Groundwater Monitoring Well Installation and Sampling

Progress Rail Spill Incident # 12-0773
4012 SR 509 South Frontage Road
Tacoma, Pierce County, Washington

April 15, 2014
Terracon Project No. 81127060

Prepared for:
Progress Rail Services
Tacoma, Washington

Prepared by:
Terracon Consultants, Inc.
Mountlake Terrace, Washington

Terracon

April 15, 2014

Progress Rail Services
4012 SR 509 South Frontage Road
Tacoma, Washington 98421

Attn: Mr. Scott Jagger

Re: Groundwater Monitoring Well Installation and Sampling
Progress Rail Spill Incident # 12-0773
4012 SR 509 South Frontage Road
Tacoma, Pierce County, Washington
Terracon Project No. 81127060

Dear Mr. Jagger:

Terracon Consultants, Inc. (Terracon) has prepared this *Groundwater Monitoring Well Installation and Sampling Report* at the above-referenced site. These services were performed in accordance with Terracon Proposal No. P81140021 dated January 31, 2014.

We appreciate the opportunity to perform these services for Progress Rail Services. Please contact either of the undersigned at (425) 771-3304 if you have questions regarding the information provided in the report.

Sincerely,

Terracon Consultants, Inc.

Eric A. Dubcak
Project Manager

Matt Wheaton, L.G., E.I.T.
Department Manager

Sabine Datum
Staff Geologist

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1.0 INTRODUCTION

1.1 Site Description

The site is located at 4012 SR 509 South Frontage Road in Tacoma. Washington (Pierce County Parcel No. 2001867000). which is located on a larger parent tract of land owned by the Port of Tacoma (Pierce County Parcel No. 0320021002) and leased by Progress Rail Services. A topographic map indicating the approximate location of the entire site is included as Figure 1. a Site Diagram depicting the area of the site with the exploration locations is included as Figure 2. and a Groundwater Gradient Map is included as Figure 3 in Appendix B.

1.2 Previous Investigations and Project Background

Terracon Consultants. Inc. (Terracon) previously performed a Limited Site Investigation (LSI). and a Supplemental Investigation and Remedial Excavation associated with the March 2012 diesel spill (Incident # 12-0773) as discussed in detail in our previous reports:

> *Draft Limited Site Investigation, Progress Rail, 4012 SR 509 South Frontage Road, Tacoma, Pierce County, Washington, dated January 28, 2013; and*
>
> *Supplemental Investigation & Remedial Excavation, Progress Rail Spill Incident #12-0773, 4012 SR 509 South Frontage Road, Tacoma, Pierce County, Washington, dated March 11, 2014.*

As a function of the backfill process of the Supplemental Investigation and Remedial Excavation activities, Terracon applied an enhanced bio-remediation agent (Advanced (ORC-A®) to soil in the saturated zone along the length of the excavation area. The enhanced bioremediation enhances the native microbial population through the introduction of oxygen in to the subsurface, which in turn promotes the metabolism of residual petroleum hydrocarbons.

In an attempt to further assess the extents of the groundwater impacts (identified in prior assessments completed by others), establish the on-site groundwater migration direction, and to monitor the effectiveness of the bio-remediation application, Terracon recommended the installation of two additional permanent groundwater monitoring wells to augment the existing two groundwater monitoring wells.

2.0 SCOPE OF SERVICES

Terracon's scope of work was conducted in accordance with the Environmental Consulting Agreement between Terracon and Progress Rail Services dated June 12, 2013 and Terracon's Proposal No. P81140021, dated January 31, 2014. Our scope of services included completion of the following tasks:

- Preparation of a Work Plan, a site specific Health and Safety Plan (HASP), pre-mobilization planning, and public utility locates.
- Advancement of two soil borings and collection of a maximum of one soil sample from each boring.
- Installation of two permanent groundwater monitoring wells within each soil boring to provide for the collection of groundwater samples. Collection of one groundwater sample from the two newly installed groundwater monitoring wells and the two existing groundwater monitoring wells (MW-1 and MW-2). Completion of measurements of top-of-casing (TOC) elevations on all four monitoring wells to a referenced datum.
- Laboratory analyses of soil and groundwater samples.
- Preparation of this Groundwater Monitoring Installation and Sampling Report summarizing the results of our findings.

2.1 Project Objectives

The objectives of this phase of the project were to evaluate the potential presence of diesel and/or oil-range total petroleum hydrocarbons (TPH) in soil and/or groundwater in the vicinity and in an inferred down-gradient position of the documented spill incident. Due to the unknown local groundwater migration direction, the completed groundwater monitoring wells will be measured to an established datum to obtain local groundwater migration directions. The topographic gradient suggests that groundwater migration is towards the east-northeast.

2.2 Standard of Care

Terracon's services were performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time period. Terracon makes no warranties, either express or implied, regarding the findings, conclusions or recommendations. Please note that Terracon does not warrant the work of laboratories, regulatory agencies or other third parties supplying information used in the preparation of the report. These groundwater installation services were performed in accordance with the scope of work agreed with you, our client, as reflected in our proposal and were not restricted by ASTM E1903-11.

2.3 Additional Scope Limitations

This report was intended to reduce, but not eliminate, uncertainty regarding the existence of recognized environmental conditions in connection with the subject site. Findings, conclusions and recommendations resulting from these services are based upon information derived from the on-site activities and other services performed under this scope of work; such information is subject to change over time. Certain indicators of the presence of hazardous substances, petroleum products, or other constituents may have been latent, inaccessible, unobservable, non-detectable or not present during these services, and we cannot represent that the site contains no hazardous substances, toxic materials, petroleum products, or other latent conditions beyond those identified during this groundwater installation activities. Subsurface conditions may vary from those encountered at the time of construction or at specific borings or wells or during other surveys, tests, assessments, investigations or exploratory services. The data, interpretations, findings, and our recommendations are based solely upon data obtained at the time and within the scope of these services. If, during future site development, different subsurface conditions from those encountered during our explorations are observed or appear to be present, we must be advised promptly so that we can review these conditions and reconsider or modify our conclusions and recommendations where necessary.

