MAD RIVER BIOLOGISTS
412 Second Street, Suite 201, Eureka, California 95501
Voice: 707/4424302 • Fax: 707/442-4043 • www.madriverbio.com

September 21, 2010

To: Bob Merrill
California Coastal Commission
North Coast District Office
710 E Street, Suite 200
Eureka, CA 95501

Re: Summary of biological and wetland studies completed to date for the Samoa Town Master Plan

Mr. Bob Merrill,

During 2003 and 2004, Mad River Biologists (MRB) conducted a biological resource study for inclusion in the Draft EIR and FEIR and to serve as the basis of eventual ESHA determination per the Coastal Act. Our goal was to identify biological communities and biological constraints that would shape the proposed zoning and eventual project plan. This letter is intended to provide a brief summary of the standards and methods employed to document possible ESHAs in the "Samoa Town Master Plan Biological Resource Study December 2004". The report serves as the basis for the biological resource information presented in chapters 2.04 and 4.04 of the environmental impact report prepared by Planwest Partners, Inc. for the STMP, and is included as an appendix to that document which remains on file with the County of Humboldt.

Habitat Mapping and Wetland Delineation Studies

Habitat mapping and wetland delineation work was performed by MRB biologists Stephanie Morrissette and Jessica Stauffer. Field mapping was done between June of 2003 and February of 2004. Wetland delineations were conducted in June and July of 2003, with follow-up visits in January and February of 2004 to collect winter hydrology data.

Habitats were mapped in the field using orthorectified aerial photographs of the plan site overlain with 1-foot topographic contour lines. Field maps were digitized using a "heads-up" digitizing procedure in ArcView for presentation purposes. Delineated wetlands were compared with survey data provided by Kelly-O'hern Associates to obtain reference points and accurate area calculations for the water treatment facility and dune hollow wetlands occurring within the plan area.

The discussion of natural communities is based on classifications described by the Department of Fish and Game, California Natural Diversity Database (CDFG 2002). Vegetation types associated with these communities follow a system created by Sawyer and Keeler-Wolf (1995) that relies on units called series, which are based on floristic dominance and assessed by cover. Wetland systems are classified according to the USFWS classification system as outlined in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). Associated vegetation series are included within the description of each wetland type when applicable.

All wetlands occurring within the plan area were identified by their presumed state and/or federal jurisdiction. Wetlands were delineated using procedures outlined in the U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual (Environmental Laboratory 1987). Soil pits were dug to assess site conditions for the presence of wetlands. In areas where initial pit data suggested a wetland determination, transects running perpendicular to the major drainage pattern were created. Soil pits were typically dug along these transects within wetland, upland and transition zones. Observation points were established where soil pits could not be dug due to the presence of an artificial substrate. At each soil pit and observation point, hydrology, vegetation, and substrate were examined, and data was recorded on site report forms. All field data and a detailed wetland delineation map showing the location of all soil pits is provided in the biological report.

Designation of Environmentally Sensitive Habitat Areas

Several habitats within the plan area are recognized as sensitive by various resource agencies. Under Section 30107.5 of the Coastal Act, the California Coastal Commission defines an "Environmentally Sensitive Habitat Area", or EHSA as "any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments." Section 30240 of the Coastal Act in part states that ESHAs shall be protected against significant disruption and limits development design adjacent to such areas to prevent impacts that would significantly degrade ESHA sites. In addition, CDFG recognizes "sensitive natural community" types within the plan area that are rare and worthy of consideration due to highly limited distribution, regardless of presence or absence of rare, threatened, or endangered status species.

Sensitive habitat status can therefore be the result of rarity of a community type, value of a community's role in the ecosystem, threats to limited habitats caused by disturbance or degradation from human activities or developments, or protection by state or federal agencies for resources such as wetlands or rare plants. Additionally, community types composed of invasive, exotic species (such as the yellow bush lupine and European beachgrass series) may be considered sensitive habitats in part due to their inclusion within larger, sensitive community types such as coastal scrub and foredunes (Sawyer and Keeler-Wolf 1995).

ESHA status determinations were based on several factors, including: type of substrate (native substrate vs. fill material), species composition (ratio of native to exotic species), relative quality of habitat for native species and functional value, proximity to other sensitive habitats and/or existing development, and historical land use practices. Under the discussion of each community type presented, the rationale for why a given habitat may or may not be considered an ESHA by regulating agencies is provided.

Proposed setbacks from ESHA are presented in chapter 4.04 of the STMP EIR. In accordance with Section 3.30.B.1 and 3.30.B.6 of the Humboldt Bay Area Plan, minimum 100-foot setbacks have been established from all presumed state and federal jurisdictional wetlands identified within the plan area, except as otherwise specified in the biological report for certain "man-induced" wetland types and one relic dune hollow located on the old log deck. Reduced setbacks were proposed by Misha Schwartz of Winzler and Kelly upon review of the biological and wetland study and subsequent site visits to the plan area. The Coastal Commission staff report further details the process by which ESHA setbacks will be determined. All habitats mapped for the plan area, including those considered ESHA, are presented in the biological report.

Determining Occurrence or Potential Occurrence of Special Status Taxa

The plan area was assessed by MRB biologists Stephanie Morrissette and Ron LeValley for habitats capable of supporting special status plant and animal taxa with known occurrence or distribution in the project region. The project region was defined as the Eureka 7.5 minute USGS quadrangle and eight adjacent coastal quadrangles. The California Natural Diversity Data Base (CNDDB) and the California Native Plant Society's (CNPS) *Inventory of rare and endangered vascular plants of California* were queried for the project region in May of 2003, and again in March of 2004. A list of regionally occurring special status plants and animals was compiled for the plan area based on the results of the data base queries, review of pertinent literature, and informal consultation with public agencies and other knowledgeable individuals. This list, including information on each species' range, habitat requirements, and its known or potential occurrence in the plan area is included as Attachment C of the full biological report.

Floristic surveys were conducted for all special-status vascular plants listed in Attachment C for which suitable habitat was determined to be present at the plan area and where development is proposed. Botanical surveys were conducted between May 13th and August 1st of 2003 for all plant species expected to be in bloom during that period. Additional botanical surveys were conducted on March 12th, 19th and April 9 of 2004 for early blooming species that may have been missed during the 2003 survey effort. A Native Species Field Survey Form was filled out for each rare plant occurrence found at the plan site. All data forms remain on file with the County of Humboldt.

Formal wildlife surveys were not conducted for this study but all incidental wildlife sightings observed during field visits to the plan area were recorded. Wildlife use of the site was assessed based on the observed and described habitats at the site. The locations of sensitive flora and fauna found within the plan area are depicted in the biological report. A compiled species list for the plan site is included as Attachment E. The identification of plant species is based on the taxonomic treatment presented in The Jepson Manual (Hickman, 1993).

Additional rare plant surveys were completed by MRB between March and July of 2009 in the vicinity of the proposed Coastal Access and Visitor Use Area west of highway 255. The surveys were performed to update the resource study conducted in 2003/2004 for the STMP. All rare plant occurrences and Environmentally Sensitive Habitat Areas were mapped and later digitized using GIS in order to update existing information. The results of these surveys were documented by MRB in a report submitted to the Samoa Pacific Group and Planwest Partners, Inc. titled "Botanical Survey for Samoa Town Master Plan Coastal Access and Visitor Use Area August 26, 2009".

If you have any questions with regard to the biological studies completed thus far, do not hesitate to call.

Sincerely,

Stephanie Morrissette

Stephanie Morrissette
Mad River Biologists

REFERENCES

California Native Plant Society (CNPS). 2009. *Electronic Inventory of Rare and Endangered Vascular Plants of California.* Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. CNPS. Sacramento, CA.

Department of Fish and Game Natural Diversity Data Base. Database query for the Eureka, Arcata North, Tyee City, Arcata South, Trinidad, Crannell, Fields Landing, Fortuna, Cannibal Island, and Ferndale 7.5 min. USGS quadrangles, May 2003, March 2004, and March 2009.

CNPS. 2001. *Inventory of rare and endangered plants of California* (sixth edition). Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, CA . x + 388pp.

Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. *Classification of wetlands and deepwater habitats of the United States.* Performed for the office of Biological Services, U.S. Fish and Wildlife Service, U.S. Department of the Interior, Washington, D.C. 20240. FWS/OBS-79-/31.

Environmental Laboratory. 1987. *Corps of Engineers wetlands delineation* manual, Technical Report Y-87-1. Department of the Army Waterways Experiment Station, Corps of Engineers, Vicksburg, Miss.

Hickman, J. C., Ed. 1993. *The Jepson manual: higher plants of California.* University of California Press, Berkeley, CA.

Humboldt County. 1989 (revised 1995). Humboldt County General Plan, Volume II: Humboldt Bay Area Plan of the Humboldt County Local Coastal Program. Eureka, CA.

Mad River Biologists. December 2004. Samoa Town Master Plan biological resource study. Prepared for County of Humboldt Community Development Services Department and Samoa Pacific Group.

Mad River Biologists. August 26, 2009. Botanical survey for Samoa Town Master Plan Coastal Access and Visitor Use Area. Prepared for Samoa Pacific Group and Planwest Partners.

Planwest Partners, Inc. 2007. Samoa Town Master Plan Final Master Environmental Impact Report. State Clearinghouse #2003052054. Prepared for Humboldt County Community Development Services.

Sawyer, J. and T. Keeler-Wolf. 1995. *A manual of California vegetation.* California Native Plant Society, Sacramento, CA.

EXHIBIT A

COMPILATION OF
ENVIRONMENTAL DOCUMENTS
FROM THE TOWN OF SAMOA

TABLE OF CONTENTS

Environmental Consultants
and Contractors

3843 Brickway Boulevard
Suite 208
Santa Rosa, CA 95403-8226

707 546-9461
FAX 707 544-5769
www.scsengineers.com

SCS ENGINEERS

Feasibility Study/Corrective Action Plan

Former Lorenzo's Shell Station
1 Cutten Street
Samoa, California
LOP #12800

File Number 01203415.01

Prepared by:

SCS Engineers
3843 Brickway Boulevard, Suite 208
Santa Rosa, California 95403

Prepared for:

Mr. Robert Stone
Humboldt County Department of Health and Human Services
Division of Environmental Health
100 H Street, Suite 100
Eureka, California 95501

February 19, 2008

LIMITATIONS/DISCLAIMER

This Feasibility Study/Corrective Action Plan (FS/CAP) has been prepared specifically for the Samoa Pacific Group, LLC, to address the need for Site remediation at 1 Cutten Street, Samoa, California. This FS/CAP has been prepared in accordance with the care and skill generally exercised by reputable professionals, under similar circumstances, in this or similar localities. No other warranty, expressed or implied, is made as to the professional opinions presented herein. Third parties use of this report at their own risk.

Access to the Site and the surrounding area is limited by buildings, roadways, underground and above-ground utilities, and other miscellaneous Site features. Therefore, the proposed field exploration and points of subsurface observation are somewhat restricted.

Changes in Site use and conditions may occur due to manmade changes or variations in rainfall, temperature, water usage, or other factors. Additional information which was not available to the consultant at the time this report was prepared or changes which may occur on the Site or in the surrounding area may result in modification to the Site that would impact this FS/CAP and the scope of work proposed. This FS/CAP is not a legal opinion.

We trust this report provides the information you require at this time and we appreciate the opportunity to work with you on this project. If you require any additional information, or have any questions, please do not hesitate to contact SCS at (707) 546-9461.

Mark Erickson
Senior Project Engineer

2/19/08
Date

Barbara Moed

Barbara Moed, PG 7529
CA registration fees paid through 07/31/09

2/19/08
Date

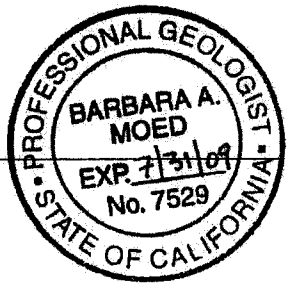


TABLE OF CONTENTS

LIST OF ATTACHMENTS

Figures

Tables

LIST OF ACRONYMS AND ABBREVIATIONS

AS	Analytical Sciences
ASTs	aboveground storage tanks
AQMD	Air Quality Management District
BTEX	benzene, toluene, ethylbenzene, xylenes
bgs	below ground surface
COC	Constituents of Concern
DPE	Dual Phase Extraction
ESL	Environmental Screening Levels
FS/CAP	Feasibility Study/Corrective Action Plan
Five Oxys	Five oxygenates o diisopropyl ether (DIPE) o ethyl tertiary butyl ether (ETBE) o tert-amyl methyl ether (TAME) o methyl tert-butyl ether (MTBE) o tert-butyl alcohol (TBA)
HCDEH	Humboldt County Department of Health and Human Services – Division of Environmental Health
MDL	method detection limit
mg/kg	milligrams per kilogram
MNA	Monitored Natural Attenuation
MNR	Monitored Natural Remediation
msl	mean sea level
NCRWQCB	North Coast Regional Water Quality Control Board
ND	non-detect
PNEG	Pacific Northwest EnviroNet Group, Inc
RWQCB	Regional Water Quality Control Board (California)
SNARL	Suggested No Adverse Response Limit
SPG	Samoa Pacific Group
SVE	Soil Vapor Extraction
TOC	Top of Casing
TPH-g	Total petroleum hydrocarbons in the gasoline range
µg/L	micrograms per liter
UST	underground storage tank
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 INTRODUCTION

SCS Engineers (SCS) is pleased to present this FS/CAP on behalf of the Samoa Pacific Group, LLC (SPG) for 1 Cutten Street, in Samoa, California (the "Site"). The FS/CAP has been prepared in response to a regulatory directive from the Humboldt County Division of Environmental Health (HCDEH, 2006a) to evaluate remedial alternatives for petroleum hydrocarbon compounds in the soil and groundwater at the Site. The Site is located in Section 16, T5N, R1W of the Eureka 7.5 minute quadrangle. The Site location is illustrated on Figure 1. General Site features are illustrated on Figure 2.

1.1 PURPOSE

This FS/CAP discusses onsite constituents of concern (COCs), remedial alternatives to address these impacts, and a comparison of alternatives to determine the most cost-effective, implementable, and applicable approach for Site remediation. This document was developed using the guidelines presented in Section 2725, Article 11, Chapter 16, Division 3, Title 23 of the California Code of Regulations (CCR).

1.2 CORRECTIVE ACTION SCOPE

The corrective action for the Site includes the following phases:

1) Preliminary Site Assessment
2) Groundwater Investigation
3) Remedial Actions

Preliminary Site Assessment and Groundwater Investigation have been completed to obtain adequate information to characterize the petroleum hydrocarbon compounds underlying the Site, and to assess Site remedial alternatives (W&K, 2004, 2005; PNEG, 2003, SCS, 2006a). Previous site assessment and groundwater investigations are summarized in the following sections of this report and have been performed under authorization of the HCDEH.

2.0 BACKGROUND

The Site is part of the unincorporated community of Samoa on the Samoa Peninsula of Humboldt and Arcata Bays at an approximate elevation of 20 feet above mean sea level (msl). The town of Samoa has historically been a privately owned logging town. The Site is located in a mixed industrial/commercial/residential area. The Site is currently used for storage and as an office for property maintenance by the owner. The Site was reportedly a service station beginning in the 1920s (W&K 2004). The service station building, pump islands, and canopies are still present at the Site. Historical information (W&K, 2004) indicates that the underground storage tanks (USTs) were removed from the Site in 1986. The USTs were replaced with aboveground storage tanks (ASTs) in a concrete secondary containment structure west of the station building (Figure 2). The near surface piping to the pump island from the former AST location remains in place onsite. Available information regarding tank removal at the Site was obtained from records at the HCDEH and documented in a previous report (SCS, 2006a).

2.1 SITE INVESTIGATIONS

Seven borings (B-5 through B-11; Figure 2) were drilled and sampled in October and November 2000 (PNEG, 2003). Soil and groundwater analyses (Table 1) revealed petroleum hydrocarbon impacts (total petroleum hydrocarbons as gasoline [TPH-g] and associated constituents), in borings B-5 and B-6 in the general vicinity of the former UST locations (Figure 3). Based on the investigation results, the HCDEH required additional investigation (HCDEH, 2003). A workplan and addendum were prepared and submitted to the HCDEH in 2004 (SCS, 2004a, 2004b). The approved Work Plan was implemented by Winzler and Kelley (W&K, 2004). Seven borings (B-12 through B-18) and four monitoring wells (MW-1 through MW-4) were drilled and sampled in May 2004 (Figure 2). The analytical results (Table 2) from this investigation indicated that soil impacts were generally limited to the area of the former USTs (Figure 3). Groundwater analyses identified hydrocarbons impacts to groundwater in B-14, B-15, B-16, B-17 and B-18 (Table 3) and MW-1 and MW-2 (Table 5). HCDEH requested additional investigation to identify the lateral and vertical extent of petroleum hydrocarbons in groundwater at the Site (HCDEH, 2004). A Work Plan was prepared and submitted to the HCDEH in June 2005 (SCS, 2005). Four additional wells (MW-05 through MW-08) were installed and incorporated into the monitoring program in February 2006 (SCS, 2006). The Site investigations performed to date appear to have assessed the vertical and lateral extent of soil and groundwater impact beneath the Site.

2.2 GROUNDWATER MONITORING

A quarterly groundwater monitoring program was implemented at the Site in March 2004 (W&K, 2004). Groundwater monitoring data for wells MW-1 through MW-8 are presented in Tables 4 and 5. Cumulative monitoring data indicate an easterly direction of groundwater flow at the Site with gradients ranging from 0.002 to 0.19 feet/foot (Table 4).

Project monitoring wells MW-1 and MW-03 through MW-08 were placed on an annual sampling program with regulatory concurrence (HCDEH, 2006b). These wells are sampled during the 1st quarter. Groundwater samples collected from Site monitoring wells are analyzed for:

- TPH-g by EPA Method 5030/8015M,
- Volatile organic compounds (VOCs) by EPA Method 8021
    - benzene, toluene, ethyl benzene and xylenes (BTEX)
    - five fuel oxygenates:
        - methyl tert butyl ether (MTBE)
        - di-isopropyl ether (DIPE)
        - ethyl tert butyl ether (ETBE)
        - tert amyl methyl ether (TAME)
        - tert butyl alcohol (TBA).

2.3 INVESTIGATION AND MONITORING RESULTS

Residual soil impacts are limited to the general vicinity of the former tank hold. Soil analyses detected total petroleum hydrocarbons as gasoline (TPH-g) at concentrations ranging from 1,100 milligrams per kilogram (mg/kg) in B-6 to 100 mg/kg in MW-1 near Cutten Street (Figure 3). The residual soil impacts in the vicinity of the former tank hold remain as a source of impact to groundwater at the Site. Analytical results confirm that groundwater impacts are limited to the vicinity of MW-2 in the northern portion of the Site (Figure 4).

3.0 SITE CONCEPTUAL MODEL

The Samoa Peninsula forms the northwestern boundary of Humboldt and Arcata Bays with the Pacific Ocean on the western side of the Peninsula. The topography of the Site and vicinity follows a gentle easterly to southeasterly slope towards Humboldt Bay and varies from rolling stable dune lands in the central portion of the town to near level former industrial land on the east. Surface water generally drains easterly toward the Bay through a network of low lying drainages controlled by the storm drain system to Humboldt Bay.

3.1 GEOLOGY AND HYDROGEOLOGY

The Site lies within the Coast Range geomorphic province of Northern California, a region characterized by subparallel north to northwest-oriented mountain ranges and intermontane alluvial valleys. The Jurassic-Cretaceous (145-65 my) age rocks of the Franciscan Complex form the basement of the region and consists dominantly of sedimentary (chert, shale and greywacke) rocks in the Humboldt Bay area with subordinate volcanic (basalt), metamorphic (greenstone, serpentine, blueschist) rock (Jenkins& Strand, 1962; Cardwell, 1965; Durham, 1979). Quaternary marine and terrigenous deposits of the Hookton and Wildcat formations crop out along the margins of the Bay and Eureka Plain (Evenson, 1959) and unconformably overlay the Franciscan Complex rocks. The surface of the Site and vicinity consist of Quaternary (<1 my) beach and dune sand deposits.

Groundwater in the Site vicinity generally occurs in a shallow unconfined aquifer between depths of approximately 2.5 to 7.5 feet bgs. Site borings have generally encountered imported fill from the ground surface to approximately 2.5 feet bgs underlain by poorly graded, sub-angular to rounded, medium grained sand with occasional minor silt to a depth of 15 feet bgs (maximum explored depth) at the Site. The sediments encountered in investigation borings are consistent with dune sand deposits identified in previous regional mapping efforts (Evenson, 1959; Kilbourne and others, 1980; Wagner and Saucedo, 1987) conducted by the California Geological Survey (formerly California Division of Mines and Geology).

3.2 CONSTITUENTS OF CONCERN

COCs identified in soil and groundwater underlying the Site are TPH-g and the VOCs BTEX. The California Regional Water Quality Control Board San Francisco Bay Region (RWQCB) *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater* (RWQCB, 2005) guidelines for Environmental Screening Levels (ESLs) are used to evaluate each of the identified COCs. Comparing Site impacts with ESLs provides regulatory compliance targets. Maximum concentrations of Site COCs found in 2000 and 2004 are compared with soil

ESLs. Maximum detected concentrations in monitoring wells from the first quarter 2007 are compared with groundwater ESLs based on potential use as a drinking water source. Cocnetrations exceeding the ESLs are shown in bold in the following Risk Evaluation Tables. The identified COCs at the Site (petroleum products and related compounds) are biodegradable in the environment and the ESLs may be overly conservative for use as target cleanup levels. Risk evaluation of COCs discovered in the Site's soil and groundwater are included in the following tables.

Soil Risk Evaluation Table

COC	Concentration (mg/kg)[2]	ESL[1] (mg/kg)	Media	Location/Depth	Sampling Date	Assessment Conclusion
TPH-g	**1,100**	100	Soil	SSTN-B-6-8.5'	2000	**>ESL**
	720	100	Soil	B-14-9.0'	05/13/04	**>ESL**
	200	100	Soil	B-16-10.0'	05/13/04	**>ESL**
	100	100	Soil	MW-1-5.0'	05/12/04	**>ESL**
Benzene	<0.5	0.044	Soil	SSTN-B-6-8.5'	2000	<ESL
	<0.5	0.044	Soil	B-14-9.0	05/13/04	<ESL
	<0.5	0.044	Soil	B-16-10.0'	05/13/04	<ESL
Toluene	**20**	2.9	Soil	SSTN-B-6-8.5'	2000	**>ESL**
	<24	2.9	Soil	B-14-9.0'	05/13/04	<ESL
	<4.0	2.9	Soil	B-16-10.0'	05/13/04	<ESL
Ethylbenzene	**23**	3.3	Soil	SSTN-B-6-8.5'	2000	**>ESL**
	<1.5	3.3	Soil	B-14-9.0'	05/13/04	<ESL
	2.0	3.3	Soil	B-16-10.0'	05/13/04	<ESL
Xylenes	**266**	2.3	Soil	SSTN-B-6-8.5'	2000	**>ESL**
	<4.0	2.3	Soil	B-14-9.0'	05/13/04	<ESL
	16.4	2.3	Soil	B-16-10.0'	05/13/04	**>ESL**

Notes:

1. Environmental Screening Level for groundwater as a current or potential drinking water source, as put forth in the RWQCB's, *Screening For Environmental Concerns At Sites With Contaminated Soil and Groundwater,* Table A- Environmental Screening Level (ESLs), Shallow Soils (<3m bgs), Groundwater IS Current or Potential Source of Drinking Water, Interim Final – February 2005.
2. mg/kg = milligrams/kilogram.

Referring to the above table, the Site exhibits the greatest TPH-g impact at depths of 8.5 to 10 feet bgs as found in exploratory borings MW-1, SSTN-B-6, B-14, and B-16 equal or exceed the ESL of 100 mg/kg (Above Table, Figure 3). BTEX constituents were also detected above the ESLs in boring SSTN-B-6 at 8.5 feet bgs, with the exception of benzene. Boring B-16 was limited to xylenes being detected above the ESL of 2.3 mg/kg. Corrective action efforts to remediate residual soil impacts will therefore be localized to the general area shown on in Figure 6.

Groundwater Risk Evaluation Table

COC	Concentration (µg/L[2])	ESL[1] (µg/L)	Media	Location	Sampling Date	Assessment Conclusion
TPH-g	**24,000**	100	Water	MW-2	3/22/07	**>ESL**
Benzene[3]	<5.0	1.0	Water	MW-2	3/22/07	<ESL
Toluene	**970**	40	Water	MW-2	3/22/07	**>ESL**
Ethylbenzene	**1,600**	30	Water	MW-2	3/22/07	**>ESL**
Xylenes	**9,100**	20	Water	MW-2	3/22/07	**>ESL**
MTBE[4]	<25	5	Water	MW-2	3/22/07	<ESL
TPH-g	**4,300**	100	Water	MW-6	3/22/07	**>ESL**
Benzene	0.94	1.0	Water	MW-6	3/22/07	<ESL
Toluene	**49**	40	Water	MW-6	3/22/07	**>ESL**
Ethylbenzene	**410**	30	Water	MW-6	3/22/07	**>ESL**
Xylenes	**1,200**	20	Water	MW-6	3/22/07	**>ESL**
MTBE	<2.5	5	Water	MW-6	3/22/07	<ESL
TPH-g	**270**	100	Water	MW-7	3/22/07	**>ESL**
Benzene	<0.5	1.0	Water	MW-7	3/22/07	<ESL
Toluene	<0.5	40	Water	MW-7	3/22/07	<ESL
Ethylbenzene	<0.5	30	Water	MW-7	3/22/07	<ESL
Xylenes	<1.5	20	Water	MW-7	3/22/07	<ESL
MTBE	<2.5	5	Water	MW-7	3/22/07	<ESL

Notes:

1. Environmental Screening Level for groundwater as a current or potential drinking water source, as put forth in the RWQCB's, *Screening For Environmental Concerns At Sites With Contaminated Soil and Groundwater,* Table A- Environmental Screening Level (ESLs), Shallow Soils (<3m bgs), Groundwater IS a Current or Potential Source of Drinking Water, Interim Final – February 2005.
2. µg/L = micrograms per liter.
3. Laboratory MDLs for benzene have been variable dependent upon matrix interference from elevated concentrations of TPHg resulting in and MDL above the water quality objective.
4. Laboratory MDLs for MTBE and other fuel oxygenates have been variable dependent upon matrix interference from elevated concentrations of TPHg resulting in and MDL above the water quality objective.

The ESL for TPH-g is the United States Environmental Protection Agency (USEPA) Suggested No Adverse Response Limit (SNARL) for drinking water sources. Currently identified TPH-g impacts in wells MW-2, MW-6 and MW-7 exceed the ESL of 100 µg/L. Analyses of groundwater from MW-1 detected TPH-g at 100 µg/L in May 2004 (Table 5); however, TPH-g and benzene concentrations have since remained below laboratory method detection limit (MDL) in that well. In general, VOCs exceed ESLs in wells MW-2 and MW-6. VOCs are generally at or below water quality objectives in all other monitoring wells. Fuel oxygenates (MTBE, ETBE, TAME, DIPE, and TBA) have not been detected above the laboratory MDL in groundwater samples collected at the Site. COC impacts appear to be limited to the vicinity of MW-2, MW-6 and the former USTs (Figures 3 and 4) extending partially underneath Cutten Street to the north. Remedial efforts will thus be focused in the vicinity of these wells.

3.3 SENSITIVE RECEPTORS

A sensitive receptor survey was conducted by SCS in February 2006 to locate buried utilities and other subsurface structures, surface water bodies, and domestic and municipal supply wells within 1,000 feet of the Site. The nearest surface water bodies to the Site are the Pacific Ocean approximately 1,600 feet to the west and Humboldt Bay approximately 1,300 feet east of the Site. Buried utilities in the Site vicinity include a water main, sanitary sewer line and storm sewer. Electrical and telephone service to the Site is from overhead lines. Representatives of SPG estimated that the water line was buried approximately 36 to 40 inches bgs and the sanitary sewer is located approximately 5 to 8 feet bgs. Burial depth of the storm sewer is unknown but is likely to be similar to the sanitary sewer. Native sand at the Site provides an excellent bedding material for buried utility lines and therefore it is likely the bedding material has a similar hydraulic conductivity to undisturbed native materials and will likely not represent a preferential flow pathway (W&K, 2004). No basements beneath structures, or domestic or municipal water supply wells were identified within the search radius.

COCs at the Site are generally limited to the vicinity of the former USTs and MW-2, have not migrated significantly based on cumulative monitoring data, and are not expected to impact nearby surface waters. Wells MW-3, MW-5, MW-7 and MW-08 delineate the approximate boundary of the groundwater plume. Please note that residual TPH-g soil concentrations in MW-1 (Figure 3) found in May 2004 are likely to be degraded to the extent that it is expected to presently be below the ESL. The identified COCs are localized within this perimeter well boundary and, based on the monitoring data accumulated to date; contaminants have not migrated beyond the perimeter wells.

4.0 FEASIBILITY STUDY

Introduction

This feasibility study presents evaluations for several corrective action alternatives for the COCs present in Site groundwater. Each alternative will be evaluated for cost-effectiveness, and SCS shall propose to implement the most cost-effective corrective action for the Site. The chosen alternative will be proposed if it adequately protects human health, safety, and the environment; and restores or protects current and potential beneficial uses of water. Six remedial alternatives for the Site are presented below.

