, unobstructed work area by good housekeeping and placing unused equipment away from work area. c1. Ensure downhole sampling equipment is cleaned between samples. c2. Create a clean sample collection area with removable poly sheeting/aluminum foil or other method ensure a clean work surface that is refreshed between each sample. d1. See PPE Quick Summary. d2. Use proper lifting techniques and 2-man rule as outlined in TRC's Employee IIPP Handbook when moving heavy objects (>40 lbs). d1. All personnel will use hearing protection within work area while heavy machinery is operating at >85 dB. f1. See PPE Quick Summary. g1. Wear nitrile gloves during handling of soil or ground water.

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
¹ JOB TASKS	² POTENTIAL HAZARDS	³ HAZARD CONTROLS (beyond wearing "Required" PPE)
2) Cont'd	h. Toxic or explosive atmosphere.	h1. Periodically monitor ambient atmosphere with PID or LEL meter. Shut down job and move personnel and equipment upwind if concentrations are detected above HASP defined action levels.
3) Boring Completion	a. Bad organization causing cross-contamination of soil, groundwater, or personnel. b. Moving heavy objects (>40-lbs) and mixing grout/concrete. c. Opening/closing/ moving drums. d. Slips, trips, falls and physical injury during auger removal. e. Overspray and cross-contamination during rod decontamination.	a1. Waste management—Identify and delineate soil stockpile area or storage area if soil cuttings/purge water are to be drummed. a2. Blot up puddles of standing water and the work area will be swept. b1. Get assistance for moving heavy objects and mixing grout/concrete. Use mechanical aids to move objects or mix grout/concrete. c1. Wear ANSI cut rated 4 or 5 Kevlar gloves during the opening and closing of drums to protect fingers. c2. Use only drum dolly to move drums with soil, hydrated bentonite grout, or concrete or other heavy contents. c3. Empty metal drums could also cause strain or injury if not moved properly. Use caution and appropriate tools (e.g., dolly). d1. Place all removed rods to side, so as not to become a trip hazard. e1. See PPE Quick Summary. e2. Do not overspray while cleaning rods. Create a "clean zone" with plastic liner for placement of decontaminated rods.
LOCATION(S) WHERE HAZARD IS TO BE EXPECTED		³ HAZARD CONTROLS (beyond wearing "Required" PPE)
1.	a.	a.
2.	a.	a.
3.	a.	a.

PID—photoionization detector; LEL—lower explosive limit; PPE—Personal Protective Equipment; ANSI—American National Standards Institute



Field Notes:

LIMITATION: As part of TRC's EHS Policy, a JSA is provided by TRC for its employees. The purpose of a JSA is NOT to identify all hazards associated with a task, but to identify key potential hazards to get TRC and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. TRC recognizes that JSA's may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JSA if required. The JSA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under TRC's supervision. Similarly, all subcontractors are required to provide their own JSA(s) for their specialty prior to performing any work for TRC or its customers in accordance with TRC's EHS Policy; however, any unsafe condition or hazard not covered in any JSA is ultimately the direct responsibility of the person or entity performing the work.

ATTACHMENT F

TAILGATE SAFETY MEETING CHECKLIST

AND

HASP COMPLIANCE AGREEMENT



Daily Pre-Job Safety Briefing

Project Name: _____ Project Number: _____
Work Location: _____ Date: _____
Tasks Performed: _____ Time: _____ AM PM
Client Name: _____ Submitted By: _____

HASP Available Onsite: Yes ☐ No ☐ Emergency Evacuation Location: _____
Emergency Facility(s): _____ Number(s): _____
Physical Address: _____
First Aid/CPR
Persons: _____

For Emergencies Dial 911/For Non-Emergencies Dial WorkCare (888) 449-7787

Personal Protective Equipment Required			Procedures/Programs Required	Yes	No	Additional Considerations	
	Yes	No	Type				
Fall Protection	☐	☐	_____	Hot Work	☐	☐	Work Procedures:
body harness, lifelines, barricades, other (specify)				LOTO/Energy Control	☐	☐	☐ Check for utility clearance ☐ Adequate work zone
Eye/Face	☐	☐	_____	Trenching/Excavation	☐	☐	☐ Vehicle grounds ☐ Working clearances
goggles, face shield, glasses, other (specify)				Signs/Barricades	☐	☐	☐ Discuss potential exposure to hazards
Respirator	☐	☐	_____	Confined Space	☐	☐	People: ☐ Worker fatigue ☐ Other work groups
SCBA, supplied air, HEPA, dust, other (specify)				Cranes/Critical Lifts	☐	☐	☐ Public safety ☐ Pedestrian control ☐ Experience
Foot Protection	☐	☐	_____	Scaffolds/Aerial Lifts	☐	☐	☐ Traffic control ☐ Other utilities ☐ Spec. Training
safety toe, EH rated, rubber boots, other (specify)				Employee Certification/Training Required			Tools/Equipment: ☐ Inspection of drilling equipment
Hand Protection	☐	☐	_____	Crane Operator	☐	☐	☐ Inspection of hoses
Kevlar, cut resistant, chemical, EH, other (specify)				Forklift Operator	☐	☐	☐ Inspection of tools
Head Protection	☐	☐	_____	Mobile Equipment Operator	☐	☐	☐ Specialized tools/equipment
hard hat, helmet, electrical hazard, other (specify)				Railroad/eRailsafe	☐	☐	☐ Correct tool/equipment for the job
Clothing	☐	☐	_____	OSHA 10/30	☐	☐	Special Precautions: ☐ Adjacent structures
coveralls, welding, sleeves, rain, FR, reflective vest,				HAZWOPER	☐	☐	☐ Condition of structures ☐ Weather conditions
chemical, other (specify)				MSHA	☐	☐	☐ Lighting conditions ☐ Terrain ☐ Water bodies
Hearing Protection	☐	☐	_____	Client Specific Training (____)	☐	☐	☐ Spills and leaks ☐ Environmental ☐ Cultural
							Other: _____

If Conditions CHANGE...Stop Work, Review, and Revise the Plan!!

TRC SAFETY OBSERVATION FORM

Revised January 2014

Location/Project Name: _____		Date: _____	
Observer Name: _____			
Observee Name: _____		Time: _____	
Task Observed			
Description of Task Observed and Background Information			
Positive Comments			
Conclusions / Why the Questionable Items Occurred?			
Feedback Session Conducted By: _____		Date: _____	
Name of Observee's Supervisor: _____		Time: _____	
Questionable Observations/Root Cause Analysis			
<u>Personal Factor:</u> (1) Lack of skill or knowledge (2) Correct way takes more time/requires more effort (3) Shortcutting standard procedures is rewarded or appreciated (4) In past, did not follow procedures or acceptable practices and no incident occurred		<u>Job Factor:</u> (5) Lack of or inadequate operational procedures or work standards (6) Inadequate communication of expectations or work standards (7) Inadequate tools or equipment	
Questionable Observation #	Root Cause Analysis #	Solution(s) To Prevent Potential Incident from Occurring	Person Responsible
Agreed Due Date	Date Completed		
Results of Verification (were solutions done?) and Validation (were solutions effective?)			
Reviewed by (Supervisor): _____		Date: _____	
Approved by (Practice Safety Leader): _____		Date: _____	

TRC OBSERVATION FORM

Revised January 2014

PERSONAL PROTECTIVE EQUIPMENT	Safe	At-Risk	Comments
1. Hearing Protection (e.g. Ear Plugs)			
2. Head Protection (e.g. Hard Hat)			
3. ANSI Rated Eye Protection (e.g. Safety Glasses)			
4. Hand Protection (e.g. Kevlar Gloves)			
5. Foot Protection (e.g. Safety Shoes)			
6. Respiratory Protection			
7. Fall Protection Inspected (e.g. harness)			
8. ANSI Rated Reflective Vest/High Visibility Clothing			
9. Other (Specify)			
BODY USE AND POSITIONING	Safe	At-Risk	Comments
10. Correct Body Use and Positioning When Lifting/Pushing/Pulling			
11. Pinch Points/Moving Equipment - Hands/Body Clear			
12. Mounts/Dismounts Using 3-Points of Contact			
13. Other (Specify)			
WORK ENVIRONMENT	Safe	At-Risk	Comments
14. Work/Walk Surface Free of Obstructions (e.g. tripping hazards)			
15. Housekeeping/Storage			
16. Defined and Secured (e.g. warning devices, barricades, cones, flags)			
17. Suspended Load, Swing Radius & Lift Area is Barricaded			
18. Safety Shut Down Devices			
19. Proper Storage & Labeling /Disposal of Sample & Waste Materials			
20. Cylinders Stored Upright, Secured, & Caps in Place			
21. Manhole/vault Inspected for Hazards			
22. Other (Specify)			
OPERATING PROCEDURES	Safe	At-Risk	Comments
23. Job Planning (HASP reviewed, JSAs, etc.)			
24. Fire Extinguishers Accessible and Inspections Current			
25. Work Permit/Authorization to Work (Hot, Cold, LOTO, Confined Space)			
26. JSA Reviewed & Followed			
27. Hazard Assessment - Hazard Hunt			
28. Interfaces with Other Functions (awareness with other personnel on site)			
29. Operators Looking Behind Prior to Backing Up			
30. Operators Wearing Seat Belts While Operating Equipment			
31. Subsurface Structures Identified			
32. Proper Trench Protective Equipment in Place			
33. Adequate Egress Is Available for Excavation & Trench (within 25 ft. if depth is <4 ft.)			
34. All Materials Set Back at Least 2 Feet From Edge of Trench/Excavation			
35. Other (Specify)			
TOOLS/EQUIPMENT	Safe	At-Risk	Comments
36. Hand Tools (Proper Equipment Selection, Condition, and Use)			
37. Power Tools (Proper Equipment Selection, Condition, and Use)			
38. Equipment, Including Heavy (Proper Equipment Selection, Condition, and Use)			
39. Hoses Inspected			
40. Required Monitoring Equipment Calibrated & Used			
41. Ladders Setup Correctly & Inspected			
42. Right Tools for the Job are Available and in Good Condition - No Fixed Open Blade Knives (FOBKS)			
43. Other (Specify)			
Total #	0	0	



"Safe Catch" Report

A "Safe Catch" is a potential hazard or incident that has not resulted in any personal injury. Unsafe working conditions, unsafe employee behaviors, improper use of equipment or use of malfunctioning equipment have the potential to cause work related injuries. It is everyone's responsibility to report and/or correct these potential incidents immediately. Please complete this form as a means to report these "Good Catch" situations and submit to your local OSC Representative and Mike Glenn, National Safety Director.

Complete ALL field entries:

Employee Name:		Date:	
Incident Location:		Office:	
Project Number:		Practice:	
Conditions			
Please check all appropriate conditions:			
☐ Unsafe Act	☐ Unsafe Condition	☐ Unsafe Equipment	☐ Unsafe Use of Equipment
Description of Incident or Potential Hazard:			
Task Performed at Time of Incident:			
Causes (Primary and Contributing):			
Corrective Action(s) Taken (remove the hazard, replace, repair, or retrain):			
Employee Signature:		Date Completed:	

Our Mission: To reduce the frequency of incidents by applying local lessons learned globally.

If you have any questions about this report or would like additional information, please reference Compliance Program [CP019—TRC Incident Response and Lessons Learned Program](#), located on TRCNET or contact Mike Glenn, National Safety Director at mglenn@trcsolutions.com.



Daily Pre-Job Safety Briefing

Hazards Associated with the Job (focus on the GEMS)				
Gravity	Electrical	Mechanical	Kinetic	Other/Environmental
☐ Falling from a height ☐ Falling objects ☐ Falling structures ☐ Climbing obstructions ☐ Dangerous trees	☐ Electrical contact ☐ Utility strike	☐ Equipment failure ☐ Cable tension ☐ Moving parts ☐ Crane/Rigging	☐ Traffic ☐ Driving conditions ☐ Moving/Shifting loads ☐ Rotating machinery ☐ Vehicle stability ☐ Heavy equip. operation	☐ Asbestos/Lead ☐ Animals/Insects ☐ Confined space ☐ Excavations ☐ Heat/Cold ☐ Poisonous Plants
List all hazards associated with this task		Signatures of Crew Members Present		Post Task Safety Analysis
				Did any injuries or incidents occur today? If yes, explain.
				☐ Yes ☐ No
Barriers to eliminate/control above hazards?				Was the injury or incident reported to the safety department?
				☐ Yes ☐ No ☐ N/A
				What problems did you have with today's work assignment?
		OSHA's Unqualified Minimum Clearances		
		Powerline Voltage Phase to Phase (kV)	Minimum Safe Clearance (ft.)	
		50 or below	10	
		Over 50 to 200	15	What can we do tomorrow to improve performance?
		Over 200 to 350	20	
		Over 350 to 500	25	
		Over 500 to 750	35	
		Over 750 to 1,000	45	
Supervisor Signature		Date		

HASP COMPLIANCE AGREEMENT

By signing below, I have completed the Tailgate Safety Meeting Checklist, reviewed this Site Health and Safety Plan and the Job Safety Analysis (JSA) and understand their contents. I hereby agree to comply with all safety requirements outlined herein:

TRC

Signature: _____, **Site Safety Officer (SSO)**

Print Name: _____ **Date:** _____

Signature: _____, **Asst. Site Safety Officer (Asst. SSO)**

Print Name: _____ **Date:** _____

Contractor:

Signature: _____, **Site Safety Officer (SSO)**

Print Name: _____ **Date:** _____

Signature: _____ **Asst. Site Safety Officer (Asst. SSO)**

Print Name: _____ **Date:** _____

Contractor:

Signature: _____, **Site Safety Officer (SSO)**

Print Name: _____ **Date:** _____

Signature: _____, **Asst. Site Safety Officer (Asst. SSO)**

Print Name: _____ **Date:** _____

TRC Employees / Contractor Personnel / Visitors

Signature: _____ **Date:** _____

Print Name: _____ **Company:** _____

Signature: _____ **Date:** _____

Print Name: _____ **Company:** _____

HASP COMPLIANCE AGREEMENT (cont.)

By signing below, I have completed the Tailgate Safety Meeting Checklist, reviewed this Site Health and Safety Plan and the Job Safety Analysis (JSA) and understand their contents. I hereby agree to comply with all safety requirements outlined herein:

TRC Employees / Contractor Personnel / Visitors (cont.)
--

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

ATTACHMENT G

TRC SAFETY OBSERVATION FORMS

TRC SAFETY OBSERVATION FORM

Revised January 2014

Location/Project Name: _____		Date: _____	
Observer Name: _____			
Observee Name: _____		Time: _____	
Task Observed			
Description of Task Observed and Background Information			
Positive Comments			
Conclusions / Why the Questionable Items Occurred?			
Feedback Session Conducted By: _____		Date: _____	
Name of Observee's Supervisor: _____		Time: _____	
Questionable Observations/Root Cause Analysis			
<u>Personal Factor:</u> (1) Lack of skill or knowledge (2) Correct way takes more time/requires more effort (3) Shortcutting standard procedures is rewarded or appreciated (4) In past, did not follow procedures or acceptable practices and no incident occurred		<u>Job Factor:</u> (5) Lack of or inadequate operational procedures or work standards (6) Inadequate communication of expectations or work standards (7) Inadequate tools or equipment	
Questionable Observation #	Root Cause Analysis #	Solution(s) To Prevent Potential Incident from Occurring	Person Responsible
Agreed Due Date	Date Completed		
Results of Verification (were solutions done?) and Validation (were solutions effective?)			
Reviewed by (Supervisor): _____		Date: _____	
Approved by (Practice Safety Leader): _____		Date: _____	

TRC OBSERVATION FORM

Revised January 2014

PERSONAL PROTECTIVE EQUIPMENT	Safe	At-Risk	Comments
1. Hearing Protection (e.g. Ear Plugs)			
2. Head Protection (e.g. Hard Hat)			
3. ANSI Rated Eye Protection (e.g. Safety Glasses)			
4. Hand Protection (e.g. Kevlar Gloves)			
5. Foot Protection (e.g. Safety Shoes)			
6. Respiratory Protection			
7. Fall Protection Inspected (e.g. harness)			
8. ANSI Rated Reflective Vest/High Visibility Clothing			
9. Other (Specify)			
BODY USE AND POSITIONING	Safe	At-Risk	Comments
10. Correct Body Use and Positioning When Lifting/Pushing/Pulling			
11. Pinch Points/Moving Equipment - Hands/Body Clear			
12. Mounts/Dismounts Using 3-Points of Contact			
13. Other (Specify)			
WORK ENVIRONMENT	Safe	At-Risk	Comments
14. Work/Walk Surface Free of Obstructions (e.g. tripping hazards)			
15. Housekeeping/Storage			
16. Defined and Secured (e.g. warning devices, barricades, cones, flags)			
17. Suspended Load, Swing Radius & Lift Area is Barricaded			
18. Safety Shut Down Devices			
19. Proper Storage & Labeling /Disposal of Sample & Waste Materials			
20. Cylinders Stored Upright, Secured, & Caps in Place			
21. Manhole/vault Inspected for Hazards			
22. Other (Specify)			
OPERATING PROCEDURES	Safe	At-Risk	Comments
23. Job Planning (HASP reviewed, JSAs, etc.)			
24. Fire Extinguishers Accessible and Inspections Current			
25. Work Permit/Authorization to Work (Hot, Cold, LOTO, Confined Space)			
26. JSA Reviewed & Followed			
27. Hazard Assessment - Hazard Hunt			
28. Interfaces with Other Functions (awareness with other personnel on site)			
29. Operators Looking Behind Prior to Backing Up			
30. Operators Wearing Seat Belts While Operating Equipment			
31. Subsurface Structures Identified			
32. Proper Trench Protective Equipment in Place			
33. Adequate Egress Is Available for Excavation & Trench (within 25 ft. if depth is <4 ft.)			
34. All Materials Set Back at Least 2 Feet From Edge of Trench/Excavation			
35. Other (Specify)			
TOOLS/EQUIPMENT	Safe	At-Risk	Comments
36. Hand Tools (Proper Equipment Selection, Condition, and Use)			
37. Power Tools (Proper Equipment Selection, Condition, and Use)			
38. Equipment, Including Heavy (Proper Equipment Selection, Condition, and Use)			
39. Hoses Inspected			
40. Required Monitoring Equipment Calibrated & Used			
41. Ladders Setup Correctly & Inspected			
42. Right Tools for the Job are Available and in Good Condition - No Fixed Open Blade Knives (FOBKS)			
43. Other (Specify)			
Total #	0	0	



"Safe Catch" Report

A "Safe Catch" is a potential hazard or incident that has not resulted in any personal injury. Unsafe working conditions, unsafe employee behaviors, improper use of equipment or use of malfunctioning equipment have the potential to cause work related injuries. It is everyone's responsibility to report and/or correct these potential incidents immediately. Please complete this form as a means to report these "Good Catch" situations and submit to your local OSC Representative and Mike Glenn, National Safety Director.

Complete ALL field entries:

Employee Name:		Date:	
Incident Location:		Office:	
Project Number:		Practice:	
Conditions			
Please check all appropriate conditions:			
☐ Unsafe Act	☐ Unsafe Condition	☐ Unsafe Equipment	☐ Unsafe Use of Equipment
Description of Incident or Potential Hazard:			
Task Performed at Time of Incident:			
Causes (Primary and Contributing):			
Corrective Action(s) Taken (remove the hazard, replace, repair, or retrain):			
Employee Signature:		Date Completed:	

Our Mission: To reduce the frequency of incidents by applying local lessons learned globally.

If you have any questions about this report or would like additional information, please reference Compliance Program [CP019—TRC Incident Response and Lessons Learned Program](#), located on TRCNET or contact Mike Glenn, National Safety Director at mglenn@trcsolutions.com.

ATTACHMENT H

WORKCARE PROGRAM INFORMATION

EARLY INCIDENT INTERVENTION®

Immediate Access to Medical Advice for Work Related Incidents

(888) 449-7787

INTRODUCTION

WorkCare, Inc. (WorkCare) and TRC have partnered together to promote Incident Intervention®, a resource designed to support company safety goals/targets—while reducing runaway-costs associated with workplace injuries and illnesses.

PURPOSE

Early Incident Intervention provides TRC employees with **IMMEDIATE** telephonic access to WorkCare clinicians at the time of a presumed, non-emergency workplace injury or illness. Clinicians provide expert guidance on the evaluation of symptoms, appropriate first aid, and the need for additional medical evaluation or treatment.

When utilizing this service within the first hour of an incident, known as the “Golden Hour,” licensed medical staff can guide the case so that medical evaluation and treatment are rendered appropriately.

*“...helps the worker
traverse the unpredictable
terrain of work-related
injuries and illness.”*

PRINCIPLES OF EARLY INCIDENT INTERVENTION

- Utilizes principles of the “Golden Hour.”
- Provides workers immediate clinician support at the time of an incident.
- Focuses on providing the right care, at the right time in the proper setting.

BENEFITS FOR EMPLOYEES

- Instant access to a medically qualified professional for evaluation of symptoms and possible outcomes.
- Professional guidance on appropriate first aid measures and medications.
- Professional advice regarding the need for additional medical evaluation or treatment.

BENEFITS FOR TRC

- Point of contact for emergency and non-emergency medical clinicians.
- Triage the incident to determine risk and urgency, delivering interventions that are consistent with medical guidelines for the specified injury and illness.
- Maintains communication with clinicians to ensure accurate and timely reporting.

