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From: Brian Tracy, PE and John Herzog, PhD, LG

Date: March 17, 2014

File: 5147-006-09

Subject: Upland Soil Data Gap Analysis and Proposed Soil Boring Locations for Dakota Creek Industries Shipyard, Port of Anacortes

INTRODUCTION

This memorandum evaluates the existing soil and groundwater data for the Dakota Creek Industries Shipyard (Site) located in Anacortes, Washington to identify potential data gaps for completion of the ongoing remedial investigation. Proposed soil sampling locations and analysis are recommended to fill the identified data gaps. A Remedial Investigation/Feasibility Study (RI/FS) Work Plan was completed in 2008 (GeoEngineers, 2008) in which data gaps in the historical site data that was collected prior to the Ecology Agreed Order were identified. The goal of the Work Plan was to fill the identified data gaps to complete the environmental characterization of the Site. Sampling and analysis was completed in general accordance with the Work Plan and remedial actions to address sediment contamination and redevelopment of portions of the Site have been completed. Samples collected as part of the formal RI revealed additional data gaps with respect to the nature and extent of contamination in upland soil. Additional groundwater monitoring, completed in 2013 identified that only some of the contamination identified in Site soils resulted in groundwater exceedances of the preliminary cleanup levels. The focus of this data gap and fulfillment analysis is to further characterize the soil contaminants that have been shown to impact groundwater. These data are necessary to complete the RI and to evaluate remedial alternatives in the FS for the Site.

SITE DESCRIPTION

The Site is located at 115 Q Avenue in Anacortes, Washington and is an active shipyard used for new vessel construction and vessel repair. The property is bounded by Port of Anacortes Pier 1 to the west and Pier 2 to the east, 3rd Street on the south, and the Guemes Channel to the north. The Site is subject to cleanup actions under Ecology Agreed Order No. DE-07TCPHQ-5080 (Ecology, 2007). The Port is the respondent to the Agreed Order, being the primary owner of the Site property.

Dakota Creek Industries (DCI) uses the shipyard facility for vessel construction and maintenance activities. Features at the Site include: a pier (part of Pier 1), two outfitting docks (the “L Dock” and the “East Dock”), a dry dock, a marine railway (now defunct), a synchrolift, upland fabrication areas, shops, a sandblast grit storage shed, warehouses and storage areas. Vessel construction and maintenance activities at the Site include metal fabrication, abrasive blasting, painting, and pressure washing. Paved areas of the Site include portions of the property south of the synchrolift and main building complex and areas along Pier 1. The remainder of the site is not paved however in most areas there is a maintained roadbed-like hard surface that is used for vehicle transport inside the facility and for fabrication layout and heavy equipment transit. The shipyard property is contained within a secured fence with guarded entrances.

PREVIOUS UPLAND INVESTIGATIONS AND CLEANUP

Multiple investigations and cleanup actions have been conducted at the Site. Previous investigations of upland soil and groundwater include:

- Excavation and confirmation sampling associated with underground storage tank (UST) removal (A-1 Pump, 1991);
- Phase 2 Environmental Site Assessment (Otten Engineering, 1997);
- Preliminary Site Assessment (Ecology & Environment for the U.S. Environmental Protection Agency, 2000);
- Excavation confirmation sampling for the removal of the marine railway hydraulic winch and associated soils (Landau Associates, 2001);
- EPA site inspection (Weston, 2001);
- VCP-RI/FS, Cleanup Action Plan (VCP-CAP), and Independent Cleanup Action Completion Report (Landau Associates, 2002a, 2002b, and 2002c);
- Groundwater investigation (Floyd Snider, 2006);
- Final Work Plan, Remedial Investigation/Feasibility Study and Interim Action Work Plan (GeoEngineers, 2008);
- Interim Action Report (GeoEngineers, 2010a);
- Remedial Investigation Data Report (GeoEngineers, 2010b).
- Groundwater monitoring conducted over four sampling event in 2012 through 2013.

The RI/FS Work Plan (GeoEngineers, 2008) includes descriptions of studies and cleanup actions completed prior to 2008. The supplemental groundwater data collected in 2012 and 2013 was provided to Ecology. In 2008, an interim action was completed to remove contaminated marine sediment as a component of Site redevelopment activities. Some of the contaminated soil that was identified in the eastern upland portion of the Site was removed during utility installation as part of the upland Site redevelopment activities.

CONTAMINANTS OF POTENTIAL CONCERN

The 2008 RI/FS Work Plan (GeoEngineers, 2008) identified contaminants of potential concern (COPCs) for the upland soil and groundwater at the Site to include:

- Gasoline-range petroleum hydrocarbons;
- Diesel- and heavy oil-range petroleum hydrocarbons:
- Methyl tertiary-butyl ether (MTBE);
- Dibromoethane, 1-2 (EDB)/Dichloroethane, 1-2 (EDC);
- Semi-volatile organic compounds (SVOCs) including polycyclic aromatic hydrocarbons (PAHs);
- Metals; and

- Dioxins/furans.

PRELIMINARY CLEANUP LEVELS

Preliminary cleanup levels were identified for groundwater and soil in the RI/FS Work Plan in accordance with MTCA requirements. The Site is zoned industrial – manufacturing/shipping, and as discussed previously in this report, the Site is currently used as a shipyard. The Port plans to continue use of the Site for shipbuilding.

Preliminary Groundwater Cleanup Levels

Groundwater at, or potentially affected by, the Site is not used for drinking water at this time and is not a reasonable future source of drinking water due the availability of a municipal water supply and due to its proximity to marine surface water. The potential exposure pathways for Site groundwater include:

- Human ingestion of marine organisms contaminated by releases of affected Site groundwater to adjacent marine surface water.
- Acute or chronic effects to aquatic organisms resulting from exposure to constituents in groundwater discharging to adjacent marine surface water.

Preliminary groundwater cleanup levels were selected from available state and federal surface water criteria according to WAC 173-340-730(3). The most conservative (lowest) published regulatory criterion was identified as the preliminary groundwater cleanup level except if the lowest published regulatory criterion is less than the background concentration, the preliminary groundwater cleanup level was set at the background concentration. Table 6 of the RI/FS Work Plan presents the preliminary cleanup levels for the Site (GeoEngineers, 2008).

Preliminary Soil Cleanup Levels

Potentially complete soil-based exposure pathways exist for humans in the upland area of the Site via incidental soil ingestion, dermal contact with soil, and inhalation of particulates. MTCA Method A and Method C soil Industrial Soil Cleanup Levels are identified for protection of human health. MTCA Method C Industrial Soil Cleanup Levels for protection of groundwater are also identified. The most conservative (lowest) published regulatory criterion was identified as the preliminary soil cleanup level except if the lowest published regulatory criterion is less than the background concentration; the preliminary groundwater cleanup level was set at the background concentration. Table 1 of the RI/FS Work Plan presents the preliminary cleanup levels for the Site (GeoEngineers, 2008).

As agreed with Ecology, a Terrestrial Ecological Evaluation (TEE) is not required for the Site. Although the Site is not paved, in August 2008 Ecology concluded that the majority of surface materials provided little to no habitat value because they are maintained as compacted roadways and work surfaces (GeoEngineers, 2010a).

UPLAND DATA GAP ANALYSIS

The RI/FS Work Plan identified data gaps for completion of the RI/FS, but was completed in 2008 and prior to the interim action and redevelopment of the Site. This upland data gap analysis evaluated existing soil data from the RI/FS Work Plan and RI Data Report along with recent groundwater data collected in 2012 and 2013.

For each contaminant with identified exceedances of preliminary soil cleanup levels, existing soil data was plotted on a figure displaying the depth interval of samples collected and analyzed and whether the result exceeded preliminary soil cleanup levels. The accompanying groundwater data from the 2012 through 2013 for each contaminant is also presented, if available. Summary tables for existing soil analytical results are included in the RI Data Report (GeoEngineers, 2010b). Soil samples taken in areas that have since been excavated and backfilled were not included in this evaluation. Figures were developed to evaluate existing data for the following contaminants that exceeded preliminary soil cleanup levels:

- Arsenic (Figure 1);
- Copper (Figure 2);
- Mercury (Figure 3);
- Nickel (Figure 4);
- Silver (Figure 5);
- Zinc (Figure 6);
- Gasoline-range hydrocarbons (Figure 7);
- Diesel- and heavy oil-range hydrocarbons (Figure 8);
- PAHs (Figure 9);
- Polychlorinated biphenyls (PCBs) (Figure 10); and
- Dioxins/furans (Figure 11).

Arsenic is the only contaminant that exceeded MTCA Method C cleanup levels for protection of human health (direct contact). At locations SB-12 and SB-15, shallow arsenic samples have concentrations higher than the MTCA Method C cleanup level of 88 milligrams per kilogram (mg/kg).

Petroleum hydrocarbons (gasoline-, diesel- and heavy oil-range) in soil exceeded MTCA Method A cleanup levels for industrial use at some locations shown in Figures 7 and 8. Method A cleanup levels for petroleum hydrocarbons are for protection of groundwater and groundwater monitoring did not result in any exceedances for petroleum hydrocarbons. The concentrations of petroleum hydrocarbons in soil do not exceed concentrations protective of human health via direct contact (i.e. ingestion, dermal contact) as documented in Ecology's Calculations for Method A Cleanup Levels (Ecology, 2001).

All other contaminants only exceeded soil cleanup levels for protection of groundwater. Arsenic, nickel and PAHs are the only contaminants in which groundwater concentration exceed preliminary groundwater cleanup levels over four rounds of groundwater sampling conducted in 2012 and 2013 at six monitoring wells.

PCBs were not identified as COPCs in the 2008 RI/FS Work Plan, but limited PCB data was presented in Landau Associates' 2002 RI/FS Report (Landau, 2002b). Results show PCBs concentrations in soil to be less than MTCA Method C cleanup levels for protection of human health. Groundwater has not been analyzed for PCBs.

Contaminants in soil that exceed preliminary soil cleanup levels for protection of groundwater, but groundwater concentrations do not exceed preliminary groundwater cleanup levels are not considered data gaps because a complete exposure pathway has been shown to be incomplete by empirical demonstration.

Based on review of the soil and groundwater existing data, the upland data gaps include:

- Arsenic in soil exceeding MTCA Method C cleanup levels for protection of human health (direct contact);
- Arsenic in soil exceeding preliminary soil cleanup levels that may be a source to groundwater;
- Nickel in soil exceeding preliminary soil cleanup levels that may be a source to groundwater; and
- PAHs in soil exceeding preliminary soil cleanup levels that may be a source to groundwater.

PROPOSED SOIL SAMPLING TO FILL UPLAND SOIL DATA GAPS

For each contaminant identified as a data gap, approximate proposed soil sampling locations were identified to fill the data gap. Figures 12 through 14 present the approximate locations of data gaps for arsenic, nickel and PAHs. Figure 15 illustrates where each approximate data gap is located by overlaying the approximate locations from Figures 12 through 14. Where soil sampling locations for different contaminants are located in close proximity locations were combined into one proposed soil sampling location. Figure 16 presents the proposed soil sampling locations to fill upland soil data gaps.

The proposed soil sampling and analysis will be collected in general accordance with the Ecology-approved work plan (GeoEngineers, 2008) using direct-push (geoprobe) drilling methods. Soil borings will be completed from ground surface to the native geologic layer which is expected to be encountered at 3 to 10 feet below ground surface throughout the Site. Boring locations may need to be modified in the field due to identified utilities or shipbuilding activities. Revised locations will be located as near the proposed location as possible to complete the data gap.

Soil samples will be collected at intervals detailed in Table 1. If visual contamination is identified during field screening, a composite of the contaminated interval will be sampled. Samples will be archived or submitted to an Ecology-approved laboratory as described in Table 1. Archived samples may be analyzed after preliminary analytical results are completed to fill the identified data gaps.

Results of the upland soil data gap investigation will be documented in a memorandum that will be submitted to Ecology to confirm that data gaps have been filled prior to preparing the RI/FS. The complete RI data set will be presented in the RI/FS report.

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BJT:JMH

Attachments:

Table 1. Rationale and Laboratory Analyses for Soil Data Gaps

Figure 1. Extent of Arsenic Contamination

Figure 2. Extent of Copper Contamination

Figure 3. Extent of Mercury Contamination

Figure 4. Extent of Nickel Contamination

Figure 5. Extent of Silver Contamination

Figure 6. Extent of Zinc Contamination

Figure 7. Extent of Gasoline Contamination

Figure 8. Extent of Diesel- and Heavy Oil Contamination

Figure 9. Extent of PAH Contamination

Figure 10. Extent of PCB Contamination

Figure 11. Extent of Dioxin/Furan Contamination

Figure 12. Identification of Arsenic Data Gaps

Figure 13. Identification of Nickel Data Gaps

Figure 14. Identification of PAH Data Gaps

Figure 15. Summary of Upland Soil Data Gaps

Figure 16. Proposed Soil Borings

Table 1
Rationale and Laboratory Analyses for Soil Data Gaps
Port of Anacortes – Dakota Creek Industries

Investigation Identification	Purpose	Boring Depth/Soil Sampling[1]	Expected Fill/Native Contact (bgs)	Proposed Laboratory Analyses for Soil Samples
GEI-1	Step out location to delineate extent of shallow arsenic contamination above cleanup levels protective of human health.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples.	Approx. 7 feet	Archive
GEI-2	Step out location to determine extent of nickel and arsenic potentially impacting groundwater at MW-7. Step out location to delineate extent of shallow arsenic contamination above cleanup levels protective of human health.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples.	Approx. 7 feet	Archive
GEI-3	Determine extent of nickel and arsenic potentially impacting groundwater at MW-7. Potential step out location to delineate extent of shallow arsenic contamination above cleanup levels protective of human health.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 7 feet	Nickel (EPA Method 6010C) Arsenic (EPA Method 6020A)
GEI-4	Determine extent of arsenic and nickel downgradient of MW-7. Step out location to determine extent of nickel potentially impacting groundwater at MW-6.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 7 feet	Nickel (EPA Method 6010C) Arsenic (EPA Method 6020A)
GEI-5	Determine extent of nickel potentially impacting groundwater at MW-6.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 7 feet	Nickel (EPA Method 6010C)
GEI-6	Determine extent of shallow arsenic contamination above cleanup levels protective of human health. Determine extent of nickel and arsenic potentially impacting groundwater at MW-7.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Surface** and the **Water Table** sampling zones for listed analyses.	Approx. 7 feet	Nickel (EPA Method 6010C) Arsenic (EPA Method 6020A)
GEI-7	Determine extent of shallow arsenic contamination above cleanup levels protective of human health. Determine extent of nickel and arsenic potentially impacting groundwater at MW-7.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Surface** and the **Water Table** sampling zones for listed analyses.	Approx. 7 feet	Nickel (EPA Method 6010C) Arsenic (EPA Method 6020A)
GEI-8	Determine extent of nickel and arsenic potentially impacting groundwater at MW-7. Potential step out location to delineate extent of shallow arsenic contamination above cleanup levels protective of human health.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 7 feet	Nickel (EPA Method 6010C) Arsenic (EPA Method 6020A)
GEI-9	Determine extent of shallow arsenic contamination above cleanup levels protective of human health.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Surface** and the **Water Table** sampling zones for listed analyses.	Approx. 7 feet	Arsenic (EPA Method 6020A)
GEI-10	Determine extent of shallow arsenic contamination above cleanup levels protective of human health. Determine extent of nickel potentially impacting groundwater at MW-6 and 3A.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Surface** and the **Water Table** sampling zones for listed analyses.	Approx. 7 feet	Nickel (EPA Method 6010C) Arsenic (EPA Method 6020A)
GEI-11	Determine extent of nickel potentially impacting groundwater at MW-6 and 3A. Step out location to delineate extent of shallow arsenic contamination above cleanup levels protective of human health.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 7 feet	Nickel (EPA Method 6010C)
GEI-12	Step out location to determine extent of shallow arsenic contamination above cleanup levels protective of human health.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Surface** sampling zone for listed analyses.	Approx. 7 feet	Arsenic (EPA Method 6020A)