4.1 REMEDIAL ALTERNATIVE EVALUATION

Alternative 1 - No Action

This alternative will require no further action for the subject Site and leaves the impacted area untreated and undisturbed allowing natural degradation processes to occur without monitoring. Implementing this alternative will include an evaluation of the trends of COCs, preparation of a soil and groundwater management plan, land use deed restrictions, and affiliated regulatory correspondence. This alternative, to attain regulatory closure, would evaluate the present Site concentrations as adequate protection of human health and the environment under current conditions, but would not meet water quality objectives discussed in Section 4.2 in the near future. All eight monitoring wells would be decommissioned following appropriate regulatory guidelines, protocol, and permits.

Alternative 2 –Monitored Natural Remediation (MNR)

This alternative includes continued Site monitoring with addition of geochemical indicators of MNR for the Site. MNR (AKA intrinsic bioremediation, natural attenuation) is predicated on the understanding that COCs in the subsurface will biodegrade, without additional enhancement, from the presence and action of indigenous microbes. The demonstration of intrinsic bioremediation requires the evaluation of several lines of evidence. This includes demonstration of declines of contaminant concentrations and evidence of biological activity resulting in remedial action. Typical parameters monitored are (but not limited to) dissolved oxygen, oxidation-reduction potential, pH, conductivity, temperature, alkalinity, total organic carbon and the presence of electron donor/acceptors (e.g., sulfate, nitrate, ferrous iron, methane). This method requires knowledge of groundwater conditions upgradient, within the plume, and downgradient from the impacted area. Data obtained from geochemical indicators, general parameters, and any necessary sampling recommendations would also be analyzed to determine the trends of onsite wells. This alternative would require regular sampling events, associated laboratory analytical costs, quarterly reporting requirements, and management oversight. This option would be re-evaluated if perimeter wells indicate migration or other plume instability. Under this alternative, Site closure would be attained once the applicable cleanup levels discussed in Section 4.2 are demonstrated as achievable by this alternative.

Alternative 3 – Excavation

This alternative includes excavation of the accessible impacted soils at the Site. Under this alternative an excavation would be performed to expedite cleanup of the subject Site. A removal action will expedite the attainment of water quality goals by removing the suspected ongoing source of residual COCs in Site soils. Once impacted soil is removed, groundwater impacts will likely be reduced by natural degradation processes. Under this option, general parameters, selected analytes, and natural attenuation parameter sampling would be conducted for a limited time to document COC reduction. Shoring of excavation area and groundwater extraction would likely be required. Storage, sampling, and disposal of extracted groundwater would also be required. Dependent upon requirements of the receiving facility, pre-treatment of extracted groundwater may be required prior to disposal. Excavation activities would be conducted during the annual low stand of groundwater in order to minimize the amount of groundwater removed from the excavation. The final cost estimate for this alternative considers the cost for excavation and hauling of the residual impacted soil, associated sampling activities, post-remedial monitoring, and reporting requirements. Additional expenditure would be required if transportation, treatment and/or disposal of groundwater removed from the excavation is necessary. This option would also require partial to complete demolition of the existing structure, and possibly extend within the Cutten Street right-of-way, requiring restoration of the street.

Alternative 4 – Oxidation and Injection

Chemical oxidation maximizes in-situ performance using a solid alkaline oxidant that employs a sodium percarbonate complex with a catalyst. The product is delivered as two parts (oxidizer and activator) that are combined, mixed with water, and injected into the subsurface as a slurry using direct-push equipment. Once in the subsurface, the combined product produces an

effective surface-mediated oxidation reaction without the violent exothermic reaction found when using Fenton's Reagent. This oxidation method provides rapid destruction of a wide range of contaminants in both soil and groundwater under ideal conditions and most cases will require multiple rounds (minimum of three) of injections to maintain adequate COC degradation. This cleanup strategy would be expected to reduce onsite COC concerns to regulatory acceptable levels but will likely require multiple injections and significant post analysis of groundwater analytical results for both onsite COCs and natural attenuation parameters (see Alternative 2 above) in order to evaluate the success of this remedial strategy.

Please note that injection of chemical oxidant compounds will likely require issuance of Waste Discharge Requirements from the North Coast Regional Water Quality Control Board (NCRWQCB).

Alternative 5 – Air/Ozone Sparging

Air sparging injects air under pressure through unsaturated soil into the groundwater. Air sparging removes petroleum hydrocarbons by stripping volatile contaminants in soil and groundwater and stimulating microorganisms to increase the rate of biodegradation. Air sparging techniques may be modified by injecting sufficient air into the groundwater to enhance the natural biodegradation processes, but at a rate sufficiently low that no stripping occurs (biosparging/bioventing). Air sparging often increases the concentration of COCs in soil vapor and may require soil vapor extraction to reduce the potential for vapor intrusion into overlying structures and to assure that volatilized COCs do not accumulate beneath the ground surface's uppermost layers.

Ozone Sparging removes organic contaminants through a combination of stripping and chemical oxidation of the volatile hydrocarbons. Ozone sparging is the injection of ozone (an oxidizer) mixed with ambient air that is introduced into the impacted aquifer via a micro-porous diffuser similar to that used in air sparging. The micro-fine bubbles enhance the contact between the oxidizing agent (ozone) and the contaminant thereby stripping the pollutant from solution and increasing the efficiency and the speed of the remediation. Oxygen, a by-product of this methodology, further enhances the bioremediation of contaminants in the subsurface.

The COCs at the Site are concentrated beneath structures and impermeable surfaces (e.g. concrete, asphaltic concrete, slab on grade foundations). This increases the potential for introduction of stripped gases into overlying structures; although, they are somewhat limited by the impermeable surfaces. This alternative may require additional technology such as vapor extraction to control stripped gas migration with subsequent treatment of vented gases. Costs associated with this method may be relatively high owing to the presence of overlying structures, impermeable surfaces, and the potential need for collection and treatment of stripped gases.

Alternative 6 – Dual Phase Extraction

Dual phase extraction (DPE) removes various combinations of impacted groundwater, separate phase petroleum products, and hydrocarbon vapors from the subsurface and treats them on-site by combining soil vapor extraction and groundwater/product recovery technologies. This technique is most effective with volatile constituents such as gasoline, benzene or

perchlorethylene. COC reduction is accomplished by using existing or newly installed groundwater wells. Wells are connected to the treatment system via one or more pumps, dependent upon system size. The technique treats impacted soils and groundwater and may also be used for plume migration control by gradually depressing groundwater levels in extraction points thereby containing/controlling the groundwater plume while entraining extracted free product (if present). The extracted separate phase product and groundwater are collected and treated prior to disposal, or in the case of treated groundwater, re-injected to the subsurface, if acceptable. Soil vapor is entrained as part of the extraction process and treated by a thermal oxidizer prior to atmospheric discharge. An added benefit to DPE is the stimulation of subsurface aerobic biodegradation of petroleum hydrocarbons by increasing the supply of oxygen to the subsurface if air sparging points are installed. Dual phase systems are effective in removing separate phase petroleum products, thereby reducing contaminant concentrations in both the saturated and unsaturated zones even in low permeability sediments.

4.2 APPLICABLE REMEDIAL GOALS

4.2.1 Remedial Goals

- Minimize the potential for human contact with soil and groundwater containing residual COCs. This phase has been generally accomplished as the impacted area of the Site is capped with either asphalt or concrete. Some contact hazard may remain during repair or replacement of buried utility and/or during future construction activities;

- Reduce or eliminate the migration of contaminants from soil and/or groundwater to nearby sensitive receptors to the extent feasible; and,

- Protection of water quality and associated numerical objectives to the extent feasible.

4.2.2 Remedial Objectives

Remedial objectives for soil and groundwater, affected or threatened by the unauthorized release, are adopted from the RWQCB's, "*Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater*", Interim Final, dated February 2005. Since the subject Site is located in an area where groundwater is considered a current or potential drinking water resource, SCS recommends the "target" remedial levels below for long-term corrective actions to protect potential uses of groundwater. These recommended target levels will require approval by the HCDEH to determine their applicability to the Site.

Environmental screening levels, as put forth in the above-referenced RWQCB Guidance have been suggested as the target remedial objectives for the Site. These values have been chosen to:

- expedite the concurrence of the regulatory agency;

- establish and assure that site remedial numerical objectives have been attained;

- protection of current and potential beneficial uses of water; and,

- minimize human health and ecological risks.

The ESLs for all petroleum hydrocarbon compounds found historically in Site groundwater are included in the following table.

Target Remedial Numerical Objectives Table

COC	ESL	Basis
TPH-g	100 µg/L	EPA SNARL for Drinking Water
Benzene	1 µg/L	Primary Drinking Water MCL
Toluene	40 µg/L	Nuisance- Taste & Odor Threshold
Ethylbenzene	30 µg/L	Nuisance- Taste & Odor Threshold
Xylenes	13 µg/L	Aquatic Life- Freshwater PRG

4.3 COST ANALYSIS, TIME FRAME, AND COMPARATIVE ANALYSIS

4.3.1 Cost Analysis

The cost analysis and estimated completion time frame of selected alternatives is included below as the Remedial Alternative Cost Summary Table. The table summarizes each remedial alternative, the activities required for each alternative, the duration for their completion and their associated cost estimate. Please note that costs included in the table are order of magnitude costs that should be used only for general evaluation of the different remedial alternatives.

Remedial Alternative Cost Summary Table

Alternative	Associated Activities	Duration	Estimated Cost*
1. No Action	▪ Evaluate well trends, and conduct risk-based closure (if required); ▪ Prepare soil and groundwater management plan; ▪ Prepare impermeable surface maintenance plan; ▪ Prepare land use deed restrictions.	9 months	$75,000
2. Monitored Natural Attenuation	▪ Execute monitoring and sampling plan; ▪ Evaluate natural attenuation; ▪ Regulatory reporting.	3-5 years	$90,000 – 150,000: $30,000/year for monitoring & final valuation; request for closure report.
3. Excavation	▪ Remove overlying structures, paving; ▪ Excavate impacted soil; ▪ Treat and dispose of soil; ▪ Treat and dispose of extracted groundwater; ▪ Monitoring/sampling plan; ▪ Permitting requirements; ▪ Site restoration.	1 month for removal activities; 1 year monitoring evaluation period	$250,000 to $400,000 Includes: Building removal and Site restoration; soil removal, treatment, sampling, disposal; groundwater treatment and disposal; and 1 year of post remedial groundwater monitoring.
4. Oxidation and Injection	▪ Install primary injection points; ▪ Install subsequent injection points; ▪ Permitting requirements; ▪ Monitoring/sampling plan; and, ▪ Regulatory reporting.	Estimated: 3-5 years (Dependent on COC destruction)	$250,000 Includes permitting, 3 rounds of injections into impacted areas (40 injections per round), and 1 year of sampling and reporting.
5. Ozone Sparging	▪ Install sparge points; ▪ Install off gas treatment; ▪ Permitting requirements; ▪ Monitoring/sampling plan; ▪ Regulatory reporting.	Estimated: 2-5 years (Dependent on COC destruction)	$200,000-300,000: Includes permitting, Sparge point installation; Portable Ozone trailer rental 2-5 years of sampling and reporting.
6. Dual Phase Extraction	▪ Mobilize and install DPE unit; ▪ Install off gas treatment; ▪ Permitting requirements; ▪ Monitoring/Sampling Plan; ▪ Regulatory reporting.	Estimated: 2 years total; (45 days for removal action; post remedial monitoring)	$150,000-200,000 Includes permitting; 45 days of Portable DPE trailer rental, water disposal, well pumps and O&M; and 1-2 years of post remedial sampling and reporting.

***Note: Alternatives do not include costs for well decommissioning.**

4.3.2 Comparison of the Remedial Action Alternatives

A comparative analysis of effectiveness and implementability for each alternative is included in the following tables.

Remedial Alternative	Effectiveness				
	Protection of Public Health & the Environment	Regulatory Compliance	Long Term Effectiveness	Reduce Toxicity	Short Term Effectiveness
1- No Action	Possibly	Possibly	High	Yes	Low
2- MNR	Yes	Yes	High	Yes	Low
3 - Excavation	Yes	Yes	High	Yes	Moderate
4 - Oxidation and Injection	Yes	Yes	High	Yes	High
5 – Air/Ozone Sparging	Yes	Yes	High	Yes	High
6 DPE	Yes	Yes	High	Yes	High

Remedial Alternative	Implementability			
	Technical Feasibility	Administrative Feasibility	Regulatory Acceptance	Community Acceptance
1 – No Action	Yes	Yes	Yes	Likely (with regulatory acceptance)
2 – MNR	Yes	Yes	Yes	Yes
3 – Excavation	Yes	No	Yes	Yes
4 – Oxidation and Injection	Yes	Yes	Yes	Yes
5 – Air/Ozone Sparging	Yes	Yes	Yes	Yes
6 – DPE	Yes	Yes	Yes	Yes

Effectiveness
Alternative 1 (*No Action*) provides no additional active protection to the environment. This alternative relies on natural (unmonitored) processes to reduce toxicity, and maintenance of the existing impermeable surfaces to reduce the potential of human and environmental contact with COCs.

Alternative 2 (*MNR*) provides no additional active protection to the environment. This alternative involves monitoring for and evaluation of geochemical parameters indicative of natural degradation processes. COCs are degraded via microbial action and abiotic reactions without enhancement.

Alternative 3 (*Excavation*) involves soil excavation and groundwater removal with associated disposal of extracted materials. This alternative may require treatment of removed materials prior to acceptance at the receiving facilities. Excavating impacted soil will remove most of the source of groundwater impact and limit future impacts to groundwater. This alternative will provide protection to public health and the environment.

Alternative 4 (*Oxidation Injection*) involves injection of solid oxidants in an effort to remediate both soil and groundwater. Multiple treatments may be required to enhance effectiveness as oxidants are depleted. This alternative will provide protection to public health and the environment.

Alternative 5 (*Air/Ozone Sparging*) involves injection of ozone into the subsurface in an effort to remediate both soil and groundwater. Multiple treatments may be required to enhance effectiveness as oxidants are depleted. This alternative will provide protection to public health and the environment.

Alternative 6 (*Dual Phase Extraction*) removes various combinations of impacted groundwater, separate phase petroleum products, and hydrocarbon vapors from the subsurface and treats them on-site by combining soil vapor extraction and groundwater/product recovery technologies. This alternative will provide protection to public health and the environment. DPE is a feasible remediation strategy because of the sandy sediments at the Site. Treated groundwater discharge may be costly pending evaluation of existing sanitary sewer facilities and/or permitting issues for storm drain disposal in the Site vicinity.

Implementability
All of the chosen alternatives are fully implementable using current technology. Restraints on implementation of alternatives 1 and 3 are discussed below.

Alternative 1 *No Action* requires preparation of a Soil and Groundwater Management Plan should excavation or other disturbance to the area of known impact be necessary. This alternative also requires a surface maintenance plan for existing impermeable surfaces (concrete flooring within structures and asphaltic concrete paving), and appropriate land use deed restrictions (commercial/industrial use).

Alternative 3 *Excavation* is technically feasible; however, implementation of this alternative would require removal of all or part of overlying structures, and potentially removal and replacement of a limited portion of Cutten Street. Alternative 3 involves use of excavation machinery and heavy equipment or trucks to move excavated soil. Proper dust control and safety measures should minimize threats to worker and public safety during remedial implementation. An additional impediment to technical feasibility is the necessary use of shoring to prevent the probability of encountering flowing sand during excavation activities.

5.0 CORRECTIVE ACTION PLAN

As discussed in Section 4.0 (above), the most cost-effective strategy for Site remediation that will meet the goals of adequate protection of human health, safety, and the environment, and protection of current and potential beneficial uses of water will be selected for the subject Site. The Remedial Alternative Cost Summary Table in Section 4.3 shows the estimated costs for the six (6) alternatives examined for the Site.

Alternative 1, the *No Action* alternative, appears potentially viable as the known impacted area is capped with impermeable materials, the plume appears stable, and COC concentrations are stable and/or declining over time. This alternative requires preparation of various administrative documents and institutional controls (e.g., deed restrictions, maintenance plans, etc.). This alternative is the least expensive of the six remedial options.

Alternative 2, the *MNR*, appears to be a potentially viable alternative based upon data collected to date at the Site. Evaluation of time versus concentration trends for COCs shows a general decrease over time with some seasonal fluctuation related to rising and falling groundwater levels. Evaluation of geochemical indicator species at the Site would be used to evaluate Site conditions to determine the dominant Terminal Electron Acceptor Processes (TEAP) in the core and margins of the plume. Monitoring at the Site would likely be required for a minimum of 2 to 5 years on a reduced schedule (e.g. semiannually) prior to consideration of regulatory case closure should this be the chosen remedy.

Alternative 3, the *Excavation* alternative with post excavation monitoring, is the most aggressive alternative for the subject Site. This alternative could achieve Site remedial goals in a shorter period of time because the removal of the accessible source (residual soil impacted area) would reduce impacts to groundwater at the Site. Excavation logistics are problematic in consideration of the accessibility of impacted soil at the Site. A portion of the impacted soil extends beneath existing structures and Cutten Street precluding the likelihood of complete source removal, thereby reducing remedial effectiveness. This alternative is expected to reduce impact to groundwater and may, when coupled with Alternative 2 (MNR), be the most successful at reducing contaminant concentrations in soil and groundwater within a reasonable time frame thereby increasing the likelihood of regulatory and public acceptance.

Alternative 4, the *Oxidation and Injection* alternative may reach remedial goals in an expedited time frame. This method is likely to require multiple injections (minimum of three) of oxidant compounds into a relatively large area. The potential for success with this methodology is considered moderate as not all impacted areas may be accessible (e.g. structure footprints) and

subsurface conditions (presence of fines) may reduce injection efficiency thereby increasing the necessary number of injection points and increasing over all cost.

Alternative 5, the *Air/Ozone Sparging* alternative may reach remedial goals within a reasonable time frame. This method will require installation of multiple sparging points and associated equipment for generation and injection of ozone into the subsurface. The presence of overlying structures and paved surfaces increase the potential trapping of stripped gases beneath impermeable surfaces. An additional concern would be the potential introduction of stripped gases into overlying and/or nearby structures. This alternative will also likely require additional technology such as vapor extraction to control stripped gas migration with subsequent treatment of vented gases. Costs associated with this method may be relatively high because of less than ideal subsurface conditions and the potential need for collection and treatment of stripped gases.

Alternative 6, *Dual Phase Extraction* may reach Site cleanup goals within a reasonable time frame by removing combinations of impacted groundwater, separate phase hydrocarbons, and hydrocarbon vapors from the subsurface and treating them onsite. Petroleum-related hydrocarbon reduction would be accomplished by connecting the existing groundwater wells to the treatment system at the Site using one or more well pumps depending on system size. Extracted groundwater would be collected, treated, and sampled prior to disposal. Soil vapor will also be entrained as part of the extraction process and DPE is most effective with volatile products such as gasoline and BTEX. Subsurface aerobic biodegradation of petroleum hydrocarbons may also be stimulated by adding air sparging points to increase the supply of oxygen to the subsurface. Extracted vapor would be treated before being discharged to the atmosphere. A DPE system would be effective but additional treatment costs may be incurred if extracted groundwater cannot be disposed directly to the existing sanitary sewer system.

5.1 RECOMMENDATIONS AND ANTICIPATED ACTIVITIES

SCS recommends Dual Phase Extraction (Alternative 6) to treat the residual source soil and impacted groundwater. Alternative 6 is expected to provide adequate protection of human health and the environment and attain water quality goals within a reasonable time frame. It is anticipated that monitoring may be required to continue evaluation of COC concentration trends to meet regulatory reporting requirements prior to the ultimate goal of regulatory closure.

SCS recommends a Pilot Study/Interim Remedial Action Plan to evaluate remedial effectiveness of DPE at the Site.

Anticipated activities for implementation:

- Prepare and submit a Pilot Study/Interim Remedial Action Plan (PS/IRAP) to HCDEH;
- Prepare Site specific health and safety plan for implementation of the PS/IRAP;
- Implementation of the Work Plan upon regulatory approval;
- Permitting activities;
- Implementation of post remedial monitoring for one year with an annual report submitted at end of monitoring period;
- Prepare and submit final report and/or closure request; and,
- Decommission monitoring wells.

6.0 REFERENCES

Department of Water Resources, 2004, North Coast Hydrologic region, Eureka Plain Basin, in California's Groundwater: DWR Bulletin 118.

Evenson, R.E., 1959, Geology and Ground-Water Features of the Eureka Area Humboldt County, California: US Geological Survey Water-Supply Paper 1470, 80 p.

HCDEH, 2003, Work Plan Directive from James W. Clark to Samoa Pacific Group, November 26.

_____, 2004, Work Plan Directive from L. Schroyer to Samoa Pacific Group, October 27.

_____, 2005a, Work Plan Directive from L. Schroyer to Samoa Pacific Group, April 27.

_____, 2005b, Work Plan Approval from R.A. Stone to Samoa Pacific Group, July 8.

_____, 2006a, Regulatory Directive from R. Stone to Samoa Pacific Group, April 25.

_____, 2006b, Regulatory Correspondence from R. Stone to Samoa Pacific Group re: Revised Sampling Program, May 3.

Kilbourne, R.T., Mualchin, L., and Saucedo, G.J., 1980, Geology for Planning: Eureka and Fields Landing 7.5-Minute Quadrangles, Humboldt County, California: California Geological Survey Open-File Report 80-9, 49p.

PNEG, 2003, Results of Soil and Groundwater Investigation for the Soccer Field, Former Service Station, and Chemical Storage Areas in the Town of Samoa, California, October 17.

RWQCB, 2005, Screening For Environmental Concerns At Sites With Contaminated Soil and Groundwater, Interim Final, February 2005.

SCS, 2004a, Work Plan for Additional Subsurface Investigation at 1 Cutten Street, Samoa, California, January 27.

____, 2004b, Addendum to the Work Plan for Additional Subsurface Investigation at 1 Cutten Street, Samoa, California, February 6.

____, 2005, Work Plan for Additional Subsurface Investigation, Lorenzo's Shell Station, 1 Cutten Street, Samoa, California, June 3.

____, 2006a, Report of Findings: Additional Subsurface Investigation and Groundwater Monitoring Report: 1st Quarter 2006, Lorenzo's Shell Station, 1 Cutten Street, Samoa, California, April 18.

____, 2006b, Groundwater Monitoring Report: 2nd Quarter 2006, Lorenzo's Shell Station, 1 Cutten Street, Samoa, California, August 1.

Strand, R.G., 1962, Geologic Map of California, Redding Sheet, 1:250,000.

USEPA, 2004, How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites.

W&K, 2004, Subsurface Investigation Report, Lorenzo's Shell Station, 1 Cutten Street, Samoa, California, dated October.

_____, 2005, Annual Quarterly Monitoring Summary – Former Lorenzo's Shell Station – 1 Cutten Street, Samoa, California, March 11.

Wagner, D.L. and Saucedo, G.J., 1987, Geologic Map of the Weed Quadrangle: California Geological Survey, Regional Geologic Map Series, Map No. 4A (Geology)

Distribution List

Mr. Sean Armstrong
Samoa Pacific Group LLC
5251 Ericson Way
Arcata, California 95521

Ms. Kasey Ashley
NCRWQCB
5550 Skylane Boulevard, Suite A
Santa Rosa, California 95403

FIGURES

TABLES

ADDITIONAL ASSESSMENT REPORT
TOWN OF SAMOA

SAMOA PENINSULA BROWNFIELDS SITE
SAMOA, HUMBOLDT COUNTY, CALIFORNIA

Prepared for:

Samoa Pacific Group, LLC.

5251 Ericson Way
Arcata, CA 95521

April 28, 2009

Prepared by:
Orrin Plocher and Stan Thiesen

of

Freshwater Environmental Services

78 Sunny Brae Center
Arcata, California 95521
Phone (707) 839-0091

PROFESSIONAL CERTIFICATION

This report has been prepared by Freshwater Environmental Services under the professional supervision of Stan Thiesen. The findings, recommendations, specifications and/or professional opinions presented in this report have been prepared in accordance with generally accepted professional hydrogeologic and environmental consulting practices, and within the scope of the project. There is no other warranty, either express or implied.

Stan Thiesen
P.G. No. 7990
Geologist
Freshwater Environmental Services

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

This report on the Additional Assessment at the Town of Samoa has been prepared by Freshwater Environmental Services (FES), on behalf of the Samoa Pacific Group, LLC. The Site location is shown on Figure 1. The California Regional Water Quality Control Board – North Coast Region (RWQCB) requested the submittal of a Workplan for the additional assessment of the Town of Samoa in a letter dated August 27, 2007 (Appendix A). A Work Plan and Addendum to the Workplan were prepared by FES and submitted on December 9, 2008 and March 4, 2009 respectively. The Workplan and Addendum to the Workplan were approved in a letter from the RWQCB dated January 12, 2009 and by telephone (Appendix A).

The goal of this investigation was to delineate the horizontal and vertical extent of impacted soils that have exceeded the screening levels for various chemical of concern and to delineate the horizontal extent of groundwater in nine separate areas of the Site

This report is organized as follows. The Site background is described in Section 2.0. The investigation methods are presented in Section 3.0. Sections 4.0 through 12.0 include discussions of each of the nine separate areas of the Site that were investigated including:

- Soccer Field (Section 4.0);
- Railroad (Section 5.0);
- Sewer System (Section 6.0);
- Unlined Burn Pit (Section 7.0);
- Lorenzo Buildings (Section 8.0);
- Rigging Shop (Section 9.0);
- Cookhouse Garages (Section 10.0);
- Soccer Field Garages (Section 11.0) and;
- Hammond Powerhouse (Section 12.0).

A discussion of previous investigations, scope of work, and soil and groundwater results will be presented for each of the nine separate areas (Section 4.0 through Section 12.0). The conclusions and recommendations are presented in Section 13.0 and the references cited in this report are listed in Section 14.0.

2.0 SITE BACKGROUND

2.1 Site Summary, Location and Ownership

The Site is located on the Samoa Peninsula and includes the Town of Samoa, Humboldt County, California (Figure 2). The Site includes residential housing, former lumber mill operations and several other facilities included within the Town of Samoa. The Site is owned by the Samoa Pacific Group, LLC.

2.2 Site Description and Historical Uses

The following discussion is based on (Winzler & Kelly, 2005 and 2007). The town of Samoa is relatively small and still has the appearance of a company lumber mill town. The town contains 98 residences, an elementary school, post office, restaurant, playground, tennis courts, soccer field, basketball courts, a former storehouse/fire station, and former gasoline station. The town is bordered on the east and south by current and former industrial lumber mill facilities. Largely undeveloped coastal dunes exist to the north and to the west.

Samoa is a former mill town dating back to 1890 and was built adjacent to lumber mill operations. Other industrial operations were also located in the proximity during the town's history. In 1892, the Samoa Land and Improvement Company bought 270 acres of land in Samoa, including waterfront land, to promote development of Samoa as a town. In 1893, Vance Redwood Company bought the property, built a sawmill, and extended railroad service to Samoa. In 1900, A.B. Hammond bought Vance Redwood Company, including the sawmill, dry kilns, and two logging camps, establishing a large sash and door factory. In 1912, Hammond Lumber Company began purchasing the town site and constructing company houses. Hammond continued to operate the mill, adding a planing mill, molding plant, sorter sheds, warehouses, shops, and steamship dockage. A ship building plant was established along the waterfront and built several ships during World War I. This plant was demolished by 1924. By then Hammond Lumber Company completed the purchase of all the houses in Samoa and managed the entire town.

In 1956, Georgia-Pacific Company bought the town of Samoa and mill from Hammond. A new plywood mill was finished by 1959. In 1973, Georgia-Pacific divested ownership of the Samoa facilities to Louisiana-Pacific, who then managed the town. In 1998, the town of Samoa, and adjacent industrial lands, were bought by Simpson Timber Company. In 2001, 65 acres, including the town of Samoa, was bought by the Samoa Pacific Group, LLC and in September of that year, they completed the purchase of an additional 150 acres of adjacent dune and industrial land.

The adjoining properties to the northeast and east (APN 401-031-55) were occupied by mill buildings and operations dating back to the turn of the century. Land to the south, portions of APN 401-031-46 and APN 401-031-59, were primarily undeveloped dune lands until portions of the land were further developed for mill use, primarily for lumber and log storage, beginning in the late 1950's.

A former mill machine shop with associated blacksmith shop dating to at least 1923 is located just east of the cookhouse restaurant, on APN's 401-031-55 and –58. A

Hammond Lumber Company refuse (teepee) burner was located southeast of the cookhouse, on APN 401-031-55. Other original Hammond mill facilities formerly located on this parcel and the adjacent APN 401-031-40 included a power plant, boiler plant, planing mill, carriage house, and various other mill buildings dating back to the turn of the century (1900). Almost all of the previous old mill buildings and facilities have since been demolished. The original Hammond mill was burned and demolished in 1966. A dock and warehouse facilities were historically located along the shoreline on APN 401-031-40. The dock and some warehouse facilities remain in use. In 1963, the Georgia-Pacific plywood mill was built on APN 401-112-13, south of Samoa, and just south of the subject parcels. Newer mill operations were also built and operated further south along APN 401-031-61, and have subsequently been removed in recent years, including the Simpson co-generation plant. Parcel APN 401-031-55 is now largely vacant.

Parcel 401-031-44 located west of Samoa is open coastal dune land adjoining the Pacific Ocean. A parking area for coastal access, a water pumping facility, and water lines of the Humboldt Bay Municipal Water District are located on this otherwise vacant parcel, as is the leach field for the western portion of the Samoa wastewater treatment facility.

2.3 Site Geology and Hydrology

Subsurface lithology generally consists of poorly sorted, subangular to subrounded, fine to medium grained sand to the maximum depth explored during this investigation, approximately 23 feet below ground level (bgl). Developmental fill was encountered at various locations throughout the Town of Samoa. Up to 15 feet of woody debris fill was encountered in the Soccer Field area during this investigation.

