ALASKA
Department of
Environmental
Conservation

ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING

GAFFNEY ROAD AREA
FAIRBANKS, ALASKA

FINAL Report
February 2009

Prepared by:

oasis
ENVIRONMENTAL

825 W. 8th Ave.
Anchorage, AK 99501

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AND
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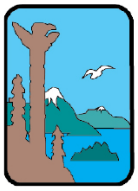

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ACRONYMS AND ABBREVIATIONS

ADEC ..... Alaska Department of Environmental Conservation
bgs ..... Below ground surface
BTEX..... Benzene, toluene, ethylbenzene, and xylenes
˚F..... Degree Fahrenheit
DCE..... Dichloroethene
DO..... Dissolved oxygen
EPA..... Environmental Protection Agency
GCL..... Groundwater cleanup level
HCl ..... Hydrochloric acid
inHg..... Inches of mercury
IDW ..... Investigation-derived waste
MS/MSD..... Matrix spike and matrix spike duplicate
µg/m^3 ..... Micrograms per cubic meter
µg/kg ..... Micrograms per kilogram
µg/L ..... Micrograms per liter
mL ..... Milliliter
mL/min ..... Milliliter per minute
OASIS ..... OASIS Environmental, Inc.
ORP ..... Oxygen reduction potential
ppm ..... Parts per million
PPE..... Personal protective equipment
PID ..... Photo-ionization detector
RME ..... Reasonable maximum exposure
RPD..... Relative percent difference
RCRA..... Resource Conservation and Recovery Act
SCL ..... Soil cleanup level
PCE..... Tetrachloroethene
TCE..... Trichloroethene
UST..... Underground storage tank
VOC ..... Volatile organic compounds

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EXECUTIVE SUMMARY

OASIS Environmental, Inc., conducted an investigation of the Gaffney Road Area site on behalf of the Alaska Department of Environmental Conservation (ADEC) in September 2008. The investigation included installation and sampling of six soil gas monitoring points, vapor intrusion assessments at two buildings, installation and sampling of 29 test borings, installation of two monitoring wells, sampling 22 monitoring wells, performing a pilot test for remediation of soil contamination behind Good News Bible and Book Store, and researching former uses of the Alaska Park and Sell property.

Concentrations of tetrachloroethene (PCE) in the soil gas implants exceeded Environmental Protection Agency target soil gas concentrations for the soil gas points located at the fourplex building containing Forget-Me-Not Books, Stone Soup Community Center, Sunshine Alterations, and Coin King Laundromat. The elevated PCE concentrations indicate that indoor air quality may be compromised. Therefore, a full vapor intrusion assessment should be considered in these buildings.

The vapor intrusion analysis of Good News Bible and Book Store yielded concentrations of PCE and trichloroethene (TCE) that were consistent with previous sample events, including an indoor air concentration of PCE that exceeded the reasonable maximum exposure (RME). The vapor intrusion analysis of State Farm showed elevated sub-slab air concentrations of PCE, but the indoor air concentration of PCE was less than the RME. At least one more round of sampling is recommended for Good News Bible and Book Store, especially for the spring period for which there is no data, and additional rounds of sampling are recommended for State Farm to verify current results and determine variability.

Soil samples from test borings identified a source area of PCE-contaminated soil to the south of Forget-Me-Not Books and Sunshine Alterations. The area appears to extend at least 150 feet along the sidewalk on the north side of Airport Way. The area behind Stone Soup Community Center and Coin King Laundromat also may be included, but this area was not investigated because access was not granted.

The test borings provided good delineation of the East PCE Plume. The plume appears to begin on the south side of the fourplex near the source area described above. The plume extends to the northwest in a direction that is consistent with mapped groundwater flow. The majority of the dissolved-phase chlorinated alkenes appear to be located in the top 20 feet of the aquifer. There is no indication that a source of dense non-aqueous phase product is located beneath the surface of the aquifer. The plume was not fully delineated to the southeast because access was not granted for this area. If access remains unobtainable for Coin King Laundromat, then additional test borings located on 14th Avenue south of Airport Way would determine whether there is an upgradient source contributing to the East PCE Plume.

Data from test borings for the past two years demonstrate the presence of two distinct plumes of chlorinated alkenes that are commingled by releases from the sewer line on

14th Avenue. The sampling and analysis of monitoring wells across the entire site show that little change has occurred in plume chemistry since last year. The two plumes remain in different states of natural attenuation as concentrations in the West PCE Plume appear mostly static, while concentrations in the East PCE Plume appear to experience slow degradation. A formal long-term monitoring plan should be developed when remedial activities begin to occur for vadose zone contamination.

A review of records and previous investigations of the former Alaska Park and Sell property indicates that a company called Fairbanks U-Drive began operations at the lot in the late 1960s and continued to circa 2000. The business appears to have used PCE on the premises, which suggests that the source area to the northeast of the building may be related to former site activities. However, the release mechanism of PCE to the vadose zone northeast of the building remains undetermined, although floor drains in the building are suspect.

1. INTRODUCTION

Under Notice-to-Proceed 18-9028-13-63, the Alaska Department of Environmental Conservation (ADEC) tasked OASIS Environmental, Inc. (OASIS) to conduct an investigation of the Gaffney Road Area (hereafter "the site") located in Fairbanks, Alaska (see Figure 1). The phases of the investigation included a characterization of the East PCE Plume, an assessment of the vapor intrusion pathway, a treatability study for vadose zone contamination behind Good News Bible and Book Store, Phase I research of the former Alaska Park and Sell property, and long-term monitoring of site wells. Activities involved with the investigation included installation and sampling of six soil gas monitoring points, vapor intrusion assessments at two buildings, installation and sampling of 29 test borings, installation of two monitoring wells, sampling 22 monitoring wells, and performing a pilot test for remediation of soil contamination behind Good News Bible and Book Store. This report summarizes the results of investigative activities, except for the pilot test which will be submitted as a separate feasibility study.

1.1. Scope of Work

Based on ADEC's scope of work (dated April 10, 2008), which was amended in May 2008 and July 2008, the following objectives have been developed for this phase of the investigation:

- Review previous uses of the former Park and Sell property.
- Identify source areas and delineate the extent of contamination for the East PCE Plume.
- Assess the overall status of the groundwater plumes.
- Determine the potential for vapor intrusion at nine buildings at the site.
- Determine the effectiveness of a soil vapor extraction system for addressing vadose zone contamination at Good News Bible and Book Store.

1.2. Project Organization

ADEC contracted OASIS to manage and execute this project. Other companies providing project support were subcontracted to OASIS.

- Owner – No involved responsible parties; ADEC is funding the project.
- Third-Party Environmental Assessor – OASIS, 825 W 8th Ave, Anchorage, Alaska, 99501.
- Drilling Subcontractor – GeoTek Alaska, Inc., 907 East Dowling Road, Ste. 16, Anchorage, Alaska, 99518.
- Laboratory Subcontractors – OnSite Environmental, Inc., 14648 NE 95th Street, Redmond, Washington, 98052; Air Toxics Ltd., 180 Blue Ravine Road, Ste. B, Folsom, California, 95630.

- Waste Subcontractor – Emerald Alaska, Inc., 2020 Viking Drive, Anchorage, Alaska, 99501.

1.3. Regulatory Framework

A regulatory framework for this project has been developed using the following regulations and guidance documents:

- ADEC, 18 AAC 75, *Oil and Other Hazardous Substances Pollution Control, Revised as of October 9, 2008*
- ADEC, *Underground Storage Tanks Procedures Manual: Guidance for Treatment of Petroleum-Contaminated Soil and Water and Standard Sampling Procedures*, *November 7, 2002*
- ADEC, *Monitoring Well Design and Construction for Investigation of Contaminated Sites, November 2008*
- ADEC, *Evaluation of Vapor Intrusion Pathway at Contaminated Sites, June 28, 2004*
- Environmental Protection Agency (EPA), *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), November 2002*
- *Interstate Technology Regulatory Council, Vapor Intrusion Pathway: A Practical Guideline, January 2007*
- California Environmental Protection Agency, *Advisory – Active Soil Gas Investigations, January 28, 2003*
- ADEC, *Cumulative Risk Guidance, June 9, 2008*
- ADEC, *Cleanup Levels Guidance, June 9, 2008*

The contaminants of concern associated with this project are the following chlorinated alkenes: tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (DCE), trans-1,2-DCE, and vinyl chloride. The chlorinated alkenes historically have been detected in soil, groundwater, and soil gas samples at the Gaffney Road Area site, except for vinyl chloride, which is a degradation compound of PCE, TCE, and DCE and an important compound for assessing potential degradation of the contaminant plumes.

Analytical results for soil samples have been evaluated using ADEC's Method Two guidelines as described in 18 AAC 75.341. Results have been compared to soil cleanup levels (SCLs) of the "Under 40 Inch Zone" presented in Table B1 of 18 AAC 75. SCLs are based upon the most restrictive benchmark for either the inhalation pathway or ingestion pathway, or the statewide migration to groundwater pathway. Analytical results for groundwater samples have been compared to the groundwater cleanup levels (GCLs) as presented in Table C of 18 AAC 75.345.

ADEC has not promulgated regulatory benchmarks for the analysis of the vapor intrusion pathway, nor does *Cleanup Levels Guidance* define an equation for calculating risk-based action levels for vapor intrusion. Therefore, for soil gas, EPA's target shallow soil gas concentrations from *OSWER Draft Guidance for Evaluating the Vapor Intrusion to*

Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), November 2002, have been used for screening purposes. For indoor air, screening criteria known as reasonable maximum exposures (RMEs) have been developed for carcinogenic contaminants (PCE, TCE, and vinyl chloride) using the target indoor air concentration equation for carcinogens from Appendix D, Section 5 of EPA's *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), November 2002*, combined with recommended risk inputs from *Cleanup Levels Guidance* and *Cumulative Risk Guidance*. Specific inputs include a target cancer risk of 1 in 100,000 from *Cumulative Risk Guidance* and the use of inhalation unit risk factors from Appendix C in *Cleanup Levels Guidance*. The original derivation of the RMEs was presented in Appendix A of *Vapor Intrusion Assessment, Gaffney Road Area* (OASIS 2008a).

For the non-carcinogenic contaminants in indoor air, cis-1,2-DCE and trans-1,2-DCE, RMEs have been calculated using the target indoor air concentration equation for non-carcinogens in Appendix D of *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), November 2002.*

Table 1 summarizes the screening levels used for this project to assess site-specific data.

TABLE 1. CONTAMINANTS OF CONCERN SCREENING LEVELS, GAFFNEY ROAD AREA

Compound	ADEC SCL (µg/kg)	ADEC GCL (µg/L)	EPA Target Shallow Soil Gas Concentration (µg/m^3)	EPA Target Deep Soil Gas Concentration (µg/m^3)	Commercial RME (µg/m^3)
PCE	24	5	81	810	20.8
TCE	20	5	2.2	22	1.1
cis-1,2-DCE	240	70	350	3,500	35
trans-1,2-DCE	370	100	700	7,000	60
Vinyl chloride	8.5	2	28	280	13.9

Notes:
µg/kg Micrograms per kilogram
µg/L Micrograms per liter
µg/m^3 Micrograms per cubic meter

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2. BACKGROUND

This section summarizes the environmental setting and previous investigations that have been performed at the Gaffney Road Area site. The environmental setting is based on site-specific information from various regional reports by the United States Geological Survey (Glass, Lilly, and Meyer 1996), Ecology and Environment, Inc (E & E 1998, 1999a, 1999b, 2000a, 2000b, 2001, 2002a, 2002b, 2003, 2004, and 2005), and OASIS (2007). Section 8 lists all referenced materials.

2.1. Environmental Setting

The site is situated on the collective floodplain of the Tanana and the Chena rivers. The surficial geology consists of unconsolidated silt, sand, and gravel of the Chena Alluvium from the Pleistocene and Holocene ages. The Chena Alluvium is characterized by well-stratified layers of unconsolidated coarse sand and gravel interbedded with poorly stratified layers and lenses of unconsolidated silt and sandy silt. The poorly stratified sediments are present in sinuous swale and slough deposits, while the unconsolidated coarse sand and gravel are ubiquitous within the Tanana-Chena floodplain. Collectively, these unconsolidated deposits are more than 300 feet thick in the Tanana River and the Chena River valleys (Péwé et al. 1976).

Discontinuous permafrost of generally low ice content is characteristic of Chena Alluvium sediments. However, swale and slough deposits commonly have moderate to high ice (permafrost) content in the form of seams and lenses. The low ice content of the coarse sand and gravel deposits is present in pore spaces and/or very thin seams. Typically, the depth to permafrost is less in the finer-grained sediments of the swale and slough deposits, and the ice content is greater in the older swale and slough deposits than in the younger swale and slough deposits. Locally, both deposits are perennially frozen and, where present, permafrost ranges in depth from 2 to 40 feet below ground surface (bgs) (Péwé et al. 1976).

The unconfined alluvial-plain Chena Alluvium aquifer is capable of yielding significant quantities of water in wells. The aquifer may exhibit seasonal confined conditions over localized areas from seasonal frosts. Also, where discontinuous permafrost is present, confined conditions may exist in subpermafrost groundwater within the alluvial plain aquifer (Péwé et al. 1976).

Recharge to the alluvial plain aquifer occurs from the Tanana and Chena rivers, with a relatively small amount resulting from infiltration of precipitation. Groundwater levels in the alluvial-plain aquifer respond relatively quickly to increases in the stages of the Tanana and the Chena rivers. Wells completed in the alluvial-plain aquifer within ½-mile of either river show the greatest elevation increases because of increased river flow (Glass, Lilly, and Meyer 1996).

Data gathered during previous groundwater assessments at the site indicate that groundwater flow in the unconfined alluvial-plain aquifer is northwest with localized variations shifting the flow north or west. In general, the elevation of the water table in

the alluvial-plain aquifer varies from 420 to 427 feet above mean sea level with an average horizontal gradient of 0.0008 feet per foot (E & E 1998, 1999a, 1999b, 2000a, 2000b, 2001, 2002a, 2002b, 2003, 2004, 2005, and OASIS 2007a). These elevation data are consistent with those presented by the USGS for the regional aquifer (Glass, Lilly, and Meyer 1996).

2.2. Previous Investigations

A series of investigations has been performed at the site since the discovery of PCE in 1993 during an investigation at an adjacent site. Three phases of initial investigations occurred from 1997 to 1999 in which the plumes were delineated and the source area at monitoring well MW-9 was identified. Annual groundwater and natural attenuation monitoring occurred from 2000 to 2004. In addition, the source area at monitoring well MW-9 was defined in 2004. Another round of groundwater and natural attenuation monitoring occurred in 2006 in addition to rehabilitation of compromised monitoring wells. A characterization of the West PCE Plume occurred in 2007, which included vapor intrusion assessments for buildings located above the West PCE Plume. Investigation activities are summarized in Table 2.

TABLE 2. SUMMARY OF PREVIOUS INVESTIGATIONS, GAFFNEY ROAD AREA

Year	Author	Activities	Findings
1993	Dames and Moore	Site investigation for a different site.	Discovery of West PCE Plume
1997	E & E	Phase I Investigation. Collected 50 passive soil gas samples within rights-of-way of source area. Installed 15 temporary wells and three permanent wells.	Groundwater contamination located in area from 700 block of Gaffney Rd. extending northwest to intersections of Barnette St. and 11th Ave. and Cushman St. and 10th Ave.
1998	E & E	Phase II Investigation. Installed 19 temporary wells. Converted 12 to semi-permanent wells. Delineated areal extent of East PCE Plume and West PCE Plume.	Two contaminant plumes identified. The East PCE Plume centered along Gaffney Rd. east of Cushman Street, and the West PCE Plume centered along Gaffney Rd. between Stacia and Turner streets. Both plumes extend north to northwest from the Gaffney Rd. area toward the Chena River.
1999	E & E	Groundwater monitoring.	Results consistent with 1998 Phase II Investigation.
1999	E & E	Phase III Investigation. Sediment and water samples collected at 11 sewer manholes. Collected 44 passive soil gas samples on private property in source area. Three former dry-cleaning facilities inspected. Installed 22 temporary wells. Converted 8 to permanent wells.	Wood-stave sewer lines likely are releasing PCE to the vadose zone. Source of PCE-contaminated soil identified behind former Royal Master's Launderette at the location of MW-9.

Year	Author	Activities	Findings
Apr-2000, Oct-2000, Oct-2001, and Oct-2002	E & E	Groundwater monitoring. Natural attenuation analysis.	Location and contaminant concentrations of the plumes are consistent from year to year. While geochemical conditions potentially are conducive to natural attenuation, the concentrations of chlorinated solvents are not decreasing within the source area of the two PCE plumes.
2003	E & E	Groundwater monitoring. Natural attenuation analysis. Indoor air sampling	Four new wells installed: three in East PCE Plume and one in West PCE Plume. Results show changing geochemistry in the East PCE Plume: TCE and cis-1,2-DCE have increasing concentrations while PCE decreases. Relatively no change in the West PCE Plume. Indoor air sampling shows detectable PCE concentrations at Magoffin Law Firm.
2004	E & E	Groundwater monitoring. Source characterization. Remedial alternative analysis.	The East PCE Plume appears to be in a state of intrinsic remediation. The West PCE Plume appears to be in a static state near the source area around MW-9. Source characterization near MW-9 identified a layer of silty soil of unknown areal extent between 5 and 12 feet below ground surface, which contains elevated concentrations of PCE. During the characterization, a wood-stave secondary sanitary sewer line for Good News Bible and Book Store was breached. Repair of the breached line included the removal of nine cubic yards of PCE-impacted soil. Remedial analysis identified soil excavation and HRC® injection as the best alternative.
2006	OASIS	Well rehabilitation. Groundwater monitoring. Natural attenuation analysis. Vapor intrusion assessment.	Replaced 12 Phase II wells with permanent wells. Groundwater analysis shows that East PCE Plume continues to biodegrade, while West PCE Plume remains static. Vapor intrusion assessment shows that Good News Bible and Book Store and Magoffin Law Firm have complete vapor intrusion pathways during winter heating season. The vapor intrusion pathway at Meyeres Real Estate appears to be incomplete.
2007	OASIS	Passive soil gas analysis along sewer line on Turner Street. Installed 70 test borings in West PCE Plume. Installed four monitoring wells in West PCE Plume. Groundwater Monitoring. Vapor intrusion assessments at seven buildings in West PCE Plume.	Source area in West PCE Plume extends across Stacia Street from Good News Bible and Book Store to former Park and Sell building and south along sewer line to the south side of Airport Way. No change in status of groundwater plumes. Vapor intrusion assessment shows complete pathway for Good News Bible and Book Store, but an incomplete pathway for Magoffin Law Firm during the summer.
2008	OASIS	Installed five test borings on the south side of Airport Way. Installed two test borings in East PCE Plume. Installed six soil borings in front of Park and Sell building. Installed two monitoring wells in East PCE Plume. Soil gas analysis at three buildings on the south side of Airport Way.	Delineated much of the southern extent of PCE plumes. Mostly delineated the areal extent of PCE in the vadose zone in front of the Park and Sell building. Soil gas analysis shows that PCE concentrations exceed EPA shallow target soil gas concentration.

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3. FIELD ACTIVITIES

This section presents a summary of field activities performed as part of vapor intrusion assessments, plume characterization, and long-term monitoring. Specific activities included the following:

- Sampling soil gas near buildings in the East PCE Plume area to assess the potential for vapor intrusion
- Sampling interior, exterior, and sub-slab air at Good News Bible and Book Store and State Farm to assess the potential for vapor intrusion
- Installing test borings to screen and analyze soil and groundwater samples in the East PCE Plume to identify source areas and determine the extent of impact from chlorinated alkenes
- Installing monitoring wells in the East PCE Plume to provide more coverage of the plume
- Sampling monitoring wells in both plumes to monitor long-term status

Appendix A contains a copy of field notes, and Appendix B presents photographs of field activities.

3.1. Soil Gas Sampling

Figure 2 shows the locations of temporary soil gas monitoring points, including the four soil gas monitoring points (SG-1 – SG-4) installed in May 2008 that have not been formerly reported. GeoTek Alaska, the drilling subcontractor, installed the points using a direct-push drill rig. Each point consisted of one shallow and one deep stainless steel soil gas implant screen. The deep implants were installed at a depth of 9 feet bgs. The shallow implants were installed at a depth of 5 feet bgs. Teflon tubing was connected to each implant and extended to the ground surface for sampling. Each implant was centered vertically within 2 feet of 10/20 silica sand. A combination of granular bentonite and hydrated bentonite slurry was used to seal the implants from each other and from the ground surface. Figure 3 profiles a typical installation of a temporary soil gas point. During installation of the implants, OASIS field personnel collected soil samples from the implant depths for analysis of percent moisture. Appendix C contains boring logs for the soil gas points.

Each soil gas monitoring point was purged and leak tested before sampling. Approximately 2 liters of air was purged by pumping at a rate of approximately 200 milliliters/minute (mL/min) using a peristaltic pump and rotameter to control flow. During the purge process, a leak-check also was performed, which consisted of a sample manifold check and a soil gas monitoring point check.

The following process was used for conducting the manifold leak-check:

- Connected the entire sample train. This entailed running Teflon sample tubing through the leak detection hood and connecting the sample tubing to the soil gas valve on the manifold; connecting the helium supply to the leak detection hood;

connecting the pump to the rotameter and the rotameter to the pump valve on the manifold using polyethylene tubing; connecting the flow controller to the sample valve; and connecting a 1-liter summa canister to the flow controller. The initial vacuum of the summa canister was checked before connecting the summa canister to the sample train.

- Closed the soil gas valve on the manifold and opened the sample and pump valves. Ran the sample pump so that a vacuum was pulled on the manifold.
- Closed the pump valve and turned off the pump. Verified that the manifold maintained a constant vacuum. If the vacuum in the manifold did not decrease after one minute, then the manifold was considered leak-free. However, if the vacuum was decreasing in the manifold, all connections were checked and the manifold leak-check was performed again.

At this point, the leak-check for the soil gas monitoring point was performed. The following process was used for the soil gas monitoring point leak-check:

- Opened all valves on the manifold and turned on the sample pump. Verified that the flow rate was 200 mL/min.
- Opened the helium tank and allowed helium to flood the leak detection hood for one minute.
- Purged 2 liters of soil gas (ten minutes of purging). During purging, connected a tedlar bag to the exhaust line of the peristaltic pump to collect a sample of the purge air. At the completion of the purge, analyzed the helium concentration of the air in the tedlar bag using a helium detector. A reading of less than 5% helium was considered a successful leak-check. A reading of more than 5% required a re-test after checking all connections.
- Lastly, oxygen, carbon dioxide, and volatile organic compound (VOC) readings also were taken from the tedlar bag using a multi-gas meter.

When the leak-check was complete, a soil gas sample was collected. Sampling commenced by closing the pump valve and opening the valve on the summa canister. Samples were collected over 30 minutes, which was controlled by the laboratory-supplied flow controller. When sampling was completed, the final vacuum of the summa canister was checked before the final tightening of the valve on the summa canister.

Soil gas samples were analyzed by Air Toxics Ltd., of Folsom, California, for chlorinated alkenes (PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride) by EPA method TO-15.

At the completion of soil gas sampling, OASIS field personnel removed the Teflon tubing from the temporary soil gas points, and GeoTek Alaska patched the surface with asphalt patch, concrete patch, or sand, depending on the surrounding surface material.

3.2. Air Sampling

Vapor intrusion assessments using a suite of air samples were planned to be conducted at Good News Bible and Book Store, State Farm, Thrifty Liquor, and Barracuda's Beach

Bar; however, access only was obtained to Good News Bible and Book Store and State Farm.

The suite of air samples included sub-slab air samples, indoor air samples, and outdoor air samples to evaluate a "multiple lines of evidence" approach for vapor intrusion. Sub-slab air samples determine the amount of contaminants that are immediately beneath a building. Indoor air samples assess the amount of contaminants present in the building and allow for an understanding of the attenuation of vapors from the subsurface to indoor air. Outdoor air samples identify the amount of contaminants present in ambient air that could contribute to indoor air quality.

OASIS field personnel initiated sampling activities at State Farm by meeting with the building's owner and conducting a building survey. The survey format was borrowed from the Interstate Technology Regulatory Council's *Vapor Intrusion Pathway: A Practical Guideline, January 2007*. The results are included in Appendix D. As part of the survey, OASIS field personnel identified proposed locations for air samples and removed possible background sources of VOCs inside the buildings. Three locations for sub-slab monitoring points were selected in the basement: one in the northwest corner, one in the northeast corner, and one in the center of the basement. The office in the northwest corner of the building was selected as the location for the indoor air sample. Appendix D includes a building diagram of the State Farm building, which shows sample locations. At Good News Bible and Book Store, OASIS field personnel only met with the building tenant to discuss any changes, whether occupancy or use related, that may have occurred since the last sampling event in August 2007.