ATTACHMENT I

TRC INCIDENT REPORT FORMS



INCIDENT NOTIFICATION REPORT

(To be completed immediately after an Injury, Illness, Incident or Significant Near Miss by Employee's Supervisor and Employee involved)

Incident Category	
☐ Injury/Illness	☐ Near Miss/Loss ☐ Property Damage ☐ Other
1 Incident Location:	_____
2 Project #:	_____
3 Client:	_____
4 Date Incident Occurred:	_____ Time: _____
5 Date Incident Reported:	_____ Time: _____
TRC Employee Information	
6 Name:	_____ Phone: _____
7 Office:	_____ Address: _____
8 Supervisor Name:	_____ Phone: _____
9 Title or Occupation:	_____
10 Sector/Practice:	_____
Incident Description	
11 Task Performed/Description of Incident:	_____ _____ _____ _____ _____
12 Conditions at the Time of Incident (weather, lighting, etc.):	_____ _____
13 Description of Property Damage:	_____ _____ _____
Employee Injury or Illness Description	
14 Describe the Injury or Illness:	_____ _____ _____ _____ _____
15 First Aid/Medical Treatment Administered:	_____ _____ _____ _____ _____
16 Was WorkCare Contacted?	☐ Yes ☐ No
17 Name of Doctor's Office, Clinic or Hospital:	_____
18 Address:	_____ Phone: _____



INCIDENT NOTIFICATION REPORT

(To be completed immediately after an Injury, Illness, Incident or Significant Near Miss by Employee's Supervisor and Employee involved)

Subcontractor Involvement	
19	Was a subcontractor involved? ☐ Yes ☐ No
20	Name of Company: _____
21	Address: _____
22	Contact Name: _____ Phone: _____
23	Description of the Incident: _____

Witness Information	
24	Were there witnesses to the incident? ☐ Yes ☐ No
25	Name(s) Address(es) Number(s)

Immediate Corrective Actions	
26	Describe the Immediate Corrective Actions Taken: _____

Client Notification	
27	Is there a client incident notification requirement? ☐ Yes ☐ No
28	Contact Name: _____
29	Date of Notification: _____ Time: _____
30	Notification Method: _____

Supervisor: _____	Signature: _____	Date: _____
Employee: _____	Signature: _____	Date: _____

ATTACHMENT J

TRC AUTO INCIDENT REPORT



AUTO INCIDENT REPORT

EMPLOYEE INFORMATION (V-1):

Name: _____ Phone: () _____
Sector/Practice: _____ Office Location: _____
Supervisor's Name: _____ Supervisor's Phone: () _____
Project #: _____ Client's Name: _____
Driver's License #: _____ State: _____

VEHICLE INFORMATION (V-1):

Year/Make/Model of Vehicle: _____
License Plate #: _____ Vehicle ID # (VIN): _____
Circle Point of Contact:  Was Vehicle Drivable? ☐ Yes ☐ No
Personal: ☐ Yes Rental: ☐ Yes Fleet: ☐ Yes
Rental Company _____

INCIDENT INFORMATION:

Date of Incident: _____ Time of Incident: _____ A.M. _____ P.M. Photos Taken: ☐ Yes ☐ No
Location of Incident: _____ City/State: _____
Were The Authorities Contacted? Police: ☐ Yes ☐ No Ambulance: ☐ Yes ☐ No Fire: ☐ Yes ☐ No
Name of Police Dept: _____ Case #: _____ Officer Name: _____
Were Citations Issued? ☐ Yes ☐ No If Yes, To Whom? _____
Citation Number: _____
Were There Any Witnesses? ☐ Yes ☐ No If Yes, Please Provide Name, Address and Phone Below:
Witness Name: _____ Witness Phone: () _____
Witness Address: _____
Traffic Conditions (i.e., heavy, light): _____ Weather Conditions (i.e., dry, wet, ice, fog): _____
WorkCare Contacted? ☐ Yes ☐ No
TRC Driver Injured? ☐ Yes ☐ No Medical Treatment Received? ☐ Yes ☐ No
Front Seat Passenger Injured? ☐ Yes ☐ No Medical Treatment Received? ☐ Yes ☐ No
Rear Driver Side Passenger Injured? ☐ Yes ☐ No Medical Treatment Received? ☐ Yes ☐ No
Rear Passenger Side Passenger Injured? ☐ Yes ☐ No Medical Treatment Received? ☐ Yes ☐ No
Describe Injuries: _____
Describe Damage to Property Other Than Motor Vehicles (i.e., guardrails, mailboxes, etc.): _____



AUTO INCIDENT REPORT

OTHER DRIVER & VEHICLE INFORMATION (V-2):

Driver's Name: _____ Driver's Phone: () _____

Driver's Address: _____

Owner's Name (If different than driver): _____ Owner's Phone: () _____

Owner's Address: _____

Year/Make/Model of Vehicle: _____ License Plate #: _____ State: _____

Circle Point of Contact:  Was Vehicle Drivable? ☐ Yes ☐ No

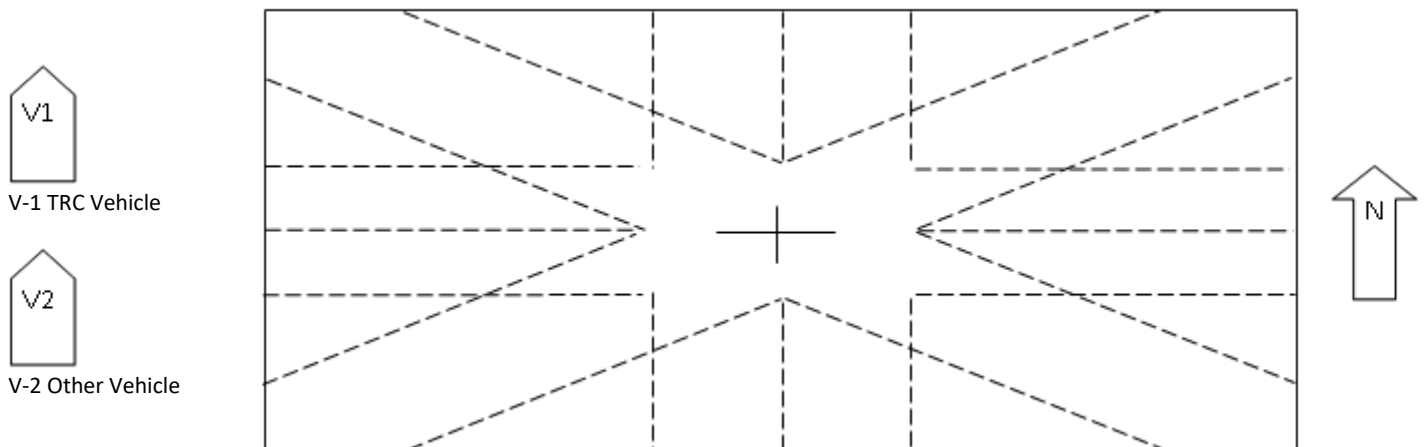
Insurance Company Name: _____ Policy Number: _____

Insurance Company Phone: () _____ Number of Passengers in Vehicle: _____

List Persons Injured: _____

Were Any Other Vehicles Involved in Incident? ☐ Yes ☐ No If yes, provide details below:

PLEASE DESCRIBE THE INCIDENT AND COMPLETE THE DIAGRAM BELOW. Be sure to indicate as many details as possible (i.e., How many lanes in each direction; Were there any turn lanes; What kind of traffic controls were there – light, stop sign, yield sign, Positions of vehicles on impact).



Completed By: _____ Signature: _____

ATTACHMENT K

BNSF SAFETY CHECKLIST AND QUICK REFERENCE GUIDES

BNSF SAFETY CHECKLIST

Basic RR Training Requirements

- Federal Railroad Administration (FRA) On-Track training
- BNSF Contractor Safety Orientation
- Enrollment in e-RailSafe (unless site is exempted)
- Web-based BNSF MOW/On-Track training. Additional BNSF training may be required for engineering work or work on the tracks (hi-rail inspections).

Project Managers/Task Managers (before fieldwork)

1. Verify that all subcontractors are approved by TRC (SQFs, Insurance, etc.).
2. Prepare project-specific Health and Safety Plan (HASP) that includes completed Job Hazard Analysis/Task Hazard Analysis (JHA/THA), auditing program, and BNSF-specific safety protocols (Maintenance of Way {MOW}) as an appendix. MOW also can be maintained at the project site as a separate document.
3. Prepare and submit electronic Safety Action Plan (SAP) at www.contractororientation.com. Print hard copies for file, for field supervisor, and for submittal to the BNSF environmental representative.
4. Confirm who the primary site contact will be (e.g., Roadmaster, Yardmaster, Water Service Foreman) and communicate with that person to discuss track protection needs prior to mobilizing to the site. Track protection shall only be provided by a BNSF Maintenance of Way (MOW) rules-qualified employee.
5. If intrusive drilling or excavation work is planned, arrange a buried utility locate via the state one-call system. Also contact Railroad's Communications Network Control Center at (800) 533-2891, BNSF signal, communications, and water service. Contact the primary BNSF environmental contact and site contact to discuss if others need to be contacted for a subsurface locate.
6. Verify that field supervisor has, and will use on a daily basis, the Field Job Safety Briefing Documentation card. The Project Manager should review the card information with the field supervisor as necessary.
7. Ensure that onsite and subcontractor personnel are compliant with FRA and BNSF On-Track training requirements. Client-specific training requirements include:
 - FRA/On-Track training
 - e-RailSafe
 - BNSF Contractor Safety Orientation

Site Supervisors (during fieldwork)

1. Conduct initial project safety meeting by reviewing the HASP and the JHA/THA with site environmental and subcontractor field personnel assigned to the project. If track protection is being provided by a flagman, then the BNSF Employee in Charge (EIC) must lead the safety discussion regarding track protection. Daily safety meetings may be combined with daily job safety briefings provided by BNSF personnel.
 2. Ensure all on-site personnel have the proper personal protective equipment (e.g., steel toed boots, hard hat, safety glasses, and reflective vests meeting ANSI level II or III orange work wear). Confirm with BNSF personnel at the facility any specific requirements on color of hard hat and reflective vest. **Note:** **new BNSF rules for slip resistant winter boots.**
 3. Verify on-site, prior to conducting work that all environmental and subcontractor personnel have with them proof of having fulfilled the required FRA and BNSF safety training requirements.
- Attend job briefing presented by the BNSF EIC and ensure all attendees complete their copy of the Field Job Safety Briefing Documentation Card (attached).

DAILY JOB BRIEFING FIELD DOCUMENTATION CARD (MANDATORY)

After a job briefing, these questions regarding FRA On-Track safety must be understood by the entire field crew who will be working within 25 feet of active railroad tracks. The TRC representative must verify that all field crew members have proof of being current with their FRA and client-specific On-Track training requirements.

1. Who is the Employee-In-Charge (**not us – must be railroad rules qualified**)

2. What type of On-Track safety/track protection do I have on the tracks I am working on

3. Is this type of protection appropriate for the type of work that I am performing

4. If heavy equipment or other personnel are involved in the work, how will it affect my work and safety

5. What type of On-Track safety do I have, if any, on adjacent tracks

6. When clearing the track, where is my designated place of safety

7. What are the track limits of my protection (reference Mile posts, Cross Streets, or Named Tracks)

8. What is the time limit of my track protection

9. Where can I find FRA and client-specific On-Track safety rules

10. Do I understand my On-Track safety and feel that I am adequately protected against trains and on track equipment

11. What is the speed limit in the authorized work zone (and adjacent tracks, if applicable)

Speed in MPH	Distance in Feet	Speed in MPH	Distance in Feet
5	110	20	1,100
10	220	55	1,210
15	330	60	1,320
20	440	65	1,430
25	550	70	1,540
30	660	75	1,650
35	770	80	1,760
40	880	85	1,870
45	990	90	1,980



ENVIRONMENTAL DEPARTMENT QUICK REFERENCE GUIDE

Approaching Others & Safety Assessment

Hazardous Energy Control - Lockout/Tagout (LOTO)

Please use/complete the following checklist to ascertain conformance to BNSF's expectations around hazardous energy control / LOTO. If a deficiency is identified, it must be resolved before allowing any applicable work covered by this issue to continue or commence.

Name/Signature: _____

Date: _____

Project Location/Activity: _____

Subject	Yes	No	NA
Maintenance or Servicing Work is or will be performed that requires energy control?			
Do the applicable contractors/consultants performing the work have the required training/qualifications to safely de-energize equipment?			
Is the proper equipment available or being used to isolate energy? • LOTO or other devices distinguishable & red in color • LOTO multi-clasp available, with one lock and one key for all employees servicing same equipment • Pipe disconnects • Valve locks • Hydraulic disconnect and/or bracing • Other			
Have other employees not involved in the work been notified of the work and safe procedures during maintenance/servicing period?			
Are proper procedures being used to fully de-energize all forms of energy (chemical, electrical, potential, pressure, heat/cold, etc.)? • Includes trying to operate equipment after de-energization			
If live overhead lines are present, have lines been de-energized or work under these areas been prevented?			
Have any guards, alarms or other safety devices been removed or deactivated?			

Method(s) used to resolve any identified deficiencies from above (use back side of page as needed):

1. _____
2. _____
3. _____
4. _____

Regulation

OSHA defines minimum clearances for cranes and derricks around overhead power lines in 29 CFR 1926.1408.

Other Corporate Program/Reference:

Safety Topics – Crane and Boom Operations:

<https://bnsfrailway.sharepoint.com/teams/SafetyCommunications/SafetyCommLibrary/crane-and-boom-operations-mw.pdf>

Key Definitions

- Work zone for cranes and derricks: the area 360 degrees around the equipment, up to the equipment's maximum working radius.

General Safety Rules when Operating around Overhead Power Lines

- Workers should never be positioned underneath an overhead or suspended load (i.e. on a crane or boom).
- The contractor must assume that all power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be deenergized and visibly grounded at the worksite.
- Determine if any part of the equipment, load line or load (including rigging and lifting accessories), if operated up to the equipment's maximum working radius in the work zone, could get closer than 20 feet to a power line. If so, the operator must meet the requirements in Option (1), Option (2), or Option (3), as follows:
 - Deenergize and ground*. Confirm from the utility owner/operator that the power line has been deenergized and visibly grounded at the worksite,
 - 20 foot clearance for lines less than 350kV*. Ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer than 20 feet to the power line by implementing the encroachment prevention measures specified below, or
 - Table A clearance* must be met. Determine the line's voltage and the minimum approach distance permitted under Table A. Determine if any part of the equipment, load line or load (including rigging and lifting accessories), while operating up to the equipment's maximum working radius in the work zone, could get closer than the minimum approach distance of the power line permitted under Table A (see § 1926.1408). If so, then the contractor must follow the encroachment prevention measures provided below to ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer to the line than the minimum approach distance.
- Where Option 3 is used, the utility owner/operator of the power lines must provide the requested voltage information within two working days of the contractor's request.

TABLE A—MINIMUM CLEARANCE DISTANCES

Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

- *Encroachment Prevention Measures.* Where encroachment precautions are required under Option (2) or Option (3) of this section, all of the following requirements must be met:
 - Conduct a pre job safety review planning meeting with the operator and the other workers who will be in the area of the equipment or load to review the location of the power line(s), and the steps that will be implemented to prevent encroachment/electrocution.
 - If tag lines are used, they must be non-conductive.
 - Erect and maintain an elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings, at 20 feet from the power line (if using Option (2) of this section) or at the minimum approach distance under Table A (if using Option (3) of this section). If the operator is unable to see the elevated warning line, a dedicated spotter must be used as described below in addition to implementing one of the additional measures described below.
 - Implement at least one of the following measures:
 - A proximity alarm set to give the operator sufficient warning to prevent encroachment,
 - A dedicated spotter who is in continuous contact with the operator. Where this measure is selected, the dedicated spotter must:
 - Not be the same person who is giving signals for any crane/boom or other move
 - Be equipped with a visual aid to assist in identifying the minimum clearance distance. Examples of a visual aid include, but are not limited to: A clearly visible line painted on the ground; a clearly visible line of stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the dedicated spotter and a building corner ahead of the dedicated spotter).
 - Be positioned to effectively gauge the clearance distance.
 - Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator.
 - Give timely information to the operator so that the required clearance distance can be maintained.
 - A device that automatically warns the operator when to stop movement, such as a range control warning device. Such a device must be set to give the operator sufficient warning to prevent encroachment,
 - A device that automatically limits range of movement, set to prevent encroachment, or
 - An insulating link/device (listed, labeled, or accepted by a Nationally Recognized Testing Laboratory in accordance with 29 CFR 1910.7) installed at a point between the end of the load line (or below) and the load.
- *Operations below Power Lines*
 - No part of the equipment, load line, or load (including rigging and lifting accessories) is allowed below a power line unless the contractor has confirmed that the utility owner/operator has deenergized and (at the worksite) visibly grounded the power line, except where one of the following exceptions applies:
 - For equipment with non-extensible booms: The uppermost part of the equipment, with the boom at true vertical, would be more than 20 feet below the plane of the power line or more than the Table A of this section minimum clearance distance below the plane of the power line.
 - For equipment with articulating or extensible booms: The uppermost part of the equipment, with the boom in the fully extended position, at true vertical, would be more than 20 feet below the plane of the power line or more than the Table A of this section minimum clearance distance below the plane of the power line.



ENVIRONMENTAL DEPARTMENT QUICK REFERENCE GUIDE Clearing Underground Utilities

Regulation

This guidance does not restate all federal, state and provincial laws, but rather is a guide for BNSF environmental staff on common best management practices to be employed by our consultants and contractors when completing intrusive subsurface activities. In the event a federal, state or provincial law conflicts with this guidance or requires an activity above and beyond this guidance, it is incumbent upon the contractor or consultant to know and apply applicable laws and regulations. If state or local laws require an activity that is less than what is required in this guidance, the contractor or consultant should take the additional safety steps required in this guidance or contact their BNSF contact to discuss alternative practices that meet BNSF expectations.

Other Environmental Department Quick Reference Guides referencing Underground Utility Clearances:

- Excavation and Trenching
- Working Around Auger Drilling Rigs

General Guidance when Clearing Underground Utilities

- Prior to initiating any activities on site, including completing underground utility clearances, a Job Safety Briefing must be held to identify hazards and risks and discuss ways to actively mitigate or reduce the hazard or risk. Applicable resources include BNSF Environmental's *Site Visit Safety Instructions and Checklist*, and *Job Safety Analysis for Environmental Remediation*, both of which are available on the BNSF Environmental HazMat intranet website.
- Make a visual survey of the proposed job site looking for evidence of underground construction, markers, vents, manholes, valves, etc. Attention should be paid to nearby buildings which can also identify potential underground utilities (water spigots, gas main, etc.)
- Consistent with ANSI Z535.1, the following colors will be used to identify underground utilities.
 -  Pink – temporary survey markings
 -  Red – electric power lines, cables, conduits and lighting cables
 -  Yellow – gas, oil, steam, petroleum or gaseous materials
 -  Orange – communication, alarm or signal lines, cables or conduit
 -  Blue – potable water
 -  Purple – reclaimed water, irrigation and slurry lines
 -  Green – sewers and drain lines
- Delineate all proposed subsurface penetrations, clearly marking the location with white paint, stakes or flags in accordance with ANSI standard Z535.1. In the event of a linear excavation, the route or perimeter of the excavation must be marked.
- Check available plans, maps, GIS information, and corporate contracts & deeds that apply to the work site.
- If work is to be completed on BNSF property (e.g., soil borings, monitor well installations, trenching, test pits, gross excavation), BNSF signals and telecommunication departments must be notified by dialing (817) 593-4357 and following the prompts. Additionally, BNSF electrical and water service must be contacted for location of affected services. Finally, discuss locations of proposed excavation with local facility personnel who are familiar with the facility and past operations.
- Not less than 2 business days, nor more than 10 days, prior to initiating intrusive subsurface activities, the contractor should initiate a utility locate through the state-specific One-Call utility clearance service. **In the event of an emergency, an emergency locate can be requested.** Typically, the service can be contacted by dialing 8-1-1; however, the contractor should check the state-specific requirements to determine if a county within a state has a separate number (e.g., Flathead and

Lincoln Counties, MT). Confirmation as to the length of time the clearance is valid for should also be made, as it varies by state.

- The consultant/contractor performing the excavation or drilling must also initiate a privately contracted utility locate service before conducting any intrusive work. The private utility locate service will be utilized to review and confirm the presence/absence of “known” utilities previously identified by the state-specific One-Call utility clearance service. The private utility locate service must use geophysical methods (e.g., electromagnetic conductance or inductance, or ground penetrating radar) to attempt to identify unknown utilities or obstructions. The consultant overseeing the work must be present during the privately contracted utility locate to discuss all locations and planned activities. Each location must be clearly marked and flagged using the appropriate color with cones, flags, paint, etc. to preserve the cleared locations. **Virtual maps or photographs housed on electronic devices are not considered appropriate substitutes for clearly marked and preserved locations in the field.**
- Following the utility locate services and prior to invasive subsurface activities, each excavation or boring location must be cleared manually to five (5) feet below ground surface. A tile probe should be used at each location to test for unknown obstructions. If a tile probe is not available, an air-knife or water-jet can be used to clear the first several feet of soil to check for subsurface obstructions. The hole should be cleared to 120% of the diameter of the largest tool used for drilling to clear tangential structures. Drilling should proceed cautiously through the first ten (10) feet of the soil column.
- The contractor and/or consultant present during the private utility locate is required to be present during the actual invasive subsurface activities.
- Keep a detailed list and map of all utilities as located
- Hold daily job safety briefings with all work groups to ensure project scope has not changed
- If work activities are extended, inspect surface markings (flags, paint, etc.) every third day to ensure they stay visible as work progresses
- If work activity must be conducted within 3 feet of an existing located utility, manually expose the utility in question using non-conductive tools/shovels and protect it in-place to include de-energizing when possible before completing the work activities. Do not use power tools or equipment in completing the manual clearance of known utilities. A representative from the department or utility (ownership of underground utility – Signals, Telecom, etc.) must be present.
- Develop emergency response procedures necessary to respond to known or potential hazards including damage to underground facilities
- Prepare an emergency response plan with applicable phone numbers
- If damage is caused or discovered, stop work immediately and assess damage and risks
- Report damage to “one-call center”, facility contact, and the BNSF Project Manager
- Protect personnel, notify local emergency providers if necessary
- Notify the Service Interruption Desk (817-352-2832 (North/Central) or 817-352-2833 (South)) if rail operations are affected.
- In case of fire or serious risk of fire, explosion, etc., make an emergency notice to all affected personnel.

ENVIRONMENTAL DEPARTMENT QUICK REFERENCE GUIDE CONFINED SPACE(S)

Regulation(s)

- Federal Railroad Administration (FRA), 49CFR part 214. The OSHA standard for Confined Spaces, Title 29 Code of Federal Regulations (CFR) Part 1910.146 and 1926.1201, addresses the practices and procedures necessary to enter confined spaces safely while employees or contractors perform servicing and maintenance activities. The standard outlines measures for confined spaces — whether permit required or not.
- Does not apply to excavation work as defined in 29CFR1926.650

Corporate Confined Space(s) Reference

- <https://employee.bnsf.com/safety/Pages/confined-space-program.aspx>

Key Definitions

- Confined Space: See below
- Hazardous Atmosphere: Means an atmosphere that may expose employees to risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:
 1. Flammable gas, vapors, or mist in excess of 10 percent (%) of its lower flammable limit (LFL);
 2. Airborne combustible dust at a concentration that meets or exceeds its LFL;
 3. Atmospheric oxygen concentration below 19.5 percent (%) or above 23.5 percent (%);
 4. Atmospheric concentration of any substance for which a dose or a permissible exposure limit (PEL) is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substance, of this part (29 CFR 1910.1000) and which could result in employee exposure in excess of its dose or permissible exposure limit
 5. Any other atmospheric condition that is immediately dangerous to life or health (IDLH).
- Permit Required Confined Space: See below
- Non-Permit Confined Space: Means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.
- Attendant: A trained individual stationed outside a permit space who assesses the status of authorized entrants and who must perform the duties specified in section 3.3 of this program. An attendant shall remain at point of entry at all times unless relieved by another attendant, may only monitor one confined space at a time and cannot perform any other duties that interfere with monitoring entry. Note to the definition of “Attendant”: An entry supervisor also may serve as an authorized entrant, as long as that person is trained and equipped as required by this program for each role he or she fills. Also, the duties of Attendant may be passed from one individual to another during the course of an entry operation.
- Authorized Entrant: An employee who is trained as an entrant and authorized by the entry supervisor to enter a permit space and perform the duties as required. Note to the definition of Authorized Entrant: An Authorized Entrant also may serve as an attendant, as long as that person is trained and equipped as required by this program for each role he or she fills. Also, the duties of Authorized Entrant may be passed from one individual to another during the course of an entry operation.
- Entry Supervisor: The qualified/trained person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this program.

What is a Confined Space?