The depth to groundwater ranged from approximately 1.5 to 20 feet during the investigation. Variation of depth to groundwater is generally attributed to surface topography. Locations higher in elevation have deeper groundwater and locations with lower elevations have shallower groundwater. The groundwater gradient is expected to fluctuate between east (toward Humboldt Bay) and west (toward the Pacific Ocean) depending on location and tidal elevations, (Winzler & Kelly, 2005).

2.4 Previous Studies

Six previous environmental documents related of the Town of Samoa are listed and discussed below.

Results of Soil and Groundwater Investigation for the Soccer Field, Former Service Station and Chemical Storage Areas in the Town of Samoa, California prepared by SCS Engineers (SCS), October 17, 2003, (SCS, 2003). This report includes soil and groundwater results from eleven borings in the Town of Samoa, conducted in October and November of 2000. Drilling and sampling was conducted at the soccer field and at Lorenzo's Shell gasoline station. Drilling and sampling at Lorenzo's Shell included the evaluation of several areas located just south of Lorenzo's. These areas include the chemical storage shed, oil storage shed, garage behind Lorenzo's and a drum storage area. Tabulated analytical results and the map from this report are included in Appendix B.

Phase I Environmental Site Assessment for Assessor's Parcel Numbers 401-031-038, -44, -46, -55, -59, and -60 Samoa, California, prepared by Winzler & Kelly

Consulting Engineers (Winzler & Kelly), February, 2004, (Winzler & Kelly, 2004). This report includes the identification of eighteen (18) Onsite Recognized Environmental Conditions (RECs) within the study area. The following table identifies the RECs by location or feature.

RECs (Winzler & Kelly, 2004)

Soccer Field
Lead Based Paint
Railroad
Sewer System
Unlined Burn Pit
Teepee Burner
Chemical Storage Shed
Oil Storage Shed
Garage behind Lorenzo Shell Station
Drum Storage
Fill/Construction Debris Pile
Rigging Shop
Garages (near Cookhouse)
Garages (near Soccer Field)
Hammond Powerhouse, Carriagehouse, Boiler Plant and Shops
Hammond Powerhouse, Simpson Co-generation Powerhouse, and the LP Pulp Mill
Friable and non-friable asbestos containing materials (ACMs) likely exist in subject property dwellings
18 pole-mounted transformers

Phase II Environmental Site Assessment for Assessor's Parcel Numbers 401-031-038, -044, -046, -055, -059, and -060 Samoa Peninsula Brownfields Site, Samoa, Humboldt County, California, prepared by Winzler & Kelly, June, 2005, (Winzler & Kelly, 2005). This report includes the results of soil and groundwater sampling to evaluate all of the onsite RECs identified in the Phase I Environmental Site Assessment (ESA) (Winzler & Kelly, 2004), except for two RECs including asbestos and pole mounted transformers. In addition to the evaluation of the onsite RECs, the investigation also included the evaluation of the impact from all of the offsite RECs, including potential impacts to the Site from airborne emissions from three emission sources. The investigation also included extensive sampling (20 sampling locations) in the "Former Lumber and Log Storage Area" which was **NOT** identified as a REC in the Phase I ESA (Winzler & Kelly, 2004). The investigation additionally included the sampling of background soils from "clean" areas for the analysis of lead, arsenic, and iron. This investigation included the drilling of acquisition and analysis of 119 soil samples and 26 groundwater samples. Tables of the analytical results and map from this investigation are included in Appendix B.

Additional Phase II Environmental Site Assessment for Assessor's Parcel Numbers 401-031-038, -044, -046, -055, -059, and -060 Samoa Peninsula Brownfields Site, Samoa, Humboldt County, California, prepared by Winzler & Kelly dated April, 2007, (Winzler & Kelly, 2007). The scope of work implemented in this investigation was approved by the NCRWQCB in a letter dated January 12, 2007

(Appendix A). Based on the results of the 2005 Phase II ESA (Winzler & Kelly, 2005), additional assessment was warranted at five (5) of the RECs as listed below.

RECs Further Assessed in the Additional Phase II ESA (Winzler & Kelly, 2007)

Lead Based Paint
Railroad
Teepee Burner
Rigging Shop
Garages near Cookhouse

In addition to the further evaluation of the above five original RECs, the Additional Phase II ESA (Winzler & Kelly, 2007) also further evaluated the "Former Lumber and Log Storage Area" which was **NOT** identified as a REC in the Phase I ESA (Winzler & Kelly, 2004). This investigation included a further evaluation of background metals concentrations in soils. Tabulated data from the Additional Phase II ESA (Winzler & Kelly, 2007) is included in Appendix B.

The NCRWQCB reviewed the above Additional Phase II ESA, (Winzler & Kelly, 2007) and in a letter dated August 22, 2007, the NCRWQCB concurred with the recommendations for further assessment and remediation (Appendix A).

Final Report, Soil XRF Screening of Five Buildings, Samoa, Humboldt County, California, prepared by Winzler & Kelly dated July 7, 2008, (Winzler & Kelly, 2008). This report expands the evaluation of lead contained in soil around residential structures resulting from lead based paint (LBP) from previous painting and paint preparation activities. Data from soil sampling analysis from the investigation is included in Appendix B.

Soil and groundwater results from all of the above studies are included in Appendix B.

Workplan for Additional Assessment, Town of Samoa, Samoa Peninsula Brownfields Site, Humboldt County, California, prepared by FES dated December 9, 2008, (FES, 2008). The Workplan includes the comparison of all previous soil and groundwater data from the Site to applicable screening levels. Soil screening levels included the California Human Health Screening Levels (CHHSLs), (CALEPA, 2005) and the Environmental Screening Levels (ESLs), (California Regional Water Quality Control Board San Francisco Bay Region, 2007 revised May 2008). Screening levels for groundwater are from the *Compilation of Water Quality Goals*, (Central Valley Regional Water Quality Control Board, July, 2008) and from the ESLs. A list of the screening levels used for this report, and approved in the Workplan, is included in Appendix C. The Workplan recommended additional assessment of nine subareas of the Site which had soil and/or groundwater impacts above the appropriate screening levels and had not been delineated.

This current report presents the methods and results of the additional assessment of the nine subareas identified in the Workplan (FES, 2008).

3.0 INVESTIGATION METHODS

3.1 Field Preparation

This assessment was accomplished through several iterations of soil and groundwater sampling that took place between January 17, 2009 and April 7, 2009. Additional phases of sampling were initiated based on the results from previous sampling events. Boring permits were obtained from the Humboldt County Department of Environmental Health (Appendix D). The boring locations were checked by Underground Service Alert (USA) and the Site owner representative. All fieldwork was conducted in accordance with sound scientific and engineering standards and quality control procedures used for this type of work in the environmental consulting industry.

3.2 Soil Sampling

Most of the borings were first attempted using a hand-auger. The specific locations of the borings were determined by site accessibility and the location of known underground structures. The boring locations were digitized using a Geographic Information System (GIS) on a 2007 aerial photo based on measurements to features that were visible on the photo. The geographic coordinates were then calculated in decimal degrees using the North American Datum of 1983 The approximate geographic coordinates of the borings are listed in Table 1. The depths of the borings ranged from 0.5 to 23 feet bgl. Soils recovered from the auger were described in the field for lithologic classification, color, relative moisture content, and indications of contamination. Soil classification was according to the Unified Soil Classification System. Lithologic logs were prepared for each boring (Appendix E). In areas where hand-augering was not successful due to surface or subsurface conditions, standard direct-push drilling was used to collect the soil samples. The direct-push, dual-tube drilling system consisted of a 2.25-inch outer rod with a nested stainless steel inner casing, which was used to collect a 1.125-inch diameter soil samples inside 4-foot plastic liners. Direct-push drilling services were provided by Fisch Drilling of Hydesville, California.

3.3 Grab Groundwater Sampling

Following hand drilling and most of the direct-push drilling, factory-slotted 3/4-inch or 1-inch well screens were placed in the borings. The slumping of saturated native sands at the water table provided sand filter packs for the temporary wells. Temporary wells were purged with dedicated tubing and a pre-cleaned bottom check-valve. Following purging, time was allowed for stabilization prior to groundwater sampling and measurement of groundwater depth, in some cases. For the assessments of the Soccer Field, Railroad, Rigging Shop, and Sewer System, the tops of selected temporary casings were field-surveyed using an onsite relative bench mark. Depth to water was measured with an electronic water level meter and used to determine the groundwater gradient at specific areas at the times of the investigations. In cases where hand-augering was not successful due to surface or subsurface conditions, standard direct-push drilling was used to collect the grab groundwater samples. Several of the groundwater samples were collected using dedicated tubing and a pre-cleaned bottom check-valve through a screen point system with a 4-foot screened interval.

Groundwater samples designated for analysis of dissolved metals were either field-filtered and preserved with nitric acid or delivered immediately to the laboratory for laboratory filtration and preservation. After completion of sampling at each location, the holes were sealed with bentonite chips from bottom to top.

3.4 Sample Handling and Chemical Analysis Methods

All soil and groundwater samples were labeled and immediately placed in an ice-cooled chest for delivery to Friedman and Bruya, Inc. of Seattle, Washington or North Coast Laboratories LTD in Arcata, California. Both analytical laboratories that were used are certified by the California Department of Health Services for the required analyses. All sample handling included chain-of-custody documentation.

The following analytical methods were used during this investigation:

- Soil and groundwater samples were analyzed for Total Petroleum Hydrocarbons (TPH) as diesel and motor oil using EPA Method 8015 with silica-gel cleanup;
- Selected Soil and groundwater samples were analyzed for TPH as diesel and motor oil using EPA Method 8015 with and without silica-gel cleanup;
- Soil samples were analyzed for TPH as gasoline, benzene, toluene, ethylbenzene and xylenes (BTEX) and volatile organic compounds (VOCs) using EPA Method 8015M or 8260B with sample preservation following EPA method 5035;
- Groundwater samples were analyzed for TPH as gasoline, BTEX compounds and VOCs using EPA method 8015M and 8260B;
- Soil and groundwater samples were analyzed for metals using EPA Method 200.8; and
- Soil and groundwater samples were analyzed for semi-volatile organic compounds (SVOCs) using EPA method 8270.

3.5 Equipment Decontamination and Waste Management

All sampling equipment was decontaminated by washing with a laboratory grade detergent/water solution followed by a tap water rinse and a final distilled water rinse. Investigation derived residual waste, including soil cuttings generated during drilling, purge waters, and equipment decontamination waters, were placed in DOT-approved 55-gallon drums or sealable 5-gallon buckets. The drums and buckets were labeled, covered and are being temporarily stored in a secure area at the Site, away from drains. FES will assist Samoa Pacific Group, LLC in evaluating disposal options and will provide documentation at a later date.

4.0 SOCCER FIELD

4.1 Introduction

Based on discussions with Mr. David Branco, former resident of Samoa, (Branco, 2009), the soccer field is the former location of three garages, much like the two remaining garages referred to in the report as the Soccer Field Garages. The former garages were built on the edge of a topographic basin approximately 5 to 10 feet below the present surface of the Soccer Field. The depression behind the garages was up to 15 feet beneath the present surface of the soccer field. Between two of the garages the slope allowed for the construction of a wood ramp that extended behind the back line of the garages. The ramp was long enough for two vehicles to be positioned end to end on the ramp with standing room underneath. Residences of the town changed their oil and performed other vehicle maintenance on the ramp resulting in the accumulation of oil and other petroleum products on the ground. It is reported that if the demand for oil changing space was exceeded at the main ramp, there was a secondary area between two other garages that was used for the same purposes. During winters, the water accumulated in the depression, submerged the two oil changing areas, resulting in the flooding of some of the garages and distribution of a layer of petroleum over the entire basin.

Following demolition of the former soccer field garages, the topographic depression was filled with wood debris and covered with a sandy soil. This current investigation thoroughly assessed both the primary and secondary oil changing areas. During drilling the buried surface was marked by a sharp contact between the woody debris and the underlying sands. In the oil changing areas, the interval was marked by a layer of oily soil and debris including a crushed beer can and part of an oil filter.

4.2 Previous Investigations

The results from two previous soil and groundwater investigations in the Soccer Field (SCS, 2003 and Winzler & Kelly, 2005) indicated that soil screening levels were exceeded for TPH as diesel and arsenic. Groundwater screening levels were exceeded for TPH as diesel, motor oil, gasoline, and dissolved metals (arsenic, chromium, lead, and nickel). Significant wood debris was noted in the upper 7 feet of soil in the Soccer Field. It was suggested that the wood debris (naturally occurring organics) could contribute to increased TPH as diesel and motor oil results in samples (Winzler & Kelly, 2005).

4.3 Scope of Work

The goals of the investigation in the Soccer Field included:

- Vertical and horizontal delineation of petroleum hydrocarbons including diesel, motor oil, and gasoline in soil and groundwater;
- Vertical and horizontal delineation of arsenic in soil;

- Delineation of dissolved arsenic, chromium, lead, nickel and zinc in groundwater; and

- Perform initial level of chemical forensics on groundwater samples for diesel, motor oil hydrocarbons to quantify the contribution from naturally occurring organics to the TPH results.

The goals of the assessment were achieved by the installation of twenty-eight soil borings in the Soccer Field, identified as soil borings SF-1 through SF-28 during four separate field events. The approximate locations of the borings are shown in Figure 3. Soil samples were collected from soil borings SF-1, SF-2 and SF-3 for the analysis of TPH as diesel and motor oil to verify the results of the previous investigation. Several soil samples were collected from each of the soil borings SF-4 through SF-12 (initial field event) that were analyzed for TPH as diesel, motor oil and gasoline, benzene, toluene, ethylbenzene, and total xylenes (BTEX) and arsenic, chromium, lead, nickel and zinc. Soil samples collected from various depths from soil borings SF-12 through SF-28 (subsequent field events) were analyzed for TPH as diesel and motor oil and specific metals based on the previous results as necessary for delineation purposes.

Most of the borings were converted into temporary wells. Following the conversion of the borings into temporary wells, groundwater samples from soil borings SF-4 through SF-12 (initial field event) were analyzed for TPH as diesel, motor oil and gasoline, BTEX compounds and dissolved metals including arsenic, chromium, lead, nickel, and zinc. Groundwater samples collected from soil borings SF-13 through SF-28 (subsequent field events) were analyzed for TPH and dissolved metals based on the previous results as necessary for the purpose of delineation.

4.4 Soil Results

Soil analytical results from the Soccer Field are included in Table 2. Copies of all laboratory analytical reports are included in Appendix F. Soil concentrations of TPH as gasoline range from <1.0 to 75 mg/kg and are below the screening level of 83 mg/kg. Soil concentrations of TPH as diesel range from <10 to 13,000 mg/kg and exceed the screening level of 83 mg/kg. Soil concentrations of TPH as motor oil range from <50 to 65,000 mg/kg and exceed the screening level of 370 mg/kg. Benzene was not detected above the minimum detection limits in any soil samples. Soil concentrations of toluene range from <0.0050 to 1.0 mg/kg and do not exceed the screening level of 2.9 mg/kg. Soil concentrations of ethylbenzene range from <0.0050 to 1.9 mg/kg and do not exceed the screening level of 2.3 mg/kg. Soil concentrations of total xylenes range from <0.0150 to 0.48 mg/kg and do not exceed the screening level of 2.3 mg/kg. Soil concentrations of arsenic range from 1.12 to 24.1 mg/kg and exceed the screening level of 3.0 mg/kg. Soil concentrations of chromium range from 16.7 to 68.2 mg/kg and do not exceed the screening level of 1,000 mg/kg. Soil concentrations of lead range from 0.961 to 6,590 mg/kg and exceed the screening level of 150 mg/kg. Soil concentrations of nickel range from 19.7 to 51.7 mg/kg and do not exceed the screening level of 1,600 mg/kg. Soil concentrations of zinc range from 19.3 to 565 mg/kg and do not exceed the screening level of 23,000 mg/kg. In summary, soil concentrations of TPH as diesel, TPH as motor oil, arsenic, and lead were detected above applicable screening levels.

4.5 Groundwater Results

Groundwater analytical results from the Soccer Field are included in Table 3. Groundwater concentrations of TPH as gasoline were below the detection limit. Groundwater concentrations of TPH as diesel range from <12 to 130 µg/L and exceed the screening level of 100 µg/L. TPH as motor oil was detected at concentrations ranging from <58 to 430 µg/L and exceed the screening level of 175 µg/L. Benzene and ethylbenzene were not detected in groundwater samples above the detection limit. Toluene was detected in groundwater samples ranging from <0.5 to 1.2 µg/L below the screening level of 40 µg/L. Total xylenes were detected in the groundwater in concentrations ranging from <1.5 to 3.5 µg/L below the screening level of 17 µg/L. Dissolved arsenic was detected in groundwater in concentrations ranging from <2.0 to 120 µg/L and exceed the screening level of 10 µg/L. Dissolved chromium was detected in groundwater in concentrations ranging from 0.87 to 120 µg/L and exceed the screening level of 50 µg/L. Dissolved lead was detected in groundwater at concentrations ranging form <0.50 to 31.8 µg/L and exceed the screening level of 2.5 µg/L. Dissolved nickel was detected in groundwater at concentrations ranging from 3.8 to 61 µg/L and exceed the screening level of 12 µg/L. Dissolved zinc was detected in groundwater in concentrations ranging from 3.12 o 56.7 µg/L and do not exceed the screening level of 2,000 µg/L. In summary, groundwater concentrations of TPH as diesel, TPH as motor oil, dissolved arsenic, dissolved chromium, dissolved lead, and dissolved nickel were detected above applicable screening levels.

4.6 Contribution of Naturally Occurring Organics to TPH results

It was suggested that the wood debris (naturally occurring organics) could contribute to TPH as diesel and motor oil results samples previously collected and analyzed from the Soccer Field (Winzler & Kelly, 2005). All soil and groundwater samples analyzed for TPH as diesel and motor oil in this investigation included the silica-gel cleanup process which removes non-petroleum organics from samples. Some soil and groundwater samples from the Soccer Field were analyzed with and without the silica-gel process to determine the contribution of non-petroleum (woody) organics. The comparison of data (Tables 4 and 5) indicated that non-petroleum organics are contributing to TPH as diesel and motor oil results in soil and groundwater samples. The results indicate that TPH as diesel results for soil samples were reduced by 17% to 28 % after the silica-gel process. TPH as motor oil results for soil samples were reduced by 4% to 33%. In a single soil sample, the TPH as motor oil results increased by 13% after the silica-gel process. The laboratory indicated that the sensitivity (precision) of the analytical technique decreases as TPH concentrations exceed 1,000 mg/kg. The single sample that had an increase in TPH as motor oil following the silica-gel process also had the highest TPH as motor oil (6,300 mg/kg) result of the samples used in the comparison.

The results indicate that TPH as diesel results for groundwater samples were reduced by 87% and 96% after the silica-gel process. TPH as motor oil results for groundwater samples were reduced by 44% to 75%.

It can be concluded that TPH results for samples analyzed without the silica-gel process, or with a poorly conducted silica-gel cleanup, could have erroneously high results for TPH. This is especially true for TPH as diesel results from groundwater samples in contact with woody debris (organics). Although the soil and groundwater samples from previous investigations (Winzler and Kelley, 2005 and 2007) are reported to have been

analyzed using the silica-gel cleanup process, the quality of the silica-gel cleanup process is unknown and may explain previous elevated TPH results from other areas that were not confirmed in this investigation.

4.7 Chemicals of Concern and Distribution

The chemicals of concern in the soil at the Soccer Field include TPH as diesel and motor oil, arsenic and lead.

The horizontal extent of chemicals of concern in soil have been delineated and the estimated extent of TPH as diesel and motor oil, arsenic and lead are shown in Figures 3, 4, 6, and 7. The vertical extent of TPH as diesel and motor oil exceeding the screening levels range from 1 foot bgl to 15.5 feet bgl although the highest concentrations are at the interface of the wood fill above and the underlying sands. The interface is marked by oil coated debris, wood, gravel and concrete (debris layer), which marks the historic surface impacted by oil changing and vehicle maintenance activities. The overlying wood debris has been in repeated contact with petroleum impacted groundwater during seasonal fluctuation of the water table. As a result of this repeated contact, the wood fill has absorbed petroleum from the groundwater resulting in moderate concentrations of petroleum impact through much of the wood fill and a relatively small area of groundwater impact. Lithologic cross sections have been prepared through the long and short axis of the basin (Figures 20 through 22).

Arsenic and lead in soils are isolated to a small area horizontally (Figure 6 and 7). Vertically, arsenic and lead are restricted to the upper surface of the historic oil changing area, just below the wood fill at depths from 7 feet bgl and extent to al least 11.5 feet bgl at the primary oil changing area. Soil samples were not collected below the groundwater table. The soils impacted with lead and arsenic concentrations over the screening levels are known to extend at least to the groundwater table, and are present as dissolved arsenic and dissolved lead in the groundwater.

The chemicals of concern in groundwater at the Soccer Field include TPH as diesel and motor oil, gasoline, and dissolved arsenic, chromium, lead, and nickel. Except for dissolved nickel, the horizontal extent of these chemicals of concern has been delineated in the groundwater and the estimated extent of TPH as diesel, motor oil, and gasoline, benzene and dissolved arsenic, chromium, and lead are shown in Figures 3 through 8. As discussed above, due to the fluctuating groundwater levels, the wood fill has absorbed petroleum products from the groundwater and resulted in a relatively small area of groundwater impacted with petroleum products. Dissolved metals have a more widespread distribution in groundwater than the petroleum, which is concentrated in the wood fill.

Dissolved nickel in groundwater has not been fully delineated to the north of the soccer field as shown on Figure 8. Due to physical access limitations (steep and heavily vegetated slope and lack of access), an additional boring that could provide for full delineation could not be drilled within a reasonable distance.

4.8 Groundwater Gradient

At the time of drilling, a survey was performed using a relative bench mark established at the Site. The top of casings and depth to water measurements were collected from temporary wells constructed in soil borings (SF-1, SF-4, SF-5, SF-7, and SF-9 through SF-12) to determine the groundwater gradient at the time of drilling. The depth to water measurements were taken after groundwater sampling and after sufficient time had passed to stabilize the groundwater in the borings. At the time of drilling the groundwater gradient was to the southeast at approximately 0.001 feet per foot.

5.0 RAILROAD

5.1 Previous Investigations

Results from two previous soil and groundwater investigations in the Railroad area (Winzler & Kelly, 2005 and Winzler & Kelly, 2007) identified TPH as diesel and motor oil in soil and groundwater. Screening levels were exceeded for arsenic in soil. Groundwater screening levels were exceeded for TPH as diesel and motor oil.

5.2 Scope of Work

The goals of the investigation in the Railroad area included:

- Delineation of petroleum hydrocarbons including diesel and motor oil in soil and groundwater; and
- Vertical and horizontal delineation of arsenic in soil and dissolved arsenic in groundwater.

The goals of the assessment were met by the installation of ten soil borings in the Railroad area, identified as soil borings RR-1 through RR-10. The approximate locations of the borings are shown on Figure 9. Soil samples were collected from 2 or 3 intervals from each of the soil borings, depending on the depth to water, and submitted to a laboratory for chemical analysis of TPH as diesel, motor oil and arsenic.

Following the conversion of the borings into temporary wells, groundwater samples from soil borings RR-1 through RR-3 were analyzed for TPH as diesel and motor oil and dissolved arsenic. Groundwater samples from soil borings RR-4 through RR-10 were analyzed for dissolved arsenic.

5.3 Soil Results

Soil analytical results from the Railroad area are included in Table 6. Soil concentrations of TPH as diesel range from <10 to 85 mg/kg and slightly exceed the screening level of 83 mg/kg. Soil concentrations of TPH as motor oil range from <50 to 280 mg/kg and do not exceed the screening level of 370 mg/kg. Soil concentrations of arsenic range from 1.13 to 9.67 mg/kg and exceed the screening level of 3.0 mg/kg. There is only a single soil sample with a concentration over 3.71 mg/kg.

Background soil concentrations of arsenic in soils from northern California (USGS, 2001) range between 3 and 4 mg/kg. Based on investigations near the Site at the Samoa Pulp Mill (MFG, 2005) background concentrations of arsenic (from areas not impacted by pulp mill operations) in soil was approximately 4 mg/kg. With the exception of the single soil sample, the arsenic concentrations in soil at the Railroad area are similar to background concentrations of arsenic in local soils.

5.4 Groundwater Results

Groundwater analytical results from the Railroad are included in Table 7. Groundwater concentrations of TPH as diesel and motor oil are all below the minimum detection limit. Groundwater concentrations of arsenic range from <5.0 to 38.5 µg/L and exceed the screening level of 10 µg/L.

5.5 Chemicals of Concern and Distribution

The chemicals of concern in soil at the Railroad include TPH as diesel and arsenic. The chemicals of concern at the Railroad in groundwater include TPH as diesel, TPH as motor oil and dissolved arsenic.

A single soil sample exceeded the screening level for TPH as diesel. The horizontal extent of TPH as diesel has been delineated and the extent of TPH as diesel in soil is shown in Figure 9. The vertical extent of the TPH as diesel in soil is limited to between 1 and 4 feet bgl.

The horizontal extent of arsenic in soil over the screening level has been nearly delineated and the estimated extent of arsenic in soil is shown in Figure 11. The highest concentrations of arsenic in soil occurred at approximately 3 feet bgl in all of the borings sampled. The arsenic concentration in all of the borings sampled indicated lower concentrations at 5 feet bgl. The source of arsenic in soil is thought to be naturally occurring except for the single result of 9.67 mg/kg which may be the result of historical filling of the area with wood and wood byproducts that contain arsenic.

The identification of groundwater exceeding the screening levels for diesel and motor oil is limited to a groundwater sample from single previous soil boring (3-B18) reported by (Winzler & Kelley, 2007). The estimated horizontal extent of the groundwater impacted with TPH as diesel and motor oil is shown in Figures 9 and 10. The extent of dissolved arsenic in groundwater exceeding the screening level is irregular and may represent leaching of irregularly distributed fill material containing wood and wood by-products. The horizontal extent of groundwater containing dissolved arsenic over the screening level has been nearly delineated and is shown in Figure 11.

5.6 Groundwater Gradient

At the time of drilling, a survey was performed using a relative bench mark established at the Site. The top of casings and depth to water measurements were collected from temporary wells constructed in soil borings (RR-1 through RR-3) to determine the groundwater gradient at the time of drilling. The depth to water measurements were taken after groundwater sampling and after sufficient time had passed to stabilize the groundwater in the borings. At the time of drilling the groundwater gradient was to the east at approximately 0.001 feet per foot.

6.0 SEWER SYSTEM

6.1 Previous Investigations

Previous investigations in the Sewer System (Winzler & Kelly, 2005) identified TPH as diesel and motor oil in soil and TPH as diesel, motor oil, and gasoline, benzene, and dissolved nickel and zinc in the groundwater. Soil screening levels were not exceeded in the Sewer System. Groundwater screening levels were exceeded for TPH as diesel, motor oil, and gasoline, benzene, and dissolved nickel and zinc.

6.2 Scope of Work

The goals of the investigation in the Sewer System include:

- Delineation of groundwater impacts with TPH as diesel, motor oil, and gasoline, benzene, and dissolved nickel and zinc.

The goals of the assessment were met by the installation of ten soil borings in the Sewer System identified as soil borings SS-1 through SS-10. The approximate locations of the borings are shown on Figure 12. Since there were no field indications of impacted soil, no soil samples were collected in the Sewer System area.

Following the conversion of the borings into temporary wells, groundwater samples from soil borings SS-1 through SS-3 were analyzed for TPH as diesel and motor oil, dissolved nickel and dissolved zinc. Groundwater samples from temporary wells in soil borings SS-4 through SS-6 were analyzed for dissolved zinc. Groundwater samples collected from temporary wells in soil borings SS-7 through SS-9 were analyzed for TPH as diesel, motor oil, gasoline, BTEX compounds and dissolved zinc. Groundwater samples collected from temporary well in soil boring SS-10 was analyzed for TPH as gasoline and BTEX compounds.

6.3 Soil Results

No soil samples were collected in the Sewer System area, since there were no field indications of soil impact.

6.4 Groundwater Results

Groundwater analytical results from the Sewer System are included in Table 8. Groundwater concentrations of TPH as diesel, motor oil, and gasoline, and BTEX compounds are all below the minimum detection limit. Groundwater concentrations of dissolved nickel range from 1.23 to 8.35 µg/L and do not exceed the screening level of 12 µg/L. Groundwater concentrations of dissolved zinc range from <2.0 to 35.1 µg/L and do not exceed the screening level of 2,000 µg/L.

6.5 Chemicals of Concern and Distribution

There are no chemicals of concern in the soils at the Sewer System. The chemicals of concern in groundwater at the Sewer System are TPH as diesel, motor oil, gasoline, and benzene, dissolved nickel and dissolved zinc. The horizontal extent of these chemicals of concern has been delineated and the estimated extent of TPH as diesel, motor oil, and gasoline, benzene, and dissolved nickel and zinc are shown in Figures 12 and Figure 13.

6.6 Groundwater Gradient

At the time of drilling, a survey was performed using a relative bench mark established at the Site. The top of casings and depth to water measurements were collected from temporary wells constructed in soil borings (SS-1, SS-2, SS-3 and SS-5, SF-6 and SF-9) to determine the groundwater gradient at the time of drilling. The depth to water measurements were taken after groundwater sampling and after sufficient time had passed to stabilize the groundwater in the borings. At the time of drilling the groundwater gradient from SS-1 through SS-3 was to the west at approximately 0.008 feet per foot. At the time of drilling the groundwater gradient from SS-5, SS-6 and SS-9 was to the southeast at approximately 0.002 feet per foot.