2.4 Reliance

This report has been prepared for the exclusive use of Progress Rail Services, and any authorization for use or reliance by any other party (except a governmental entity having jurisdiction over the site) is prohibited without the express written authorization of Progress Rail Services and Terracon. Any unauthorized distribution or reuse is at Progress Rail Service's sole risk. Notwithstanding the foregoing, reliance by authorized parties will be subject to the terms, conditions, and limitations stated in the proposal, Groundwater Monitoring Well Installation report, and the Environmental Consulting Agreement. The limitation of liability defined in the terms and conditions is the aggregate limit of Terracon's liability to Progress Rail Services and all relying parties unless otherwise agreed in writing.

3.0 METHODOLOGY

Methods used to complete this report were developed based on information provided by the client, the previously performed LSI and Supplemental Investigation and Remedial Excavation, and from our experience on similar projects in the site vicinity. A conceptual model of hydrogeologic and environmental conditions was developed based on site geology and hydrogeology. The conceptual model included the following key elements:

- Probable subsurface conditions would consist of non-native fill material consisting of gravelly sand to approximately 2 to 5 feet bgs overlying silty sand and sandy silt.

- The estimated depth to groundwater would be 2 to 7 feet below ground surface. Based on topography, the inferred groundwater migration direction would be to the east-northeast.
- The probable location of potential on-site impaired media would be in the vicinity of the reported spill and former excavation area;
- Potential hydrocarbon constituents would consist of diesel- and/or oil- range TPH.

Based on these conceptual subsurface conditions, direct-push drilling methods were selected for completion of subsurface exploration activities. Investigation activities are summarized below.

4.0 FIELD INVESTIGATION

Terracon has a 100% commitment to the safety of all its employees. As such, and in accordance with our *Incident and Injury Free*® safety goals, Terracon conducted the fieldwork under a site specific health and safety plan developed for this project. Work was performed using the Occupational Health and Safety Administration (OSHA) Level D work attire consisting of hard hats, safety glasses, protective gloves, and protective boots. In an effort to locate underground utilities in the work area, Terracon contacted the Washington State Utility Notification Center to arrange for public underground utility clearance for the proposed borings. In addition, a private utility location service was subcontracted by Terracon to identify the locations and depths of the various utilities located within the structure to avoid damage to such utilities.

On February 11, 2014, Terracon Staff Geologist Adam Stauffer mobilized to the site to conduct field activities. A total of two soil borings, identified as B-12 and B-13, were advanced using a truck mounted direct-push technology (DPT) drill rig supplied and operated by Holocene Drilling, Inc. of Puyallup, Washington, a Washington State-licensed driller. The borings were advanced using a direct-push sampler equipped with disposable acetate sample sleeves. Throughout the drilling operation, soil samples were obtained continuously (to the extent practical) from 4-foot long pushes driven into the ground using a 500-foot-pound, percussion hammer. The steel sampling tube was extracted from the hole and the liners were removed and split open. Non-disposable sampling equipment was cleaned using an Alconox® wash and potable water prior to the beginning of the project.

The soil borings were completed with permanent groundwater monitoring wells MW-3 (B-12) and MW-4 (B-13). Specifically, MW-3 was advanced northeast of the locomotive wash pad to an approximate depth of 15 feet bgs. MW-4 was advanced between the locomotive shop and the locomotive wash pad to an approximately depth of 16 feet. At the time of drilling, the locations selected for the groundwater monitoring wells were based on the assumption that the

groundwater flow direction was consistent with the topographic gradient, towards the northeast. Monitoring well MW-4 was placed within the limits of the reported plume and in an effort to establish a down-gradient point of compliance MW-3 was placed to the northeast of the reported plume area. Figure 2 - Site Diagram indicates the approximate locations of the explorations in relation to general site boundaries (Appendix A).

A field log of each exploration was maintained, including the thickness and depth of each soil unit encountered and the depth to the uppermost water table. Soil samples were observed to document soil lithology, color, and moisture content. Soils were logged in general accordance with American Society for Testing and Materials (ASTM) Practice Designation D-2488, *Standard Practice for Description of Soils (Visual-Manual Procedure)*. Boring logs are included in Appendix B.

4.1 Soil Sampling

A total of two soil samples, one from boring B-12/MW-3 and three from boring B-13/MW-4, were submitted for laboratory analysis. Soil samples were collected from the capillary fringe zone at depths of approximately 4 ½ to 5 feet bgs. Two additional soil samples were collected from B-13/MW-4 at 6 ½ to 7 ½ feet bgs and at 11 to 12 feet bgs, which were put on hold pending laboratory analysis of the shallower samples.

Soil samples were extracted by hand from the acetate sleeve sampler using disposable gloves and placed directly into laboratory supplied glassware.

Each sample container was labeled with the project number, date, time, boring number, and sample number. Sample containers were placed in a chilled cooler immediately after sampling, and subsequently expedited to the analytical laboratory by Terracon under strict chain-of-custody procedures.

4.2 Field Screening Methods

Soil samples from select depths were field-screened using a MiniRAE 3000 photoionization detector (PID). Samples were screened by first segregating a minimum of one ounce of soil into a sealed plastic bag. The samples in the sealed bag were then set aside to allow potential volatilization from the sample to accumulate. Headspace analysis was performed by subsequently puncturing each plastic bag with the probe of the PID to estimate the concentration of volatile components partitioned into the atmosphere ("headspace") within the plastic bag.

The PID was calibrated with isobutylene gas (100 ppm). The highest digital readout value displayed by the instrument was recorded for each sample (the results are integrated into the boring logs in Appendix B). The value recorded for the PID indicates the total vapor concentration of volatile organic compounds (VOCs) with ionization potentials less than the energy produced by the ionizing radiation source (ultraviolet lamp) of the PID. These compounds include numerous volatile constituents of petroleum hydrocarbons. However, the PID is not capable of determining the species of these compounds or their concentrations in the soil samples. Consequently, the PID is considered merely a screening tool that aids in detecting the presence of volatile soil contaminants.

4.3 Monitoring Well Installation and Groundwater Sampling

The two soil borings were completed as permanent groundwater monitoring wells, MW-3 and MW-4. Each groundwater monitoring well consists of a 2-inch inside diameter, schedule 40 flush-threaded PVC pipe. The groundwater monitoring wells were equipped with a 10-foot section of 0.010-inch slotted screen, mated to an appropriate length section of blank riser, which extended to approximately 0.25 feet below the ground surface. The annular space between the well casing and screen and the borehole wall was filled with #10-20 silica sand to approximately one foot above the screened interval. A hydrated bentonite seal was placed above this, and the wells were completed at the ground surface with lockable, flush-mount monuments that were cemented in place. The monitoring wells were constructed in accordance with the Washington State *Minimum Standards for Construction and Maintenance of Wells* (Washington Administrative Code (WAC) 173-160). Monitoring well construction details are provided along with the boring logs in Appendix C.