Table 1
Rationale and Laboratory Analyses for Soil Data Gaps
Port of Anacortes – Dakota Creek Industries

Investigation Identification	Purpose	Boring Depth/Soil Sampling[1]	Expected Fill/Native Contact (bgs)	Proposed Laboratory Analyses for Soil Samples
GEI-13	Determine extent of shallow arsenic contamination above cleanup levels protective of human health.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Surface** sampling zone for listed analyses.	Approx. 7 feet	Arsenic (EPA Method 6020A)
GEI-14	Determine extent of shallow arsenic contamination above cleanup levels protective of human health.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Surface** sampling zone for listed analyses.	Approx. 7 feet	Arsenic (EPA Method 6020A)
GEI-15	Step out location to delineate extent of shallow arsenic contamination above cleanup levels protective of human health. Step out location to determine extent of nickel potentially impacting groundwater at MW-6 and 3A.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples.	Approx. 7 feet	Archive
GEI-16	Step out location to delineate extent of shallow arsenic contamination above cleanup levels protective of human health. Step out location to determine extent of nickel potentially impacting groundwater at MW-6 and 3A.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples.	Approx. 7 feet	Archive
GEI-17	Determine extent of nickel potentially impacting groundwater at downgradient well MW-3A.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 7 feet	Nickel (EPA Method 6010C)
GEI-18	Determine extent of arsenic and nickel potentially impacting groundwater at downgradient well MW-2A.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 9 feet	Nickel (EPA Method 6010C) Arsenic (EPA Method 6020A)
GEI-19	Step out location to determine extent of arsenic and nickel potentially impacting groundwater at downgradient well MW-2A.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples.	Approx. 9 feet	Archive
GEI-20	Step out location to determine extent of nickel potentially impacting groundwater at downgradient wells and/or MW-4.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples.	Approx. 9 feet	Archive
GEI-21	Determine extent of arsenic, nickel and PAH contamination potentially impacting groundwater at MW-4.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 9 feet	Nickel (EPA Method 6010C) Arsenic (EPA Method 6020A) PAHs (EPA Method 8270D/SIM)

Table 1
Rationale and Laboratory Analyses for Soil Data Gaps
Port of Anacortes – Dakota Creek Industries

Investigation Identification	Purpose	Boring Depth/Soil Sampling[1]	Expected Fill/Native Contact (bgs)	Proposed Laboratory Analyses for Soil Samples
GEI-22	Determine extent of arsenic, nickel and PAH contamination downgradient of MW-4.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 9 feet	Nickel (EPA Method 6010C) Arsenic (EPA Method 6020A) PAHs (EPA Method 8270D/SIM)
GEI-23	Step out location to determine extent of arsenic, nickel and PAH contamination downgradient of MW-4.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples	Approx. 9 feet	Archive
GEI-24	Step out location to determine extent of arsenic and nickel contamination at downgradient well MW-2A.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples	Approx. 9 feet	Archive
GEI-25	Determine extent of arsenic and nickel potentially impacting groundwater at downgradient well MW-2A.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 9 feet	Nickel (EPA Method 6010C) Arsenic (EPA Method 6020A)
GEI-26	Determine extent of arsenic and nickel potentially impacting groundwater at downgradient well MW-2A.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 9 feet	Nickel (EPA Method 6010C) Arsenic (EPA Method 6020A)
GEI-27	Step out location to determine extent of arsenic, nickel, and PAH contamination downgradient of MW-4.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples	Approx. 9 feet	Archive
GEI-28	Determine extent of arsenic, nickel and PAH contamination potentially impacting groundwater at MW-4.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 9 feet	Nickel (EPA Method 6010C) Arsenic (EPA Method 6020A) PAHs (EPA Method 8270D/SIM)
GEI-29	Step out location to determine extent of arsenic and nickel contamination in downgradient wells MW-2A.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples	Approx. 9 feet	Archive
GEI-30	Step out location to determine extent of arsenic and nickel contamination in downgradient wells MW-2A.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples	Approx. 9 feet	Archive

Table 1
Rationale and Laboratory Analyses for Soil Data Gaps
Port of Anacortes – Dakota Creek Industries

Investigation Identification	Purpose	Boring Depth/Soil Sampling[1]	Expected Fill/Native Contact (bgs)	Proposed Laboratory Analyses for Soil Samples
GEI-31	Step out location to determine extent of arsenic and nickel contamination in downgradient wells MW-2A.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples	Approx. 9 feet	Archive
GEI-32	Step out location to determine extent of arsenic contamination in groundwater upgradient of MW-1.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples	Approx. 9 feet	Archive
GEI-33	Step out location to determine extent of arsenic contamination contributing to groundwater.	Advance boring to 10 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples	Approx. 9 feet	Archive
GEI-34	Step out location to determine extent of arsenic contamination contributing to groundwater.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples	Approx. 7 feet	Archive
GEI-35	Step out location to determine extent of arsenic contamination in groundwater potentially impacting groundwater at MW-1.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples	Approx. 7 feet	Archive
GEI-36	Determine extent of arsenic contamination potentially impacting groundwater at MW-1.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 7 feet	Arsenic (EPA Method 6020A)
GEI-37	Determine extent of arsenic contamination in groundwater downgradient of MW-1.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 7 feet	Arsenic (EPA Method 6020A)
GEI-38	Determine extent of arsenic contamination potentially impacting groundwater at MW-1.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 7 feet	Arsenic (EPA Method 6020A)
GEI-39	Step out location to determine extent of arsenic contamination potentially impacting groundwater at MW-1.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive Samples	Approx. 7 feet	Archive
GEI-40	Step out location to determine extent of arsenic contamination contributing to groundwater.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples	Approx. 7 feet	Archive

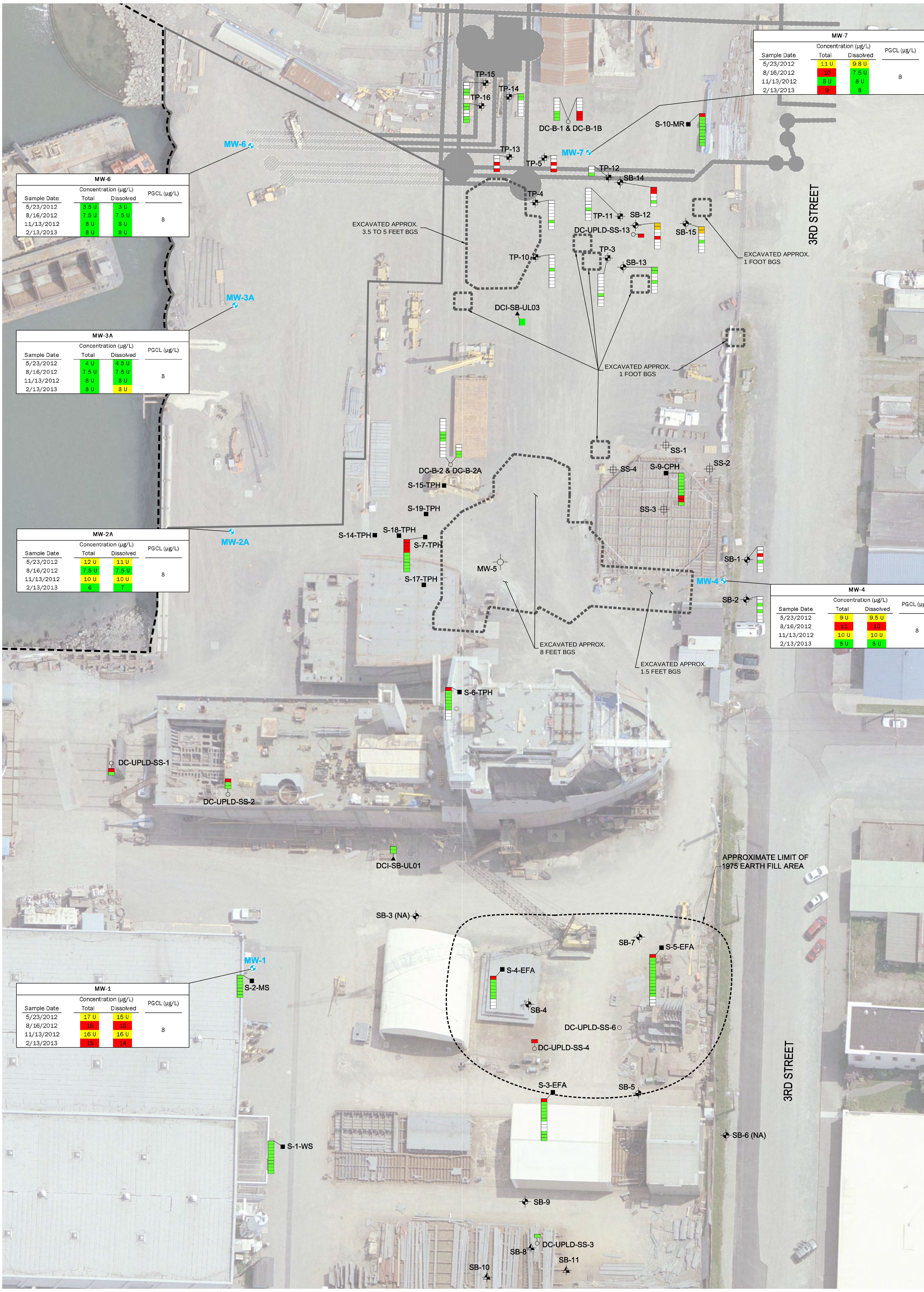
Table 1
Rationale and Laboratory Analyses for Soil Data Gaps
Port of Anacortes – Dakota Creek Industries

Investigation Identification	Purpose	Boring Depth/Soil Sampling[1]	Expected Fill/Native Contact (bgs)	Proposed Laboratory Analyses for Soil Samples
GEI-41	Step out location to determine extent of arsenic contamination contributing to groundwater.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples	Approx. 7 feet	Archive
GEI-42	Determine extent of arsenic contamination potentially impacting groundwater at MW-1.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Submit samples collected from the **Water Table** sampling zone for listed analyses.	Approx. 7 feet	Arsenic (EPA Method 6020A)
GEI-43	Step out location to determine extent of arsenic contamination contributing to groundwater.	Advance boring to 8 feet bgs or 1 foot below fill/native contact (whichever is deeper). Archive samples	Approx. 7 feet	Archive

Notes:

[1] Sampling intervals will vary based on conditions found at each boring location. At each sampling location, samples will be collected for potential chemical analysis from four sampling zones (**Surface** [generally 0 to 1 feet bgs], **Vadose** [approximately middle of vadose zone], **Water Table** [saturated soil at the top of water table], and **Native** [native soil at fill/native contact]). If visual contamination is observed during field screening, that sample interval will be collected and submitted for analysis. All samples collected will be archived for potential future analysis based on the results of the analyses listed above.

bgs below ground surface



MW-7

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	11 U	9.8 U	8
8/16/2012	10	7.5 U	
11/13/2012	8 U	8 U	
2/13/2013	9	8	

MW-6

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	3.5 U	3 U	8
8/16/2012	7.5 U	7.5 U	
11/13/2012	8 U	8 U	
2/13/2013	8 U	8 U	

MW-3A

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	4 U	4.5 U	8
8/16/2012	7.5 U	7.5 U	
11/13/2012	8 U	8 U	
2/13/2013	8 U	8 U	

MW-2A

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	12 U	11 U	8
8/16/2012	7.5 U	7.5 U	
11/13/2012	10 U	10 U	
2/13/2013	6	7	

MW-4

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	9 U	9.5 U	8
8/16/2012	11	10	
11/13/2012	10 U	10 U	
2/13/2013	8 U	8 U	

MW-1

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	17 U	15 U	8
8/16/2012	15	15	
11/13/2012	16 U	16 U	
2/13/2013	15	14	

Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

- GEI-1 Groundwater Monitoring Well
- 11 Detected concentration or MRL below preliminary groundwater cleanup level.
- 12 U Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.
- 7.5U Detected concentration exceeds preliminary groundwater cleanup level.

Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

- Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.
- No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.
- Orange shading of the sample depth interval indicates that containment was detected at concentrations greater than the preliminary cleanup level for protection of human health.
- Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.
- Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.
- Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
2. Locations for which the total depth of sub-surface exploration is not known, the depth of the deepest sample at the location for which analysis was performed represents the total depth of exploration.
3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

NA	Not Analyzed
BGS	Below Ground Surface
PGCL	Preliminary Groundwater Cleanup Level
U	Analyte not detected above laboratory reporting limit
µg/L	micrograms per liter

30 0 30
FEET

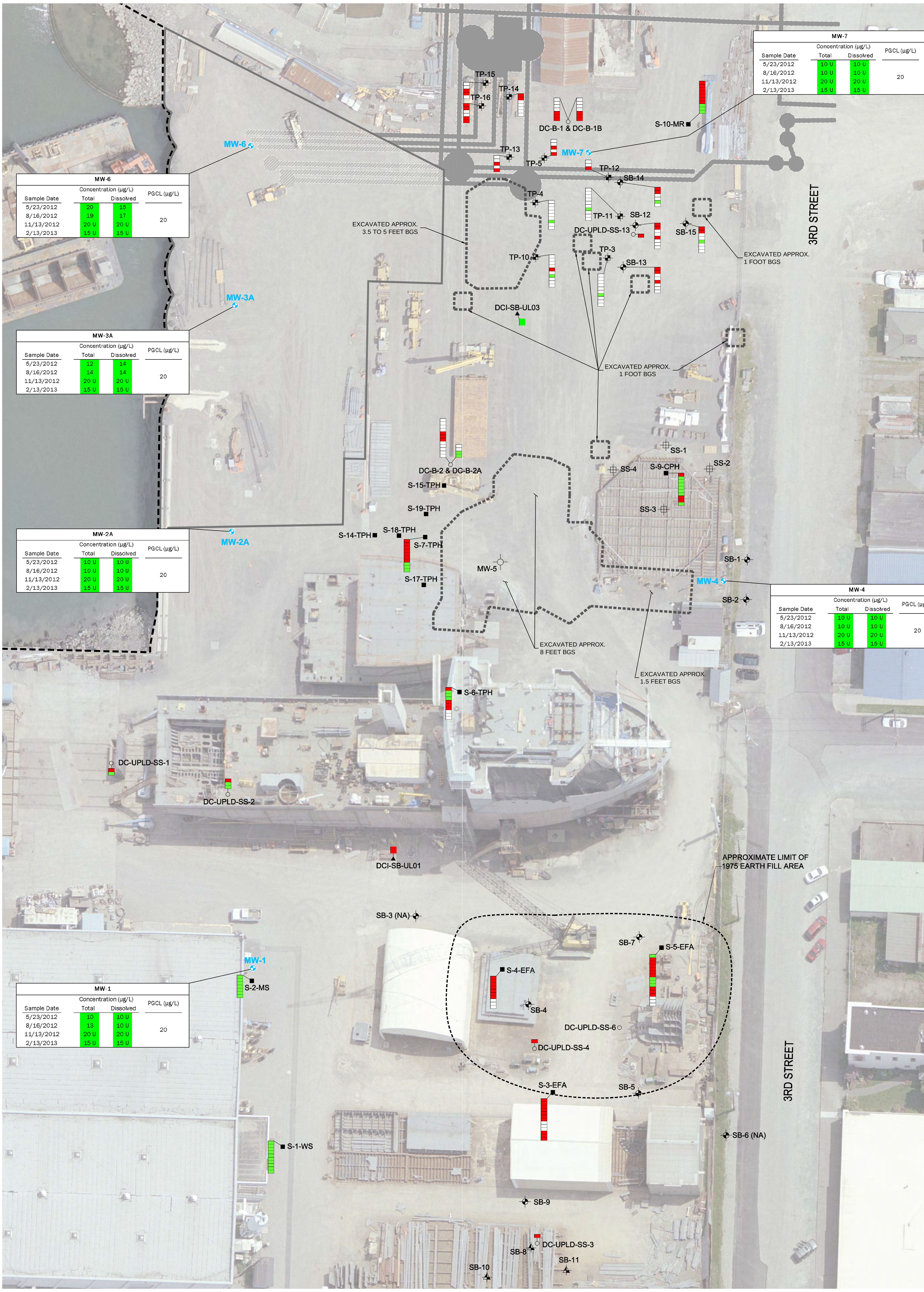
Extent of Arsenic Contamination

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 1

P:\5\5147006\09\CAD\514700609 All Contaminants Figs 1-15.dwg\TAB:Arsenic Modified by tmichaud on Mar 10, 2014 - 13:28



MW-6

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	20	15	20
8/16/2012	19	17	
11/13/2012	20 U	20 U	
2/13/2013	15 U	15 U	

MW-3A

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	12	14	20
8/16/2012	14	14	
11/13/2012	20 U	20 U	
2/13/2013	15 U	15 U	

MW-2A

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	10 U	10 U	20
8/16/2012	10 U	10 U	
11/13/2012	20 U	20 U	
2/13/2013	15 U	15 U	

MW-1

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	10	10 U	20
8/16/2012	13	10 U	
11/13/2012	20 U	20 U	
2/13/2013	15 U	15 U	

MW-7

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	10 U	10 U	20
8/16/2012	10 U	10 U	
11/13/2012	20 U	20 U	
2/13/2013	15 U	15 U	

MW-4

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	10 U	10 U	20
8/16/2012	10 U	10 U	
11/13/2012	20 U	20 U	
2/13/2013	15 U	15 U	

Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

- GEI-1 Groundwater Monitoring Well
- 11 Detected concentration or MRL below preliminary groundwater cleanup level.
- 12 U Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.
- 7.5U Detected concentration exceeds preliminary groundwater cleanup level.

Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

- Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.
- No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.
- Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.
- Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.
- Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
2. Locations for which the total depth of sub-surface exploration is not known, the depth of the deepest sample at the location for which analysis was performed represents the total depth of exploration.
3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

NA Not Analyzed
BGS Below Ground Surface
PGCL Preliminary Groundwater Cleanup Level
U Analyte not detected above laboratory reporting limit
µg/L micrograms per liter

30 0 30
FEET

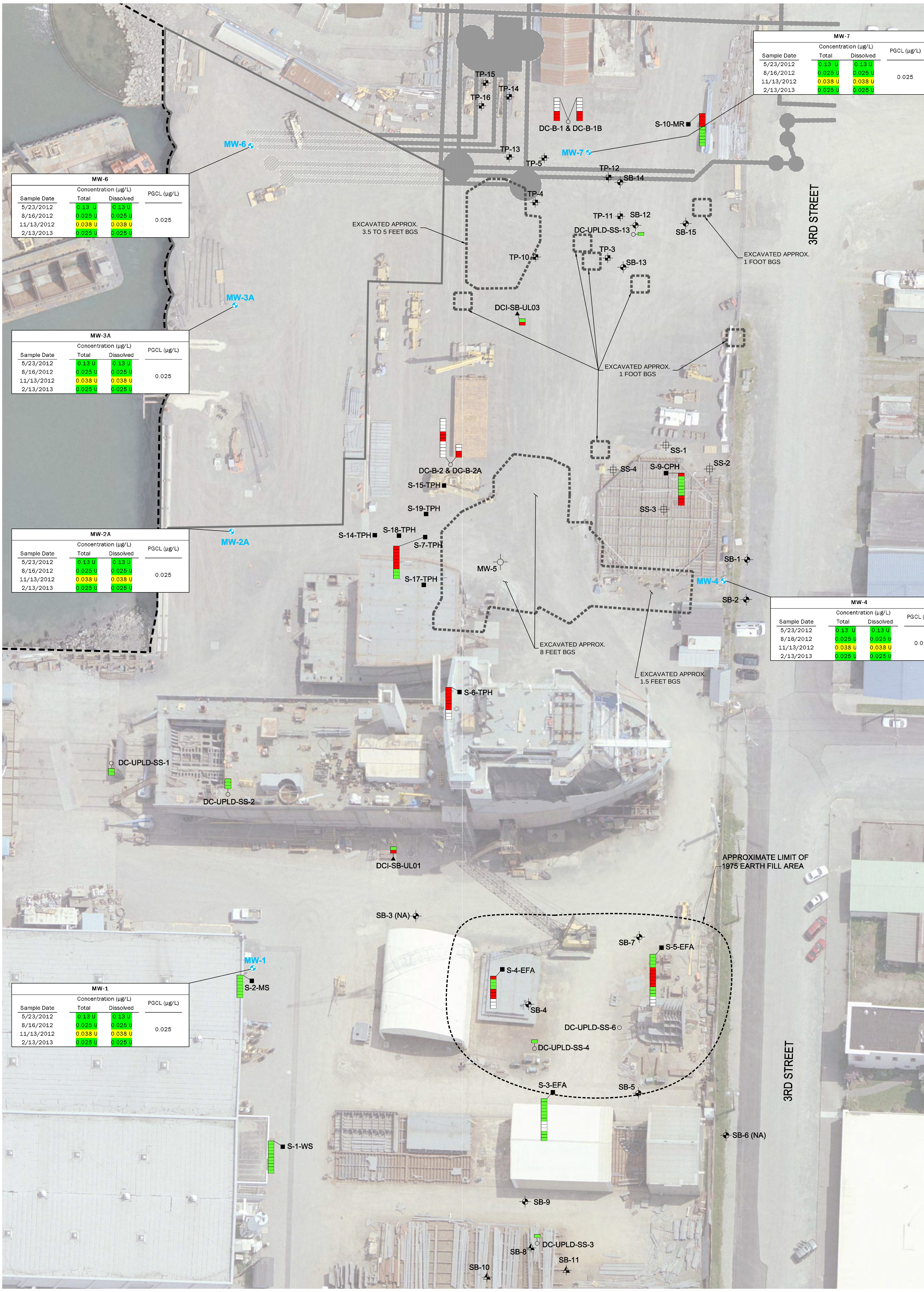
Extent of Copper Contamination

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GeoEngineers

Figure 2

P:\15\1547006\09\CAD\1547006\09 All Contaminants Figs 1-15.dwg\TAB:Copper modified by tmichaud on Mar 10, 2014 - 13:30



MW-6

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	0.13 U	0.13 U	0.025
8/16/2012	0.025 U	0.025 U	
11/13/2012	0.038 U	0.038 U	
2/13/2013	0.025 U	0.025 U	

MW-7

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	0.13 U	0.13 U	0.025
8/16/2012	0.025 U	0.025 U	
11/13/2012	0.038 U	0.038 U	
2/13/2013	0.025 U	0.025 U	

MW-3A

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	0.13 U	0.13 U	0.025
8/16/2012	0.025 U	0.025 U	
11/13/2012	0.038 U	0.038 U	
2/13/2013	0.025 U	0.025 U	

MW-2A

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	0.13 U	0.13 U	0.025
8/16/2012	0.025 U	0.025 U	
11/13/2012	0.038 U	0.038 U	
2/13/2013	0.025 U	0.025 U	

MW-4

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	0.13 U	0.13 U	0.025
8/16/2012	0.025 U	0.025 U	
11/13/2012	0.038 U	0.038 U	
2/13/2013	0.025 U	0.025 U	

MW-1

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	0.13 U	0.13 U	0.025
8/16/2012	0.025 U	0.025 U	
11/13/2012	0.038 U	0.038 U	
2/13/2013	0.025 U	0.025 U	

Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

- GEI-1 Groundwater Monitoring Well
- 11 Detected concentration or MRL below preliminary groundwater cleanup level.
- 12 U Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.
- 7.5U Detected concentration exceeds preliminary groundwater cleanup level.

Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

- Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.
- No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.
- Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.
- Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.
- Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
2. Locations for which the total depth of sub-surface exploration is not known, the depth of the deepest sample at the location for which analysis was performed represents the total depth of exploration.
3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

NA Not Analyzed
BGS Below Ground Surface
PGCL Preliminary Groundwater Cleanup Level
U Analyte not detected above laboratory reporting limit
µg/L micrograms per liter

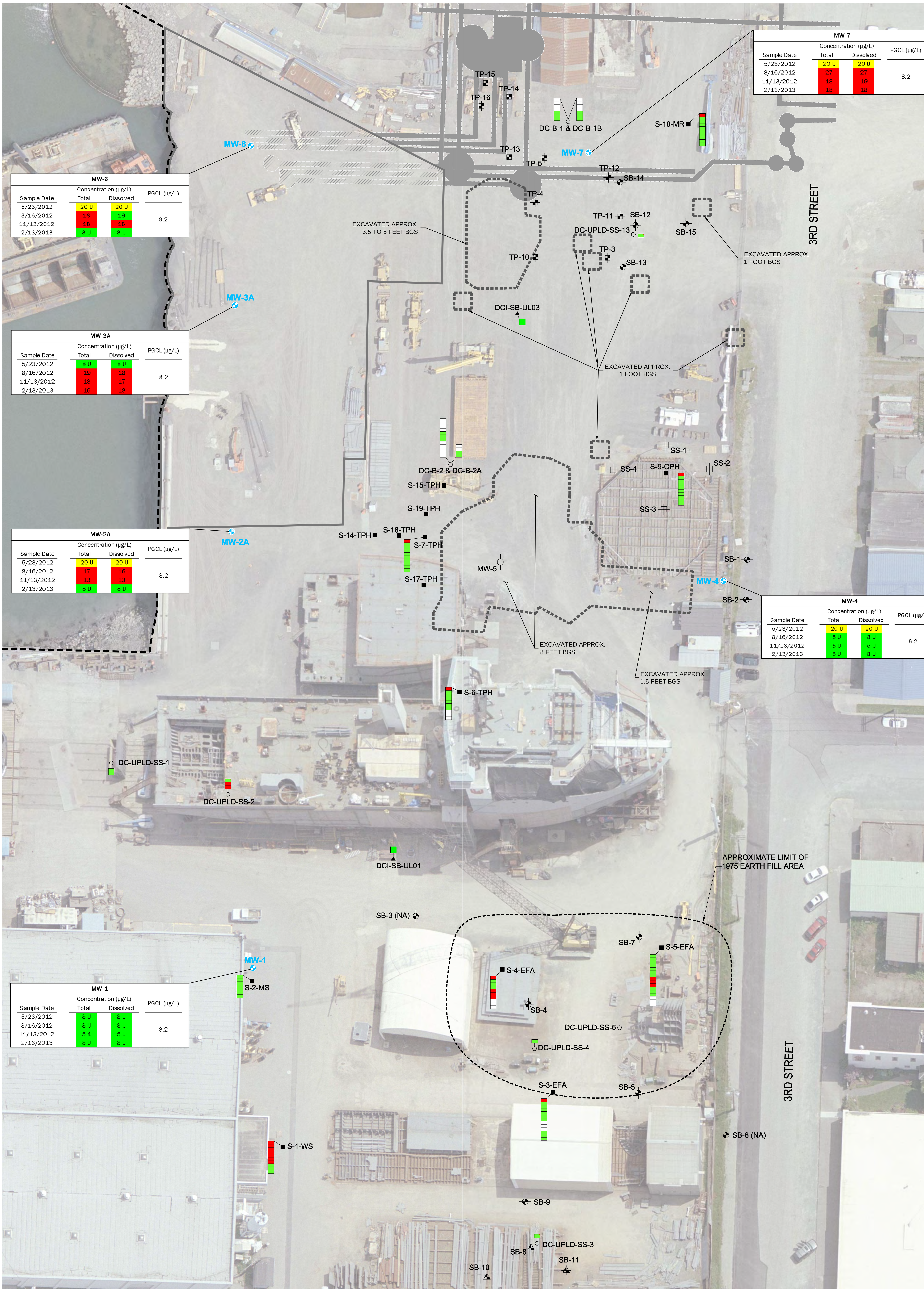
Extent of Mercury Contamination

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 3

P:\5\5147006\09\CAD\514700609 ALL CONTAMINANTS FIGS 1-15.DWG\TAB:MERCURY MODIFIED BY TMICHAUD ON MAR 10, 2014 - 13:31



MW-6

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	20 U	20 U	8.2
8/16/2012	18	19	
11/13/2012	18	18	
2/13/2013	8 U	8 U	

MW-7

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	20 U	20 U	8.2
8/16/2012	27	27	
11/13/2012	18	19	
2/13/2013	18	18	

MW-3A

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	8 U	8 U	8.2
8/16/2012	19	18	
11/13/2012	18	17	
2/13/2013	16	18	

MW-2A

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	20 U	20 U	8.2
8/16/2012	17	16	
11/13/2012	13	13	
2/13/2013	8 U	8 U	

MW-4

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	20 U	20 U	8.2
8/16/2012	8 U	8 U	
11/13/2012	5 U	5 U	
2/13/2013	8 U	8 U	

MW-1

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	8 U	8 U	8.2
8/16/2012	8 U	8 U	
11/13/2012	5.4	5 U	
2/13/2013	8 U	8 U	

Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

- GEI-1 — Groundwater Monitoring Well
- 11 — Detected concentration or MRL below preliminary groundwater cleanup level.
- 12 U — Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.
- 7.5U — Detected concentration exceeds preliminary groundwater cleanup level.