7.0 UNLINED BURN PIT

7.1 Previous Investigations

Previous investigations in the Unlined Burn Pit (Winzler & Kelly, 2005) included the drilling and sampling of six boreholes. Dioxins and furans were not detected in soil or groundwater samples. Volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) were not detected in soil or groundwater samples. The groundwater screening level for dissolved zinc was exceeded. The maximum concentration of zinc in the groundwater was 2,600 µg/L, which is in excess of the screening level of 2,000 µg/L.

7.2 Scope of Work

The scope of work initially focused on the evaluation of dissolved zinc in groundwater. Due to field indications of petroleum impact in soils (discoloration), soil was evaluated for TPH as diesel and motor oil at two locations and groundwater was evaluated for TPH as diesel and motor oil at four locations. The goals of the investigation in the Unlined Burn Pit included:

- Delineation of dissolved zinc in groundwater; and
- Delineation of TPH as diesel and motor oil in soil and groundwater.

The goals of the assessment were met by the installation of six soil borings in the Unlined Burn Pit identified as soil borings ULBP-1 through ULBP-6 and ULBP-1A. ULBP-1 met refusal prior to achieving the depth of groundwater. ULBP-1A was drilled with the direct push rig as an alternative to ULBP-1. The approximate locations of the borings are shown on Figure 14. One soil sample from soil borings ULBP-1 through ULBP-3 and ULBP-1A was collected and submitted to a laboratory for chemical analysis of zinc. The soil samples were selected based on the field review of the fill material encountered in the Unlined Burn Pit. Soil samples were collected from intervals under the fill and are interpreted to represent the near subsurface at the time that the Unlined Burn Pit was in use. Due to field indications of impact, soil samples from ULBP-1 and ULBP-1A were also submitted for the analysis of TPH as diesel and motor oil.

Following the conversion of the borings into temporary wells, groundwater samples from temporary wells in soil borings ULBP-1A, ULBP-2 and ULBP-3 were analyzed for dissolved zinc. Groundwater samples from temporary wells in soil borings ULBP-1A and ULBP-4 through ULBP-6 were analyzed for TPH as diesel and motor oil.

7.3 Soil Results

Soil analytical results from the Unlined Burn Pit are included in Table 9. Soil concentrations of zinc ranged from 19.3 to 156 mg/kg, well under the screening level of 23,000 mg/kg. TPH as diesel was detected at concentrations ranging from 11 to 50 mg/kg, below the screening level of 83 mg/kg. Soil analytical results from the Unlined Burn Pit from this and previous investigations did not exceed any screening levels.

7.3 Groundwater Results

Groundwater analytical results from the Unlined Burn Pit are included in Table 10. Groundwater concentrations of dissolved zinc ranged from 3.05 to 94.3 µg/L, well under the screening level of 2,000 µg/L and well below the concentration previously reported (Winzler & Kelly, 2005). TPH as diesel and motor oil were detected at concentrations of 150 and 230 µg/L, respectively in groundwater from soil boring ULBP-1A, slightly exceeding the screening levels of 100 and 175 µg/L, respectively. TPH as diesel and motor oil were not detected in the groundwater samples from soil borings ULBP-4 through ULBP-6.

7.4 Chemicals of Concern and Distribution

The chemicals of concern at the Unlined Burn Pit in groundwater are dissolved zinc (reported in a previous investigation) and TPH as diesel and motor oil in groundwater. The horizontal extent of both chemicals of concern in groundwater have been delineated and the estimated extent of TPH as diesel and motor oil and dissolved zinc are shown in Figure 14.

8.0 LORENZO BUILDINGS

8.1 Previous Investigations

The Lorenzo Buildings consists of two previously investigated buildings immediately south of the Former Lorenzo Shell services station. The Lorenzo Buildings include;

- Former chemical storage shed; and
- Former oil storage shed.

The Lorenzo Buildings were investigated and reported in (SCS, 2003), and (Winzler & Kelly, 2005). The soil and groundwater results from the previous investigations are included in Appendix B.

Former Chemical Storage Shed
Previous investigations (SCS, 2003, and Winzler & Kelly, 2005) identified soil containing TPH as diesel and motor oil. TPH as motor oil exceeded the screening level for soil. Groundwater samples did not contain detectable concentrations of petroleum products, VOCs, or SVOCs.

Former Oil Storage Shed
Previous investigations (SCS, 2003, and Winzler & Kelly, 2005) identified shallow soil containing TPH as diesel, motor oil, and gasoline, and the semi-volatile organic compound benzo(a)pyrene. The soil screening level was exceeded for benzo(a)pyrene. Groundwater samples did not contain detectable TPH as diesel, motor oil, gasoline, or SVOCs. Groundwater from soil boring B-7, located between the Former Oil Storage Shed and the Former Lorenzo Shell, was found to contain tetrachloroethene (PCE) a common solvent, at 2.4 µg/L (SCS, 2003), which is above the screening level of 0.06 µg/L.

8.2 Scope of Work

The goals of the investigation in the Lorenzo Buildings include:

- Delineation of TPH as diesel and motor oil in soil;
- Delineation of SVOCs including benzo(a)pyrene in soil and groundwater; and
- Delineation of PCE in soils and groundwater.

The goals of the assessment were met by the installation of seventeen soil borings around the Lorenzo Buildings identified as soil borings LB-1 through LB-17. The approximate locations of the borings are shown on Figure 15.

Former Chemical Storage Shed
Two soil samples were collected from soil borings LB-1 through LB-3 and LB-11 through LB-15 (Former Chemical Storage Shed) from approximately 0.5 and 1.5 foot depths bgl and were submitted to a laboratory for chemical analysis of TPH as diesel and motor oil. An additional soil sample was collected at soil boring LB-15 from 3 feet bgl adjacent to

the location of soil boring LB-2 and was submitted for chemical analysis of TPH as diesel and motor oil.

Former Oil Storage Shed
Two soil samples were collected from soil borings LB-4 through LB-7, LB-16 and LB-17 (Former Oil Storage Shed) from either 0.5 and 1.5 foot depths bgl or 1.0 and 2.0 feet bgl and were submitted to a laboratory for chemical analysis of SVOCs including benzo(a)pyrene.

Following the conversion of the soil borings LB-6 and LB-7 into temporary wells, groundwater samples were collected and analyzed for SVOC compounds including benzo(a)pyrene.

One soil sample was collected at the surface at each of the soil boring locations LB-8 through LB-10 and analyzed for VOCs including PCE.

The groundwater samples from the temporary well at soil boring LB-18 and groundwater monitoring wells MW-3 and MW-4 (Former Lorenzo Shell) were analyzed for VOC compounds including PCE.

8.3 Soil Results

Former Chemical Storage Shed
Soil analytical results from the Lorenzo Buildings are included in Table 11, (LB-1 through LB-3 and LB-11 through LB-15). Soil concentrations of TPH as Diesel ranged from <10 to 620 mg/kg, and exceed the screening level of 83 mg/kg. TPH as motor oil was detected at concentrations ranging from <50 to 1,600 mg/kg, which is in excess of the screening level of 370 mg/kg.

Former Oil Storage Shed
Soil analytical results from the Lorenzo Buildings are included in Table 11, (LB-4 through LB-10, LB-16 and LB-17). The only SVOC that was detected in soil samples was benzo(a)pyrene. Benzo(a)pyrene concentrations in soil ranged from <0.01 to 0.066 mg/kg, and exceed the screening level of 0.038 mg/kg.

Surface soil samples collected from LB-8 through LB-10 did not contain any VOCs, including PCE, above the detection limits.

8.4 Groundwater Results

Former Oil Storage Shed
Groundwater analytical results from the Lorenzo Buildings (LB-6 and LB-7) are included in Table 12. Groundwater samples were found not to contain any SVOCs, including benzo(a)pyrene, above the detection limits.

The groundwater sample from soil boring LB-18 and monitoring wells MW-3 and MW-4 (Former Lorenzo Shell) were analyzed for VOC compounds including PCE and were found not to contain any VOCs, above the detection limits.

8.5 Chemicals of Concern and Distribution

Former Chemical Storage Shed
The chemicals of concern in soil at the Lorenzo Buildings (Former Chemical Storage Shed) are TPH as diesel and motor oil. The horizontal extent of both chemicals of concern has been delineated and the estimated extent of TPH as diesel and motor oil is shown in Figures 15. The vertical extent of TPH as diesel and motor oil is less than 3 feet bgl.

There are no groundwater chemicals of concern in this area.

Former Oil Storage Shed
The chemical of concern in soil at the Lorenzo Buildings (Former Oil Storage Shed) is benzo(a)pyrene. The horizontal extent of benzo(a)pyrene has been delineated and the estimated extent of benzo(a)pyrene is shown in Figure 15. Vertically the benzo(a)pyrene is limited to less than 2 feet bgl.

The chemical of concern in groundwater at the Lorenzo Buildings (Former Oil Storage Shed) is PCE. The horizontal extent of PCE has been delineated and is shown in Figure 15.

9.0 RIGGING SHOP

9.1 Previous Investigations

Previous investigations in the area of the Rigging Shop (Winzler & Kelly, 2005 and 2007) included the drilling and sampling of nine soil borings. TPH as diesel and motor oil was identified in shallow soil samples below the screening levels. TPH as gasoline, BTEX compounds and SVOCs were not detected in soil or groundwater samples. Dissolved zinc was detected in groundwater samples exceeding the screening level. The maximum concentration of dissolved zinc in the groundwater was 3,000 µg/L, which is in excess of the screening level of 2,000 µg/L.

9.2 Scope of Work

The scope of work at the Rigging Shop initially focused on the evaluation of dissolved zinc in groundwater. Due to field indications of potential impact in soil at soil boring RS-1, soil and groundwater samples were evaluated for TPH as diesel and motor oil at RS-1. The goals of the investigation in the Rigging Shop included:

- Delineation of dissolved zinc in groundwater; and
- Evaluation of TPH as diesel and motor oil in groundwater.

The goals of the assessment were met by the installation of three soil borings in the area of the Rigging Shop identified as soil borings RS-1 through RS-3. The approximate locations of the borings are shown on Figure 16. One soil sample from each soil boring was collected and submitted to a laboratory for chemical analysis of zinc. Due to field indications of potential petroleum impact (color), an additional soil sample from soil boring RS-1 was collected and submitted to a laboratory for chemical analysis of TPH as diesel and motor oil.

Following the conversion of the soil borings into temporary wells, groundwater samples from all of the temporary wells were analyzed for dissolved zinc. A groundwater sample from the temporary well installed at soil boring RS-1 was also analyzed for TPH as diesel and motor oil.

9.3 Soil Results

Soil analytical results from the Rigging Shop are included in Table 13. Soil concentrations of zinc ranged from 40.7 to 178 mg/kg, well under the screening level of 23,000 mg/kg. TPH as diesel and motor oil were not detected in the soil samples. Soil analytical results from the Rigging Shop from this and previous investigations did not exceed any screening levels.

9.4 Groundwater Results

Groundwater analytical results from the Rigging Shop are included in Table 14. Groundwater concentrations of zinc ranged from 4.73 to 12.5 µg/L, well under the screening level of 2,000 µg/L and below the concentration previously reported (Winzler & Kelly, 2005). TPH as diesel and motor oil were not detected in the groundwater sample

collected from soil boring RS-1. No screening levels for groundwater were exceeded in this investigation at the Rigging Shop.

9.5 Chemicals of Concern and Distribution

The chemicals of concern at the Rigging Shop are dissolved zinc reported in a previous investigation (Winzler & Kelley, 2005). The horizontal extent of zinc in the groundwater has been delineated and the estimated extent of dissolved zinc is shown in Figure 16. Since no TPH as diesel and motor oil was detected in soil or groundwater samples, it is not a chemical of concern at the Rigging Shop.

9.6 Groundwater Gradient

At the time of drilling, a survey was performed using a relative bench mark established at the Site. The top of casings and depth to water measurements were collected from temporary wells constructed in soil borings (RS-1, RS-2, and RS-3) to determine the groundwater gradient at the time of drilling. The depth to water measurements were taken after groundwater sampling and after sufficient time had passed to stabilize the groundwater in the borings. At the time of drilling the groundwater gradient from RS-1 through RS-3 was to the southeast at approximately 0.002 feet per foot.

10.0 COOKHOUSE GARAGE

10.1 Previous Investigations

Previous investigations in the area of the Cookhouse Garages (Winzler & Kelly, 2005 and 2007) included the drilling and sampling of nine soil borings. TPH as diesel and motor oil were identified in shallow soil samples at concentrations below screening levels. TPH as gasoline, and BTEX compounds were not detected in soil samples. A single SVOC compound, fluoranthene, was detected in shallow soil samples.

TPH as diesel and motor oil were not detected in groundwater samples from the Cookhouse Garages. Dissolved arsenic was detected in groundwater below the screening level.

10.2 Scope of Work

The scope of work at the Cookhouse Garages initially focused on the evaluation of the SVOC compounds in soil. Due to additional historic information acquired during the assessment (potential oil changing at the south end of the garages) additional borings were drilled to evaluate the potential presence of TPH as diesel and motor oil in soil and groundwater. The goals of the investigation in the Cookhouse Garages included:

- Delineation of soil and groundwater impacts with the SVOC compounds; and
- Evaluation of TPH as diesel and motor oil in soil and groundwater.

The goals of the assessment were met by the installation of twelve soil borings in the area of the Cookhouse Garage identified as soil borings CHG-1 through CHG-12. The approximate locations of the borings are shown on Figure 17. Two soil samples were collected from soil borings CHG-1 through CHG-5 and CHG-7 through CHG-9 from depths of 0.5 and 2.0 foot bgl and were submitted to a laboratory for chemical analysis of SVOC compounds.

Following the conversion of soil borings CHG-1 and CHG-2 into temporary wells, groundwater samples were collected and analyzed for SVOC compounds including fluoranthene.

Soil samples were collected from soil borings CHG-6 and CHG-10 through CHG-12 and were submitted for analysis of TPH as diesel and motor oil.

Following the conversion of the soil borings CHG-6 and CHG-10 through CHG-12 into temporary wells, groundwater samples were collected and analyzed for TPH as diesel and motor oil.

10.3 Soil Results

Soil analytical results from the Cookhouse Garage are included in Table 15. The SVOC compound benzo(a)pyrene was detected in soil samples at concentrations that ranged

from <0.01 to 0.18 mg/kg, and exceed the screening level of 0.038 mg/kg. TPH as diesel and motor oil was not detected in any soil samples collected.

10.4 Groundwater Results

Groundwater analytical results from the Cookhouse Garage are included in Table 16. TPH as diesel and motor oil and SVOC compounds were not detected in the groundwater samples collected from the Cookhouse Garage. No screening levels for groundwater were exceeded in this investigation at the Cookhouse Garage.

10.5 Chemicals of Concern and Distribution

There are no chemicals of concern in the groundwater at the Cookhouse Garage. The chemical of concern in soil at the Cookhouse Garage is the SVOC compound benzo(a)pyrene. The horizontal extent of benzo(a)pyrene in soil has been delineated and the estimated extent of benzo(a)pyrene is shown in Figure 17. SVOC compounds were not detected in any of the samples collected from 2 feet bgl. The vertical extent of the SVOC compound benzo(a)pyrene is limited to the upper 2 feet of soil.

11.0 SOCCER FIELD GARAGES

11.1 Previous Investigations

The previous soil investigation around the Soccer Field Garages, (Winzler & Kelly, 2005) identified TPH as motor oil in soil from the 0.5 foot depth interval from two areas of the garages that exceeded the screening level. The 0.5 foot composite soil sample collected from the northern portion of the north garage contained motor oil at a concentration of 370 mg/kg which is equal to the soil screening level. The 0.5 foot composite soil sample from the south end of the north garage and the north end of the south garage contained motor oil and lead exceeding the screening levels. Soil screening levels were not exceeded in any soil samples collected from the 1.5 or 3.0 foot depth intervals within the Soccer Field Garages.

11.2 Scope of Work

The goals of the investigation in the Soccer Field Garage included:

- Horizontal delineation of TPH as diesel and motor oil in soil and groundwater around the Soccer Field Garages.

The goals of the assessment were met by the sampling of eight boreholes (SFG-1 through SFG-8) shown on Figure 18. Two soil samples were collected from soil borings SFG-1, SFG-2, and SFG-5 through SFG-8 near the surface and at a depth of 2 feet bgl. The soil samples were collected and submitted to a laboratory for chemical analysis of TPH as diesel and motor oil. Three and four soil samples were collected from soil borings SFG-3 and SFG-4, respectively. Soil samples were collected from soil borings SFG-3 and SFG-4 near the surface, at a depth of 2 feet bgl, and just above the groundwater table for chemical analysis of TPH as diesel and motor oil. Following the conversion of soil borings SFG-3 and SFG-4 into temporary wells, groundwater samples from the two temporary wells were analyzed for TPH as diesel and motor oil. Groundwater samples were also analyzed for dissolved arsenic, chromium and nickel to aid in the delineations in the groundwater at the adjacent Soccer Field.

11.3 Soil Results

Soil analytical results from the Soccer Field Garages are included in Table 17. Soil concentrations of TPH as diesel range from <10 to 1,100 mg/kg and exceed the screening level of 83 mg/kg. Soil concentrations of TPH as motor oil range from <50 to 1,600 mg/kg and exceed the screening level of 370 mg/kg.

11.4 Groundwater Results

Groundwater analytical results from the Soccer Field Garages are included in Table 18. Groundwater concentrations of TPH as diesel are below the detection limits. Groundwater concentrations of TPH as motor oil ranged from <60 to 66 µg/L, under the screening level of 175 µg/L. Dissolved chromium was detected in the groundwater at concentrations of 4.84 and 11.0 µg/L and did not exceed the screening level of 50 µg/L.

Dissolved arsenic was detected in the groundwater at concentrations of <1.0 and 1.89 µg/L and did not exceed the screening levels of 10 µg/L. Dissolved nickel was detected in the groundwater at concentrations of 8.09 and 4.24 and did not exceed the screening level of 12 µg/L.

11.5 Chemicals of Concern and Distribution

There are no chemicals of concern in the groundwater at the Soccer Field Garages. The chemicals of concern at the Soccer Field Garages in soil are TPH as diesel and motor oil. The horizontal extent of TPH as diesel and motor oil in soil has been delineated and the estimated extent of TPH as diesel and motor oil is shown in Figure 18. The vertical extent of soil impacted with diesel and motor oil exceeding the screening level has been determined to be shallower than two feet bgl at the Soccer Field Garages.

12.0 HAMMOND POWERHOUSE

12.1 Previous Investigations

A previous soil and groundwater investigation around the Hammond Powerhouse (Winzler & Kelly, 2005) identified TPH as diesel and motor oil in soil. The maximum soil concentrations are 73 mg/kg TPH as diesel and 450 mg/kg TPH as motor oil in the composite soil sample from 2 feet bgl from three borings (15-B1 through 15-B3) (Winzler & Kelly, 2005). Groundwater sampling and testing indicated that the groundwater from soil boring 15-B3 (Winzler & Kelly, 2005) did not contain detectable concentrations of TPH as gasoline, diesel and motor oil, VOCs or SVOCS. Dioxin and furans were not detected in soils or groundwater samples from the Hammond Powerhouse. The TPH as motor oil exceeded the screening level in the single composite soil sample collected from 2 feet bgl as described above. Screening levels were not exceeded in the composite surface soil sample collected from borings 15-B1 through 15-B3.

12.2 Scope of Work

The goals of the investigation in the Hammond Powerhouse include:

- Vertical and horizontal delineation of TPH as motor oil in soil and groundwater in the area of the Hammond Powerhouse.

The goals of the assessment were met by the installation of eight soil borings in the area of the Hammond Powerhouse, identified as soil borings HPH-1 through HPH-8. The approximate locations of the borings are shown on Figure 19.

Soil borings HPH-1 through HPH-3 were drilled in the locations of previous soil borings 15-B1 through 15-B3 (Winzler & Kelly, 2005). Soil samples were collected from two or three intervals in soil boring HPH-1 through HPH-3 and submitted for chemical analysis of TPH as diesel and motor oil, and zinc. Soil samples were collected from a single interval from soil borings HPH-4 through HPH-8 and submitted for chemical analysis of TPH as diesel and motor oil.

Following the conversion of soil borings HPH-1, HP-2 and HPH-5 through HPH-7 into temporary wells, grab groundwater samples from the temporary wells were collected and submitted for analysis for TPH as diesel, and motor oil. Groundwater samples collected from temporary wells constructed at soil borings HPH-1 and HPH-2 were also submitted for analysis of dissolved zinc.

12.3 Soil Results

Soil analytical results from the Hammond Powerhouse are included in Table 19. Soil concentrations of TPH as diesel range from <10 to 200 mg/kg and exceed the screening level of 83 mg/kg. Soil concentrations of TPH as motor oil range from <50 to 790 mg/kg and exceed the screening level of 370 mg/kg. Soil concentrations of zinc ranged from 7.72 mg/kg to 117 mg/kg and are below the screening level of 23,000 mg/kg.

12.4 Groundwater Results

Groundwater analytical results from the Hammond Powerhouse are included in Table 20. Groundwater concentrations of TPH as diesel range from <19 µg/L to 32 µg/L and do not exceed the screening level of 100 µg/L. Groundwater concentrations of TPH as motor oil ranged from <53 to 190 µg/L, and exceed the screening level of 175 µg/L. Dissolved zinc was detected in the groundwater at concentrations of 1.63 and 10.8 µg/L and did not exceed the screening level of 2,000 µg/L.

12.5 Chemicals of Concern and Distribution

The chemicals of concern in the soil at the Hammond Powerhouse are TPH as diesel and motor oil. The horizontal extent of TPH as diesel and motor oil in soil has not been delineated and the estimated extent of TPH as diesel and motor oil are shown in Figure 19. The vertical extent of soil impacted with diesel and motor oil exceeding the screening level at HPH-2 is shallower than 3.0 feet bgl. The vertical extent of soil impacted with diesel exceeding the screening level at HPH-7 is known to extend from approximately 3.0 feet bgl to the groundwater surface at approximately 6 feet bgl.

The chemical of concern at the Hammond Powerhouse in groundwater is TPH as motor oil. The horizontal extent of TPH as motor oil (although only slightly above the screening level (190 µg/L compared to the screening level of 175 µg/L) in groundwater has been determined to extend offsite to the southeast of the Site. The estimated extent of TPH motor oil is shown in Figure 19.

13.0 CONCLUSIONS AND RECOMMENDATIONS

Chemicals of concern were identified in soil and/or groundwater in nine subareas in the Town of Samoa. The tables below provide a summary of chemicals of concern in each subarea.

Chemicals of Concern in Soil						
	TPH-Diesel	TPH-Motor Oil	Fluoranthene (SVOC)	Benzo(a)pyrene (SVOC)	Arsenic	Lead
Soccer Field	X	X			X	X
Railroad	X				X	
Sewer System	NO Soil COCs					
Unlined Burn Pit	NO Soil COCs					
Lorenzo Buildings	X	X		X		
Rigging Shop	NO Soil COCs					
Cookhouse Garages			X	X		
Soccer Field Garages	X	X				
Hammond Powerhouse	X	X				

Chemicals of Concern in Groundwater										
	TPH-Gasoline	TPH-Diesel	TPH-Motor Oil	Benzene	Tetrachloroethene (PCE)	Dissolved Arsenic	Dissolved Chromium	Dissolved Lead	Dissolved Nickel	Dissolved Zinc
Soccer Field	X	X	X			X	X	X	X	
Railroad		X	X			X				
Sewer System	X	X	X	X					X	X
Unlined Burn Pit		X	X							X
Lorenzo Buildings					X					
Rigging Shop										X
Cookhouse Garages	NO Groundwater COCs									
Soccer Field Garages	NO Groundwater COCs									
Hammond Powerhouse			X							

Chemicals of Concern in soil and groundwater have been delineated to the screening levels to the extent practically feasible. The exceptions include:

- Soccer Field: dissolved nickel in groundwater is not fully delineated to the north due to physical drilling limitations (steep and heavily vegetated slope and lack of access), an additional boring necessary for full delineation could not be drilled within a reasonable distance. The source of the dissolved nickel in groundwater is suspected to be related to the vehicle maintenance and disposal of vehicle maintenance wastes within the wood filled depression behind the former garages. It is possible that disposal of automotive maintenance products also occurred at scattered sites within the Soccer Field area and may be the cause of the elevated nickel concentrations away from the historic oil changing areas. The basin, which is defined based on the presence of wood fill, and considered to be the source, has been delineated. It is recommended that no additional assessment is necessary in order to determine an appropriate remedial action.

- Railroad area: dissolved arsenic in groundwater is not fully delineated to the northeast. It is suspected that most of the dissolved arsenic in groundwater in the area of the Railroad is the result of leaching of native soils containing naturally occurring arsenic except for the single result of 9.67 mg/kg which

may be the result of historical filling of the area that may contain areas of higher arsenic concentrations possibly due to the incorporation of wood ash which can contain arsenic that is readily leachable. Given the relatively low concentrations of dissolved arsenic in groundwater, no identified obvious source other than naturally occurring arsenic in soils and historic fill, the absence of other significant arsenic impacted media near the railroad area, it is recommended that no additional assessment is necessary in order to determine an appropriate remedial action.

Hammond Powerhouse: TPH as motor oil in groundwater and TPH as diesel and motor oil in soil. TPH as diesel and motor oil were detected in soil samples with the highest concentrations of 200 mg/kg TPH as diesel and 790 mg/kg TPH as motor oil at boring HPH-2. Multiple layers of fill including concrete, asphalt, brick and wood were encountered in this area. The source of diesel and motor oil in the vicinity of HPH-2 is suspected to be related to the various generations of fill that consists of the demolition debris of the former powerhouse and likely earlier generations of fill.

The only detection of TPH as motor oil in groundwater exceeding the screening level of 175 µg/L was from HPH-1 (190 µg/L), which was located near an apparently abandoned wooden storm water line. The storm water line likely conveyed petroleum-impacted surface runoff from equipment use and storage and vehicle use and parking. Given the relatively low concentrations of TPH as motor oil in groundwater and TPH as diesel and motor oil in soil, which may be associated with multiple layers of historic fill, it is recommended that no additional groundwater or soil assessment is necessary in order to determine an appropriate remedial action.

Soccer Field
FES recommends the preparation of a remedial action plan to address the soil and groundwater that exceed the screening levels in the Soccer Field.

Railroad
Due to the relatively low concentrations of chemicals of concern in the soil and groundwater that have been delineated (except as noted above), FES recommends that no additional investigation is warranted in Railroad area. A deed restriction will be used in this area of the Site that will restrict the use of groundwater for drinking.

Sewer System
Due to the relatively low concentrations of chemicals of concern in the groundwater that have been delineated, no impacted soils, and the potential source in groundwater being the sewer system discharge that will be eliminated at the time that the new sewer system is constructed, FES recommends that no additional investigation is warranted in the Sewer System area. A deed restriction will be used in this area of the Site that will restrict the use of groundwater for drinking.

Unlined BurnPit
Due to the relatively low concentrations of chemicals of concern in the groundwater that have been delineated, and no impact to soils in excess of the screening levels, FES recommends that no additional investigation is warranted in the Unlined Burn Pit area. A

deed restriction will be used in this area of the Site that will restrict the use of groundwater for drinking.

Lorenzo Buildings
Due to the relatively low concentrations of a chemical of concern in the groundwater that has been delineated, and low concentrations of shallow impacted soils, FES recommends that a soil and groundwater contingency plan be prepared to address future subsurface activities in the area of the Lorenzo Buildings. A deed restriction will be used in this area of the Site that will restrict the use of groundwater for drinking.

Rigging Shop
Due to the relatively low concentrations of chemicals of concern in the groundwater that have been delineated, and no impact to soils in excess of the screening levels, FES recommends that no additional investigation is warranted in the Rigging Shop area. A deed restriction will be used in this area of the Site that will restrict the use of groundwater for drinking.

Cookhouse Garages
Due to the absence of chemicals of concerns in the groundwater, and low concentrations of shallow impacted soils, FES recommends that a soil and groundwater contingency plan be prepared to address future subsurface activities in the area of the Cookhouse Garages.

Soccer Field Garages
Due to the absence of chemicals of concern in the groundwater, and low concentrations of shallow impacted soils, FES recommends that a soil and groundwater contingency plan be prepared to address future subsurface activities in the area of the Soccer Field Garages.

Hammond Powerhouse
Due to the relatively low concentrations of chemicals of concern in the soil and groundwater that have been delineated (except as noted above) and no known significant sources of impacted soil, FES recommends that a soil and groundwater contingency plan be prepared to address future subsurface activities in the area of the Hammond Power House. A deed restriction will also be used in this area of the Site that will restrict the use of groundwater for drinking.

In conclusion, FES recommends the following:

- Preparation of a remedial action plan for the Soccer Field;
- Preparation of deed restrictions prohibiting groundwater use in the Railroad area, Sewer System, Unlined Burn Pit, Lorenzo Buildings, Rigging Shop and Hammond Powerhouse; and
- Preparation of a soil and groundwater contingency plan to cover the area of the Lorenzo Buildings, Cookhouse Garages, Hammond Powerhouse, and Soccer Field Garages.

14.0 REFERENCES

Branco, David, 2009, Personal communication with longtime resident of Samoa.

California Environmental Protection Agency (CALEPA), *Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties,* January 2005.

California Regional Water Quality Control Board San Francisco Bay Region, 2007, *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater,* November 2007, revised May 2008.

