SITE CLOSURE ACTIVITIES REPORT
NORTH BAY PROPERTY
ADEC FILE NO. 2320.26.020

PREPARED FOR
TESORO ALASKA COMPANY

Prepared by
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KENT & SULLIVAN, INC.
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1.0 INTRODUCTION

This report documents closure activities performed at the North Bay property located at mile 15.4 on the Kenai Spur Highway north of Kenai, Alaska (Figure 1). The site is owned by Tesoro Alaska Company (Tesoro) and consists of two property parcels,. The first parcel is a former Tesoro service station located along the highway, and the second parcel is a residential property situated between the service station and the Cook Inlet bluff.

1.1 REMEDIATION SUMMARY

A dissolved-phase groundwater plume, resulting from a leaded gasoline release from underground storage tanks (USTs) at the former service station, extended approximately 900 feet to the Cook Inlet intertidal zone in 2000. The plume was exceptionally narrow (less than 60 feet), and benzene, 1,2-dichloroethane (EDC), and gasoline-range organics (GRO) were the principal contaminants of concern. Tesoro has completed the remediation of both shallow soil and groundwater contamination associated with this release. Groundwater has been remediated to the Alaska Department of Environmental Conservation (ADEC) groundwater criteria, and soil within 15 feet of the surface has been remediated to ADEC's most stringent soil criteria as summarized in the following subsections.

1.1.1 Groundwater Cleanup

Tesoro installed three phases of air sparge (AS) systems with Phase 1 starting in July 2000 and consisting of three wells installed across the central portion of the plume. The Phase 1 wells were operated between 2000 and 2004. By April 2001 benzene and EDC concentrations were below detectable concentrations downgradient of the Phase 1 sparge zone.

Phase 2 began in April 2001 and consisted of three additional AS wells installed about 300 feet upgradient of the Phase 1 wells. The Phase 2 system operated between 2001 and 2006. Benzene and EDC concentrations downgradient of the Phase 2 system were below their groundwater criteria by October 2003 for benzene and by November 2004 for EDC.

The Phase 3 system began in November 2005 and consisted of 3 AS wells installed along the eastern edge of the former service station. The Phase 3 system operated through 2006. Benzene and EDC concentrations downgradient and upgradient of the Phase 3 wells were below their groundwater criteria by November 2006 except for one well, well B-22, located on the service station parcel. The results from three rounds of subsequent sampling, October 2007, May 2008, and October 2008, demonstrate that benzene, EDC, and GRO concentrations were below groundwater criteria in all site wells, including well B-22 (KSI, *2008 Groundwater Monitoring Report, North Bay Site*).

1.1.2 Soil Cleanup

Tesoro installed a soil vapor extraction (SVE) system with two vapor extraction wells at the service station site in March 2000. The SVE system was temporarily taken out of service in May 2001 when the former service station building that housed the unit was demolished. The unit was re-installed in a portable building and re-started in July 2002. The SVE system operated discontinuously between July 2002 and February 2007.

1.2 CLOSURE ACTIVITIES

Tesoro completed closure activities at the site in 2009. Closure activities consisted of collecting confirmation soil samples from the former service station site and abandoning the remaining monitoring and remediation wells. A final conceptual site model was developed to show that all potential pathways that existed at the site have been remediated. The activities and findings associated with these tasks are described in this report.

2.0 CONFIRMATION SOIL SAMPLING

2.1 SAMPLE COLLECTION

Confirmation soil samples were collected in general accordance with the *Shallow Soil Investigation Plan* (KSI, August 31, 2009) approved by Alaska Department of Environmental Conservation (ADEC) on September 1, 2009. The field work was conducted on November 11, 2009. A qualified person, as defined by 18 AAC 75, supervised the excavations and collected soil samples, and L&J Excavation excavated the test pits.