Means a space that (must meet all three):

1. Large enough and so configured that an employee can bodily enter and perform assigned work; and
2. Has limited or restricted means for entry or exit (i.e. silos, storage bins, vessels, or tanks, etc.); and
3. Not designed for continuous employee occupancy.

What is a Permit Required Confined Space?

Means a confined space that has one or more of the following characteristics:

1. Contains or has the potential to contain a hazardous atmosphere;
2. Contains a material that has the potential for engulfing an entrant;
3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
4. Contains any other recognized serious safety or health hazard.

Procedures

- **Entering a Non-Permit Required Confined Space?**

Before beginning any work, the following steps must be followed to safely enter a permit required confined space as outlined in BNSF's Confined Space Program:

- Proper training
- Know and understand confined spaces in work environment
- Ensure a confined space permit exists or is created
- Follow the Non-Permit Required Confined Space (NRCS) entry procedures & checklist
- Use air monitoring equipment

- **Entering Permit Required Confined Space?**

Before beginning any work, the following steps must be followed to safely enter a permit required confined space as outlined in BNSF's Confined Space Program:

- Proper training or ensure contractor employees have the proper training and certifications
- Know and understand confined spaces in work environment
- Ensure a confined space permit exists or is created
- Follow Permit Required Confined Space (PRCS) entry procedures & entry permit
- Use air monitoring equipment:
 - Continuous forced fresh air ventilation must be utilized during each confined space
 - Eliminate any hazardous atmosphere prior to persons entering the space as verified through air monitoring
 - Follow reclassification of confined spaces, if needed
 - Ensure appropriate PPE and on site rescue services are provided/available
 - Debrief & close permit

What are some types of BNSF confined spaces?

- Permit Required:

- Sanitary Sewage Manhole
 - Waste Water Grit Chamber
 - Equalization Waste Water Tank
 - Above Ground Storage Tank
-
- Non Permit Required:
 - Utility Closets
 - Below Grade Trenches
 - Storage Vaults

Training

- Initial awareness training shall be administered to ensure that all *employees* understand the purpose and function of the confined space program if they perform or supervise employees who perform work near confined spaces
- Employees shall acquire the required knowledge and skills through applicable training/certification required to implement confined space procedures if they will be performing the duties of an attendant, entrant, entry supervisor or rescue team
- Refresher training shall be provided at least every 3 years for all affected employees
- All training shall be documented and include the following:
 - Each employee's name,
 - Date(s) trained,
 - The name of the person(s)/organization conducting the training, and
 - The content of the training.

Reference(s)

- BNSF Confined Space Entry Program (SFTY-1200-4003-02-SYS-1/1/2017)
- FRA 49 CFR 214
- OSHA 1910.146
- OSHA 1926.1201



ENVIRONMENTAL DEPARTMENT QUICK REFERENCE GUIDE

Core Safety Rules

Purpose

To ensure that each employee understands his or her rights and responsibilities under the Employee Safety Rules applicable to all employees not otherwise covered by craft-specific rules.

Employee Rights and Responsibilities

- Take sufficient time to perform tasks safely
- Perform job tasks only when you have received the training and authorization to complete the tasks
- Assure you are alert and attentive when performing tasks
- Warn co-workers of unsafe working conditions or behaviors
- Comply with all safety rules, mandates, instructions, training practices and policies
- Comply with warnings, whether verbal, written, or posted
- Never complete a task alone that requires two or more people to complete safely
- Conduct yourself in a way that supports a safe environment free of harassment, practical jokes, and horseplay.

Guidelines

- A large part of complying with the rules is being situationally aware. Know whether any hazards are in the area, and do not lose focus.
- Always remember that the railroad is a safe but unforgiving environment. Losing awareness – even momentarily- can result in an accident that leads to a serious injury or loss of life.
- Always approach others about safety!
- Keep in mind that while we all like to have fun at work, horseplay and practical jokes are unprofessional and could lead to a lapse in safety-focus.

Other Corporate Program/Reference

- Safety Rules for Employees: <http://depot2.bnsf.com/ops/timetables-and-rulebooks/BNSF%20Safety%20Rule%20Books/Employee%20Safety%20Rules.pdf>
- Safety Programs <https://employee.bnsf.com/safety/Pages/safety-programs.aspx>



ENVIRONMENTAL DEPARTMENT QUICK REFERENCE GUIDE FALL PROTECTION

Regulation(s)

- Federal Railroad Administration (FRA) / Title 49 Code of Federal Regulations (CFR); 214.103, 214.105, 214.107, 214.109. The FRA / OSHA standard for Fall Protection. Title 29 Code of Federal Regulations (CFR) Part 1910, 1915 (<https://www.osha.gov/SLTC/fallprotection/standards.html>) and 1926 (<https://www.osha.gov/SLTC/fallprotection/construction.html>) and associated sections and subparts contained therein, addresses the practices and procedures necessary for compliance with fall protection while employees or contractors perform servicing and maintenance activities.

Corporate Fall Protection Reference

- <https://employee.bnsf.com/safety/Pages/fall-protection-program.aspx>

Key Definitions

- Affected Employee:** An employee whose job requires them to operate or use a machine or equipment on which servicing or maintenance is performed where there is a risk of fall from a height 4 foot (Ladders, Scaffolds, and Lifts), for FRA Bridge Safety Workers working at a height of 12 (twelve) feet or more, and/or when performing work on building roofs within 6 ft (2m) from roof's edge requires fall protection. An employee is an Affected employee if they are using fall protection equipment, systems and/or procedures, or whose job requires them to work in an area in which such activities are being performed. Most BNSF environmental employees are affected employees.
- Anchor** - a secure point of attachment for lifelines, lanyards or deceleration devices
- Competent / Qualified Person:** A person who has been trained and explicitly permitted to use fall protection equipment (by possession of recognized degree, certificate, professional training, or by extensive knowledge, training and experience has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter per OSHA: 29CFR 1926.450(b)) in order to perform, construction, service or maintenance. Employees operating or performing maintenance on waste water treatment plants, oil/water separators, storm water treatment systems, and/or remediation systems may be a "Competent Person".
- Deceleration distance** - the additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the location of an employee's body belt or body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.
- Fall arrest** – Designed to stop a worker's fall after descent has begun
- Fall restraint** – Secure the worker to an anchor using a lanyard of proper design
- Free fall** - the act of falling before a personal fall arrest system begins to apply force to arrest the fall.
- Leading edge** - the edge of a floor, roof, or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.
- Opening** - a gap or void 30 inches (76 cm) or more high and 18 inches (48 cm) or more wide, in a wall or partition, through which employees can fall to a lower level.
- Personal fall arrest system** - a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

What is fall protection and why is it performed?

- Fall protection is an umbrella term that encompasses different types of systems and programs; systems that are designed to arrest a free fall, systems that are designed to restrain a worker in a position to prevent him from reaching a fall hazard, and policies that may eliminate fall hazards. The BNSF Railway will prioritize the elimination of fall protection hazards. If the hazards cannot be eliminated, then employees will be required to use personal fall protection systems. Procedures, systems and equipment are intended to prevent employees from falling off, onto or through working levels and to protect employees from falling objects.

- **Fall protection protocol and fall restraint equipment is in place to protect employees from injury.**
- It is important to **always** refer to the applicable fall protection standard and procedures for each specific task **before** beginning any construction, service or repair work.

When is fall protection required?

- Tasks and workplaces requiring fall protection are identified during workplace fall hazard surveys, risk assessments, job hazard analysis, etc. These assessments shall consider tasks and circumstances at the work area which might impact the safety of workers while working at heights, fall hazards regardless of height, and working above dangerous hazards.
- Fall protection is required to ensure the safety of workers when there is a risk of fall from a height 4 foot (Ladders, Scaffolds, and Lifts), and FRA Bridge Safety Worker a height of 12 (twelve) feet.
- When performing work on building roofs specifically close to the edge, consult local regulations for the specifics/areas requiring fall protection. Generally, working within 6 ft (2m) from roof's edge requires fall protection.

How is Fall Protection achieved?

- Elimination or substitution – eliminate the hazard or substitute a process, sequence or procedure to eliminate a fall hazard
- Engineering Controls / Passive fall protection – Isolate the potential of falling using, walls, guardrails, handrails or covering floor openings
- Administrative controls – Develop policies, procedures, practices and guidelines to mitigate the risk. Provide training, instruction and supervision to help mitigate the hazard.
- Personal Protective Equipment
 - o Fall restraint – Secure the worker to an anchor using a lanyard of proper design
 - o Fall arrest – Designed to stop a worker's fall after descent has begun

How do I know what standard to follow; OSHA or FRA?

- Generally ladders are regulated by OSHA – Fixed ladders require fall protection at heights of 24 feet or greater. This includes a single ladder from surface level, as well as shorter ladders that are entirely above 24 feet, such as a series of ladders. New Fixed Ladders higher than 24 feet require a ladder safety system (LSS), or personal fall arrest system that meets all the requirements of 29 CFR 1910.28. Existing Fixed Ladders higher than 24 feet that have a cages or wells will be required by November 18, 2036 to replace the cages or wells with a ladder safety system (LSS) or personal fall arrest system that meets all requirements of 29 CFR 1910.28. New Fixed ladders equipped with a personal fall arrest system or ladder safety system (LSS) shall have rest platforms provided at a maximum intervals of 150 feet.
- Rolling stock carries the FRA exemption - As a best practice, you would not want to tie off to moving equipment unless you were in a safe/reinforced area (similar to a seat belt in a cab) as crushing exposure is generally a more catastrophic risk than falls.
- Railroad Bridges and other structures on railroad property may carry the FRA exemption - FRA requirements apply to on-track locations, such as bridge work, which requires specialized *Bridge Inspector* training. OSHA regulations would not apply to ladders, platforms, and other surfaces on signal masts, cantenary systems, turntables, and similar structures or to walkways beside the tracks in yards or along the right-of- way. FRA will determine the need for and feasibility of general standards.
- Remember - BNSF Railway applies a standardized 4 ft. height limit for fall protection where FRA practices (exemptions and/or height requirements, such as bridges), as well as OSHA exemptions do not apply.

Guidance

- Fall Protection questions/concerns should be directed to your local Manager of Safety or the System Safety email contact at bnsf.safety1@bnsf.com. In case of a fall or near miss, the onsite Supervisor and / or Safety Department Representative will perform a thorough investigation and the findings reviewed to make necessary changes to the Fall Protection practices.

Training

- Initial training shall be administered to ensure that all *affected employees* understand the purpose and function of the fall protection program if they perform, or supervise employees who perform work requiring fall protection equipment to be used in performance of their duties.
- *Authorized employees* shall acquire the necessary knowledge and skills required to implement energy control procedures.
- Refresher training shall be provided at least every 3 years for all *affected employees* and at least annually for *authorized employees*.

- All training shall be documented and include the following:
 - Each employee's name,
 - Date(s) trained,
 - The name of the person(s)/organization conducting the training, and
 - The content of the training.

References

- BNSF Fall Protection Program (SFTY-1200-4005-02-SYS-1/1/2017)
- FRA Track and Rail and Infrastructure Integrity Compliance Manual Volume III – Railroad Workplace Safety Chapter 2 – Bridge Worker Safety Standards (January 2015)

ENVIRONMENTAL DEPARTMENT QUICK REFERENCE GUIDE Hazardous Energy Control - Lockout/Tagout (LOTO)

Regulation

- The OSHA standard for The Control of Hazardous Energy (Lockout/Tagout), Title 29 Code of Federal Regulations (CFR) Part 1910.147, addresses the practices and procedures necessary to disable machinery or equipment, thereby preventing the release of hazardous energy while employees perform servicing and maintenance activities. The standard outlines measures for controlling hazardous energies — electrical, mechanical, hydraulic, pneumatic, chemical, thermal, and other energy sources. In addition, 29 CFR 1910.333 sets forth requirements to protect employees working on electric circuits and equipment. This section requires workers to use safe work practices, including lockout and tagging procedures. These provisions apply when employees are exposed to electrical hazards while working on, near, or with conductors or systems that use electric energy.

Corporate Hazardous Energy Control Program (HECP) Reference

- [http://depot2.bnsf.com/ops/Safety/HECP/HECP%20Appendices/Hazardous%20Energy%20Control%20Program%20\(HECP\).pdf](http://depot2.bnsf.com/ops/Safety/HECP/HECP%20Appendices/Hazardous%20Energy%20Control%20Program%20(HECP).pdf)

Key Definitions

- Affected Employee: An employee whose job requires them to operate or use a machine or equipment on which servicing or maintenance is performed during Lockout or Tagout, or whose job requires them to work in an area in which such activities are being performed. Most BNSF environmental employees are affected employees.
- Authorized Employee: A person who has been trained and explicitly permitted to lockout and/or tagout machines or equipment in order to perform service or maintenance. Employees operating or performing maintenance on waste water treatment plants, oil/water separators, stormwater treatment systems, and/or remediation systems may be an "Authorized Employee".
- LOTO-required machines/equipment: Machines or equipment where the unexpected energization, start up or release of stored energy or chemicals could occur and cause personal injury or damage equipment during service or maintenance operations.

What is Lockout/Tagout (LOTO) and why is it performed?

- LOTO is the required procedure of shutting down and locking equipment/tools before repairs or servicing begins to prevent line-of-fire/release-of-energy or pinch point exposures to those working on that equipment. Once the equipment is properly shut down and secured with a lock, a tag is placed along with the lock in a visible location on the machine to let other workers know that it is currently being serviced and who is performing this work. The lock used by the Authorized Employee should not be a common lock and only the Authorized Employee should have the key.
- **Both lockout and tagout are in place to protect employees from injury.**
- It is important to **always** refer to the applicable LOTO procedures for each specific piece of equipment **before** beginning any service or repair work.

When is LOTO required?

LOTO procedures must be in place:

- During maintenance, repair, or service of equipment if it could unexpectedly start up, energize, or release stored energy;
- Whenever guards or other safety devices are removed or bypassed; or
- Anytime part of the body is placed in a danger zone during equipment "cycle" or operation.

How is LOTO achieved?

Before beginning any work on equipment, the following steps must be followed to achieve LOTO:

- Obtain and review the LOTO procedures for that specific piece of equipment.
- Notify all affected employees.
- Shut down/de-energize the equipment, using normal controls.

- Apply LOTO devices and/or block energy sources. **Note:** Each person working on the equipment must have his/her own lock with only one unique key. There is no master key.
- Verify isolation.
 - o Try out the lockout and test the machine to be sure that lockout procedure is effective.

How does a Hazardous Energy Control Plan (HECP) help protect workers during LOTO procedures?

This written procedure guide lists the steps required to de-energize and apply LOTO to a specific piece of equipment.

- The HECP is usually located at the equipment that requires LOTO.
- All affected personnel must be notified before LOTO is applied and when it is removed.
- Workers should check to ensure that the part of the equipment to be worked on is de-energized. Use a volt meter or manipulate the controls to ensure that no residual energy is in place.
- **Completion:** Inform all affected personnel and follow written procedures when removing LOTO and putting equipment back into service.

What is the difference between Lockout, Tagout and Blockout?

- **Lockout** refers to the placement of a **lockout device** on an energy-isolating device – such as a circuit breaker, disconnect switch, line valve or block – to prevent the equipment from being energized. This prevents an unexpected surge of energy that could potentially injure an employee.
- **Tagout** refers to the placement of a written warning device, i.e., a **tag**, stating “Danger – Do Not Operate” that identifies the name and craft of the authorized employee who placed it.
 - o The tag is placed on an energy-isolating device to indicate to other workers that the device and equipment being controlled **must not** be operated until the tagout device is removed by the worker who attached it.
- **Blockout** refers to the placement of a mechanical device or material to block movement so that no movement is possible.

Is it acceptable to work on equipment that is protected by a co-worker's LOTO lock and tag?

- No. Do not rely on a co-worker's lockout/tagout. A worker must place his or her own lock and tag directly on the energy-isolating device and keep the key in their possession while repairing and servicing equipment.
- **Remember:** ONE PERSON. ONE LOCK. ONE LIFE.

What are some types of lockout devices?

- Some of the most common lockout devices include locks, blocks, chains, multi-lock hasps, wheel valve covers and ball valve covers.
Note: All lockout hardware should be **red** in color.

What about equipment that will not accommodate a lockout device?

- In cases where a lock is not physically possible, tagout only procedures can be used.
- A supervisor must first verify that lockout cannot be achieved.
- The tag must be placed in the same location that the lockout device would have been attached.
- Other measures – such as removal of a valve handle – must also be used to reduce the likelihood of inadvertent energizing of the machine.

Should LOTO locks be used on non-equipment items?

- LOTO locks should only be used to lock applicable BNSF equipment/tools when required.

When is LOTO not required when servicing or repairing equipment?

- Cord and plug-connected equipment, powered by a single energy source that is unplugged when the plug is under the exclusive control of the employee, does not require LOTO.
- **Note:** Electrical plug lockout devices must be used if and when the plug is not under the immediate, physical control of the employee working on the equipment.

Training

- Initial training shall be administered to ensure that all *affected employees* understand the purpose and function of the energy control program and energy control procedures including the prohibition relating to attempts to reenergize locked out/tagged out machines or equipment.
- *Authorized employees* shall acquire the necessary knowledge and skills required to implement energy control procedures.
- Refresher training shall be provided at least every 3 years for all *affected employees* and at least annually for *authorized employees*.
- All training shall be documented and include the following:
 - Each employee's name,
 - Date(s) trained,
 - The name of the person(s)/organization conducting the training, and
 - The content of the training.



ENVIRONMENTAL DEPARTMENT QUICK REFERENCE GUIDE HOT WORK

Hot work is any work that involves burning, welding, using fire or spark producing tools, or that produces a source of ignition. Welding, cutting & grinding operations are common to the RR industry. This can be dangerous in the fact that these operations may cause the surrounding area to catch fire and/or combust and pose hazards to personnel and equipment as well as the community or creating wildfires if it goes uncontrolled. Can occur outdoors or indoors.

Regulation(s)

- Hot Work is basically covered under OSHA Subpart Q (Welding, Cutting & Brazing) 1910.252 requirements. NFPA also has a standard for Hot Work under 51B. Both of these address the practices and procedures necessary to abide by Hot Work requirements while employees or contractors perform servicing and maintenance activities that include welding, cutting, brazing, grinding.

Corporate Hot Work Reference

- Not specifically identified, but various safety policies follow the general requirements – Fire Prevention, Welding, & Cutting, Electrical, Confined Space(s), Right-Of-Way Fires, Bridge Work, Wooden Snowsheds & Tunnels, etc.

Key Definitions

- Fire Watch: An individual posted in specific circumstances by the PAI. The fire watch will observe the hot work and monitor conditions to ensure that a fire or explosion does not occur as a result of the work performed.
- Hot Work: Any work involving welding, brazing, soldering, heat treating, grinding, powder-actuated tools, hot riveting and all other similar applications producing a spark, flame, or heat, or similar operations that are capable of initiating fires or explosions.
- Hot Work Permit: The employer's written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

Why the Importance of Hot Work?

- To prevent fires, personnel safety & equipment; while welding, cutting, brazing & grinding there can be many materials nearby that are combustible

Procedures

- All employees and contractors working under BNSF supervision shall comply with the elements of the Hot Work Safety as identified in the appropriate programs (Confined Spaces, Work on Wood Bridges, Tunnels & Snowsheds).
- This program covers welding, brazing, soldering, heat treating, grinding, powder-actuated tools, hot riveting and all other similar applications producing a spark, flame, or heat.
- This program does not cover use of candles, laboratory activities, pyrotechnics or special effects, cooking equipment, electric soldering irons or torch-applied roofing (See NFPA 241).
- All hot work performed by outside contractors shall be in conformance with NFPA 51B at a minimum.

- Hot work operations in confined spaces require additional safeguards and are addressed in the Confined Space Program.
- Hot work on and near building systems and piping may require additional safeguards.

Before beginning any work, the following steps must be followed to safely conduct Hot Work:

- Proper training
- Establish permissible areas for hot work.
- Determine site-specific flammable materials, hazardous processes, or other potential fire hazards present or likely to be present in the work location.
- Ensure that all individuals involved in hot work operations (including contractors) are:
- Trained in the safe operation of their equipment and the safe use of the process. These individuals must have an awareness of the risks involved and understand the emergency procedures in the event of a fire.
- Familiar with this procedure.
- Familiar with site-specific flammable materials, hazardous processes and conditions, and other potential fire hazards.

What are some types of BNSF Hot Work examples?

- Confined Spaces
- Permit Confined Spaces
- Fuel Storage Tank and systems (pumps, piping, etc)
- Electrical rooms
- Generators
- Rooms with combustible materials
- Rail thermite welding

ENVIRONMENTAL DEPARTMENT QUICK REFERENCE GUIDE

Safe Driving (Company or Rental Vehicle)

Purpose

To ensure the safety of each employee who drives a company or rental vehicle, and provide guidance on proper vehicle use.

General Safety Rules when Operating a Company or Rental Vehicle

- Employees shall operate all vehicles that they use for business safely. All Drivers must:
 - o Have a valid state driver's license.
 - o Comply with all applicable state and local motor vehicle laws. The vehicle operator is responsible for any traffic citations.
 - o Wear seat belts, whether operating or riding as a passenger in the vehicle.
 - o Report and participate in the investigation of any vehicle collisions or property damage accidents (reference below BNSF flow chart for reporting instructions)
 - o Operate vehicles only when they are in safe operating condition. Each employee shall inspect the vehicle to assure that the vehicle is in sound operating condition.
- Driving on company business and/or driving a company vehicle while under the influence of intoxicants and other drugs (which could impair driving ability) is forbidden and is sufficient cause for discipline, up to and including termination of employment.
- While driving a BNSF owned or rented vehicle (off rail), do not:
 - o Use cellular or mobile telephones, or similar hand-held electronic devices for voice communications in other than hands-free mode.
 - o Manually enter or read text from cellular or mobile telephones, or similar hand-held electronic devices (e.g. emailing, performing any electronic text retrieval or entry, accessing a web page, etc.).
 - o Dial or answer cellular or mobile telephones by pressing more than a single button
 - o Use notebook computers, laptops or similar devices. Display screen of such devices capable of being closed must be closed. Devices not capable of closing the screen must be turned off.
- Employees must be aware of and comply with any local, state or federal laws governing use of wireless equipment while driving (e.g., laws banning use of wireless phone while driving).
- No driver shall operate a company vehicle when his/her ability to do so safely has been impaired by illness, fatigue, injury, or prescription medication.
- Drivers are responsible for the security of company vehicles assigned to them. The vehicle engine must be shut off, ignition keys removed, and vehicle doors locked whenever the vehicle is left unattended.