Central Valley Regional Water Quality Control Board, 2008, *A Compilation of Water Quality Goals*, July 2008.

Freshwater Environmental Services, 2008, *Workplan for Additional Assessment, Town of Samoa, Samoa Peninsula Brownfields Site, Samoa, Humboldt County, California: December 9.*

MFG, Inc., 2005, *Supplemental Site Characterization Report, Pulp Mill, One TCF Drive, Samoa, California,* May 27.

SCS, Engineers, 2003, *Results of Soil and Groundwater Investigation for the Soccer Field, Former Services Station and Chemical Storage Areas in the Town of Samoa, California*: October 17.

USGS, 2001, *Geochemical Landscapes of Conterminous Unites States-New Map Presentations for 22 Elements*, Professional Paper 1648

Winzler & Kelly Consulting Engineers, 2004, *Phase I Environmental Site Assessment for Assessor's Parcel Numbers 401-031-038, -44, -46, -55, -59, and -60 Samoa, California*: February.

Winzler & Kelly Consulting Engineers, 2005, *Phase II Environmental Site Assessment for Assessor's Parcel Numbers 401-031-038, -44, -46, -55, -59, and -60 Samoa, Peninsula Brownfields Site Samoa, Humboldt, California*: June.

Winzler & Kelly Consulting Engineers, 2007, *Additional Phase II Environmental Site Assessment for Assessor's Parcel Numbers 401-031-038, -44, -46, -55, -59, and -60 Samoa, Peninsula Brownfields Site Samoa, Humboldt, California*: April.

Winzler & Kelly Consulting Engineers, 2008, *Final Report, Soil XRF Screening of Five Buildings, Samoa, Humboldt County, California*: July 7.

TABLES

TABLE 1
SOIL BORING LOCATIONS
Town of Samoa
Samoa, CA

Boring ID	Latitude [1]	Longitude [1]
CHG-1	40.820426044	-124.182400984
CHG-10	40.820445621	-124.182559411
CHG-11	40.820368836	-124.182342745
CHG-12	40.820294294	-124.182369776
CHG-2	40.820571032	-124.182184298
CHG-3	40.820386059	-124.182394680
CHG-4	40.820471229	-124.182270809
CHG-5	40.820561343	-124.182143093
CHG-6	40.820382329	-124.182474925
CHG-7	40.820386623	-124.182151438
CHG-8	40.820507592	-124.182002920
CHG-9	40.820735850	-124.181937611
HPH-1	40.818708217	-124.181699271
HPH-2	40.818920513	-124.181482550
HPH-3	40.819106112	-124.181745457
HPH-4	40.819003170	-124.181583652
HPH-5	40.818782961	-124.181609518
HPH-6	40.818856735	-124.181867003
HPH-7	40.818609617	-124.181922402
HPH-8	40.818661701	-124.182269519
LB-1	40.816750571	-124.187329388
LB-10	40.817110781	-124.187347537
LB-11	40.816715886	-124.187332512
LB-12	40.816708425	-124.187416049
LB-13	40.816786860	-124.187380608
LB-14	40.816815761	-124.187364603
LB-15	40.816792771	-124.187361791
LB-16	40.816769793	-124.187460471
LB-17	40.816928915	-124.187370378
LB-18	40.817069382	-124.187531481
LB-2	40.816791226	-124.187357298
LB-3	40.816818290	-124.187292817
LB-4	40.816878540	-124.187459794
LB-5	40.816902382	-124.187399553
LB-6	40.816842341	-124.187351125

TABLE 1
SOIL BORING LOCATIONS
Town of Samoa
Samoa, CA

Boring ID	Latitude [1]	Longitude [1]
LB-7	40.816821902	-124.187413800
LB-8	40.817081792	-124.187431524
LB-9	40.817131882	-124.187421496
MW-3	40.817296746	-124.187271226
MW-4	40.816980063	-124.187229357
RR-1	40.819298732	-124.183948424
RR-10	40.819214319	-124.182756682
RR-2	40.819205797	-124.183896538
RR-3	40.819316302	-124.183838034
RR-4	40.819430116	-124.184117012
RR-5	40.819109912	-124.183990478
RR-6	40.819039289	-124.183797369
RR-7	40.819341678	-124.183657280
RR-8	40.819130435	-124.183586140
RR-9	40.818848664	-124.183140114
RS-1	40.819672002	-124.183514298
RS-2	40.819329862	-124.183258837
RS-3	40.819373239	-124.183091827
SF-1	40.819602015	-124.186354652
SF-10	40.819916609	-124.186197389
SF-11	40.819872060	-124.186114997
SF-12	40.820154148	-124.186322161
SF-13	40.820235236	-124.186214746
SF-14	40.820114397	-124.186185977
SF-15	40.820141906	-124.186385186
SF-16	40.819775805	-124.186590681
SF-17	40.819623362	-124.186234120
SF-18	40.819701252	-124.186068177
SF-19	40.819809339	-124.186018966
SF-2	40.820325678	-124.186570359
SF-20	40.819907746	-124.185987770
SF-21	40.820006582	-124.186006765
SF-22	40.820049855	-124.186136179
SF-23	40.820745937	-124.186449022
SF-24	40.820389337	-124.186084142
SF-25	40.820142418	-124.185945508

TABLE 1
SOIL BORING LOCATIONS
Town of Samoa
Samoa, CA

Boring ID	Latitude [1]	Longitude [1]
SF-26	40.819443241	-124.185932251
SF-27	40.819517653	-124.186424036
SF-28	40.819980379	-124.185499384
SF-3	40.819940613	-124.186405537
SF-4	40.819796921	-124.186373220
SF-5	40.819729212	-124.186285650
SF-6	40.819833993	-124.186208725
SF-7	40.819854579	-124.186181301
SF-8	40.819849951	-124.186222738
SF-9	40.819818192	-124.186118847
SFG-1	40.820360569	-124.186968617
SFG-2	40.820017222	-124.187081891
SFG-3	40.820239384	-124.187004061
SFG-4	40.819960151	-124.187032624
SFG-5	40.820022543	-124.187148452
SFG-6	40.820058376	-124.186897774
SFG-7	40.820340242	-124.186835442
SFG-8	40.820401592	-124.187082923
SS-1	40.815234800	-124.191265590
SS-10	40.815046032	-124.191317184
SS-2	40.815441225	-124.190715860
SS-3	40.814998193	-124.190682618
SS-4	40.814340459	-124.190031786
SS-5	40.814206969	-124.189727066
SS-6	40.814081640	-124.190115525
SS-7	40.813950460	-124.190077226
SS-8	40.813995316	-124.189678462
SS-9	40.813740130	-124.189787260
ULBP-1	40.814674751	-124.188993944
ULBP-1A	40.814602619	-124.188934594
ULBP-2	40.814395550	-124.188441118
ULBP-3	40.814679195	-124.188456011
ULBP-4	40.814579604	-124.188525517
ULBP-5	40.814300142	-124.188278550
ULBP-6	40.814670074	-124.189266790

TABLE 1
SOIL BORING LOCATIONS
Town of Samoa
Samoa, CA

Boring ID	Latitude [1]	Longitude [1]

Notes:

1 Latitude and longitude are presented in decimal degrees based on the 1983 North

TABLE 2
SUMMARY OF CHEMICAL ANALYSES
OF SOIL SAMPLES FROM THE SOCCER FIELD
Town of Samoa
Samoa, CA

Soccer Field - Soils

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			BTEX (EPA 8021B)				Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Arsenic (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
Boring ID	Screening Level	83 [a]	83 [a]	370 [a]	0.044 [a]	2.9 [a]	2.3 [a]	2.3 [a]	3.0 [b]	1,000 [a]	150 [b]	1,600 [b]	23,000 [b]
SF-1-3.0'	19-Feb-09	–	390	390	–	–	–	–	–	–	–	–	–
SF-2-4.0'	19-Feb-09	–	1,600	170	–	–	–	–	–	–	–	–	–
SF-3-5.0'-7.0'	19-Feb-09	–	450	620	–	–	–	–	–	–	–	–	–
SF-4-1.0'-3.0'	23-Jan-09	7.3 [1]	1,700	530	<0.010 [1]	0.031 [1]	0.043 [1]	<0.030 [1]	1.84	27.7	8.02	24.4	32.4
SF-4-7.0'-8.0'	23-Jan-09	4.3 [1]	580	280	<0.010 [1]	0.10 [1]	0.17 [1]	<0.030 [1]	1.26	24.4	7.27	19.7	28.5
SF-4-11.0'-12.0'	23-Jan-09	<1.0 [1]	<10	<50	<0.0050 [1]	<0.0050 [1]	<0.0050 [1]	<0.0150 [1]	2.89	45.6	3.64	34.8	19.3
SF-5-1.0'-2.0'	23-Jan-09	<2.0 [1]	340	440	<0.010 [1]	0.055 [1]	0.12 [1]	<0.030 [1]	1.12	16.7	5.46	22.2	24.5
SF-5-7.0'-8.0'	23-Jan-09	<2.0 [1]	590	870	<0.010 [1]	0.085 [1]	0.012 [1]	<0.030 [1]	1.40	25.5	15.6	22.9	40.5
SF-5-9.0'-12.0'	23-Jan-09	<1.0 [1]	<10	52	<0.0050 [1]	0.0052 [1]	<0.0050 [1]	<0.0150 [1]	2.45	36.9	3.29	41.9	25.9
SF-6-1.0'	20-Jan-09	<4.0	53	320	<0.04	0.14	<0.04	<0.12	1.89	27.7	18.0	26.6	44.0
SF-6-4.0'	20-Jan-09	32	300	320	<0.04	0.49	0.93	<0.12	1.41	39.5	6.57	28.3	24.3
SF-6-7.0'	20-Jan-09	20	500	940	<0.04	0.88	0.49	<0.12	1.52	23.8	18.0	20.7	42.7
SF-7-1.0'	19-Jan-09	18	25	130	<0.04	0.04	<0.04	<0.12	1.97	26.9	12.1	24.0	31.7
SF-7-4.0'	19-Jan-09	56	370	580	<0.04	0.78	0.72	<0.12	1.26	23.8	7.10	22.4	27.6
SF-7-7.0'	19-Jan-09	38	650	1,300	<0.04	0.85	0.15	<0.12	1.62	28.3	9.93	26.5	31.5
SF-7-10.5'	21-Jan-09	<2.0	930	2,400	<0.02	0.06	<0.02	<0.06	1.41	27.7	13.2	24.0	334
SF-7-11.5'	21-Jan-09	<1.0	13,000	65,000	<0.0050	0.076	0.0070	0.048	24.1	49.9	6,590	51.3	259
SF-8-1.0'	20-Jan-09	11	170	1,400	<0.04	0.09	<0.04	<0.12	2.49	29.5	20.4	28.9	50.2
SF-8-4.0'	20-Jan-09	75	290	250	<0.04	0.34	1.9	<0.12	1.46	28.2	7.58	24.5	30.1
SF-8-7.0'	20-Jan-09	33	1,000	1,500	<0.04	0.40	0.13	<0.12	1.44	24.5	17.2	26.7	39.0
SF-9-1.0'-4.0'	23-Jan-09	<2.0 [1]	270	160	<0.010 [1]	0.012	<0.010 [1]	<0.030 [1]	2.01	30.1	8.10	24.9	38.0
SF-9-5.0'-7.0'	23-Jan-09	2.1 [1]	540	710	<0.010 [1]	1.0 [1]	0.12 [1]	<0.030 [1]	1.78	33.5	11.1	31.4	42.9
SF-9-10.0'-12.0'	23-Jan-09	<2.0 [1]	480	800	<0.010 [1]	0.049 [1]	<0.010 [1]	<0.030 [1]	2.03	30.6	62.0	29.6	64.4
SF-10-1.0'-4.0'	23-Jan-09	2.4 [1]	190	210	<0.010 [1]	0.19 [1]	0.067 [1]	0.017 [1]	1.77	31.8	9.57	26.1	37.7
SF-10-4.0'-6.0'	23-Jan-09	<1.0 [1]	430	410	<0.0050 [1]	0.051 [1]	0.033 [1]	<0.0150 [1]	1.91	30.6	9.18	26.7	33.0
SF-10-8.0'-10.0'	23-Jan-09	<2.0 [1]	450	600	<0.010 [1]	0.078 [1]	0.025 [1]	<0.030 [1]	1.54	32	13.2	29.9	54.6
SF-10-10.0'-11.5'	23-Jan-09	2.3 [1]	480	890	<0.010 [1]	0.061 [1]	<0.010 [1]	<0.030 [1]	1.99	27.1	32.9	24.6	165

TABLE 2
SUMMARY OF CHEMICAL ANALYSES
OF SOIL SAMPLES FROM THE SOCCER FIELD
Town of Samoa
Samoa, CA

Soccer Field - Soils

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			BTEX (EPA 8021B)				Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Arsenic (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
Boring ID	Screening Level	83 [a]	83 [a]	370 [a]	0.044 [a]	2.9 [a]	2.3 [a]	2.3 [a]	3.0 [b]	1,000 [a]	150 [b]	1,600 [b]	23,000 [b]
SF-11-7.0'	21-Jan-09	--	660	1,600	--	--	--	--	2.15	32.2	8.53	32.9	40.9
SF-11-11.5'	21-Jan-09	<2.0 [1]	2,600	6,300 [2]	<0.010 [1]	0.019 [1]	<0.010 [1]	<0.030 [1]	4.94	68.2	1,390	51.7	565
SF-12-10.0'-12.0'	23-Jan-09	<1.0 [1]	320	870	<0.0050 [1]	0.0084 [1]	<0.0050 [1]	<0.0150 [1]	2.86	35.7	168	33.5	393
SF-13-11.0'-15.5'	10-Mar-09	--	410	1,100	--	--	--	--	--	--	0.961	--	--
SF-13-15.5'-16.0'	10-Mar-09	--	<10	<50	--	--	--	--	--	--	4.08	--	--
SF-14-10.0'-13.0'	10-Mar-09	--	440	970	--	--	--	--	--	--	14.3	--	--
SF-14-13.0'-15.0'	10-Mar-09	--	<10	<50	--	--	--	--	--	--	3.79	--	--
SF-15-6.5'-9.0'	10-Mar-09	--	350	400	--	--	--	--	--	--	25.5	--	--
SF-15-9.5'-11.5'	10-Mar-09	--	<10	<50	--	--	--	--	--	--	4.21	--	--
SF-16-1.0'-3.0'	10-Mar-09	--	<10	<50	--	--	--	--	--	--	--	--	--
SF-16-4.0'-7.0'	10-Mar-09	--	<10	<50	--	--	--	--	--	--	--	--	--
SF-16-8.0'-12.0'	10-Mar-09	--	<10	<50	--	--	--	--	--	--	--	--	--
SF-17-4.0'-8.0'	10-Mar-09	--	350	1,000	--	--	--	--	--	--	--	--	--
SF-17-8.0'-10.0'	10-Mar-09	--	<10	<50	--	--	--	--	--	--	--	--	--
SF-18-5.0'-9.0'	10-Mar-09	--	680	960	--	--	--	--	--	--	--	--	--
SF-18-9.0'-12.0'	10-Mar-09	--	31	260	--	--	--	--	--	--	--	--	--
SF-19-8.0'-12.0'	10-Mar-09	--	800	3,300	--	--	--	--	1.53	--	--	--	--
SF-19-16.0'-18.0'	10-Mar-09	--	<10	<50	--	--	--	--	2.21	--	--	--	--
SF-20-4.0'-7.0'	10-Mar-09	--	39	150	--	--	--	--	1.82	--	8.77	--	--
SF-20-7.0'-10.5'	10-Mar-09	--	<10	<50	--	--	--	--	2.05	--	3.85	--	--
SF-21-3.0'-8.0'	10-Mar-09	--	18	99	--	--	--	--	3.24	--	13.1	--	--
SF-21-13.0'-16.0'	10-Mar-09	--	<10	<50	--	--	--	--	2.32	--	3.53	--	--
SF-22-3.0'-15.0'	10-Mar-09	--	200	170	--	--	--	--	1.81	--	11.1	--	--
SF-22-16.0'-19.0'	10-Mar-09	--	<10	<50	--	--	--	--	1.47	--	3.53	--	--
SF-23-7.5'-8.0'	04-Apr-09	--	<10	<50	--	--	--	--	--	--	--	--	--
SF-24-8.0'-8.5'	04-Apr-09	--	<10	<50	--	--	--	--	--	--	--	--	--
SF-24-12.0'-12.5'	04-Apr-09	--	<10	<50	--	--	--	--	--	--	--	--	--

TABLE 2
SUMMARY OF CHEMICAL ANALYSES
OF SOIL SAMPLES FROM THE SOCCER FIELD
Town of Samoa
Samoa, CA

Soccer Field - Soils

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			BTEX (EPA 8021B)				Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Arsenic (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
Boring ID	Screening Level	83 [a]	83 [a]	370 [a]	0.044 [a]	2.9 [a]	2.3 [a]	2.3 [a]	3.0 [b]	1,000 [a]	150 [b]	1,600 [b]	23,000 [b]
SF-25-9.0'-9.5'	04-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–
SF-25-14.0'-14.5'	04-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–
SF-26-9.75'-12'	04-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–
SF-26-6.0'-8.0'	04-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–
SF-27-10.0'-12.0'	04-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–
SF-28-8.0'-12.0'	04-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–

Notes:
350 Red bold indicates a result that exceeds a screening level.
a California Regional Water Quality Control Board San Francisco Bay Region, 2007, *Screening for Environmental Concerns at Sites with Contaminated Soil and*
b California Environmental Protection Agency (CALEPA), *Use of California Human Health Screening Levels*
1 Sample analyzed using EPA Method 8260B.
2 Reported concentration is an estimate. The value exceeded the calibration range established for the analyte.

TABLE 3
SUMMARY OF CHEMICAL ANALYSES
OF GROUNDWATER GRAB SAMPLES FROM THE SOCCER FIELD
Town of Samoa
Samoa, CA

Soccer Field - Groundwater

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			BTEX (EPA 8021B)				Dissolved Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (µg/L)	TPH-Diesel (µg/L)	TPH-Motor Oil (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Arsenic (µg/L)	Chromium (µg/L)	Lead (µg/L)	Nickel (µg/L)	Zinc (µg/L)
Boring ID	Screening Level	50 [a]	100 [a]	175 [a]	0.15 [c]	40 [c]	3.2 [c]	17 [c]	10 [b]	50 [c]	2.5 [d]	12 [c]	2,000 [c]
SF-4	23-Jan-09	<50	<12 [1]	<58 [1]	<0.15 [2]	<0.5	<0.5	<1.5	3.73	16.0	<1	6.92	3.41
SF-5	23-Jan-09	<50	<13 [1]	<66 [1]	<0.15 [2]	<0.5	<0.5	<1.5	**26.3**	8.22	<1.0	3.85	3.12
SF-7	23-Jan-09	<50	**130**	**430**	<0.15 [2]	1.2	<0.5	3.5	**52.6**	36.8	**31.8**	10.3	56.7
SF-9	23-Jan-09	<50	22	81	<0.15 [2]	<0.5	<0.5	<1.5	**16.7**	41.0	<1.0	9.91	6.23
SF-10	23-Jan-09	<50	21	78	<0.15 [2]	<0.5	<0.5	<1.5	**42.0**	38.7	1.38	**13.1**	11.8
SF-11	23-Jan-09	<50	20	96 [1]	<0.15 [2]	<0.5	<0.5	<1.5	**44.5**	48.0	<1.0	6.44	16.5
SF-12	23-Jan-09	<50	<12 [1]	<58 [1]	<0.15 [2]	<0.5	<0.5	<1.5	**10.4**	**51.4**	**3.04**	10.2	18.7
SF-13	10-Mar-09	--	--	--	--	--	--	--	7.9	**100**	1.5	**20**	--
SF-14	10-Mar-09	--	--	--	--	--	--	--	**25**	**120**	**3.2**	--	--
SF-15	10-Mar-09	--	--	--	--	--	--	--	**67**	**63**	<1.0	--	--
SF-17	10-Mar-09	--	--	--	--	--	--	--	5.6	--	--	--	--
SF-18	10-Mar-09	--	<12 [1]	<61 [1]	--	--	--	--	**27**	--	<1.0	--	--
SF-19	10-Mar-09	--	--	--	--	--	--	--	<5.0	--	--	--	--
SF-20	10-Mar-09	--	--	--	--	--	--	--	**45**	--	--	11	--
SF-21	10-Mar-09	--	--	--	--	--	--	--	**120**	**95**	<1.0	**58**	--
SF-22	10-Mar-09	--	--	--	--	--	--	--	**99**	**110**	<1.0	**38**	--
SF-23	06-Apr-09	--	--	--	--	--	--	--	--	14	--	**34**	--
SF-24	06-Apr-09	--	--	--	--	--	--	--	3.0	40	0.61	**61**	--
SF-25	06-Apr-09	--	--	--	--	--	--	--	7.3	36	<0.50	**49**	--
SF-26	06-Apr-09	--	--	--	--	--	--	--	<2.0	--	--	--	--
SF-27	06-Apr-09	--	--	--	--	--	--	--	3.3	--	--	--	--
SF-28	06-Apr-09	--	--	--	--	--	--	--	<2.0	0.87	--	3.8	--

Notes:

350 Red bold indicates a result that exceeds a screening level.

a Kasey Ashley personal communication (11/21/08)

b EPA Primary MCL

c Central Valley Regional Water Quality Control Board, 2008, A Compilation of Water Quality Goals, July 2008.

d California Regional Water Quality Control Board San Francisco Bay Region, 2007, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, November 2007, revised May 2008.

1 Reporting limits are elevated due to insufficient sample volume.

TABLE 4
COMPARISON OF TPH AS DIESEL AND MOTOR OIL RESULTS
FROM SOIL SAMPLES WITH AND WITHOUT SILICA-GEL CLEANUP
Town of Samoa
Samoa, CA

Soccer Field - Soils

		TPH-D/MO (EPA 8015M)		TPH-D/MO (EPA 8015M) with silica-gel			
Boring ID	Date Sampled	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	Percent Reduction of TPH Diesel Results	Percent Reduction of TPH Motor Oil Results
SF-6-7.0'	20-Jan-09	660	1,400	500	940	**24%**	**33%**
SF-7-7.0'	19-Jan-09	830	1,600	650	1,300	**22%**	**19%**
SF-7-10.5'	21-Jan-09	1,200	2,500	930	2,400	**23%**	**4%**
SF-8-7.0'	20-Jan-09	1,200	1,700	1,000	1,500	**17%**	**12%**
SF-11-11.5'	21-Jan-09	3,600	5,600	2,600	6,300	**28%**	**-13%**

TABLE 5
COMPARISON OF TPH AS DIESEL AND MOTOR OIL RESULTS
FROM GROUNDWATER SAMPLES WITH AND WITHOUT SILICA-GEL CLEANUP
Town of Samoa
Samoa, CA

Soccer Field - Groundwater

		TPH-D/MO (EPA 8015M)		TPH-D/MO (EPA 8015M) with silica-gel			
Boring ID	Date Sampled	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	Percent Reduction of TPH Diesel Results	Percent Reduction of TPH Motor Oil Results
SF-7	23-Jan-09	1,000	770	130	430	**87%**	**44%**
SF-11	23-Jan-09	490	380	20	96	**96%**	**75%**

TABLE 6
SUMMARY OF CHEMICAL ANALYSES
OF SOIL SAMPLES FROM THE RAILROAD
Town of Samoa
Samoa, CA

Railroad - Soil

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	Arsenic (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
Boring ID	Screening Level	83 [a]	83 [a]	370 [a]	3.0 [b]	1,000 [a]	150 [b]	1,600 [b]	23,000 b
RR-1-1.0'	29-Jan-09	--	66	100	2.35	--	--	--	--
RR-1-3.0'	29-Jan-09	--	<10	<50	**3.70**	--	--	--	--
RR-1-5.0'	29-Jan-09	--	<10	<50	**3.08**	--	--	--	--
RR-2-1.0'	29-Jan-09	--	16	<50	**3.41**	--	--	--	--
RR-2-3.0'	29-Jan-09	--	**85**	280	**9.67**	--	--	--	--
RR-2-5.0'	29-Jan-09	--	<10	<50	**3.32**	--	--	--	--
RR-3-1.0'	29-Jan-09	--	16	58	2.47	--	--	--	--
RR-3-3.0'	29-Jan-09	--	13	57	**3.71**	--	--	--	--
RR-3-5.0'	29-Jan-09	--	<10	<50	1.13	--	--	--	--
RR-4-1.0'	09-Mar-09	--	--	--	2.79	--	--	--	--
RR-4-3.0'	09-Mar-09	--	<10	<50	**3.16**	--	--	--	--
RR-4-5.0'	09-Mar-09	--	<10	<50	2.63	--	--	--	--
RR-5-1.0'	09-Mar-09	--	--	--	1.98	--	--	--	--
RR-5-3.0'	09-Mar-09	--	<10	<50	2.38	--	--	--	--
RR-6-1.0'	09-Mar-09	--	--	--	1.76	--	--	--	--
RR-6-3.0'	09-Mar-09	--	<10	<50	2.40	--	--	--	--

Notes:

350 Red bold indicates a result that exceeds a screening level.

a California Regional Water Quality Control Board San Francisco Bay Region, 2007, *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater,* November 2007, revised May 2008.

b California Environmental Protection Agency (CALEPA), *Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties,* January 2005.

TABLE 7
SUMMARY OF CHEMICAL ANALYSES
OF GROUNDWATER GRAB SAMPLES FROM THE RAILROAD
Town of Samoa
Samoa, CA

Railroad - Groundwater

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			Dissolved Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (µg/L)	TPH-Diesel (µg/L)	TPH-Motor Oil (µg/L)	Arsenic (µg/L)	Chromium (µg/L)	Lead (µg/L)	Nickel (µg/L)	Zinc (µg/L)
Boring ID	Screening Level	50 [a]	100 [a]	175 [a]	10 [b]	50 [c]	2.5 [d]	12 [c]	2,000 [c]
RR-1	29-Jan-09	--	<50	<175 [1]	2.09	--	--	--	--
RR-2	07-Feb-08	--	<50	<175 [1]	**12.2**	--	--	--	--
RR-3	07-Feb-08	--	<50	<175 [1]	**17.6**	--	--	--	--
RR-5	09-Mar-09	--	--	--	<5.0	--	--	--	--
RR-6	09-Mar-09	--	--	--	7.4	--	--	--	--
RR-7	09-Mar-09	--	--	--	8.8	--	--	--	--
RR-8	09-Mar-09	--	--	--	**29**	--	--	--	--
RR-9	04-Apr-09	--	--	--	2.9	--	--	--	--
RR-10	4-Apr-09	--	--	--	**10**	--	--	--	--

Notes:

350 Red bold indicates a result that exceeds a screening level.

a Kasey Ashley personal communication (11/21/08)

b EPA Primary MCL

c Central Valley Regional Water Quality Control Board, 2008, A Compilation of Water Quality Goals, July 2008.

d California Regional Water Quality Control Board San Francisco Bay Region, 2007, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, November 2007, revised May 2008.

1 Result is below normal reporting limits. Value is an estimate.

TABLE 8
SUMMARY OF CHEMICAL ANALYSES
OF GROUNDWATER GRAB SAMPLES FROM THE SEWER SYSTEM
Town of Samoa
Samoa, CA

Sewer System - Groundwater

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			BTEX (EPA 8021B)				Dissolved Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (µg/L)	TPH-Diesel (µg/L)	TPH-Motor Oil (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Arsenic (µg/L)	Chromium (µg/L)	Lead (µg/L)	Nickel (µg/L)	Zinc (µg/L)
Boring ID	Screening Level	50 [a]	100 [a]	175 [a]	0.15 [c]	40 [c]	3.2 [c]	17 [c]	10 [b]	50 [c]	2.5 [d]	12 [c]	2,000 [c]
SS-1	02-Feb-09	--	<12 [1]	<60 [1]	--	--	--	--	--	--	--	8.35	2.29
SS-2	02-Feb-09	--	<12 [1]	<60 [1]	--	--	--	--	--	--	--	1.23	<2.0
SS-3	02-Feb-09	--	<12 [1]	<60 [1]	--	--	--	--	--	--	--	2.70	<2.0
SS-4	19-Feb-09	--	--	--	--	--	--	--	--	--	--	--	4.58
SS-5	03-Feb-09	--	--	--	--	--	--	--	--	--	--	--	35.1
SS-6	02-Feb-09	--	--	--	--	--	--	--	--	--	--	--	2.39
SS-7	25-Feb-09	<50	<13 [1]	<65 [1]	<0.15 [2]	<0.5	<0.5	<1.5	--	--	--	--	6.39
SS-8	25-Feb-09	<50	<11 [1]	<53 [1]	<0.15 [2]	<0.5	<0.5	<1.5	--	--	--	--	11.6
SS-9	03-Feb-09	<100	<12 [1]	<60 [1]	<0.15 [2]	<1.0	<1.0	<3.0	--	--	--	--	4.28
SS-10	07-Apr-09	<50	--	--	<0.5 [2]	<0.5 [2]	<0.5 [2]	<1.0 [2]	--	--	--	--	--

Notes:

350 Red bold indicates a result that exceeds a screening level.

a Kasey Ashley personal communication (11/21/08)

b EPA Primary MCL

c Central Valley Regional Water Quality Control Board, 2008, A Compilation of Water Quality Goals, July 2008.

d California Regional Water Quality Control Board San Francisco Bay Region, 2007, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, November 2007, revised May 2008.