Following construction, the two newly installed monitoring wells were subsequently developed by purging with a peristaltic pump. Approximately 10 gallons of development water was generated during the development.

Subsequent to well development activities, the location and casing elevation of monitoring wells MW-3 and MW-4 were measured to a referenced elevation point. The northeast corner of the locomotive shop was used as the referenced elevation point.

Following the development of the wells, a total of four groundwater samples, one sample from each on-site monitoring well (MW-1, MW-2, MW-3, and MW-4), were collected on February 17, 2014. Prior to sample collection, groundwater levels in the wells were measured with an electric water level indicator. Subsequently, monitoring wells were purged until consistent values (i.e., less than 10% variance between consecutive readings) were obtained for pH, turbidity, dissolved oxygen, oxidation-reduction potential, and conductivity using a multi-parameter water quality meter equipped with a flow through cell.

Groundwater samples from the wells were collected with a peristaltic pump utilizing low flow techniques. Dedicated polyethylene tubing was placed within the submerged screened interval of the well. Discharge from the peristaltic pump was directed into laboratory provided glassware.
Each sample container was labeled with the project number, date, time, well number, and sample number. Sample containers were placed in a chilled cooler immediately after sampling, and subsequently transported to the analytical laboratory by Terracon under strict chain-of-custody procedures.

Investigation-derived waste (IDW) consisting of soil cuttings, development groundwater, and equipment cleaning water generated during the field activities were placed in Department of Transportation (DOT) approved 55-gallon steel drums, sealed and appropriately labeled with project-specific information and initial accumulation date. A total of one 55-gallon drum and one 16-gallon drum were generated during this investigation. As discussed in the proposal, soil and groundwater IDW may require off-site disposal.

4.4 Analytical Laboratory Testing

A total of two soil samples and four groundwater samples were submitted for chemical analysis to Friedman & Bruya of Seattle, Washington, a Washington State-accredited laboratory. The soil and groundwater samples were analyzed for diesel- and oil-range TPH using Northwest Method NWTPH-Dx. The executed chain-of-custody forms and laboratory analytical certificates are provided in Appendix D. All analyses were completed using standard turnaround times.

Data packages were checked for completeness immediately upon receipt from the laboratory to ensure that data and QA/QC information requested were present. Data quality was assessed by considering holding times, surrogate recovery, method blanks, matrix spike and matrix spike duplicate recovery, and detection limits.

5.0 FIELD INVESTIGATION RESULTS

5.1 Geology/Hydrogeology

Detailed lithologic descriptions are presented on the soil boring logs included in Appendix C. In general, subsurface soil conditions consisted of approximately 1 to 5 feet of non-native fill material consisting of gravel with sand, silty sand, and sand overlying native sand with varying amounts of silt to maximum depths explored. Soils were generally found to be in a moist grading to saturated condition. During drilling activities groundwater was encountered at approximately 4 feet bgs. During groundwater sampling activities the groundwater level in the

wells was measured between 2.4 and 2.7 feet bgs (also refer to Table 1 in Appendix A for measured groundwater levels).

Based on the groundwater monitoring well casing elevations and measured depths to groundwater in the wells, Terracon prepared a groundwater gradient map (included as Figure 3 in Appendix A). Although based on topography the groundwater gradient had been estimated to flow towards the east-northeast, based on our interpretation of the elevation data and depth to groundwater measurements during this sampling event, groundwater appears to flow towards the west-southwest; however, groundwater conditions can fluctuate seasonally. In addition, due to the close proximity to Commencement Bay, the site vicinity may be influenced by tidal processes.

5.2 Field Screening

The PID field screening results are summarized on the boring logs in Appendix C. Elevated readings were not detected in soil collected from borings B-1 through B-4. Sheens, staining, and visual or olfactory indications of contamination were not observed on any of the soil samples and/or groundwater samples.

5.3 Analytical Results

A total of two soil samples and four groundwater samples were analyzed for diesel- and oil-range TPH using Northwest Method NWTPH-Dx. The executed chain-of-custody forms and laboratory analytical certificates are provided in Appendix D. Additional discussion and interpretation of analytical results relative to applicable cleanup levels are discussed below.

The maximum allowable contaminant levels in the State of Washington are defined in the Model Toxics Control Act (WAC 173-340), referred to as MTCA. Applicable cleanup levels under MTCA can be developed using either Method A tabulated values or using Method B and Method C risk-based formulations. Method A and Method B cleanup levels allow for unrestricted land use, including residential use. Method C cleanup levels apply only to industrial properties as defined in WAC 173-340-745. We have compared the analytical results to the Method A cleanup levels for the purposes of this report.

5.4 Soil Sampling Results

A total of two soil samples, one from each of the two borings, were submitted to the analytical laboratory and were analyzed for diesel- and oil-range TPH. Diesel- and oil-range TPH were not identified above laboratory reporting limits in the two samples. Soil quality is summarized in Table 2 of Appendix A.

5.5 Groundwater Sampling Results

A total of four groundwater samples were submitted to the laboratory and analyzed for diesel- and oil-range TPH. Diesel-range TPH was detected in all four groundwater samples collected and oil-range TPH was additionally detected in the groundwater sample collected from MW-4. All concentrations detected were below the MTCA Method A cleanup levels. Groundwater quality is summarized in Table 3 of Appendix A

5.6 Quality Assurance/Quality Control Results

The analytical results for the current investigation were checked for completeness immediately upon receipt from the laboratory to ensure that data and QA/QC information requested were present. Data quality was assessed by considering hold times, surrogate recovery, method blanks, matrix spike and matrix spike duplicate (MS/MSD) recovery, and detection limits. QA/QC review was completed using guidance described in *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (Draft Final, USEPA, 2005). Our evaluation assumes that the QA/QC is correct as reported by the laboratory, and merely provides an interpretation of the QA/QC results.

Hold Times. All analyses were completed within specified hold times.

Surrogate Recoveries. All surrogate recoveries were within laboratory limits.

Method Blanks. Analytes were not detected in any of the laboratory method blanks.