Three test pits (TP-1, TP-2, and TP-3) were excavated with a Komatsu 200 at the approximate locations shown on Figure 2. The test pits were located to evaluate the potential for hydrocarbon impacted soil to remain in the shallow subsurface (less than 12 feet). Test pit TP-1 was located in the known location of a former UST, test pit TP-2 at the a possible location of a third UST near the southeast corner of the former service station building, and test pit TP-3 near the apparent head of the original groundwater plume. Test pit 3 (TP-3) could not be excavated in the planned location because a large slab of concrete was encountered below the soil surface. The test pit was excavated immediately north of the concrete.

The test pits were logged to document soil stratigraphy and sample locations. Samples were collected from two-feet depth intervals for field screening with a photoionization detector (PID). PID readings were taken directly from the excavator bucket as well as from samples collected in accordance with the UST Procedures Manual for head-space readings. Soil samples were collected for laboratory analysis at 6 and 12 feet from all three test pits. Appendix A contains the test pit logs that show the soil lithologies in the test pits, head-space PID readings, and laboratory sample locations.

2.2 LABORATORY ANALYSIS

The soil samples were analyzed at the SGS Environmental Services (SGS) in Anchorage for benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA method 8021B, EDC by EPA Method 8260, and GRO by method AK-101. Appendix B contains the laboratory report and the ADEC checklist.

EDC? Why? The ADEC Approved Work Plan 8/31/09 didn't state that it needed to be analyzed

2.3 DATA QUALITY REVIEW

This QA summary includes a review, where appropriate, of holding times, blanks, matrix spike (MS) and laboratory control sample (LCS) recoveries, duplicate sample relative percent differences (RPDs), reporting limits, and overall assessment of data in the sample event. Each analysis that was performed is evaluated in the following subsections.

Field samples were reviewed to determine overall precision of sampling and analysis as well as matrix heterogeneity for GRO, BTEX and EDC.

Laboratory data were evaluated using laboratory-supplied control criteria. In the following method-specific discussions, only the criteria exceedances that impact data qualification or require assessment beyond laboratory documentation are discussed.

Seven soil samples, including one trip blank, were submitted in one laboratory batch to SGS on November 12, 2009. A field duplicate was not submitted with this batch. A matrix spike/matrix spike duplicate (MS/MSD) sample was not designated for this batch. Why? ADEC approved Shallow Soil Investigation Plan dated Aug 31, 2009 states that they will,

The sample results are reported under SGS job number 1096192, and all samples were received at SGS in good condition with the following exception:

- Temperature at receipt was recorded at 0.3°C, which is below the recommended range of 4±2°C. All samples were preserved with methanol, and no ice was noted in the samples. No qualifications were made based on temperatures.

2.3.1 GRO by AK101

All data elements/indicators are in conformance with the project criteria.

2.3.2 BTEX, EDC by 8260B

All data elements/indicators are in conformance with the project criteria.

- Additional compounds (EDB, MTBE) were included in compound list that were not requested on the COC.

2.3.3 Overall Assessment

The following summary highlights the data evaluation findings for this sampling event:

- No data are rejected.
- The completeness objectives (greater than 85 percent complete) for this project are met.
- The precision and accuracy of the laboratory data, as measured by laboratory quality control indicators, suggest that the data are useable as qualified for the purposes of this project.

2.4 FINDINGS

The test pit logs in Appendix A show that the site is underlain by poorly- to well-graded sands and gravels beginning at depths between two and four feet below ground surface. A 1.5- to 2-feet-thick sandy silt overlies the sands except in the area of test pit TP-1 where fill was present to a depth of about four feet.

Evidence of hydrocarbon contamination was not observed in the test pits. Odors, staining, sheens, or elevated PID readings were not detected.

The analytical results from the test pits samples are summarized on Table 1. The samples did not contain detectable BTEX, EDC, or GRO.

3.0 WELL DECOMMISSIONINGS

The wells listed on the adjacent table and shown on Figure 2 were decommissioned on December 21 and 22 in accordance with the ADEC guidance document *Monitoring Well Guidance* (ADEC, February 2009). Two wells, B-1 and B-30, could not be found either because they were covered with snow and ice or because they have been inadvertently destroyed. The wells were abandoned by Hughes Drilling as follows.