1 Reporting limit is elevated due to insufficient sample volume.

2 Samples were analyzed using EPA Method 8260.

TABLE 9
SUMMARY OF CHEMICAL ANALYSES
OF SOIL SAMPLES FROM UNLINED BURN PIT
Town of Samoa
Samoa, CA

Unlined Burn Pit - Soil

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	Arsenic (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
Boring ID	Screening Level	83 [a]	83 [a]	370 [a]	3.0 [b]	1,000 [a]	150 [b]	1,600 [b]	23,000 b
ULBP-1-6.0'	30-Jan-09	--	11	<50	--	--	--	--	156
ULBP-1A-14.0'-16.0'	25-Feb-09	--	50	<79	--	--	--	--	50
ULBP-2-7.0'-8.0'	30-Jan-09	--	--	--	--	--	--	--	19.3
ULBP-3-8.0'-9.0'	30-Jan-09	--	--	--	--	--	--	--	19.3

Notes:

350 Red bold indicates a result that exceeds a screening level.

a California Regional Water Quality Control Board San Francisco Bay Region, 2007, *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater,* November 2007, revised May

b California Environmental Protection Agency (CALEPA), *Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties,* January 2005.

TABLE 10
SUMMARY OF CHEMICAL ANALYSES
OF GROUNDWATER GRAB SAMPLES FROM THE UNLINED BURN PIT
Town of Samoa
Samoa, CA

Unlined Burn Pit - Groundwater

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			BTEX (EPA 8021B)				Dissolved Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (µg/L)	TPH-Diesel (µg/L)	TPH-Motor Oil (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Arsenic (µg/L)	Chromium (µg/L)	Lead (µg/L)	Nickel (µg/L)	Zinc (µg/L)
Boring ID	Screening Level	50 [a]	100 [a]	175 [a]	0.15 [c]	40 [c]	3.2 [c]	17 [c]	10 [b]	50 [c]	2.5 [d]	12 [c]	2,000 [c]
ULBP-1A	25-Feb-09	--	**150**	**230**	--	--	--	--	--	--	--	--	94.3
ULBP-2	30-Jan-09	--	--	--	--	--	--	--	--	--	--	--	5.22
ULBP-3	30-Jan-09	--	--	--	--	--	--	--	--	--	--	--	3.05
ULBP-4	11-Mar-09	--	<11 [1]	<56 [1]	--	--	--	--	--	--	--	--	--
ULBP-5	11-Mar-09	--	<12 [1]	<62 [1]	--	--	--	--	--	--	--	--	--
ULBP-6	17-Mar-09	--	<10	<52	--	--	--	--	--	--	--	--	--

Notes:

350 Red bold indicates a result that exceeds a screening level.

a Kasey Ashley personal communication (11/21/08)

b EPA Primary MCL

c Central Valley Regional Water Quality Control Board, 2008, A Compilation of Water Quality Goals, July 2008.

d California Regional Water Quality Control Board San Francisco Bay Region, 2007, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, November 2007, revised May 2008.

1 Reporting limits are elevated due to insufficient sample volume.

TABLE 11
SUMMARY OF CHEMICAL ANALYSES
OF SOIL SAMPLES FROM THE LORENZO BUILDINGS
Town of Samoa
Samoa, CA

Lorenzo Buildings

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			BTEX (EPA 8021B)				SVOCs (EPA 8270D SIM)															
	Date Sampled	TPH-Gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Naphthalene (mg/kg)	Acenaphthylene (mg/kg)	Acenaphthene (mg/kg)	Fluorene (mg/kg)	Phenanthrene (mg/kg)	Anthracene (mg/kg)	Fluoranthene (mg/kg)	Pyrene (mg/kg)	Benz(a)anthracene (mg/kg)	Chrysene (mg/kg)	Benzo(e)pyrene (mg/kg)	Benzo(b)fluoranthene (mg/kg)	Benzo(k)fluoranthene (mg.kg)	Indeno(1,2,3-cd)pyrene (mg/kg)	Dibenz(a,h)anthracene (mg/kg)	Benzo(g,h,i)perylene (mg/kg)
Boring ID	Screening Level	83 [a]	83 [a]	370 [a]	0.044 [a]	2.9 [a]	2.3 [a]	2.3 [a]	1.3 [a]	13 [a]	18 [a]	8.9 [a]	11 [a]	2.8 [a]	40 [a]	85 [a]	0.38 [a]	23 [a]	0.038 [a]	0.38 [a]	0.38 [a]	0.62 [a]	0.062 [a]	27 [a]
LB-1-0.5'	17-Jan-09	–	87	740	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-1-1.5'	17-Jan-09	–	42	130	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-2-0.5'	17-Jan-09	–	120	620	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-2-1.5'	17-Jan-09	–	620	1,600	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-3-0.5'	17-Jan-09	–	32	130	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-3-1.5'	17-Jan-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-4-1.0'	17-Jan-09	–	–	–	–	–	–	–	<0.01	<0.01	<0.01	<0.01 [3]	0.012	<0.01 [3]	0.018	0.018	<0.01	0.013	<0.01	0.014	<0.01	<0.01	<0.01	0.012
LB-4-2.0'	17-Jan-09	–	–	–	–	–	–	–	<0.01	<0.01	<0.01	<0.01 [3]	0.013	<0.01 [3]	0.022	0.022	<0.01	0.018	<0.01	0.018	<0.01	<0.01	<0.01	0.014
LB-5-1.0'	17-Jan-09	–	–	–	–	–	–	–	0.026	0.039	<0.01	<0.01 [3]	0.13	0.018 [3]	0.15	0.18	0.052	0.11	0.066	0.11	0.039	0.061	0.012	0.072
LB-5-2.0'	17-Jan-09	–	–	–	–	–	–	–	<0.01	<0.01	<0.01	<0.01 [3]	0.013	<0.01 [3]	0.015	0.018	<0.01	0.011	<0.01	0.011	<0.01	<0.01	<0.01	<0.01
LB-6-0.5'	17-Jan-09	–	–	–	–	–	–	–	<0.01	<0.01	<0.01	<0.01 [3]	0.015	<0.01 [3]	0.023	0.022	<0.01	0.019	<0.01	0.017	<0.01	<0.01	<0.01	<0.01
LB-6-1.5'	17-Jan-09	–	–	–	–	–	–	–	<0.01	<0.01	<0.01	<0.01 [3]	<0.01	<0.01 [3]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
LB-7-0.5'	18-Jan-09	–	–	–	–	–	–	–	0.19	0.12	<0.1	<0.01 [3]	0.57	<0.1 [3]	0.60	0.58	0.21	0.31	0.16	0.27	<0.1	0.13	<0.1	0.16
LB-7-1.5'	18-Jan-09	–	–	–	–	–	–	–	0.035	0.038	<0.01	<0.1 [3]	0.075	<0.01 [3]	0.091	0.097	0.015	0.038	0.015	0.033	<0.01	0.013	<0.01	0.017
LB-8 [1,2]	19-Feb-09	–	–	–	<0.005 [2]	<0.005 [2]	<0.005 [2]	<0.015 [2]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-9 [1,2]	19-Feb-09	–	–	–	<0.005 [2]	<0.005 [2]	<0.005 [2]	<0.015 [2]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-10 [1,2]	19-Feb-09	–	–	–	<0.005 [2]	<0.005 [2]	<0.005 [2]	<0.015 [2]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-11-0.5'	07-Mar-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-11-1.5'	07-Mar-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-12-0.5'	07-Mar-09	–	35	220	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-12-1.5'	07-Mar-09	–	<10	54	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-13-0.5'	07-Mar-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-13-1.5'	07-Mar-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-14-0.5'	07-Mar-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-14-1.5'	07-Mar-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-15-3.0'	07-Mar-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LB-16-0.5'	07-Mar-09	–	–	–	–	–	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

TABLE 11
SUMMARY OF CHEMICAL ANALYSES
OF SOIL SAMPLES FROM THE LORENZO BUILDINGS
Town of Samoa
Samoa, CA

Lorenzo Buildings

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			BTEX (EPA 8021B)				SVOCs (EPA 8270D SIM)															
	Date Sampled	TPH-Gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Naphthalene (mg/kg)	Acenaphthylene (mg/kg)	Acenaphthene (mg/kg)	Fluorene (mg/kg)	Phenanthrene (mg/kg)	Anthracene (mg/kg)	Fluoranthene (mg/kg)	Pyrene (mg/kg)	Benz(a)anthracene (mg/kg)	Chrysene (mg/kg)	Benzo(a)pyrene (mg/kg)	Benzo(b)fluoranthene (mg/kg)	Benzo(k)fluoranthene (mg.kg)	Indeno(1,2,3-cd)pyrene (mg/kg)	Dibenz(a,h)anthracene (mg/kg)	Benzo(g,h,i)perylene (mg/kg)
Boring ID	Screening Level	83 [a]	83 [a]	370 [a]	0.044 [a]	2.9 [a]	2.3 [a]	2.3 [a]	1.3 [a]	13 [a]	16 [a]	8.9 [a]	11 [a]	2.8 [a]	40 [a]	85 [a]	0.38 [a]	23 [a]	0.038 [a]	0.38 [a]	0.38 [a]	0.82 [a]	0.062 [a]	27 [a]
LB-16-1.5'	07-Mar-09	–	–	–	–	–	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
LB-17-1.0'	07-Mar-09	–	–	–	–	–	–	–	<0.01	<0.01	<0.01	<0.01	0.021	<0.01	0.028	0.031	0.015	0.022	0.018	0.029	0.014	0.018	<0.01	0.021
LB-17-2.0'	07-Mar-09	–	–	–	–	–	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Notes:
350 Red bold indicates a result that exceeds a screening level.
a California Regional Water Quality Control Board San Francisco Bay Region, 2007, *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater*, November 2007, revised May 2008.
b California Environmental Protection Agency (CALEPA), *Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties*, January 2005.
1 In addition to BTEX compounds, samples were also analzyed for Volatile Organic Compounds and none were detected.
2 Samples were analyzed using EPA Method 8260.
3 Reported concentration is an estimate due to laboratory quality control issues.

TABLE 12
SUMMARY OF CHEMICAL ANALYSES
OF GROUNDWATER GRAB SAMPLES FROM THE LORENZO BUILDINGS
Town of Samoa
Samoa, CA

Lorenzo Buildings - Groundwater

		VOCs (EPA 8260B)	SVOCs (EPA 8270D SIM)															
	Date Sampled	Tetrachloroethene (µg/L)	Naphthalene (µg/L)	Acenaphthylene (µg/L)	Acenaphthene (µg/L)	Fluorene (µg/L)	Phenanthrene (µg/L)	Anthracene (µg/L)	Fluoranthene (µg/L)	Pyrene (µg/L)	Benz(a)anthracene (µg/L)	Chrysene (µg/L)	Benzo(a)pyrene (µg/L)	Benzo(b)fluoranthene (µg/L)	Benzo(k)fluoranthene (µg/L)	Indeno(1,2,3-cd)pyrene (µg/L)	Dibenz(a,h)anthracene (µg/L)	Benzo(g,h,i)perylene (µg/L)
Boring ID	Screening Level	–	17 [a]	30 [d]	20 [a]	280 [a]	16 [c]	2,100 [c]	280 [c]	210 [c]	0.017 [a]	0.18 [c]	0.004 [c]	0.04 [c]	0.04 [c]	0.04 [c]	0.0048 [c]	0.10 [d]
LB-6	18-Jan-09	–	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
LB-7	18-Jan-09	–	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
LB-18 [1]	06-Apr-09	<1.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
MW-3 [1]	07-Apr-09	<1.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
MW-4 [1]	07-Apr-09	<1.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Notes:

350 Red bold indicates a result that exceeds a screening level.

a Kasey Ashley personal communication (11/21/08)

b EPA Primary MCL

c Central Valley Regional Water Quality Control Board, 2008, A Compilation of Water Quality Goals, July 2008.

d California Regional Water Quality Control Board San Francisco Bay Region, 2007, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, November 2007, revised May 2008.

1 Groudwater Sample analyzed for VOCs using EPA 8260B. No VOCs were detected above the laboratory reporting limit that ranged from 0.5 to

TABLE 13
SUMMARY OF CHEMICAL ANALYSES
OF SOIL SAMPLES FROM RIGGING SHOP
Town of Samoa
Samoa, CA

Rigging Shop - Soil

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	Arsenic (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
Boring ID	Screening Level	83 [a]	83 [a]	370 [a]	3.0 [b]	1,000 [a]	150 [b]	1,600 [b]	23,000 b
RS-1-0.0'-0.5'	27-Jan-09	--	--	--	--	--	--	--	178
RS-1-6.0'	27-Jan-09	--	<10	<50	--	--	--	--	83.7
RS-2-0.0'-0.5'	27-Jan-09	--	--	--	--	--	--	--	40.7
RS-3-0.0'-0.5'	27-Jan-09	--	--	--	--	--	--	--	63.3

Notes:
350 Red bold indicates a result that exceeds a screening level.
a California Regional Water Quality Control Board San Francisco Bay Region, 2007, *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater,* November 2007, revised May 2008.
b California Environmental Protection Agency (CALEPA), *Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties,* January 2005.

TABLE 14
SUMMARY OF CHEMICAL ANALYSES
OF GROUNDWATER GRAB SAMPLES FROM RIGGING SHOP
Town of Samoa
Samoa, CA

Rigging Shop - Groundwater

		TPH-G/D/MO (EPA 8015M) (D/Mo with silica gel)			BTEX (EPA 8021B)				Dissolved Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (µg/L)	TPH-Diesel (µg/L)	TPH-Motor Oil (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Arsenic (µg/L)	Chromium (µg/L)	Lead (µg/L)	Nickel (µg/L)	Zinc (µg/L)
Boring ID	Screening Level	50 [a]	100 [a]	175 [a]	0.15 [c]	40 [c]	3.2 [c]	17 [c]	10 [b]	50 [c]	2.5 [d]	12 [c]	2,000 [c]
RS-1	27-Jan-09	--	<60 [1]	<175 [2]	--	--	--	--	--	--	--	--	8.84
RS-2	27-Jan-09	--	--	--	--	--	--	--	**31.8**	--	--	--	12.5
RS-3	27-Jan-09	--	--	--	--	--	--	--	**38.5**	--	--	--	4.73

Notes:
350 Red bold indicates a result that exceeds a screening level.
a Kasey Ashley personal communication (11/21/08)
b EPA Primary MCL
c Central Valley Regional Water Quality Control Board, 2008, A Compilation of Water Quality Goals, July 2008.
d California Regional Water Quality Control Board San Francisco Bay Region, 2007, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, November 2007, revised May 2008.
1 Reporting limit is elevated due to insufficient sample volume.
2 Result is below normal reporting limits. The value reported is an estimate.

TABLE 15
SUMMARY OF CHEMICAL ANALYSES
OF SOIL SAMPLES FROM COOKHOUSE GARAGES
Town of Samoa
Samoa, CA

Cookhouse Garages - Soil

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			SVOCs (EPA 8270D SIM)														
	Date Sampled	TPH-Gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	Naphthalene (mg/kg)	Acenaphthylene (mg/kg)	Acenaphthene (mg/kg)	Fluorene (mg/kg)	Phenanthrene (mg/kg)	Anthracene (mg/kg)	Fluoranthene (mg/kg)	Pyrene (mg/kg)	Benz(a)anthracene (mg/kg)	Chrysene (mg/kg)	Benzo(a)pyrene (mg/kg)	Benzo(b)fluoranthene (mg/kg)	Benzo(k)fluoranthene (mg.kg)	Indeno(1,2,3-cd)pyrene (mg/kg)	Dibenz(a,h)anthracene (mg/kg)	Benzo(g,h,i)perylene (mg/kg)
Boring ID	Screening Level	83 [a]	83 [a]	370 [a]	1.3 [a]	13 [a]	16 [a]	8.9 [a]	11 [a]	2.8 [a]	40 [a]	85 [a]	0.038 [a]	23 [a]	0.038 [a]	0.38 [a]	0.38 [a]	0.62 [a]	0.062 [a]	27 [a]
CHG-1-0.5'	26-Jan-09	–	–	–	0.013	<0.01	<0.01	<0.01	0.045	<0.01	0.14	0.10	0.038	0.068	**0.056**	0.088	0.030	0.058	<0.01	0.063
CHG-1-2.0'	26-Jan-09	–	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CHG-2-0.5'	26-Jan-09	–	–	–	<0.01	<0.01	<0.01	<0.01	0.021	<0.01	0.063	0.047	0.021	0.039	0.035	0.058	0.019	0.044	<0.01	0.048
CHG-2-2.0'	26-Jan-09	–	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CHG-3-0.5'	07-Mar-09	–	–	–	0.013	<0.01	<0.01	<0.01	0.037	<0.01	0.070	0.050	0.019	0.041	0.027	0.054	0.016	0.034	<0.01	0.037
CHG-3-2.0'	07-Mar-09	–	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CHG-4-0.5'	07-Mar-09	–	–	–	0.010	0.024	<0.01	<0.01	0.19	0.012	0.45	0.34	0.12	0.20	**0.18**	0.27	0.11	0.16	0.031	0.14
CHG-4-2.0'	07-Mar-09	–	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CHG-5-0.5'	07-Mar-09	–	–	–	<0.01	<0.01	<0.01	<0.01	0.024	<0.01	0.082	0.063	0.029	0.047	**0.045**	0.077	0.025	0.045	<0.01	0.042
CHG-5-2.0'	07-Mar-09	–	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CHG-6-3.5'-4.0'	05-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CHG-6-4.5'-5.0'	05-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CHG-7-0.5'	05-Apr-09	–	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CHG-7-2.0'	05-Apr-09	–	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CHG-8-0.5'	05-Apr-09	–	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.016	0.013	<0.01	<0.01	<0.01	0.014	<0.01	0.012	<0.01	0.015
CHG-8-2.0'	05-Apr-09	–	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CHG-9-0.5'	05-Apr-09	–	–	–	<0.01	<0.01	<0.01	<0.01	0.023	<0.01	0.029	0.027	<0.01	0.015	0.011	0.017	0.015	0.015	<0.01	0.019
CHG-9-2.0'	05-Apr-09	–	–	–	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CHG-10-4.5'-5.0'	05-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CHG-11-3.0'-4.0'	05-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CHG-12-4.5'-5.5'	05-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Notes:
350 Red bold indicates a result that exceeds a screening level.
a California Regional Water Quality Control Board San Francisco Bay Region, 2007, *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater,* November 2007, revised May 2008.
b California Environmental Protection Agency (CALEPA), *Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties,* January 2005.

TABLE 16
SUMMARY OF CHEMICAL ANALYSES
OF GROUNDWATER GRAB SAMPLES FROM THE COOKHOUSE GARAGE
Town of Samoa
Samoa, CA

Cookhouse Garage - Groundwater

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			SVOCs (EPA 8270D SIM)															
	Date Sampled	TPH-Gasoline (µg/L)	TPH-Diesel (µg/L)	TPH-Motor Oil (µg/L)	Naphthalene (µg/L)	Acenaphthylene (µg/L)	Acenaphthene (µg/L)	Fluorene (µg/L)	Phenanthrene (µg/L)	Anthracene (µg/L)	Fluoranthene (µg/L)	Pyrene (µg/L)	Benz(a)anthracene (µg/L)	Chrysene (µg/L)	Benzo(a)pyrene (µg/L)	Benzo(b)fluoranthene (µg/L)	Benzo(k)fluoranthene (µg/L)	Indeno(1,2,3-cd)pyrene (µg/L)	Dibenz(a,h)anthracene (µg/L)	Benzo(g,h,i)perylene (µg/L)
Boring ID	Screening Level	50 [a]	100 [a]	175 [a]	17 [a]	30 [b]	20 [a]	280 [a]	16 [a]	2,100 [a]	280 [a]	210 [a]	0.017 [a]	0.18 [a]	0.004 [a]	0.04 [a]	0.04 [a]	0.04 [a]	0.0048 [a]	0.10 [b]
CHG-1	26-Jan-09	–	–	–	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
CHG-2	26-Jan-09	–	–	–	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
CHG-6	05-Apr-09	–	25	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CHG-10	05-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CHG-11	05-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CHG-12	05-Apr-09	–	<10	<50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Notes:

350 Red bold indicates a result that exceeds a screening level.

a Central Valley Regional Water Quality Control Board, 2008, A Compilation of Water Quality Goals, July 2008.

b California Regional Water Quality Control Board San Francisco Bay Region, 2007, *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater,* November 2007, revised May 2008.

TABLE 17
SUMMARY OF CHEMICAL ANALYSES
OF SOIL SAMPLES FROM SOCCER FIELD GARAGES
Town of Samoa
Samoa, CA

Soccer Field Garages - Soil

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	Arsenic (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
Boring ID	Screening Level	83 [a]	83 [a]	370 [a]	3.0 [b]	1,000 [a]	150 [b]	1,600 [b]	23,000 b
SFG-1-0.5'	19-Feb-09	--	18	140	--	--	--	--	--
SFG-1-2.0'	19-Feb-09	--	<10	<50	--	--	--	--	--
SFG-2-0.0'-0.5'	19-Feb-09	--	**1,100**	**1,600**	--	--	--	--	--
SFG-2-2.0'	19-Feb-09	--	<10	<50	--	--	--	--	--
SFG-3-1.0'	04-Feb-09	--	<10	83	--	--	--	--	--
SFG-3-2.0'	04-Feb-09	--	<10	<50	--	--	--	--	--
SFG-3-7.5'	04-Feb-09	--	<10	<50	--	--	--	--	--
SFG-4-0.75'	04-Feb-09	--	12	100	--	--	--	--	--
SFG-4-2.0'	04-Feb-09	--	<10	<50	--	--	--	--	--
SFG-4-6.0'	04-Feb-09	--	<10	<50	--	--	--	--	--
SFG-4-7.5'	04-Feb-09	--	<10	<50	--	--	--	--	--
SFG-5-0.0'-0.5'	17-Mar-09	--	17	130	--	--	--	--	--
SFG-5-2.0'	17-Mar-09	--	<10	<50	--	--	--	--	--
SFG-6-0.0'-0.5'	17-Mar-09		14	130	--	--	--	--	--
SFG-6-2.0'	17-Mar-09		<10	<50	--	--	--	--	--
SFG-7-0.0'-0.5'	17-Mar-09		<10	82	--	--	--	--	--
SFG-7-2.0'	17-Mar-09		<10	59	--	--	--	--	--
SFG-8-0.0'-0.5'	17-Mar-09		21	230	--	--	--	--	--
SFG-8-2.0'	17-Mar-09	--	<10	48	--	--	--	--	--

Notes:

350 Red bold indicates a result that exceeds a screening level.

a California Regional Water Quality Control Board San Francisco Bay Region, 2007, *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater,* November 2007, revised May 2008.

b California Environmental Protection Agency (CALEPA), *Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties,* January 2005.

TABLE 18
SUMMARY OF CHEMICAL ANALYSES
OF GROUNDWATER GRAB SAMPLES FROM SOCCER FIELD GARAGES
Town of Samoa
Samoa, CA

Soccer Field Garages - Groundwater

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			BTEX (EPA 8021B)				Dissolved Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (µg/L)	TPH-Diesel (µg/L)	TPH-Motor Oil (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Arsenic (µg/L)	Chromium (µg/L)	Lead (µg/L)	Nickel (µg/L)	Zinc (µg/L)
Boring ID	Screening Level	50 [a]	100 [a]	175 [a]	0.15 [c]	40 [c]	3.2 [c]	17 [c]	10 [b]	50 [c]	2.5 [d]	12 [c]	2,000 [c]
SFG-3	04-Feb-09	--	<12 [1]	66	--	--	--	--	1.89	11.0	--	8.09	--
SFG-4	04-Feb-09	--	<12 [1]	<60 [1]	--	--	--	--	<1.0	4.84	--	4.24	--

Notes:

350 Red bold indicates a result that exceeds a screening level.

a Kasey Ashley personal communication (11/21/08)

b EPA Primary MCL

c Central Valley Regional Water Quality Control Board, 2008, A Compilation of Water Quality Goals, July 2008.

d California Regional Water Quality Control Board San Francisco Bay Region, 2007, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, November 2007, revised May 2008.

1 Reporting limit is elevated due to insufficient sample volume.

TABLE 19
SUMMARY OF CHEMICAL ANALYSES
OF SOIL SAMPLES FROMHAMMOND POWERHOUSE
Town of Samoa
Samoa, CA

Hammond Powerhouse - Soil

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	Arsenic (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
Boring ID	Screening Level	83 [a]	83 [a]	370 [a]	3.0 [b]	1,000 [a]	150 [b]	1,600 [b]	23,000 b
HPH-1-0.0'-0.5'	25-Feb-09	--	<10	<50	--	--	--	--	17.0
HPH-1-2.0'-3.0'	25-Feb-09	--	<10	<50	--	--	--	--	7.72
HPH-1-4.0'-6.0'	25-Feb-09	--	<10	<50	--	--	--	--	12.6
HPH-2-1.0'-2.0'	25-Feb-09	--	**200**	**790**	--	--	--	--	112
HPH-2-3.0'-4.0'	25-Feb-09	--	<10	<50	--	--	--	--	27.0
HPH-3-0.0'-0.5	30-Jan-09	--	58	310	--	--	--	--	117
HPH-3-2.0'	25-Feb-09	--	<10	<50	--	--	--	--	16.1
HPH-3-4.0'	30-Jan-09	--	<10	<50	--	--	--	--	26.9
HPH-4-2.0'-4.0'	11-Mar-09	--	<10	<50	--	--	--	--	--
HPH-5-2.0'-4.0'	11-Mar-09	--	<10	98	--	--	--	--	--
HPH-6-1.5'-4.0'	11-Mar-09	--	13	60	--	--	--	--	--
HPH-7-3.5'-6.0'	11-Mar-09	--	**160**	360	--	--	--	--	--
HPH-8-0.0'-2.0'	04-Apr-09	--	61	300					
HPH-8-5.0'-7.0'	04-Apr-09	--	<10	<50					

Notes:
350 Red bold indicates a result that exceeds a screening level.
a California Regional Water Quality Control Board San Francisco Bay Region, 2007, *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater*, November 2007, revised May 2008.
b California Environmental Protection Agency (CALEPA), *Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties*, January 2005.

TABLE 20
SUMMARY OF CHEMICAL ANALYSES
OF GROUNDWATER GRAB SAMPLES FROM HAMMOND POWERHOUSE
Town of Samoa
Samoa, CA

Hammond Powerhouse - Groundwater

		TPH-G/D/MO (EPA 8015M) (D/MO with silica gel)			BTEX (EPA 8021B)				Dissolved Metals (EPA 200.8)				
	Date Sampled	TPH-Gasoline (µg/L)	TPH-Diesel (µg/L)	TPH-Motor Oil (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Arsenic (µg/L)	Chromium (µg/L)	Lead (µg/L)	Nickel (µg/L)	Zinc (µg/L)
Boring ID	Screening Level	50 [a]	100 [a]	175 [a]	0.15 [c]	40 [c]	3.2 [c]	17 [c]	10 [b]	50 [c]	2.5 [d]	12 [c]	2,000 [c]
HPH-1	25-Feb-09	--	30	**190**	--	--	--	--	--	--	--	--	10.8
HPH-2	25-Feb-09	--	17	99	--	--	--	--	--	--	--	--	1.63
HPH-5	11-Mar-09	--	12	<53 [1]	--	--	--	--	--	--	--	--	--
HPH-6	11-Mar-09	--	<19 [1]	<94 [1]	--	--	--	--	--	--	--	--	--
HPH-7	11-Mar-09	--	32	120 [2]	--	--	--	--	--	--	--	--	--

Notes:

190 Red bold indicates a result that exceeds a screening level.

a Kasey Ashley personal communication (11/21/08)

b EPA Primary MCL

c Central Valley Regional Water Quality Control Board, 2008, A Compilation of Water Quality Goals, July 2008.

d California Regional Water Quality Control Board San Francisco Bay Region, 2007, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, November 2007, revised May 2008.

1 Reporting limits are elevated due to insufficient sample volume.

2 Result is considered an estimate due to laboratory quality control issues.

FIGURES

N
W E
S

Feet
0 500 1,000 2,000 3,000 4,000

LEGEND

Base Image Data Source:
1:24,000 Digital Raster Graph Mosaic of Humboldt County, California

ALL LOCATIONS APPROXIMATE

Samoa Pacific Group

Figure 1
Site Location Map
Samoa Townsite
Samoa, California

Freshwater Environmental Services

Date: 4-26-09

By: SJT

LEGEND

Approximate boundary of site.

Approximate areas included in this investigation.

Base Image Data Source: Obtained from City of Eureka Engineering/GIS Department Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N W E S

Feet
0 100 200 400 800 800 1,000 1,200

Samoa Pacific Group, LLC.