Defensive Driving Guidelines

- Drivers are required to maintain a safe following distance at all times. Drivers should keep a two second interval between their vehicle and the vehicle immediately ahead. During slippery road conditions, the following distance should be increased to at least four seconds.
- Drivers must yield the right of way at all traffic control signals and signs requiring them to do so. Drivers should also be prepared to yield for safety's sake at any time. Pedestrians and bicycles in the roadway always have the right of way.
- Drivers must honor posted speed limits. In adverse driving conditions, reduce speed to a safe operating speed that is consistent with the conditions of the road, weather, lighting, and volume of traffic. Tires can hydroplane on wet pavement at speeds as low as 40 mph.
- Radar Detectors are strictly prohibited in company vehicles.
- Turn signals must be used to show where you are heading; while going into traffic and before every turn or lane change.
- When passing or changing lanes, view the entire vehicle in your rear view mirror before pulling back into that lane.
- Be alert of other vehicles, pedestrians, and bicyclists when approaching intersections. Never speed through an intersection on a caution light. When the traffic light turns green, look both ways for oncoming traffic before proceeding.
- When waiting to make left turns, keep your wheels facing straight ahead. If rear ended, you will not be pushed into the lane of oncoming traffic.
- When stopping behind another vehicle, leave enough space so you can see the rear wheels of the car in front. This allows room to go around the vehicle if necessary, and may prevent you from being pushed into the car in front of you if you are rear-ended.
- Avoid backing where possible, but when necessary, keep the distance traveled to a minimum and be particularly careful.
 - o Check behind your vehicle before backing.
 - o Back to the driver's side. Do not back around a corner or into an area of no visibility.

Weather

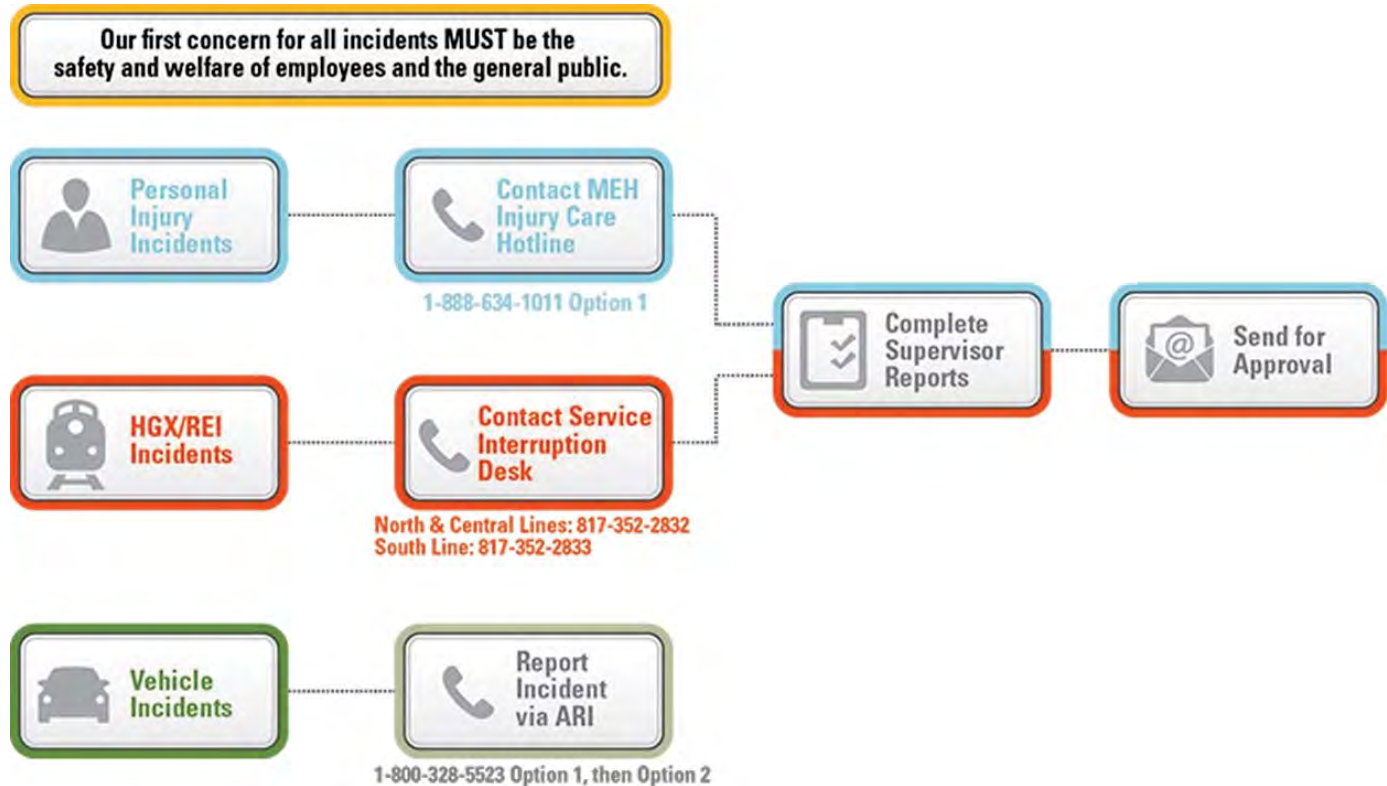
During inclement weather:

- o Slow down.
- o Do not use the cruise control.
- o Apply traction devices as needed (for example, snow chains).

If requested, or if in your opinion it is unsafe to proceed, pull off the road at a secure location until the weather clears sufficiently to drive.

Other Corporate Program/Reference

BNSF Injury and Accident Reporting Guideline:



Regulation

The OSHA standard for Excavation, Title 29 Code of Federal Regulations (CFR) Part 1926.650 - .652, addresses the practices and procedures necessary to ensure worker safety in an excavation are adequately protected from cave-ins by an adequate protective system. The standard also addresses other potential hazards including falls, falling loads, hazardous atmospheres and incidents involving mobile equipment. The standards apply to all open excavations made in the Earth's surface, including trenches. Following the requirements of the standards will prevent or greatly reduce the risk of cave-ins and other excavation-related incidents.

Key Definitions

- **Excavation:** Any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal.
- **Trench (Trench excavation):** a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 meters).
- **Competent Person:** an individual (generally a professional engineer or other trained and certified person) who is capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to workers, soil types and protective systems required, and who is authorized to take prompt corrective measures to eliminate these hazards and conditions. Under the Excavation standards, tasks performed by the competent person include: classifying soil; inspecting protective systems; designing structural ramps; monitoring water removal equipment; and conducting site inspections.

Trench Safety Measures

Trenches 5 feet (1.5 meters) deep or greater require a protective system unless the excavation is made entirely in stable rock. If less than 5 feet deep, a **competent person** may determine that a protective system is not required. Trenches 20 feet (6.1 meters) deep or greater require that the protective system be designed by a registered professional engineer or be based on tabulated data prepared and/or approved by a registered professional engineer in accordance with 1926.652(b) and (c).

General Trenching and Excavation Rules

- Keep heavy equipment away from trench edges.
- Identify other sources that might affect trench stability.
- Keep excavated soil (spoils) and other materials at least 2 feet (0.6 meters) from trench edges.
- Know where underground utilities are located before digging.
- Test for atmospheric hazards such as low oxygen, hazardous fumes and toxic gases when > 4 feet deep.
- Inspect trenches at the start of each shift.
- Inspect trenches following a rainstorm or other water intrusion.
- Do not work under suspended or raised loads and materials.
- Inspect trenches after any occurrence that could have changed conditions in the trench.
- Ensure that personnel wear high visibility or other suitable clothing when exposed to vehicular traffic.
- A means of egress, including a stairway, ladder ramp or other safe means of egress shall be located in trench excavations that are 4 feet (1.22 meters) or more in depth so as to require no more than 25 feet (7.62 meters) of lateral travel for employees.
- Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.
- All non-essential personnel should refrain from standing near the edges of an open excavation.

Protective Systems

There are four different types of protective systems (see attached OSHA Quick Card).

- **Benching** means a method of protecting workers from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near vertical surfaces between levels. *Benching cannot be done in Type C soil.*

- **Sloping** involves cutting back the trench wall at an angle inclined away from the excavation.
- **Shoring** requires installing aluminum hydraulic or other types of supports to prevent soil movement and cave-ins.
- **Shielding** protects workers by using trench boxes or other types of supports to prevent soil cave-ins.

Designing a protective system can be complex because you must consider many factors: soil classification, depth of cut, water content of soil, changes caused by weather or climate, surcharge loads (e.g., spoil, other materials to be used in the trench) and other operations in the vicinity.

Additional Information

Visit OSHA's Safety and Health Topics web page on trenching and excavation at
www.osha.gov/SLTC/trenchingexcavation/index.html
www.osha.gov/dcsp/statestandard.html

Regulation

OSHA does not have specific guidance directed at working around auger drilling rigs; however OSHA defines minimum clearances for cranes and derricks around overhead power lines in 29 CFR 1926.1408. For further clarification of clearance zones when working around overhead power lines and minimum expectations, please review the Quick Reference Guide titled *Clearance Zones around Overhead Power Lines*. The National Groundwater Association has published the *Environmental Remediation Drilling Safety Guideline*, which can be downloaded at <http://www.ngwa.org/Documents/erdsq.pdf>.

Other Corporate Program/Reference:

Safety Topics – Crane and Boom Operations:

<https://bnsfrailway.sharepoint.com/teams/SafetyCommunications/SafetyCommLibrary/crane-and-boom-operations-mw.pdf>

Key Definitions

- Exclusion zone for drilling rig: the area 360 degrees around the equipment, up to the equipment's maximum mast height.

General Safety Rules when Operating around Auger Drilling Rigs

- To the extent practical, the location sited for the boring should be level ground with clearly identified means of entry and egress, well ventilated, and clear of surface obstructions such as large rocks, fallen trees, loose pipes or isolated equipment.
- Prior to initiating drilling activities, the contractor should initiate a utility locate through the state-specific One-Call utility clearance service. Typically, the service can be contacted by dialing 8-1-1. Additionally, if making subsurface penetrations on BNSF property (e.g. soil borings, monitor well installations, trenching, test pits, gross excavation), BNSF signals and telecommunication departments should be notified by dialing (817) 593-4357 and following the prompts. A tile probe should be used at each location to test for unknown obstructions. If a tile probe is not available, an air-knife or water-jet can be used to clear the first few feet of soil to check for subsurface obstructions. The hole should be cleared to 120% of the diameter of the largest tool used for drilling to clear tangential structures. Drilling should proceed cautiously through the first ten (10) feet of the soil column.
- Before raising the mast, look up to check for overhead obstructions. The contractor must assume that all power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be de-energized and visibly grounded at the worksite.
- Determine if any part of the equipment, load line or load (including rigging and lifting accessories), if operated up to the equipment's maximum working radius or height in the work zone, could get closer than 20 feet to a power line. If so, the operator must meet the requirements outlined in the Quick Reference Guide titled *Clearance Zones around Overhead Power Lines*.
- As part of the safety tailgate meeting, each crew member and observer should be shown how to shut-down the rig in an emergency, and where the fire extinguisher, blood-borne pathogen kit, and first-aid kit are located.
- In high-traffic areas, the work area around the rig should be cordoned off with either barricades or traffic cones, spaced far enough away from the rig that the driller and crew are allowed to work unimpeded, yet close enough to prevent by-standers from entering the work area. In areas of particularly high frequency traffic (e.g. intermodal facilities), a traffic control plan may be warranted and personnel should wear high-visibility workwear.
- Tools, materials, and supplies should be stored so that work can proceed in an orderly fashion, with sufficient room in the work area to move about without tripping hazards being present. Equipment should not be stored in places that would interfere with escape routes in an emergency.
- Work areas, platforms, walkways and other access-ways should be kept free of obstructions such as materials and tools, and substances such as debris, grease, ice, and mud, in order to minimize the tripping, slipping and falling hazards around the drill rig.

- During active operations, only the driller and crew should be positioned within the exclusion zone, defined as the area with a radius of at least one mast length around the rig. The geotechnical work station should be positioned outside of this exclusion zone and all observers should remain outside the exclusion zone during active operation.
- When completing drilling in support of environmental investigations, all crew members should don the appropriate PPE and minimize contact with soil, sediment, groundwater or known contaminants (e.g. NAPL).
- Workers should never be positioned underneath an overhead or suspended load (i.e. on a crane or boom).
- Augers should only be cleared of cuttings with a shovel or other tool. Never reach into a rotating auger to clear cuttings by hand.
- In the event of inclement weather (rain, sleet, snow), drilling should cease. In the event of an electrical storm, drilling should cease when thunder or lightning or within five (5) miles of the drilling location. All workers must shelter away from the drilling rig. If possible the mast should be lowered.
- All open boreholes should be covered and protected or backfilled adequately and according to local and state regulations on completion of the drilling.
- Never move between boring locations with the mast extended. The mast should be lowered and all augers, rods, tools, and equipment properly stored before moving the rig between boring locations.
- Prior to demobilization, verify all waste materials has been removed from the site or are properly contained, labeled and scheduled for pickup.



ENVIRONMENTAL DEPARTMENT QUICK REFERENCE GUIDE WORKING AROUND TRACK AND IN YARDS

Regulation(s)

- FRA Track and Safety Compliance Manual, Volume 3

Corporate Rule

- Employee Safety Rules S1.6.2, S13.1

Key Definitions

- Fouling Track - Fouling a track means the placement of an individual in such proximity to a track that the individual could be struck by a moving train or other on-track equipment, or in any case is within four feet of the nearest rail. FRA

Procedures

- Employees are prohibited from fouling a track, including in a yard, except when duties require it and safeguards are utilized.
- Always conduct a safety briefing before doing work near tracks and when tasks or situations change.
- Know your track protection!
- Always ask yourself: **Do I need to foul the track? Is it safe to foul the track? How do I determine if it is safe to foul the track?**
- When crossing or fouling tracks:
 - **Do not cross within 25 feet of the end of standing equipment** unless the appropriate protection has been established.
 - **Do not cross in front of approaching equipment** unless you are sufficiently ahead of the equipment to cross safely.
 - **Do not walk between rails or foul the track**, except when duties require and proper protection is provided. Use caution during bad weather and when visibility is impaired.
- When crossing over rail equipment, such as locomotives or cars:
 - Obtain positive confirmation that the equipment will not be moved.
 - Cross only through cars with a crossover platform and preferably with handholds.
 - Do not step on the coupler or uncoupling lever.
- Always identify exposures and look to minimize risks when working around track. It is important to consider and identify exposures present for a given task. While there are

multiple exposures present when duties require fouling a track, some of the most common are listed below and should be covered during the safety briefing.

Line of Fire/Release of Energy

- When working near tracks, only walk between rails or foul the track when duties require.
- Before fouling track, determine whether it is safe to do so.
- If the track is occupied, ensure the appropriate protection has been provided for the task to be performed.
- Be aware of your surroundings at all times (including movement on adjacent tracks) to ensure that you are not in the line of fire from unexpected movement.
- Verify tracks intended for railcar or engine movement are clear of obstructions before removing the appropriate protection to allow the movement.

Life-Saving Processes

- When working near track, always remember to follow and use the most critical procedures and brief with co-workers about these procedures.
- When parking or spotting equipment next to tracks, use the clearance lines to ensure equipment is parked a safe distance from the track.

Ascending/Descending

- Use caution when stepping off equipment to avoid stepping into the foul of an adjacent track. Never get on or off moving equipment, except in an emergency to prevent injury.

Walking/Path of Travel

- Conditions such as weather, lighting and range of vision can affect your safe path of travel or the ability to visually check all equipment. For example, equipment can appear to be farther away than it actually is during periods of darkness. Snow and rain can obscure vision, and create slip, trip or fall hazards.
- To minimize risk when working near track:
 - Remain alert and attentive. **Always expect the movement of trains, locomotives, cars or other equipment at any time, on any track and in either direction.**
 - Look in both directions, watch for moving equipment on adjacent tracks, and cross in front of approaching equipment only when sufficiently ahead of the movement to do so.
 - Don't lose focus of movement on adjacent tracks.

ATTACHMENT L

COVID-19 GUIDELINES FOR FIELD ACTIVITIES
AND QUESTIONNAIRE

COVID-19: BNSF Onsite Safe Work Practices

The safety and well-being of our employees, the clients we serve and the community at large is of the utmost importance to TRC. Our Corporate and Environmental Sector leadership and safety teams closely monitor the COVID-19 situation via information from the Center for Disease Control (CDC), World Health Organization (WHO) and various state and local agencies – these internal safety support groups provide daily status and policy updates to all TRC staff. We are confident that we can pre-screen our staff before they enter your facility and maintain proper social distancing to prevent transmission of COVID-19 in either direction.

Our current standard pre-screening actions consist of:

- We confirm that no TRC employees have traveled to a CDC Warning Level 3 country within the 2 weeks prior to each field project, and travel outside the US has been restricted until further notice.
- We confirm on a daily basis that no TRC employees exhibit COVID-19 symptoms.
- We ask our staff to complete daily pre-work temperature checks. Any employee with a temperature greater than the CDC threshold of 100.4°F or who feels ill is immediately sent home to self-quarantine and seek immediate care and may not return to work for at least 14 days or until cleared by a health professional. If the employee is assigned to a field project away from their home office, they are immediately sent to the hotel to self-quarantine and contact their personal healthcare provider ASAP. The same return-to-work criteria applies. In both cases, the TRC Safety Leadership and our HR staff are notified for additional support as needed.
- Our TRC offices are broadly distributed across the continental US – 90% of domestic sources are located within an eight hour drive of one of our offices. As such, we can continue to cost-effectively deliver resources to your facility if domestic air travel is restricted or becomes problematic.
- We ask our staff to document daily who and when contact has occurred with on-site personnel should the need arise for future exposure notifications.

TRC will not send staff to a location where they may be exposed to COVID-19. Before we arrive on-site, we will ask you to confirm that there have been no cases of COVID-19 at the facility and that there is no risk of exposure to our staff.

While at your facility:

- We ask that any pre-work safety meetings be conducted virtually or in groups smaller than 10 people following social distancing practices.
- We will continue the daily temperature checks described above.
- We make review of corporate best-practices related to COVID-19 part of our daily tail-gate meeting.
- We ask that any communication with staff at your facilities be conducted either electronically or in a location outside the vehicle where proper social distancing can be maintained.
- Our field staff will communicate amongst themselves, the home office and your staff, as necessary by either cell phone or radio.
- We request that lavatory or portable toilet facilities with soap and hot water for hand-washing or hand sanitizer dispenser be available for our staff. If this is not feasible, please advise us.

If you have any questions regarding our approach to performing work safely at your facility, please don't hesitate to contact your project manager or Kari Means at (512) 589-9944.

	TRC HEALTH AND SAFETY MANAGEMENT SYSTEM		EHS Policy
	DOCUMENT TITLE: COVID-19 Guidelines for Field Activities		Management System Procedures
	DOCUMENT NUMBER: CP052.1	Revision Number: 6	Compliance Programs
	APPROVED BY: Mike Glenn	Page 1 of 6	Forms, Checklists, Permits, etc.

1. ASSESSING FIELD ACTIVITIES FOR COVID-19 RISK

Following TRC's health and safety management system, work activities should be assessed to identify possible hazards and the precautions necessary to mitigate risk to an acceptable level, including risks associated with COVID-19. TRC is following the US Occupational Safety and Health Administration's (OSHA) risk assessment guidance for COVID-19. Project-specific controls that are developed through the risk assessment process must be communicated to project employees and also listed in the project Health and Safety Plan.

1.1. Risk Assessment

To determine appropriate precautions, OSHA has divided job tasks into four risk exposure levels: very high, high, medium, and lower risk. The majority of TRC's work is considered Low risk.

- **Very High:** Exposure risk jobs are those with high potential for exposure to known or suspected sources of COVID-19 during specific medical, postmortem, or laboratory procedures. Workers in this category include healthcare workers and healthcare or laboratory personnel collecting or handling specimens from known or suspected COVID-19 patients.
 - **Precautions:** TRC does not engage in Very High-risk work.
- **High:** Exposure risk jobs are those with high potential for exposure to known or suspected sources of COVID-19. Workers in this category include healthcare delivery and support staff (e.g., doctors, nurses, and other hospital staff who must enter patients' rooms) exposed to known or suspected COVID-19 patients.
 - **Precautions:** TRC does not engage in High-risk work.
- **Medium:** Exposure risk jobs include those that require frequent and/or close contact with (i.e., within 6 feet of) people who may be infected with COVID-19, but who are not known or suspected COVID-19 patients. In areas without ongoing community transmission, workers in this risk group may have frequent contact with travelers who may return from international locations with widespread COVID-19 transmission. In areas where there is ongoing community transmission, workers in this category may have contact be with the general public (e.g., in schools, high-population-density work environments, and some high-volume retail settings).
 - **Precautions**
 - Continue to follow the CDC's guidelines for social distancing and hand hygiene.
 - Where appropriate, limit client and third-party access to the worksite or restrict access to only certain workplace areas.
 - Consider strategies to minimize face-to-face contact (e.g., drive through windows, phone-based communication, telework).

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- Employees and Project Managers with medium exposure risk may need to wear some combination of gloves (i.e., nitrile), a face mask (or ½ mask tight-fitting respirator), and/or a face shield or goggles. PPE ensembles for workers in the medium exposure risk category will vary by work task, the results of the hazard assessment, and the types of exposures workers have on the job.
- **Lower:** Exposure risk (caution) jobs are those that do not require contact with people known to be, or suspected of being, infected with COVID-19 nor frequent close contact with (i.e., within 6 feet of) the general public. Workers in this category have minimal occupational contact with the public and other coworkers.
 - **Precautions** – While OSHA does not recommend specific controls for Low-risk work, TRC will continue to follow the CDC’s primary precautions including social distancing and hand hygiene.

1.2. Best Practices

TRC has identified additional best practices that can be used to further mitigate potential exposure to COVID-19. In addition, the CDC’s COVID-19 guidelines which include social distancing and hand hygiene, the following options should be considered.

- **Travel**
 - Drive in separate vehicles
 - If vehicle has two passengers, both passengers should wear face coverings
 - Consider completing tasks alone
 - Sanitize your hands after using the fuel pump
 - Sanitize interior surfaces of rental vehicles
 - Driving instead of flying
- **Project Sites**
 - Use disposable chemical resistant gloves (i.e., nitrile) when disinfectant wipes are not available
 - Schedule work during “off hours” when less people are around
 - Wait until 3 days after last person left the area, if possible
 - Wear a face covering if you can’t work alone
 - Consider using a ½ mask tight-fitting respirator when N95 masks are not available (if deemed appropriate)
 - Contact clients via telephone or video conference instead of face-to-face meetings

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- **Construction sites**

- Avoid “tailgate meetings” or “water cooler meetings” without following social distancing protocols
- Avoid sharing pens/pencils
- Safety Meetings should be held in groups of 10 or less and should observe 6’ personal distance
- Face coverings are recommended to be worn by TRC and their subcontractors
- Stagger lunch times to minimize social gatherings; consider eating in separate areas
- All lunch waste, bottles and cans should be disposed of immediately after use
- Never share PPE (hard hats, high visibility vests, personal floatation device, safety glasses, etc.
- Avoid community coffee pots in field offices
- Provide disposable paper cups at drinking stations
- Wear gloves when operating equipment and if possible, limit one operator to a piece of equipment. Sanitize controls after use
- No sharing hand tools
- Set up hand cleaning or sanitizing stations at various locations on the site, ideally near port-o-lets
- Put your clothing directly in the washing machine at the end of shift
- Limit number of workers in confined spaces as much as possible
- Use telephones or Teams meetings to avoid face-to-face meetings when possible

2. SYMPTOMS AND PRECAUTIONS FOR COVID-19

2.1. Background

The 2019 novel coronavirus, or COVID-19, is a new respiratory virus first identified in Wuhan, Hubei Province, China. It’s called a “novel” — or new — coronavirus, because it is a coronavirus that has not been previously identified.