B-008	B-048*
B-012*	B-049*
B-013*	B-050*
B-014*	B-051
B-022*	B-052*
B-036*	B-053*
B-047	VEB-02*
*Casing could not be pulled.	

1. The bottom well cap was punctured with a steel drill rod.
2. Bentonite grout was pumped to the bottom of the well using a tremie pipe installed at the bottom of the casing until a column of grout filled the casing to near ground surface.
3. The casing was then withdrawn while maintaining the grout level near ground surface. Grout was brought to within one foot of ground surface and the remaining borehole was filled with native soil.
4. For well with casings that could not be removed, the casing was completely grouted with bentonite to within one foot of ground surface and then completed with one foot of native soil.

4.0 SITE CONCEPTUAL MODEL

Figure 3 shows the conceptual site model (CSM) for the North Bay site at closure. The CSM shows the migration pathways that were potentially complete and the potentially affected human receptors at the time of the UST release. Pathways that are no longer complete are shown with dashed lines and formerly potential receptors are shown with open circles. As Figure 3 shows, the shallow soil and groundwater pathways have been remediated and no longer pose a risk to human receptors. Soil deeper than 12 feet is also assumed to meet ADEC's migration to groundwater cleanup criteria since site groundwater meets groundwater criteria.

5.0 CONCLUSIONS

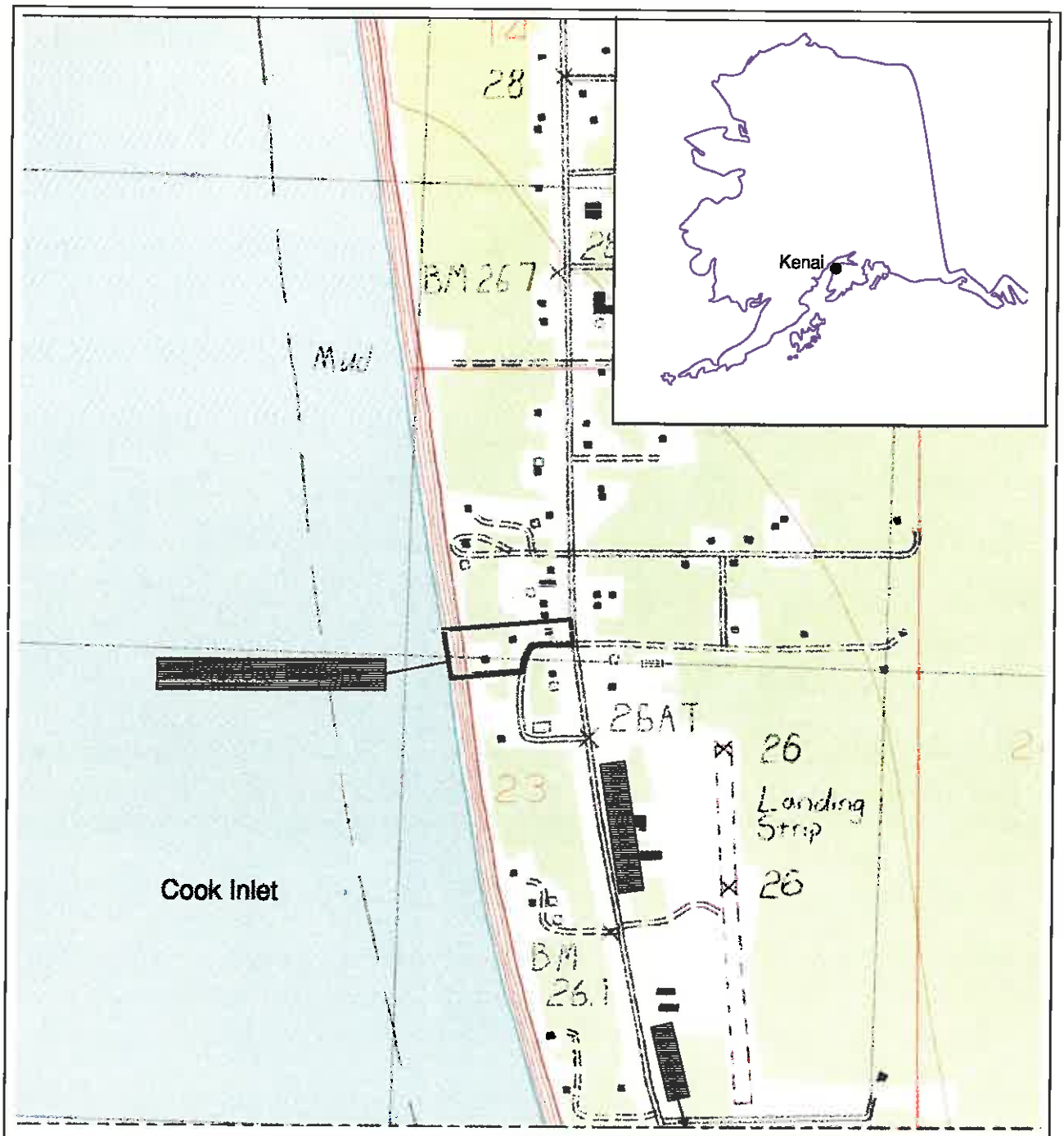
Tesoro has completed remediation of soil and groundwater at the North Bay site in accordance with the requirements of 18 AAC 78. All identified risks to human health and the environment associated with the UST release at the former service station have been remediated to ADEC's most stringent standards for soil and groundwater. This site is ready for a clean closure approval from ADEC.