Figure 2
Site Plan

Date: 4-26-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater
- Former Garage Locations

Base Image Data Source:
Obtained from City of Eureka
Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N W E S

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 3
Soccer Field
Diesel in Soil and Groundwater
Delineation Map

Date: 4-26-09

By: SJT

Freshwater
Environmental
Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater
- Former Garage Locations

Base Image Data Source:
Obtained from City of Eureka
Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 4
Soccer Field
Motor Oil in Soil and Groundwater
Delineation Map

Date: 4-26-09

By: SJT

Freshwater
Environmental
Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater
- Former Garage Locations

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 5
Soccer Field
Gasoline in Groundwater
Delineation Map

Date: 4-26-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater
- Former Garage Locations

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 6
Soccer Field
Arsenic in Soil and Groundwater
Delineation Map

Date: 4-26-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater
- Former Garage Locations

Base Image Data Source:
Obtained from City of Eureka
Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N
W
E
S

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 7
Soccer Field
Lead in Soil and Groundwater
Delineation Map

Date: 4-26-09

By: SJT

Freshwater
Environmental
Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater
- Former Garage Locations

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 8
Soccer Field
Chromium and Nickel in Groundwater Delineation Map

Date: 4-26-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater

Base Image Data Source:
Obtained from City of Eureka
Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N W E S

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 9
Railroad
Diesel in Soil and Groundwater
Delineation Map

Date: 4-26-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N S E

Feet
0 10 20 40 60 80 100 120

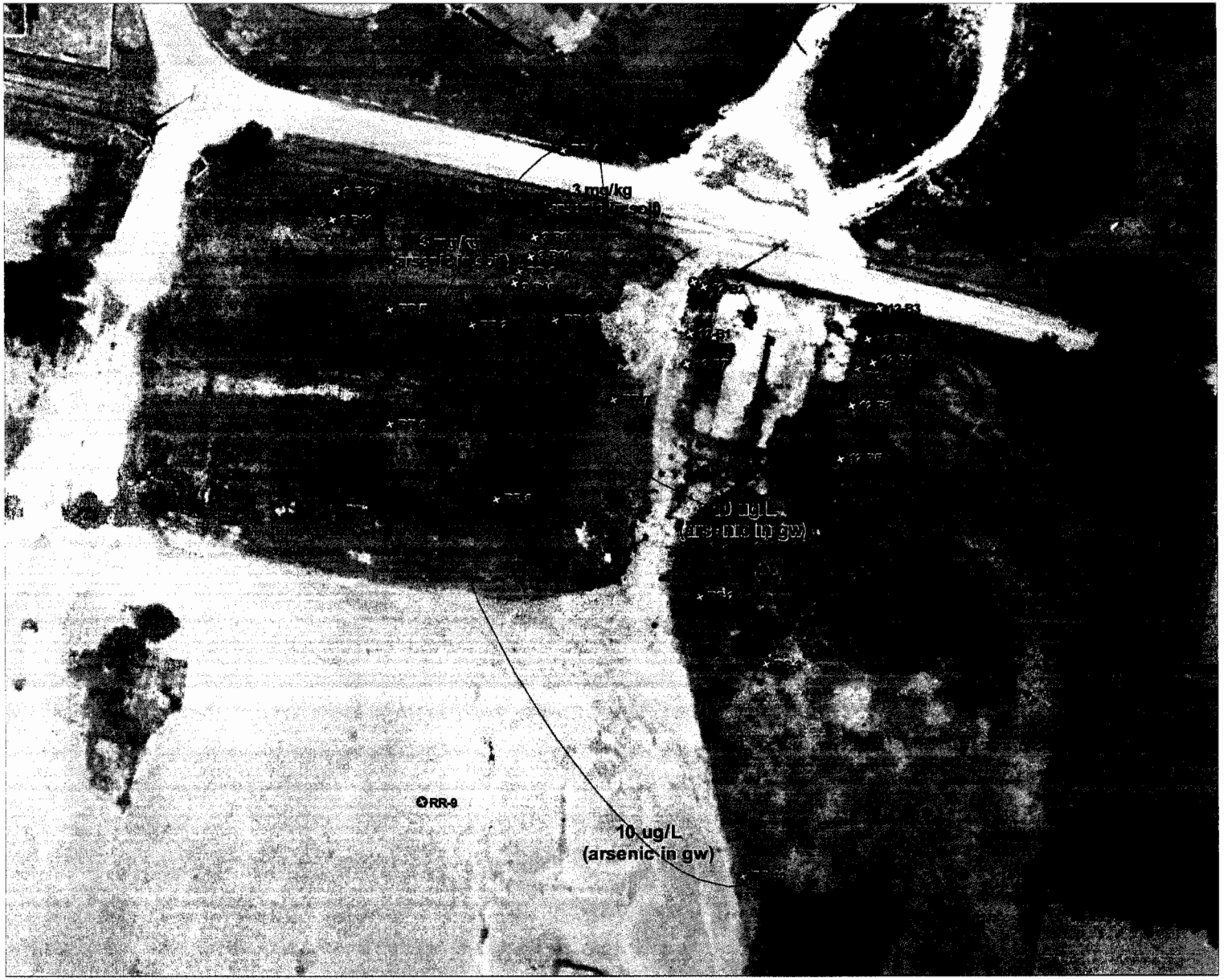
Samoa Pacific Group, LLC.

Figure 10
Railroad
Motor Oil in Groundwater
Delineation Map

Date: 4-26-09

By: SJT

Freshwater Environmental Services



LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater

Base Image Data Source:
Obtained from City of Eureka
Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 11
Railroad
Arsenic in Soil and Groundwater
Delineation Map

Date: 4-26-09

By: SJT

Freshwater
Environmental
Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 80 80 100 120 140 160

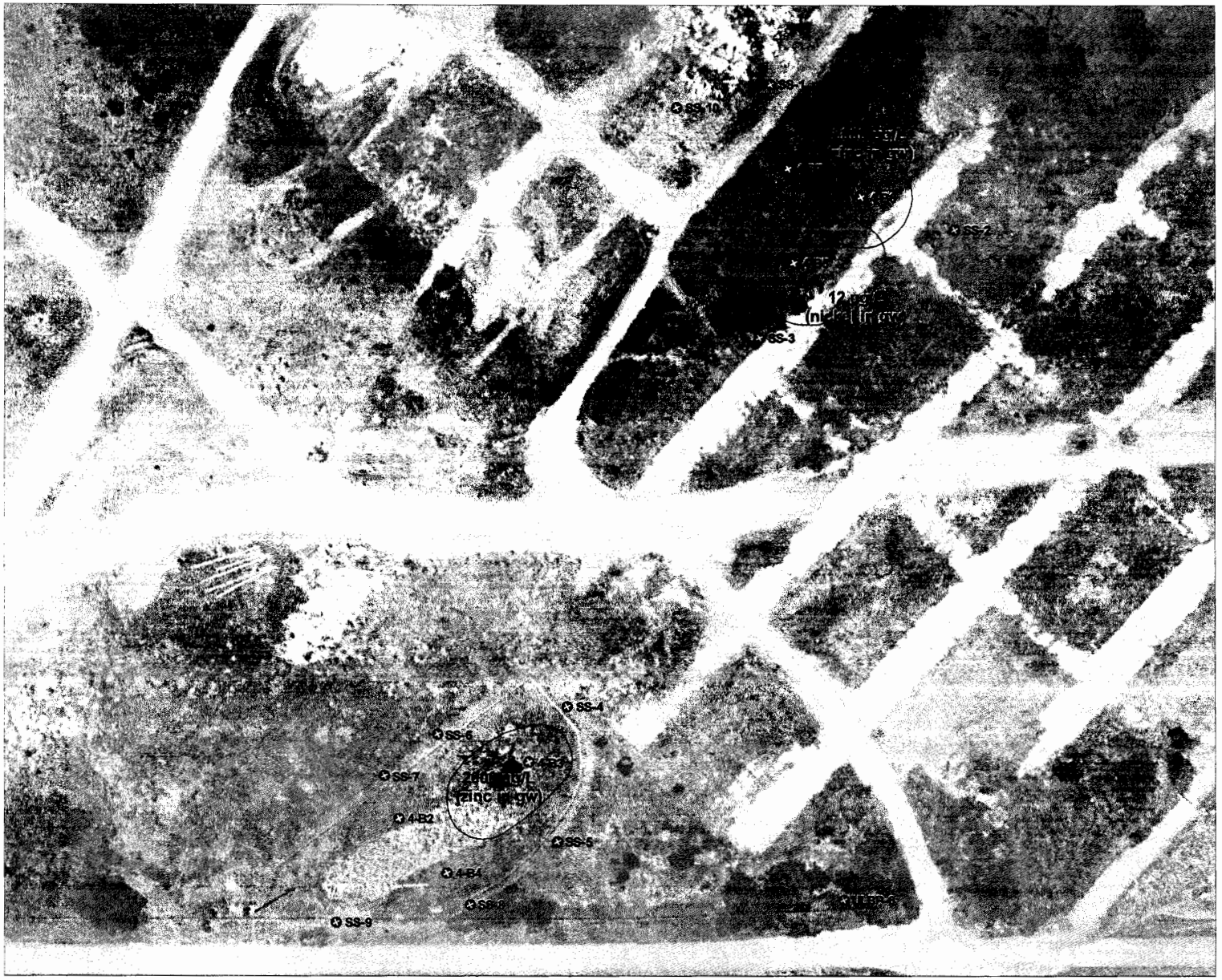
Samoa Pacific Group, LLC.

Figure 12
Sewer System
Gasoline - Diesel - Motor Oil - Benzene in Groundwater Delineation Map

Date: 4-26-09

By: SJT

Freshwater Environmental Services



LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 60 80 100 120 140 160

Samoa Pacific Group, LLC.

Figure 13
Sewer System
Nickel and Zinc in Groundwater
Delineation Map

Date: 4-26-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater

Base Image Data Source:
Obtained from City of Eureka
Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 60 80 100

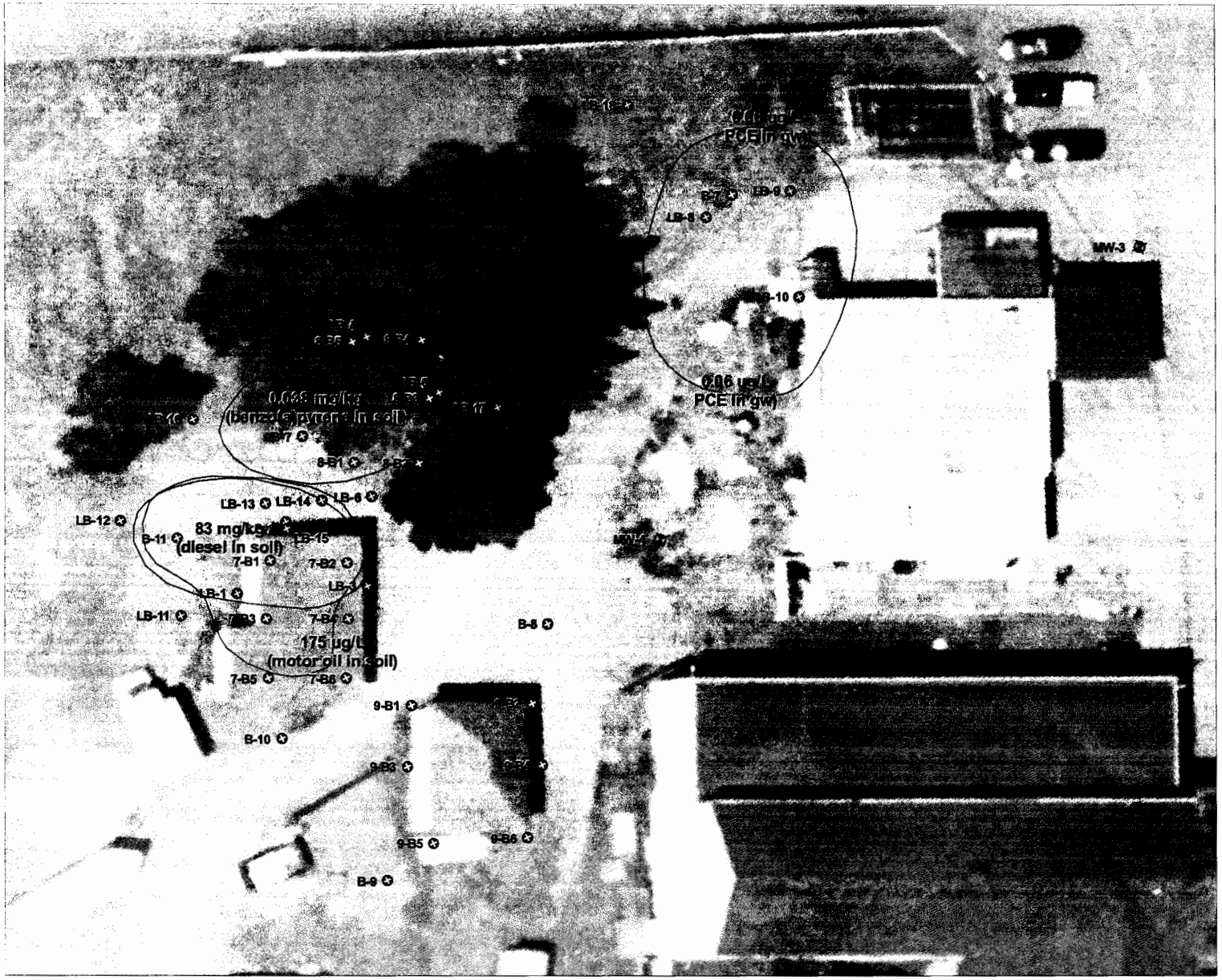
Samoa Pacific Group, LLC.

Figure 14
Unlined Burn Pit
Diesel - Motor Oil - Zinc
in Groundwater Delineation Map

Date: 4-26-09

By: SJT

Freshwater Environmental Services



LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 5 10 20 30 40 50

Samoa Pacific Group, LLC.

Figure 15
Lorenzo Buildings
Diesel - Motor Oil - Benzo(a)pyrene in Soil and PCE in Groundwater Delineation Map

Date: 4-23-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 5 10 20 30 40 50 60 70 80

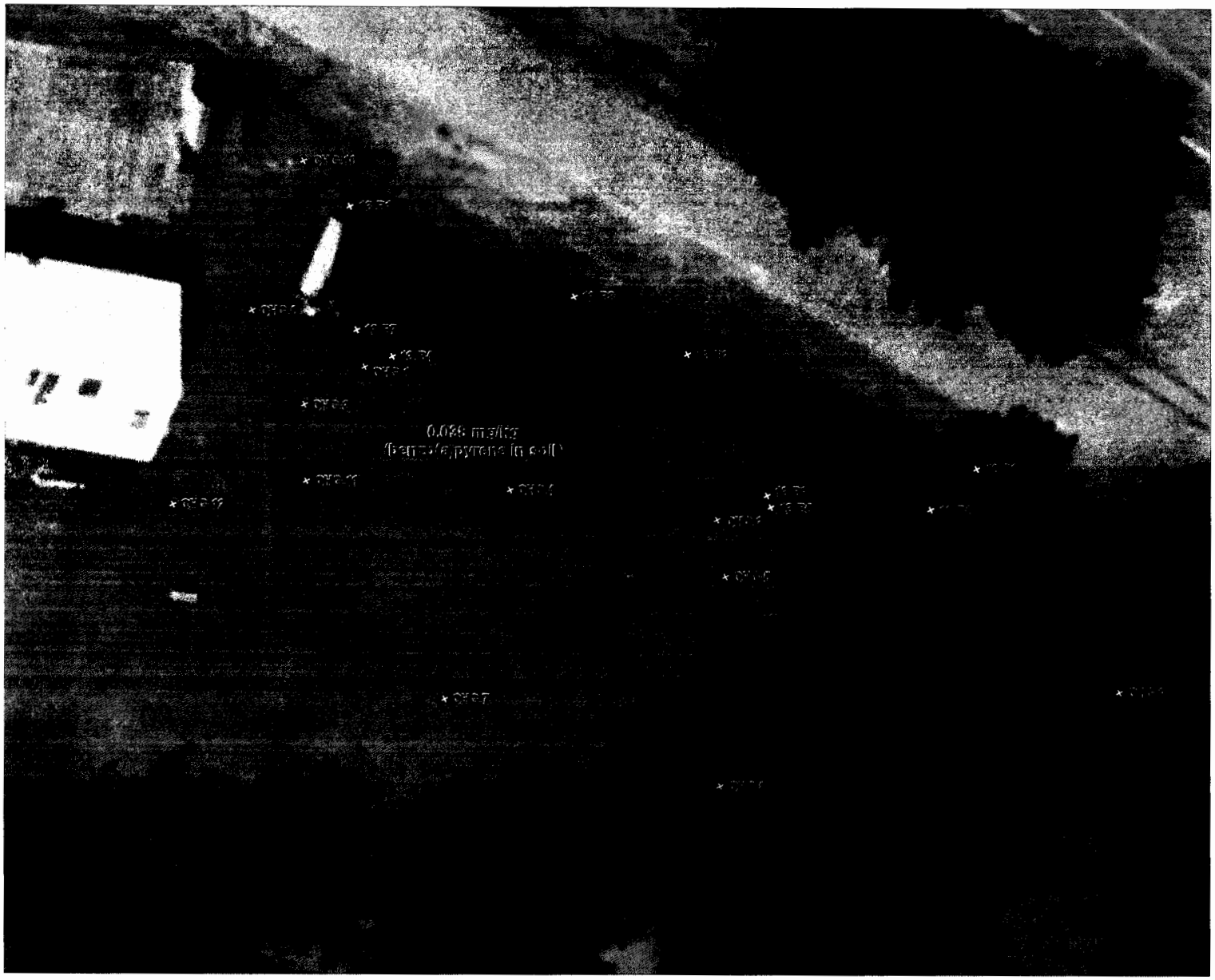
Samoa Pacific Group, LLC.

Figure 16
Rigging Shop
Zinc in Groundwater
Delineation Map

Date: 4-26-09

By: SJT

Freshwater Environmental Services



LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N
W
E
S

Feet
0 5 10 20 30 40 50

Samoa Pacific Group, LLC.

Figure 17
Cookhouse Garages
Benzo(a)pyrene in Soil
Delineation Map

Date: 4-26-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 5 10 20 30 40 50

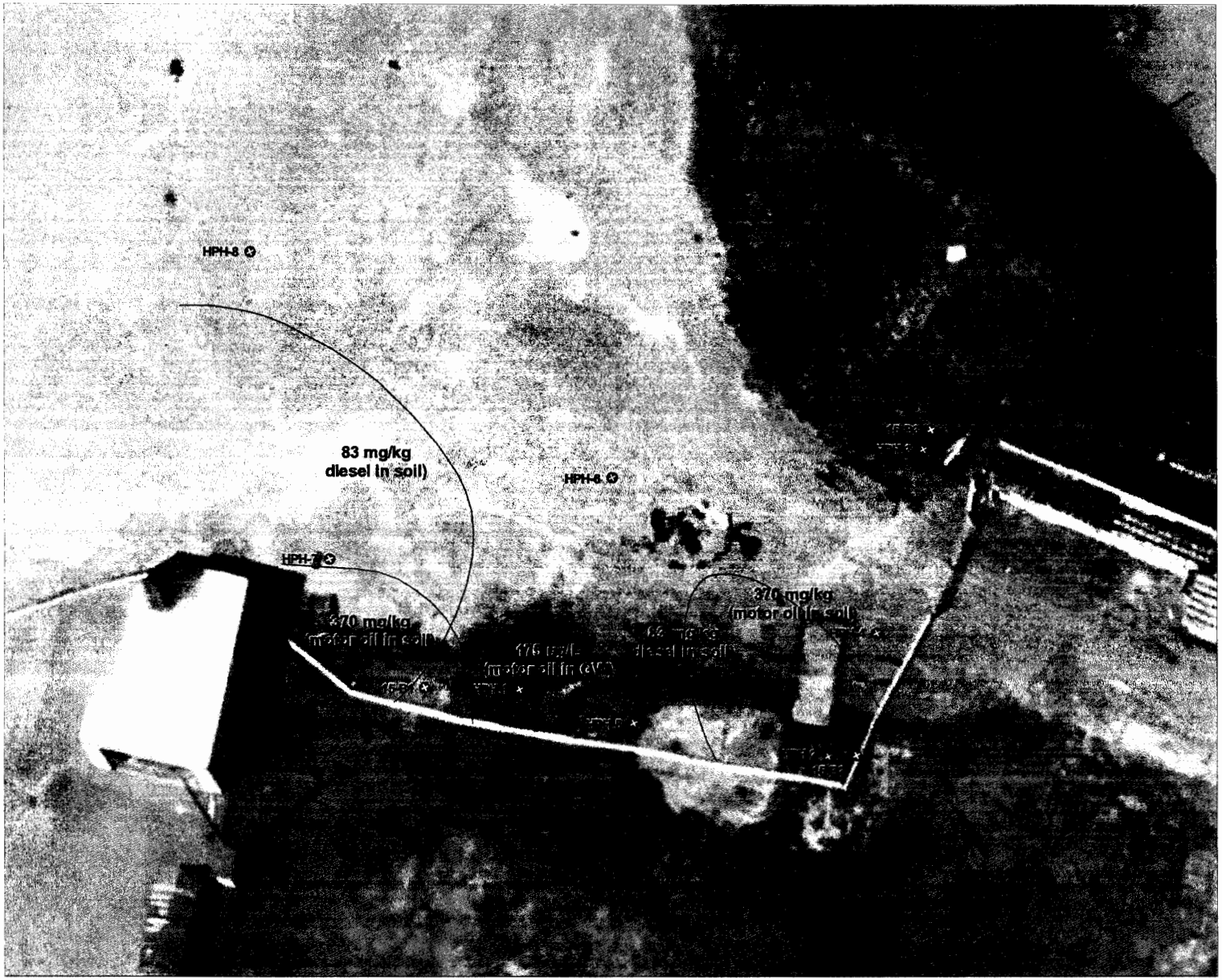
Samoa Pacific Group, LLC.

Figure 18
Soccer Field Garages
Diesel and Motor Oil in Soil
Delineation Map

Date: 4-26-09

By: SJT

Freshwater Environmental Services



LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater

Base Image Data Source: Obtained from City of Eureka Engineering/GIS Department Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 5 10 20 30 40 50 60 70 80

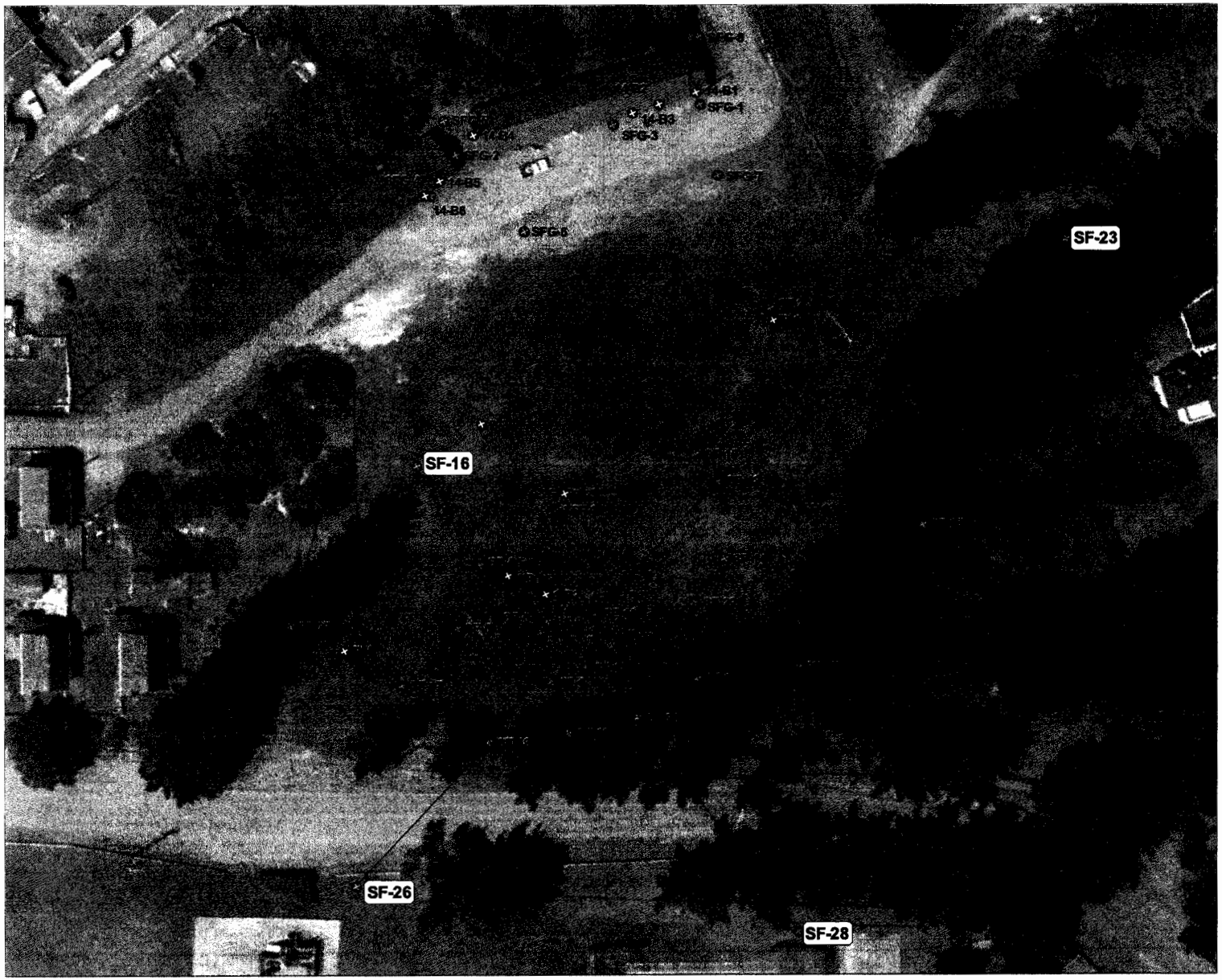
Samoa Pacific Group, LLC.

Figure 19
Hammond Powerhouse
Diesel and Motor Oil in
Soil and Groundwater
Delineation Map

Date: 4-26-09

By: SJT

Freshwater
Environmental
Services



LEGEND

- Boring Location (this investigation)
- Boring Locations (previous investigations)

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 60 80 100 120

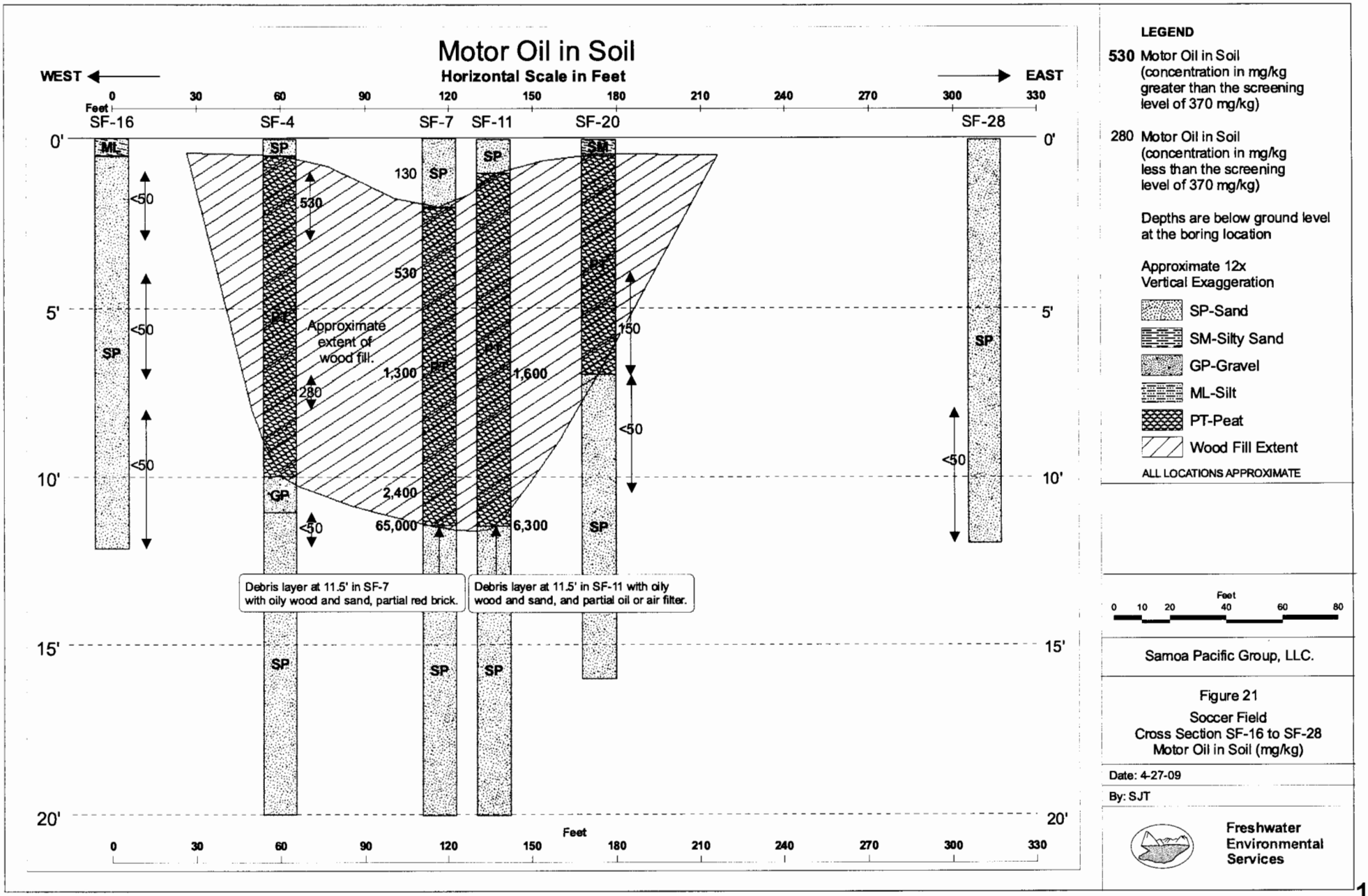
Samoa Pacific Group, LLC.