The general location of air samples for both buildings is included in Figure 4. At each building, air sampling was initiated with the collection of the outdoor air sample. Outdoor air samples were collected in 6-liter, 100% certified-clean summa canisters with a 24-hour flow controller. The indoor air samples were next deployed at each building. Again, 6-liter, 100% certified-clean summa canisters with a 24-hour flow controller were used. Table 3 presents a summary of air samples collected as part of vapor intrusion assessments.

During the collection of the 24-hour outdoor and indoor air samples, OASIS field personnel collected the sub-slab air samples. A leak-check of each sub-slab sample port was performed prior to sample collection. The procedures used for the leak-check were the same as presented in Section 3.1 for soil gas sampling. In addition, a pre-sample pressure/vacuum measurement was taken at each sub-slab sample port with a magnehelic gauge. After the leak-checks occurred, sub-slab air samples were collected by connecting a 6-liter, 100% certified summa canister with a 30-minute flow controller to the sample valve of the manifold.

Air Toxics Ltd, of Folsom, California, performed analysis of the air samples. Indoor and outdoor air samples were analyzed for chlorinated alkenes (PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride) by EPA method TO-15 SIM. Sub-slab air samples were analyzed for the same compounds by EPA method TO-15.

Lastly, OASIS field personnel established a portable, electronic meteorological station on Gaffney Road to record barometric pressure and temperature during the 24 hours of sampling at each building.

3.3. Test Borings

OASIS field personnel oversaw the installation of a grid of 29 test borings to investigate the East PCE Plume. OASIS subcontracted with GeoTek Alaska to install the test borings using a direct-push drill rig. Figure 5 presents the locations for test borings, including five test borings that were installed in May 2008 and have not been formally reported. The following subsections describe the procedures for collecting, screening, and analyzing soil and groundwater samples from the test borings.

3.3.1. Soil Samples

The direct-push drill rig was used to collect continuous soil cores in 5-foot dedicated sleeves. OASIS field personnel screened the continuous soil cores for VOCs using a photo-ionization detector (PID). PID readings were taken for every foot of soil. The screening technique included splitting the core with a stainless steel spoon and shielding the PID probe tip within the split core with the spoon.

OASIS field personnel also screened the continuous soil cores for chlorinated compounds using the Color-Tec method. Samples for Color-Tec analysis were collected for the intervals of 0–5 feet bgs, 5–10 feet bgs, and 10–15 feet bgs. The collection of a sample for Color-Tec analysis included removing approximately 2.5 grams of soil per ½ foot of soil core so that the screening sample included ten increments over 5 feet and was composed of approximately 25 grams. The increments were added to a dedicated 40-milliter (mL) vial with a septa lid. The vial then was filled to approximately 70% capacity with distilled water. The vial next was placed in a hot water bath and brought to approximately 100 degrees Fahrenheit (°F). At this point, the Color-Tec sample was analyzed using a purge/extraction technique to draw approximately 100 cubic centimeters of head-space air through a PCE detector tube. The PCE detector tube primarily responds to the presence of PCE, but it also reacts to any chlorinated alkene, and to chlorinated alkanes to a lesser extent.

At the completion of screening activities, OASIS field personnel recorded physical observations from each soil core. Appendix C contains boring logs for all test borings, which include PID readings, Color-Tec results, and physical observations.

Based on PID and Color-Tec results, OASIS field personnel selected certain soil core intervals for confirmation soil sampling. Confirmation soil samples were collected from intervals that had a Color-Tec response. The length of the sample interval varied based on professional judgment with intervals ranging from 2 to 5 feet in length. Intervals near the groundwater interface often were truncated to avoid sampling soil that was within the water table (e.g., 10–13 feet bgs instead of 10–15 feet bgs). Table 4 details the soil core intervals from which confirmation soil samples were collected.

Confirmation samples were collected in a similar method to Color-Tec samples, except at least 5 grams were taken from each of the ten increments so that the sample had at least 50 grams of soil. The sample material was added to a pre-tared, 4-ounce amber jar that contained 25 mL of methanol for preservative. Confirmation soil samples were analyzed for PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride by EPA method 8260B. In addition, another 4-ounce jar was filled for corresponding percent solids analysis. OnSite Environmental Inc., of Redmond, Washington, analyzed all confirmation soil samples.

3.3.2. Groundwater Sampling

Following the completion of soil sampling, OASIS field personnel initiated the screening and sampling of groundwater. The direct-push drill rig was used to create sample intervals every 10 feet. Groundwater intervals were obtained by placing a 3-foot, slotted screen point on the leading drill rod and driving the drill rod to the desired depth. When the bottom of the screen point reached the desired sample depth, the drill rod was lifted 3 feet while the screen point was held in place with a smaller diameter rod located inside the main drill rod. The slotted screen point then filled with groundwater for sampling.

The initial screen point was secured at 15–18 feet bgs for all test borings. Subsequent groundwater sample intervals were 10 feet deeper. OASIS sampled each groundwater interval by placing dedicated polyethylene tubing within the slotted screen point and using a peristaltic pump to draw groundwater to the surface. The screen points were pumped at a rate of less than 1 liter per minute. Groundwater passed through a flow cell for the purpose of monitoring pH, temperature, specific conductivity, dissolved oxygen (DO), and oxygen reduction potential (ORP). When parameters stabilized, a screening sample was collected for Color-Tec analysis. This process included filling a dedicated, 40 mL vial with septa lid to approximately 70% capacity. The vial then was prepared and analyzed by the same procedures discussed in Section 3.3.1.

OASIS field personnel also collected confirmation groundwater samples from intervals in each test boring. A confirmation sample was collected from the shallow interval in each test boring in order to have a consistent data point for all test borings. In addition, for test borings that required a third interval, a confirmation sample was collected in order to have a consistent data point for test borings that had three or four groundwater intervals. Confirmation groundwater samples also were collected from the fourth interval in three test borings. These samples were collected at the discretion of field personnel. Table 4 details the groundwater intervals that had confirmation groundwater samples collected.

Confirmation samples were collected by filling three 40 mL vials with septa lids and preserved with hydrochloric acid (HCl) so that no headspace remained. The 40 mL vials were filled directly from the end of the dedicated tubing. OnSite Environmental, of Redmond, Washington, analyzed the confirmation samples for PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride by EPA method 8260B.

Groundwater screening and sampling continued in each test boring until one of the following occurred:

- Two consecutive non-detect readings were produced on Color-Tec.
- Four 10-foot intervals of groundwater were sampled.

Therefore, all test borings had a minimum of two groundwater intervals sampled.

3.4. Monitoring Well Installation

OASIS directed GeoTek Alaska in the installation of two permanent monitoring wells (MW-32 and MW-33) in the East PCE Plume. The locations of the wells were selected based on field results of the test borings. The ADEC project manager and OASIS field team leader conferred on the proposed locations. Figure 6 shows the location of the new wells, including two wells (MW-30 and MW-31) that were installed in May 2008 and have not been formally reported. The following list describes the rationale for the locations of the new wells:

- Monitoring well MW-30 was installed in the corner of a sewer line connection on the property of Barracuda's Beach Bar. This well serves as an upgradient monitoring point for the East PCE Plume.
- Monitoring well MW-31 was installed on the south side of Sunshine Alterations on the upgradient side of the sewer line located behind the store. This well serves as a source area monitoring point for the East PCE Plume.
- Monitoring well MW-32 was installed on the north side of Gaffney Road across from Forget-Me-Not Books. This well serves as a mid-plume monitoring point between MW-33 and MW-14.
- Monitoring well MW-33 was installed on the north side of Forget-Me-Not Books. This well serves as a source area well.

The wells were installed following standard practices detailed in ADEC's *Monitoring Well Design and Construction for Investigation of Contaminated Sites, November 2008.* Each well is constructed of 1.5-inch diameter PVC. The bottom 5 feet included 0.010-inch slotted screen with a 3-inch sump. The screen is surrounded by a sand pack that comes 2 feet above the top of the screen. A bentonite slurry was then poured into the annulus to a height of 1 foot bgs. Six inches of sand are on top of the bentonite to drain the monument. The wells were completed with 8-inch flush monuments surrounded by a concrete base.

3.5. Groundwater Monitoring

OASIS field personnel sampled monitoring wells within both the West PCE Plume and East PCE Plume to determine current concentrations of chlorinated alkenes. OnSite Environmental, of Redmond, Washington, analyzed the samples for PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride by EPA method 8260B. Figure 6 shows the locations of the monitoring wells.

Groundwater samples were collected by lowering dedicated polyethylene tubing into the screened section of each well. The tubing was connected to a peristaltic pump, which was used to bring groundwater to the surface. An in-line flow-through cell was attached

at the end of the tubing train to monitor pH, temperature, specific conductivity, DO, and ORP for stabilization. Purging occurred at a rate of less than 1 liter per minute. When water quality parameters stabilized, samples were collected directly from the end of the dedicated polyethylene tubing. For chlorinated alkenes, three 40 mL vials with septa lids and pre-preserved with HCl were filled so that no headspace remained in each vial.

3.6. Work Plan Deviations

OASIS prepared *Additional Site Characterization and Long-Term Monitoring Work Plan, Gaffney Road Area,* (OASIS 2008b), which outlined the strategy and methodology for the collection of environmental samples and executing the treatability study. Some of the executed activities and details deviated from the plan. The list below identifies the deviations:

- The work plan called for the installation of three temporary soil gas probes behind the fourplex of businesses (Forget-Me-Not Books, Stone Soup Community Center, Sunshine Alterations, and Coin King Laundromat) above the East PCE Plume; however, the soil gas point that was to be located behind Coin King was not installed because access was not secured to the property.
- The work plan called for vapor intrusion assessments at Barracuda's Beach Bar and Thrifty Liquor, but property owners did not grant access. Therefore, air samples were not collected at these locations.
- The work plan called for the installation of 33 test borings in the area of the East PCE Plume. The inability to secure access to the Coin King property eliminated many of the planned test borings. Some extra test borings were added to locations where access was granted to better delineate the East PCE Plume.
- Monitoring well MW-30 was not sampled because access to Barracuda's Beach Bar was not granted.

3.7. Investigation-Derived Waste

Characterization and monitoring activities generated solid and aqueous investigation-derived waste (IDW). Solid IDW included unused soil cores, used personal protective equipment (PPE), and used sampling equipment, such as disposable nitrile gloves, sample sleeves, sample tubing, and field test reagent kits. Unused soil cores were placed back down abandoned test borings, and GeoTek Alaska filled the remaining annular space of abandoned test borings with a bentonite grout to seal the borings. Used PPE and sampling equipment were contained in trash bags and disposed of at the Fairbanks landfill.

Aqueous IDW included test well and monitoring well purge water and decontamination fluids. These wastes were contained in 55-gallon drums for disposal as non-hazardous waste, except for purge water from monitoring wells MW-9, TW-46, MW-28, and MW-29. Purge water from these four wells was contained in a separate 35-gallon drum for disposal as Resource Conservation and Recovery Act (RCRA) regulated waste for the

toxicity characteristic based on PCE concentrations above 700 micrograms per liter (µg/L).

OASIS field personnel coordinated with Emerald Alaska, the IDW subcontractor, for pickup, transport, and disposal of the drums containing aqueous IDW.

4. FINDINGS

This section discusses results for the vapor intrusion assessments, characterization of the East PCE Plume, and sampling of monitoring wells. Appendix E contains a copy of laboratory analytical data reports.

4.1. Soil Gas Samples

Table 5 presents analytical results for soil gas samples collected from the temporary soil gas monitoring points, including the four soil gas monitoring points installed in May 2008 that have not been formerly reported. Figure 2 shows the analytical results for the soil gas samples.

PCE was detected in every shallow and deep soil gas implant. In addition, the concentrations of PCE exceeded the EPA shallow or deep target soil gas concentration at all 20 locations except the deep implant of SG-2, the deep implant of SD-10, and the shallow and deep implant of SG-11. TCE also exceeded either the EPA shallow or deep target soil gas concentration in 12 of the 20 samples, including both the shallow and deep implants of soil gas monitoring points SG-1, SG-3, SG-4, SG-9, and SG-12. Cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride did not exceed EPA target soil gas concentrations for any monitoring point. Soil gas monitoring point SG-11 was the only location that did not have a single compound exceed any EPA target soil gas concentration.

4.2. Air Samples

Samples were collected from September 17–19, 2008, at Good News Bible and Book Store and State Farm. OASIS field personnel established a meteorological station at the OASIS office, located at 748 Gaffney Road, to measure barometric pressure and temperature during sampling. Table 6 contains the recorded weather data.

Temperatures ranged from 33.4°F to 58.6°F during sampling. Pressure readings began at 29.09 inches of mercury (inHg) and fluctuated to a maximum of 29.23 inHg and a minimum of 28.91 inHg over 55 hours of monitoring. The median pressure reading was 29.06. The data show a slight downward trend, but the small range suggests that atmospheric conditions likely had minimal effect on vapor conditions during sampling.

The following subsections detail air sample results per building.

4.2.1. Good News Bible and Book Store

Good News Bible and Book Store has slab-on-grade construction. The heating system is hot-water baseboard, and the system had been turned on the day before sampling activities commenced. This was the fourth sampling event at Good News Bible and Book Store.

Table 7 presents analytical results for air samples collected at Good News Bible and Book Store. Figure 4 displays analytical results for PCE and TCE. All three sub-slab ports measured a slight pressure of 0.005 inHg or less prior to sampling.

PCE, TCE, and the BTEX compounds (benzene, toluene, ethylbenzene, and xylenes) were detected in the indoor air sample; however, only PCE exceeded its RME. The ambient concentration of PCE in the outdoor air sample was too low to have a significant contributing effect.

PCE and TCE were the only compounds detected in the sub-slab samples: PCE was detected at all three locations, while TCE was detected in the two ports (SS-1 and SS-2) along the southern wall of the building. The PCE concentrations at SS-1 continue to be the highest for the building at an order magnitude greater than the next highest location (SS-2). Table 7 also shows calculated indoor air/average sub-slab air attenuation factors for PCE (0.39%) and TCE (> 1.17%), which are the only two compounds with sufficient reportable data to calculate attenuation factors. Given that the 95th percentile for indoor air/sub-slab air attenuation factors for 311 paired data points in EPA's vapor intrusion database is 15% (EPA 2008), it is assumed that the calculated attenuation factors for PCE and TCE at Good News Bible and Book Store represent actual vapor intrusion scenarios. Therefore, the vapor intrusion pathway is complete for Good News Bible and Book Store.

4.2.2. State Farm

State Farm has a basement with a poured concrete floor and cinder block walls. Approximately one-third of the basement has a tile floor. The depth of the basement is approximately 6 feet bgs. Cracks are visible in the concrete floor, and utilities enter the building through the cinder block walls. There is a sump in the southeast corner of the basement. The heating system is hot-water baseboard. Appendix D contains a copy of the building survey.

Table 8 presents analytical results for air samples collected at State Farm. Figure 4 displays analytical results for PCE and TCE.

PCE and the BTEX compounds were detected in the indoor air sample, but none of the compounds exceeded its RME. The ambient concentration of PCE in the outdoor air sample was approximately 35% of the indoor air sample, while for the BTEX compounds ambient contribution was greater than 35% for all four compounds.

PCE, TCE, and cis-1,2-DCE were detected in the air samples from the two sub-slab ports (SS-5 and SS-6) on the north side of the basement, while PCE, TCE, benzene, and toluene were detected in the air sample from the sub-slab port (SS-7) in the center of the basement. The concentrations of PCE, TCE, and cis-1,2-DCE were greatest in the sample from sub-slab port SS-6, which is located closest to a sewer line. Table 7 also shows calculated indoor air/average sub-slab air attenuation factors for PCE (0.01%) and TCE (< 0.04%), which are the only two compounds with sufficient reportable data to calculate attenuation factors. These attenuation factors appear to represent vapor intrusion of PCE and TCE because the numeric factors correlate with the data set of attenuation factors presented in *U.S. EPA's Vapor Intrusion Database: Preliminary Evaluation of Attenuation Factors – Draft* (EPA 2008), but as previously noted, the indoor air concentrations for PCE and TCE were less than the RME.

4.2.3. Cumulative Results

As noted in Section 4.2.1, four sample events (October 2006, February 2007, August 2007, and September 2008) have now occurred at Good News Bible and Book Store. Table 9 presents the cumulative PCE and TCE data for these four sample events. Indoor air concentrations of PCE have ranged from 24 micrograms per cubic meter (µg/m^3) to 58 µg/m^3. The highest indoor air result for PCE occurred in August 2007, and the lowest result was in February 2007. In addition, the maximum and minimum indoor air concentrations for TCE occurred in the same months.

Variability in sub-slab concentrations for PCE and TCE has been greater than the indoor air concentrations. For instance, concentrations of PCE have been measured at three different orders of magnitude for sub-slab port SS-2. However, indoor air/sub-slab air attenuation factors for PCE and TCE have shown less variability than individual indoor or sub-slab air concentrations, which provides evidence that while concentrations may change appreciably between sample events, the resulting percentage of contaminant vapor entering the building is more consistent.

4.3. Soil Sampling

This subsection discusses results for soil samples collected from the 29 test borings installed in the East PCE Plume, plus five additional test borings installed in May 2008. Table 10 presents field screening and analytical results for all soil samples.

4.3.1. Color-Tec Sample Results

Only four of the 34 total test borings associated with the East PCE Plume had at least one soil sample from the vadose zone with a detectable response for Color-Tec analysis. One of the test borings, TB-103, only had a low-level response in the third sample interval (10–15 feet bgs), which likely is influence from the water table as opposed to actual vadose zone contamination. Two of the test borings, TB-76 and TB-112, are located behind the fourplex of businesses (Forget-Me-Not Books, Sunshine Alterations, Stone Soup Community Center, and Coin King Laundromat) above the East PCE Plume and near a sewer line. The last test boring, TB-74, is located on the south side of Airport Way near the junction of two sewer lines, which is a type of location that has shown to be a common problem for leaking PCE to the vadose zone.

The Color-Tec responses for TB-74 and TB-112 were low (less than 1.0 part per million [ppm]), which professional experience tends to suggest does not correlate to centers of source areas, but rather are locations that are on the fringes of source areas or impacted by minor releases from the wood-stave sewer lines.

Only test boring TB-76 had Color-Tec responses that likely are indicative of a significant mass of vadose zone contamination. This location is on the west side of where the sewer lines for the fourplex and Kodiak Jack's intersect. Contamination was observed in the first (0–5 feet bgs) and second (5–10 feet bgs) intervals, but not the third interval (10–15 feet bgs).

4.3.2. Confirmation Sample Results

Only 11 confirmation soil samples were collected from the 34 total test borings given the low number of detectable responses with Color-Tec field screening. Six of the samples were collected to confirm detectable responses of Color-Tec analysis, and the other five were collected to confirm non-detect responses of Color-Tec analysis. Figure 7 shows concentrations of PCE from all 11 confirmation soil samples in addition to corresponding Color-Tec results.

The analytical results of confirmation samples support the field finding that a source area exists at test boring TB-76. Additional data from test boring TB-112 suggest that the source area may extend along the north side of Airport Way by the sidewalk. The samples show that contamination is present near ground surface and extends down to the groundwater.

Analytical results from other soil samples indicate locations with much lower concentrations of PCE. For example:

- The interval from 5–10 feet bgs in test boring TB-74 had a PCE concentration of 25 micrograms per kilogram (µg/kg), which just exceeds the SCL of 24 µg/kg.
- The interval from 5–10 feet bgs in test boring TB-77 had a PCE concentration of 84 µg/kg. The corresponding Color-Tec result for this location was non-detect, which represents a false negative for the Color-Tec analysis; however, given the test boring's proximity to test borings TB-76 and TB-112 and the nearby sewer line, it is not surprising to find PCE at this location.
- The interval from 8–10 feet bgs in test boring TB-89 had a PCE concentration of 52 µg/kg. The corresponding Color-Tec result for this location was again non-detect; however, previous investigations have shown that the lower response limit for Color-Tec analysis in soil often corresponds to approximately 50 µg/kg. The location of test boring TB-89 also is along the sidewalk on the north side of Airport Way, similar to test borings TB-76 and TB-112, which appears to be a source area as discussed above.
- The interval from 10–13 feet bgs in test boring TB-103 had a PCE concentration of 80 µg/kg. Corresponding groundwater samples from test boring TB-103 (see next subsection) had elevated concentrations of PCE, so the soil result may be influenced by the groundwater smear zone and volatizing groundwater caught in the pore space of sample material.

Two final notes about confirmation soil samples are: 1) three of the five confirmation soil samples that were collected to confirm non-detect responses of Color-Tec analysis had no compounds detected above the laboratory reporting limit; and 2) PCE was the only compound detected above laboratory reporting limits in all 11 confirmation samples. This second finding suggests that PCE is the original release contaminant for the East PCE Plume.

4.4. Groundwater Sampling

This subsection discusses results for groundwater samples collected from the 29 test borings installed in the East PCE Plume, plus five additional test borings installed in May 2008. Table 11 presents analytical results for all field screening and confirmation groundwater samples collected from test borings.

4.4.1. Color-Tec Sample Results

A Color-Tec sample was collected at all sample intervals in each test boring for a total of 105 samples. Thirty-four groundwater samples were analyzed from both the shallow (15–18 feet bgs) and second (25–28 feet bgs) intervals; 23 were analyzed from the third interval (35–38 feet bgs); and 14 were analyzed from the fourth interval (45–48 feet bgs). Figures 8, 9, and 10 present the Color-Tec results for all samples from the shallow interval, second interval, and third interval, respectively.

Twelve test borings did not have a detectable response in either the shallow or second sample intervals for the test borings. Eight of them were located on the west side of the East PCE Plume: TB-84, TB-85, TB-86, TB-87, TB-88, TB-89, TB-90, and TB-91. Three were located in the northeast area of the test boring grid on the north side of Gaffney Road: TB-107, TB-108, and TB-109. The last test boring (TB-75) was located on the south side of Airport Way. This location served as an upgradient test boring.

Ten test borings had a Color-Tec response of 1 ppm or greater for at least one of the sample intervals. These test borings (TB-76, TB-77, TB-93, TB-99, TB-100, TB-102, TB-103, TB-105, TB-110, and TB-112) are located in middle of the grid area of the East PCE Plume, and they extend from the southern edge of the grid area along Airport Way to the northern extent of the grid area above Gaffney Road.

The other 12 test borings had detectable Color-Tec responses, but the concentrations were less than 1 ppm. These test borings were located on what appears to be the eastern and western edges of the East PCE Plume.

Color-Tec readings were highest in the shallow interval for all test borings except TB-104, TB-110, and TB-111. The second interval (25–28 feet bgs) had the highest Color-Tec reading for test borings TB-104 and TB-110, while the third interval (35–38 feet bgs) had the highest Color-Tec reading in test boring TB-111. These test borings were located on the downgradient side of the test boring grid; therefore, the chlorinated alkenes appear to have sunk in the aquifer with time and distance from the source area. It should be noted, however, that Color-Tec readings for subsequent intervals in these three test borings showed decreasing concentrations of chlorinated alkenes. The fact that the shallow interval had the majority of highest Color-Tec readings demonstrates that dense, chlorinated compounds are not sinking rapidly in the aquifer and that a source of dense, non-aqueous phase liquid likely is not present deep in the aquifer; otherwise, Color-Tec results probably would have increased with depth.

4.4.2. Confirmation Sample Results

Sixty confirmation groundwater samples were collected and analyzed from various intervals to confirm Color-Tec results. A confirmation sample was collected from the shallow interval (15–18 feet bgs) in all 34 test borings. No confirmation samples were collected from the second interval (25–28 feet bgs). If a third interval (35–38 feet bgs) was necessary based on Color-Tec results, which occurred 23 times, then a confirmation sample was collected from the third interval. Lastly, three confirmation samples were collected from the fourth interval (45–48 feet bgs).

Figure 8 shows PCE concentrations from the shallow interval for all 34 test borings. Nineteen of the test borings had either a PCE or TCE concentration that exceeded the GCL in the shallow interval. These results provide excellent delineation of the East PCE Plume, such as the likely location of the center of the plume and the lateral fringes where concentrations of chlorinated alkenes begin to decrease to less than GCLs. The only areas of the East PCE Plume that were not adequately defined are the areas behind Stone Soup Community Center and Coin King Laundromat, to the east of Coin King Laundromat, and on the south side of Airport Way along 14th Avenue, which are all locations that were not investigated as part of this characterization. However, it does not appear likely that the East PCE Plume extends to the east side of Coin King Laundromat because the downgradient test borings from the east side (TB-106, TB-107, TB-108) have either very low or non-detectable concentrations of chlorinated alkenes. An investigation of the area behind Stone Soup Community Services and Coin King Laundromat would likely provide additional evidence for the elevated concentrations of chlorinated alkenes observed in test boring TB-103 and possibly provide additional information on source areas in the vadose zone, while an investigation along 14th Avenue would determine whether an upgradient source was contributing to the East PCE Plume.