Historical Soil Sample Location and Type

- DC-UPLD-SS13 — Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 — EPA site inspection (Weston 2001)
- S-10-MR — Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 — Soil borings (GeoEngineers 2008)
- MW-5 — Former monitoring well (GeoEngineers 2008)
- SS-1 — Surface soil samples (GeoEngineers 2008)
- SB-11 — Hand auger soil boring (GeoEngineers 2008)
- TP-15 — Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

- Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.
- No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.
- Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.
- Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.
- Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
2. Locations for which the total depth of sub-surface exploration is not known, the depth of the deepest sample at the location for which analysis was performed represents the total depth of exploration.
3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

NA	Not Analyzed
BGS	Below Ground Surface
PGCL	Preliminary Groundwater Cleanup Level
U	Analyte not detected above laboratory reporting limit
µg/L	micrograms per liter

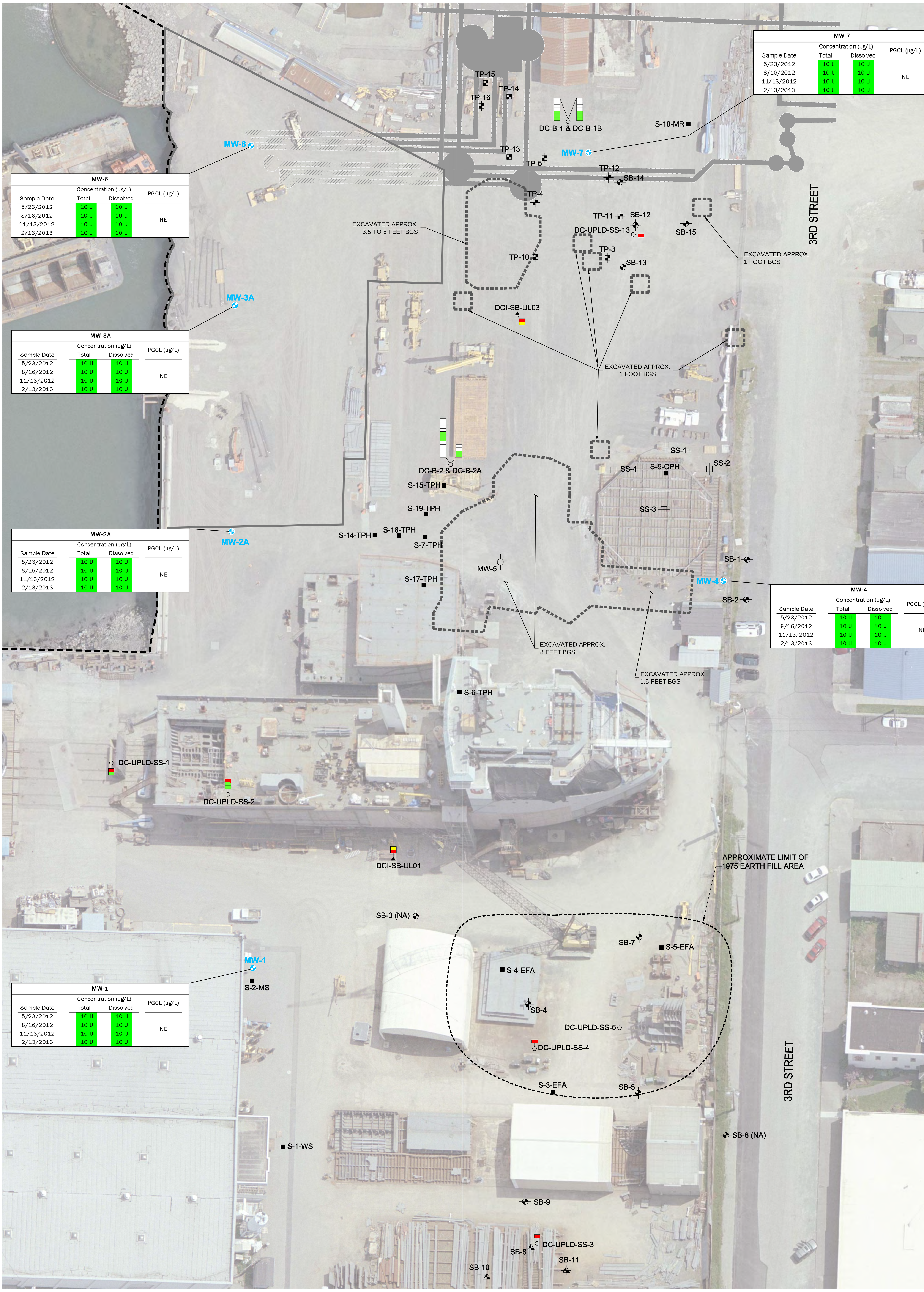
30 0 30
FEET

Extent of Nickel Contamination

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 4



MW-7

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	10 U	10 U	NE
8/16/2012	10 U	10 U	
11/13/2012	10 U	10 U	
2/13/2013	10 U	10 U	

MW-6

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	10 U	10 U	NE
8/16/2012	10 U	10 U	
11/13/2012	10 U	10 U	
2/13/2013	10 U	10 U	

MW-3A

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	10 U	10 U	NE
8/16/2012	10 U	10 U	
11/13/2012	10 U	10 U	
2/13/2013	10 U	10 U	

MW-2A

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	10 U	10 U	NE
8/16/2012	10 U	10 U	
11/13/2012	10 U	10 U	
2/13/2013	10 U	10 U	

MW-4

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	10 U	10 U	NE
8/16/2012	10 U	10 U	
11/13/2012	10 U	10 U	
2/13/2013	10 U	10 U	

MW-1

Sample Date	Concentration (µg/L) Total	Concentration (µg/L) Dissolved	PGCL (µg/L)
5/23/2012	10 U	10 U	NE
8/16/2012	10 U	10 U	
11/13/2012	10 U	10 U	
2/13/2013	10 U	10 U	

Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

- GEI-1 Groundwater Monitoring Well
- 11 Detected concentration or MRL below preliminary groundwater cleanup level.
- 12 U Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.
- 7.5U Detected concentration exceeds preliminary groundwater cleanup level.

Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

- Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.
- No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.
- Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.
- Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.
- Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
2. Locations for which the total depth of sub-surface exploration is not known, the depth of the deepest sample at the location for which analysis was performed represents the total depth of exploration.
3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

NA Not Analyzed
BGS Below Ground Surface
PGCL Preliminary Groundwater Cleanup Level
U Analyte not detected above laboratory reporting limit
µg/L micrograms per liter

30 0 30
FEET

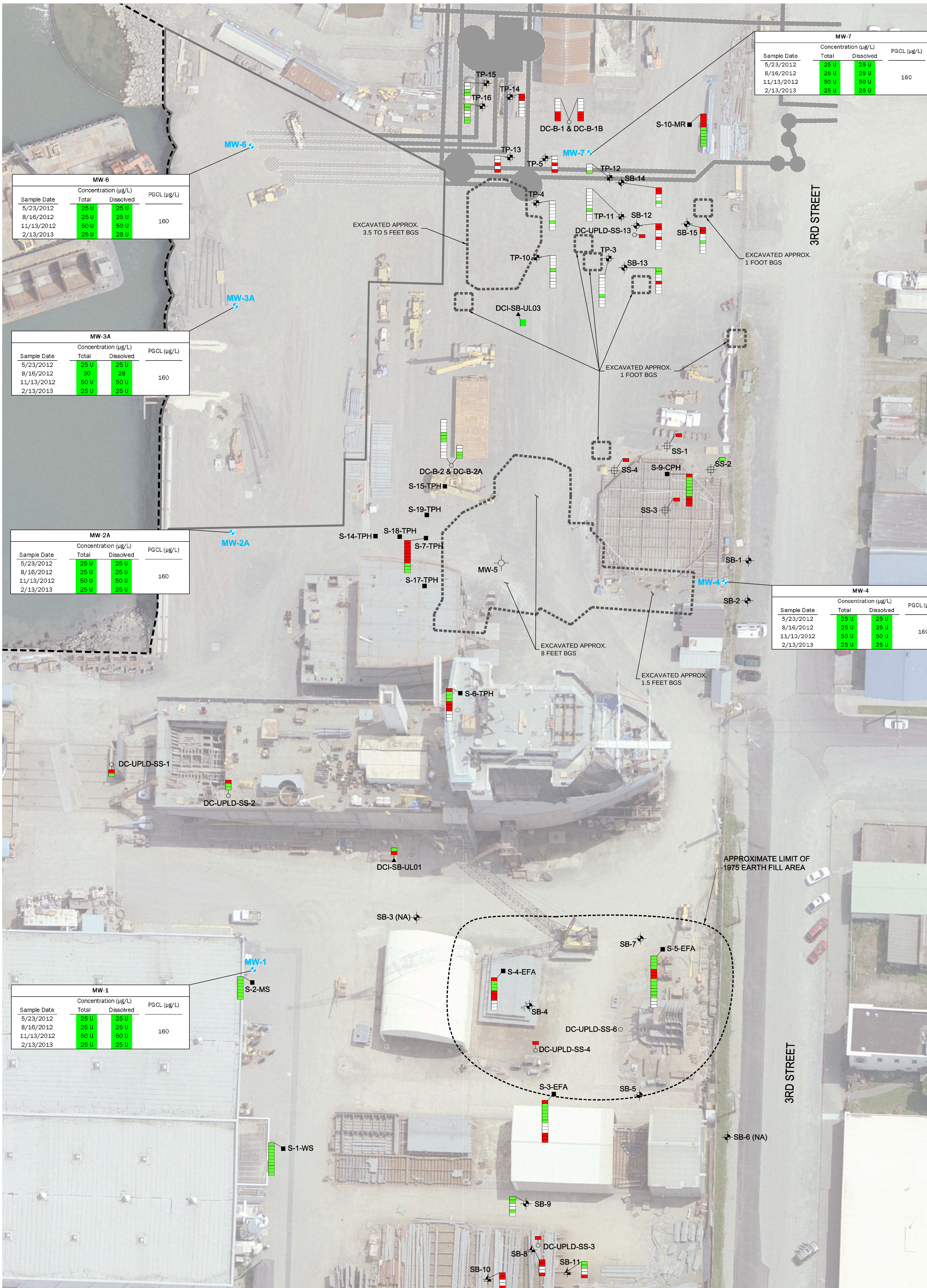
Extent of Silver Contamination

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GeoEngineers

Figure 5

P:\5\5147006\09\CAD\514700609 All Contaminants Figs 1-15.dwg\TAB:Silver modified by tmichaud on Mar 10, 2014 - 13:32



MW-7

Sample Date	Concentration (µg/L) Total	Dissolved	PGCL (µg/L)
5/23/2012	25 U	25 U	160
8/16/2012	25 U	25 U	
11/13/2012	50 U	50 U	
2/13/2013	25 U	25 U	

MW-6

Sample Date	Concentration (µg/L) Total	Dissolved	PGCL (µg/L)
5/23/2012	25 U	25 U	160
8/16/2012	25 U	25 U	
11/13/2012	50 U	50 U	
2/13/2013	25 U	25 U	

MW-3A

Sample Date	Concentration (µg/L) Total	Dissolved	PGCL (µg/L)
5/23/2012	25 U	25 U	160
8/16/2012	30	28	
11/13/2012	50 U	50 U	
2/13/2013	25 U	25 U	

MW-2A

Sample Date	Concentration (µg/L) Total	Dissolved	PGCL (µg/L)
5/23/2012	25 U	25 U	160
8/16/2012	25 U	25 U	
11/13/2012	50 U	50 U	
2/13/2013	25 U	25 U	

MW-4

Sample Date	Concentration (µg/L) Total	Dissolved	PGCL (µg/L)
5/23/2012	25 U	25 U	160
8/16/2012	25 U	25 U	
11/13/2012	50 U	50 U	
2/13/2013	25 U	25 U	

MW-1

Sample Date	Concentration (µg/L) Total	Dissolved	PGCL (µg/L)
5/23/2012	25 U	25 U	160
8/16/2012	25 U	25 U	
11/13/2012	50 U	50 U	
2/13/2013	25 U	25 U	

Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

- GEI-1 Groundwater Monitoring Well
- 11 Detected concentration or MRL below preliminary groundwater cleanup level.
- 12 U Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.
- 7.5U Detected concentration exceeds preliminary groundwater cleanup level.

Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

- Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.
- No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.
- Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.
- Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.
- Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
2. Locations for which the total depth of sub-surface exploration is not known, the depth of the deepest sample at the location for which analysis was performed represents the total depth of exploration.
3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

NA Not Analyzed

BGS Below Ground Surface

PGCL Preliminary Groundwater Cleanup Level

U Analyte not detected above laboratory reporting limit

µg/L micrograms per liter

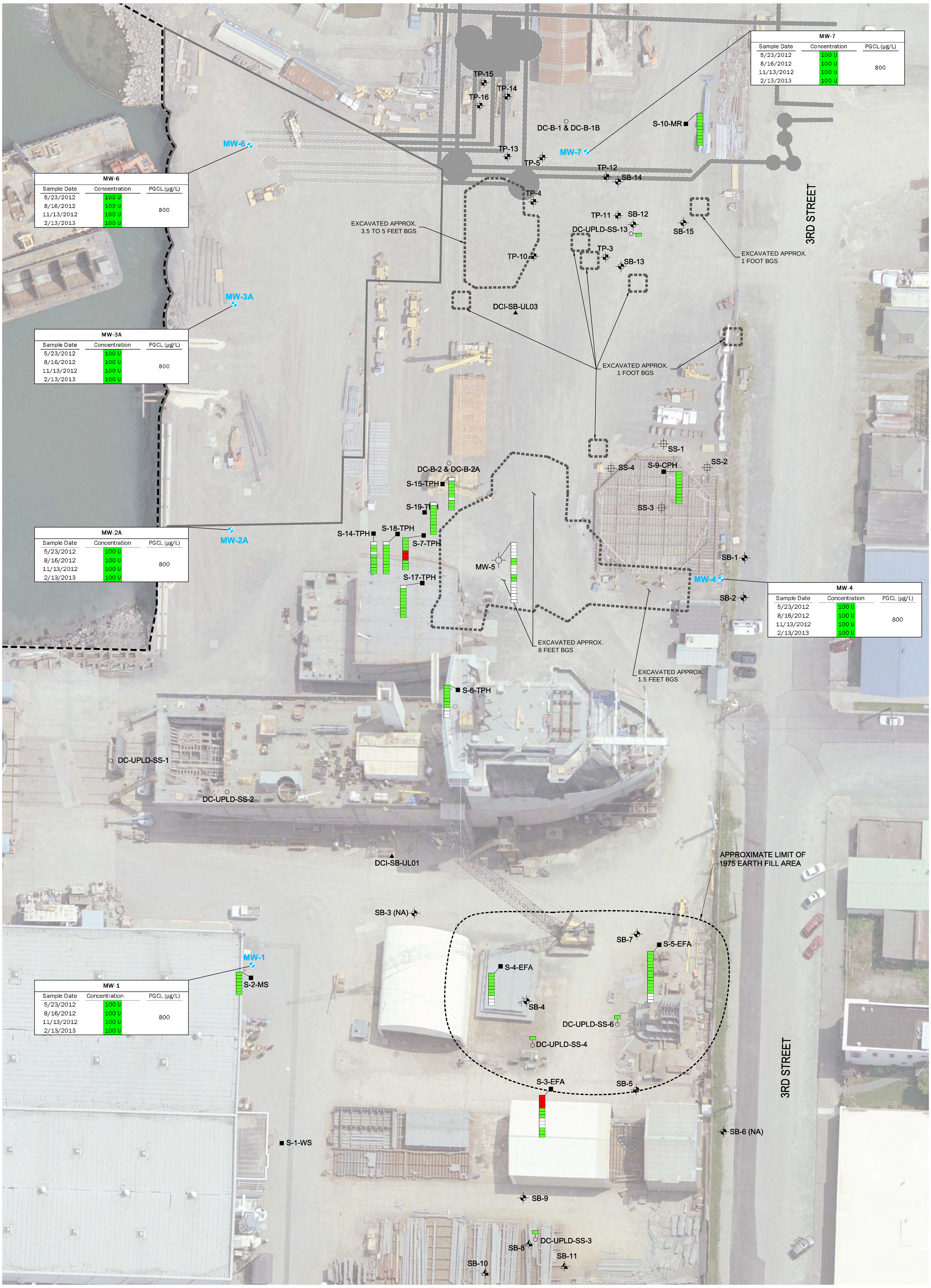
Extent of Zinc Contamination

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 6

P:\5\5147006\09\CAD\5147006009 All Contaminants Figs 1-15.dwg\TAB:Zinc modified by tmichaud on Mar 10, 2014 - 13:32



Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

- GEI-1 Groundwater Monitoring Well
- 11 Detected concentration or MRL below preliminary groundwater cleanup level.
- 12 U Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.
- 7.5U Detected concentration exceeds preliminary groundwater cleanup level.

Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

- Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.
- No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.
- Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.
- Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.
- Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
2. Locations for which the total depth of sub-surface exploration is not known, the depth of the deepest sample at the location for which analysis was performed represents the total depth of exploration.
3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

NA Not Analyzed
BGS Below Ground Surface
PGCL Preliminary Groundwater Cleanup Level
U Analyte not detected above laboratory reporting limit
µg/L micrograms per liter

30 0 30
FEET

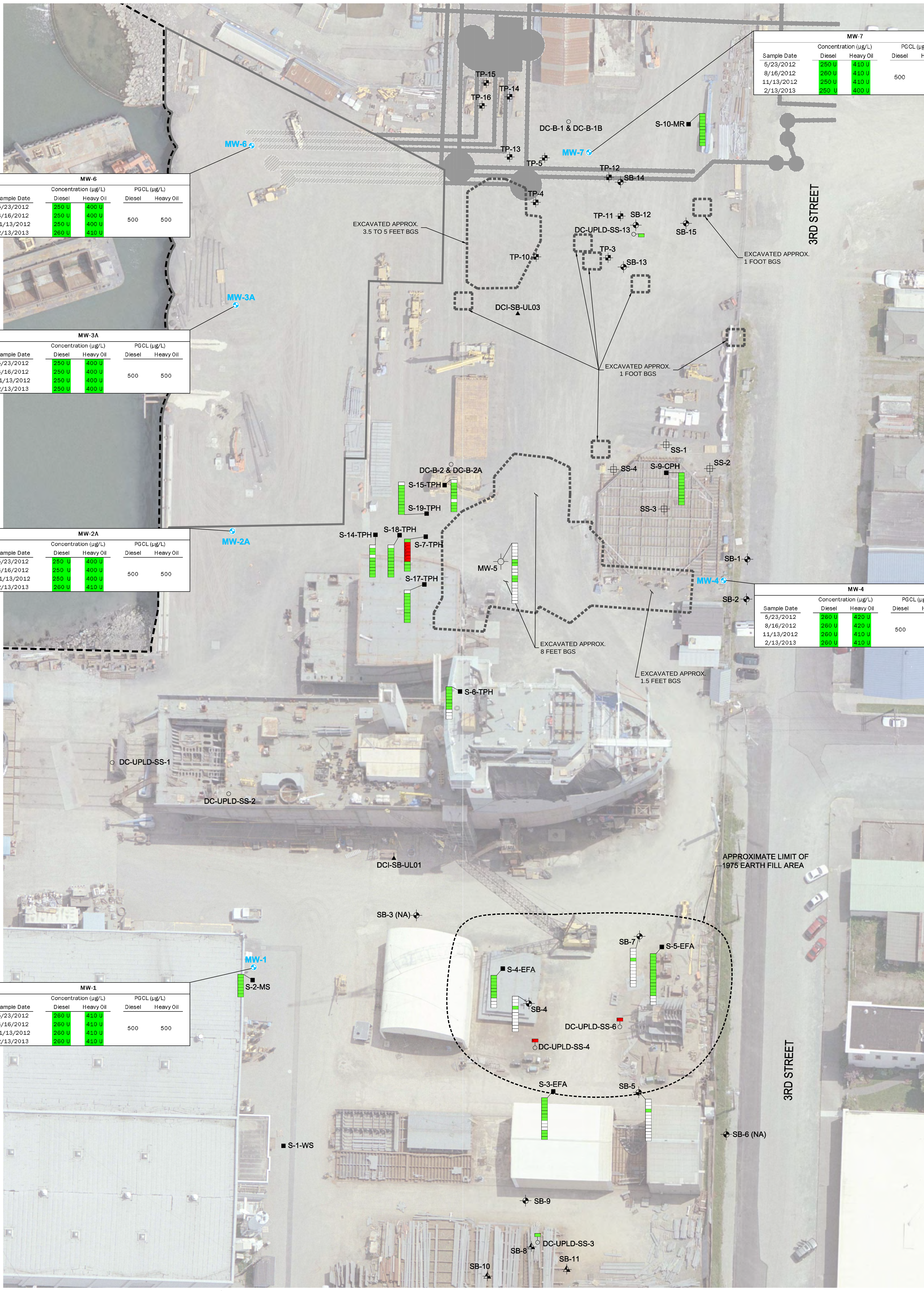
Extent of Gasoline Contamination

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 7

P:\5\5147006\09\CAD\514700609 All Contaminants Figs 1-15.dwg\TAB:TPH-G modified by tmichaud on Mar 10, 2014 - 13:33



MW-7				
	Concentration (µg/L)		PGCL (µg/L)	
Sample Date	Diesel	Heavy Oil	Diesel	Heavy Oil
5/23/2012	250 U	410 U	500	500
8/16/2012	260 U	410 U		
11/13/2012	250 U	410 U		
2/13/2013	250 U	400 U		

MW-6				
	Concentration (µg/L)		PGCL (µg/L)	
Sample Date	Diesel	Heavy Oil	Diesel	Heavy Oil
5/23/2012	250 U	400 U	500	500
8/16/2012	250 U	400 U		
11/13/2012	250 U	400 U		
2/13/2013	260 U	410 U		

MW-3A				
	Concentration (µg/L)		PGCL (µg/L)	
Sample Date	Diesel	Heavy Oil	Diesel	Heavy Oil
5/23/2012	250 U	400 U	500	500
8/16/2012	250 U	400 U		
11/13/2012	250 U	400 U		
2/13/2013	250 U	400 U		

MW-2A				
	Concentration (µg/L)		PGCL (µg/L)	
Sample Date	Diesel	Heavy Oil	Diesel	Heavy Oil
5/23/2012	250 U	400 U	500	500
8/16/2012	250 U	400 U		
11/13/2012	250 U	400 U		
2/13/2013	260 U	410 U		

MW-4				
	Concentration (µg/L)		PGCL (µg/L)	
Sample Date	Diesel	Heavy Oil	Diesel	Heavy Oil
5/23/2012	260 U	420 U	500	500
8/16/2012	260 U	420 U		
11/13/2012	260 U	410 U		
2/13/2013	260 U	410 U		

MW-1				
	Concentration (µg/L)		PGCL (µg/L)	
Sample Date	Diesel	Heavy Oil	Diesel	Heavy Oil
5/23/2012	260 U	410 U	500	500
8/16/2012	260 U	410 U		
11/13/2012	260 U	410 U		
2/13/2013	260 U	410 U		

Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

- GEI-1 Groundwater Monitoring Well
- 11 Detected concentration or MRL below preliminary groundwater cleanup level.
- 12 U Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.
- 7.5U Detected concentration exceeds preliminary groundwater cleanup level.

Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

- Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.
- No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.
- Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.
- Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.
- Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
2. Locations for which the total depth of sub-surface exploration is not known, the depth of the deepest sample at the location for which analysis was performed represents the total depth of exploration.
3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

NA Not Analyzed
BGS Below Ground Surface
PGCL Preliminary Groundwater Cleanup Level
U Analyte not detected above laboratory reporting limit
µg/L micrograms per liter

30 0 30
FEET

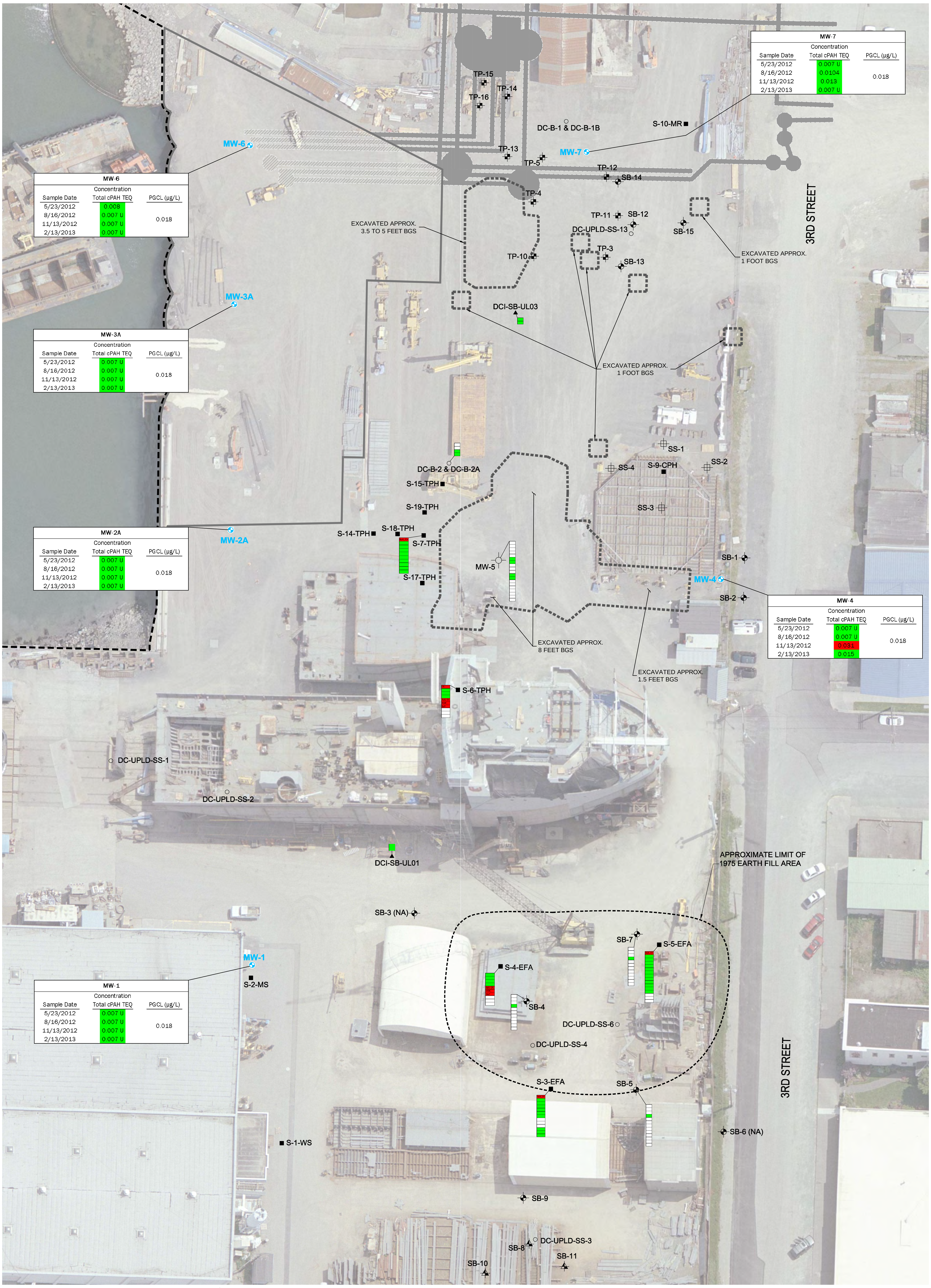
Extent of Diesel and Heavy Oil Contamination

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GeoEngineers

Figure 8

P:\5\5147006\09\CAD\514700609 All Contaminants Figs 1-15.dwg\TAB:TPH-D modified by tmichaud on Mar 10, 2014 - 13:33



MW-7

Sample Date	Concentration Total cPAH TEQ	PGCL (µg/L)
5/23/2012	0.007 U	0.018
8/16/2012	0.0104	
11/13/2012	0.013	
2/13/2013	0.007 U	

MW-6

Sample Date	Concentration Total cPAH TEQ	PGCL (µg/L)
5/23/2012	0.008	0.018
8/16/2012	0.007 U	
11/13/2012	0.007 U	
2/13/2013	0.007 U	

MW-3A

Sample Date	Concentration Total cPAH TEQ	PGCL (µg/L)
5/23/2012	0.007 U	0.018
8/16/2012	0.007 U	
11/13/2012	0.007 U	
2/13/2013	0.007 U	

MW-2A

Sample Date	Concentration Total cPAH TEQ	PGCL (µg/L)
5/23/2012	0.007 U	0.018
8/16/2012	0.007 U	
11/13/2012	0.007 U	
2/13/2013	0.007 U	

MW-4

Sample Date	Concentration Total cPAH TEQ	PGCL (µg/L)
5/23/2012	0.007 U	0.018
8/16/2012	0.007 U	
11/13/2012	0.031	
2/13/2013	0.015	

MW-1

Sample Date	Concentration Total cPAH TEQ	PGCL (µg/L)
5/23/2012	0.007 U	0.018
8/16/2012	0.007 U	
11/13/2012	0.007 U	
2/13/2013	0.007 U	

Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

- GEI-1 Groundwater Monitoring Well
- 11 Detected concentration or MRL below preliminary groundwater cleanup level.
- 12 U Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.
- 7.5U Detected concentration exceeds preliminary groundwater cleanup level.

Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

- Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.
- No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.
- Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.
- Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.
- Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
2. Locations for which the total depth of sub-surface exploration is not known, the depth of the deepest sample at the location for which analysis was performed represents the total depth of exploration.
3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

NA	Not Analyzed
BGS	Below Ground Surface
PGCL	Preliminary Groundwater Cleanup Level
cPAH	Carcinogenic Polycyclic Aromatic Hydrocarbons
TEQ	Toxic Equivalent
U	Analyte not detected above laboratory reporting limit
µg/L	micrograms per liter

30 0 30
FEET

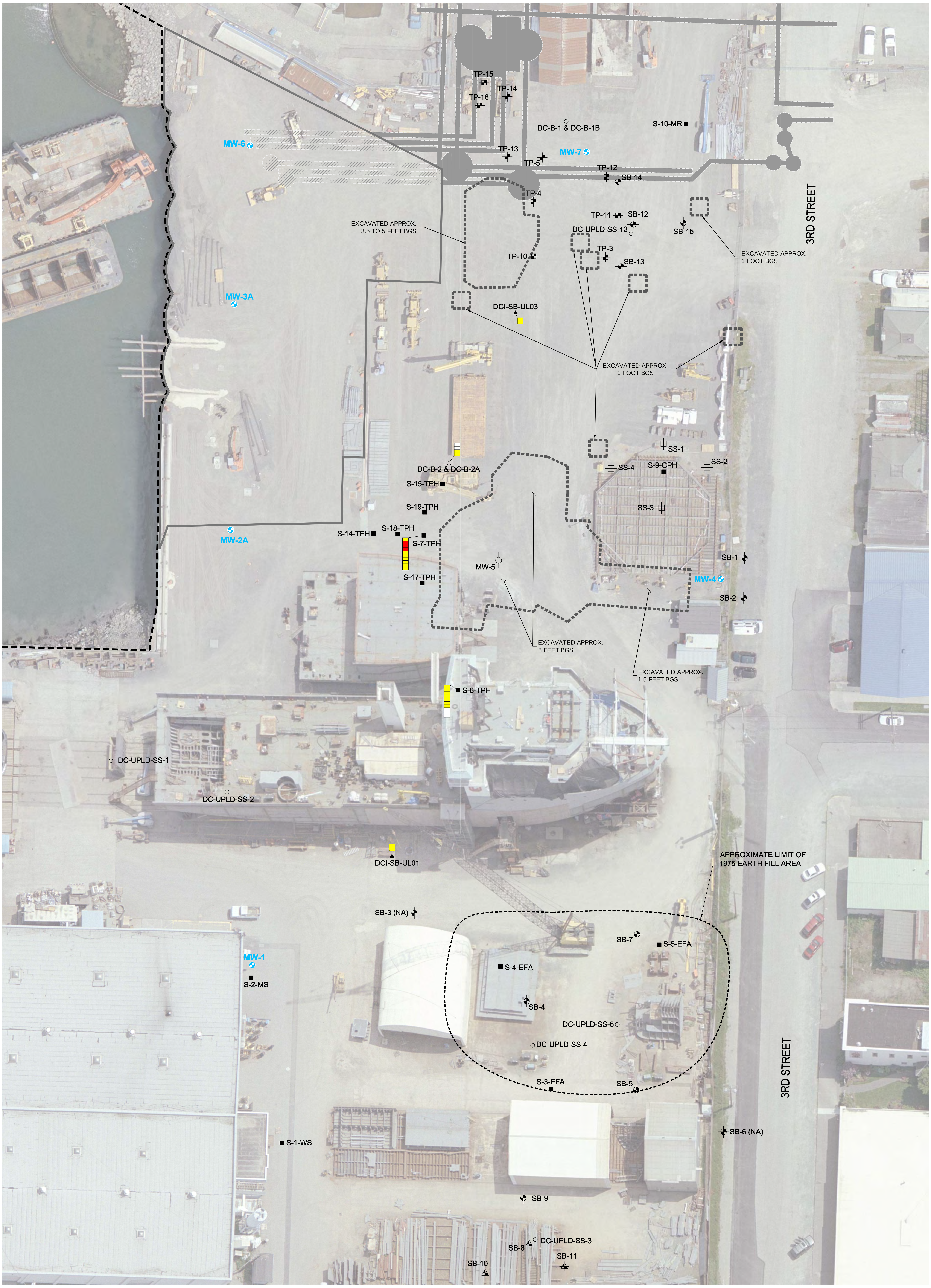
Extent of PAHs Contamination

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 9

P:\5\5147006\09\CAD\514700609 All Contaminants Figs 1-15.dwg\TAB:PAHs modified by tmichaud on Mar 10, 2014 - 13:34



Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

- GEI-1 Groundwater Monitoring Well

Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.

Extent of Contamination

- No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.
- Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.
- Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.
- Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
2. Locations for which the total depth of sub-surface exploration is not known, the depth of the deepest sample at the location for which analysis was performed represents the total depth of exploration.
3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

NA Not Analyzed

BGS Below Ground Surface

30 0 30

FEET

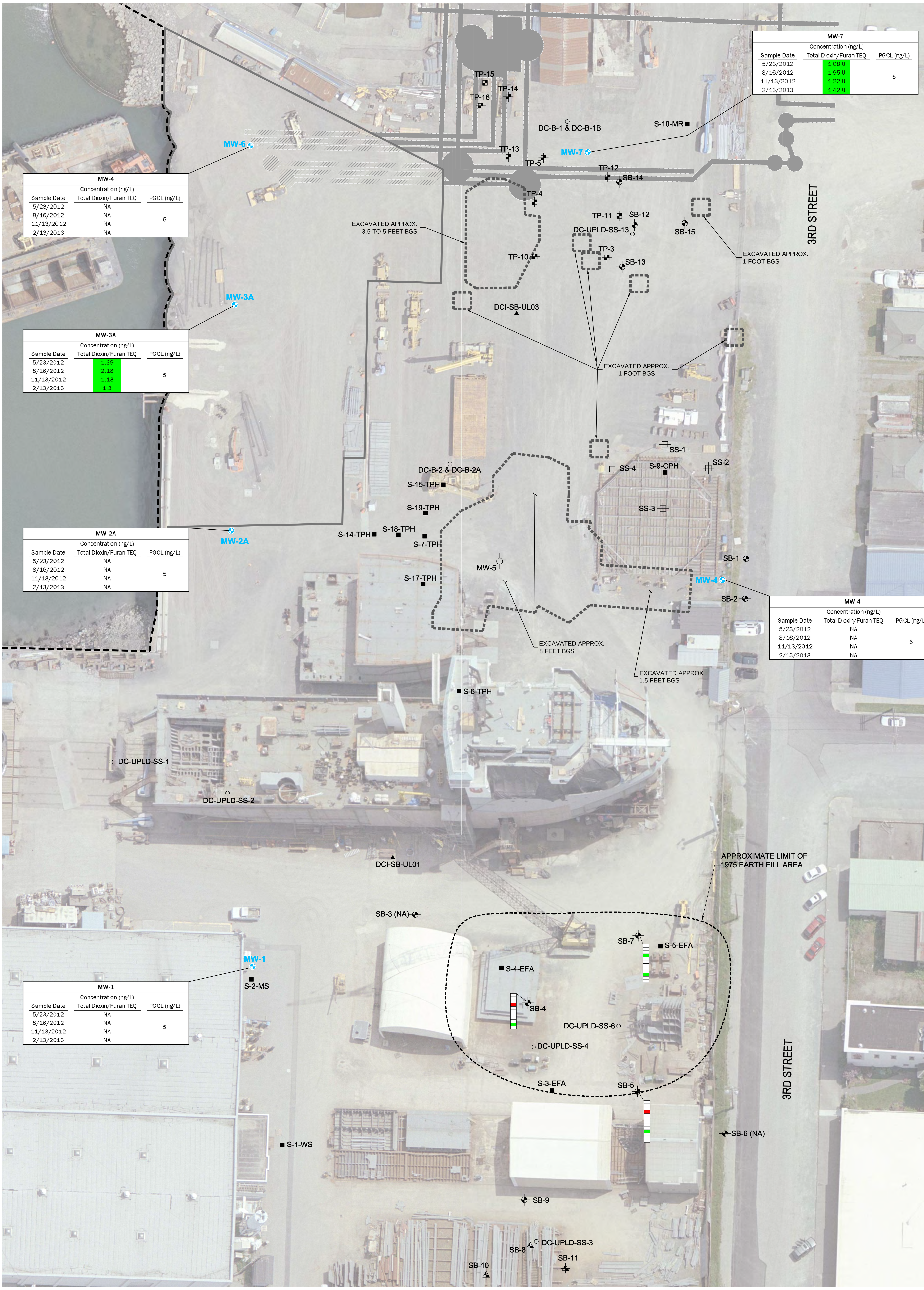
Extent of PCBs Contamination

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 10

P:\5\5147006\09\CAD\514700609 ALL CONTAMINANTS FIGS 1-15.DWG\TAB:PCBS MODIFIED BY TMICHAUD ON MAR 10, 2014 - 13:34



MW-7

Sample Date	Concentration (ng/L) Total Dioxin/Furan TEQ	PGCL (ng/L)
5/23/2012	1.08 U	5
8/16/2012	1.95 U	
11/13/2012	1.22 U	
2/13/2013	1.42 U	

MW-6

Sample Date	Concentration (ng/L) Total Dioxin/Furan TEQ	PGCL (ng/L)
5/23/2012	NA	5
8/16/2012	NA	
11/13/2012	NA	
2/13/2013	NA	

MW-3A

Sample Date	Concentration (ng/L) Total Dioxin/Furan TEQ	PGCL (ng/L)
5/23/2012	1.39	5
8/16/2012	2.18	
11/13/2012	1.13	
2/13/2013	1.3	

MW-2A

Sample Date	Concentration (ng/L) Total Dioxin/Furan TEQ	PGCL (ng/L)
5/23/2012	NA	5
8/16/2012	NA	
11/13/2012	NA	
2/13/2013	NA	

MW-4

Sample Date	Concentration (ng/L) Total Dioxin/Furan TEQ	PGCL (ng/L)
5/23/2012	NA	5
8/16/2012	NA	
11/13/2012	NA	
2/13/2013	NA	

MW-1

Sample Date	Concentration (ng/L) Total Dioxin/Furan TEQ	PGCL (ng/L)
5/23/2012	NA	5
8/16/2012	NA	
11/13/2012	NA	
2/13/2013	NA	

Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

- GEI-1 Groundwater Monitoring Well
- 11 Detected concentration or MRL below preliminary groundwater cleanup level.
- 12 U Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.
- 7.5U Detected concentration exceeds preliminary groundwater cleanup level.

Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

- Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.
- No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.
- Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.
- Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.
- Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
2. Locations for which the total depth of sub-surface exploration is not known, the depth of the deepest sample at the location for which analysis was performed represents the total depth of exploration.
3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

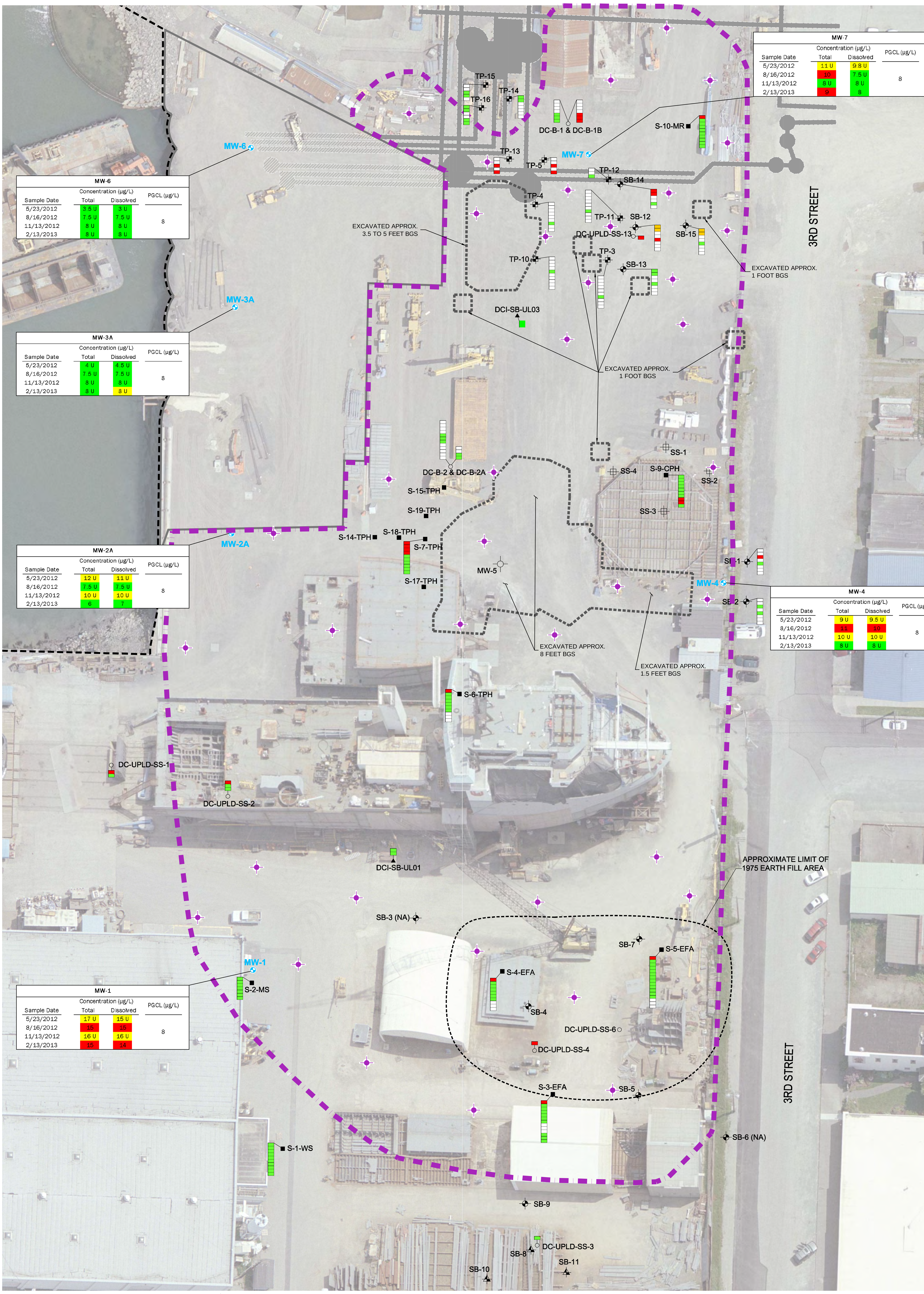
NA Not Analyzed
BGS Below Ground Surface
PGCL Preliminary Groundwater Cleanup Level
TEQ Toxic Equivalent
U Analyte not detected above laboratory reporting limit
ng/L nanograms per liter

Extent of Dioxins-Furans Contamination

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 11



MW-7			
	Concentration (µg/L)		PGCL (µg/L)
Sample Date	Total	Dissolved	
5/23/2012	11 U	9.8 U	8
8/16/2012	10	7.5 U	
11/13/2012	8 U	8 U	
2/13/2013	9	8	

MW-6			
	Concentration (µg/L)		PGCL (µg/L)
Sample Date	Total	Dissolved	
5/23/2012	3.5 U	3 U	8
8/16/2012	7.5 U	7.5 U	
11/13/2012	8 U	8 U	
2/13/2013	8 U	8 U	

MW-3A			
	Concentration (µg/L)		PGCL (µg/L)
Sample Date	Total	Dissolved	
5/23/2012	4 U	4.5 U	8
8/16/2012	7.5 U	7.5 U	
11/13/2012	8 U	8 U	
2/13/2013	8 U	8 U	

MW-2A			
	Concentration (µg/L)		PGCL (µg/L)
Sample Date	Total	Dissolved	
5/23/2012	12 U	11 U	8
8/16/2012	7.5 U	7.5 U	
11/13/2012	10 U	10 U	
2/13/2013	6	7	

MW-4			
	Concentration (µg/L)		PGCL (µg/L)
Sample Date	Total	Dissolved	
5/23/2012	9 U	9.5 U	8
8/16/2012	11	10	
11/13/2012	10 U	10 U	
2/13/2013	8 U	8 U	

MW-1			
	Concentration (µg/L)		PGCL (µg/L)
Sample Date	Total	Dissolved	
5/23/2012	17 U	15 U	8
8/16/2012	15	15	
11/13/2012	16 U	16 U	
2/13/2013	15	14	

Legend

Existing and Historical Site Features

Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)

Area of soil removal performed for utility installation during Interim Action Construction

Area of utility installation performed within new backfill

Approximate limit of area backfilled during 2008 Interim Action Construction

Boundary between Marine and Upland Areas

Groundwater Monitoring Location

GEI-1 Groundwater Monitoring Well

11 Detected concentration or MRL below preliminary groundwater cleanup level.

12 U Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.

7.5U Detected concentration exceeds preliminary groundwater cleanup level.