MS/MSD Results. MS and MSD recoveries were all within laboratory limits, and Relative Percent Differences (RPDs) between MS and MSD recoveries were all within laboratory limits.

Laboratory Reporting Limits. Reporting limits were below MTCA cleanup levels.

The diesel-range TPH analytical result from all groundwater samples collected and the oil-range TPH results from MW-4 were flagged based on the sample chromatographic pattern not resembling the fuel standard used for quantitation. Since the concentrations detected are below MTCA Method A cleanup levels, repeated analyses of the samples with a silica-gel cleanup was not performed. Silica-gel cleanup removes naturally occurring organics that can interfere with analytical results.

Based upon our interpretation of quality control information provided by the laboratories, it is our opinion that the overall dataset is useable as qualified for the purposes of this investigation.

6.0 FINDINGS AND CONCLUSIONS

Terracon completed groundwater monitoring well installation for the above-referenced site. A total of two borings (B-12 and B-13) were advanced at the site. Soil borings B-12 and B-13 were completed with permanent groundwater monitoring wells, identified as groundwater monitoring wells MW-3 and MW-4, respectively. Prior to sampling, all on-site groundwater monitoring wells (MW-1 through MW-4) were surveyed by Terracon. Based on groundwater elevation data collected groundwater appears to be migrating toward the west-southwest.

A total of two soil samples and four groundwater samples were analyzed for diesel and oil-range TPH. Diesel and oil-range TPH were not detected above laboratory detection limits in any of the soil samples collected. Diesel-range TPH was detected in all groundwater samples collected at concentrations between 74 µg/l and 390 µg/l. Oil-range TPH was detected only in the groundwater sample collected from groundwater monitoring well MW-4 at a concentration of 410 µg/l. These concentrations are below the MTCA Method A cleanup levels of 500 µg/l for diesel- and oil-range TPH. Since the laboratory flagged the groundwater samples based on the sample chromatographic pattern not resembling the fuel standard used for quantitation, Terracon infers that analyzing groundwater samples with a silica-gel cleanup may have lowered or eliminated the identified concentrations.

Based on the current groundwater results, the concentrations within the central portion of the plume, near MW-4, have reduced significantly as compared to the grab sample collected by others. It appears that the removal of the source area and the installation of the ORC has likely had a positive effect.

7.0 RECOMMENDATIONS

Based on the findings of this assessment, it does not appear that site soil has been impacted by the spill incident beyond the previous excavation in the areas investigated. Although one soil grab sample was collected and contained diesel-range TPH concentrations above MTCA cleanup levels, similar concentrations have not been identified in other areas associated with this release. Although concentrations of diesel- and/or oil-range TPH were identified in groundwater samples collected from the four permanent groundwater monitoring wells, the concentrations were below MTCA Method A cleanup levels. As previously proposed, Terracon will coordinate to complete a second round of groundwater sampling in May 2014 to identify TPH concentrations and the groundwater gradient, which can fluctuate seasonally and may be influenced by tidal processes.

APPENDIX A
TABLES

Table 1 – Groundwater Elevations

Table 2 – Summary of Soil Analytical Results

Table 3 – Summary of Groundwater Analytical Results

TABLE 1

SUMMARY OF DEPTH TO GROUNDWATER MEASUREMENTS
Progress Rail Spill Incident # 12-0773
4012 SR 509 South Frontage Road
Tacoma, Pierce County, Washington

Well Number	Sample Date	TOC Elevation (Feet)	Depth to Water (Feet)	Relative Groundwater Elevation (Feet)
MW-1	8/16/2013	98.24	5.70	92.54
	2/17/2014	98.24	2.41	95.83
MW-2	8/16/2013	98.95	5.85	93.10
	2/17/2014	98.95	2.54	96.41
MW-3	2/17/2014	99.33	2.52	96.81
MW-4	2/17/2014	98.96	2.71	96.25

TABLE 2

SUMMARY OF SOIL ANALYTICAL RESULTS - TPH DX

Progress Rail Spill Incident # 12-0773
4012 SR 509 South Frontage Road
Tacoma, Pierce County, Washington

all concentrations are in milligrams per kilogram

Boring ID	Sample Number	Sample Collected By:	Sample Date	Sample Depth (feet)	TPH DX (NWTPH DX)	
					Diesel-Range	Oil-Range
West end Sample		Panhandle	3/7/12	NA	**44**	**210**
South side sample			3/7/12	NA	ND<26	ND <51
East end sample			3/7/12	NA	**5,500**	**900**
North side sample			3/7/12	NA	ND <24	ND <54
B-1	S-1	Terracon	11/15/12	4.5	ND (<50)	ND (<250)
B-1	S-2		11/15/12	7.5	ND (<50)	ND (<250)
B-2	S-1		11/15/12	3.5	ND (<50)	ND (<250)
B-2	S-2		11/15/12	7.5	ND (<50)	ND (<250)
B-3	S-1		11/15/12	4	ND (<50)	ND (<250)
B-3	S-2		11/15/12	8	ND (<50)	ND (<250)
B-7	S-1		11/15/12	5.5	ND (<50)	ND (<250)
B-7	S-2		11/15/12	7.5	ND (<50)	ND (<250)
B-9	S-1		11/15/12	5.5	ND (<50)	ND (<250)
B-9	S-2		11/15/12	7.5	ND (<50)	ND (<250)
B-10	S-1		8/3/13	4.5-5.5	ND (<50)	ND (<250)
B-11	S-1		8/3/13	3.5-4.5	ND (<50)	ND (<250)
B-12	S-1		2/11/14	4.5-5.5	ND (<50)	ND (<250)
B-13	S-1		2/11/14	4.5-5.5	ND (<50)	ND (<250)
MTCA Method A Cleanup Level					**2,000**	**2,000**

Note: Values reported above detection limits are in bold.
Shaded cells are values that exceed cleanup levels.

TPH - total petroleum hydrocarbons
MTCA - Model Toxics Control Act
< - Constituent detected below the reportable detection limit (RDL)
ND - Not detected above RDL.