Both the COVID-19 and influenza (flu) are respiratory illnesses, which have similar symptoms. Both are contagious and both can be mild or severe, even fatal in rare cases. The key difference between the novel coronavirus and influenza is we know what to expect from the flu.

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2.2. Symptoms and Steps to Follow If You Develop Symptoms

Symptoms and Warning Signs	Take the following steps
Symptoms may appear 2-14 days after exposure to the virus. People with these symptoms may have COVID-19: • Cough • Shortness of breath • Fever, equal to or greater than 100.4°F (38.0°C) • Chills • Repeated shaking with chills • Muscle pain • Headache • Sore throat • New loss of taste or smell This list is not all inclusive. Other less common symptoms have been reported, including gastrointestinal symptoms like nausea, vomiting, or diarrhea.	1. Notify your field and direct supervisor that you feel ill. 2. Supervisor shall notify Office Practice Leader/Practice Leader, Mike Glenn (949-697-7418), and your HR Business Partner immediately. 3. Immediately isolate yourself and return to your place of lodging (return home if nearby). 4. Contact your personal healthcare provider asap (consider using the Cigna app) for evaluation and follow their instructions. 5. Update your field and direct supervisor of your health and work status (e.g., when do you expect to return to work). 6. If you're diagnosed with COVID-19 notify Mike Glenn (949-697-7418) and your HR Business Partner immediately. This communication will be treated as confidential.
If you develop any of the following emergency warning signs: • Trouble breathing • Persistent pain or pressure in the chest • New confusion • Inability to wake or stay awake • Bluish lips or face This list is not all inclusive so please consult with your medical provider for further guidance.	1. Get medical attention immediately. 2. If you're diagnosed with COVID-19, notify Mike Glenn (949-697-7418) and your HR Business Partner immediately. This communication will be treated as confidential.

Source: CDC COVID-19 Symptoms <https://www.cdc.gov/coronavirus/2019-ncov/about/symptoms.html>

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2.3. COVID-19 Self-Quarantine and Return to Work Process

- The SVP, Director of Corporate EHS and/or the Director, Corporate EHS and Compliance will facilitate a self-quarantine and return to work process for employees that have been impacted by the COVID-19. Employees will be placed into one of three categories based on their exposure to the pandemic.
 - **Category 1:** Employee reporting symptoms and/or receives negative test result of COVID-19.
 - **Category 2:** Employee suspects exposure to COVID-19 but does not develop symptoms.
 - **Category 3:** Employee receives a positive test for COVID-19.
- No matter the category all employees shall notify a member of the Corporate EHS Team regarding the development of symptoms, suspected exposure or positive test. Upon notification to the Corporate EHS Team will notify HR and work the employees Supervisor/Project Manager to make appropriate client notifications.
- Employees of each category will be required to quarantine for the appropriate amount of time based on the medical opinion of a third-party medical provider and the best available guidance from government agencies such the Center for Disease Control (CDC).
- Prior to returning to work after a quarantine has been issued to an employee, the employee shall receive a medical clearance from his/her third-party medical provider and provide a copy the Corporate EHS Team. Examples for each category are listed here:
 - **Category 1:** Employee must receive clearance to return to work from third party medical provider (WorkCare is an option for employees).
 - **Category 2:** Employee can return work following quarantine period of 14 days provided they remain symptom free. Telephonic healthcare provider such as WorkCare may be optional.
 - **Category 3:** Recovered employee, must be symptom free without medication for at least 72 hours and at least 10 days from initial symptoms, provides Safety and HR clearance from third party medical provider prior to returning to work.

	TRC HEALTH AND SAFETY MANAGEMENT SYSTEM		EHS Policy
	DOCUMENT TITLE: COVID-19 Guidelines for Field Activities		Management System Procedures
	DOCUMENT NUMBER: CP052.1	Revision Number: 6	Compliance Programs
	APPROVED BY: Mike Glenn	Page 6 of 6	Forms, Checklists, Permits, etc.

2.4. Transmission

COVID-19 can be spread from person to person through droplets caused by an infected person coughing, sneezing or talking and can be spread by an infected person for several days before their symptoms appear.

2.5. Precautions

- Wear face coverings in settings where social distancing measure are difficult to maintain.
- Practice Social Distancing
 - Practice social distancing by avoiding large gatherings and maintaining distance (approximately 6 feet) from others when possible.
 - Do not share eating or drinking utensils, avoid close conversation, and other direct physical contact like hand shaking. “Close contact” does not include activities such as walking by a person or briefly sitting across an office.
- Hand Hygiene
 - According to the CDC, washing hands with soap and water is the best way to get rid of germs in most situations. If soap and water are not readily available, you can use an alcohol-based hand sanitizer that contains at least 60% alcohol. You can tell if the sanitizer contains at least 60% alcohol by looking at the product label.
- Practice good respiratory hygiene – covering mouth and nose when coughing or sneezing, using tissues and disposing of them correctly.
- Obtain immunizations recommended by healthcare providers to help avoid disease.
- Early self-isolation of those feeling unwell, feverish and having other symptoms of flu.
- Avoiding touching your eyes, nose or mouth.
- Frequently disinfect all areas that are likely to have frequent hand contact (like doorknobs, faucets, handrails).

2.6. Client Meetings/Interactions

Be aware of any restrictions or requirements that clients have in place regarding visiting client facilities or attending meetings. Verify with supervisor/project managers prior to visiting client facilities or meetings in person.

	TRC HEALTH AND SAFETY MANAGEMENT SYSTEM		EHS Policy Management System Procedures Compliance Programs Forms, Checklists, Permits, etc.
	DOCUMENT TITLE: COVID-19 Questionnaire for Onsite Workers		
	DOCUMENT NUMBER: CP052.2	Revision Number: 2	
	APPROVED BY: Mike Glenn	Page 1 of 1	

The safety of our employees and their families, subcontractors, clients, and visitors is TRC's highest priority. As the COVID-19 pandemic continues to evolve and spread, TRC will continue to monitor the CDC, WHO, and local agencies in order to provide up-to-date information to protect all of those in our community.

To prevent the spread of COVID-19 and reduce the potential risk of exposure to our employees, subcontractors, and visitors, we request all personnel involved with on-site project-related work complete this assessment questionnaire. This questionnaire will be completed upon arrival to the jobsite and prior to conducting any job-related tasks. Your participation is important to help us take precautionary measures to protect you and everyone on our team.

Date: _____

Name: _____

Company/Organization: _____

Email Address: _____

Phone Number: _____

Project Name: _____

- Do you have signs of a fever or measured temperature above 100.4°F or greater, a dry cough, tiredness, or trouble breathing within the past 72 hours?
☐ Yes ☐ No
- Have you had "close contact" with an individual diagnosed with COVID-19? "Close contact" means living in the same household as a person who has tested positive for COVID-19, caring for a person who has tested positive for COVID-19, being within 6 feet of a person who has tested positive for COVID-19 for 15 minutes or more, or coming in direct contact with secretions (for example, sharing utensils or being coughed on) from a person who has tested positive for COVID-19 while the person was symptomatic.
☐ Yes ☐ No
- Have you, or anyone inside your residence been exposed to someone else who is currently being quarantined by a doctor or a local public health official?
☐ Yes ☐ No

Be aware that your client may have additional requirements as well. Please consult the [COVID-19 Client Documents](#) on TRCNet to review your client's guidance. Only personnel who answer "No" to all questions listed above will be granted site access. **Copies of completed questionnaires are to be maintained onsite with the HASP and project documents. If the answer is "Yes" to question 1, please contact your Supervisor, Office Practice Leader/OPL, Mike Glenn, and your HR Business Partner.**

ATTACHMENT M

BNSF ENVIRONMENTAL SAFETY AND JOB BRIEFING TEMPLATE



MY SAFETY ↔ MY LIFE ↔ MY RESPONSIBILITY

ENVIRONMENTAL DEPARTMENT / JOB SAFETY BRIEFING

(DATE/LOCATION/MANAGER): JOHN MICHAEL LEASE (JML) SITE

WORK PLANNED FOR TODAY (NEW BRIEFING REQUIRED DAILY – REBRIEFING REQUIRED WHEN RISKS/CONDITIONS CHANGE): _____

☐ **Stop Work Authority:** You have obligation and authority to report an unsafe situation to the Safety Officer / Project Manager

Weather:

Temperature (F):	Wind Speed / Gusts:	Wind Direction:
Conditions (current/predicted):	Humidity:	

IS THERE AN APPLICABLE JSA TO BE REVIEWED:

YES, see HASP

EXPOSURES: Which of the five EXPOSURES are present for the work to be performed? How do we control/mitigate the RISKS to the EXPOSURES?

1. LIFE SAVING PROCESSES – Confirm location of life-saving resources and key assignments on the table below. Identify the greatest risk(s) to life in planned work and method of mitigating risk(s) in lines below. Capture additional notes on back of form.

Closest Hospital Name/Address/Phone: Cascade Medical Center Emergency Room 817 Commercial St, Leavenworth, WA, 98826		Work Site Address: Right-of-way adjacent to 5640 Sunset Highway Cashmere, Washington, 98815	
Emergency Meeting Location/Evacuation Route:			
Location of Emergency Equipment:	First Aid Kit: TRC vehicle	Fire Extinguisher: TRC vehicle	Eye Wash: TRC vehicle
Assignments:	CPR:	First Aid:	Call 911:

RISKS/MITIGATION: _____

2. WALKING/PATH OF TRAVEL – Review primary path(s) of travel for planned work. Identify any risks along the path(s) of travel (e.g. rail, ties, loose gravel, steep slopes, and heavy veg.) and method to avoid or mitigate risk(s) noted in lines below. Capture additional notes on back of form.

RISKS/MITIGATION:

3. Line of Fire/Release of Energy – Review work area for potential Line(s) of Fire/Release of Energy. Identify position(s) or location(s) to avoid being hit, cut/struck, or sprayed if something shifts, moves, releases, or travels unexpectedly. Capture additional notes on back of form.

RISKS/MITIGATION:

4. PINCH POINTS – Review work area for potential pinch point(s). Identify methods of mitigating risk(s) in lines below. Capture additional notes on back of form.

RISKS/MITIGATION:

5. ASCENDING/DESCENDING – Review work area for potential areas of ascending or descending, paying particular attention to ladders, steps, and steep slopes. Identify methods of mitigating risk(s) in lines below. Capture additional notes on back of form.

RISKS/MITIGATION:

REBRIEFING REQUIRED – Identify circumstances requiring a rebriefing:

CIRCUMSTANCES:

ADDITIONAL REFERENCES/POTENTIALLY REQUIRED BRIEFINGS

☐ Permit Programs (Confined Space, Hot Work)	☐ Clearance Zones (overhead lines, water bodies, utility clearance, overhead work)
☐ On track safety & expecting locomotive/car movement at any time (see below)**	☐ Hazardous Energy Control Program
☐ Fall Protection / Elevated Work	☐ Vehicle Safety / Traffic Patterns
☐ Chemical Handling/Transfer	☐ Spill Response
☐ Chemical / Other Exposure Safety	☐ Task Specific PPE
☐ Adjacent work activity	☐ Walking & Working Surfaces / Slips, Trips, Falls
☐ Unsafe behaviors	☐ Approaching Others / Behavior Based Safety
☐ Tools / Equipment	☐ Other



MY SAFETY ↔ MY LIFE ↔ MY RESPONSIBILITY

****IF "ON TRACK SAFETY" WAS CHECKED ABOVE PLEASE COMPLETE BELOW:**

Type of track:	☐ Controlled	☐ Non-Controlled	Track Speed:	Confirm Type of Protection (BLUE or RED) with Roadmaster:
Working Limits:	Track Number(s):		Track Limits: _____ to _____	Time Limits: _____ to _____
Adjacent Track Protection:	☐ YES	☐ NO	Track Limits: _____ to _____	Time Limits: _____ to _____
Employee In Charge (EIC):	Name:			Cell Phone:

FLAGMEN OR LOOKOUT (MUST SERVE NO OTHER WORK ROLE): _____

TRAIN APPROACH WARNING: _____

CLEARING TIME/SIGHT DISTANCE: _____

EVACUATION AREA: _____

Additional Personal Protective Equipment (PPE)

PPE required for job:	☐ Level A	☐ Level B	☐ Level C	☐ Level D
☐ SCBA	☐ Supplied Air Respirator	☐ Air Purifying Respirator FF (Cartridge type):		
☐ Fully-Encapsulated Suit	☐ Coverall (type):	☐ Air Purifying Respirator HF (Cartridge type):		
☐ Boots:	☐ Ear Plugs	☐ Glove (Inner):	☐ Safety Glasses	
☐ Boot Covers	☐ Ear Muffs	☐ Glove (Outer):	☐ Chemical Goggles	
☐ FRC/Bunker Gear	☐ PFD	☐ Hard Hat	☐ Face Shield	
☐ Com. Device:	☐ Traffic Cones/Signs	☐ Reflective Vest	☐ Tension Straps/Tie-Down/Tarp	
☐ Bonding and Grounding	☐ LOTO	☐ Chem-Resistant Apron	☐ MSDS	
☐ Harness/Lanyard	☐ GFCI	☐ Barrier Cream	☐ Eye Wash	
☐ Evacuation Plan	☐ Ventilation:	☐ Decon Station/Response Zones established and clearly identified		

DEBRIEFING NOTES – What went well today? What do we need to improve or change?

CONCERNS TO BE ADDRESSED – Who will address the concerns raised and by when?

--

Reminder: As conditions change, be certain to rebrief with all workgroups

Led by: _____

Attendees Initials Below:

ATTACHMENT N

BNSF UNDERGROUND CABLE LOCATION AND ACKNOWLEDGEMENT FORM

BNSF Railway
Underground Cable Location & Acknowledge

Date: _____

Project: _____

Meeting Location: _____

Time: _____

Attendees at proposed work-site (Signature of representative)

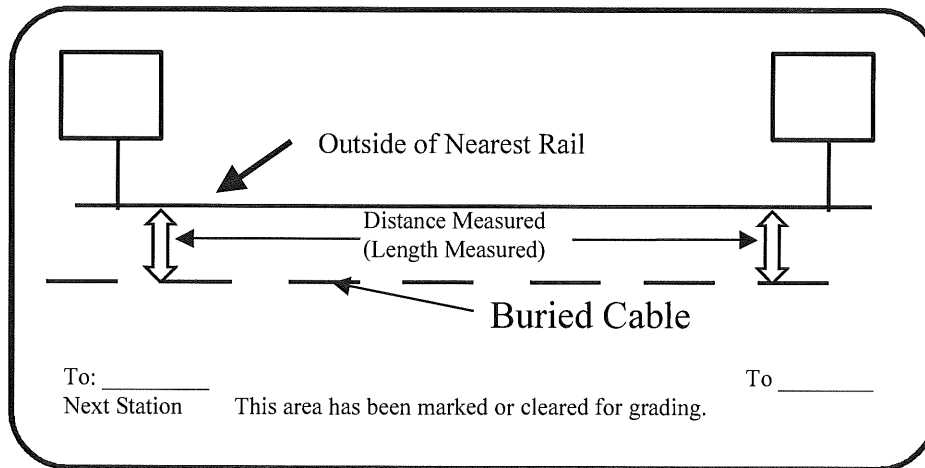
☐ BNSF Signal _____

☐ Grading Contractor _____

☐ Project Inspector _____

☐ Flag person on duty _____

No grading will be permitted in this area without this completed form in the possession of the above.



Notes:

All signal cables must be marked with paint and flags (as ground conditions permit) prior to any grading.

Attachment B
TRC Standard Operating Procedure 003
Soil Sampling

Title: Soil Sampling		Procedure Number: ECR 003	
		Revision Number: 02	
		Effective Date: January 2020	
Authorization Signatures			
			
Technical Reviewer Darby Litz	Date 1/1/20	Environmental Sector Quality Director Elizabeth Denly	Date 1/1/20

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LIST OF ATTACHMENTS

Attachment A	Procedure for Collection of Samples for VOCs, VPH, or GRO (SW-846 Method 5035A)
Attachment B	Shipping Methanol-preserved Samples
Attachment C	SOP Fact Sheet
Attachment D	SOP Modifications for PFAS

1.0 INTRODUCTION

1.1 Scope and Applicability

This Standard Operating Procedure (SOP) was prepared to direct TRC personnel in the logistics, collection techniques, and documentation requirements for collecting representative soil samples. These are standard (i.e., typically applicable) operating procedures that may be changed, as required, dependent upon site conditions, equipment limitations, or limitations imposed by the procedure. In addition, other state or federal requirements may be above and beyond the scope of this SOP and will be followed, if applicable. In all instances, the actual procedures used should be documented and described in the field notes. Portions of this SOP may be applicable to soil sample collection for geotechnical analysis. However, specific instructions for collection of geotechnical samples are not provided; these samples should be collected in accordance with ASTM methods or other applicable standards.

1.2 Summary of Method

The objective of soil sampling is to obtain a representative sample of soil for laboratory analysis of constituents of interest at a given site. This objective requires that the sample be of sufficient quantity and quality for analysis by the selected analytical method. For specialized sampling programs involving per- and polyfluorinated alkyl substances (PFAS), refer to Attachment D for further details. Soil samples may be collected using a variety of methods and equipment depending on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be sampled using a spade, trowel, and/or scoop. Sampling at greater depths typically is performed using a hand auger, continuous flight auger, a split-spoon, direct-push methods (i.e., Geoprobe®), sonic drilling, a backhoe or an excavator. The following reference may be used as a guide to aid in selecting an appropriate method or sampling device for the collection of subsurface soil samples with a drill rig: ASTM D6169–98 Standard Guide for Selection of Soil and Rock Sampling Devices Used With Drill Rigs for Environmental Investigation.

1.3 Equipment

The following equipment may be utilized when collecting soil samples. Project-specific conditions or laboratory requirements may warrant the addition or deletion of items from this list.

- Appropriate level of personal protective equipment (PPE), as specified in the site-specific Health and Safety Plan (HASp).
- Sample containers (may be supplied by the laboratory, depending upon the regulatory program): The proper containers should be determined in conjunction with the analytical laboratory in the planning stages of the project.

For non-volatile organic compound (VOC) parameters, glass containers with Teflon®-lined caps are typically utilized. Typical containers used for VOC parameters are provided in Attachment A. Brass liners, steel liners, or soil core acetate liners with Teflon® tape and plastic end caps may also be used.

- En-Core® samplers.

- Disposable plastic syringes or Terra Core™ samplers.
- Stainless steel mixing bowl.
- Stainless steel spoon or spatula.
- Hand auger, mud auger, sand auger, bucket auger and T-handle.
- Post hole auger.
- Extension rods.
- Stainless steel trowel.
- Shovel.
- Tape measure, folding ruler.
- Wooden stakes and spray paint, plastic flagging (highly visible), or steel pin flags.
- Field book and/or boring log.
- Sample container labels.
- Chain-of-custody (COC) forms (TRC or laboratory, as appropriate).
- Camera.
- Maps/site plan.
- Survey equipment and/or global positioning system (GPS) and/or other means of measuring sample locations.
- Indelible marking pens or markers.
- Organic absorbent (e.g., Slickwick, ground corn cob, sawdust).
- Sample coolers.
- Bubble wrap.
- Ice (for sample storage/preservation).
- Zip-loc® plastic bags (for ice and COCs).
- Equipment decontamination supplies.

1.4 Definitions

Composite sample	Composed of a number of grab samples collected over a period of time or space during a single sampling event and mixed together.
En-Core® sampler	A disposable volumetric sampling device with an airtight sealing cap.
Grab sample	Individual discrete sample collected at a particular time.

High-level VOC analysis	VOC soil analysis that yields high reporting limits (approximately 50-200 µg/kg, depending on the laboratory). Samples are typically preserved in methanol and cooled to 4°C. High-level VOC analyses are used for samples that are expected to contain elevated concentrations of VOCs (>200 µg/kg).
Low-level VOC analysis	VOC soil analysis that yields low reporting limits (approximately 5 µg/kg, depending on the laboratory). Samples are typically preserved in water, cooled to 4°C, and frozen within 48 hours of collection. Low-level VOC analyses are used for samples that are expected to contain lower concentrations of VOCs (≤200 µg/kg).
Terra Core™ sampler	A disposable volumetric sampling device used to transfer soil samples to the appropriate sample containers.

1.5 Health & Safety Considerations

TRC personnel will be on site when implementing this SOP. Therefore, TRC personnel shall follow the site-specific HASP. TRC personnel will use the appropriate level of PPE, as defined in the HASP.

Soil samples containing chemical contaminants may be handled during implementation of this SOP. Additionally, sample preservatives including caustics and/or acids may be considered hazardous materials and TRC employees will appropriately handle and store them at all times. Address chemicals that pose specific toxicity or safety concerns and follow any other relevant requirements, as appropriate. Hazardous substances may be incompatible or may react to produce heat, chemical reactions, or toxic products. Hazardous substances may be incompatible with clothing or equipment; some substances can permeate or degrade protective clothing or equipment. Also, hazardous substances may pose a direct health hazard to workers through inhalation or skin contact or if exposed to heat/flame and they combust. Material safety data sheets for chemicals handled by TRC should be maintained in the field.

1.6 Cautions and Potential Problems

- Cross contamination: Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary.
- Improper sample collection: Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample, or inadequate homogenization of the samples where required, resulting in variable, non-representative results.
- Special considerations for the different soil sampling techniques are provided below in the applicable sections. Cautions and potential problems associated with soil sampling for VOCs are provided in Attachment A.

- Special care should be taken when sampling for PFAS. Please refer to Attachment D for details.

1.7 Personnel Qualifications

Since this SOP will be implemented at sites or in work areas that entail potential exposure to toxic chemicals or hazardous environments, all TRC personnel must be adequately trained. Project and client-specific training requirements for samplers and other personnel on site should be developed in project planning documents, such as the sampling plan or project work plan. These requirements may include:

- OSHA 40-hour Health and Safety Training for Hazardous Waste Operations and Emergency Response (HAZWOPER) workers
- 8-hour annual HAZWOPER refresher training

2.0 PROCEDURES

Always review the site-specific work plan and/or scope of work for any site-specific sampling procedures.

2.1 Pre-Sampling Activities

Pre-sampling activities that the sampling team should consider include the following: preparing a sampling strategy; reviewing the work plan approved by the regulatory agency; selecting a laboratory, and determining laboratory-specific procedures related to bottle orders, holding times, work orders, methods of analysis, COC procedures, data deliverables, schedule, and cost. Additional activities include determining shipping logistics, utility clearance, and handling of investigation-derived waste disposal. Pre-labeling bottles can help to reduce sampling and labeling errors.

The following steps should also be employed.

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.
2. Obtain necessary sampling and monitoring equipment.
3. Decontaminate or clean equipment, and ensure that it is in working order.
4. Prepare schedules and coordinate with staff, client, and regulatory agencies, if appropriate.
5. Perform a general site survey prior to site entry in accordance with the site-specific HASP.
6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site factors, including extent and nature of contaminants, should be considered when selecting sample locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.