The confirmation sample results for the shallow interval also demonstrate that degradation compounds TCE and cis-1,2-DCE, and trans-1,2-DCE to a lesser extent, are present throughout the East PCE Plume. In addition, an analysis of the ratio of PCE to TCE in confirmation samples from the shallow interval indicates that ratios steadily decrease at test borings located more downgradient in the plume. For example, the PCE/TCE ratio in TB-77 is 85, which decreases to 3.1 in TB-103, which further decreases to 1.2 in TB-102, and concludes at 0.87 in TB-110. Based on confirmation soil sample data as discussed in Section 4.3.2, no TCE was observed in the vadose zone; therefore, it is inferred that TCE (and cis-1,2-DCE) is present because of degradation of PCE as the contaminant moves through the groundwater.

Figure 10 shows the analytical results for the third groundwater interval (35–38 feet bgs). Analytical data from the confirmation groundwater samples collected in the third interval confirm the field results for Color-Tec analysis by showing that concentrations of chlorinated alkenes are significantly less at a depth of 20–25 feet into the aquifer. The results also demonstrate that the ratios of PCE to TCE observed in the shallow interval decrease with depth as the chlorinated alkenes sink in the aquifer. For example, the

PCE/TCE ratio at TB-103 changes from 3.1 to 0.39 for the shallow and third intervals, respectively, while for test boring TB-102 the change is 1.2 to 0.014, and for test boring TB-110, the change is 0.87 to 0.016.

In summary, the analytical results for confirmation groundwater samples support that PCE is the original release compound; that the shallow part of the aquifer (top 20 feet) is the most impacted portion; and that PCE is readily degrading to TCE and the DCE isomers.

4.4.3. Monitoring Well Sample Results

Twelve existing monitoring wells in the West PCE Plume and eight existing monitoring wells and two new monitoring wells in the East PCE Plume were sampled to determine current concentrations of chlorinated alkenes in both plumes. Table 12 presents the analytical results, and Figure 6 shows the analytical results for PCE, TCE, cis-1,2-DCE, and trans-1,2-DCE. Current concentrations of chlorinated alkenes in the monitoring wells remain similar to historical results, although some wells, such as MW-12 and MW-13, are showing a gradual, slow decline in concentrations. Table 13 presents cumulative results of chlorinated alkenes for all wells at the Gaffney Road Area site. Table 14 contains cumulative results for molar concentrations of total chlorinated alkenes in order to compare the mass of chlorinated alkenes by well and sample date.

Table 15 presents the groundwater elevations as measured on October 9, 2008. Figure 11 shows a groundwater contour map based on the October 9 elevations. The figure was made using splining techniques in GIS software. The average horizontal groundwater gradient is 0.008 feet per foot, which is consistent with previous investigations (see Section 2.1).

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5. PROPERTY RESEARCH

The part of the former Alaska Park and Sell under consideration is located at 1330 Stacia Street. The legal description of the site is Rickert Subdivision, Block 20, Lot 3A. The lot contains a slab-on-grade building with 2,354 square feet of space and a non-permanent storage shed. The building contains office and garage space (FNSB 2008).

5.1. Records Review

OASIS personnel conducted a review of site history. The review included an examination of aerial photographs, a chain of title report, and research of available Polk directories and Sanborn maps. In the 1959 aerial photograph (Figure 12), the lot was undeveloped, but the 1970 aerial photograph (Figure 13) shows the current building with numerous cars parked around the building. The lot was likely developed around 1967 because that is when two underground storage tanks (USTs) were installed (Dames and Moore 1994). In Figure 13, a concrete foundation is present to the northeast of the building under which the USTs formerly were located. The 1979 aerial photograph (Figure 14) reveals very little change compared to the 1970 aerial, but the 1990 aerial photograph (Figure 15) shows an increase in debris piles around the lot. Barrels and drum tops even appear visible in some of the piles. A 1990 site visit of the property by ADEC includes pictures of some of these barrels and drums (ADEC 1990).

The chain of title report is included in Appendix F. Two property transactions occurred for Lot 3A before 1965, before which no development had occurred at the property based on aerial photographs. The original grantor and grantee are assumed to be free of potential responsibility given no development had occurred. However, the grantees in the second transaction, Russell H. Williams and C.O. Dunkin, may have been involved in business activities at the property because an operation called Fairbanks U-Drive, which appears to be a company that ran a Hertz Car Rental franchise, was present on the lot before Mr. Williams and Mr. Dunkin sold the lot to Fairbanks U-Drive and James Lundgren in 1969. Fairbanks U-Drive was a type of parent company for the Hertz Car Rental franchise in Fairbanks.

Fairbanks U-Drive sold the property in 1994 to Janice Chaffin-Bell, who was involved in the business of Fairbanks U-Drive (Dames and Moore 1994). In 2002, Ms. Chaffin-Bell transferred the property to a limited liability company in which she had interest, before selling the property to Gerald Swisher in 2003. Mr. Swisher sold the property to Alaska Park and Sell later in 2003. Mr. Swisher's involvement in the Alaska Park and Sell company is not clear.

The Anchorage Loussac Library maintains a database of Polk directories and Sanborn maps. The Polk directories date back to 1961. The only matching business found for Rickert Subdivision, Block 20, Lot 3A was Hertz Rental Car during the 1990s, which matches with information from the chain of title report. Sanborn maps were available for the years 1927 to 1969. The maps did not show any structures on Lot 3A.

5.2. Previous Investigations

Numerous stages of the Gaffney Road Area site investigations have analyzed environmental conditions at the former Alaska Park and Sell property. Significant events have included passive soil gas sampling in 1997, installation of test borings in 1999, vapor intrusion assessment in August 2007, installation of a grid of test borings in September 2007, and installation of test borings in 2008. In addition, a 1994 report from Dames and Moore documents the removal of two 5,000-gallon USTs containing gasoline for Fairbanks U-Drive, the company associated with Hertz Rental Car. During the excavation, 12 soil samples were collected from the excavation, but the samples were analyzed for hydrocarbons only so no information is available for chlorinated alkenes (Dames and Moore 1994). Figure 16 shows the estimated boundaries of the tank excavation, in addition to the locations of test borings from 2007 and 2008. As the figure depicts, test borings TB-78 and TB-79 appear to be located within the bounds of the former excavation. Data from these test borings are interesting in that elevated concentrations of chlorinated alkenes were present in soils from 0–5 bgs.

Figure 16 also shows the estimated extent of impact in the vadose zone from chlorinated alkenes at the former Alaska Park and Sell. Since the identification of widespread soil contamination in front of the former Alaska Park and Sell building in September 2007, there has been uncertainty of whether the contamination is an independent source area or whether it is linked to the source area that originates behind Good News Bible and Book Store.

The available information and data suggest that the more likely scenario is that there is a separate source of solvents located on the former Alaska Park and Sell property. The idea that the contamination is associated with the source area behind Good News Bible and Book Store would be convenient, but at this time there is no evidence that Lot 3A was used by the former Royal Masters Launderette. Therefore, the only way for the release of PCE behind Good News Bible and Book Store to impact the former Alaska Park and Sell building was if PCE migrated horizontally approximately 100 feet in shallow surface soil, which seems unlikely.

The unlikelihood that the contamination originated from practices or releases at the former Royal Masters Launderette directs the analysis to how and what the causes may be from former activities at Lot 3A. The available information includes the 1994 Dames and Moore report, which also discusses the removal of a 300-gallon waste oil UST on the western side of the building. The removal occurred because ADEC had requested cleanup of poorly maintained drums in the area of the waste oil UST. A surface soil sample collected above the tank had a PCE concentration of 3,390 µg/kg (Dames and Moore 1994). Therefore, there is evidence that the Hertz Rental Car facility was using PCE in its operations. Figure 16 shows the approximate location of the sample.

The bay of the former Alaska Park and Sell building has floor drains. It is possible that small amounts of PCE were spilled on the floor and washed down the floor drains over time. The current owner believes the drains connect with the building's sanitary sewer system, which flows west to the sewer main on Turner Street (Swisher 2008); however,

if by chance the floor drains leach outside the building or the building's sanitary sewer line connects with the sewer main on Stacia Street, then a plausible explanation for the source area to the northeast of the building exists.

The chemical signature of the chlorinated alkenes has previously been used to separate the vadose zone contamination near Good News Bible and Book Store and the vadose zone contamination near the former Alaska Park and Sell: namely, that significant concentrations of cis-1,2-DCE were present near the former Alaska Park and Sell building and not near Good News Bible and Book Store. However, it is now known that the vadose zone at Alaska Park and Sell was impacted with petroleum hydrocarbons from the USTs, thereby creating an environment conducive to degradation of PCE to cis-1,2-DCE. Therefore, the use of chemical signatures to differentiate the source areas may not be as useful as previously believed.

Lastly, it should be pointed out that soil samples from test borings TB-78 and TB-79 had elevated PCE concentrations in the vadose zone even though the sample matrix consisted of fill from the excavation of the USTs. There appear to be two explanations for this: 1) the fill was contaminated with PCE; or 2) the process by which PCE was released occurred or continued to occur after the removal of the tanks. If the process of release consisted of a leach field for the floor drains, or a slow release from a secondary sewer line, then it is plausible that releases continued to occur because Hertz Rental Car operated at the facility after the excavation of the USTs. In addition, given that PCE is present in the vadose zone outside the limits of excavation for the USTs, it seems more likely that some release process was ongoing, instead of the explanation that the fill was contaminated.

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6. QUALITY ASSURANCE REVIEW

This section summarizes the results of a data review using ADEC's *Environmental Laboratory Data and Quality Assurance Requirement, August 20, 2008,* and EPA's *National Functional Guidelines for Organic Data Review, October 1999,* to determine data quality and to evaluate potential impact on the usability of the data. The review was performed using EPA Level II laboratory data reports that were provided by OnSite Environmental and Air Toxics, Ltd. Laboratory analytical reports are provided in Appendix E. ADEC data review checklists are included in Appendix G.

The following list provides a brief review of data quality objectives. More details are presented in Appendix G.

- All work was performed by OASIS personnel who are qualified individuals as per 18 AAC 75.990(100).
- Completeness – 100% of samples submitted were analyzed, thereby meeting the data quality objective of 95%.
- Accuracy – All primary, matrix spike/matrix spike duplicate (MS/MSD), laboratory control, and method blank samples met method criteria for surrogate recoveries. Recovery limits were within laboratory control limits for all MS/MSD samples and laboratory control samples.
- Precision – Eight sets of water duplicate samples and four sets of air duplicate samples were collected and analyzed during the completion of the project. The frequency of field duplicate collection for water and air met the 10% frequency requirement. No soil sample field duplicate was collected, which was a field oversight. Relative percent differences (RPDs) for all water and air duplicate samples met plan requirements. RPDs for MS/MSD samples and laboratory control samples also met criteria. All laboratory method blanks were non-detect for contaminants of concern.
- Comparability – Samples were collected and analyzed in a manner that allowed analytical results to be compared to each other.
- Representativeness – Water samples were collected in a manner that minimally disturbed the water column and retrieved the sample matrix from the desired depth. Soil samples were collected from soil cores with minimal disturbance. Soil gas and sub-slab air samples were collected after performing a leak-check in the field using helium to ensure that infiltration did not occur at ground surface.

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7. EVALUATION OF FINDINGS

OASIS conducted an investigation of the Gaffney Road Area site in Fairbanks, Alaska, on behalf of ADEC. The phases of the investigation included a characterization of the East PCE Plume, an assessment of the vapor intrusion pathway, a treatability study for vadose zone contamination behind Good News Bible and Book Store, Phase I research of the former Alaska Park and Sell property, and long-term monitoring of site wells. Activities involved with the approaches of the investigation included installation and sampling of six soil gas monitoring points, vapor intrusion assessments at two buildings, installation and sampling of 29 test borings, installation of two monitoring wells, and sampling 22 monitoring wells. The following is a summary of findings from the investigation:

- Concentrations of PCE in the shallow and deep soil gas implants exceeded both the EPA shallow and deep target soil gas concentrations for the four temporary soil gas points located at the fourplex building containing Forget-Me-Not Books, Stone Soup Community Center, Sunshine Alterations, and Coin King Laundromat. The concentration of PCE in one of the shallow implants for the two temporary soil gas points next to Kodiak Jack's was the only compound that exceeded EPA target soil gas concentrations for these two soil gas points.
- The vapor intrusion analysis of Good News Bible and Book Store yielded indoor air, outdoor air, and sub-slab air concentrations of PCE and TCE that were consistent with previous sample events at the building. The indoor air concentration of PCE again exceeded the RME for an occupational setting.
- The vapor intrusion analysis of State Farm yielded sub-slab air concentrations of PCE that were as elevated as concentrations observed at Good News Bible and Book Store; however, the indoor air concentration of PCE was well below the RME for an occupational setting.
- The grid of test borings in the area of the East PCE Plume identified a source area of PCE-contaminated soil on the south side of the fourplex. The area appears to extend at least 150 feet along the sidewalk on the north side of Airport Way. The area behind Stone Soup Community Center and Coin King Laundromat may be included, but this area was not investigated because access was not granted.
- The grid of test borings provided good delineation of the East PCE Plume. Analytical data from the groundwater samples show that PCE and its degradation compounds have formed a plume that appears to begin on the south side of the fourplex near the source area described above. The plume extends to the northwest in a direction that is consistent with mapped groundwater flow. The plume was not fully delineated to the southeast in the area behind Stone Soup Community Center and Coin King Laundromat because access was not granted for this area.
- The sampling and analysis of the entire network of monitoring wells in the source area of the two plumes show that little change has occurred in plume chemistry since

last year. The two plumes remain in different states of natural attenuation as concentrations in the West PCE Plume appear to decrease primarily through dilution while concentrations in the East PCE Plume appear to experience degradation but not reductive dechlorination.

- A review of records and previous investigations of the former Alaska Park and Sell property indicates that a company called Fairbanks U-Drive, which was a Hertz Car Rental franchise, began operations at the lot in the late 1960s and continued to circa 2000. Fairbanks U-Drive had two USTs containing gasoline on the northeast side of the Park and Sell building. The tanks were removed in 1994. No samples were analyzed for chlorinated alkenes during the removal; however, a surface soil sample collected above a waste oil UST on the western side of the building had a PCE concentration of 3,390 µg/kg, which establishes that PCE likely was used by Fairbanks U-Drive. The release mechanism of PCE to the vadose zone northeast of the building is unknown, but six floor drains inside the former Alaska Park and Sell building are possible explanations. The current owner stated that he believes the floor drains connect to the building's sewer system and flow west to the sewer main on Turner Street; however, if he is incorrect, then a sewer system that flows east to Stacia Street or a leach field for the floor drains could explain the source area.

7.1. Conclusions

Based on the findings summarized above, the conclusions from this investigation are the following:

- The elevated soil gas readings for PCE and TCE around the fourplex containing Forget-Me-Not Books, Stone Soup Community Center, Sunshine Alterations, and Coin King Laundromat suggest that indoor air quality may be compromised inside these buildings.
- Kodiak Jack appears to be on the cusp of potential impact to indoor air quality from the East PCE Plume based on the analytical results for the two soil gas monitoring points located adjacent to the building.
- The vapor intrusion assessment at Good News Bible and Book Store indicates that no significant change has occurred to indoor, outdoor, and sub-slab air concentrations. Elevated sub-slab concentrations of PCE continue to affect indoor air quality. The variation that has been present between previous sample events is beginning to be "averaged out" now that there are four sample events from which to pool data.
- The vapor intrusion assessment at State Farm showed that while sub-slab concentrations of PCE and TCE are elevated, indoor air did not exceed EPA target indoor air concentrations for the two compounds.
- The source area of PCE-contaminated soil behind the fourplex containing Forget-Me-Not Books, Stone Soup Community Center, Sunshine Alterations, and Coin King Laundromat is likely not well delineated. There is good reason to suspect that vadose zone contamination is located further to the east behind Stone Soup

Community Center and Coin King Laundromat based on elevated soil gas readings in temporary soil gas point SB-9 and that the downgradient test boring with the most impacted groundwater (TB-103) appears to be at a cross-gradient angle from the two test borings (TB-76 and TB-112) with the highest PCE concentrations in soil. Vadose zone contamination, however, does not appear to extend to the east of Coin King Laundromat because the downgradient test borings TB-107 and TB-108 did not have detections of chlorinated alkenes in groundwater.

- The majority of the dissolved-phase chlorinated alkenes in the East PCE Plume appear to be located in the top 20 feet of the aquifer. There is no indication that a source of dense, non-aqueous phase product is located beneath the surface of the aquifer.
- Figure 17 presents a conceptual model of the East PCE Plume. The contours contain the area that likely has PCE or TCE concentrations above the GCLs. It should be noted that the model projects depth of contamination on the two dimensional figure. For instance, test boring TB-94 likely has a concentration of PCE or TCE greater than 5 µg/L in the second interval (25–28 feet bgs) given the Color-Tec response of 0.8 ppm, even though PCE and TCE in the shallow interval were less than 5 µg/L.
- The East PCE Plume appears to be experiencing degradation of PCE much more rapidly than the West PCE Plume. In a distance of less than 300 feet (test boring TB-77 to test boring TB-110), the ratio of PCE to TCE concentrations declines from 85 to 0.87 in the shallow groundwater interval (15–18 feet bgs). Both DCE isomers also were regularly detected in the groundwater samples from the test borings, but no vinyl chloride was detected. At this point, it is difficult to separate what is merely a combination of degradation and dilution of PCE and its degradation compounds, and what may be actual reductive dechlorination, especially given the absence of detectable concentrations of vinyl chloride.
- Figure 18 presents the current conceptual model of the Gaffney Road Area site based on the cumulative data from the past two years of investigations. As seen in the figure, the centers of the plumes are clearly separate with Cushman Street serving an artificial boundary between the plumes, yet the sewer line along 14th Avenue, acting as transport of PCE, appears to bridge the two plumes around Cushman Street. For instance, the elevated groundwater concentrations around MW-27 appear to be the result of some break in the sewer line, and the source of this PCE appears to be from the east side of Cushman Street, given the directional flow of the sewer line, even though MW-27 is located on the west side of Cushman Street. In this manner, this figure provides an excellent study of how the sewer lines contribute to the transport of PCE across the Gaffney Road Area site. Without the sewer lines, the plumes would be completely separate and smaller in width, and the contamination on the south side of Airport Way likely would not exist.
- The vadose zone contamination at the Alaska Park and Sell property appears more likely to be the result of former activities at the property rather than a result of

activities at the former Royal Masters Launderette. Documentation of PCE in a surface soil sample above the former waste oil UST, located on the western side of the building, suggests that PCE was used by Fairbanks U-Drive. The release mechanism that has caused the contamination to be present in the vadose zone in front of the former Park and Sell building remains unknown, although the floor drains inside the building are suspect.

7.2. Recommendations

The following recommendations are provided to further understand the distribution, degradation, and impact of chlorinated alkenes at the Gaffney Road Area site. The recommendations serve as options for ADEC to consider in project planning, but ADEC is not obligated to enact or implement any or all of the recommendations.

- Implement a vapor intrusion assessment for the fourplex of buildings containing Forget-Me-Not Books, Stone Soup Community Center, Sunshine Alterations, and Coin King Laundromat. The combination of elevated soil gas readings and the presence of the East PCE Plume underneath the fourplex provides ample evidence to indicate that indoor air quality may be compromised.
- Consider the need for a vapor intrusion assessment at Kodiak Jack's based on the current soil gas data. Although the concentration of PCE exceeded the EPA target soil gas concentration in one of the shallow soil gas implants adjacent to Kodiak Jack's, conducting sub-slab and indoor air sampling inside the night club could be problematic from securing permission to collecting the samples.
- Conduct at least one more round of air sampling at Good News Bible and Book Store. A spring/early summer sample event is the only season currently not represented in the data set. The results of this additional sample event may create a data set of sufficient size to effectively control natural variation for the purpose of having a quality baseline data set.
- Conduct more rounds of air sampling at State Farm to determine whether vapor intrusion changes with seasonal or atmospheric differences.
- Consider completing the delineation of the East PCE Plume. In additional to more test borings behind Coin King Laundromat, if access is obtainable, locate additional test borings on 14th Avenue south of Airport Way, which would determine whether there is an upgradient source contributing to the East PCE Plume.
- Consider sampling the sentinel wells (MW-20S and MW-20D, MW-22S and MW-22D, and MW25S and MW25D) located near the Golden Heart Utilities public wells. These wells have not been sampled since 2006, so it seems prudent to assess the downgradient state of the West PCE Plume.
- Develop a long-term plan for sampling monitoring wells that should include monitored natural attenuation and trend analysis. This plan would be most beneficial if done in conjunction with initial remedial activities.

- Divide the Gaffney Road Area site into two contaminated sites: Gaffney Road East Plume and the Gaffney Road West Plume. The investigations during the past two years have demonstrated that the plumes have separate sources, and it has become increasingly unwieldy to distinguish between each source area and plume. However, the plumes will remain linked for the long-term because of the presence of the sanitary sewer lines acting as a contributing source of contamination for both plumes.
- Involve current and former owners of the former Alaska Park and Sell property in the project as potentially responsible parties. Consider conducting an investigation of the floor drains at the former Park and Sell building to determine if they could be a source of the vadose zone contamination in front of the Park and Sell building.

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8. REFERENCES

Alaska Department of Environmental Conservation (ADEC), 1990, Site Visit of Hertz Contaminated Site, performed by Leslie Simmons, ADEC.

Dames and Moore, September 1, 1994, *Underground Storage Tank Closure Report, Fairbanks U-Drive, Fairbanks, Alaska*, prepared for Janice Chaffin-Bell.

Ecology and Environment, Inc. (E & E), February 2005, November 2004 *Gaffney Road Area-Wide Groundwater Investigation*, submitted to ADEC, Division of Spill Prevention and Response, Contaminated Sites Remediation Program, Anchorage, Alaska.

_____, June 2004, *October 2003 Gaffney Road Phase III Area-Wide Groundwater Monitoring Report*, submitted to ADEC, Division of Spill Prevention and Response, Contaminated Sites Remediation Program, Anchorage, Alaska.

_____, June 2003, *October 2002 Gaffney Road Phase III Area-Wide Groundwater Monitoring Report*, submitted to ADEC, Division of Spill Prevention and Response, Contaminated Sites Remediation Program, Anchorage, Alaska.

_____, January 2002a, *October 2001 Groundwater Sampling Report*, *Gaffney Road Area-Wide Phase III Groundwater Investigation*, submitted to ADEC, Division of Spill Prevention and Response, Contaminated Sites Remediation Program, Anchorage, Alaska.

_____, May 2002b, *Evaluation of Indoor Air Data Related to Potential Impacts from Contaminated Groundwater; Gaffney Road Area-Wide Phase III Groundwater Investigation*, submitted to ADEC, Division of Spill Prevention and Response, Contaminated Sites Remediation Program, Anchorage, Alaska.

_____, 2001, *October 2000 Groundwater Sampling Report*, *Gaffney Road Area-Wide Phase III Groundwater Investigation,* submitted to ADEC, Division of Spill Prevention and Response, Contaminated Sites Remediation Program, Anchorage, Alaska.

_____, 2000a, *Final Report, Gaffney Road Area-Wide Phase III Groundwater Investigation, Fairbanks, Alaska*, submitted to ADEC, Division of Spill Prevention and Response, Contaminated Sites Remediation Program, Anchorage, Alaska.

_____, 2000b, *April 2000 Groundwater Sampling Report*, *Gaffney Road Area-Wide Phase III Groundwater Investigation* submitted to ADEC, Division of Spill Prevention and Response, Contaminated Sites Remediation Program, Anchorage, Alaska.

_____, February 1999a, *Final Report, Gaffney Road Area-Wide Phase II Groundwater Investigation, Fairbanks, Alaska*, submitted to ADEC, Division of Spill Prevention and Response, Contaminated Sites Remediation Program, Anchorage, Alaska.

_____, May 20, 1999b, *Gaffney Road Area-Wide Phase II Groundwater Investigation, April 1999 Groundwater Sampling Report, Fairbanks, Alaska*, submitted to ADEC, Division of Spill Prevention and Response, Contaminated Sites Remediation Program, Anchorage, Alaska.