TABLE 3

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - TPH DX

Progress Rail Spill Incident # 12-0773
4012 SR 509 South Frontage Road
Tacoma, Pierce County, Washington

all concentrations are in micrograms per liter

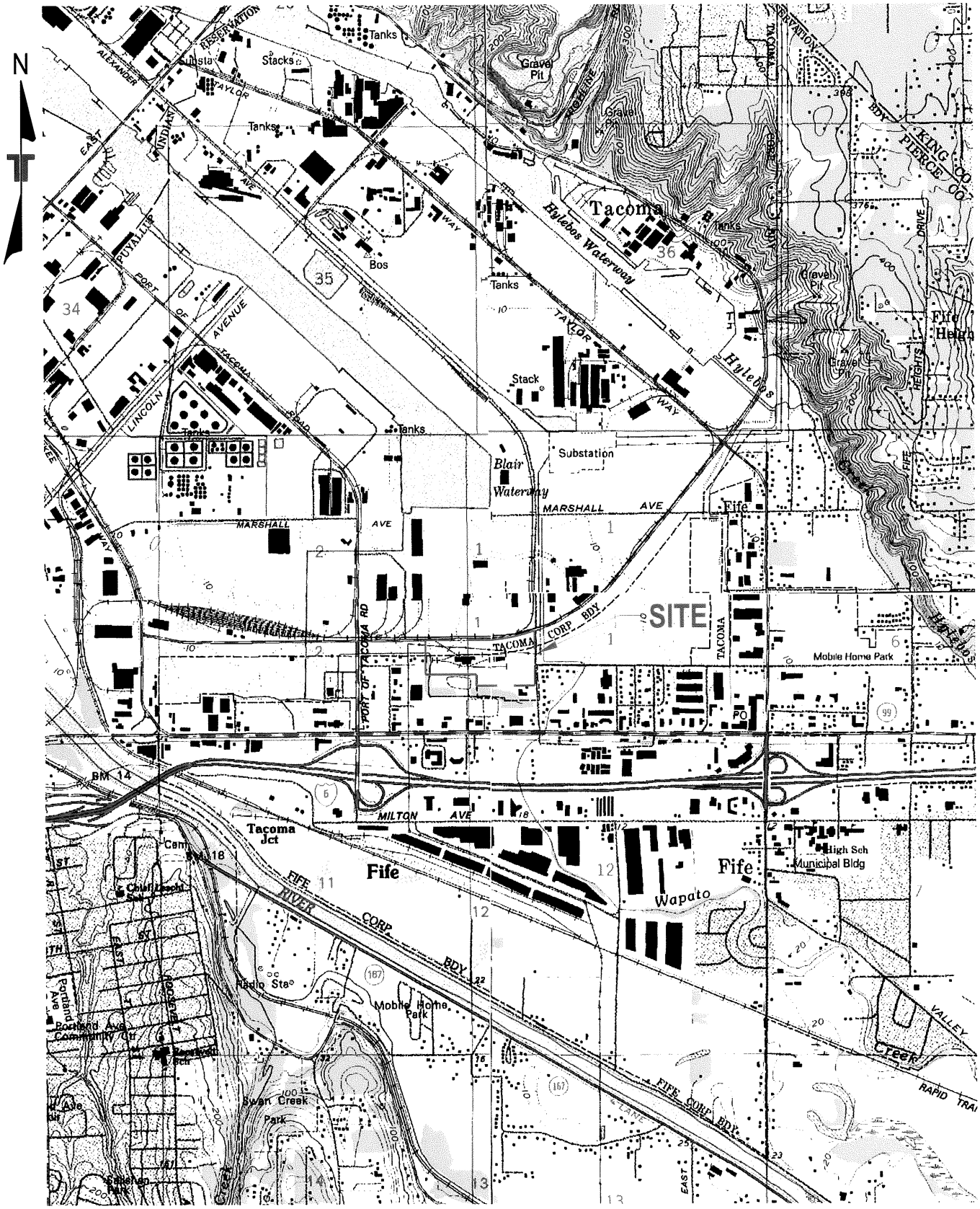
Sample	Sampled Collected By:	Sample Date	TPH DX (NWTPH DX)	
			Diesel-Range	Oil-Range
DP-1	Panhandle	5/22/12	**2,300**	**1,000**
DP-2		5/22/12	**450**	**700**
DP-4		5/22/12	**560**	**1,500**
B-1	Terracon	11/15/12	**220x**	ND <250
B-2		11/15/12	**140x**	ND <250
B-3		11/15/12	**380x**	ND <250
B-4		11/15/12	**330x**	**390x**
B-5		11/15/12	**5,800**	**9,800x**
B-7		11/15/12	**900x**	**760x**
B-9		11/15/12	**140x**	ND <250
MW-1		8/16/13	**62x**	ND <250
		2/17/14	**150x**	ND <250
MW-2		8/16/13	**94x**	ND <250
		2/17/14	**200x**	ND <250
MW-3		2/17/14	**74x**	ND <250
MW-4		2/17/14	**390x**	**410x**
MTCA Method A Cleanup Level			**500**	**500**

Note: Values reported above detection limits are in bold.
Shaded cells are values that exceed cleanup levels.

TPH - total petroleum hydrocarbons
MTCA - Model Toxics Control Act
x - the sample chromaticgraph pettern does not resemble the fuel standard for quantitation

APPENDIX B

Figure 1 - Topographic Map
Figure 2 - Site Diagram
Figure 3 - Groundwater Contour Map