NOTE: If spray paint is used to mark stakes, the spray paint should be carefully isolated from the space used to hold sample bottles, sampling equipment, etc.

7. Prior to any subsurface soil sampling, especially that completed with a drill rig or backhoe, it is important to ensure that all sampling locations are clear of overhead and buried utilities by conducting a utility survey/markout.

2.2 General Soil Sampling Procedures

1. Refer to other TRC SOPs for the proper procedures for classifying soil samples and for screening of samples for VOCs. Special care is required when sampling for PFAS. Please refer to Attachment D for details.
2. **For sampling in the State of California only:** When the sampling interval is predetermined and soil samples are collected by direct-push methods into an acetate liner, the section of the liner corresponding to the predetermined depth interval may be cut off and submitted to the laboratory for analysis with the exception of samples for VOC, volatile petroleum hydrocarbon (VPH), or gasoline-range organics (GRO) analysis. If VOC, VPH, or GRO analysis is required, then these samples can be collected from either open end of the acetate liner section according to the procedures outlined in Attachment A prior to packaging and submitting it to the laboratory. The laboratory should be consulted for the required length of liner tube (i.e., sample volume) depending on the analytical suite and to ensure that the use of acetate liners is appropriate for the analytical method(s). After collecting material for the VOC, VPH, or GRO analysis samples (if required), seal each end of the acetate liner section with Teflon tape and plastic end caps. Wrap the ends with non-volatile tape and label the acetate liner with the sample identification (ID) and date and time of collection. Ensure that the laboratory will perform homogenization of the soil sample within the acetate liner and proceed to Step #9.
3. Prior to the collection of soil samples from a particular location or depth, the soil is typically screened for organic vapors with a portable meter equipped with a flame ionization detector (FID) and/or photoionization detector (PID) depending upon the suspected contaminants of concern and site-specific work plan requirements. Such organic vapor screening may be used to determine appropriate soil sample locations or depths for laboratory VOC analysis depending upon established site-specific work plan requirements. Soil should be screened *in situ* or immediately upon retrieval of the soil sample from the subsurface.
4. Samples for VOC, VPH or GRO analysis are then collected as soon as possible after the soil has been exposed to the atmosphere and prior to sample collection for other analyses.
 - o **These samples are NOT homogenized.**
 - o These samples are generally collected using an open-barrel disposable syringe, a Terra Core™ sampler, or an En-Core® sampler, or equivalent. Note that En-Core® samplers are not recommended for non-cohesive soils (see Attachment A).
 - o Refer to the site-specific work plan or governing regulatory authority for preservation requirements for VOC, VPH or GRO analysis. Attachment A of this SOP includes typical procedures on the collection and preservation of soil samples for VOC, VPH and GRO analysis.

5. After collecting the sample for VOC analysis, the sample portion for the remaining analysis should be well homogenized, *in situ* (if possible, such as with surface soil sampling), or in a decontaminated stainless steel bowl or disposable new aluminum pie pan. These soil samples must be thoroughly mixed to ensure that the sample is as representative as possible of the sample media. Soil can be homogenized and transferred to sample containers using soil sampling devices that have been decontaminated prior to use or individually wrapped, sterile, new polystyrene devices. Such sterile, polystyrene devices are generally for one-time use. Stainless steel devices may be decontaminated and individually foil wrapped, plastic bagged, or field decontaminated and foil wrapped between uses. Decontamination of sampling equipment shall be conducted in accordance with TRC's SOP on equipment decontamination.
6. Stones, gravel, or vegetation should be removed from the soil sample as much as practical prior to placement in sample containers, since these materials will not be analyzed. Visible asphalt, concrete, ash, slag, and coal debris should also be removed from the sample as much as possible to ensure sufficient soil quantity for laboratory analyses, unless these matrices are part of the overall characterization program. The soil sample must be representative of what the end user is trying to characterize. In addition, if such debris is to be tested, further sample preparation (e.g., pulverizing) will likely be necessary in the field or laboratory. In any case, the presence of any such materials in the soil at the sample location must be documented in the field book.
7. Filling of the sample bottles should be completed immediately after sample collection to minimize losses due to volatilization and biodegradation. Soil classification can be completed following sample collection.
8. Place the sample into an appropriate, labeled container(s) by using the alternate shoveling method and secure the cap(s) tightly. The alternate shoveling method involves placing a spoonful of soil in each container in sequence and repeating until the containers are full or the sample volume has been exhausted. Threads on the container and lid should be cleaned to ensure a tight seal when closed.
9. Restore the sampling location to grade in accordance with applicable state or federal guidelines and/or the site-specific work plan. Options include backfilling the sample location with the remaining removed soil, bentonite pellets or, cement/bentonite grout depending on site conditions and patching the surface to match the surrounding area (e.g., topsoil with grass seed, asphalt or concrete patch), as necessary. Boreholes must be abandoned or backfilled after the completion of sampling. In general, shallow boreholes (e.g., less than 10 feet deep) that remain open and do not approach the water table may be abandoned by pouring a cement/bentonite grout mixture from the surface or pouring bentonite pellets from the surface and hydrating the pellets in lifts. The grout mixture should be based on site-specific conditions (e.g., boring depth, groundwater depth, and formation permeability), site-specific work plan procedures, and local regulatory requirements. Boreholes where bridging of the bentonite may be an issue, such as boreholes that intercept groundwater or are greater than approximately 10 feet in depth, should be backfilled by pressure grouting with a cement/bentonite grout mixture, either through a re-entry tool string or through a tremie pipe introduced to within several feet of the borehole bottom.

10. Record locations of soil borings/samples in the field book by sketching a map and/or providing a description of the location. Always measure and record distances to fixed landmarks, such as buildings, fences, curbs, existing surveyed wells, etc. Additionally, a GPS unit with real-time sub-meter accuracy (not applicable for interior samples or other site conditions such as heavy tree/brush cover and thick cloud cover that limit unit connection with satellites) could be used to document sample locations. Note observations about elevation changes between sample locations.

2.2.1 Surface Soil Sampling Methods

The depth of surface soil samples will be determined on a site-specific basis and may be influenced by site-specific conditions and/or applicable local, state, or federal regulatory programs and potential exposure pathways. Surface soils are generally classified as soils between the ground surface and 6 to 12 inches below ground surface (bgs). The most common interval is 0 to 6 inches; however, the data quality objectives of the investigation may dictate another interval, such as 0 to 3 inches for risk assessment purposes.

The following procedure should be used for surface soil sampling:

1. If a thick, matted root zone, leaf layer, gravel, surface debris, concrete, etc. is present at or near the surface, it should be carefully removed using clean decontaminated tools or clean nitrile gloves before the soil sample is collected. The presence and thickness of any such material should be recorded in the field book for each location. The depth measurement for the soil sample begins at the top of the soil horizon, immediately following any such removed materials.
2. A decontaminated stainless steel spoon, scoop or trowel is typically used for surface soil sampling depths from 0 to 12 inches bgs where conditions are generally soft, and there is no problematic vegetative layer to penetrate. A hand auger or shovel may also be used to dig down to the desired depth and then after careful removal of the dug soils from the hole, a decontaminated stainless steel spoon, scoop or trowel is used to collect the soil sample from the bottom of the hole for laboratory chemical analysis. Plated trowels typically available from garden supply centers should not be used due to potential heavy metal impacts from the trowel plating.
3. When using stainless steel spoons or trowels, consideration must be given to the procedure used to collect a soil sample for VOC analysis. Samples for VOC, VPH or GRO analysis must be collected first and never homogenized or composited. These samples are collected using an open-barrel disposable syringe, a Terra Core™ sampler, or an En-Core® sampler, or equivalent. If the soil being sampled is cohesive and holds its *in situ* texture in the spoon or trowel, the En-Core® sampler or disposable syringe used to collect the sub-sample should be plugged directly from the spoon or trowel. However, if the soil is not cohesive and crumbles when removed from the ground surface for sampling, the sub-sample should be plugged directly from the surface of the appropriate sample depth. Additionally, note that En-Core® samplers are not recommended for non-cohesive soils (see Attachment A). Generally, the sample portion for VOC analysis is collected from several inches below grade to minimize volatilization from the *in situ* soil.
4. Continue by following the General Soil Sampling Procedures in Section 2.2.

2.2.2 Hand Auger Sampling Methods

The shallow subsurface interval may be considered to extend from approximately 12 inches bgs to a site-specific depth at which sample collection using manual collection with a spoon or trowel becomes difficult or impractical. Hand augers may be used to advance boreholes and collect soil samples in shallow subsurface intervals. Often, 4-inch diameter stainless steel auger buckets with cutting heads are used. The auger is advanced by simultaneously pushing and turning using an attached T-handle with extensions (if needed).

Auger holes are advanced one bucket at a time until the appropriate sample depth is achieved. When the sample depth is reached, the bucket used to advance the hole is removed and decontaminated or a clean bucket is attached. The clean auger bucket is then placed in the hole and filled with soil to make up the sample and then carefully removed. The practical depth of investigation using a hand auger largely depends upon the soil properties and depth of investigation. In sand, augering is typically easy to perform, but the depth of collection is limited to the depth at which the sand begins to flow or collapse. The use of hand augers may be of limited use in soils containing large amounts of unnatural fill (e.g., brick, slag, concrete), coarse gravel and cobbles (or larger grain size), and in tight clays or cemented sands. In these soil types, it becomes more difficult to recover a sample due to increased friction and torqueing of the hand auger extensions as the depth increases. At some point, these problems become so severe that alternate methods (i.e., power equipment) must be used.

The following procedure is used for collecting soil samples with the hand auger:

1. Attach the auger head to a drill rod extension and attach the T-handle to the rod.
2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first several inches of surface soil and any root layer for an area approximately 6 inches in radius around the borehole location.
3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the borehole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding rod extensions. It also facilitates refilling the borehole and avoids possible contamination of the surrounding area.
4. When the sample depth is reached, remove the bucket used to advance the borehole and attach a decontaminated or clean bucket. Place the clean auger bucket in the borehole, advance the clean auger bucket to fill it with the soil sample and then carefully remove the clean auger bucket.
5. If VOC analysis is to be performed, collect a sample directly at the bottom of the boring, if within reach, and not from the auger bucket. If not within reach, collect the sample directly from the auger bucket or from minimally disturbed material immediately after the auger bucket is emptied. Use an En-Core® sampler or other coring device (i.e., syringe, Terra Core™) to collect the sub-sample as described in Attachment A. Note: some regulatory agencies do not allow for subsurface VOC sample collection directly with a hand auger; refer to the site-specific work plan and regulatory requirements to ensure the collection of VOC samples with a hand auger is appropriate.

6. Continue by following the General Soil Sampling Procedures in Section 2.2. Note that if another sample is to be collected in the same borehole, but at a greater depth, reattach the auger bucket to the rod assembly, and follow steps 1 through 5 above, making sure to decontaminate the sampling device between samples.

Special Considerations for Hand Auger Sampling

- *Utility Clearance* - Prior to any subsurface soil sampling, it is important to ensure that all sampling locations are clear of overhead and buried utilities through the conduct of a utility survey/markout. Locations on private properties should also be reviewed with the owner prior to installation.
- *Slough* - Because of the tendency for the auger bucket to scrape material from the sides of the auger hole while being extracted, the top several inches of soil in the auger bucket should be discarded prior to placing the bucket contents in the homogenization container for processing.
- *VOC Sample Collection* - Observe precautions for VOC sample collection found in Attachment A and/or the site-specific work plan.
- *Decontamination* - If sampling equipment is to be reused at a new sampling location or at a deeper depth in the same location, proper decontamination of sampling equipment is required.

2.2.3 Direct-Push Sampling Methods

Direct-push sampling methods are used primarily to collect shallow and deep subsurface soil samples. Soil sampling probes may range from simple hand tools to truck-mounted or track-mounted hydraulically operated rigs. The basic concept is the same for all of these samplers: the tool is hydraulically driven into the soil, filling the tube, and then the tool is withdrawn. All of the sampling tools involve the collection and retrieval of the soil sample within a thin-walled liner. The following sections describe two specific sampling methods using direct-push techniques, along with details specific to each method.

- *Macro-Core® Sampler (Direct-push)* - The Macro-Core® (MC®) sampler is a solid barrel, direct-push sampler equipped with a piston-rod point assembly used primarily for collection of either continuous or depth-discrete subsurface soil samples. Although other lengths are available, the standard MC® sampler has an assembled length of approximately 52 inches (1321 mm) with an outside diameter (OD) of 2.2 inches (56 mm). The MC® sampler is capable of recovering a discrete sample core 45 inches x 1.5 inches (1143 mm x 38 mm) contained inside a removable liner. The resultant sample volume is a maximum of 1300 mL. The MC® sampler may be used in either an open-tube or closed-point configuration.
- *Dual-tube Soil Sampling System (Direct-push)* - The Dual-tube 21 soil sampling system is a direct-push system for collecting continuous core samples of unconsolidated materials from within a sealed outer casing of 2.125-inch (54 mm) OD probe rod. The samples are collected within a liner that is threaded onto the leading end of a string of 1.0-inch diameter probe rod. Collected samples have a volume of up to 800 mL in the form of a 1.125-inch x 48-inch (29 mm x 1219 mm) core. Use of this method allows for collection of a continuous core inside a cased hole, minimizing or preventing cross contamination between different intervals during sample collection. The outer casing is advanced, one core length at a time, with only the inner probe rod and core being removed and replaced between samples. If the sampling zone of

interest begins at some depth below ground surface, a solid drive tip must be used to drive the dual-tube assembly and core to its initial sample depth.

The following procedure is used for collecting soil samples from direct-push soil cores:

1. The driller will advance and extract the soil sampler liner which will then be given to the field sampler - confirm with the driller which end is top and which end is bottom. Record the time of core collection (military time), the soil boring ID and the depth interval in feet bgs in the field book.
2. Measurement of vertical depth should start from the top of soil; surface asphalt, surficial concrete slabs, or gravel sub-base should be excluded from the depth measurement unless otherwise specified in the site-specific work plan. However, the presence and thickness of these items should be noted in the field book.
3. Measure the length of recovered soil in inches and record in the field book.
4. Continue by following the General Soil Sampling Procedures in Section 2.2.

If a specific depth interval is targeted for sampling, be sure to give consideration to the percent recovery of soil when selecting the sample interval. For example, if the targeted sample interval was from 2.0 to 2.5-ft, and the core barrel was advanced from 0 to 4 ft bgs, and 30 inches (2.5 ft) of soil was recovered, the sample should be collected immediately below the mid-point of the recovered soil, or 15- inches below the top of the recovered soil (not including slough). The sample designation will indicate that the depth was 2.0 to 2.5 ft bgs.

Special Considerations for Direct-push Sampling

- *Utility Clearance* - Prior to any subsurface soil sampling, especially that completed with a drill rig, it is important to ensure that all sampling locations are clear of overhead and buried utilities through the conduct of a utility survey/markout. Locations on private properties should also be reviewed with the owner prior to installation.
- *Liner Use and Material Selection* - Direct-push soil samples are collected within a dedicated new or decontaminated liner to facilitate removal of sample material from the sample barrel. The liners may only be available in a limited number of materials for a given sample tool, although overall, liners are available in brass, stainless steel, cellulose acetate butyrate (CAB), polyethylene terephthalate glycol (PETG), polyvinyl chloride (PVC) and Teflon®. For most investigations, the standard disposable new polymer liner material for a sampling tool will be acceptable. When the study objectives require very low reporting levels or unusual contaminants of concern, the use of more inert liner materials such as Teflon® or stainless steel may be necessary. However, such costly liner materials typically are not disposable and therefore require decontamination between each use.
- *Sample Orientation* - When the liners and associated sample are removed from the sample tubes, it is important to confirm and maintain the proper orientation of the sample. This is particularly important when multiple sample depths are collected from the same push. It is also important to maintain proper orientation to define precisely the depth at which an aliquot was collected. Maintaining proper orientation is typically accomplished using vinyl end caps.

Convention is to place red caps on the top of the liner and black caps on the bottom to maintain proper sample orientation. Orientation can also be indicated by marking on the exterior of the liner with a permanent marker.

- *Core Catchers* - Occasionally the material being sampled lacks cohesiveness and is subject to crumbling and falling out of the sample liner. In such cases, the use of core catchers on the leading end of the sampler may help retain the soil until it is retrieved to the surface. Core catchers may only be available in specific materials and should be evaluated for suitability. However, given the limited sample contact that core catchers have with the sample material, most standard core catchers available for a tool system will be acceptable.
- *VOC Sample Collection* - Observe precautions for VOC sample collection found in Attachment A and/or the site-specific work plan.
- *Decontamination* - The cutting shoe and piston rod point are to be decontaminated between each sample. Within a borehole, the sample barrel, rods, and drive head may be subjected to an abbreviated cleaning to remove obvious and loose material, but must be cleaned between boreholes, such as with high-pressure water or steam.

2.2.4 Split-spoon Sampling Methods

All split-spoon samplers, regardless of size, are basically split cylindrical barrels that are threaded on each end. The leading end is held together with a beveled threaded collar that functions as a cutting shoe. The other end is held together with a threaded collar that serves as the stub used to attach the spoon to a string of drill rod.

- *Standard Split Spoon* - A drill rig auger is used to advance a borehole to the target depth. The drill auger string is then removed and a standard split spoon is attached to a string of drill rod. Split spoons used for soil sampling must be constructed of stainless steel and are typically 2.0- inches OD (1.5-inches inside diameter) and 18- inches to 24- inches in length. Other diameters and lengths are common and may be used if constructed of the proper material. After the spoon is attached to the string of drill rod, it is lowered into the borehole. The safety hammer is then used to drive the split spoon into the soil at the bottom of the borehole. After the split spoon has been driven into the soil, filling the spoon, it is retrieved to the surface, where it is removed from the drill rod string and opened for sample acquisition. Split-spoon soil sampling for geotechnical purposes should be conducted in accordance with ASTM Method D1586 *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soil*.

The following procedure is used for collecting soil samples from split-spoon soil cores:

1. Record the blow count per 6-inch interval when advancing split-spoon samplers with the hollow stem auger rig. Record the hammer weight (e.g., 140 pounds [lb] is standard, but 300 lb may also be used to advance the spoon). Blow counts are an indication of soil density and are a measure of the number of blows it takes for a 140 lb slide hammer falling over a distance of 30- inches to penetrate 6- inches of soil. The drillers will keep the count and will repeat them to the field sampler (e.g., 11, 13, 16 – means the number of blows the hammer advanced the spoon every 6 inches over a total depth interval of the split-spoon sampler, in this case over 18 inches). If refusal is encountered, the count is recorded in the book as “# of hammer blows / depth in inches the spoon is driven” (e.g., 50/3 – means 50 blows of the hammer advanced the spoon 3 inches).

2. The driller will advance, extract, and open the split spoon, which will then be given to the field sampler - confirm with the driller which end is top and which end is bottom, if a soil sampler liner is used and removed from the spoon. Record the time of core collection (military time), the soil boring ID and the depth interval in feet bgs in the field book.
3. Measurement of vertical depth should start from the top of soil; surface asphalt, surficial concrete slabs or gravel sub-base should be excluded from the depth measurement unless otherwise specified in the site-specific work plan. However, the presence and thickness of these items should be noted in the field book.
4. Measure the length of recovered soil in inches and record in the field book.
5. Continue by following the General Soil Sampling Procedures in Section 2.2.

Special Considerations for Split-spoon Sampling

- *Utility Clearance* - Prior to any subsurface soil sampling, especially that completed with a drill rig, it is important to ensure that all sampling locations are clear of overhead and buried utilities through the conduct of a utility survey/markout. Locations on private properties should also be reviewed with the owner prior to installation.
- *Slough* - Generally discard the top several inches of material in the spoon before removing any portion for sampling. This material normally consists of borehole wall material that has sloughed off of the borehole wall after removal of the drill string prior to and during insertion of the split spoon.
- *VOC Sample Collection* - Observe precautions for VOC sample collection found in Attachment A and/or the site-specific work plan.
- *Decontamination* - The split-spoon sampler(s) is to be decontaminated between each sample. Within a borehole, the split spoon sample barrels must be cleaned between each sample - the driller typically has multiple barrels and can alternate between clean and dirty barrels so drilling progress is not affected by decontamination of the barrels. The augers should be decontaminated between boreholes (such as with high-pressure steam).

2.2.5 Shelby Tube/Thin-walled Sampling Methods

Shelby tubes, also referred to generically as thin-walled push tubes or Acker thin-walled samplers, are used to collect subsurface soil samples in cohesive soils and clays during drilling activities. In addition to samples for chemical analyses, Shelby tubes are also used to collect relatively undisturbed soil samples for geotechnical analyses of physical properties such as shear strength, grain size distribution, density, hydraulic conductivity and permeability, to support engineering design, construction, and hydrogeologic characterizations at hazardous waste and other sites.

A typical Shelby tube is 30 inches in length, has a 3.0-inch OD (2.875-inch inside diameter) and may be constructed of steel, stainless steel, galvanized steel, or brass. They are typically attached to push heads constructed with a ball check to aid in holding the sample in the tube during retrieval. If used for collecting samples for chemical analyses, it must be constructed of stainless steel. If used for collecting samples for standard geotechnical parameters, any material is acceptable. To collect a sample, the tube is attached to a string of drill rod and is lowered into the borehole, where the sampler is then pressed into the undisturbed material by hydraulic force from

the drill rig. Shelby tube or thin-walled soil sampling should be conducted in accordance with ASTM Method D1587 *Practice for Thin-walled Tube Sampling of Soils for Geotechnical Purposes*.

After retrieval to the surface, the tube containing the sample is then removed from the sampler head. If samples for chemical analyses are needed, the soil contained inside the tube is then removed for sample acquisition by following the direct-push sampling procedures in Section 2.2.3. If the sample is collected for geotechnical parameters, the tube is typically sealed, to maintain the sample in its relatively undisturbed state, capped, labeled appropriately (including sample ID, top end of sample, inches of recovery, etc.), and shipped to the appropriate geotechnical laboratory. The tube is typically stored in an upright position to maintain the integrity of the undisturbed sample. For geotechnical use, check with the laboratory prior to sampling to understand sample volume recoveries needed to perform the actual tests.

2.2.6 Sonic Drilling Sampling Methods

Sonic drilling/rotary vibratory drilling employs the use of high-frequency, resonant energy to advance a core barrel or casing into subsurface formations. Although sonic drilling is not technically a direct-push method of soil sampling, it is similar because soil sample collection from cores of recovered unconsolidated soil would follow the same procedures as described for direct-push methodologies. The soil core is extruded from the core barrel or casing into a plastic sleeve.

Sonic drilling is different than conventional drilling, as sonic drilling minimizes the friction between the borehole wall and the drilling tool by maintaining the resonance of the drill string with a sonic drill head. Typically the drilling method utilizes dual casings that independently resonate into the subsurface with an inner core barrel that is overrun by an outer casing.

Typically core runs are 10-feet. The core barrel is removed from the borehole and the core is extruded into a plastic sleeve. The plastic sleeve is placed on dedicated plastic sheeting. The plastic sleeve is then slit with a razor knife (or similar) vertically along the core run, exposing the soil inside.