◊ ◊ ◊

Table 1. Summary of 2009 confirmation soil sample analytical results

Sample ID	Lab ID	Sample Date	Benzene	Toluene	Ethylbenzene	Total Xylenes	EDC	GRO
TP-1-6	1096192001	11/11/2009	0.018 U	0.060 U	0.030 U	0.120 U	0.030 U	0.003 U
TP-1-12	1096192002	11/11/2009	0.020 U	0.068 U	0.034 U	0.136 U	0.034 U	0.003 U
TP-2-6	1096192003	11/11/2009	0.021 U	0.070 U	0.035 U	0.140 U	0.035 U	0.004 U
TP-2-12	1096192004	11/11/2009	0.012 U	0.039 U	0.020 U	0.078 U	0.020 U	0.002 U
TP-3-6	1096192005	11/11/2009	0.015 U	0.050 U	0.025 U	0.100 U	0.025 U	0.003 U
TP-3-12	1096192006	11/11/2009	0.019 U	0.065 U	0.032 U	0.130 U	0.032 U	0.003 U

Results are reported in mg/kg.
U Analyte not detected above concentration shown in table.



Site Location Map

~ North Bay Property ~

TESORO ALASKA COMPANY

Date: 9/21/00 Drawn by: BKJ

Proj. No.: 01-59 Checked by:

File: S:\01-59 North Bay\Site Location Map.dwg

FIGURE 1

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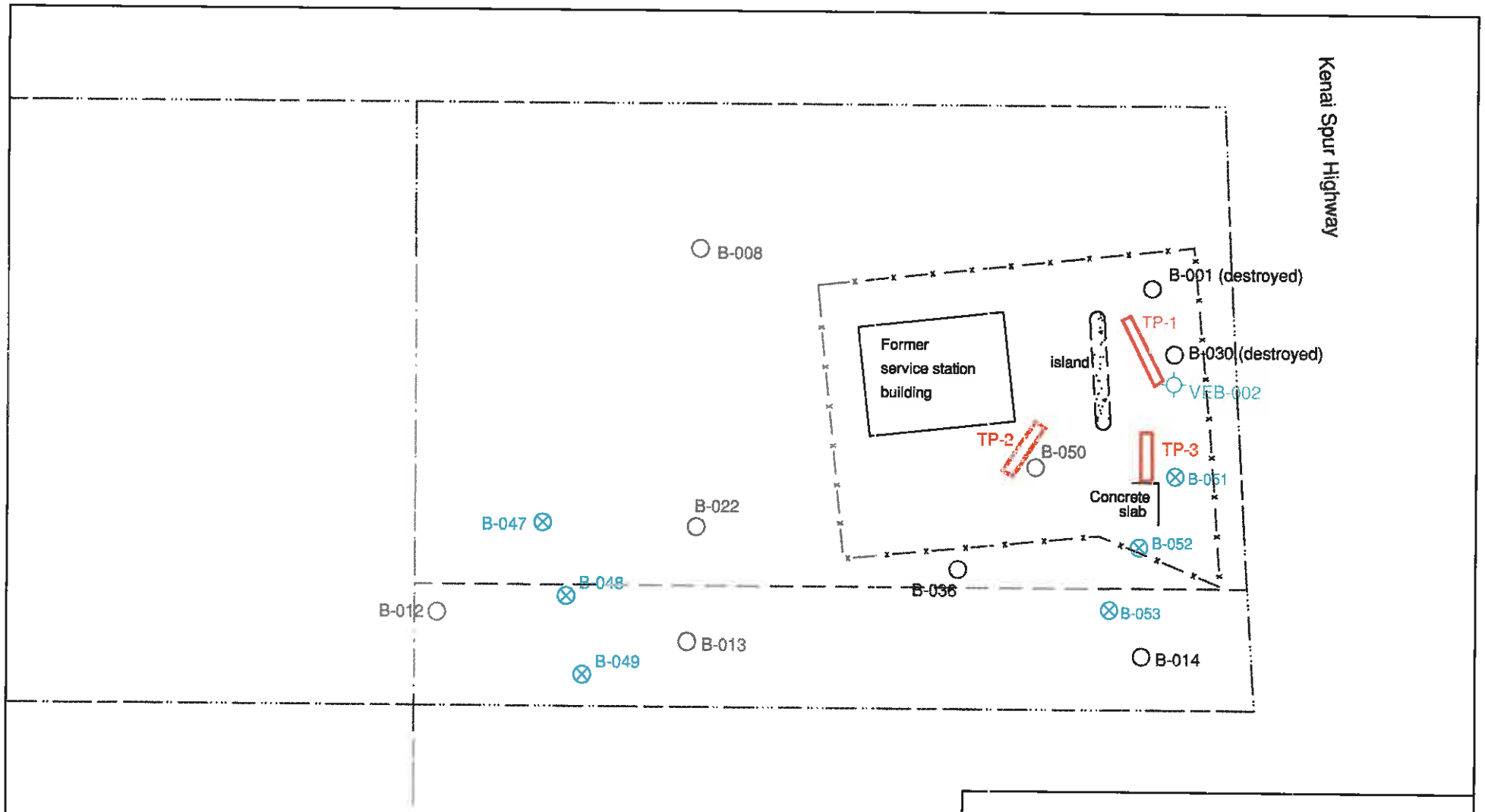
NORTH

Scale

0 1000 2000

Base Map: USGS Quadrangle Map, Kenai C4 SW, Scale 1:24,000



EXPLANATION

- B-025 ○ Former monitoring well location
- B-048 ⊗ Former air sparging well location
- VEB-002 ⊕ Former vapor extraction well location
- ▭ 2009 test pit location (TP)

NORTH

Scale

0 40 80 feet

Test Pit and Well Locations Map

~North Bay Property~

TESORO ALASKA COMPANY

Date: 2/04/2010 Drawn by: SMM

Proj. No.: 01-59 Checked by:

File: 01-59\2010\Figure 2.dwg

FIGURE 2

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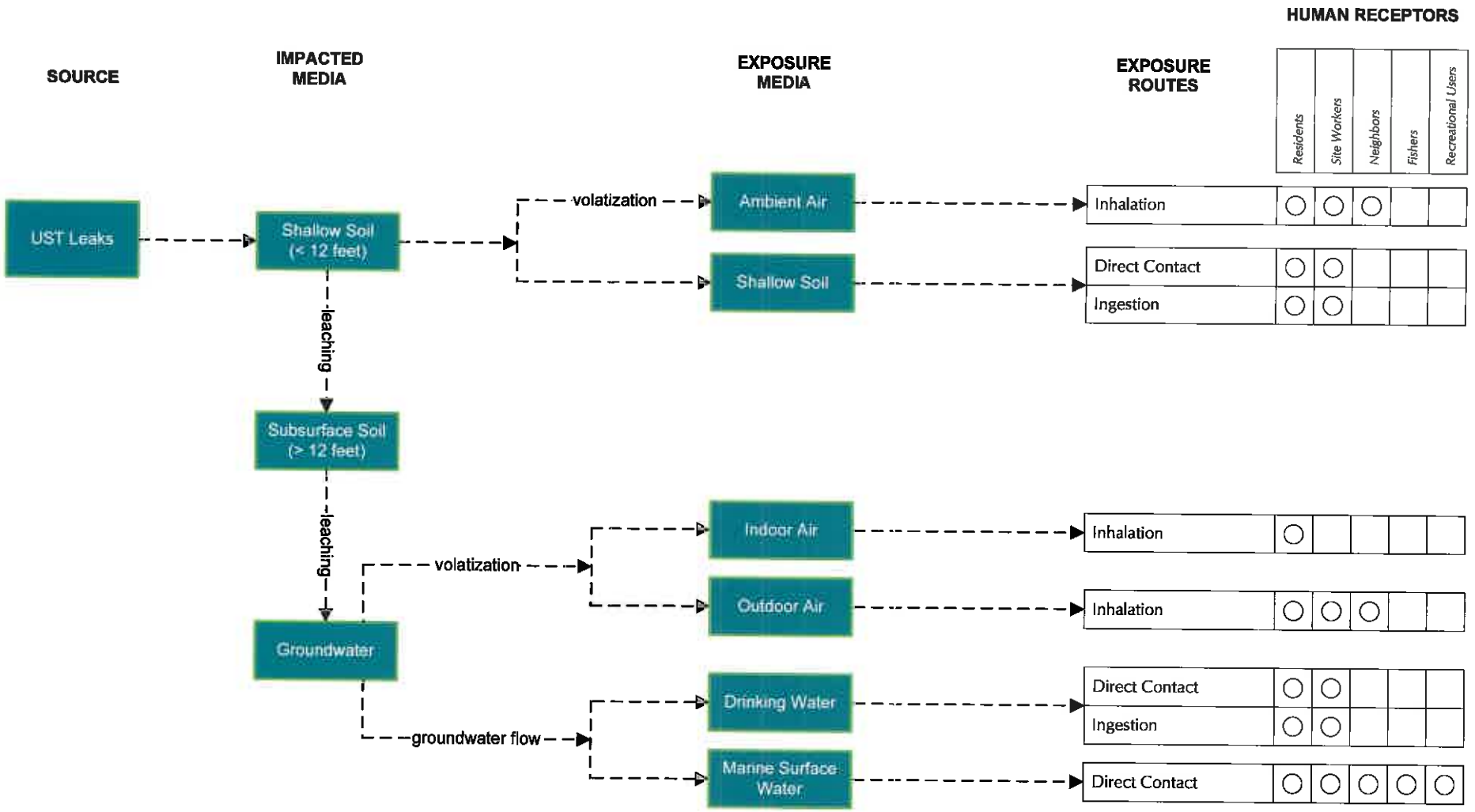

Potential pathway

Incomplete pathway

Potentially affected receptor with potentially complete pathway

Potentially affected receptor with incomplete pathway

Pathway is not applicable or the potential risk associated with the pathway appears low