_____, January 1998, *Gaffney Road Area-Wide Groundwater Investigation Report, Fairbanks, Alaska,* submitted to ADEC, Division of Spill Prevention and Response, Contaminated Sites Remediation Program, Anchorage, Alaska.

Fairbanks North Star Borough (FNSB), August 1, 2008, FNSB GIS Property Summary: PAN 0090913.

Glass, R.L., M.R. Lilly, and D.F. Meyer, 1996, *Ground-Water Levels in an Alluvial Plain Between the Tanana and Chena Rivers Near Fairbanks, Alaska, 1986-93,* United States Geological Survey Water-Resources Investigations Report 96-4060.

OASIS Environmental, Inc., March 2008a, *Vapor Intrusion Assessment, Gaffney Road Area*, prepared for ADEC.

_____, September 2008b, *Additional Site Characterization and Long-Term Monitoring, Work Plan, Gaffney Road Area*, prepared for ADEC.

_____, April 2007, *Groundwater Assessment, Gaffney Road Area*, submitted to ADEC, Division of Spill Prevention and Response, Contaminated Sites Remediation Program, Anchorage, Alaska.

Péwé, T.L., B J. Well, R.B. Forbes, and F.R. Weber, 1976, Geologic Map of the Fairbanks D-2 SW Quadrangle, Alaska: United States Geological Survey Miscellaneous Investigation Series Map I-829-A, Scale 1:24,000.

Swisher, Gerry, July 25, 2008, telephone interview with Andrew Weller, OASIS.

United States Environmental Protection Agency (EPA), March 4, 2008, *U.S. EPA's Vapor Intrusion Database: Preliminary Evaluation of Attenuation Factors*, Office of Solid Waste.

TABLES

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Table 3

Air Sample Summary

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Sample Location	Sample Number	Date	Sample Type	Duration	Description	Comments
AA-1	08GRA501AA	9/17/2008	Outdoor Air	24-hour	Behind Good News Bible and Book Store	
IA-1	08GRA502IA 08GRA503IA	9/17/2008	Indoor Air	24-hour	Retail area of Good News Bible and Book Store - near CD rack	08GRA503IA is a duplicate
SS-1	08GRA505SS 08GRA506SS	9/18/2008	Sub-Slab Air	30-minute	Boiler room in Good News Bible and Book Store	08GRA506SS is a duplicate
SS-2	08GRA504SS	9/17/2008	Sub-Slab Air	30-minute	Southeast corner of storage room in Good News Bible and Book Store	
SS-3	08GRA507SS	9/18/2008	Sub-Slab Air	30-minute	Break room of Good News Bible and Book Store	
AA-2	08GRA508AA	9/18/2008	Outdoor Air	24-hour	South side of State Farm	
IA-2	08GRA509IA	9/18/2008	Indoor Air	24-hour	Northwest office of State Farm	
SS-5	08GRA511SS	9/18/2008	Sub-Slab Air	30-minute	Northeast corner of basement in State Farm	
SS-6	08GRA510SS	9/18/2008	Sub-Slab Air	30-minute	Northwest corner of basement in State Farm	
SS-7	08GRA512SS	9/18/2008	Sub-Slab Air	30-minute	Center of basement in State Farm	

Table 4

Test Boring Sample Summary

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Test Boring	Sample Date	Boring Depth	Confirmation Samples						
			Soil			Groundwater			
			0-5 ft	5-10 ft	10-15 ft	15-18 ft	25-28 ft	35-38 ft	45-48 ft
TB-73	5/18/2008	38 ft	No	✔	No	✔	No	✔	
TB-74	5/18/2008	38 ft	No	✔	No	✔	No	✔	
TB-75	5/18/2008	28 ft	No	✔	No	✔	No		
TB-76	5/18/2008	38 ft	✔	No	No	✔	No	✔	
TB-77	5/18/2008	38 ft	No	✔	No	✔	No	✔	
TB-84	9/16/2008	28 ft	No	No	No	✔	No		
TB-85	9/17/2008	28 ft	No	No	No	✔	No		
TB-86	9/17/2008	28 ft	No	No	No	✔	No		
TB-87	9/17/2008	28 ft	No	No	No	✔	No		
TB-88	9/17/2008	38 ft	No	No	No	✔	No	✔	No
TB-89	9/17/2008	28 ft	No	✔	No	✔	No		
TB-90	9/18/2008	28 ft	No	No	No	✔	No		
TB-91	9/18/2008	28 ft	No	No	No	✔	No		
TB-92	9/18/2008	48 ft	No	No	No	✔	No	✔	No
TB-93	9/18/2008	48 ft	No	No	No	✔	No	✔	No
TB-94	9/19/2008	48 ft	No	No	No	✔	No	✔	✔
TB-95	9/19/2008	48 ft	No	✔	No	✔	No	✔	No
TB-96	9/19/2008	48 ft	No	No	No	✔	No	✔	No
TB-97	9/20/2008	38 ft	No	No	No	✔	No	✔	
TB-98	9/20/2008	38 ft	No	No	No	✔	No	✔	
TB-99	9/20/2008	38 ft	No	No	No	✔	No	✔	
TB-100	9/20/2008	48 ft	No	No	No	✔	No	✔	No
TB-101	9/21/2008	48 ft	No	No	No	✔	No	✔	No
TB-102	9/21/2008	48 ft	No	No	No	✔	No	✔	✔
TB-103	9/21/2008	48 ft	No	No	✔	✔	No	✔	No
TB-104	9/21/2008	48 ft	No	No	No	✔	No	✔	No
TB-105	9/22/2008	48 ft	No	No	No	✔	No	✔	No
TB-106	9/22/2008	38 ft	No	No	No	✔	No	✔	
TB-107	9/22/2008	28 ft	No	No	No	✔	No		
TB-108	9/22/2008	28 ft	No	No	No	✔	No		
TB-109	9/23/2008	28 ft	No	No	No	✔	No		
TB-110	9/23/2008	48 ft	No	No	No	✔	No	✔	✔
TB-111	9/23/2008	48 ft	No	No	No	✔	No	✔	No
TB-112	9/24/2008	38 ft	✔	✔	✔	✔	No	✔	

Key:

ft = Feet

Table 5

Soil Gas Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Soil Gas Module	Sample Date	Sample Depth	Sample Number	LEL (ppm)	CO_2 (%)	Oxygen (%)	Moisture (%)	PCE (µg/m^3)	TCE (µg/m^3)	cis-1,2-DCE (µg/m^3)	trans-1,2-DCE (µg/m^3)	Vinyl Chloride (µg/m^3)
SG-01 S	5/20/2008	5 ft	08GRA158SG	---	1.4	20.0	---	**4,400**	**310**	120	ND (11.0)	ND (7.0)
SG-01 D	5/20/2008	9 ft	08GRA159SG	---	1.9	19.4	---	**5,900**	**400**	170	ND (14.0)	ND (9.2)
SG-02 S	5/19/2008	4 ft	09GRA152SG	---	1.6	19.4	---	**300**	ND (6.8)	ND (5.0)	ND (5.0)	ND (3.2)
SG-02 D	5/19/2008	9 ft	08GRA151SG	---	5.4	15.3	---	490	18	ND (5.1)	ND (5.1)	ND (3.3)
SG-03 S	5/19/2008	5 ft	08GRA153SG	---	5.5	15.3	---	**10,000**	**110**	62	ND (27.0)	ND (17.0)
SG-03 D	5/19/2008	9 ft	08GRA154SG	---	7.0	14.1	---	**23,000**	**500**	420	ND (51.0)	ND (33.0)
	duplicate	9 ft	08GRA155SG	---	---	---	---	**23,000**	**480**	430	ND (42.0)	ND (27.0)
SG-04 S	5/20/2008	5 ft	08GRA156SG	---	3.0	18.3	---	**5,600**	**170**	58	ND (14.0)	ND (9.0)
SG-04 D	5/20/2008	9 ft	08GRA157SG	---	4.7	16.8	---	**14,000**	**630**	400	ND (31.0)	ND (20.0)
SG-08 S	9/16/2008	5 ft	08GRA401SG	95	10.8	8.9	7	**1,900**	ND (7.2)	ND (5.3)	ND (5.3)	ND (3.4)
SG-08 D	9/16/2008	9 ft	08GRA402SG	2,150	7.5	9.8	24	**9,500**	**150**	ND (21)	ND (21)	ND (14)
SG-09 S	9/16/2008	5 ft	08GRA403SG	110	3.0	17.5	14	**17,000**	**170**	ND (44)	ND (44)	ND (28)
SG-09 D	9/16/2008	9 ft	08GRA404SG	120	3.5	16.9	15	**29,000**	**320**	ND (73)	ND (73)	ND (47)
SG-10 S	9/17/2008	5 ft	08GRA410SG	110	5.4	13.5	12	**260**	ND (9.1)	ND (5.3)	ND (5.3)	ND (3.4)
SG-10 D	9/17/2008	9 ft	08GRA411SG	120	9.2	9.2	18	620	ND (8.0)	ND (5.9)	ND (5.9)	ND (3.8)
SG-11 S	9/17/2008	5 ft	08GRA412SG	100	5.7	14.8	9	18	ND (7.2)	ND (5.3)	ND (5.3)	ND (3.4)
SG-11 D	9/21/2008	9 ft	08GRA413SG	180	5.6	15.0	23	13	ND (7.1)	ND (5.2)	ND (5.2)	ND (3.4)
	duplicate	9 ft	08GRA414SG	---	---	---	---	12	ND (7.1)	ND (5.2)	ND (5.2)	ND (3.4)
SG-12 S	9/16/2008	5 ft	08GRA405SG	140	3.3	17.4	14	**880**	**200**	ND (5.5)	8	ND (3.5)
SG-12 D	9/17/2008	9 ft	08GRA406SG	95	4.0	16.2	10	**5,200**	**2,000**	53	77	ND (5.4)
SG-13 S	9/17/2008	4.25 ft	08GRA407SG	55	1.7	19.0	24	**510**	ND (7.2)	ND (5.3)	ND (5.3)	ND (3.4)
	duplicate	4.25 ft	08GRA408SG	---	---	---	---	**500**	ND (7.4)	ND (5.5)	ND (5.5)	ND (3.5)
SG-13 D	9/17/2008	9 ft	08GRA409SG	30	3.6	16.7	9	**1,600**	**64**	ND (5.3)	31	ND (3.4)
EPA Target Shallow Soil Gas Concentration								**81**	**2.2**	**350**	**700**	**28**
EPA Target Deep Soil Gas Concentration								**810**	**22**	**3,500**	**7,000**	**280**

Key:

% = Percent
CO_2 = Carbon dioxide
DCE = Dichloroethene
EPA = Environmental Protection Agency
ft = Feet
LEL = Lower explosive limit
µg/m^3 = Micrograms per cubic meter
ND = Not detected
PCE = Tetrachloroethene
ppm = Parts per million
TCE = Trichloroethene

Table 6

Atmospheric Measurements

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Date	Time	Temperature (°F)	Pressure (inHg)
9/17/2008	9:30		29.09
	10:30	43.5	29.09
	11:30	43.2	29.12
	12:30		29.12
	13:30		29.15
	14:30		29.15
	15:30		29.18
	16:30		29.18
	17:30		29.18
	18:30	46.4	29.18
	19:30		29.21
	20:30		29.21
	21:30		29.21
	22:30		29.23
	23:30		29.21
9/18/2008	0:30		29.15
	1:30		29.15
	2:30		29.15
	3:30		29.15
	4:30		29.12
	5:30		29.09
	6:30		29.06
	7:30	36.3	29.06
	8:30		29.03
	9:30		29.03
	10:30		29.00
	11:30		29.03
	12:30		29.03
	13:30		29.00
	14:30		29.00
	15:30		29.00
	16:30		28.97
	17:30		28.97
	18:30		28.94
	19:30		28.97
	20:30		28.97
	21:30		28.97
	22:30		29.00
	23:30		29.03
9/19/2008	0:30		29.03
	1:30		29.03
	2:30		29.06
	3:30		29.09
	4:30		29.09
	5:30		29.09
	6:30		29.09
	7:30	33.4	29.06
	8:30		29.06
	9:30		29.03
	10:30		29.03
	11:30		29.00
	12:30		29.00
	13:30		28.97
	14:30		28.94
	15:30		28.91
	16:30	58.6	28.91

Key:

°F = Degrees Fahrenheit

inHg = Inches of mercury

Table 7
Air Sample Analytical Results
Good News Bible and Book Store
Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Compound	Units	RME	Indoor Air		Outdoor Air	Sub-Slab Air				Sub-Slab Average	Indoor Air to Sub-Slab Air Attenuation Factor
			IA-1		AA-1	SS-1		SS-2	SS-3		
			Primary	Duplicate		Primary	Duplicate				
PCE	µg/m^3	20.8	**25**	**23**	0.31	15,000	16,000	3,400	510	6,303	0.0039
TCE	µg/m^3	1.1	0.49	0.45	ND (0.23)	78	80	44	ND (4.7)	< 42	> 0.0117
cis-1,2-DCE	µg/m^3	35	ND (0.13)	ND (0.11)	ND (0.17)	ND (30)	ND (29)	ND (7.4)	ND (3.5)	< 14	NQ
trans-1,2-DCE	µg/m^3	60	ND (0.67)	ND (0.57)	ND (0.84)	ND (30)	ND (29)	ND (7.4)	ND (3.5)	< 14	NQ
Vinyl chloride	µg/m^3	13.9	ND (0.043)	ND (0.037)	ND (0.054)	ND (19)	ND (19)	ND (4.8)	ND (2.2)	< 8.7	NQ
Benzene	µg/m^3	15.7	1.5	2.9	2.1	ND (24)	ND (23)	ND (6.0)	ND (2.8)	< 11	NQ
Toluene	µg/m^3	5,000	13	19	13	ND (28)	ND (28)	ND (7.0)	ND (3.3)	< 13	NQ
Ethylbenzene	µg/m^3	1,000	2.0	2.7	3.9	ND (32)	ND (32)	ND (8.1)	ND (3.8)	< 15	NQ
Xylenes	µg/m^3	100	8.2	12	31	ND (64)	ND (64)	ND (16.2)	ND (7.6)	< 29	NQ

Notes: Value in paranethesis is laboratory reporting limit.

Bolded indoor air values exceed RME.

Sub-slab average concentrations derived by averaging three primary sub-slab samples. Laboratory reporting limit used for non-detect results.

Less than sign (<) or greater than sign (>) indicates at least one sub-slab result was non-detect.

Attenuation factors are unitless percentages that are calculated by subtracting the outdoor air concentration from the indoor air concentration and dividing by the sub-slab average concentration.

Field parameters for sub-slab air samples were not measured because equipment was being used for soil gas sampling.

Key:

% = Percent
DCE = Dichloroethene
LEL = Lower explosive limit
µg/m^3 = Micrograms per cubic meter
ND = Not detected
NQ = Not quantified
PCE = Tetrachloroethene
ppm = Parts per million
RME = Reasonable maximum exposure
TCE = Trichloroethene

Table 8
Air Sample Analytical Results
State Farm
Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Compound	Units	RME	Indoor Air	Outdoor Air	Sub-Slab Air			Sub-Slab Average	Indoor Air to Sub-Slab Air Attenuation Factor
			IA-2	AA-2	SS-5	SS-6	SS-7		
PCE	µg/m^3	20.8	1.1	0.39	7,800	19,000	2,400	9,733	0.0001
TCE	µg/m^3	1.1	ND (0.17)	ND (0.16)	360	860	120	447	< 0.0004
cis-1,2-DCE	µg/m^3	35	ND (0.12)	ND (0.12)	13	120	ND (3.7)	< 46	NQ
trans-1,2-DCE	µg/m^3	60	ND (0.63)	ND (0.60)	ND (13)	ND (30)	ND (3.7)	< 16	NQ
Vinyl chloride	µg/m^3	13.9	ND (0.040)	ND (0.039)	ND (8.4)	ND (20)	ND (2.4)	< 10	NQ
Benzene	µg/m^3	15.7	4.1	3.1	ND (10)	ND (24)	3.2	< 12	NQ
Toluene	µg/m^3	5,000	20	12	ND (12)	ND (29)	5.0	< 15	NQ
Ethylbenzene	µg/m^3	1,000	3.5	1.3	ND (14)	ND (33)	ND (4.0)	< 17	NQ
Xylenes	µg/m^3	100	15	5.8	ND (28)	ND (66)	ND (8.2)	< 34	NQ

Notes: Value in paranethesis is laboratory reporting limit.

Bolded indoor air values exceed RME.

Sub-slab average concentrations derived by averaging three primary sub-slab samples. Laboratory reporting limit used as value for non-detect results.

Less than sign (<) or greater than sign (>) indicates at least one sub-slab result was non-detect.

Attenuation factors are unitless percentages: calculated by subtracting the outdoor air concentration from the indoor air concentration and dividing by the sub-slab average.

Field parameters for sub-slab air samples were not measured because equipment was being used for treatability study at Good News Bible and Book Store.

Key:

DCE = Dichloroethene
µg/m^3 = Micrograms per cubic meter
ND = Not detected
NQ = Not quantified
PCE = Tetrachloroethene
RME = Reasonable maximum exposure
TCE = Trichloroethene

Table 9

Cumulative Air Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Building	Compound	Sample Date	Heating System On	Temperature Range (˚F)	Sample Location					Sub-Slab Average ($\mu g/m^3$)	Indoor Air to Sub-Slab Air Attenuation Factor
					IA-1 ($\mu g/m^3$)	AA-1 ($\mu g/m^3$)	SS-1 ($\mu g/m^3$)	SS-2 ($\mu g/m^3$)	SS-3 ($\mu g/m^3$)		
Good News Bible and Book Store	PCE	9/17/2008	Yes	36 - 44	**25**	0.31	15,000	3,400	510	6,303	0.0039
		8/2/2007	No	53 - 73	**58**	0.52	25,000	750	150	8,633	0.0067
		2/15/2007	Yes	(13) - 17	**24**	2.4	8,600	80	72	2,917	0.0074
		11/1/2006	Yes	19 - 23	**44**	0.61	9,200	2,400	83	3,894	0.0111
	TCE	9/17/2008	Yes	36 - 44	0.49	ND (0.23)	78	44	ND (4.7)	< 42	> 0.0117
		8/2/2007	No	53 - 73	**1.1**	ND (0.16)	140	10	ND (3.6)	< 51	> 0.0216
		2/15/2007	Yes	(13) - 17	0.44	ND (0.14)	36	ND (4.9)	ND (4.9)	< 15	> 0.0293
		11/1/2006	Yes	19-23	0.63	ND (0.14)	48	30	ND (4.5)	< 28	> 0.0225

Notes: Value in paranethesis is laboratory reporting limit.

Bolded indoor air values exceed RME.

Sub-slab average concentrations derived by averaging three primary sub-slab samples. Laboratory reporting limit used for non-detect results.

Less than sign (<) or greater than sign (>) indicates at least one sub-slab result was non-detect.

Attenuation factors are unitless percentages: calculated by subtracting the outdoor air concentration from the indoor air concentration and dividing by the sub-slab average concentration.

Key:

DCE = Dichloroethene

$\mu g/m^3$ = Micrograms per cubic meter

ND = Not detected

PCE = Tetrachloroethene

RME = Reasonable Maximum Exposure

TCE = Trichloroethene

Table 10

Soil Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Boring	Sample Depth	Sample Number	Color-Tec (ppm)	PCE (µg/kg)	TCE (µg/kg)	cis-1,2-DCE (µg/kg)	trans-1,2-DCE (µg/kg)	Vinyl Chloride (µg/kg)
TB-73	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	08GRA114SB	ND	ND (55)	ND (55)	ND (55)	ND (55)	ND (280)
	10-15 ft	---	ND	---	---	---	---	---
TB-74	0-5 ft	---	0.3	---	---	---	---	---
	5-10 ft	08GRA103SB	0.3	**25**	ND (10)	ND (10)	ND (10)	ND (50)
	10-15 ft	---	0.2	---	---	---	---	---
TB-75	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	08GRA104SB	ND	ND (6.6)	ND (6.6)	ND (6.6)	ND (6.6)	ND (33)
	10-15 ft	---	ND	---	---	---	---	---
TB-76	0-5 ft	---	1.6	---	---	---	---	---
	2.5-3.5 ft	08GRA105SB	>3	**560 JF**	ND (23)	ND (23)	ND (23)	ND (120)
	duplicate	08GRA106SB	---	**110 JF**	ND (5.7)	ND (5.7)	ND (5.7)	ND (28)
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-77	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	08GRA107SB	ND	**84**	ND (29)	ND (29)	ND (29)	ND (140)
	10-15 ft	---	ND	---	---	---	---	---
TB-84	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-85	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-86	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-87	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-88	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-89	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	8-10 ft	08GRA225SB	---	**52**	ND (36)	ND (36)	ND (36)	ND (36)
	10-15 ft	---	ND	---	---	---	---	---
TB-90	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-91	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-92	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-93	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
		ADEC SCL	**---**	**24**	**20**	**240**	**370**	**8.5**

Table 10

Soil Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Boring	Sample Depth	Sample Number	Color-Tec (ppm)	PCE (µg/kg)	TCE (µg/kg)	cis-1,2-DCE (µg/kg)	trans-1,2-DCE (µg/kg)	Vinyl Chloride (µg/kg)
TB-94	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-95	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	7-10 ft	08GRA237SB	---	ND (27)	ND (27)	ND (27)	ND (27)	ND (27)
	10-15 ft	---	ND	---	---	---	---	---
TB-96	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-97	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-98	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-99	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-100	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-101	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-102	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-103	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-13 ft	08GRA257SB	---	**80**	ND (24)	ND (24)	ND (24)	ND (24)
	10-15 ft	---	0.2	---	---	---	---	---
TB-104	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-105	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-106	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-107	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-108	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-109	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
ADEC SCL			**---**	**24**	**20**	**240**	**370**	**8.5**

Table 10

Soil Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Boring	Sample Depth	Sample Number	Color-Tec (ppm)	PCE (µg/kg)	TCE (µg/kg)	cis-1,2-DCE (µg/kg)	trans-1,2-DCE (µg/kg)	Vinyl Chloride (µg/kg)
TB-110	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-111	0-5 ft	---	ND	---	---	---	---	---
	5-10 ft	---	ND	---	---	---	---	---
	10-15 ft	---	ND	---	---	---	---	---
TB-112	0-5 ft	---	0.1	---	---	---	---	---
	2-5 ft	08GRA278SB	---	**140**	ND (29)	ND (29)	ND (29)	ND (29)
	5-10 ft	---	ND	---	---	---	---	---
	7-10 ft	08GRA279SB	---	**200**	ND (26)	ND (26)	ND (26)	ND (26)
	10-13 ft	08GRA280SB	---	**280**	ND (30)	ND (30)	ND (30)	ND (30)
	10-15 ft	---	1.0	---	---	---	---	---
		ADEC SCL	**---**	**30**	**27**	**200**	**400**	**9**

Notes: Value in parenthesis is the laboratory reporting limit.

Bolded value indicates result exceeds ADEC SCL.