The procedures for collecting soil samples from sonic cores are the same as the procedures presented for collecting soil samples from direct-push sampling methods in Section 2.2.3.

Special Considerations for Sonic Drilling Sampling

- *Utility Clearance* - Prior to any subsurface soil sampling, especially that completed with a drill rig, it is important to ensure that all sampling locations are clear of overhead and buried utilities through the conduct of a utility survey/markout. Locations on private properties should also be reviewed with the owner prior to installation.
- Sonic-generated soils are not undisturbed. The resonance of the core barrel during advancement energizes the skin of the sample immediately adjacent to the barrel, approximately $\frac{1}{8}$ to $\frac{1}{4}$ inch around the OD of the sample. Heating of the soils is possible.
- Coring is always accomplished without air or fluids. Depending on site conditions, the outer casing may require adding some water to the borehole if heaving or flowing sands/sand and gravel are present.

- Resistance is not measured during core barrel advancement, as in split-spoon sampling where blow counts are measured. To collect conventional split-spoon samples and obtain blow counts, the sonic drill rigs can be outfitted with automatic hammers to advance split spoons or thin-walled push tubes, although the advantage of drilling speed with the sonic drilling technique is diminished.

2.2.7 Excavator Sampling Methods

A backhoe or excavator can be used to assist with soil sampling. This method is typically used during remedial excavation activities (to collect floor and sidewall samples within the excavation), test pit installation, or trenching operations. Test pit excavations are commonly completed to allow for greater observation of physical soil characteristics (e.g., stockpiles) and/or to further investigate buried suspect areas of concern (e.g., petroleum tanks, drums, waste, fill).

The following procedures are used for collecting soil samples excavated with a backhoe or excavator:

1. Prior to any excavation, it is important to ensure that all sampling locations are clear of overhead and buried utilities through the conduct of a utility survey/markout.
2. For test pits or trench excavation, excavate in accordance with the site-specific work plan. Typically, this will be approximately 3 feet wide and approximately 1 foot deep below the cleared sampling location with the backhoe. Remedial excavations may be much wider and deeper. The work plan may also require that excavated soils be placed on plastic sheets or another impervious surface and protected from rain.
3. Refer to the site-specific work plan for the number of floor and/or sidewall samples, which is typically driven by the surface area and can vary depending on the governing regulatory agency.
4. Samples can be collected using a trowel, spoon, or coring device at the desired intervals. A clean shovel may be used to remove a 1 to 2- inch layer of soil from the vertical face of the pit that contacted the backhoe bucket and where soil sampling is planned. Scrape the vertical face at the point of sampling to remove any soil that may have fallen from above and to expose fresh soil for sampling. In many instances, soil sample locations within the excavation area are inaccessible (do not physically enter backhoe excavations to collect a sample). In these cases, soil samples can be collected directly from the backhoe bucket – use caution not to collect a soil sample from edges that may have come into contact with the backhoe bucket.
5. If VOC analyses are required, collect the sample in accordance with the procedures in Attachment A and/or the site-specific work plan. With a dedicated decontaminated spoon, or equivalent, place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

6. Abandon the pit or excavation according to applicable state regulations and the site-specific work plan. Generally, shallow excavations can simply be backfilled with the removed soil material.

Special Considerations for Excavator Sampling

- *Utility Clearance* - Prior to any subsurface soil sampling, it is important to ensure that all sampling locations are clear of overhead and buried utilities through the conduct of a utility survey/markout. Locations on private properties should also be reviewed with the owner prior to installation.
- *VOC Sample Collection* - Observe precautions for VOC sample collection found in Attachment A and/or the site-specific work plan.
- Do not physically enter backhoe excavations to collect a sample if the excavations are unstable or not sloped and protected with shoring. A trench with non-cohesive soils (i.e., sand, saturated/wet muds, or flowing water at the base) is particularly susceptible to collapsing suddenly. Never enter a trench without a confined space entry permit, as required by OSHA regulations.
- Smearing is an important issue when sampling with a backhoe or excavator. Any time a vertical or near vertical surface is sampled, such as achieved when shovels or similar devices are used for subsurface sampling, the surface should be dressed (scraped) to remove smeared soil. This is necessary to minimize the effects of contaminant migration interferences due to smearing of material from other levels.
- Loose paint, grease and rust should be removed and the backhoe bucket decontaminated prior to use for sample collection if the bucket will come in direct contact with the material to be sampled. Care should be taken to collect the soil sample from the center of the excavated material within the bucket (i.e., material that has not touched the bucket walls).

2.2.8 Stockpile Soil Sampling Methods

Stockpiled soils are typically sampled to characterize the soils for reuse or disposal. The stockpile sampling strategy used must consider the source of the soil and all available data, field observations, shape/dimensions and volume of the pile, and sampling frequency requirements established by oversight regulatory agencies or potential soil disposal facilities.

If the stockpile is known to be a representative mixture of soil with no known or suspected significant variability of contamination with depth in the pile, the stockpile sampling may be conducted according to the surface soil sampling method described in Section 2.2.1. However, if the soil characteristics are not known or are known or suspected to vary with depth in the pile, both surface soil and deeper subsurface soil samples will be required to properly characterize the soil pile.

A backhoe or excavator equipped with a bucket can be used to collect subsurface soil samples from stockpiles. This method is often preferred for collecting subsurface soil samples from a stockpile, since it allows the sampler greater opportunity to inspect the physical characteristics of the pile for any potential signs of variability for determining appropriate sample depths and locations.

Typically, based on the minimum required number of samples for the estimated stockpile volume, the stockpile is divided into the appropriate number of estimated volumes equal to that sample number. For example, if the specified sample frequency is 1 sample per 1,000 cubic yards (cy) and the estimated stockpile size is 4,000 cy, the stockpile would be broken down into approximately four equal volumes or quadrants. Grab VOC samples and composite non-VOC samples, as required, would then be collected from each of the areas for characterization of the stockpile.

2.3 Post-sampling Activities

1. After the samples have been collected, the sampling location may be marked with wooden stakes colored with highly visible spray paint and/or flagging in order to identify the sample location for surveying purposes. The sample and/or location identification should be written on the stake in indelible ink or marking pen. The sample location should be surveyed in the field with a GPS unit if not surveyed later by some other means. A sketch of the sampling locations should also be included in the field book.
2. Package the samples with bubble wrap and/or organic absorbent, as necessary.
3. Place the samples into a shipping container and cool to 4°C. If wet ice is used to cool the samples, place the ice in double-bags to prevent water from the melting ice from damaging the samples during shipment.
4. Complete the COC form.
5. Decontaminate non-disposable sampling equipment.

3.0 INVESTIGATION-DERIVED WASTE DISPOSAL

Field personnel should discuss specific documentation and containerization requirements for investigation-derived waste disposal with the Project Manager.

Each project must consider investigation-derived waste disposal methods and have a plan in place prior to performing the field work. Provisions must be in place as to what will be done with investigation-derived waste. If investigation-derived waste cannot be returned to the site, consider material containment, such as a composite drum, proper labeling, on-site storage by the client, testing for disposal approval of the materials, and ultimately the pickup and disposal of the materials by appropriately licensed vendors.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

The collection of specific field quality control (QC) samples will be specified in the project-specific planning documents and may include one or more of the following: field blank, equipment blank, trip blank, field duplicate, and matrix spike/matrix spike duplicates.

4.1 Duplicate Soil Sample Collection

The following procedures should be used for collecting duplicate soil samples:

1. For QC purposes, each duplicate sample will be submitted to the laboratory as a “blind” duplicate sample, in that a unique sample identification not tied to the primary sample identification will be assigned to the duplicate (e.g., DUP-01). Standard labeling procedures used for soil sampling will be employed. However, a sample collection time will not be included on the sample label or the COC form. The actual source of the duplicate sample will be recorded in the field book.
2. Each duplicate sample will be collected simultaneously with the actual sample. At the coincident step in the sampling procedures that the VOC, VPH and/or GRO containers are filled and sealed, the duplicate sample VOC, VPH and/or GRO containers will also be filled and sealed. Duplicates for all parameters other than VOCs, VPH and GRO should be filled from the homogenized sample to ensure consistency between the sample and the duplicate. Following the order of collection specified for each set of containers (i.e., VOCs, VPH, GRO, semivolatile organic compounds [SVOCs], other organics and then inorganic compounds), the duplicate sample containers will be filled simultaneously with each parameter.
3. All collection and preservation procedures outlined for soil sampling will be followed for each duplicate sample.

5.0 DATA MANAGEMENT AND RECORDS MANAGEMENT

Record the general sample collection information such as location, identification, and date/time in the field book or on a field data sheet. Typical field documentation recorded in a field book includes the following information:

- Sample identification number
- Sample location (description or sketch of the sample point)
- Sample depth interval
- GPS coordinates and coordinate system
- Time and date sample was collected
- Personnel performing the task
- Visual or sensory description of the sample (e.g., odors, staining)
- Brief soil descriptions (e.g., color, texture, appearance)
- Presence of any fill materials (e.g., concrete, asphalt, ash)
- Readings from field screening equipment (e.g., PID)
- Weather conditions during sampling
- Other pertinent observations including whether photographs were taken
- Sample collection equipment used
- Decontamination procedure
- Analytical parameters

Affix a properly completed label to each sample container.

All sample numbers must be documented on the COC form that accompanies the samples during shipment. Any deviations from the record management procedures specified in the site-specific work plan must be approved by the Project Manager and documented in the field book.

6.0 REFERENCES

ASTM Methods D1586 *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soil*, D1587 *Practice for Thin-walled Tube Sampling of Soils for Geotechnical Purposes*, ASTM D6169 *Standard Guide for Selection of Soil and Rock Sampling Devices Used With Drill Rigs for Environmental Investigation*, ASTM International, Most Current Version.

MassDEP, *Method for the Determination of Volatile Petroleum Hydrocarbons (VPH)*, May 2004.

U.S. EPA, SW-846 Method 5035A, *Closed System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples*, Draft Revision 1, July 2002.

U.S. EPA Environmental Response Team, *Soil Sampling SOP #2012*, February 18, 2000.

U.S. EPA Science and Ecosystem Support Division, *Soil Sampling Operating Procedure (SESDPROC-300-R2)*, December 20, 2011.

7.0 SOP REVISION HISTORY

REVISION NUMBER	REVISION DATE	REASON FOR REVISION
0	SEPTEMBER 2013	NOT APPLICABLE
1	NOVEMBER 2016	ADDED ATTACHMENT D TO ACCOMMODATE SOP MODIFICATIONS REQUIRED WHEN SAMPLING FOR PFAS; CHANGED NAMING CONVENTION FOR SOP FROM RMD TO ECR.
2	JANUARY 2020	TRC RE-BRANDING

Attachment A:

Procedure for Collection of Samples for VOCs, VPH or GRO (SW-846 Method 5035A)

1.0 SAMPLING FOR VOLATILE ORGANIC COMPOUNDS IN SOIL BY EPA METHOD 5035/5035A

The following sampling protocol is recommended for site investigations assessing the extent of VOCs (including VPH and GRO) in soils at a project site. Because of the large number of options available, careful coordination between field and laboratory personnel is needed. The specific sampling containers and sampling tools required will depend upon the required detection levels and intended data use. Once this information has been established, selection of the appropriate sampling procedure and preservation method best applicable to the investigation can be made.

SW-846 Method 5035 provides instructions and options on the preservation of soil samples for low-level and high-level VOC analyses:

- Low-level (≤ 200 $\mu\text{g/kg}$) and
- High-level (> 200 $\mu\text{g/kg}$).

The choice of low-level or high-level analysis is determined by the requirements of the project. However, since the low-level method is only valid for a certain concentration range, a sample for analysis by the high-level method must also be collected to ensure quantification of all target analytes is possible, if needed.

The low-level method uses one or more of the following options for the sampling/preservation of soils:

- Soil sampled into a vial with a sodium bisulfate (NaHSO_4) solution.
- Soil collected in an En-Core[®] sampler and immediately shipped to the laboratory for further preservation (within 48 hours).
- Soil collected in a vial with organic-free water, sealed in the field, and shipped to the laboratory immediately in order to meet the method preservation requirement to freeze within 48 hours of collection.

Based on project-specific requirements, trip blanks may be recommended. Refer to the site-specific work plan for quality assurance (QA)/QC requirements.

1.1 Low-level Method (VOCs)

Option A - Direct sampling into En-Core[®] samplers

- Three 5 gram size En-Core[®] samplers for each sample.
- One nonpreserved container for moisture determination.

Option B - Direct sampling into vial with chemical preservative

- Two 5 gram size cores are added to volatile organic analysis (VOA) vials (one soil core is added to each of two VOA vials with sodium bisulfate solution) for each sample using a Terra Core[™] or other coring sampler (e.g., disposable syringe). Once the vials are sealed in the field, these are not opened again.
- One nonpreserved container for moisture determination.

Option C - Direct sampling into vial with water (to be frozen at the laboratory)

- Two 5 gram size cores are added to VOA vials (one soil core is added to each of two VOA vials with water) for each sample using a Terra Core™ or other coring sampler (e.g., disposable syringe). Once the vials are sealed in the field, these are not opened again.
- One nonpreserved container for moisture determination.

1.2 High-level Method (VOC, VPH, GRO)

Option D - Direct sampling into En-Core® samplers

- One 5 gram size En-Core® sampler for each sample.
- One nonpreserved container for moisture determination.

Option E - Direct sampling into a methanol-preserved vial

- For VOCs: 5 or 10 grams of soil is added to a VOA vial (with 5 or 10 grams of methanol, respectively) for each sample using a Terra Core™ or other coring sampler (e.g., disposable syringe). This may also depend upon the regulatory agency (e.g., New Jersey Department of Environmental Protection requires 8 to 12 grams in 25 mL methanol or 5 grams in 10 mL methanol).
- For VPH or GRO: The coring device will be filled with 25 grams of undisturbed soil if 60-ml vials with 25 ml of methanol are used, or 15 grams of undisturbed soil if 40-ml vials with 15 ml of methanol are used. The goal is to have a 1:1 ratio of soil- to-methanol.
- One nonpreserved container for moisture determination.

1.3 Cautions and Potential Problems

1. Potential leaking sample containers for VOC, VPH and GRO analyses:

Options for evaluating containers for leaking preservatives:

- a. When ordering pre-preserved sample containers, laboratories should be encouraged to mark the meniscus of the preservative on all sample containers. The preservative level should be checked before sampling as a quick check that there has not been any loss of liquid.
- b. Compare preservative level in multiple bottles and select one for comparison purposes to subsequent sample bottles.
- c. Weigh methanol-preserved sample containers prior to sampling. Sample containers found to have lost greater than 0.2 grams of methanol compared to their initial weight should not be used. In order to perform this option, initial container weights must be provided by the laboratory.

2. Potential methanol absorption:

Soil may be encountered that absorbs all of the methanol preservative (e.g., organic-rich soil, fine-grain soil). These soils can absorb the methanol leaving no methanol extract for the laboratory to analyze. In these instances, the use of additional methanol is required. The laboratory must be contacted for sample containers with an increased volume of methanol.

Using a 1:2 ratio of soil to methanol will help to ensure that there will be adequate volume of methanol remaining for analysis. **NOTE: Additional methanol should not be added to the sample container by the sampler in the field. Containers with additional methanol must be obtained from the laboratory.**

3. Collection of samples with high moisture content:

Soil samples with high (>50%) moisture content (e.g., sediments, soil samples below the water table) may prevent the attainment of the ideal 1:1 soil-to-preserved ratio. In these instances, depending on the data quality objectives, it may be necessary to evaluate the soil to determine what level in the disposable syringe corresponds to the required weight (typically 5 grams for VOCs and 15 or 25 grams for VPH). This can be performed by collecting several trial samples with disposable syringes. Weigh each trial sample and note the length of the soil in the syringe. These measurements would be used to determine how much soil in the syringe corresponds to 5 ± 0.5 grams (or the desired weight ± 0.5). All trial samples should be discarded and not used for analysis.

4. En-Core® sampler cautions:

- a. En-Core® samplers, or equivalent, should only be used on fine-grain or cohesive soils (soils that stay together in the En-Core® sampler and do not fall apart). En-Core® samplers should not be used to collect soil samples that consist of dry sand, gravel, or a mixture of gravel and fines, or samples with high moisture (e.g., sediments and soil samples below the water table). In the case of soil samples that consist of dry sand, gravel, or a mixture of gravel and fines, or samples with high moisture (e.g., sediments and soil samples below the water table), a stainless steel spatula or scoop should be used with field preservation techniques.
- b. The En-Core® sampler is a single-use device and cannot be decontaminated and reused.
- c. The volume of material collected in an En-Core® sampler should not cause excessive stress on the coring tool.
- d. The volume of material collected should not be so large that the sample easily falls apart during extrusion.
- e. The En-Core® sampler should not be used if any of the components are damaged as the seals may be compromised. Under no circumstances should any components be removed or disturbed.
- f. It is important to make sure air is not trapped behind the sample, as this could cause air to pass through the sample, resulting in a loss of VOCs, or it could cause the sample to be pushed prematurely from the coring tool.

5. Potential effervescence with use of sodium bisulfate as a preservative for low-level VOC analysis of soils:

This method of preservation is not preferred and, therefore, is not outlined below. If it is used, the following cautions exist:

- a. Carbonaceous or strongly alkaline soils may cause potential effervescence when reacting with the sodium bisulfate and may result in a loss of VOCs and a shattered vial. If effervescence occurs, sodium bisulfate should not be used. The laboratory

must be contacted and low-level preservation techniques, using water only, should be followed.

- b. Loamy materials or materials containing decayed material may result in false positive results for acetone due to the interaction with the sodium bisulfate.
- c. Some VOCs may be lost due to the resulting acidification when sodium bisulfate is used (e.g., styrene, 2-chloroethyl vinyl ether, acrylonitrile).
- d. Some VOCs may be lost if the laboratory is using a heated purge in combination with the sodium bisulfate preservative (e.g., methyl tert butyl ether [MTBE] and other fuel oxygenates).

1.4 Sample Containers and VOC Sampling Equipment

- Method 5035A-compatible containers or kits (for VOCs, VPH and GRO). Preservatives may be required for some samples with certain variations of SW-846 method 5035A – consult the governing regulatory agency or principal analytical chemist to determine which preservatives are necessary.
 - Low-level VOCs: two 40-mL VOA vials pre-preserved with 5 mL organic-free water and also containing a magnetic stir bar.
 - High-level (or medium-level) VOCs: one 40-mL VOA vial pre-preserved with 5 or 10 mL of purge-and-trap-grade methanol. Volume will be dependent upon laboratory's preference or regulatory agency requirements (e.g., New Jersey Department of Environmental Protection prefers vials with 10 or 25 mL of purge-and-trap-grade methanol).
 - VPH and GRO: One 60-mL vial pre-preserved with 25 mL of purge-and-trap-grade methanol **or** One 40-mL VOA vial pre-preserved with 15 mL of purge-and-trap-grade methanol
and
 - One glass container (or other appropriate container) with no preservative to allow the laboratory to perform the percent solids measurement. NOTE: The laboratory typically requires a minimum of 20 grams to perform this test. Therefore, submitting a sample size less than 4 ounces may be acceptable. This additional container will not be required if the sample is also being submitted for other non-VOC parameters.
- En-Core® samplers, or equivalent, for VOC, VPH and/or GRO analysis:
 - High-level VOC or GRO analysis: one 5-gram En-Core® sampler.
 - Low-level VOC analysis: two 5-gram En-Core® samplers.
 - VPH, GRO or toxicity characteristic leaching procedure (TCLP) VOC analysis: one 25-gram En-Core® sampler.
- Disposable plastic syringes or Terra Core™ samplers.
- Foam VOC vial holders.
- Portable digital scale (accurate to ± 0.01 grams) with calibration weights.

2.0 COLLECTION OF SAMPLES USING EN-CORE® SAMPLERS, OR EQUIVALENT

- The sample will be collected using an En-Core® sampler, or equivalent, as soon as possible after the soil has been exposed to the atmosphere.
- Check that the En-Core® sampler, or equivalent, is full using both of the following procedures:
 - a. Be sure that the back o-ring on the plunger can be seen when looking through the viewing hole on the handle. This will mean that the soil has pushed the plunger fully to the back.
 - b. The plunger can only be rotated when it is fully pushed to the back of the body. Therefore, it is important to twist the plunger to guarantee that the soil has filled the sampler and the back o-rings have sealed.
- Immediately seal the En-Core® sampler, or equivalent. Be sure to twist the cap as it is pushed on. The cap is properly sealed when the two locking arms are completely and symmetrically over the body ridge.
- The samples must be shipped to a laboratory within 24 hours of sampling to ensure the 48-hour hold time for preservation will be met.
- In the event that a field screening technique (instrument reading or visual staining of the soil) indicates the possible presence of VOCs or hydrocarbons, note the observations or instrument readings in the field book. If the field screening technique does not indicate the presence of VOCs, this should also be noted.
- If samples are collected for only VOC and VPH analyses, a separate aliquot must be collected in an unpreserved container in order for the laboratory to perform a dry weight determination.

3.0 COLLECTION OF SAMPLES USING FIELD PRESERVATION

- Samples for VOCs will be collected as soon as possible after the soil has been exposed to the atmosphere.
- Samples for VOCs will be collected first (prior to collection of samples for other parameters) using an open-barrel disposable syringe, Terra Core™ sampler, or equivalent. In the case of soil samples that consist of dry sand, gravel, or a mixture of gravel and fines, or samples with high moisture (e.g., sediments and soil samples below the water table), an open-barrel disposable syringe may not be practical; a stainless steel spatula or scoop can be used with field preservation techniques.
- Soil samples for VOC analyses should **never** be homogenized.
- Each pre-preserved sample container will be weighed prior to sample collection, and the container/preservative weight will be recorded. This procedure will generally be performed by the laboratory prior to shipping the containers to the field.
- Depending upon project requirements, samples for VOC analysis will be collected as low-level, high-level, or both.

A. Low-level VOCs

1. The syringe will be filled with undisturbed soil of the following volume: 5 grams of soil.
As an option to the syringes, 5-gram Terra Core™ samplers, or equivalent, can be used. The goal is to have a 1:1 ratio of soil- to- preservative.
2. The soil will be extruded into a pre-preserved VOA vial containing a magnetic stir bar and 5 mL organic-free water. This will be done in replicate.
3. Any sand grains present on the container rim or cap must be removed to ensure an air-tight seal of the vial. The VOA vial will be capped quickly and labeled with the sample ID, date, and time of collection. Labels should not be written on the cap of the vial.
4. Gently swirl sample to break up the soil aggregate, if necessary, until the soil is covered with preservative. It is imperative that the soil sample be completely immersed in the preservative solution.
5. In the event that a field screening technique (instrument reading or visual staining of the soil) indicates the possible presence of VOCs or hydrocarbons, note the observations or instrument readings in the field book. If the field screening technique does not indicate the presence of VOCs, this should also be noted.
6. If samples are collected for only VOC analysis, a separate aliquot must be collected in an unpreserved container in order for the laboratory to perform a dry weight determination.

B. High-level VOCs, VPH, or GRO

1. High-level VOCs: The syringe will be filled with undisturbed soil of the following volume: 5 or 10 grams of soil for high-level analysis (added to the 5 or 10 ml of methanol, respectively). This may also depend upon the regulatory agency (e.g., New Jersey Department of Environmental Protection requires 8 to 12 grams in 25 mL methanol or 5 grams in 10 mL methanol).