CLOSURE SITE CONCEPTUAL MODEL

NORTH BAY SITE

Tesoro Alaska Company

Date:	2/4/2010
File:	0159/2010/Reports/CSM
Drawn by:	SCK

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Figure **3**

Location sketch

START DATE:	11-11-09	TEST PIT:	TP-1
END DATE:	11-11-09	PROJECT:	01-59 N. Bay
CONTRACTOR:	L&J	GEOLOGIST:	SCK

Temperatures in the mid- to high 20s, breezy, snowing

SAMPLE INTERVAL (FBG)	SAMPLE TYPE	SAMPLE ID	AMBIENT PID	HEAD-SPACE PID	USCS	LITHOLOGIC DESCRIPTION
0						
2				1.0	sw/ml	Medium brownish-gray interlayered with reddish brown fine to coarse SAND with 5 to 10 percent rounded gravel up to 3 inches, moist, no odor.
						Light brown SILT with fine sand, moist, no odor.
4				1.2		
6	Grab	TP-1-6		2.0	sp	Medium gray, fine to medium SAND, moist, no odor.
8				1.4		
10				1.4	sw	Medium gray, fine to coarse SAND with trace gravel at 7 feet increasing to 40 or 50 percent at 10 feet and then decreasing to 5 or 10 percent at 12 feet, moist, no odor.
12	Grab	TP-1-12		1.5		
14						
16						

TEST PIT LOG

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Location sketch

START DATE:	11-11-09	TEST PIT:	TP-2
END DATE:	11-11-09	PROJECT:	01-59 N. Bay
CONTRACTOR:	L&J	GEOLOGIST:	SCK

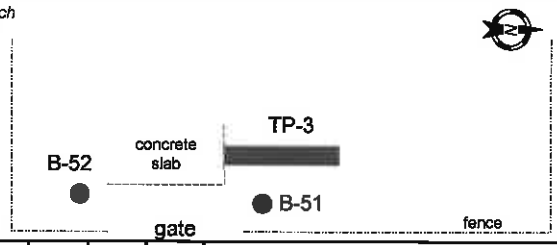
Temperatures in the mid- to high 20s, breezy, snowing

SAMPLE INTERVAL (FBG)	SAMPLE TYPE	SAMPLE ID	AMBIENT PID	HEAD-SPACE PID	USCS	LITHOLOGIC DESCRIPTION
0						Top soil.
2				1.7	ml	Light olive gray SILT with trace rounded gravel and coarse sand, moist, no odor.
4				0.8	sw	Medium gray, fine to coarse SAND with 5 to 10 percent fine rounded gravel, moist, no odor.
6	Grab	TP-2-6		1.8		
8				1.8	sw/gw	Medium gray coarse SAND and GRAVEL with abundant iron staining from 7 to 11 feet, no odor.
10				1.7		
12	Grab	TP-2-12		1.8		
14						
16						

TEST PIT LOG

KENT & SULLIVAN, INC.

Location sketch



START DATE:	11-11-09	TEST PIT:	TP-3
END DATE:	11-11-09	PROJECT:	01-59 N. Bay
CONTRACTOR:	L&J	GEOLOGIST:	SCK

Temperatures in the mid- to high 20s, breezy, snowing

SAMPLE INTERVAL (FBG)	SAMPLE TYPE	SAMPLE ID	AMBIENT PID	HEAD-SPACE PID	USCS	LITHOLOGIC DESCRIPTION
0						
						Top soil, concrete rubble.
2				0.6		
					ml	Banded (orangish brown, yellowish brown, reddish-brown) SILT with fine sand and trace gravel, moist, no odor.
4				0.8		
					sp	Medium gray, medium to coarse SAND with trace gravel, moist, no odor.
6	Grab	TP-3-6		0.7		
					sw/gw	Dark gray coarse SAND and GRAVEL, moist, no odor.
8				0.8		
					sp	Medium gray, fine to medium SAND with trace gravel, moist, no odor.
10				0.6		
					sw/gw	Dark gray, coarse SAND and fine GRAVEL, no odor.
12	Grab	TP-3-12		0.7		
14						
16						

TEST PIT LOG

KENT & SULLIVAN, INC.