Key:

ADEC = Alaska Department of Environmental Conservation

DCE = Dichloroethene

ft = Feet

J = Estimated concentration less than the laboratory reporting limit

µg/kg = Micrograms per kilogram

ND = Not detected

NS = Not sampled

PCE = Tetrachloroethene

ppm = Parts per million

SCL = Soil cleanup level

TCE = Trichloroethene

Table 11

Groundwater Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Boring	Sample Depth	Sample Number	Color-Tec (ppm)	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Vinyl chloride (µg/L)
TB-73	14-18 ft	08GRA117GW	0.6	**21**	0.89	0.41	ND (0.2)	ND (0.2)
	24-28 ft	---	ND	---	---	---	---	---
	34-38 ft	08GRA118GW	ND	0.24	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
TB-74	14-18 ft	08GRA119GW	0.7	**21**	0.84	ND (0.2)	ND (0.2)	ND (0.2)
	duplicate	08GRA120GW	---	**21**	0.91	ND (0.2)	ND (0.2)	ND (0.2)
	24-28 ft	---	ND	---	---	---	---	---
	34-38 ft	08GRA121GW	ND	0.30	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
TB-75	14-18 ft	08GRA122GW	ND	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
	24-28 ft	---	ND	---	---	---	---	---
TB-76	14-18 ft	08GRA123GW	2	**81**	3.1	3.0	ND (0.4)	ND (0.4)
	24-28 ft	---	ND	**---**	---	---	---	---
	34-38 ft	08GRA124GW	ND	0.94	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
TB-77	14-18 ft	08GRA125GW	7.5	**330**	3.9	ND (2.0)	ND (2.0)	ND (2.0)
	24-28 ft	---	0.2	---	---	---	---	---
	34-38 ft	08GRA126GW	ND	3.4	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
TB-84	15-18 ft	08GRA219GW	ND	4.1	1.9	0.35	0.38	ND (0.2)
	25-28 ft	---	ND	---	---	---	---	---
TB-85	15-18 ft	08GRA220GW	ND	3.3	1.3	0.24	ND (0.2)	ND (0.2)
	25-28 ft	---	ND	---	---	---	---	---
TB-86	15-18 ft	08GRA221GW	ND	3.1	2.4	0.41	ND (0.2)	ND (0.2)
	25-28 ft	---	ND	---	---	---	---	---
TB-87	15-18 ft	08GRA222GW	ND	2.1	0.84	ND (0.2)	ND (0.2)	ND (0.2)
	25-28 ft	---	ND	---	---	---	---	---
TB-88	15-18 ft	08GRA223GW	ND	1.6	1.2	ND (0.2)	0.21	ND (0.2)
	25-28 ft	---	ND	---	---	---	---	---
	35-38 ft	08GRA224GW	ND	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
	45-48 ft	---	ND	---	---	---	---	---
TB-89	15-18 ft	08GRA226GW	ND	2.5	2.9	0.41	0.99	ND (0.2)
	25-28 ft	---	ND	---	---	---	---	---
TB-90	15-18 ft	08GRA227GW	ND	2.3	1.6	0.36	ND (0.2)	ND (0.2)
	25-28 ft	---	ND	---	---	---	---	---
TB-91	15-18 ft	08GRA228GW	ND	1.1	0.51	ND (0.2)	ND (0.2)	ND (0.2)
	25-28 ft	---	ND	---	---	---	---	---
TB-92	15-18 ft	08GRA229GW	0.5	**5.9**	**16**	9.2	32	ND (0.2)
	25-28 ft	---	0.3	---	---	---	---	---
	35-38 ft	08GRA230GW	ND	0.62	1.1	1.1	4.6	ND (0.2)
	45-48 ft	---	ND	---	---	---	---	---
TB-93	15-18 ft	08GRA231GW	1.2	**48**	**30**	2.2	0.60	ND (0.2)
	duplicate	08GRA232GW	---	**48**	**31**	2.2	0.61	ND (0.2)
	25-28 ft	---	1.1	---	---	---	---	---
	35-38 ft	08GRA233GW	0.6	0.62	25	7.7	29	ND (0.2)
	45-48 ft	---	0.4	---	---	---	---	---
TB-94	15-18 ft	08GRA234GW	ND	0.66	2.5	0.37	0.26	ND (0.2)
	25-28 ft	---	0.8	---	---	---	---	---
	35-38 ft	08GRA235GW	0.2	0.23	0.96	10	40	ND (0.2)
	45-48 ft	08GRA236GW	ND	0.29	0.49	0.22	0.86	ND (0.2)
TB-95	15-18 ft	08GRA238GW	ND	**12**	0.79	0.26	ND (0.2)	ND (0.2)
	25-28 ft	---	0.1	---	---	---	---	---
	35-38 ft	08GRA239GW	0.1	ND (0.2)	0.52	4.1	13	ND (0.2)
	45-48 ft	---	ND	---	---	---	---	---
		ADEC GCL	**---**	**5**	**5**	**70**	**100**	**2**

Table 11

Groundwater Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Boring	Sample Depth	Sample Number	Color-Tec (ppm)	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Vinyl chloride (µg/L)
TB-96	15-18 ft	08GRA240GW	0.3	**18**	**5.3**	0.65	ND (0.2)	ND (0.2)
	25-28 ft	---	0.3	---	---	---	---	---
	35-38 ft	08GRA241GW	ND	0.40	0.23	ND (0.2)	ND (0.2)	ND (0.2)
	duplicate	08GRA242GW	---	0.42	0.23	ND (0.2)	ND (0.2)	ND (0.2)
	45-48 ft	---	ND	---	---	---	---	---
TB-97	15-18 ft	08GRA243GW	0.6	**37**	3.0	0.41	0.47	ND (0.2)
	25-28 ft	---	ND	---	---	---	---	---
	35-38 ft	08GRA244GW	ND	0.23	0.49	2.0	7.6	ND (0.2)
TB-98	15-18 ft	08GRA245GW	0.5	**29**	**6.0**	0.56	ND (0.2)	ND (0.2)
	25-28 ft	---	ND	---	---	---	---	---
	35-38 ft	08GRA246GW	ND	0.22	0.26	ND (0.2)	ND (0.2)	ND (0.2)
TB-99	15-18 ft	08GRA247GW	1.5	**98**	**5.5**	3.7	ND (0.4)	ND (0.4)
	25-28 ft	---	ND	---	---	---	---	---
	35-38 ft	08GRA248GW	ND	0.28	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
TB-100	15-18 ft	08GRA249GW	1.5	**50**	**30**	4.4	7.0	ND (0.2)
	25-28 ft	---	1.1	---	---	---	---	---
	35-38 ft	08GRA250GW	0.8	0.56	**18**	12	45	ND (0.2)
	45-48 ft	---	0.5	**---**	---	---	---	---
TB-101	15-18 ft	08GRA251GW	0.9	**58**	**15**	2.9	5.9	ND (0.4)
	25-28 ft	---	0.1	---	---	---	---	---
	35-38 ft	08GRA252GW	0.2	0.60	0.71	7.5	30	ND (0.2)
	45-48 ft	---	ND	**---**	---	---	---	---
TB-102	15-18 ft	08GRA253GW	6	**210**	**180**	27	2.8	ND (1.0)
	duplicate	08GRA254GW	---	**210**	**180**	27	2.9	ND (1.0)
	25-28 ft	---	2.5	---	---	---	---	---
	35-38 ft	08GRA255GW	1.0	0.94	**67**	5.8	14	ND (0.4)
	45-48 ft	08GRA256GW	0.2	1.7	**16**	1.2	2.6	ND (0.2)
TB-103	15-18 ft	08GRA258GW	10	**490**	**160**	**98**	2.9	ND (2.0)
	25-28 ft	---	5	---	---	---	---	---
	35-38 ft	08GRA259GW	0.8	1.5	**38**	4.8	15	ND (0.2)
	45-48 ft	---	0.4	**---**	---	---	---	---
TB-104	15-18 ft	08GRA260GW	0.2	3.7	3.2	6.3	11	ND (0.2)
	25-28 ft	---	0.8	---	---	---	---	---
	35-38 ft	08GRA261GW	0.1	0.85	**11**	1.1	3.4	ND (0.2)
	45-48 ft	---	ND	**---**	---	---	---	---
TB-105	15-18 ft	08GRA264GW	1.1	**19**	**8.2**	17	51	ND (0.4)
	duplicate	08GRA265GW	---	**19**	**8.0**	17	53	ND (0.4)
	25-28 ft	---	0.7	---	---	---	---	---
	35-38 ft	08GRA266GW	ND	0.28	1.5	ND (0.2)	0.39	ND (0.2)
	45-48 ft	---	ND	**---**	---	---	---	---
TB-106	15-18 ft	08GRA267GW	ND	0.79	0.83	0.44	0.98	ND (0.2)
	25-28 ft	---	0.1	---	---	---	---	---
	35-38 ft	08GRA268GW	ND	0.23	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
TB-107	15-18 ft	08GRA269GW	ND	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
	25-28 ft	---	ND	---	---	---	---	---
TB-108	15-18 ft	08GRA270GW	ND	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
	25-28 ft	---	ND	---	---	---	---	---
TB-109	15-18 ft	08GRA271GW	ND	0.49	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
	25-28 ft	---	ND	---	---	---	---	---
TB-110	15-18 ft	08GRA272GW	1.7	**66**	**76**	4.8	0.46	ND (0.4)
	25-28 ft	---	5	---	---	---	---	---
	35-38 ft	08GRA273GW	1.0	1.2	**77**	5.5	14	ND (0.4)
	45-48 ft	08GRA274GW	ND	0.80	3.6	0.28	0.77	ND (0.2)
		ADEC GCL	**---**	**5**	**5**	**70**	**100**	**2**

Table 11

Groundwater Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Boring	Sample Depth	Sample Number	Color-Tec (ppm)	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Vinyl chloride (µg/L)
TB-111	15-18 ft	08GRA275GW	0.4	4.9	**16**	5.1	13	ND (0.2)
	duplicate	08GRA276GW	---	4.7	**16**	5.2	13	ND (0.2)
	25-28 ft	---	0.2	---	---	---	---	---
	35-38 ft	08GRA277GW	0.5	0.47	**14**	7.3	27	ND (0.2)
	45-48 ft	---	ND	---	---	---	---	---
TB-112	15-18 ft	08GRA281GW	7	**610**	7.0	ND (4.0)	ND (4.0)	ND (4.0)
	25-28 ft	---	ND	---	---	---	---	---
	35-38 ft	08GRA282GW	ND	1.6	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
		ADEC GCL	**---**	**5**	**5**	**70**	**100**	**2**

Note: Value in parenthesis is the laboratory reporting limit.
Bolded value indicates result exceeds ADEC GCL.

Key:

ADEC = Alaska Department of Environmental Conservation
DCE = Dichloroethene
ft = Feet
GCL = Groundwater cleanup level
µg/L = Micrograms per liter
ND = Not detected
NS = Not sampled
PCE = Tetrachloroethene
ppm = Parts per million
TCE = Trichloroethene

Table 12

Monitoring Well Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Monitoring Well	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Vinyl Chloride (µg/L)
East Plume					
MW-13	0.63	**54**	10	33	ND (0.4)
MW-14	ND (0.2)	**6.4**	12	39	ND (0.2)
MW-15	2.4	**8.2**	3.9	8.2	ND (0.2)
MW-4	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
GP-MW-7	2.6	4.8	0.42	0.22	ND (0.2)
MW-32	**61**	**320**	33	31	ND (2.0)
MW-33	**700**	**60**	37	ND (4.0)	ND (4.0)
Duplicate	**730**	**64**	38	ND (4.0)	ND (4.0)
MW-31	**500**	**5.3**	ND (1.0)	ND (1.0)	ND (1.0)
MW-7	2.9	0.94	ND (0.2)	ND (0.2)	ND (0.2)
MW-6	**89**	2.3	0.5	ND (0.4)	ND (0.4)
West Plume					
MW-27	**200**	**5.0**	3.9	ND (1.0)	ND (1.0)
MW-28	**2,900**	ND (20)	ND (20)	ND (20)	ND (20)
MW-8	**210**	**5.0**	9.6	ND (1.0)	ND (1.0)
MW-3	**8.0**	0.86	0.28	ND (0.2)	ND (0.2)
MW-29	**1,300**	**15**	65	ND (10)	ND (10)
MW-9	**1,100**	**12**	12	ND (10)	ND (10)
TW-46	**870**	**11**	**160**	ND (4.0)	ND (4.0)
Duplicate	**890**	**11**	**160**	ND (4.0)	ND (4.0)
TW-45	**230**	**7.6**	46	ND (1.0)	ND (1.0)
MW-26	**260**	**6.5**	6.0	ND (1.0)	ND (1.0)
MW-12	**140**	2.5	4.4	ND (1.0)	ND (1.0)
MW-16	**59**	**13**	2.1	0.47	ND (0.4)
MW-17	0.61	**5.3**	6.9	23	ND (0.2)
ADEC GCL	**5**	**5**	**70**	**100**	**2**

Note: Value in parenthesis is the laboratory reporting limit.
Bolded value indicates result exceeds ADEC GCL.

Key:

ADEC = Alaska Department of Environmental Conservation
DCE = Dichloroethene
ft = Feet
GCL = Groundwater cleanup level
µg/L = Micrograms per liter
ND = Not detected
PCE = Tetrachloroethene
TCE = Trichloroethene

Table 13

Cumulative Monitoring Well Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Monitoring Well	Sample Date	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Vinyl chloride (µg/L)
MW-1	Oct-06	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Nov-04	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-03	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-02	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-01	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-99	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Oct-97	ND	ND	ND	ND	ND
MW-3	Sept-08	**8.0**	0.86	0.28	ND (0.2)	ND (0.2)
	Oct-06	**9.13**	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Nov-04	**8.11**	1.06	0.358 J	ND (1.0)	ND (1.0)
	Oct-03	**6.02**	0.760 J	0.324 J	ND (1.0)	ND (1.0)
	Oct-02	**7.48**	0.942	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-01	**8.52**	1.03	0.516 J	ND (1.0)	ND (1.0)
	Oct-00	**9.27**	0.937 J	0.488 J	ND (1.0)	ND (2.0)
	Apr-00	**9.8**	1.1	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-99	**10**	1.1	ND (1.0)	ND (1.0)	ND (2.0)
	Oct-97	**5.1**	0.9	ND	ND	ND
MW-4	Sept-08	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
	Oct-06	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Nov-04	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-03	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-02	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-01	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Oct-99	ND (1.0)	3.8	ND (1.0)	ND (1.0)	ND (2.0)
MW-6	Sept-08	**89**	2.3	0.5	ND (0.4)	ND (0.4)
	Oct-07	**86**	2.1	0.46	ND (0.4)	ND (0.4)
	Oct-06	**95.6**	2.53	ND (1.0)	ND (1.0)	ND (1.0)
	Nov-04	**99.9**	3.27	0.775 J	ND (1.0)	ND (1.0)
	Oct-03	**125**	3.81	1.62	0.121 J	ND (1.0)
	Oct-02	**85.2**	3.23 J	ND (5.0)	ND (5.0)	ND (5.0)
	Oct-01	**132**	4.58	2.95	0.152 J	ND (1.0)
	Oct-00	**153**	4.48 J	3.20 J	ND (5.0)	ND (10.0)
	Apr-00	**120**	3.3	3.1	ND (2.5)	ND (5.0)
MW-7	Sept-08	2.9	0.94	ND (0.2)	ND (0.2)	ND (0.2)
	Oct-06	4.46	1.72	ND (1.0)	ND (1.0)	ND (1.0)
	Nov-04	**7.23**	2.58	0.268 J	ND (1.0)	ND (1.0)
	Oct-03	3.91	1.19	0.208 J	ND (1.0)	ND (1.0)
	Oct-02	2.90	0.833 J	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-01	**5.42**	1.41	0.201 J	ND (1.0)	ND (1.0)
	Oct-00	3.44	0.707 J	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-00	**5.7**	1.3	ND (1.0)	ND (1.0)	ND (2.0)
	Oct-99	**7.1**	1.78	0.304 J	ND (1.0)	ND (2.0)
	ADEC GCL	**5**	**5**	**70**	**100**	**2**

Table 13

Cumulative Monitoring Well Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Monitoring Well	Sample Date	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Vinyl chloride (µg/L)
MW-8	Sept-08	**210**	**5.0**	9.6	ND (1.0)	ND (1.0)
	Oct-07	**200**	4.0	9.7	ND (1.0)	ND (1.0)
	Oct-06	**378**	**6.50**	23.5	1.26	ND (1.0)
	Nov-04	**283**	**5.84**	15.1	0.131 J	ND (1.0)
	Oct-03	**244**	**5.15**	11.4	0.348 J	ND (1.0)
	Oct-02	**343**	**5.78**	17.6	ND (1.0)	ND (1.0)
	Oct-01	**321**	**5.42**	13.8	0.107 J	ND (1.0)
	Oct-00	**312**	**5.14 J**	8.75 J	ND (10.0)	ND (20.0)
	Apr-00	**210**	ND (5.0)	8.5	ND (5.0)	ND (10)
MW-9	Sept-08	**1,100**	**12**	12	ND (10)	ND (10)
	Oct-07	**1,300**	**13**	15	ND (10)	ND (10)
	Oct-06	**1,540**	**16.3**	14.4	ND (1.0)	ND (1.0)
	Nov-04	**1,070**	**14.8**	10.3	0.615 J	ND (1.0)
	Oct-03	**664**	**10.5**	11.5	0.513 J	ND (1.0)
	Oct-02	**1,300**	**31**	37.9	ND (10.0)	ND (10.0)
	Oct-01	**972**	**17.7**	19.8	0.739 J	ND (1.0)
	Oct-00	**1,200**	ND (50.0)	ND (50.0)	ND (50.0)	ND (100)
	Apr-00	**500**	ND (5.0)	ND (5.0)	ND (5.0)	ND (10)
	Oct-99	**727**	**12.2**	14.3	ND (5.0)	ND (10.0)
MW-12	Sept-08	**140**	2.5	4.4	ND (1.0)	ND (1.0)
	Oct-07	**210**	3.2	7.9	ND (1.0)	ND (1.0)
	Oct-06	**290**	**5.37**	12.8	ND (1.0)	ND (1.0)
	Nov-04	**275**	4.75	9.51	ND (1.0)	ND (1.0)
	Oct-03	**237**	3.21	8.04	0.172 J	ND (1.0)
	Oct-02	**252**	3.4 J	7.97	ND (5.0)	ND (5.0)
	Oct-01	**354**	4.91	9.99	ND (1.0)	ND (1.0)
	Oct-00	**193**	ND (12.5)	ND (12.5)	ND (12.5)	ND (25.0)
	Apr-00	**390**	ND (10)	ND (10)	ND (10)	ND (20)
MW-13	Sept-08	0.63	**54**	10	33	ND (0.4)
	Oct-07	0.45	**74**	9.1	23	ND (0.4)
	Oct-06	ND (1.0)	**113**	9.41	18.0	ND (1.0)
	Nov-04	0.928 J	**166**	8.21	6.51	ND (1.0)
	Oct-03	2.06	**233**	11.8	5.92	ND (1.0)
MW-14	Sept-08	ND (0.2)	**6.4**	12	39	ND (0.2)
	Oct-07	ND (0.4)	**11**	13	40	ND (0.4)
	Oct-06	ND (1.0)	**21.6**	22.6	40.4	ND (1.0)
	Nov-04	0.434 J	**54.2**	12.0	31.7	ND (1.0)
	Oct-03	1.09	**67.2**	8.28	16.0	ND (1.0)
MW-15	Sept-08	2.4	**8.2**	3.9	8.2	ND (0.2)
	Oct-07	2.0	**8.1**	4.4	8.3	ND (0.4)
	Oct-06	2.65	**11.3**	4.91	7.08	ND (1.0)
	Nov-04	3.29	**14.6**	3.04	5.71	ND (1.0)
	Oct-03	3.27	**13.3**	3.13	4.69	ND (1.0)
	ADEC GCL	**5**	**5**	**70**	**100**	**2**

Table 13

Cumulative Monitoring Well Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Monitoring Well	Sample Date	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Vinyl chloride (µg/L)
MW-16	Sept-08	**59**	**13**	2.1	0.47	ND (0.4)
	Oct-07	**62**	**11**	1.9	0.45	ND (0.4)
	Oct-06	**85.4**	**9.59**	2.27	ND (1.0)	ND (1.0)
	Nov-04	**77.8**	**8.55**	2.19	0.326 J	ND (1.0)
	Oct-03	**122**	**6.1**	3.21	0.439 J	ND (1.0)
MW-17 (Former TW-16)	Sept-08	0.61	**5.3**	6.9	23	ND (0.2)
	Oct-07	0.48	**5.5**	8.0	24	ND (0.2)
	Oct-06	ND (1.0)	**7.95**	10.1	27.3	ND (1.0)
	Nov-04	**20.5**	**26.4**	2.56	5.45	ND (1.0)
	Oct-03	**26.2**	**24.1**	2.49	3.61	ND (1.0)
	Oct-02	**33.8**	**22.5**	2.12	2.87	ND (1.0)
	Oct-01	**47.1**	**20.1**	2.16	3.00	ND (1.0)
	Oct-00	**61.6**	**19.7**	ND (5.0)	2.55 J	ND (10.0)
	Apr-00	**54**	**17**	2.0	2.4	ND (2.0)
	Oct-99	**78.1**	**14.3**	1.92 J	2.31 J	ND (10.0)
	Apr-99	**56**	**16**	2.2	2.5	ND (2.0)
	Oct-98	**59**	**8.1**	ND (2.0)	2.1	ND (4.0)
MW-18 (Former TW-19)	Oct-06	**12.5**	3.24	2.40	ND (1.0)	ND (1.0)
	Nov-04	**20.1**	3.69	2.79	0.239 J	ND (1.0)
	Oct-03	**16.6**	3.01	3.21	0.266 J	ND (1.0)
	Oct-02	**14.9**	3.17	3.31	ND (1.0)	ND (1.0)
	Oct-01	**16.9**	3.35	3.60	0.230 J	ND (1.0)
	Oct-00	**15.3**	3.11	3.72	0.231 J	ND (2.0)
	Apr-00	**14**	3.0	3.6	ND (1.0)	ND (2.0)
	Apr-99	**13**	2.5	3.8	ND (1.0)	ND (2.0)
	Oct-98	**15**	3.1	4.7	ND (1.0)	ND (2.0)
MW-19 (Former TW-20)	Oct-06	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-99	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Oct-98	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-20S (Former TW-21S)	Oct-06	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Nov-04	0.153 J	0.264 J	0.770 J	ND (1.0)	ND (1.0)
	Oct-03	0.143 J	0.172 J	0.546 J	ND (1.0)	ND (1.0)
	Oct-02	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-01	ND (1.0)	0.152 J	0.392 J	ND (1.0)	ND (1.0)
	Oct-00	0.226 J	ND (1.0)	0.467 J	ND (1.0)	ND (2.0)
	Apr-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-99	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-20D (Former TW-21D)	Oct-06	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Nov-04	ND (1.0)	ND (1.0)	0.165 J	ND (1.0)	ND (1.0)
	Oct-03	ND (1.0)	ND (1.0)	0.145 J	ND (1.0)	ND (1.0)
	Oct-02	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-01	ND (1.0)	ND (1.0)	0.139 J	ND (1.0)	ND (1.0)
	Oct-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-99	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	ADEC GCL	**5**	**5**	**70**	**100**	**2**

Table 13

Cumulative Monitoring Well Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Monitoring Well	Sample Date	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Vinyl chloride (µg/L)
MW-21 (Former TW-22)	Oct-06	**6.33**	4.76	3.39	1.31	ND (1.0)
	Nov-04	**8.18**	**5.83**	3.27	1.30	ND (1.0)
	Oct-03	**6.14**	4.67	3.32	1.43	ND (1.0)
	Oct-02	4.98	4.37	3.04	1.22	ND (1.0)
	Oct-01	**5.90**	**5.01**	3.05	1.37	ND (1.0)
	Oct-00	**5.12**	4.39	2.89	1.26	ND (2.0)
	Apr-00	4.9	3.7	2.7	ND (1.0)	ND (2.0)
	Apr-99	**5.5**	3.9	3.0	ND (1.0)	ND (2.0)
	Oct-98	**5.7**	4.2	3.3	1.0	ND (2.0)
MW-22S (Former TW-26S)	Oct-06	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Nov-04	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-03	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-02	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-01	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-99	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Oct-98	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-22D (Former TW-26D)	Oct-06	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Nov-04	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-03	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-02	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-01	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-99	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-23 (Former TW-28)	Oct-06	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Apr-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-99	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Oct-98	1.3	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-24 (Former TW-32)	Oct-06	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Apr-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-99	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Oct-98	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-25S (Former TW-34S)	Oct-06	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Nov-04	ND (1.0)	ND (1.0)	0.177 J	ND (1.0)	ND (1.0)
	Oct-03	ND (1.0)	ND (1.0)	0.224 J	ND (1.0)	ND (1.0)
	Oct-02	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-01	ND (1.0)	ND (1.0)	0.172 J	ND (1.0)	ND (1.0)
	Oct-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Oct-99	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	NR
	Apr-99	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Oct-98	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	ADEC GCL	**5**	**5**	**70**	**100**	**2**