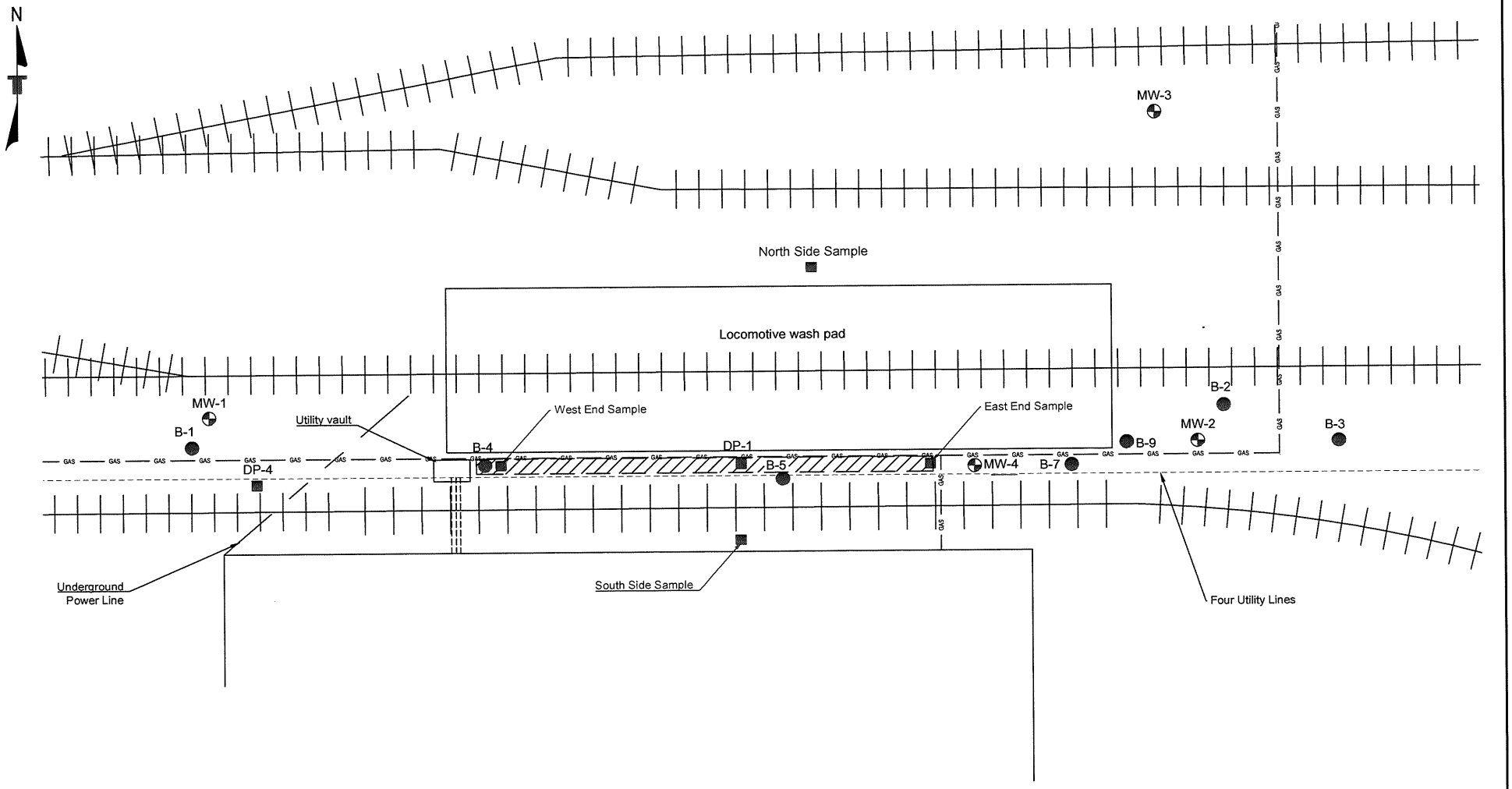
LEGEND:

— — — — Approximate site boundary

USGS Topographic Map, Tacoma North, Tacoma South, Poverty Bay, and Puyallup Quadrangles, 1994

Project Mngr: LCS	Project No. 81127060	Terracon Consulting Engineers and Scientists	**Topographic Map**
Drawn By: EMP	Scale: Not to scale	21905 64th Avenue W., Ste 100 Mountlake Terrace, WA 98043	Progress Rail Spill Incident #12-0773
Checked By: LCS	File No.	PH. (425) 771-3304 FAX. (425) 771-3549	4012 SR 509 South Frontage Road
Approved By: MYW	Date: March 2014		Tacoma. Pierce County. Washington

FIG. No. 1



Boring completed by Terracon

Monitoring well completed by Terracon

Boring completed by others

Excavation completed by others

20 0 5 10 20

SCALE IN FEET

Information from previous investigation was provided to Terracon by Progress Rail

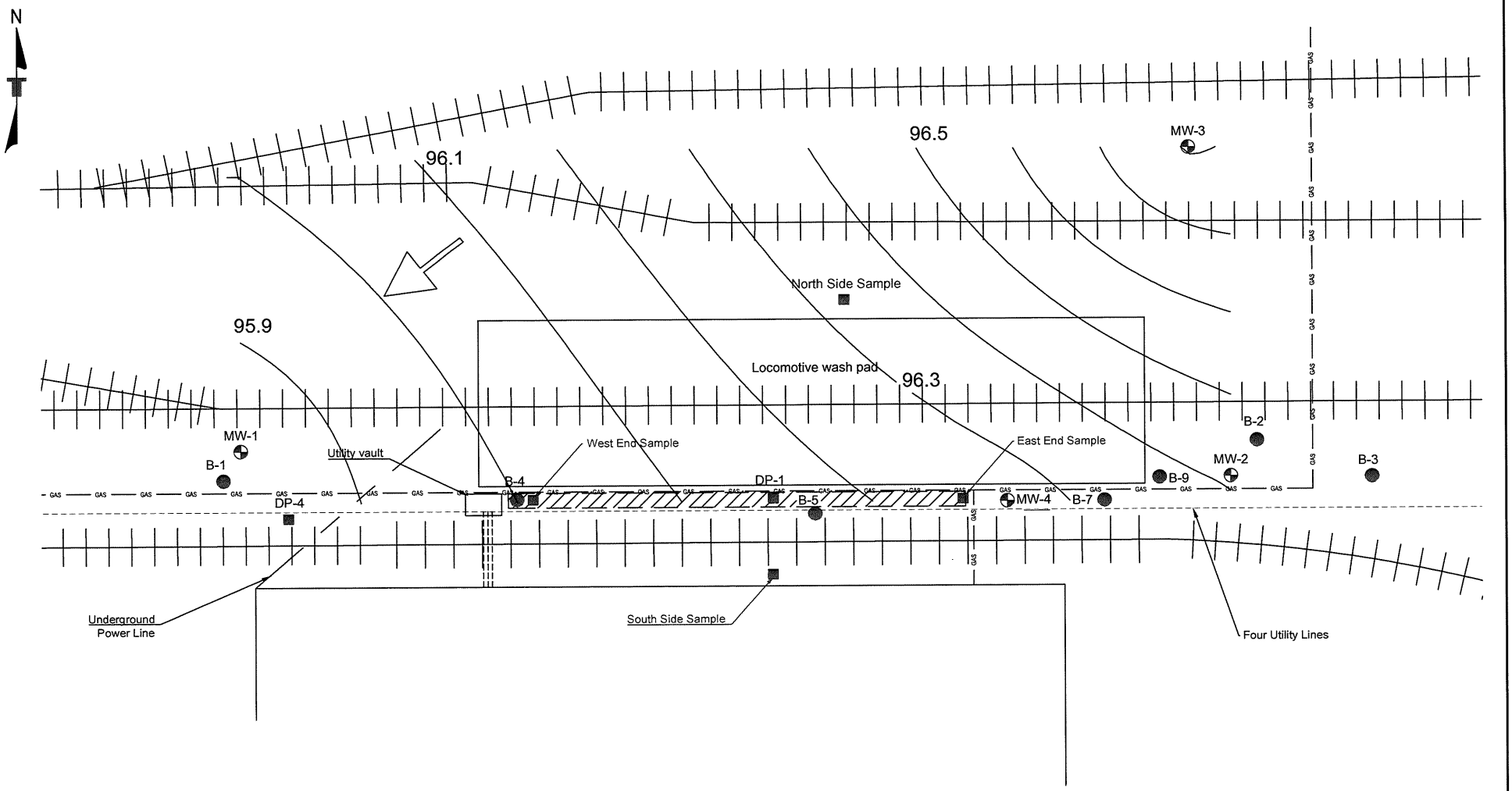
Project Mngr:	EAD
Drawn By:	EAD
Checked By:	EAD
Approved By:	MYW
Project No.	8112-060
Scale:	As shown
File No.	
Date:	March 2014