VPH or GRO: The syringe will be filled with 25 grams of undisturbed soil if 60-ml vials with 25 ml of methanol are used, or 15 grams of undisturbed soil if 40-ml vials with 15 ml of methanol are used. The goal is to have a 1:1 ratio of soil- to- methanol.

As an option to the syringes, 5-gram Terra Core™ samplers, or equivalent, can be used. Typically, the goal is to have a 1:1 ratio of soil- to- preservative.
2. The sample will be extruded into a VOA vial containing purge-and-trap grade methanol
3. Any sand grains present on the container rim or cap must be removed to ensure an air-tight seal of the vial. The VOA vial will be capped quickly and labeled with the sample ID, date, and time of collection. Labels should not be written on the cap of the vial.
4. Gently swirl sample to break up the soil aggregate, if necessary, until the soil is covered with preservative. It is imperative that the soil sample be completely immersed in the preservative solution.
5. In the event that a field screening technique (instrument reading or visual staining of the soil) indicates the possible presence of VOCs or hydrocarbons, note the observations or instrument readings in the field book. If the field screening technique does not indicate the presence of VOCs, this should also be noted.

6. Methanol is considered to be a hazardous material by the US Department of Transportation (DOT) and the International Air Transportation Association (IATA). Shipments containing methanol between the field and the laboratory must conform to the rules established in Title 49 of the Code of Federal Regulations (49 CFR parts 171 to 179) and the most current edition of the IATA Dangerous Goods Regulations. The volumes of methanol recommended in the VOC method fall under the small quantity exemption of 49 CFR section 173.4. Refer to Attachment B for further details.
7. If samples are collected for only VOC analysis, a separate aliquot must be collected in an unpreserved container in order for the laboratory to perform a dry weight determination.

Attachment B:

Shipping Methanol-preserved Samples

Shipping of Hazardous Materials

Methanol is considered a hazardous material by the US Department of Transportation (DOT) and the International Air Transport Association (IATA). Shipments of methanol between the field and the laboratory must conform to the rules established in Title 49 of the Code of Federal Regulations (49 CFR parts 171 to 179) and the most current edition of the IATA Dangerous Goods Regulations. Consult these documents or your shipping company for complete details.

Small Quantity Exemption

The volumes of methanol recommended in the high-level VOC, VPH and GRO methods fall under the small quantity exemption of 49 CFR section 173.4. To qualify for this exemption, all of the following conditions must be met:

- ◇ the maximum volume of methanol in each sample container must not exceed 30 mL
- ◇ the sample container must not be full of methanol
- ◇ the sample container must be securely packed and cushioned in an upright position and be surrounded by a sorbent material capable of absorbing spills from leaks or breakage of sample containers
- ◇ the package weight must not exceed 64 pounds
- ◇ the volume of methanol per shipping container must not exceed 500 mL
- ◇ the packaging and shipping container must be strong enough to hold up to the intended use
- ◇ the package must not be opened or altered while in transit
- ◇ the shipper must mark the shipping container as follows:

“This package conforms to 49 CFR 173.4”

When shipping domestically by Federal Express via ground or air, the following rules apply:

- ◇ follow the inner packaging requirements of 49 CFR 173.4
- ◇ no labels, placards, up arrows, or dangerous goods shipping papers are required
- ◇ if the Federal Express airbill has a shipper’s declaration for hazardous goods on it, check the Yes box under *Shipper’s Declaration not Required*

When shipping internationally by Federal Express, the following rules apply:

- ◇ follow the inner packaging requirements of 49 CFR 173.4
- ◇ use dangerous goods shipping papers
- ◇ apply orientation arrows on opposite vertical sides on the exterior of the package

Shipping Papers for International Shipments

International shipments must be accompanied by dangerous goods shipping papers that include the following:

Proper Shipping Name:	Methyl Alcohol
Hazardous Class:	Flammable Liquid
Identification Number:	UN1230
Total Quantity:	(mL methanol/container x the number of containers)
Emergency Response Info:	Methanol MSDS attached
Emergency Response Phone:	1-800-424-9300

Attachment C:

SOP Fact Sheet

SOIL SAMPLING PROCEDURES

PURPOSE AND OBJECTIVE	
Soil sampling is conducted in order to obtain a representative sample for laboratory analysis of constituents of interest at a given site. Soil samples may be collected using a variety of methods and equipment depending on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type.	
WHAT TO BRING	
- Stainless steel mixing bowl and stainless steel spoon or spatula - Hand auger or post hole auger, if applicable - Stainless steel trowel and/or shovel - Tape measure, folding ruler - Wooden stakes and spray paint, plastic flagging (highly visible), or steel pin flags - Field book and/or boring log - Camera - Maps/site plan	- Survey equipment and/or GPS and/or other means of measuring sample locations - Indelible marking pens or markers - Sample coolers, sample containers (including any necessary En-Core® samplers, disposable plastic syringes or Terra Core™ samplers), sample container labels, COCs, and ice - Bubble wrap and Zip-loc® plastic bags (for ice and COCs) - Equipment decontamination supplies - Any required field screening equipment, such as PID
OFFICE	
- Prepare/update the HASP; make sure the field team is familiar with the latest version. - Discuss the objective for the soil sampling program with the Project Manager and/or the field lead. Discuss sample order, collection method, designation, analytical parameters, turn-around times, laboratory, etc. - Are the soil cuttings to be containerized in drums or returned to borehole? - Volume of soil required for each sample? - QA/QC sample collection? - Field decontamination required? - Verify whether police traffic control will be required for work completed on or near public roadways.	- Confirm that all necessary equipment is available in-house or has been ordered. Rental equipment is typically delivered the day before fieldwork is scheduled. Prior to departure, test equipment and make sure it is in proper working order. - Verify that a utility survey/mark-out has been performed to ensure that sample locations are clear of overhead and buried utilities. Obtain a copy of the markout ticket or confirmation number. Additionally, a private geophysical sub-surface survey may be necessary. - Review sample bottle order for accuracy and completeness. - Make sure soil boring locations (or specific sampling areas) are clearly identified on figure and that soil boring and sample designations are understood.
ON-SITE	
- Verify that underground utilities have been marked out and that the markouts are clear. Stay at least two feet away from any marked utility. Identify if any overhead obstructions or limited access areas exist near proposed borings and contact the Project Manager if any proposed locations need to be moved. Sketch/photograph markout locations. - Review the HASP with all field personnel, conduct Health & Safety tailgate meeting.	- Make sure appropriate PPE is worn by all personnel and work area is safe (i.e., utilize traffic cones; minimize interference with on-site activities and pedestrian traffic, etc.) - Calibrate equipment (if applicable) and record all rental equipment serial numbers in the field book.
GENERAL SOIL SAMPLING PROCEDURES	
Refer to other TRC SOPs for the proper procedures for classifying soil samples and for screening of samples for VOCs.	Perform any required field screening in situ or immediately upon retrieval of the soil sample from the subsurface.

SOIL SAMPLING PROCEDURES

- Samples for VOC, VPH or GRO analysis are then collected as soon as possible after the soil has been exposed to the atmosphere and prior to sample collection for other analyses.
 - **These samples are NOT homogenized.**
 - These samples are generally collected using an open-barrel disposable syringe, a Terra Core™ sampler, or an En-Core® sampler, or equivalent. Refer to the site-specific work plan or governing regulatory authority for preservation requirements for VOC, VPH or GRO analysis and Attachment A of ECR 003.
- After collecting the sample for VOC analysis, the sample portion for the remaining analysis should be well homogenized, in situ (if possible, such as with surface soil sampling), or in a decontaminated stainless steel bowl or disposable new aluminum pie pan to ensure that the sample is as representative as possible of the sample media.
- Stones, gravel, vegetation or debris (such as concrete, asphalt, ash or slag) should be removed from the soil sample as much as practical prior to placement in sample containers, unless these matrices are part of the overall characterization program.
- Transfer to sample containers using clean new or decontaminated spoons/scoops.
- Filling of the sample bottles should be completed immediately after sample collection to minimize losses due to volatilization and biodegradation. Soil classification can be completed following sample collection.
- Place the sample into an appropriate, labeled container(s) by using the alternate shoveling method and secure the cap(s) tightly. The alternate shoveling method involves placing a spoonful of soil in each container in sequence and repeating until the containers are full or the sample volume has been exhausted. Threads on the container and lid should be cleaned to ensure a tight seal when closed.
- Make sure ALL sample containers are clearly labeled with the site name, sample date, sample collection time and sample designation including depth in indelible ink. Samples should be entered on the COC as they are collected. Make sure to clearly identify requested sample analyses on the COC.
- Labeled samples should be immediately put into a cooler with ice; sample coolers should always be kept within eyesight or stored within the cab of the vehicle or other secured place such as a locked office.
- Be aware of sample holding times, and arrange for samples to be in the laboratory's possession accordingly.
- Restore the sampling location to grade in accordance with applicable state regulations and/or the site-specific work plan. Options include backfilling the sample location with the remaining removed soil, bentonite pellets or cement/bentonite grout depending on site conditions and patching the surface to match the surrounding area (e.g., topsoil with grass seed, asphalt or concrete patch), as necessary.
- Record locations of soil borings/samples in the field book by sketching a map and/or providing a description of the location. When measuring locations of soil borings/samples, always use fixed landmarks such as buildings, fences, curbs, etc.
- Decontaminate sampling equipment in accordance with TRC's SOP on equipment decontamination.
- Ensure any IDW is appropriately managed. If IDW cannot be returned to the site, consider material containment, such as a composite drum, proper labeling, on-site storage by the client, testing for disposal approval of the materials, and ultimately the pickup and disposal of the materials by appropriately licensed vendors.

SURFACE SOIL SAMPLING PROCEDURES

The depth of surface soil samples are typically collected from 0-6 in. or 0-12 in. and will be determined on a site-specific basis and may be influenced by site-specific conditions. The following procedure should be used for surface soil sampling:

- If a thick, matted root zone, leaf layer, gravel, surface debris, concrete, etc. is present at or near the surface, it should be carefully removed using clean decontaminated tools before the soil sample is collected. The presence and thickness of any such material should be recorded in the field book for each location. The depth measurement for the soil sample begins at the top of the soil horizon, immediately following any such removed materials.
- A decontaminated stainless steel spoon, scoop or trowel is typically used for surface soil sampling depths from 0 to 12 inches bgs. A hand auger or shovel may also be used to dig down to the desired depth and then after careful removal of the dug soils from the hole, a decontaminated stainless steel spoon, scoop or trowel is used to collect the soil sample from the bottom of the hole for laboratory chemical analysis.
- Continue by following the General Soil Sampling Procedures.

HAND AUGER SAMPLING PROCEDURES

Hand augers may be used to advance boreholes and collect soil samples in shallow subsurface intervals. Often, 4-inch diameter stainless steel auger buckets with cutting heads are used. The auger is advanced by simultaneously pushing and turning using an attached T-handle with extensions (if needed). Auger holes are advanced one bucket at a time until the appropriate sample depth is achieved. The following procedure should be used for hand auger sampling:

- Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the borehole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding rod extensions. It also facilitates refilling the borehole and avoids possible contamination of the surrounding area.

SOIL SAMPLING PROCEDURES

- When the sample depth is reached, remove the bucket used to advance the borehole and attach a decontaminated or clean bucket. Place the clean auger bucket in the borehole, advance the clean auger bucket to fill it with the soil sample and then carefully remove the clean auger bucket.
- If VOC analysis is to be performed, collect a sample directly at the bottom of the boring, if within reach, and not from the auger bucket. If not within reach, collect the sample directly from the auger bucket or from minimally disturbed material immediately after the auger bucket is emptied.
- Continue by following the General Soil Sampling Procedures.

DIRECT PUSH/SPLIT SPOON/SONIC DRILLING SAMPLING PROCEDURES

For some soil investigations, soil logs provide justification for sample locations and intervals so be descriptive and precise.

- The driller will advance the soil sampler (macrocore, split spoon, sonic casing, etc.) which will then be given to the sampler – confirm with driller which end is top and which end is bottom. Record the time of core collection in the field book (military time). Begin the soil record by indicating the soil boring location, followed by the depth interval in feet bgs [e.g., B-1/0-4].
- Record the blow count per six inch interval when collecting split-spoon samplers with hollow stem auger rig. The drillers will keep the count and repeat them to you. If refusal is encountered, the count is recorded in the book as “# of hammer blows / depth in inches the spoon is driven” (e.g., 50/3 – means 50 blows of the hammer advanced the spoon 3 inches).
- Measurement of vertical depth should start from the top of soil; surface asphalt, surficial concrete slabs or gravel sub-base should be excluded from depth measurement (however, the presence and thickness of these items should be noted in the field book).
- Measure the length of recovered soil in inches and record in the field book.
- Continue by following the General Soil Sampling Procedures. If a specific depth interval is targeted for sampling, be sure to account for percent recovery when selecting the sample interval.

SHELBY TUBE SAMPLING PROCEDURES

A typical Shelby tube is 30 inches in length, has a 3.0-inch OD (2.875-inch inside diameter) and may be constructed of steel, stainless steel, galvanized steel, or brass, depending on the specific application. They are typically attached to push heads constructed with a ball check to aid in holding the sample in the tube during retrieval. To collect a sample, the tube is attached to a string of drill rod and is lowered into the borehole, where the sampler is then pressed into the undisturbed material by hydraulic force from the drill rig. After retrieval to the surface, the tube containing the sample is then removed from the sampler head.

- If samples for chemical analyses are needed, the soil contained inside the tube is then removed for sample acquisition by following the direct-push sampling procedures.
- If the sample is collected for geotechnical parameters, the tube is typically sealed, to maintain the sample in its relatively undisturbed state, capped, labeled appropriately (including sample ID, top end of sample, inches of recovery, etc.), and shipped to the appropriate geotechnical laboratory. The tube is typically stored in an upright position to maintain the integrity of the undisturbed sample.
- For geotechnical use, check with the laboratory prior to sampling to understand sample volume recoveries needed to perform the actual tests.

EXCAVATOR SAMPLING PROCEDURES

A backhoe or excavator can be used to assist with soil sampling such as during remedial excavation activities (to collect floor and sidewall samples within the excavation), test pit installation, or trenching operations. Test pit excavations are commonly completed to allow for greater observation of physical soil characteristics (e.g., stockpiles) and/or to further investigate buried suspect areas of concern (e.g., petroleum tanks, drums, waste, fill). The following procedures are used for collecting soil samples excavated with a backhoe or excavator:

- For test pits or trench excavation, excavate in accordance with the site-specific work plan. Typically, this will be approximately 3 feet wide and approximately 1 foot deep below the cleared sampling location with the backhoe. Remedial excavations may be much wider and deeper. The work plan may also require that excavated soils be placed on plastic sheets or another impervious surface and protected from rain.
- Refer to the site-specific work plan for the number of floor and/or sidewall samples, which is typically driven by the surface area and can vary depending on the governing regulatory agency.
- Samples can be collected using a trowel, spoon, or coring device at the desired intervals. A clean shovel may be used to remove a 1 to 2-inch layer of soil from the vertical face of the pit that contacted the backhoe bucket and where soil sampling is planned. Scrape the vertical face at the point of sampling to remove any soil that may have fallen from above and to expose fresh soil for sampling. In many instances, soil sample locations within the excavation area are inaccessible (do not physically enter backhoe excavations to collect a sample). In these cases, soil samples can be collected directly from the backhoe bucket – use caution not to collect a soil sample from edges that may have come into contact with the backhoe bucket.
- Continue by following the General Soil Sampling Procedures.
- Abandon the pit or excavation according to applicable state regulations and the site-specific work plan. Generally, shallow excavations can simply be backfilled with the removed soil material.

SOIL SAMPLING PROCEDURES

STOCKPILE SOIL SAMPLING PROCEDURES

Stockpiled soils are typically sampled to characterize the soils for reuse or disposal. The stockpile sampling strategy used must consider the source of the soil and all available data, field observations, shape/dimensions and volume of the pile, and sampling frequency requirements established by oversight regulatory agencies or potential soil disposal facilities.

If the stockpile is known to be a representative mixture of soil with no known or suspected significant variability of contamination with depth in the pile, the stockpile sampling may be conducted according to the surface soil sampling method described above. However, if the soil characteristics are not known or are known or suspected to vary with depth in the pile, both surface soil and deeper subsurface soil samples will be required to properly characterize the soil pile. Based on the minimum required number of samples for the estimated stockpile volume, the stockpile is divided into the appropriate number of estimated volumes equal to that sample number.

POST SAMPLING ACTIVITIES

- | | |
|---|--|
| <ul style="list-style-type: none"> • After the samples have been collected, the sampling location may be marked with wooden stakes colored with highly visible spray paint and/or flagging with the sample location identification written on the stake in indelible ink. The sample location should be surveyed in the field with a GPS unit if not surveyed later by some other means. A sketch of the sampling locations should also be included in the field book. | <ul style="list-style-type: none"> • Package the samples with bubble wrap as necessary. • Place the samples into a shipping container and cool to 4°C. If wet ice is used to cool the samples, place the ice in double-bags to prevent water from the melting ice from damaging the samples during shipment. • Complete and cross check the COC form. • Decontaminate non-disposable sampling equipment. |
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DOs AND DO NOTs OF SOIL SAMPLING

DOs:

- | | |
|--|---|
| <ul style="list-style-type: none"> • No matter the work plan or the site, DO have the following items when going into the field: <ul style="list-style-type: none"> ◦ Site-Specific HASP ◦ Steel-toed boots ◦ Field book and a pen with indelible ink. ◦ Nitrile gloves ◦ Business cards • DO review soil boring logs or cross sections from previous sampling events, if available. • DO call the Project Manager or field team leader if unexpected conditions are encountered or at least twice during the work day to update them. Even if everything is fine and there are no questions, call with an update. It is also recommended to call when sampling is winding down for the day to make sure that the work plan has been fully implemented and there are no additional tasks to complete. • DO have the numbers for laboratory, vehicle rental and equipment rental providers readily available while in the field. • DO decontaminate any heavy equipment used for the advancement of sampling devices by steam cleaning or high pressure/hot water wash prior to and between sample locations. This would include, but is not limited to auger flights, drill rods, backhoe buckets and other respective accessories. | <ul style="list-style-type: none"> • DO review and count the sample bottles and compare to the COC prior to leaving the site. • DO record sampler type (e.g., macrocore, split spoon, etc.) and boring method (e.g., direct push, hammer, etc.) in the field book. • DO record the hammer weight, the distance of the hammer drop and the method for hammer lift (i.e., cathead and rope, hydraulic, etc.) in the field book at least once per day when collecting split-spoon samples with a drill rig. |
|--|---|

DO NOTs:

- DO NOT sign anything in the field. This includes disposal documentation, statements, etc; call the Project Manager if there is an issue.
- DO NOT use non-indelible ink to label samples or record field notes – if the field book gets wet, notes become illegible.
- DO NOT include any upper soils which may “fall” as a result of the open borehole caving in (slough) when recording recovery.
- DO NOT use general terms such as “Fill” or “Till” as a sole description for layers – always give detailed description of soil components.

Attachment D:

SOP Modifications for PFAS

Due to the pervasive nature of PFAS in various substances routinely used during sampling and the need to mitigate potential cross-contamination or sampling bias to ensure representative data are collected, special care should be taken when sampling for PFAS. The following table highlights the required modifications to this SOP when sampling for PFAS.

PFAS Sampling Protocols	
SOP Section Number	Modifications to SOP
1.3	- Do not use equipment utilizing Teflon® during sample handling or mobilization/demobilization. This includes waterproof/resistant paper products, certain personal protective equipment (PPE) (see below), and Teflon® tape. - Blue Ice® (chemical ice packs) must not be used to cool samples or be used in sample coolers. Regular ice in Ziploc® bags can be used. - Do not use low density polyethylene (LDPE)¹ or glass sample containers or containers with Teflon-lined lids. HDPE or polypropylene containers are acceptable for sample storage. HDPE or polypropylene caps are acceptable. - Do not use aluminum foil - Waterproof field books, plastic clipboards and spiral bound notebooks should not be used. Field notes should be recorded on loose paper field forms maintained in aluminum or Masonite clipboards. Field notes should be attached to the project-specific field book or folder upon returning to the office. - Avoid using waterproof labels for sample bottles. The use of paper labels covered with clear tape or placed in Ziploc® bags to avoid moisture on the sample label is acceptable. - Do not use Post-It Notes during sample handling or mobilization/demobilization. - Refer to TRC's SOP ECR-010 Equipment Decontamination for PFAS-specific decontamination protocols. Ensure that PFAS-free water is used during the decontamination procedure.
1.5	Always consult the Site Specific Health and Safety Plan (HASP) prior to conducting field work. The following considerations should be made with regards to field preparation during PFAS sampling: - Tyvek® suits should not be worn during PFAS sampling events. Cotton coveralls may be worn. - Boots and other field clothing containing Gore-Tex™ or other waterproof/resistant material should not be worn. This includes rain gear. Boots made with polyurethane and polyvinyl chloride (PVC) are acceptable. - Stain resistant clothing should not be worn. - Food and drink should not be allowed within the exclusion area. Pre-wrapped food or snacks should not be in the possession of sampling personnel during sampling. Bottled water and hydration drinks (e.g., Gatorade®) may be consumed in the staging area

PFAS Sampling Protocols	
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	only. - Personnel involved with sample collection and handling should wear nitrile gloves at all times while collecting and handling samples or sampling equipment. Avoid handling unnecessary items with nitrile gloves. A new pair of gloves must be donned prior to collecting each sample. - Wash hands with Alconox or Liquinox and deionized water after leaving vehicle before setting up at a soil sampling location.
1.6	- Avoid wearing clothing laundered with fabric softeners. - Avoid wearing new clothing (recommended 6 washings since purchase). Clothing made of cotton is preferred. - Avoid using cosmetics, moisturizers, hand creams, or other related products as part of cleaning/showering on the day of sampling. - Avoid using sunscreens or insect repellants that are not natural or chemical free.
2.2	- LDPE and/or glass containers should not be used for sampling. Teflon®-lined caps should also not be used during sample collection. Instead, HDPE or polypropylene containers are acceptable for sample storage. HDPE or polypropylene caps are acceptable. Do not homogenize soil in aluminum pie pans. Use a decontaminated stainless steel bowl. - Stainless steel tools should not be wrapped in aluminum foil after decontaminating prior to and in between uses. - Homogenize the soil sample in a decontaminated, stainless steel bowl and place in an appropriate laboratory-provided sample container (as listed above) following the collection of VOC, VPH or GRO samples.
2.2.3	Do not use Teflon® liners for direct push sampling methods. Cellulose acetate butyrate (CAB) liners are acceptable.
2.2.7	Homogenize the soil sample in a decontaminated, stainless steel bowl and place in an appropriate laboratory-provided sample container (as listed above) following the collection of VOC, VPH or GRO samples.
2.3	Samples for PFAS analysis must be shipped at <10°C. Standard coolers are acceptable.

¹PFAS have been used as an additive in the manufacturing of LDPE to smooth rough surfaces.