Table 13

Cumulative Monitoring Well Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Monitoring Well	Sample Date	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Vinyl chloride (µg/L)
MW-25D (Former TW-34D)	Oct-06	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Nov-04	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-03	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-02	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-01	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Oct-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Oct-99	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Apr-99	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Oct-98	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-26	Sept-08	**260**	**6.5**	6.0	ND (1.0)	ND (1.0)
	Oct-07	**250**	4.9	6.3	ND (2.0)	ND (2.0)
MW-27	Sept-08	**200**	**5.0**	3.9	ND (1.0)	ND (1.0)
	Oct-07	**300**	**7.7**	8.2	ND (2.0)	ND (2.0)
MW-28	Sept-08	**2,900**	ND (20)	ND (20)	ND (20)	ND (20)
	Oct-07	**3,800**	ND (20)	43	ND (20)	ND (20)
MW-29	Sept-08	**1,300**	**15**	65	ND (10)	ND (10)
	Oct-07	**1,200**	**14**	**90**	ND (10)	ND (10)
MW-31	Sept-08	**500**	**5.3**	ND (1.0)	ND (1.0)	ND (1.0)
	May-08	**190**	**7.5**	ND (1.0)	ND (1.0)	ND (1.0)
TW-45	Sept-08	**230**	**7.6**	46	ND (1.0)	ND (1.0)
	Oct-07	**300**	**10**	67	ND (2.0)	ND (2.0)
	Oct-06	**270**	**8.05**	61.4	ND (1.0)	ND (2.0)
	Nov-04	**328**	**11.7**	49.3	ND (1.0)	ND (1.0)
	Oct-03	**342**	**11.7**	58.9	1.63	ND (1.0)
	Oct-02	**350**	**7.43**	33.9	ND (1.0)	ND (1.0)
	Oct-01	**244**	**7.15**	26.4	0.305 J	ND (1.0)
	Oct-00	**448**	ND (25.0)	24.4 J	ND (25.0)	ND (50.0)
	Apr-00	**400**	**11**	29	ND (10)	ND (20)
	Oct-99	**363**	**13.2**	41.0	ND (5.0)	ND (10.0)
TW-46	Sept-08	**870**	**11**	**160**	ND (4.0)	ND (4.0)
	Oct-07	**1,100**	**11**	**150**	ND (4.0)	ND (4.0)
	Oct-06	**988**	**12.4**	**157**	3.00	ND (2.0)
	Nov-04	**1,130**	**14.9**	**209**	3.68 J	ND (1.0)
	Oct-03	**973**	**13.6**	**269**	4.72	ND (1.0)
	Oct-02	**1,640**	**32.6**	**686**	9.86 J	ND (10.0)
	Oct-01	**1,170**	**13.4**	**138**	2.98	ND (1.0)
	Oct-00	**1,270**	ND (50.0)	**329**	ND (50.0)	ND (100)
	Apr-00	**1,500**	ND (25)	**300**	ND (25)	ND (50)
	Oct-99	**1,640**	**14.6**	**163**	3.52 J	ND (10.0)
GP-MW7	Sept-08	2.6	4.8	0.42	0.22	ND (0.2)
	Oct-06	4.00	**8.28**	ND (1.0)	ND (1.0)	ND (1.0)
	Nov-04	**7.15**	**15.4**	0.677 J	0.270 J	ND (1.0)
	Oct-03	2.27	4.85	0.256 J	0.0900 J	ND (1.0)
	Dec-02	3.93	**9.31**	NR	NR	NR
	Oct-02	2.8	**7.1**	NR	NR	NR
	Feb-02	**7.54**	**15.8**	0.737 J	ND (1.0)	ND (1.0)
	ADEC GCL	**5**	**5**	**70**	**100**	**2**

Table 13

Cumulative Monitoring Well Sample Analytical Results

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Monitoring Well	Sample Date	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Vinyl chloride (µg/L)
LS-MW38	Oct-06	2.29	3.12	2.22	1.11	ND (1.0)
	Nov-04	2.37	3.19	2.10	1.23	ND (1.0)
	Oct-03	1.96	2.54	1.48	0.872 J	ND (1.0)
	Dec-02	ND (1.0)	1.86	1.68	ND (1.0)	NR
	Sep-01	2.09	2.73	2.09	ND (1.0)	ND (2.0)
	Oct-00	1.05	1.40	1.11	0.480 J	ND (2.0)
	Jun-98	2.2	2.10	1.5	ND (1.0)	NR
LS-MW41	Oct-06	**18.3**	3.87	1.77	ND (1.0)	ND (1.0)
	Nov-04	**24.7**	**5.03**	2.28	0.292 J	ND (1.0)
	Oct-03	**21.4**	4.40	3.11	0.339 J	ND (1.0)
	Oct-02	**21.2**	4.22	3.16	ND (1.0)	ND (1.0)
	Sep-01	**24.7**	4.00	3.36	0.271 J	ND (1.0)
	Oct-00	**20.8**	3.90	3.90	0.290 J	ND (2.0)
	Jun-98	**9.7**	1.20	ND (1.0)	ND (1.0)	NR
LS-MW46	Oct-06	1.44	3.89	3.55	3.08	ND (1.0)
	Nov-04	1.83	4.37	3.89	3.91	ND (1.0)
	Oct-03	1.60	3.11	2.09	2.08	ND (1.0)
	Dec-02	1.81	3.74	2.45	2.27	NR
	Oct-02	1.64	**32.6**	**686**	9.86	ND (10.0)
	Sep-01	2.10	4.04	2.34	2.61	ND (2.0)
	Oct-00	1.75	3.02	1.18	1.47	ND (2.0)
	Jun-98	1.0	2.6	1.4	1.8	NR
LS-MW47	Oct-06	3.24	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	Nov-04	4.58	0.311 J	0.143 J	ND (1.0)	ND (1.0)
	Oct-03	3.7	0.184 J	ND (1.0)	ND (1.0)	ND (1.0)
	Dec-02	4.2	ND (1.00)	ND (1.00)	ND (1.00)	NR
	Sep-01	3.62	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Oct-00	4.29	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
	Jun-98	3.2	ND (1.0)	ND (1.0)	ND (1.0)	NR
	ADEC GCL	**5**	**5**	**70**	**100**	**2**

Note: Value in parentheses is the laboratory reporting limit.

Key:

ADEC = Alaska Department of Environmental Conservation

DCE = Dichloroethene

GCL = Groundwater cleanup level

µg/L = Micrograms per liter

ND = Not detected above the reporting limit shown in parentheses

NR = Not reported

PCE = Tetrachloroethene

TCE = Trichloroethene

Table 14
Cumulative Monitoring Well Sample Molar Concentrations
Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Monitoring Well	Units	mole/µL			
	Sample Date	PCE Molar Concentration	TCE Molar Concentration	DCE Molar Concentration	Total Molar Concentration
MW-3	Sep-08	0.048	0.007	NA	0.055
	Oct-06	0.055	0.008	NA	0.063
	Nov-04	0.049	0.008	NA	0.057
	Oct-03	0.036	0.006	NA	0.042
	Oct-02	0.045	0.007	NA	0.052
	Oct-01	0.051	0.008	NA	0.059
	Oct-00	0.056	0.007	NA	0.063
	Apr-00	0.059	0.008	NA	0.067
	Apr-99	0.060	0.008	NA	0.069
	Oct-97	0.031	0.007	NA	0.038
MW-6	Sep-08	0.537	0.018	0.005	0.559
	Oct-07	0.519	0.016	0.005	0.539
	Oct-06	0.576	0.019	0.008	0.603
	Nov-04	0.602	0.025	0.008	0.635
	Oct-03	0.754	0.029	0.017	0.799
	Oct-02	0.514	0.025	0.026	0.564
	Oct-01	0.796	0.035	0.030	0.861
	Oct-00	0.923	0.034	0.033	0.990
	Apr-00	0.724	0.025	0.032	0.781
MW-7	Sep-08	0.017	0.007	NA	0.025
	Oct-06	0.027	0.013	NA	0.040
	Nov-04	0.044	0.020	NA	0.063
	Oct-03	0.024	0.009	NA	0.033
	Oct-02	0.017	0.006	NA	0.024
	Oct-01	0.033	0.011	NA	0.043
	Oct-00	0.021	0.005	NA	0.026
	Apr-00	0.034	0.010	NA	0.044
	Oct-99	0.043	0.014	NA	0.056
MW-8	Sep-08	1.266	0.038	0.099	1.403
	Oct-07	1.206	0.030	0.100	1.337
	Oct-06	2.279	0.049	0.242	2.571
	Nov-04	1.707	0.044	0.156	1.907
	Oct-03	1.471	0.039	0.118	1.628
	Oct-02	2.068	0.044	0.182	2.294
	Oct-01	1.936	0.041	0.142	2.119
	Oct-00	1.881	0.039	0.090	2.011
	Apr-00	1.266	0.019	0.088	1.373

Table 14
Cumulative Monitoring Well Sample Molar Concentrations
Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Monitoring Well	Units	mole/µL			
	Sample Date	PCE Molar Concentration	TCE Molar Concentration	DCE Molar Concentration	Total Molar Concentration
MW-9	Sep-08	6.633	0.091	0.124	6.848
	Oct-07	7.839	0.099	0.155	8.093
	Oct-06	9.287	0.124	0.149	9.559
	Nov-04	6.452	0.113	0.106	6.671
	Oct-03	4.004	0.080	0.119	4.203
	Oct-02	7.839	0.236	0.391	8.466
	Oct-01	5.861	0.135	0.204	6.200
	Oct-00	7.236	NA	NA	NA
	Apr-00	3.015	NA	NA	NA
	Oct-99	4.384	0.093	0.147	4.624
MW-12	Sep-08	0.844	0.019	0.045	0.909
	Oct-07	1.266	0.024	0.081	1.372
	Oct-06	1.749	0.041	0.132	1.922
	Nov-04	1.658	0.036	0.098	1.793
	Oct-03	1.429	0.024	0.083	1.537
	Oct-02	1.520	0.026	0.082	1.628
	Oct-01	2.135	0.037	0.103	2.275
	Oct-00	1.164	NA	NA	NA
	Apr-00	2.352	NA	NA	NA
MW-13	Sep-08	0.004	0.411	0.444	0.858
	Oct-07	0.003	0.563	0.331	0.897
	Oct-06	0.005	0.860	0.283	1.147
	Nov-04	0.006	1.263	0.152	1.421
	Oct-03	0.012	1.773	0.183	1.969
MW-14	Sep-08	0.001	0.049	0.526	0.575
	Oct-07	0.001	0.084	0.547	0.632
	Oct-06	0.003	0.164	0.650	0.817
	Nov-04	0.003	0.413	0.451	0.866
	Oct-03	0.007	0.511	0.250	0.768
MW-15	Sep-08	0.014	0.062	0.125	0.202
	Oct-07	0.012	0.062	0.131	0.205
	Oct-06	0.016	0.086	0.124	0.226
	Nov-04	0.020	0.111	0.090	0.221
	Oct-03	0.020	0.101	0.081	0.202
MW-16	Sep-08	0.356	0.099	0.027	0.481
	Oct-07	0.374	0.084	0.024	0.482
	Oct-06	0.515	0.073	0.023	0.611
	Nov-04	0.469	0.065	0.023	0.557
	Oct-03	0.736	0.046	0.033	0.815

Table 14
Cumulative Monitoring Well Sample Molar Concentrations
Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Monitoring Well	Units	mole/µL			
	Sample Date	PCE Molar Concentration	TCE Molar Concentration	DCE Molar Concentration	Total Molar Concentration
MW-17 (Former TW-16)	Sep-08	0.004	0.040	0.308	0.352
	Oct-07	0.003	0.042	0.330	0.375
	Oct-06	0.003	0.061	0.386	0.449
	Nov-04	0.124	0.201	0.083	0.407
	Oct-03	0.158	0.183	0.063	0.404
	Oct-02	0.204	0.171	0.051	0.427
	Oct-01	0.284	0.153	0.053	0.490
	Oct-00	0.371	0.150	0.052	0.573
	Apr-00	0.326	0.129	0.045	0.500
	Oct-99	0.471	0.109	0.044	0.623
	Apr-99	0.338	0.122	0.048	0.508
	Oct-98	0.356	0.062	0.032	0.449
MW-18 (Former TW-19)	Oct-06	0.075	0.025	0.025	0.125
	Nov-04	0.121	0.028	0.029	0.178
	Oct-03	0.100	0.023	0.033	0.156
	Oct-02	0.090	0.024	0.034	0.148
	Oct-01	0.102	0.025	0.037	0.165
	Oct-00	0.092	0.024	0.038	0.154
	Apr-00	0.084	0.023	0.037	0.144
	Apr-99	0.078	0.019	0.039	0.137
	Oct-98	0.090	0.024	0.048	0.163
MW-21 (Former TW-22)	Oct-06	0.038	0.036	0.048	0.123
	Nov-04	0.049	0.044	0.047	0.141
	Oct-03	0.037	0.036	0.049	0.122
	Oct-02	0.030	0.033	0.044	0.107
	Oct-01	0.036	0.038	0.046	0.119
	Oct-00	0.031	0.033	0.043	0.107
	Apr-00	0.030	0.028	0.038	0.096
	Apr-99	0.033	0.030	0.041	0.104
	Oct-98	0.034	0.032	0.044	0.111
MW-26	Sept-08	1.568	0.049	0.072	1.690
	Oct-07	1.508	0.037	0.086	1.630
MW-27	Sept-08	1.206	0.038	0.051	1.295
	Oct-07	1.809	0.059	0.105	1.973
MW-28	Sept-08	17.488	0.152	0.413	18.053
	Oct-07	22.915	0.152	0.650	23.717
MW-29	Sept-08	7.839	0.114	0.681	8.634
	Oct-07	7.236	0.107	0.949	8.292
MW-31	Sept-08	3.015	0.040	0.021	3.076
	May-08	1.146	0.057	0.021	1.223

Table 14
Cumulative Monitoring Well Sample Molar Concentrations
Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Monitoring Well	Units	mole/µL			
	Sample Date	PCE Molar Concentration	TCE Molar Concentration	DCE Molar Concentration	Total Molar Concentration
TW-45	Sep-08	1.387	0.058	0.474	1.919
	Oct-07	1.809	0.076	0.691	2.576
	Oct-06	1.628	0.061	0.633	2.323
	Nov-04	1.978	0.089	0.509	2.575
	Oct-03	2.062	0.089	0.608	2.759
	Oct-02	2.111	0.057	0.350	2.517
	Oct-01	1.471	0.054	0.272	1.798
	Oct-00	NA	NA	NA	NA
	Apr-00	2.412	0.084	0.299	2.795
	Oct-99	2.189	0.100	0.423	2.712
TW-46	Sep-08	5.246	0.084	1.681	7.011
	Oct-07	6.633	0.084	1.578	8.295
	Oct-06	5.958	0.094	1.650	7.703
	Nov-04	6.814	0.113	2.194	9.121
	Oct-03	5.867	0.104	2.823	8.794
	Oct-02	9.890	0.248	7.178	17.315
	Oct-01	7.055	0.102	1.454	8.612
	Oct-00	NA	NA	NA	NA
	Apr-00	NA	NA	NA	NA
	Oct-99	9.890	0.111	1.718	11.718
GP-MW7	Sep-08	0.016	0.037	NA	0.052
	Oct-06	0.024	0.063	NA	0.087
	Nov-04	0.043	0.117	NA	0.160
	Oct-03	0.014	0.037	NA	0.051
	Dec-02	0.024	0.071	NA	0.095
	Oct-02	0.017	0.054	NA	0.071
	Feb-02	0.045	0.120	NA	0.166
LS-MW38	Oct-06	0.014	0.024	0.034	0.072
	Nov-04	0.014	0.024	0.034	0.073
	Oct-03	0.012	0.019	0.024	0.055
	Dec-02	0.006	0.014	0.022	0.043
	Sep-01	0.013	0.021	0.027	0.060
	Oct-00	0.006	0.011	0.016	0.033
	Jun-98	0.013	0.016	0.021	0.050
LS-MW41	Oct-06	0.110	0.029	0.018	0.158
	Nov-04	0.149	0.038	0.024	0.211
	Oct-03	0.129	0.033	0.032	0.195
	Oct-02	0.128	0.032	0.033	0.193
	Sep-01	0.149	0.030	0.035	0.214
	Oct-00	0.125	0.030	0.040	0.195
	Jun-98	0.058	0.009	0.010	0.078

Table 14

Cumulative Monitoring Well Sample Molar Concentrations

Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Monitoring Well	Units	mole/µL			
	Sample Date	PCE Molar Concentration	TCE Molar Concentration	DCE Molar Concentration	Total Molar Concentration
LS-MW46	Oct-06	0.009	0.030	0.068	0.107
	Nov-04	0.011	0.033	0.080	0.125
	Oct-03	0.010	0.024	0.043	0.076
	Dec-02	0.011	0.028	0.049	0.088
	Sep-01	0.013	0.031	0.051	0.094
	Oct-00	0.011	0.023	0.027	0.061
	Jun-98	0.006	0.020	0.033	0.059
LS-MW47	Oct-06	0.020	NA	NA	0.020
	Nov-04	0.028	NA	NA	0.028
	Oct-03	0.022	NA	NA	0.022
	Dec-02	0.025	NA	NA	0.025
	Sep-01	0.022	NA	NA	0.022
	Oct-00	0.026	NA	NA	0.026
	Jun-98	0.019	NA	NA	0.019

Notes: Value in parentheses is the laboratory reporting limit.

Unless noted below, non-detect values were assigned as one-half the laboratory reporting limit.

TCE concentration in MW-3 for 2006 sample was set at 1.0.

cis-1,2-DCE concentration in MW-6 for 2006 sample was set at 0.75.

Samples from 2000 for MW-9 were not considered because of unpredictability of TCE and cis-1,2-DCE estimated concentrations.

Samples from 2000 for MW-12 were not considered because of unpredictability of TCE and cis-1,2-DCE estimated concentrations.

PCE concentration in MW-13 for 2006 sample was set at 0.75.

Sample from October 2000 for TW-45 was not considered because of unpredictability of TCE estimated concentration.

Samples from 2000 in TW-46 were not considered because of unpredictability of TCE estimated concentrations.

Trans-1,2-DCE concentration in TW-46 for 2007 was set at 3.0.

PCE concentration in LSMW-38 for 2002 sample set at 1.0.

Oct 2002 data set excluded for LS-MW46 because of cis-1,2-DCE outlier.

Key:

DCE = Dichloroethene

mole/µL = Mole per microliter

NA = Not applicable because of too many non-detect values

PCE = Tetrachloroethene

TCE = Trichloroethene

Table 15
Groundwater Elevation Measurements
Gaffney Road Area Additional Site Characterization and Long-Term Monitoring

Monitoring Well	Well Depth	Screened Interval	TOC Elevation (Feet)	Depth to Groundwater (Feet)	Groundwater Elevation (Feet)
MW-3	19.6	9.6-19.6	436.50	11.07	425.43
MW-4	19.5	12-17	438.88	12.94	425.94
MW-6	17.5	12.5-17.5	438.45	12.67	425.78
MW-7	17.5	12.5-17.5	439.24	13.51	425.73
MW-8	16.5	11.5-16.5	438.10	12.50	425.60
MW-9	17.5	12.5-17.5	439.34	13.87	425.47
MW-12	19.5	14.5-19.5	441.00	15.47	425.53
MW-13	30	25-30	439.55	13.80	425.75
MW-14	25	20-25	439.85	14.28	425.57
MW-15	29	24-29	438.49	13.34	425.15
MW-16	26	21-26	437.62	12.41	425.21
MW-17	24	19-24	435.99	11.25	424.74
MW-26	20	15-20	439.01	13.47	425.54
MW-27	20	15-20	440.76	14.78	425.98
MW-28	20	15-20	439.10	13.26	425.84
MW-29	20	15-20	438.22	12.50	425.72
MW-30	20	15-20	439.94	13.91	426.03
MW-31	20	15-20	439.23	13.25	425.98
MW-32	20	15-20	439.42	13.64	425.78
MW-33	20	15-20	440.15	14.26	425.89
TW-45	17.5	12.5-17.5	439.20	13.86	425.34
TW-46	17.5	12.5-17.5	438.52	13.16	425.36

Notes: MW-4 has loose casing, so groundwater elevation is assumed to be an estimate.

Key:

TOC = Top of Casing

FIGURES

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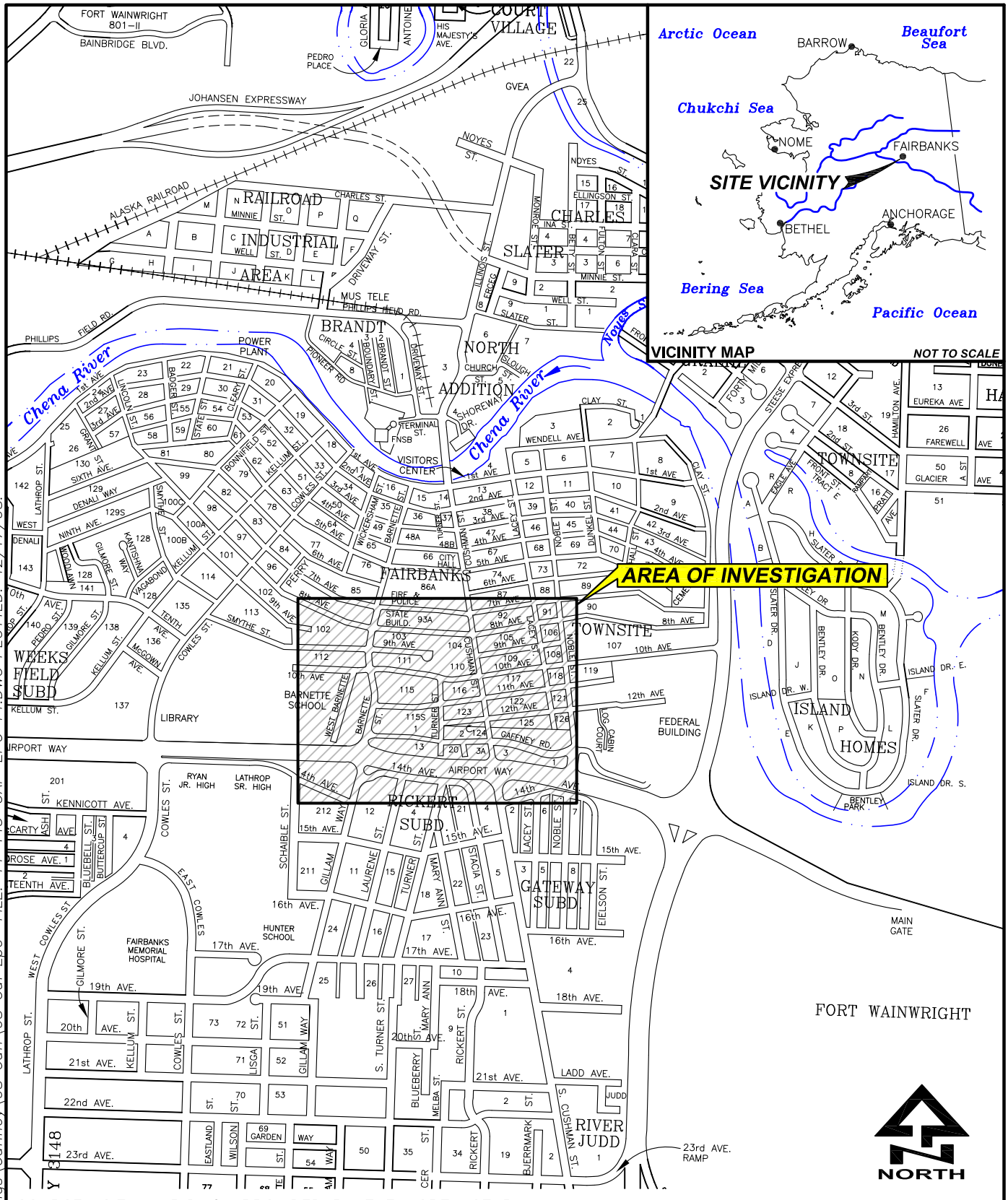