Terracon
Consulting Engineers and Scientists
21905 64th Avenue W. Ste 100 Mountlake Terrace, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

SITE DIAGRAM

Progress Rail Site
4012 SR 509 South Frontage Road
Tacoma. Pierce County. Washington

FIG. No. 2



Boring completed by Terracon

Monitoring well completed by Terracon

Boring completed by others

Excavation completed by others

Groundwater migration direction

20 0 5 10 20

SCALE IN FEET

Information from previous investigation was provided to Terracon by Progress Rail

Project Mngr:	EAD
Drawn By:	EAD
Checked By:	EAD
Approved By:	MYW
Project No.	8112-060
Scale:	Not to scale
File No.	
Date:	March 2014

Terracon
Consulting Engineers and Scientists
21905 64th Avenue W. Ste 100 Mountlake Terrace, WA 98043
PH. (425) 771-3304 FAX. (425) 771-3549

GROUNDWATER CONTOUR MAP

Progress Rail Site
4012 SR 509 South Frontage Road
Tacoma. Pierce County. Washington

FIG. No. 3

APPENDIX C

Boring Logs

WELL LOG NO. MW-3/B-12

PROJECT: Progress Rail Services Spill
Incident #12-0773

CLIENT: Progress Rail Services
Tacoma, WA

SITE: 4012 SR 509 South Frontage Road
Tacoma, Washington

LOCATION: NE of NE corner of locomotive wash pad

GRAPHIC LOG	DEPTH		INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample ID
	1.0	**GRAVEL (GP)**. with sand. light brown. moist (FILLI); post holed to depth to allow direct push advance					
	4.0	**SILTY SAND (SM)**. gray brown. moist (FILLI) 3" of rust colored laminations with marbled pattern					PID <1.0ppm
	8.0	**SAND (SP)**. trace silt. gray. saturated 2" organic/wood debris; organic odor		5	▽		S-1 PID <1.0ppm
	16.0	NO RECOVERY; slough in sampler; saturated		10			PID <1.0ppm
		Boring Terminated at 16 Feet		15			

Stratification lines are approximate. In-situ. the transition may be gradual.

Well ID BHV-706

Advancement Method:
Direct Push

Abandonment Method:

Notes:

WATER LEVEL OBSERVATIONS

▽ *Water level at 4.5 feet while drilling*

Terracon
21905 64th Ave. W. Suite 100
Mountlake Terrace. Washington

Well Started: 2/11/2014 | Well Completed: 2/11/2014

Drill Rig: AMS Powerprobe 9500 D | Driller: Holocene

Project No.: 81127060

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-WELL BORING LOGS 081313.GPJ TERRACON_STD_TEMPLATE.GDT 2/26/14

WELL LOG NO. MW-4/B-13

PROJECT: Progress Rail Services Spill Incident #12-0773

CLIENT: Progress Rail Services Tacoma, WA

SITE: 4012 SR 509 South Frontage Road Tacoma, Washington

LOCATION: N of NE corner of locomotive shop

DEPTH	GRAPHIC LOG		INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample ID
0		**GRAVEL (GP)**. with sand. brown. moist grading to saturated (FILL). post holed to depth with hand auger due to utilities nearby					
3.0		**SAND (SW)**. trace silt. brown. saturated (FILL)			▽		
4.8		**SAND (SM)**. with silt. gray. saturated		5			S-1
		color change to dark gray/black					PID 1.3ppm
							PID 1.6ppm
		color change to gray		10			PID 1.4ppm
12.0		NO RECOVERY		15			
16.0		***Boring Terminated at 16 Feet***					

Stratification lines are approximate. In-situ. the transition may be gradual.

Well ID BHV-707

Advancement Method: Direct Push

Abandonment Method:

Notes:

WATER LEVEL OBSERVATIONS

▽ *Water level at 4 feet while drilling*

Terracon
21905 64th Ave. W. Suite 100
Mountlake Terrace. Washington

Well Started: 2/11/2014 | Well Completed: 2/11/2014

Drill Rig: AMS Powerprobe 9500 D | Driller: Holocene

Project No.: 81127060

APPENDIX D

ANALYTICAL REPORTS AND CHAIN OF CUSTODY

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Kurt Johnson, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

February 18, 2014

Eric A. Dubcak, Project Manager
Terracon
Pacific Cascade Building
21905 64th Ave. W., Suite 100
Mountlake Terrace, WA 98043

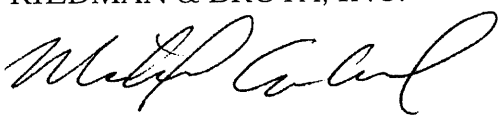
Dear Mr. Dubcak:

Included are the results from the testing of material submitted on February 11, 2014 from the Progress Rail 81127060, F&BI 402119 project. There are 4 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
TRC0218R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on February 11, 2014 by Friedman & Bruya, Inc. from the Terracon Progress Rail 81127060, F&BI 402119 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Terracon
402119 -01	B-12,S-1,4.5-5
402119 -02	B-13,S-1,4.5-5
402119 -03	B-13,S-2,6.5-7.5
402119 -04	B-13,S-3,11-12

All quality control requirements were acceptable.