Historical Soil Sample Location and Type

DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)

DCI-SBUL03 EPA site inspection (Weston 2001)

S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)

SB-2 Soil borings (GeoEngineers 2008)

MW-5 Former monitoring well (GeoEngineers 2008)

SS-1 Surface soil samples (GeoEngineers 2008)

SB-11 Hand auger soil boring (GeoEngineers 2008)

TP-15 Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.

No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.

Orange shading of the sample depth interval indicates that containment was detected at concentrations greater than the preliminary cleanup level for protection of human health.

Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.

Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.

Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
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3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

NA Not Analyzed

BGS Below Ground Surface

PGCL Preliminary Groundwater Cleanup Level

U Analyte not detected above laboratory reporting limit

µg/L micrograms per liter

Data Gaps Evaluation

General location of proposed soil boring to address arsenic data gaps

General area to characterize arsenic contamination in soil

N S E W

30 0 30

FEET

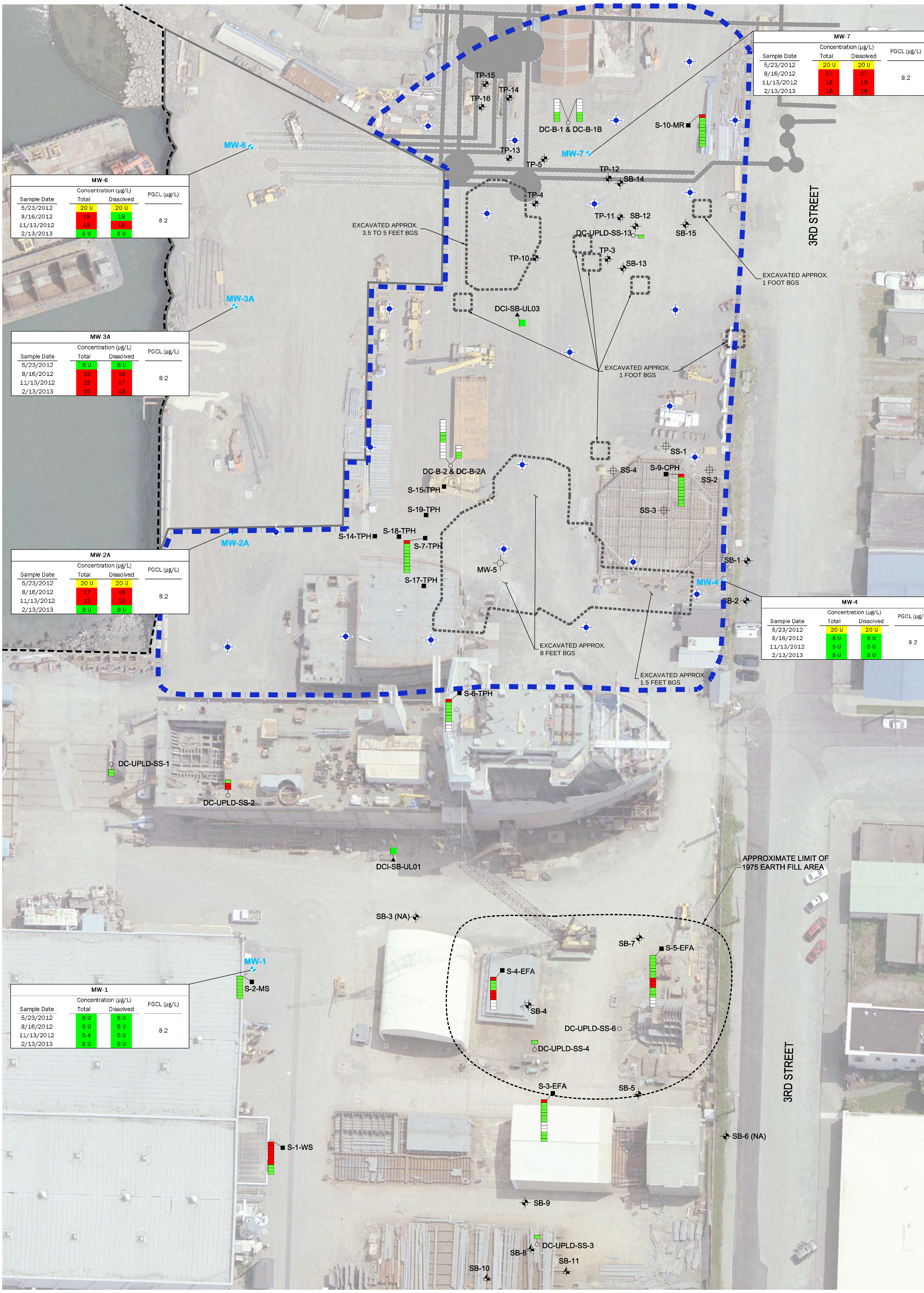
Identification of Arsenic Data Gaps

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GeoEngineers

Figure 12

P:\5\5147006\09\CAD\514700609 All Contaminants Figs 1-16.dwg\TAB:Arsenic (2) Modified by TMichaud on Mar 13, 2014 - 15:15



MW-7			
	Concentration (µg/L)		PGCL (µg/L)
Sample Date	Total	Dissolved	
5/23/2012	20 U	20 U	8.2
8/16/2012	27	27	
11/13/2012	18	19	
2/13/2013	18	18	

MW-6			
	Concentration (µg/L)		PGCL (µg/L)
Sample Date	Total	Dissolved	
5/23/2012	20 U	20 U	8.2
8/16/2012	18	19	
11/13/2012	18	18	
2/13/2013	8 U	8 U	

MW-3A			
	Concentration (µg/L)		PGCL (µg/L)
Sample Date	Total	Dissolved	
5/23/2012	8 U	8 U	8.2
8/16/2012	19	18	
11/13/2012	18	17	
2/13/2013	16	18	

MW-2A			
	Concentration (µg/L)		PGCL (µg/L)
Sample Date	Total	Dissolved	
5/23/2012	20 U	20 U	8.2
8/16/2012	17	16	
11/13/2012	13	13	
2/13/2013	8 U	8 U	

MW-4			
	Concentration (µg/L)		PGCL (µg/L)
Sample Date	Total	Dissolved	
5/23/2012	20 U	20 U	8.2
8/16/2012	8 U	8 U	
11/13/2012	5 U	5 U	
2/13/2013	8 U	8 U	

MW-1			
	Concentration (µg/L)		PGCL (µg/L)
Sample Date	Total	Dissolved	
5/23/2012	8 U	8 U	8.2
8/16/2012	8 U	8 U	
11/13/2012	5.4	5 U	
2/13/2013	8 U	8 U	

Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
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- 11 Detected concentration or MRL below preliminary groundwater cleanup level.
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Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

- Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.
- No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.
- Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.
- Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.
- Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
2. Locations for which the total depth of sub-surface exploration is not known, the depth of the deepest sample at the location for which analysis was performed represents the total depth of exploration.
3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

NA Not Analyzed
BGS Below Ground Surface
PGCL Preliminary Groundwater Cleanup Level
U Analyte not detected above laboratory reporting limit
µg/L micrograms per liter

Data Gaps Evaluation

- General location of proposed soil boring to address nickel data gaps
- General area to characterize nickel contamination in soil

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Identification of Nickel Data Gaps

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

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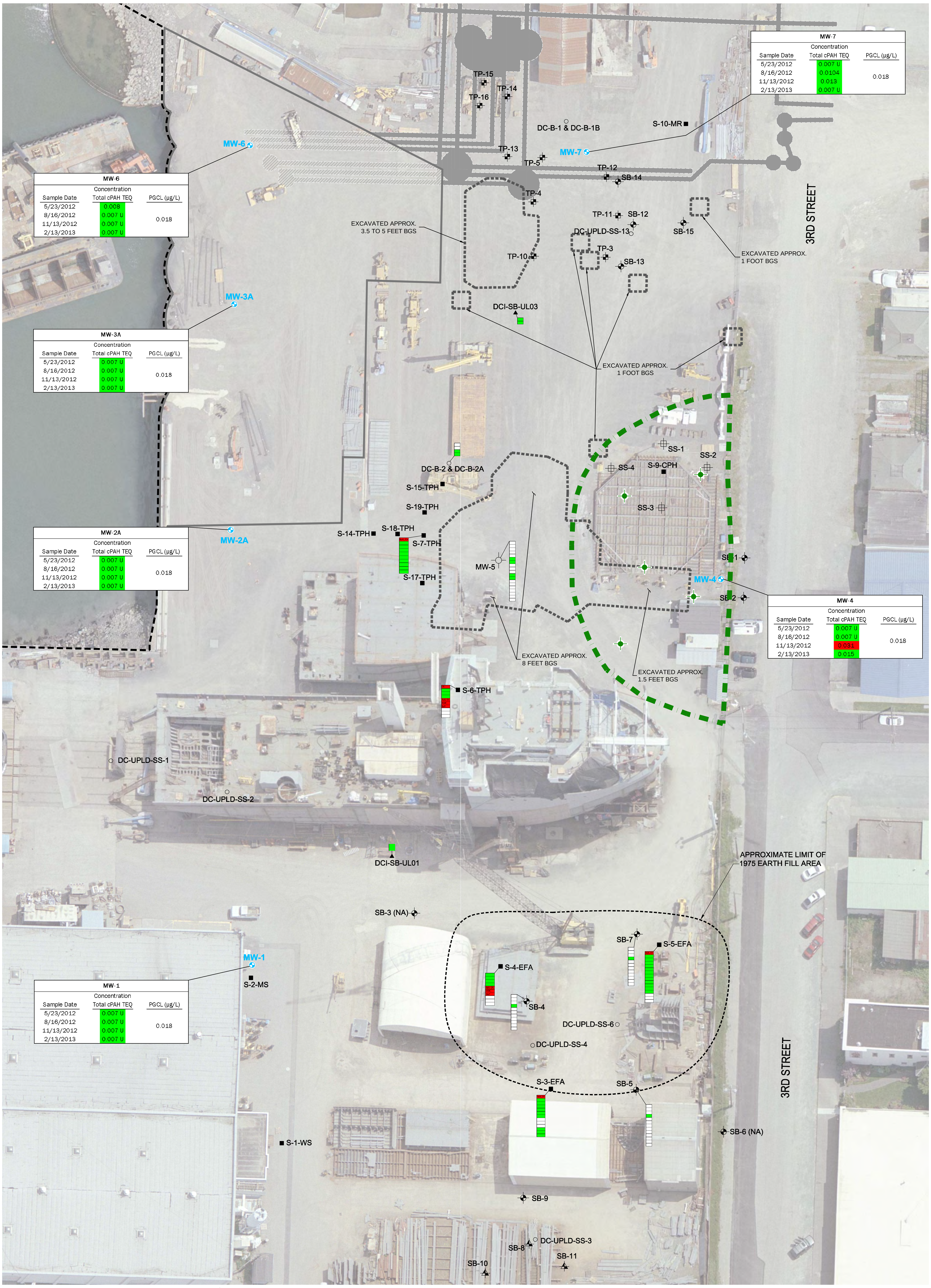
Figure 13



MW-7

Sample Date	Concentration Total cPAH TEQ	PGCL (µg/L)
5/23/2012	0.007 U	0.018
8/16/2012	0.0104	
11/13/2012	0.013	
2/13/2013	0.007 U	

MW-6

Sample Date	Concentration Total cPAH TEQ	PGCL (µg/L)
5/23/2012	0.008	0.018
8/16/2012	0.007 U	
11/13/2012	0.007 U	
2/13/2013	0.007 U	

MW-3A

Sample Date	Concentration Total cPAH TEQ	PGCL (µg/L)
5/23/2012	0.007 U	0.018
8/16/2012	0.007 U	
11/13/2012	0.007 U	
2/13/2013	0.007 U	

MW-2A

Sample Date	Concentration Total cPAH TEQ	PGCL (µg/L)
5/23/2012	0.007 U	0.018
8/16/2012	0.007 U	
11/13/2012	0.007 U	
2/13/2013	0.007 U	

MW-4

Sample Date	Concentration Total cPAH TEQ	PGCL (µg/L)
5/23/2012	0.007 U	0.018
8/16/2012	0.007 U	
11/13/2012	0.031	
2/13/2013	0.015	

MW-1

Sample Date	Concentration Total cPAH TEQ	PGCL (µg/L)
5/23/2012	0.007 U	0.018
8/16/2012	0.007 U	
11/13/2012	0.007 U	
2/13/2013	0.007 U	

Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

- GEI-1 Groundwater Monitoring Well
- 11 Detected concentration or MRL below preliminary groundwater cleanup level.
- 12 U Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.
- 7.5U Detected concentration exceeds preliminary groundwater cleanup level.

Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Sample Depth Interval[1]

- Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[2] of sub-surface exploration.
- No shading of the sample depth interval indicates a sample was either not obtained or not analyzed for the contaminant.
- Red shading of the sample depth interval indicates that the contaminant was detected at concentration greater than the preliminary cleanup level for protection of groundwater.
- Green shading of the sample depth interval indicates that the contaminant was either not detected or detected at concentration less than the preliminary cleanup level.
- Yellow shading of the sample depth interval indicates that the laboratory method reporting limit (MRL) for the contaminant was greater than the preliminary cleanup level.

NOTES:

1. Sample depth intervals are shown for soil sampling locations for which the contaminant was analyzed. If the contaminant was not analyzed at a location, no sample depth interval is shown.
2. Locations for which the total depth of sub-surface exploration is not known, the depth of the deepest sample at the location for which analysis was performed represents the total depth of exploration.
3. Soil sampling locations representative of contaminated soils that have been previously remediated are not shown on this figure.