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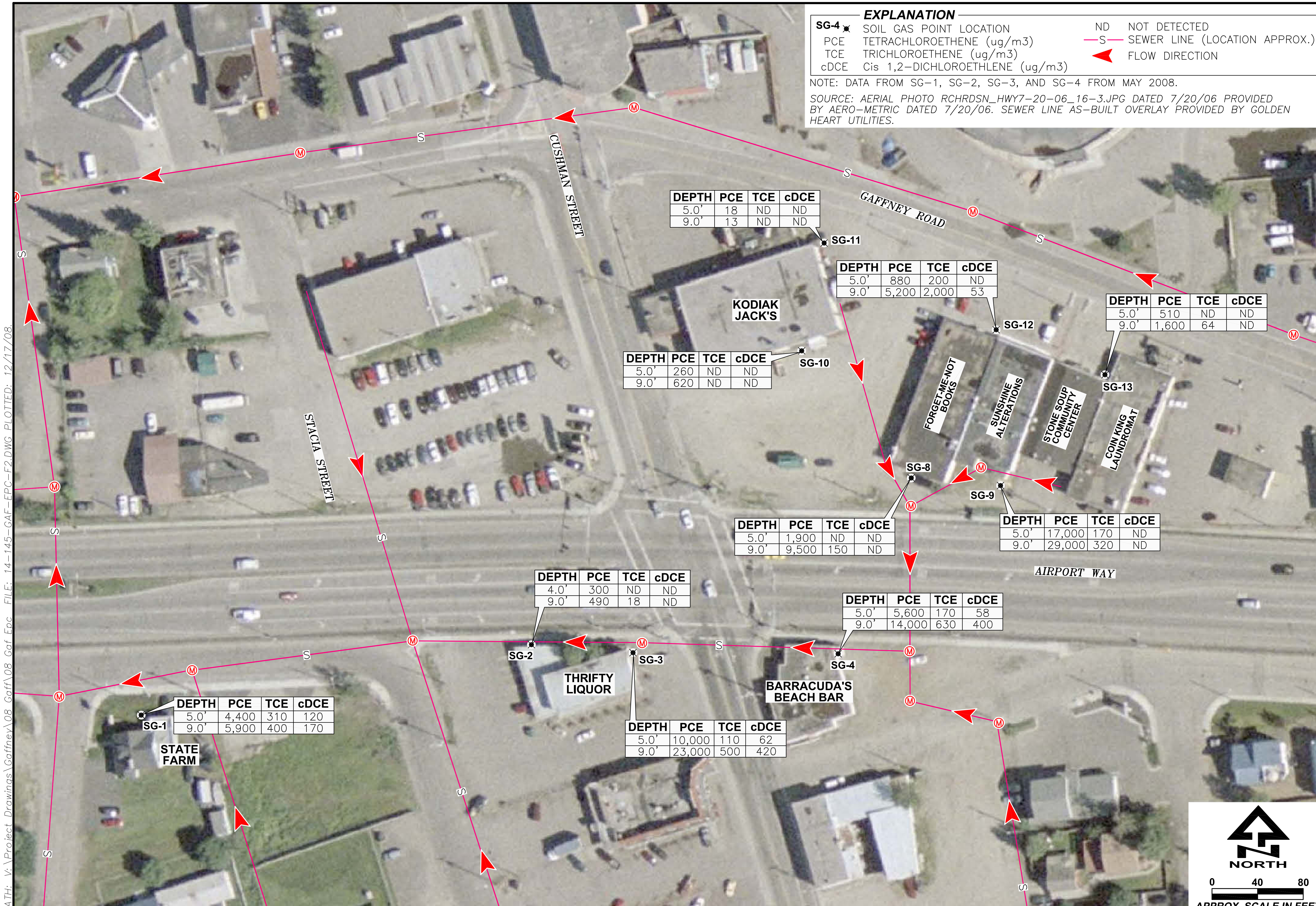
SITE LOCATION MAP

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION
AND LONG-TERM MONITORING
Fairbanks, Alaska

FIGURE
1



SG-1

DEPTH	PCE	TCE	cDCE
5.0'	4,400	310	120
9.0'	5,900	400	170

SG-2

DEPTH	PCE	TCE	cDCE
4.0'	300	ND	ND
9.0'	490	18	ND

SG-3

DEPTH	PCE	TCE	cDCE
5.0'	10,000	110	62
9.0'	23,000	500	420

SG-4

DEPTH	PCE	TCE	cDCE
5.0'	5,600	170	58
9.0'	14,000	630	400

SG-8

DEPTH	PCE	TCE	cDCE
5.0'	1,900	ND	ND
9.0'	9,500	150	ND

SG-9

DEPTH	PCE	TCE	cDCE
5.0'	17,000	170	ND
9.0'	29,000	320	ND

SG-10

DEPTH	PCE	TCE	cDCE
5.0'	260	ND	ND
9.0'	620	ND	ND

SG-11

DEPTH	PCE	TCE	cDCE
5.0'	18	ND	ND
9.0'	13	ND	ND

SG-12

DEPTH	PCE	TCE	cDCE
5.0'	880	200	ND
9.0'	5,200	2,000	53

SG-13

DEPTH	PCE	TCE	cDCE
5.0'	510	ND	ND
9.0'	1,600	64	ND

EXPLANATION

SG-4 SOIL GAS POINT LOCATION
PCE TETRACHLOROETHENE (ug/m3)
TCE TRICHLOROETHENE (ug/m3)
cDCE Cis 1,2-DICHLOROETHLENE (ug/m3)
ND NOT DETECTED
—S— SEWER LINE (LOCATION APPROX.)
FLOW DIRECTION

NOTE: DATA FROM SG-1, SG-2, SG-3, AND SG-4 FROM MAY 2008.

SOURCE: AERIAL PHOTO RCHRDSN_HWY7-20-06_16-3.JPG DATED 7/20/06 PROVIDED BY AERO-METRIC DATED 7/20/06. SEWER LINE AS-BUILT OVERLAY PROVIDED BY GOLDEN HEART UTILITIES.

FIGURE 2

SOIL GAS SAMPLE LOCATIONS AND ANALYTICAL RESULTS

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

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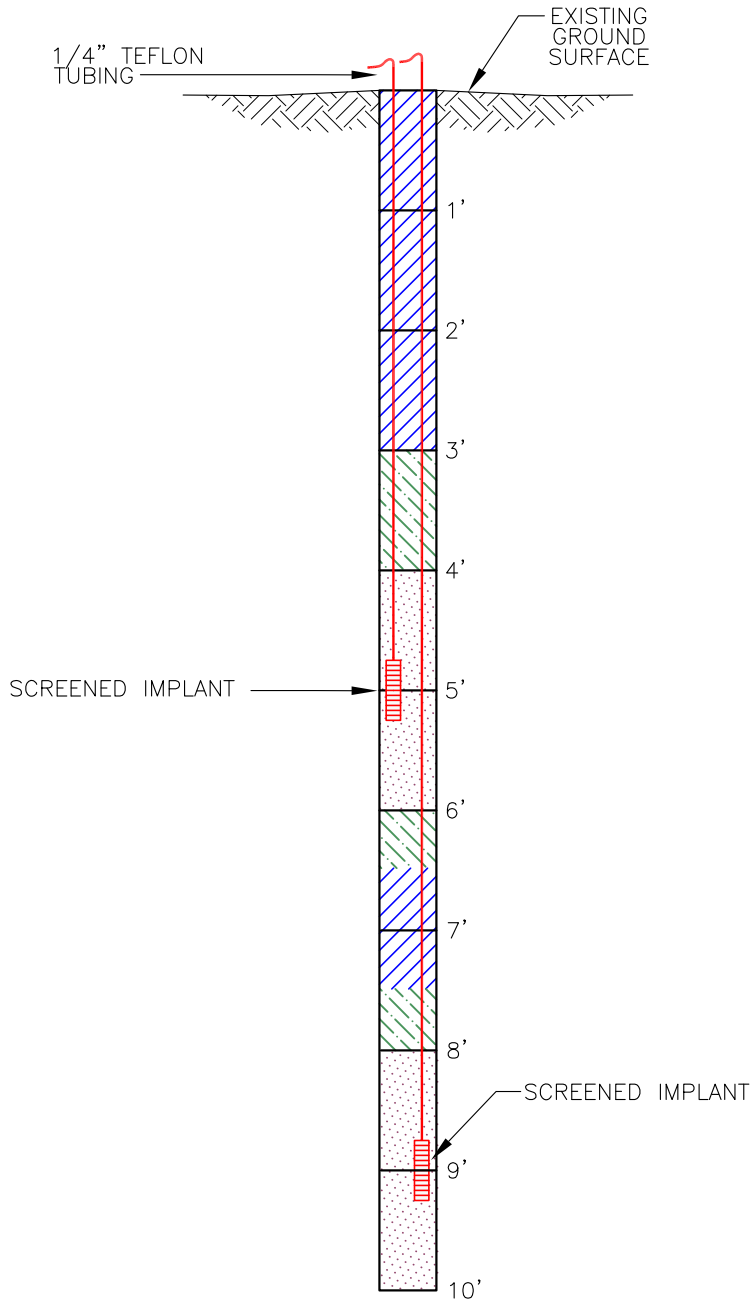

HYDRATED BENTONITE SLURRY

DRY GRANULAR BENTONITE

10/20 SILICA SAND

NOT TO SCALE

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TYPICAL SOIL GAS POINT

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

FIGURE

3

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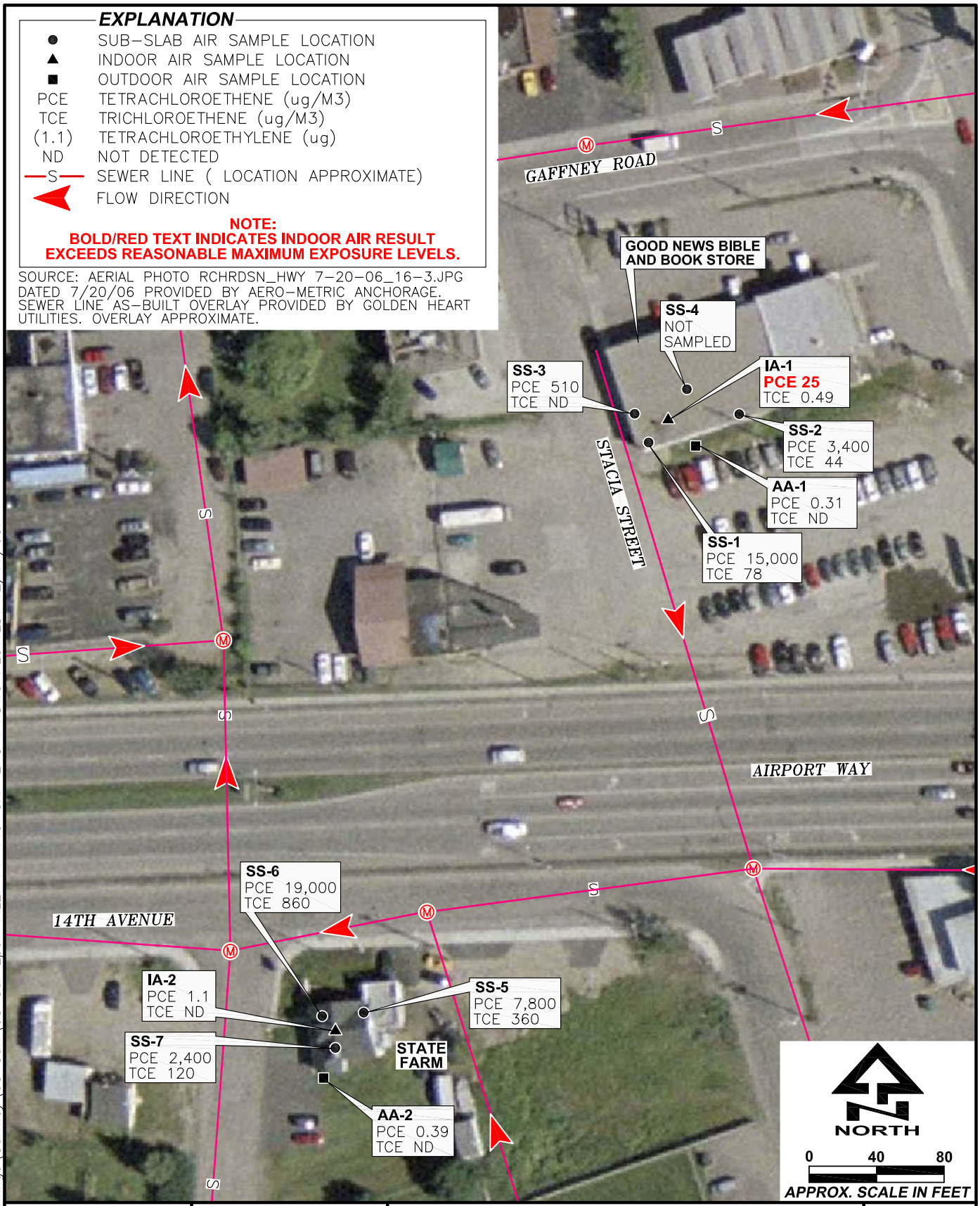

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AIR SAMPLE LOCATIONS AND ANALYTICAL RESULTS

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION
AND LONG-TERM MONITORING
Fairbanks, Alaska

FIGURE

4

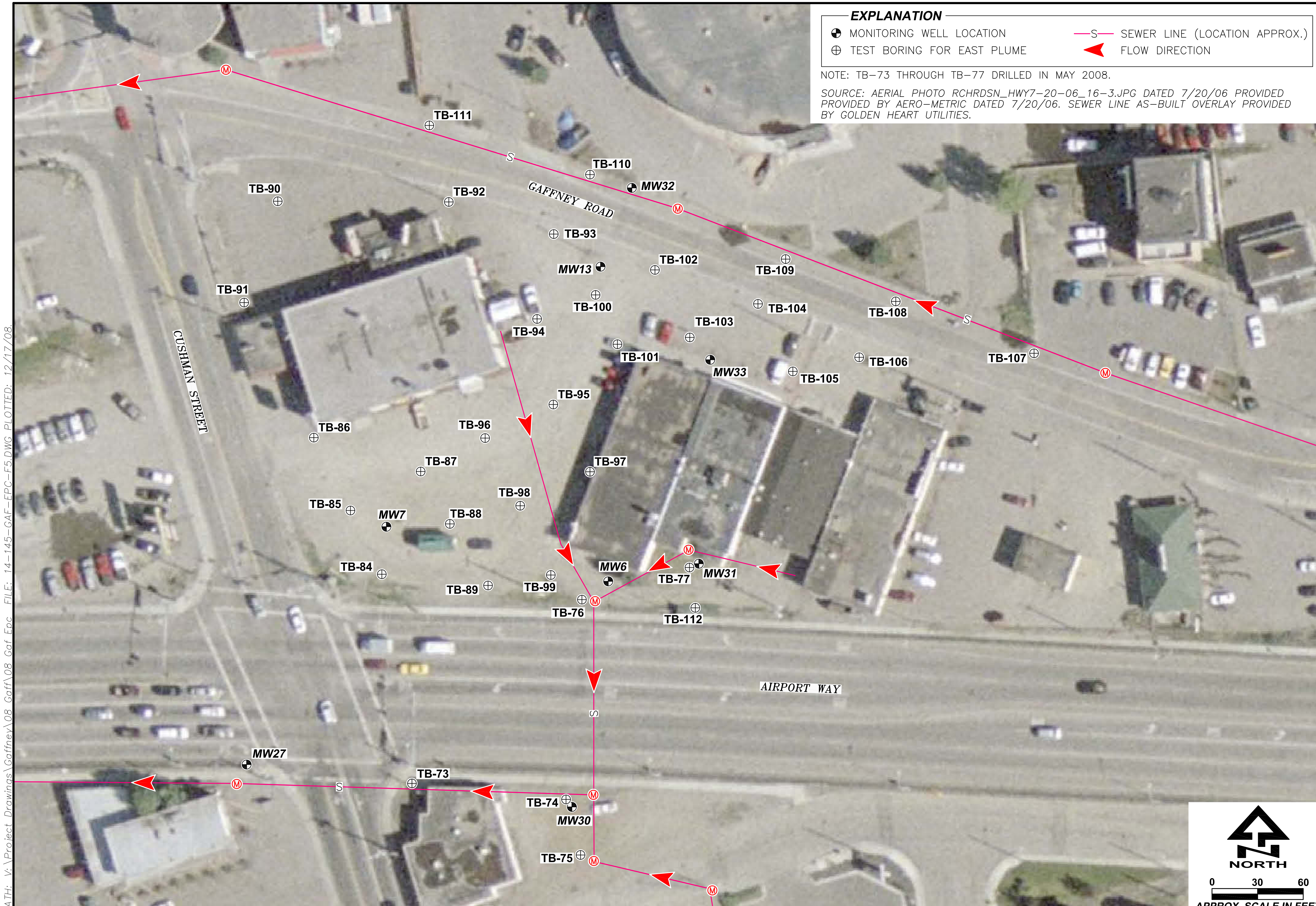

FIGURE 5

TEST BORING LOCATIONS

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

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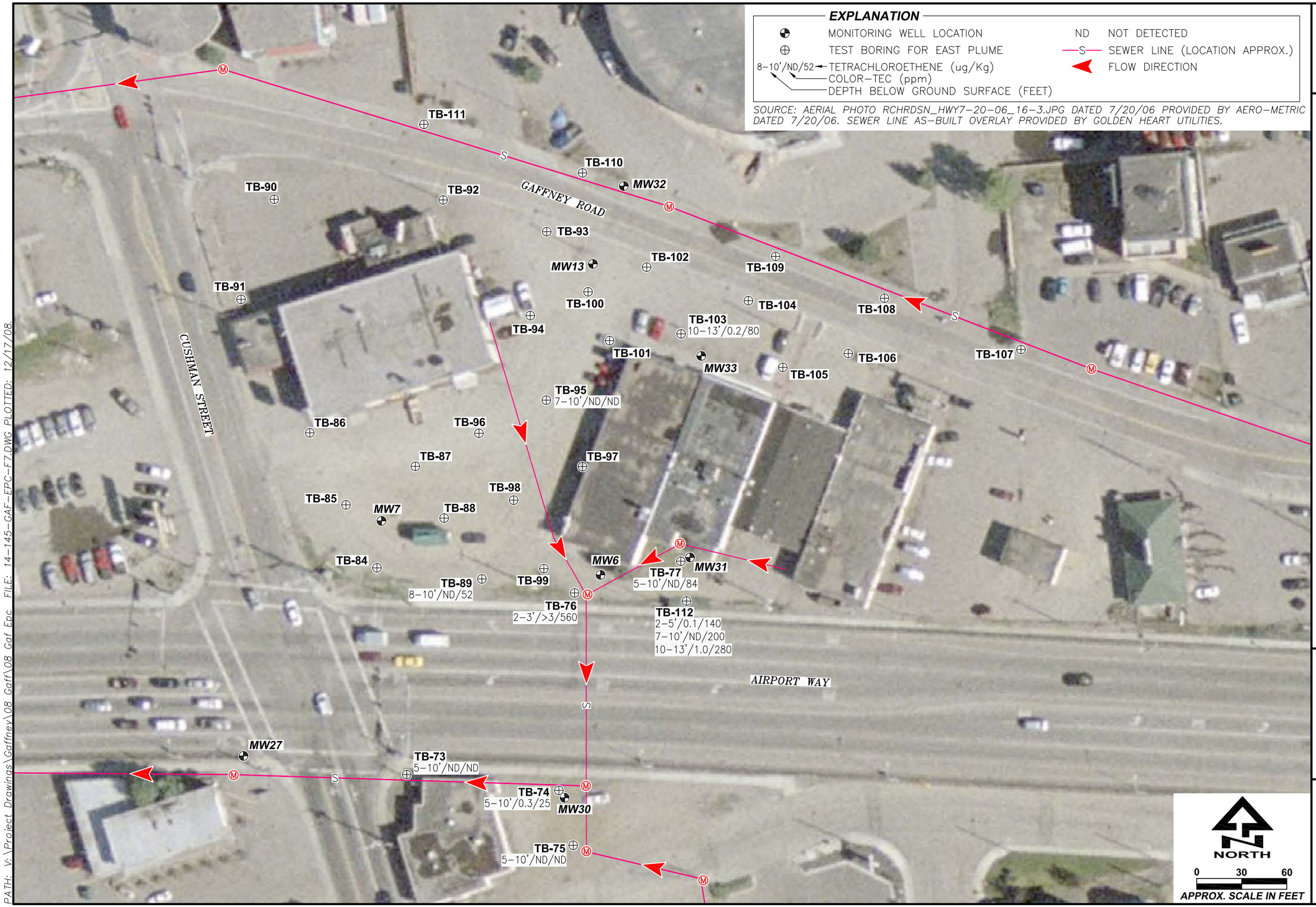

FIGURE 7

SOIL SAMPLE ANALYTICAL RESULTS

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

DATE: DEC. 2008
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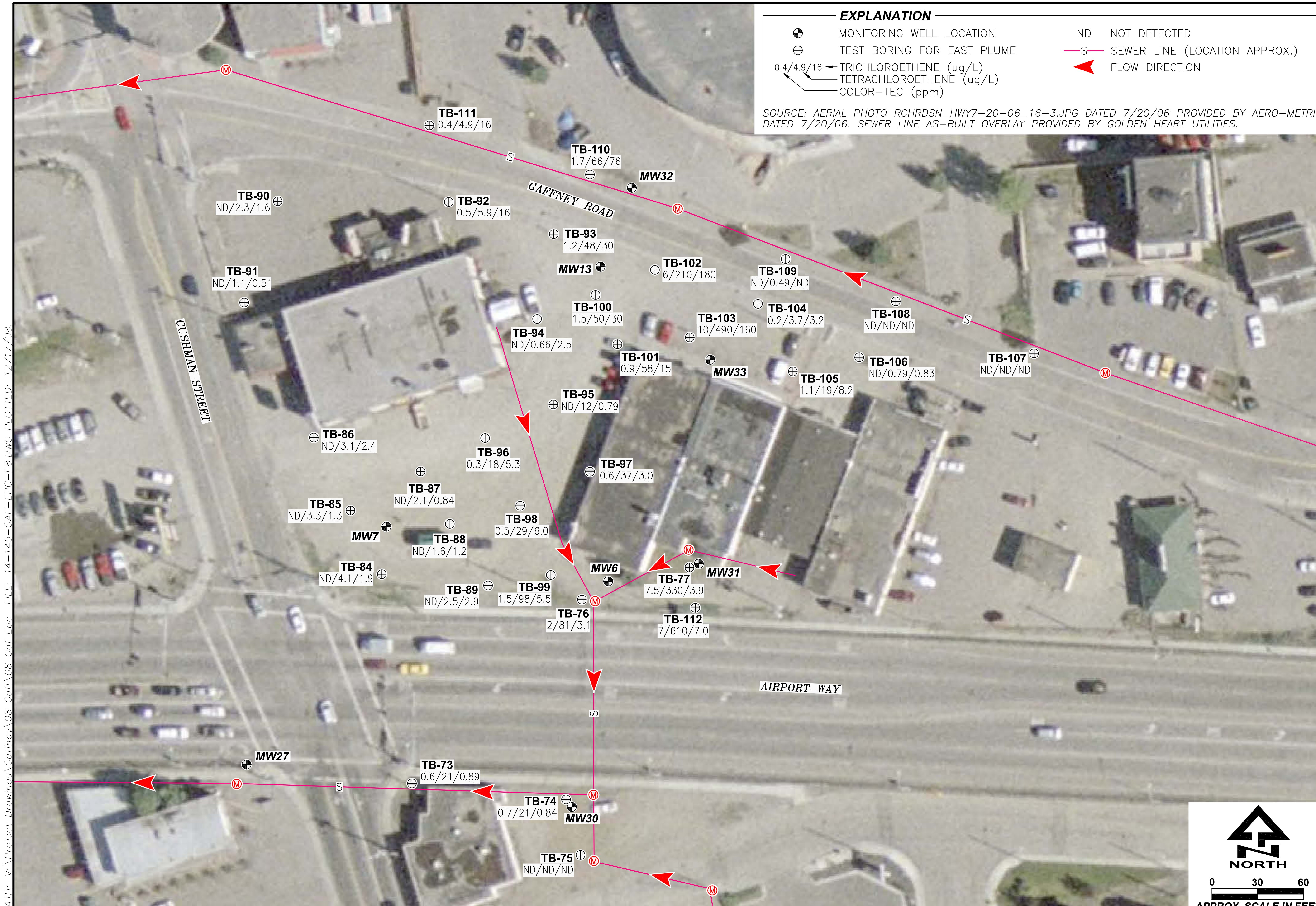

FIGURE 8

GROUNDWATER SAMPLE ANALYTICAL RESULTS FOR SHALLOW INTERVAL (15-18 FEET)

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

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FIGURE 9

GROUNDWATER SAMPLE ANALYTICAL RESULTS FOR SECOND INTERVAL (25-28 FEET)

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG–TERM MONITORING
Fairbanks, Alaska

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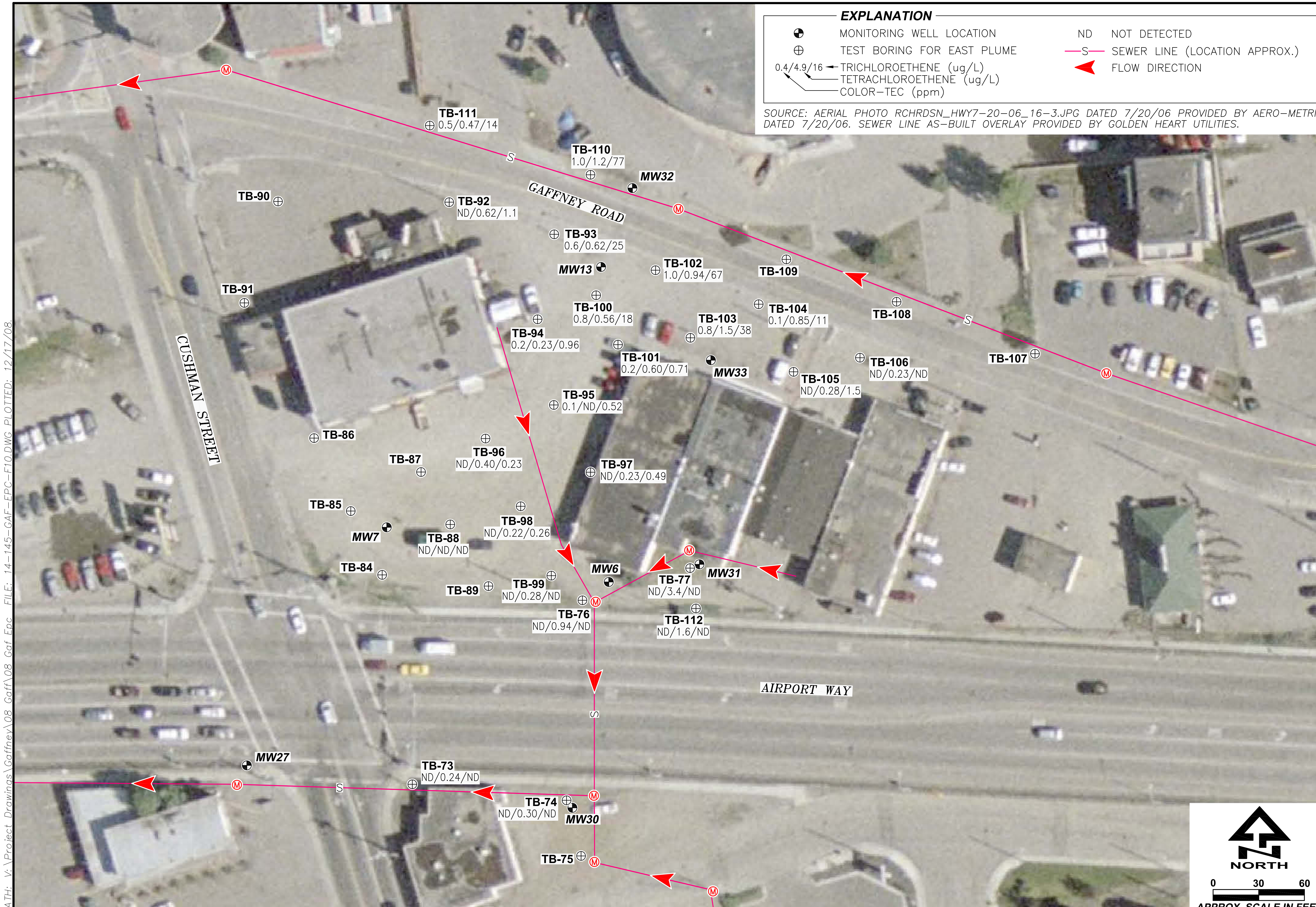

PATH: V:\Project Drawings\Gaffney\08 Gaff\08 Gaf Epc FILE: 14-145-GAF-EPC-F10.DWG PLOTTED: 12/17/08

FIGURE 10

GROUNDWATER SAMPLE ANALYTICAL RESULTS FOR THIRD INTERVAL (35-38 FEET)

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

DATE: DEC. 2008
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FIGURE 11

GROUNDWATER ELEVATIONS AND CONTOURS

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

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SOURCE: SCANNED IMAGES FROM AERO-METRIC ANCHORAGE.