Date of Report: 02/18/14
Date Received: 02/11/14
Project: Progress Rail 81127060, F&BI 402119
Date Extracted: 02/13/14
Date Analyzed: 02/13/14

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 53-144)
B-12,S-1,4.5-5 402119-01	<50	<250	121
B-13,S-1,4.5-5 402119-02	<50	<250	122
Method Blank 04-292 MB	<50	<250	121

Date of Report: 02/18/14
Date Received: 02/11/14
Project: Progress Rail 81127060, F&BI 402119

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: 402145-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	101	85	64-133	17

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	97	58-147

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

A1 – More than one compound of similar molecule structure was identified with equal probability.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for this range fell outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte indicated may be due to carryover from previous sample injections.

d - The sample was diluted. Detection limits may be raised due to dilution.

ds - The sample was diluted. Detection limits are raised due to dilution and surrogate recoveries may not be meaningful.

dv - Insufficient sample was available to achieve normal reporting limits and limits are raised accordingly.

fb - Analyte present in the blank and the sample.

fc – The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. The variability is attributed to sample inhomogeneity.

ht - Analysis performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of normal control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j – The result is below normal reporting limits. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.

jr - The rpd result in laboratory control sample associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the compound indicated is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc – The sample was received in a container not approved by the method. The value reported should be considered an estimate.

pr – The sample was received with incorrect preservation. The value reported should be considered an estimate.

ve - Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

402119

SAMPLE CHAIN OF CUSTODY

ME 2/11/14

B01

Page # 1 of 1

Send Report To Eric Dubcak

Company Terracon

Address 21905-64th Ave W, Ste. 100

City, State, ZIP Mountlake Terrace, WA 98043

Phone # 425-771-3304 Fax #

SAMPLERS (signature)

PROJECT NAME/NO. Progress Rail 61127060

PO #

REMARKS email results to Eric Dubcak edubcak@terracon.com

TURNAROUND TIME
- [X] Standard (2 Weeks)
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [X] Dispose after 30 days
- [ ] Return samples
- [ ] Will call with instructions

Sample ID	Lab ID	Date	Time	Sample Type	# of containers	ANALYSES REQUESTED: TPH-Diesel w/silica gel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS						Notes
B-12, S-1, 4½-5	01	2-11-14	08:52	Soil	1	X											
B-13, S-1, 4½-5	02	"	11:10	"	1	X											
B-13, S-2, 6½-7½	03	"	11:15	"	1											→	HOLD SAMPLE
B-13, S-3, 11-12	04	"	11:13	"	1											→	HOLD SAMPLE

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

FORMS\COC\COC.DOC

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Adam A. Stauffer	Terracon	2-11-14	15:15
Received by:		Kurt Johnson	F-B-B	2/11/14	15:15
Relinquished by:					
Received by:					

Samples received at 12 °C

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Kurt Johnson, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

February 24, 2014

Eric A. Dubcak, Project Manager
Terracon
Pacific Cascade Building
21905 64th Ave. W., Suite 100
Mountlake Terrace, WA 98043

Dear Mr. Dubcak:

Included are the results from the testing of material submitted on February 18, 2014 from the 81127060, F&BI 402225 project. There are 4 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
TRC0224R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on February 18, 2014 by Friedman & Bruya, Inc. from the Terracon 81127060, F&BI 402225 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Terracon
402225-01	MW-1-021714
402225-02	MW-2-021714
402225-03	MW-3-021714
402225-04	MW-4-021714

All quality control requirements were acceptable.

Date of Report: 02/24/14
Date Received: 02/18/14
Project: 81127060, F&BI 402225
Date Extracted: 02/18/14
Date Analyzed: 02/19/14

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 51-134)
MW-1-021714 402225-01	150 x	<250	92
MW-2-021714 402225-02	200 x	<250	95
MW-3-021714 402225-03	74 x	<250	107
MW-4-021714 402225-04	390 x	410 x	108
Method Blank 04-341 MB2	<50	<250	105

Date of Report: 02/24/14
Date Received: 02/18/14
Project: 81127060, F&BI 402225

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	87	100	58-134	14

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

A1 – More than one compound of similar molecule structure was identified with equal probability.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for this range fell outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte indicated may be due to carryover from previous sample injections.

d - The sample was diluted. Detection limits may be raised due to dilution.

ds - The sample was diluted. Detection limits are raised due to dilution and surrogate recoveries may not be meaningful.

dv - Insufficient sample was available to achieve normal reporting limits and limits are raised accordingly.

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fc – The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. The variability is attributed to sample inhomogeneity.

ht - Analysis performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of normal control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j – The result is below normal reporting limits. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.

jr - The rpd result in laboratory control sample associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the compound indicated is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc – The sample was received in a container not approved by the method. The value reported should be considered an estimate.

pr – The sample was received with incorrect preservation. The value reported should be considered an estimate.

ve - Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

402225

SAMPLE CHAIN OF CUSTODY

ME 02/18/14 COS

Send Report To Eric Pubcak
Company Terracon
Address 21905-64TH Ave W, Ste 100
City, State, ZIP Mountlake Terrace, WA 98043
Phone #425-771-3304 Fax #

SAMPLERS (signature)
PROJECT NAME/NO. Progress Rail B1127060
PO #
REMARKS email to eabubcak@terracon.com

Page # 1 of 1

TURNAROUND TIME
- [x] Standard (2 Weeks)
- [ ] RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Dispose after 30 days
- [ ] Return samples
- [ ] Will call with instructions

Sample ID	Lab ID	Date	Time	Sample Type	# of containers	ANALYSES REQUESTED: TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS						Notes
MW-1-021714	01	2-17-14	14:02	GW	1	X											
MW-2-021714	02	"	15:00	"	1	X											
MW-3-021714	03	"	14:29	"	1	X											
MW-4-021714	04	"	15:20	"	1	X											

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

FORMS\COC\COC.DOC

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Adam Stauffer	Terracon	2-18-14	07:40
Received by:		James Bruya	F&B	2/18/14	0740
Relinquished by:					
Received by:					

Samples received at 3 °C