NA	Not Analyzed
BGS	Below Ground Surface
PGCL	Preliminary Groundwater Cleanup Level
cPAH	Carcinogenic Polycyclic Aromatic Hydrocarbons
TEQ	Toxic Equivalent
U	Analyte not detected above laboratory reporting limit
µg/L	micrograms per liter

Data Gaps Evaluation

- General location of proposed soil boring to address PAHs data gaps
- General area to characterize PAH contamination in soil

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Identification of PAH Data Gaps

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

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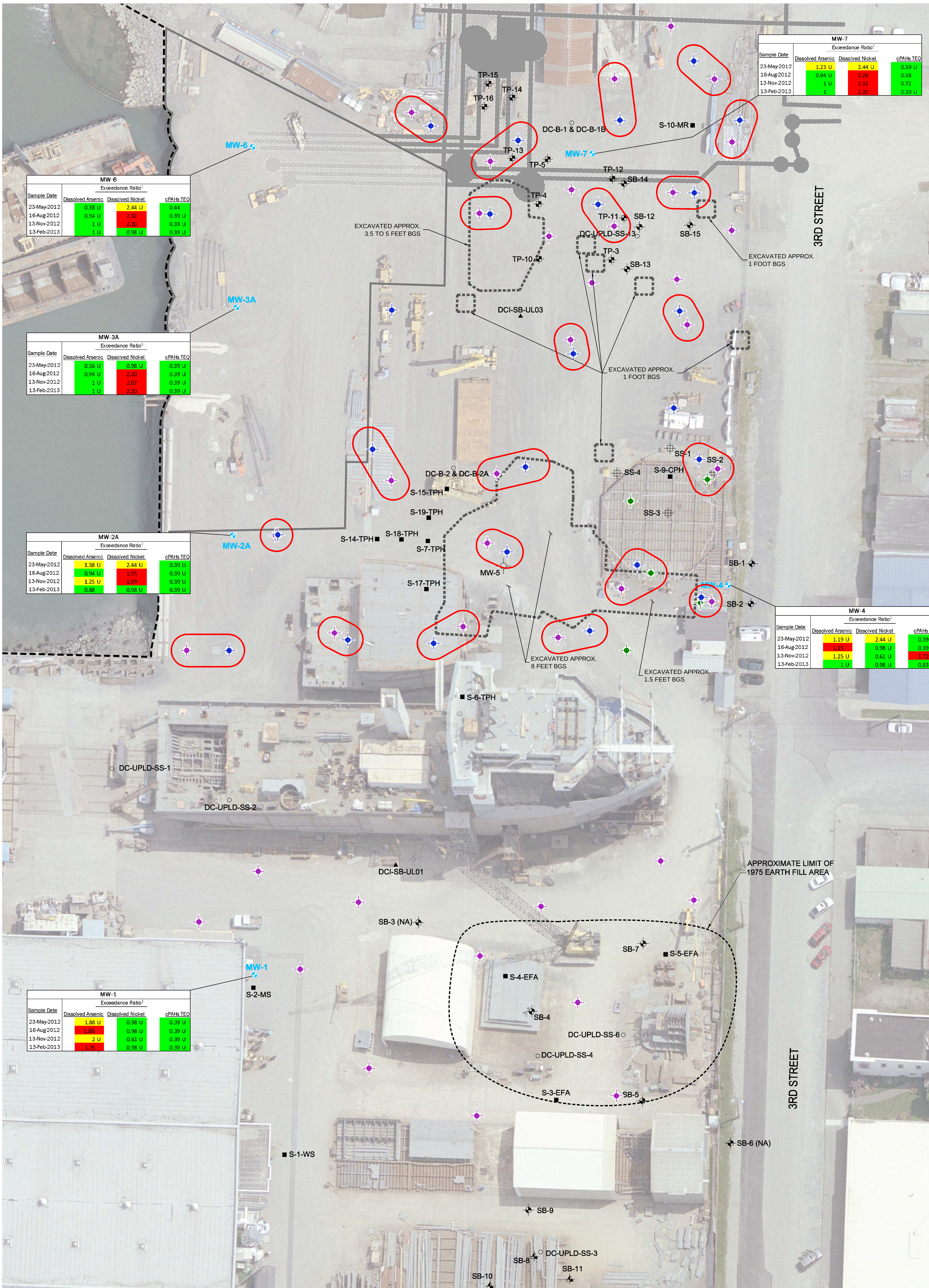
Figure 14

P:\5\5147006\09\CAD\514700609 All Contaminants Figs 1-16.dwg\TAB:PAHs (2) Modified by TMichaud on Mar 13, 2014 - 15:30



MW-7			
Sample Date	Exceedance Ratio[1]		
	Dissolved Arsenic	Dissolved Nickel	cPAHs TEQ
23-May-2012	1.23 U	2.44 U	0.39 U
16-Aug-2012	0.94 U	3.29	0.58
13-Nov-2012	1 U	2.32	0.72
13-Feb-2013	1	2.20	0.39 U

MW-6			
Sample Date	Exceedance Ratio[1]		
	Dissolved Arsenic	Dissolved Nickel	cPAHs TEQ
23-May-2012	0.38 U	2.44 U	0.44
16-Aug-2012	0.94 U	2.32	0.39 U
13-Nov-2012	1 U	2.20	0.39 U
13-Feb-2013	1 U	0.98 U	0.39 U

MW-3A			
Sample Date	Exceedance Ratio[1]		
	Dissolved Arsenic	Dissolved Nickel	cPAHs TEQ
23-May-2012	0.56 U	0.98 U	0.39 U
16-Aug-2012	0.94 U	2.20	0.39 U
13-Nov-2012	1 U	2.07	0.39 U
13-Feb-2013	1 U	2.20	0.39 U

MW-2A			
Sample Date	Exceedance Ratio[1]		
	Dissolved Arsenic	Dissolved Nickel	cPAHs TEQ
23-May-2012	1.38 U	2.44 U	0.39 U
16-Aug-2012	0.94 U	1.95	0.39 U
13-Nov-2012	1.25 U	1.59	0.39 U
13-Feb-2013	0.88	0.98 U	0.39 U

MW-4			
Sample Date	Exceedance Ratio[1]		
	Dissolved Arsenic	Dissolved Nickel	cPAHs TEQ
23-May-2012	1.19 U	2.44 U	0.39 U
16-Aug-2012	1.25	0.98 U	0.39 U
13-Nov-2012	1.25 U	0.61 U	1.72
13-Feb-2013	1 U	0.98 U	0.83

MW-1			
Sample Date	Exceedance Ratio[1]		
	Dissolved Arsenic	Dissolved Nickel	cPAHs TEQ
23-May-2012	1.88 U	0.98 U	0.39 U
16-Aug-2012	1.88	0.98 U	0.39 U
13-Nov-2012	2 U	0.61 U	0.39 U
13-Feb-2013	1.75	0.98 U	0.39 U

Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

GEI-1 Groundwater Monitoring Well

Groundwater chemical analytical results

Exceedance ratios[1] for the analytes that exceed preliminary groundwater cleanup levels in one or more than one monitoring event are presented in this figure. A complete summary of groundwater chemical analytical results is presented in Figures 1 through 11.

- Detected concentration or MRL below preliminary groundwater cleanup level.
- Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.
- Detected concentration exceeds preliminary groundwater cleanup level.
- U Analyte not detected above laboratory reporting limit

Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Data Gaps Evaluation

- General location of proposed soil boring to address arsenic data gaps
- General location of proposed soil boring to address nickel data gaps
- General location of proposed soil boring to address PAHs data gaps
- Data gaps combined into one proposed soil boring

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Summary of Upland Soil Data Gaps

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

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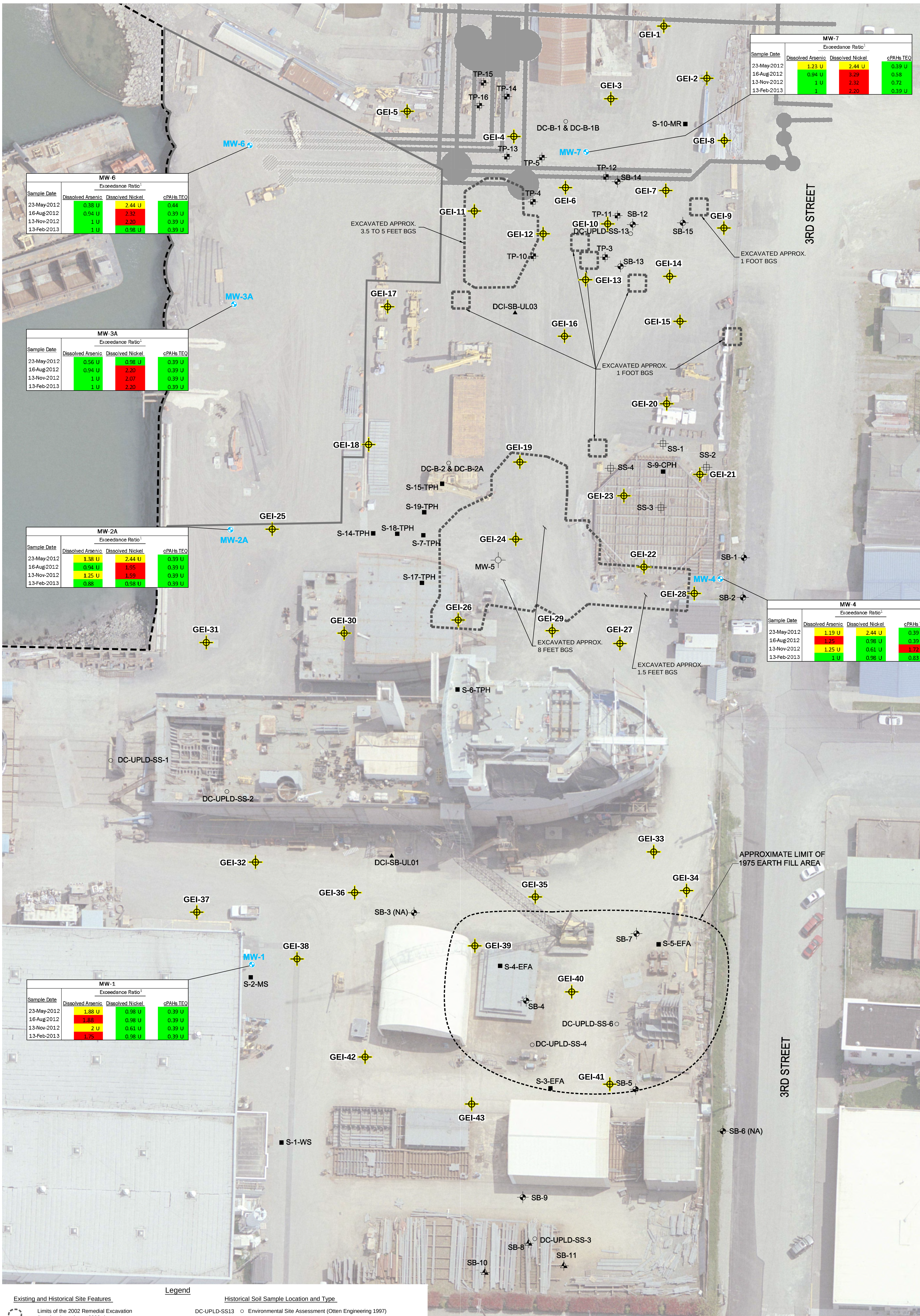
Figure 15

P:\5\5147006\09\CAD\514700609 All Contaminants Figs 1-16.dwg\TAB:Data Gap modified by tmichaud on Mar 13, 2014 - 15:53



MW-7

Sample Date	Exceedance Ratio[1] Dissolved Arsenic	Dissolved Nickel	cPAHs TEQ
23-May-2012	1.23 U	2.44 U	0.39 U
16-Aug-2012	0.94 U	3.29	0.58
13-Nov-2012	1 U	2.32	0.72
13-Feb-2013	1	2.20	0.39 U

MW-6

Sample Date	Exceedance Ratio[1] Dissolved Arsenic	Dissolved Nickel	cPAHs TEQ
23-May-2012	0.38 U	2.44 U	0.44
16-Aug-2012	0.94 U	2.32	0.39 U
13-Nov-2012	1 U	2.20	0.39 U
13-Feb-2013	1 U	0.98 U	0.39 U

MW-3A

Sample Date	Exceedance Ratio[1] Dissolved Arsenic	Dissolved Nickel	cPAHs TEQ
23-May-2012	0.56 U	0.98 U	0.39 U
16-Aug-2012	0.94 U	2.20	0.39 U
13-Nov-2012	1 U	2.07	0.39 U
13-Feb-2013	1 U	2.20	0.39 U

MW-2A

Sample Date	Exceedance Ratio[1] Dissolved Arsenic	Dissolved Nickel	cPAHs TEQ
23-May-2012	1.38 U	2.44 U	0.39 U
16-Aug-2012	0.94 U	1.95	0.39 U
13-Nov-2012	1.25 U	1.59	0.39 U
13-Feb-2013	0.88	0.98 U	0.39 U

MW-4

Sample Date	Exceedance Ratio[1] Dissolved Arsenic	Dissolved Nickel	cPAHs TEQ
23-May-2012	1.19 U	2.44 U	0.39 U
16-Aug-2012	1.25	0.98 U	0.39 U
13-Nov-2012	1.25 U	0.61 U	1.72
13-Feb-2013	1 U	0.98 U	0.83

MW-1

Sample Date	Exceedance Ratio[1] Dissolved Arsenic	Dissolved Nickel	cPAHs TEQ
23-May-2012	1.88 U	0.98 U	0.39 U
16-Aug-2012	1.88	0.98 U	0.39 U
13-Nov-2012	2 U	0.61 U	0.39 U
13-Feb-2013	1.75	0.98 U	0.39 U

Legend

Existing and Historical Site Features

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)
- Area of soil removal performed for utility installation during Interim Action Construction
- Area of utility installation performed within new backfill
- Approximate limit of area backfilled during 2008 Interim Action Construction
- Boundary between Marine and Upland Areas

Groundwater Monitoring Location

GEI-1 Groundwater Monitoring Well

Groundwater chemical analytical results

Exceedance ratios[1] for the analytes that exceed preliminary groundwater cleanup levels in one or more than one monitoring event are presented in this figure. A complete summary of groundwater chemical analytical results is presented in Table 3 through 8.

- Detected concentration or MRL below preliminary groundwater cleanup level.
- Method reporting limit (MRL) exceeds preliminary groundwater cleanup level.
- Detected concentration exceeds preliminary groundwater cleanup level.
- U Analyte not detected above laboratory reporting limit

Historical Soil Sample Location and Type

- DC-UPLD-SS13 Environmental Site Assessment (Otten Engineering 1997)
- DCI-SBUL03 EPA site inspection (Weston 2001)
- S-10-MR Remedial investigation soil sample (Landau Associates 2002 a)
- SB-2 Soil borings (GeoEngineers 2008)
- MW-5 Former monitoring well (GeoEngineers 2008)
- SS-1 Surface soil samples (GeoEngineers 2008)
- SB-11 Hand auger soil boring (GeoEngineers 2008)
- TP-15 Test pit (GeoEngineers 2008)

Data Gaps Evaluation

GEI-1 Proposed soil boring location

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Proposed Soil Borings

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

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Figure 16