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1959 PHOTOGRAPH

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

FIGURE

12

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1970 PHOTOGRAPH

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

FIGURE

13

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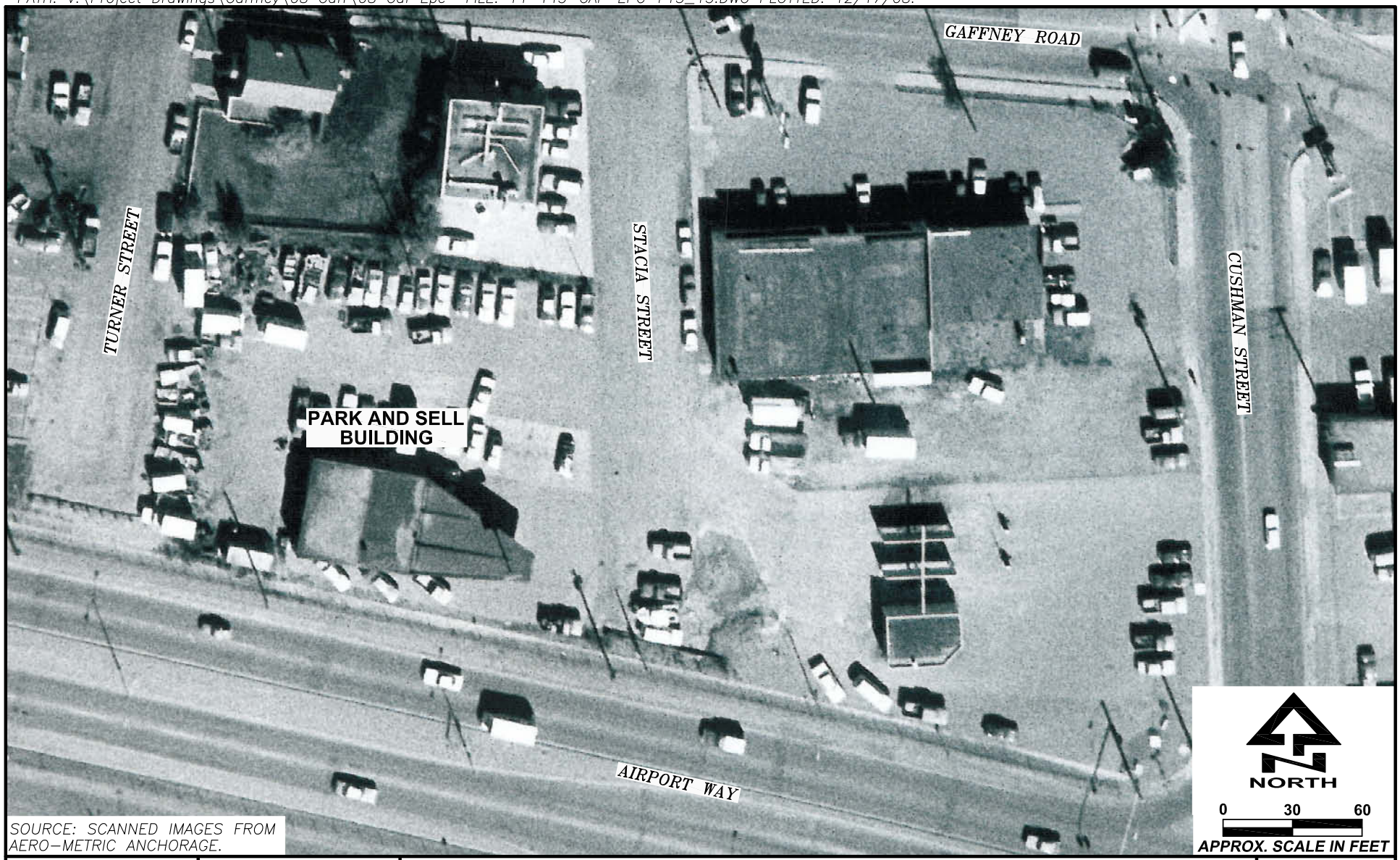

SOURCE: SCANNED IMAGES FROM AERO-METRIC ANCHORAGE.

oasis ENVIRONMENTAL

DATE: DEC. 2008
CHKD: J.R.C.
DRAWN: C.E.H.
PROJ. No.: 14-145

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1979 PHOTOGRAPH

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

FIGURE

14

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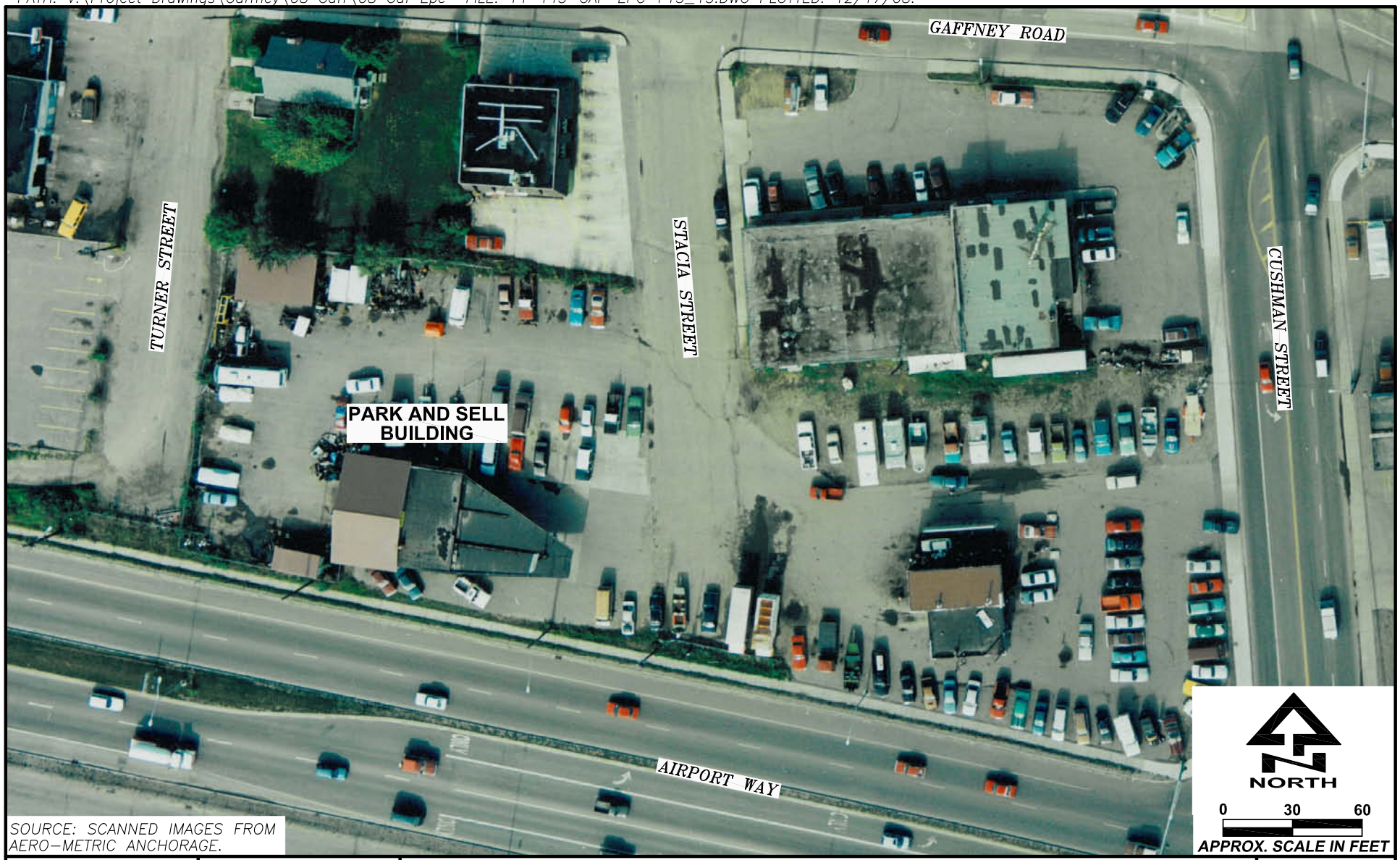

SOURCE: SCANNED IMAGES FROM AERO-METRIC ANCHORAGE.

oasis ENVIRONMENTAL

DATE: DEC. 2008
CHKD: J.R.C.
DRAWN: C.E.H.
PROJ. No.: 14-145

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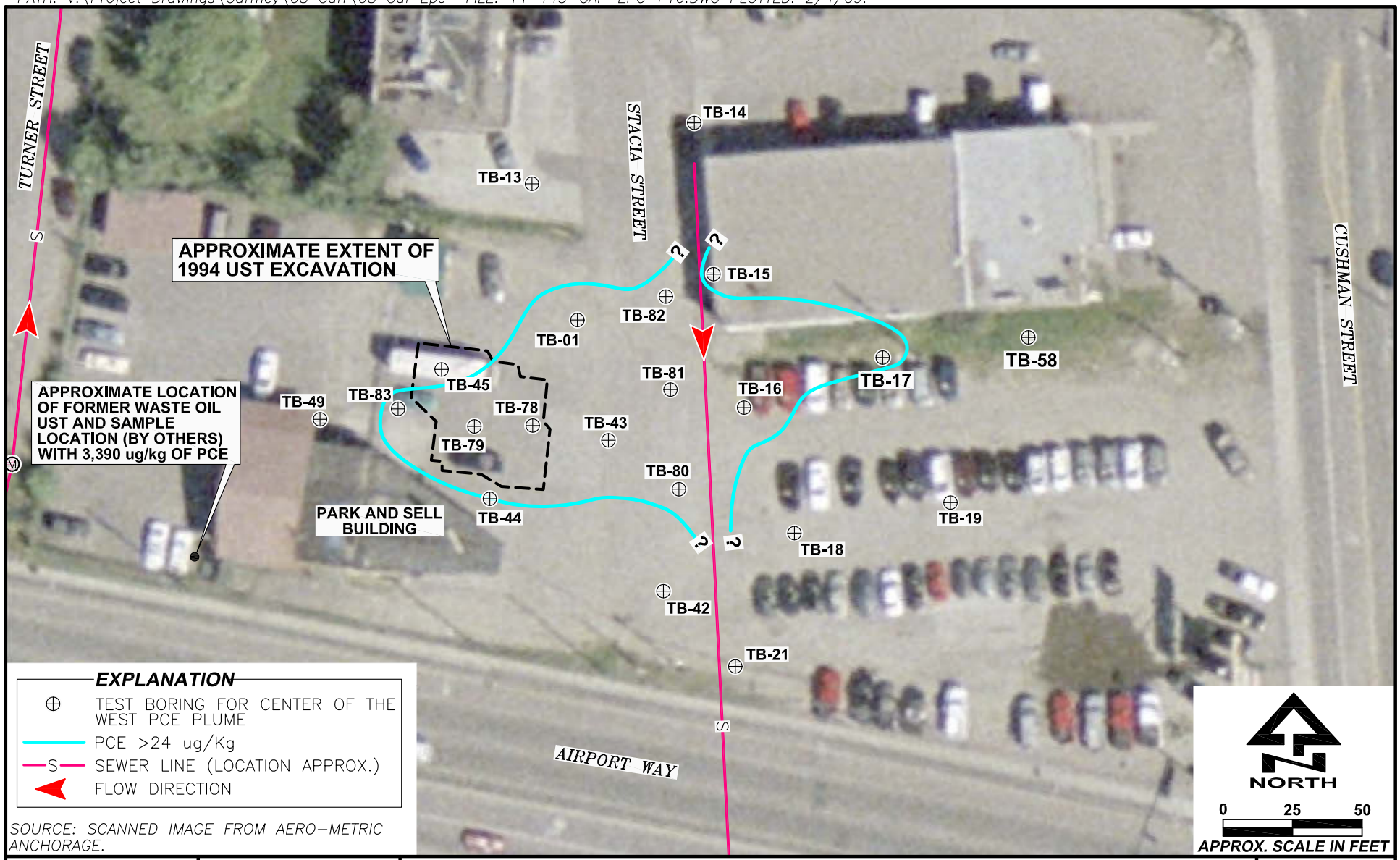
1990 PHOTOGRAPH

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

FIGURE

15

PATH: V:\Project Drawings\Gaffney\08 Gaff\08 Gaf Epc FILE: 14-145-GAF-EPC-F16.DWG PLOTTED: 2/4/09.



SOURCE: SCANNED IMAGE FROM AERO-METRIC ANCHORAGE.

oasis ENVIRONMENTAL

DATE: FEB. 2009
CHKD: B.J.M.
DRAWN: C.E.H.
PROJ. No.: 14-145

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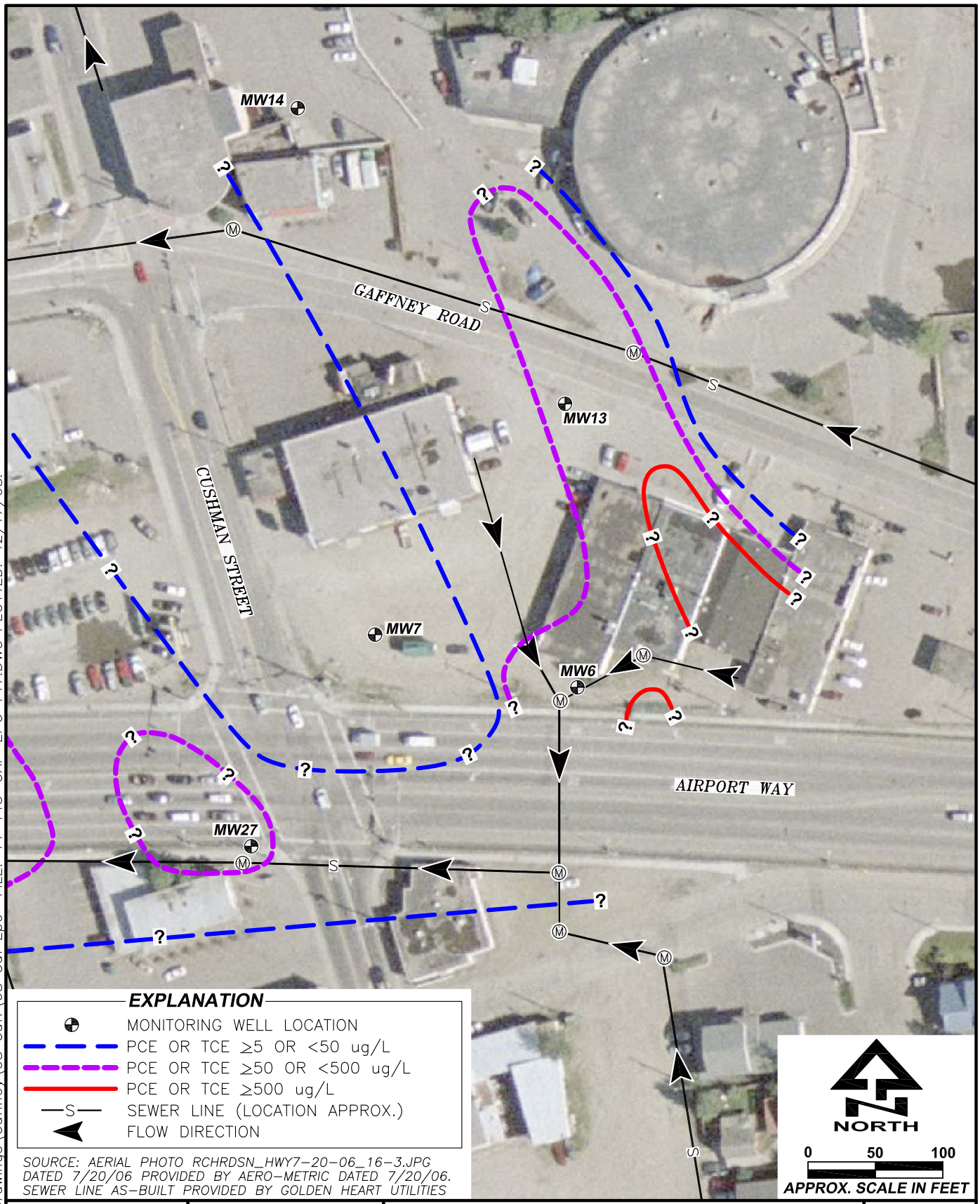
CONCEPTUAL MODEL OF VADOSE ZONE CONTAMINATION AT PARK AND SELL

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

FIGURE

16



SOURCE: AERIAL PHOTO RCHRDSN_HWY7-20-06_16-3.JPG DATED 7/20/06 PROVIDED BY AERO-METRIC DATED 7/20/06. SEWER LINE AS-BUILT PROVIDED BY GOLDEN HEART UTILITIES

PATH: V:\Project Drawings\Gaffney\08 Gaff\08 Gaf Epc FILE: 14-145-GAF-EPC-F17.DWG PLOTTED: 12/17/08.

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DATE: DEC. 2008
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DRAWN: C.E.H.
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CONCEPTUAL MODEL OF GROUNDWATER CONTAMINATION IN THE EAST PLUME

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

FIGURE

17

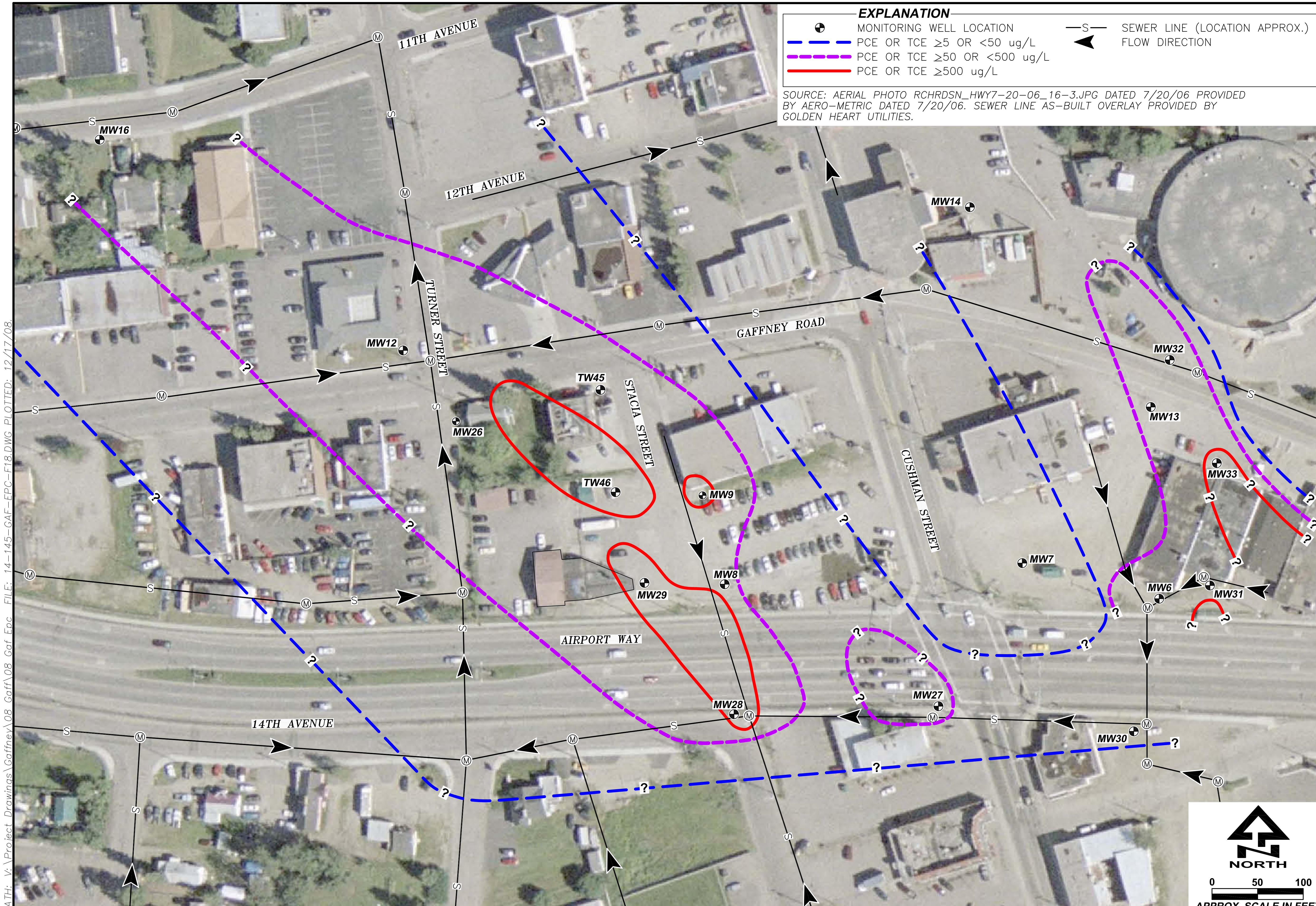

FIGURE 18

CONCEPTUAL MODEL OF GROUNDWATER CONTAMINATION FOR THE GAFFNEY ROAD AREA

GAFFNEY ROAD AREA
ADDITIONAL SITE CHARACTERIZATION AND LONG-TERM MONITORING
Fairbanks, Alaska

DATE: DEC. 2008
CHKD: J.R.C.
DRAWN: C.E.H.
PROJ. No.: 14-145

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APPENDIX A

Field Notes

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APPENDIX B

Photographs

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APPENDIX C

Boring Logs

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APPENDIX D

Building Surveys

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APPENDIX E

Laboratory Analytical Reports

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APPENDIX F

Chain of Title Report

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APPENDIX G

Quality Assurance Review

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