Figure 20
Soccer Field
Cross Section Locations

Date: 4-26-09

By: SJT

Freshwater Environmental Services



LEGEND

530 Motor Oil in Soil (concentration in mg/kg greater than the screening level of 370 mg/kg)

280 Motor Oil in Soil (concentration in mg/kg less than the screening level of 370 mg/kg)

Depths are below ground level at the boring location

Approximate 12x Vertical Exaggeration

- SP-Sand
- SM-Silty Sand
- GP-Gravel
- ML-Silt
- PT-Peat
- Wood Fill Extent

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 60 80

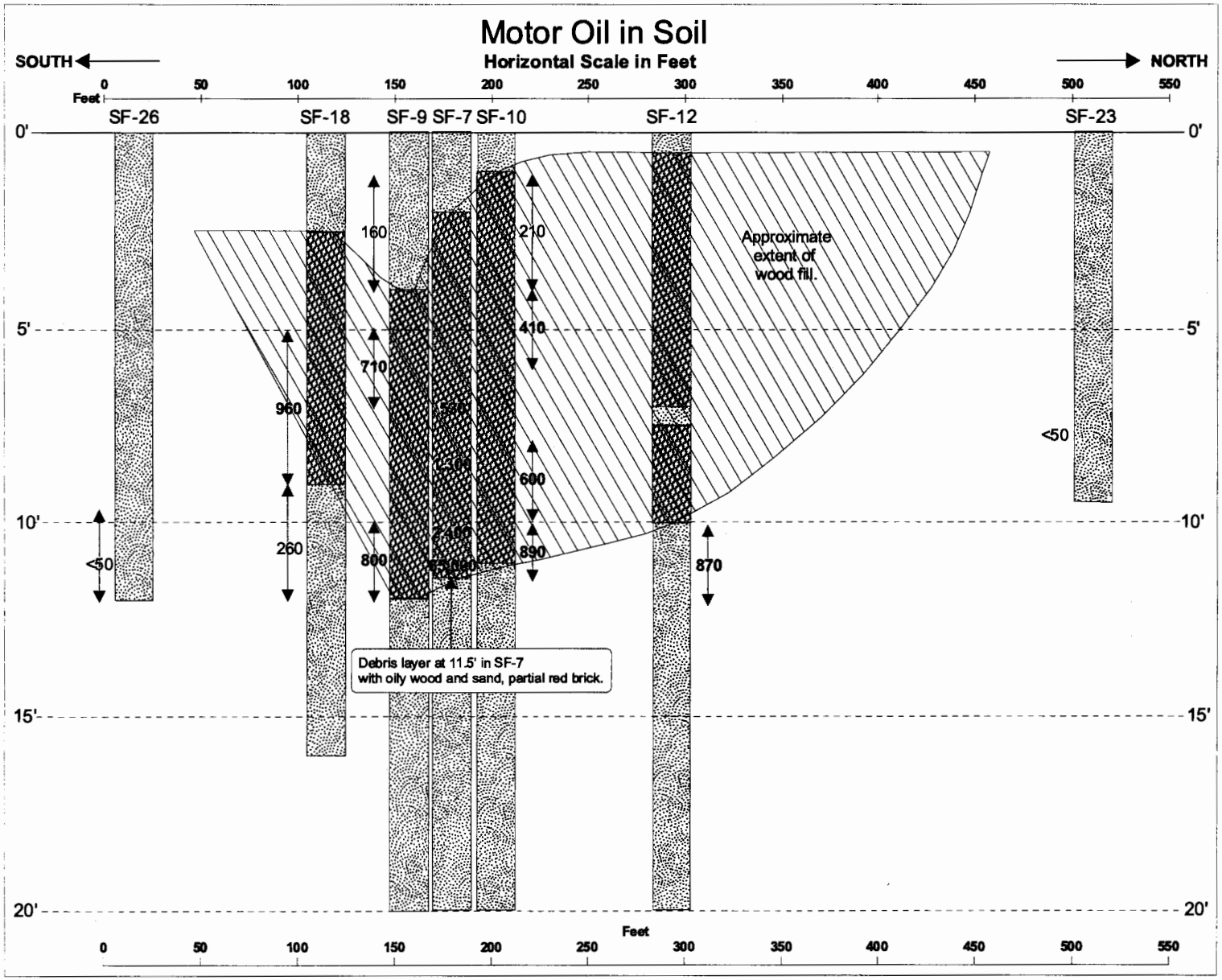
Samoa Pacific Group, LLC.

Figure 21
Soccer Field
Cross Section SF-16 to SF-28
Motor Oil in Soil (mg/kg)

Date: 4-27-09

By: SJT

Freshwater Environmental Services



LEGEND

530 Motor Oil in Soil (concentration in mg/kg greater than the screening level of 370 mg/kg)

280 Motor Oil in Soil (concentration in mg/kg less than the screening level of 370 mg/kg)

Approximate 20x Vertical Exaggeration

Wood Fill Extent

SP-Sand

PT-Peat

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 22
Soccer Field
Cross Section SF-23 to SF-26
Motor Oil in Soil (mg/kg)

Date: 4-27-09

By: SJT

Freshwater Environmental Services

APPENDIX A

Regional Water Quality Control Board Letters

California Regional Water Quality Control Board
North Coast Region
William R. Massey, Chairman

Linda S. Adams
Secretary for Environmental Protection

www.waterboards.ca.gov/northcoast
5550 Skylane Boulevard, Suite A, Santa Rosa, California 95403
Phone: (877) 721-9203 (toll free) • Office: (707) 576-2220 • FAX: (707) 523-0135

Arnold Schwarzenegger
Governor

August 4, 2006

Mr. Dan Johnson
Samoa Pacific Group LLC
5251 Ericson Way
Arcata, CA 95521

Dear Mr. Johnson:

Subject: Comments on Site Priority List

File: Samoa Peninsula, Samoa, California, Case No. 1NHU890

I reviewed the *Site Priority List* (List) completed by Winzler & Kelly for the Samoa Peninsula Brownfields site. I have several concerns with statements in the List. The following outlines my general comments on the Report. No specific comments will be sent.

- As stated in my letter of November 29, 2005, the use of Preliminary Remediation Goals (PRGs) for investigation and/or cleanup decisions is not valid. The PRGs for soil are not protective of groundwater. Cleanup numbers for soil contamination are the naturally occurring background levels where feasible. The process for determining the feasibility is outlined in Title 23, Division 3, Chapter 15, Section 2550.4 of the California Code of Regulations. In addition, the Regional Water Board determines the water quality objectives (cleanup numbers) for groundwater.

- I do not concur with no further action for the lead base paint survey areas. Hazardous levels of lead are located in surface soils. These contaminated surface soils need to be remediated. In additional, sampling is required to verify if the lead in the soils is a potential source of contamination of surface waters.

- In several locations, the statement is made that the levels of Total Petroleum Hydrocarbons are likely related to naturally occurring organics in the soil. There is no data to substantiate this statement. Prior to my concurrence that

no further work is required, laboratory samples will need to be collected to substantiate the premise.

In summary, you will need to submit a time schedule for the investigation of the areas of the site. You need to submit the time schedule to our agency by September 18, 2006. Section 13267 of the California Water Code contains the authority for this request.

Please contact me at (707) 576-2673 if you have any questions.

Sincerely,

Kasey Ashley

Kasey Ashley P.G.
Engineering Geologist

080406_KA_kasamoa03

cc: Tony Shen, Redevelopment Agency, County of Humboldt, 520 E Street, Eureka, CA 95501
Pat Kaspari, Winzler & Kelly, Consulting Engineers, 633 Third Street, Eureka, CA 95501

California Regional Water Quality Control Board
North Coast Region
William R. Massey, Chairman

www.waterboards.ca.gov/northcoast
5550 Skylane Boulevard, Suite A, Santa Rosa, California 95403
Phone: (877) 721-9203 (toll free) • Office: (707) 576-2220 • FAX: (707) 523-0135

Linda S. Adams
Secretary for Environmental Protection

Arnold Schwarzenegger
Governor

January 12, 2007

ECONOMIC DEVELOPMENT DIVISION
JAN 17 2007
COUNTY OF HUMBOLDT

copy

Mr. Dan Johnson
Samoa Pacific Group LLC
5251 Ericson Way
Arcata, CA 95521

Dear Mr. Johnson:

Subject: Concurrence with Workplan for Additional Sampling and Analysis

File: Samoa Peninsula, Samoa, California, Case No. 1NHU890

I reviewed the *Workplan for Additional Sampling and Analysis* (Plan) developed by Winzler & Kelly Consulting Engineers for the further investigation of discharges at the Samoa Peninsula Brownfield Site. The Plan is generally considered adequate for the further investigation of discharges. I look forward to the implementation of the Plan at the earliest possible date.

You need to submit the report of field activities to our agency by May 1, 2007. Section 13267 of the California Water Code contains the authority for this request.

Please contact me at (707) 576-2673 if you have any questions.

Sincerely,

Kasey Ashley

Kasey Ashley P.G.
Engineering Geologist

011207_KA_kasamoa04

File B.F. Assessment
Correspondence

A.W.,

cc: ~~Tony Shon~~, Redevelopment Agency, County of Humboldt, 520 E Street, Eureka, CA 95501
Pat Kaspari, Winzler & Kelly, Consulting Engineers, 633 Third Street, Eureka, CA 95501
Norm Crawford, Humboldt County Health Department, 100 H Street, Suite 100, Eureka, CA 95501

California Regional Water Quality Control Board
North Coast Region
John W. Corbett, Chairman

Linda S. Adams
Secretary for Environmental Protection

www.waterboards.ca.gov/northcoast
5550 Skylane Boulevard, Suite A, Santa Rosa, California 95403
Phone: (877) 721-9203 (toll free) • Office: (707) 576-2220 • FAX: (707) 523-0135

Arnold Schwarzenegger
Governor

August 27, 2007

Mr. Dan Johnson
Samoa Pacific Group LLC
5251 Ericson Way
Arcata, CA 95521

Dear Mr. Johnson:

Subject: Comments on Additional Phase II Environmental Site Assessment

File: Samoa Peninsula, Samoa, California, Case No. 1NHU890

I reviewed the *Additional Phase II Environmental Site Assessment* (Report) developed by Winzler & Kelly Consulting Engineers for the further investigation of discharges at the Samoa Peninsula Brownfield Site. The Report indicates that additional areas of contamination were found and previously identified contamination was further delineated. I concur with the conclusions that additional investigation and remediation is necessary.

You need to submit a workplan for the further investigation of the site to our agency by October 1, 2007. Section 13267 of the California Water Code contains the authority for this request.

Please contact me at (707) 576-2673 if you have any questions.

Sincerely,

Kasey Ashley

Kasey Ashley P.G.
Engineering Geologist

082707_KA_kasamoa05

cc: Tony Shen, Redevelopment Agency, County of Humboldt, 520 E Street, Eureka, CA 95501
Pat Kaspari, Winzler & Kelly Consulting Engineers, 633 Third Street, Eureka, CA 95501

CASE NO: 1nhu890
PCA CODE: 161-01
DOCUMENT NAME: Kasamoa06

November 14, 2008

Mr. Dan Johnson
Samoa Pacific Group LLC
5251 Ericson Way
Arcata, CA 95521

Dear Mr. Johnson:

Subject: Comments on Workplan for Additional Assessment
File: Samoa Peninsula, Samoa, California, Case No. 1NHU890

Regional Water Board staff reviewed the *Workplan for Additional Assessment* (Plan) developed by Freshwater Environmental Services for the further investigation of discharges at the Samoa Peninsula Brownfield Site. Eighteen areas of Recognized Environmental Conditions (RECs) have been previously identified at the site.

The Plan proposes no further investigation for nine RECs. These nine areas have identified shallow soil contamination and no contaminants of concern were identified in groundwater. Analyses of the threat to human health and other ecological receptors from the shallow contaminated soils have not been completed. This analysis will need to be completed prior to a determination that additional land use requirements are not needed. Specifically, you will need to conduct a comparison of the levels of contaminants in site soils to the California Human Health Screening Levels (CHHSLs) published by the California Environmental Protection Agency. A list of the nine areas with previously identified RECs is found on Attachment #1.

The Plan proposes no further activities for four areas with previously identified RECs. These areas are the unlined burn pit, teepee burner, Offsite Emission Sources for dioxins, and fill/construction debris pile. Regional Water Board staff concurs with this proposal.

The Plan proposes that further investigation of the lead in soil around historical structures will be addressed in a separate workplan. No schedule for the submittal of the lead investigation has been received.

The Plan proposes further investigation of the Soccer Field, Railroad Site, Sewer System, and arsenic areas with previously identified RECs. Regional Water Board staff concurs with the Plan and considers the proposed activities as the next step in identification of the vertical and horizontal extent of contamination in the three areas. Staff looks forward to the implementation of the Plan at the earliest opportunity. A copy of this letter has been forwarded to the Humboldt County Environmental Health Department to enable processing of required permits.

The report of field activities needs to be submitted to this agency within 30 days of receiving final laboratory data and no later than March 1, 2009. Section 13267 of the California Water Code contains the authority for this request.

Please contact me at (707) 576-2673 if you have any questions.

Sincerely,

Kasey Ashley P.G.
Senior Engineering Geologist

KA:kasamoa06

Enclosure: Attachment #1

cc:

Andrew Whitney, Economic Development Division, County of Humboldt, 520 E St., Eureka, CA 95501
Pat Kaspari, Winzler & Kelly, Consulting Engineers, 633 Third Street, Eureka, CA 95501
Melanie Faust, California Coastal Commission, 710 E Street, Suite 200, Eureka, CA 95501

Attachment #1

Chemical Storage Shed
Oil Storage Shed
Garage behind Lorenzo Shell Station
Drum Storage Area
Rigging Shop
Garages near Cookhouse
2 Garages (near Soccer Field)
Hammond Powerhouse, Carriagehouse, Boiler Plant and Shops
Former Lumber and Log Storage

California Regional Water Quality Control Board
North Coast Region
Bob Anderson, Chairman

Linda S. Adams
Secretary for Environmental Protection

www.waterboards.ca.gov/northcoast
5550 Skylane Boulevard, Suite A, Santa Rosa, California 95403
Phone: (877) 721-9203 (toll free) • Office: (707) 576-2220 • FAX: (707) 523-0135

Arnold Schwarzenegger
Governor

January 12, 2009

Mr. Dan Johnson
Samoa Pacific Group LLC
5251 Ericson Way
Arcata, CA 95521

Dear Mr. Johnson:

Subject: Comments on Workplan for Additional Assessment

File: Samoa Peninsula, Samoa, California, Case No. 1NHU890

Regional Water Board staff reviewed the December 9, 2008 *Workplan for Additional Assessment* (Plan) developed by Freshwater Environmental Services for the further investigation of discharges at the Samoa Peninsula Brownfield Site.

Regional Water Board staff concurs with the Plan and considers the proposed activities as the next step in identification of the vertical and horizontal extent of contamination. Staff looks forward to the implementation of the Plan at the earliest opportunity. A copy of this letter has been forwarded to the Humboldt County Environmental Health Department to enable processing of required permits.

The report of field activities needs to be submitted to this agency within 30 days of receiving final laboratory data and no later than June 1, 2009. Section 13267 of the California Water Code contains the authority for this request.

Please contact me at (707) 576-2673 if you have any questions.

Sincerely,

Kasey Ashley

Kasey Ashley P.G.
Senior Engineering Geologist

011209_KSA_kasamoa07

cc: Andrew Whitney, Economic Development Division, County of Humboldt, 520 E Street, Eureka, CA 95501
Orrin Plocher, Freshwater Environmental Services, 1372 Anderson, McKinleyville, CA 95519
Melanie Faust, California Coastal Commission, 710 E Street, Suite 200, Eureka, CA 95501
Norm Crawford, Humboldt County Health Department, 100 H Street, Suite 100, Eureka, CA 95501

APPENDIX B

Historic Soil and Groundwater Data

REMEDIAL ACTION PLAN
TOWN OF SAMOA

SAMOA PENINSULA BROWNFIELDS SITE
SAMOA, HUMBOLDT COUNTY, CALIFORNIA

Prepared for:

Samoa Pacific Group, LLC.

5251 Ericson Way
Arcata, CA 95521

July 10, 2009

Prepared by:
Orrin Plocher and Stan Thiesen

of

Freshwater Environmental Services

78 Sunny Brae Center
Arcata, California 95521
Phone (707) 839-0091

PROFESSIONAL CERTIFICATION

This report has been prepared by Freshwater Environmental Services under the professional supervision of Stan Thiesen. The findings, recommendations, specifications and/or professional opinions presented in this report have been prepared in accordance with generally accepted professional hydrogeologic and environmental consulting practices, and within the scope of the project. There is no other warranty, either express or implied.

Stan Thiesen
P.G. No. 7990
Geologist
Freshwater Environmental Services

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

This Remedial Action Plan (RAP) is for the Town of Samoa Soccer Field (Site) located in Samoa, California and was prepared by Freshwater Environmental Services (FES), on behalf of the Site owners, Samoa Pacific Group, LLC. The Site location is shown on Figure 1. The preparation of this RAP for the soccer field area was recommended in the *Additional Assessment Report, Samoa Peninsula Brownfields Site, Samoa, Humboldt County, California* prepared by FES (FES, 2009). This RAP was prepared to describe proposed remediation goals and remediation alternatives for the Town of Samoa Soccer Field (Figure 2).

Several investigations have been conducted at the Town of Samoa to identify Chemicals of Concern (COCs) and to delineate the extent of impacted soils and groundwater. This Remedial Action Plan will focus on the Soccer Field. Information summarizing the results of previous investigations regarding the entire Town of Samoa is included in the *Additional Assessment Report, Samoa Peninsula Brownfields Site, Samoa, Humboldt County, California* prepared by FES (FES, 2009).

The chemicals of concern in soil at the Site include TPH as diesel and motor oil, arsenic and lead. The COCs in groundwater at the Site include TPH as diesel and motor oil, gasoline, and dissolved arsenic, chromium, lead, and nickel. A summary of the results from previous investigations is included in Section 2.5 of this report.

This report is organized as follows:

- The Site background is described in Section 2.0;
- The distribution of chemicals of concern in the soccer field are described in Section 3.0;
- The proposed remedial action goals are presented in Section 4.0;
- The remedial action alternatives are presented in Section 5.0;
- An analysis of the alternatives are presented in Section 6.0;
- Recommendations and Schedule are described in Section 7.0; and
- A list of references is presented in Section 8.0.

2.0 SITE BACKGROUND

2.1 Site Summary, Location and Ownership

The Site is located on the Samoa Peninsula and includes the Town of Samoa Soccer Field, located in Humboldt County, California (Figure 1). The Site includes a soccer field that is used for various recreational purposes by residents of the town of Samoa. The only structures at the Site are two wooden soccer goals located at each end of the grass covered field. Vehicle storage garages for the residents of Samoa are located adjacent to the western edge of the Site. To the south and to the west beyond the garages are residential homes. A recreational area including a playground, tennis courts and basketball court is located to the east of the Site across Vance Avenue. North of the Site is a steep heavily vegetated wooded area with a single residence. The Site is owned by the Samoa Pacific Group, LLC. A history of the Town of Samoa is summarized in Winzler & Kelly, 2005, 2007, and FES, 2008, 2009. This section will focus on the background of the Soccer Field.

2.2 Site Description and Historical Uses

Based on discussions with Mr. David Branco, former long time resident of Samoa, (Branco, 2009), the soccer field is the former location of five garages, similar to the two remaining garages referred to as the Soccer Field Garages. The approximate locations of the former garages are shown on Figures 2 through 12. The former garages were built on the edge of a topographic basin approximately 5 to 10 feet below the present surface of the Soccer Field. The depression behind the garages was up to 15 feet beneath the present surface of the soccer field. Between two of the garages the slope allowed for the construction of a wood ramp that extended behind the back line of the garages. The ramp was long enough for two vehicles to be positioned end to end on the ramp with standing room underneath. Residences of the town changed their oil and performed other vehicle maintenance on the ramp resulting in the accumulation of oil and other petroleum products on the ground. It is reported that if the demand for oil changing space was exceeded at the main ramp, there was a secondary area between two other garages that was used for the same purposes but to a lesser extent. The approximate locations of the oil changing/maintenance areas are shown on Figures 2 through 9.

During the rainy season, surface water accumulated in the depression and at times submerged the two oil changing areas, resulting in the flooding of some of the garages and the potential distribution of water containing oil over the surface of the entire basin. The laboratory results from previous investigations indicated the greatest accumulation of petroleum products at the primary oil changing area, a lesser accumulation of petroleum products at the secondary oil changing location and a relatively minor accumulation of petroleum products smeared by rising and falling water that extends to the margins of the water filled depression.

Following demolition of the former soccer field garages, the topographic depression was filled with wood debris and covered with a sandy soil. The primary and secondary oil changing areas were thoroughly assessed (FES, 2009). The buried surface between the underlying sand and the woody fill is marked by a distinct contact (FES, 2009). In the primary oil changing area, the interval is marked by a layer of oily soil and debris.

Boring SF-11 encountered a crushed beer can and part of an oil filter at the contact which is at a depth of approximately 11.5 feet (FES, 2009).

2.3 Site Geology and Hydrogeology

Most of the town of Samoa has been modified by residential and industrial development beginning in the 1890's (Winzler & Kelly, 2004). The introduction of non-native vegetation, especially European beach grass (Ammophila arenaria) which was first introduced in the early 1900's (Pacific Watershed Associates, 1991) to stabilize the sand has altered the erosion and transportation of sand.

Subsurface lithology generally consists of well sorted, subangular to subrounded, fine to medium grained sand to the maximum depth explored, approximately 23 feet below ground level (bgl). Developmental fill is present at various locations throughout the Town of Samoa. Up to 15 feet of wood debris fill is present in the Soccer Field.

The depth to groundwater at the Town of Samoa ranged from approximately 1.5 to 20 feet bgl during the most recent investigation (FES, 2009). The variation of the depth to groundwater is generally attributed to surface topography. Locations higher in elevation have deeper groundwater and locations with lower elevations have shallower groundwater. The groundwater gradient is expected to fluctuate between east (toward Humboldt Bay) and west (toward the Pacific Ocean) depending on location and tidal elevations, (Winzler & Kelly, 2005). The depth to groundwater in the soccer field during the most recent investigation (FES, 2009) was found to range between 10 and 12 feet bgl.

2.4 Sensitive Receptors

A sensitive receptor survey was conducted by FES during preparation of this Remedial Action Plan to identify buried utilities and other subsurface structures, surface water bodies, and domestic and municipal supply wells within 1,000 feet of the soccer field. Electric and telephone services to the town of Samoa are provided by overhead lines. Buried utilities in the area of the Site include a water main and service connections, sanitary sewer line, storm sewer line, fire suppression system and irrigation lines. The approximate locations of the underground utilities in the Soccer Field are shown on Figures 2 through 9. Water lines are estimated to be buried at 36 to 40 inches bgl and are constructed of 3-inch diameter galvanized steel. The sanitary sewers are located five to eight feet bgl and the storm sewers depth is likely similar to the sanitary sewer depth (SCS, 2008). The depth of the fire suppression lines and irrigation lines are unknown. Native sands at the Site provides an excellent bedding material for buried utility lines and therefore it is likely the bedding material has a similar hydraulic conductivity to the undisturbed native materials and will likely not represent a preferential flow pathway (Winzler & Kelley, 2004a). The water supply line is not in contact with impacted groundwater in the soccer field. The nearest surface water bodies to the Site are the Pacific Ocean approximately 1,300 feet to the west of the Site and Humboldt Bay approximately 1,500 feet east of the Site. EDR, a company specializing in searching and reporting on state and federal environmental databases, was contracted to perform a well search within a one-mile radius of the Site (Appendix A). The EDR report indicated that there is a public water supply well very near to the Site. The water supply

well is indicated to be owned by Louisiana Pacific Corporation which has a Samoa address. The water system is actually located on Pitcher Creek near Big Lagoon approximately 25 miles north of the Site. No basements beneath structures, or domestic or municipal water supply wells were identified within the searched radius. Potable water is supplied to the residents of the town of Samoa by the Humboldt Bay Municipal Water District.

2.5 Summary of Previous Investigations

Four previous environmental documents related to the Soccer Field in the Town of Samoa are listed and discussed below.

Results of Soil and Groundwater Investigation for the Soccer Field, Former Service Station and Chemical Storage Areas In the Town of Samoa, California prepared by SCS Engineers October 17, 2003, (SCS, 2003). This report includes soil and groundwater results from eleven borings in the Town of Samoa, conducted in October and November of 2000. Four of the borings were drilled in the Soccer Field. Soil and groundwater data from the borings is included in Appendix B.

Phase I Environmental Site Assessment for Assessor's Parcel Numbers 401-031-038, -44, -46, -55, -59, and -60 Samoa, California, prepared by Winzler & Kelly Consulting Engineers (Winzler & Kelly), February, 2004, (Winzler & Kelly, 2004). This report includes the identification of eighteen (18) Onsite Recognized Environmental Conditions (RECs) within the study area including the Soccer Field.

Phase II Environmental Site Assessment for Assessor's Parcel Numbers 401-031-038, -044, -046, -055, -059, and -060 Samoa Peninsula Brownfields Site, Samoa, Humboldt County, California, prepared by Winzler & Kelly, June, 2005, (Winzler & Kelly, 2005). Included in this report are the results of soil and groundwater sampling from two borings in the Soccer Field. Tables of the analytical results and map from this investigation are included in Appendix B.

Additional Assessment, Town of Samoa, Samoa Peninsula Brownfields Site, Humboldt County, California, prepared by FES dated April 28, 2009, (FES, 2009). The report included the additional assessment of nine subareas of the Town of Samoa, including the Soccer Field. The results of this investigation included the delineation of all COCs in soil and groundwater to the extent practical. The investigation included drilling and sampling of 28 borings in the Soccer Field and recommended the preparation of a Remedial Action Plan to address impacts at the Soccer Field. Soil and groundwater results for the Soccer Field are included in Appendix B.

The results from three previous soil and groundwater investigations in the Soccer Field (SCS, 2003, Winzler & Kelly, 2005, and FES, 2009) indicate that soil screening levels were exceeded for TPH as diesel and motor oil, arsenic and lead. Groundwater screening levels were exceeded for TPH as diesel, motor oil, gasoline, and dissolved metals (arsenic, chromium, lead, and nickel). Significant wood debris was noted in the upper 15 feet of soil in the Soccer Field, (FES, 2009).

3.0 DISTRIBUTION OF CHEMICALS OF CONCERN IN THE SOCCER FIELD

3.1 Soil

Soil analytical results from the Soccer Field are included in Appendix B. Soil concentrations of TPH as gasoline range from <1.0 to 75 milligrams per kilogram (mg/kg) and are below the screening level of 83 mg/kg. Soil concentrations of TPH as diesel range from <10 to 13,000 mg/kg and exceed the screening level of 83 mg/kg. Soil concentrations of TPH as motor oil range from <50 to 65,000 mg/kg and exceed the screening level of 370 mg/kg. Soil concentrations of benzene range from < 0.005 to 0.009 mg/kg and do not exceed the screening level of 0.044 mg/kg. Soil concentrations of toluene range from <0.0050 to 1.0 mg/kg and do not exceed the screening level of 2.9 mg/kg. Soil concentrations of ethylbenzene range from <0.0050 to 1.9 mg/kg and do not exceed the screening level of 2.3 mg/kg. Soil concentrations of total xylenes range from <0.0150 to 0.048 mg/kg and do not exceed the screening level of 2.3 mg/kg. Soil concentrations of arsenic range from 1.12 to 24.1 mg/kg and exceed the screening level of 3.0 mg/kg. Soil concentrations of chromium range from 16.7 to 68.2 mg/kg and do not exceed the screening level of 1,000 mg/kg. Soil concentrations of lead range from 0.961 to 6,590 mg/kg and exceed the screening level of 150 mg/kg. Soil concentrations of nickel range from 19.7 to 51.7 mg/kg and do not exceed the screening level of 1,600 mg/kg. Soil concentrations of zinc range from 19.3 to 565 mg/kg and do not exceed the screening level of 23,000 mg/kg. In summary, soil concentrations of TPH as diesel, TPH as motor oil, arsenic, and lead were detected above applicable screening levels.

The chemicals of concern in the soil at the Soccer Field include TPH as diesel and motor oil, arsenic and lead.

The horizontal extent of chemicals of concern in soil have been delineated and the estimated extent of TPH as diesel and motor oil, arsenic and lead are shown in Figures 3, 4, 6, and 7 respectively. The vertical extent of TPH as diesel and motor oil exceeding the screening levels range from 1 foot bgl to 15.5 feet bgl although the highest concentrations are at the interface of the wood fill and the underlying sands. The interface is marked by oil coated debris, wood, gravel and concrete (debris layer), which marks the historic surface impacted by oil changing and vehicle maintenance activities. The overlying wood debris has been in repeated contact with petroleum impacted groundwater during seasonal fluctuation of the water table. As a result of this repeated contact, the wood fill has absorbed petroleum from the groundwater resulting in moderate concentrations of petroleum impact through much of the wood fill and a relatively small area of groundwater impact. Lithologic cross sections have been prepared through the long and short axis of the basin (Figures 9 through 11).

Arsenic and lead in soils are limited to a small area horizontally (Figure 6 and 7). Vertically, arsenic and lead are restricted to the upper surface of the historic oil changing area, just below the wood fill at depths from 7 feet bgl to at least 11.5 feet bgl at the primary oil changing area. Soil samples were not collected below the groundwater table. The soils impacted with lead and arsenic concentrations over the screening levels are

known to extend at least to the groundwater table, and are present as dissolved arsenic and dissolved lead in the groundwater.

3.2 Soil Vapor

The majority of petroleum impacted media contains TPH as motor oil and diesel which are not readily volatilized. The only relatively volatile contaminant known from the Site is TPH as gasoline and BTEX. The highest concentration of TPH as gasoline in soil was 75 mg/kg at SF-8 located in the primary oil changing area and within the proposed excavation footprint (Figure 5). The highest concentration of TPH as gasoline in groundwater was 160 micrograms per liter (µg/L) at 1-B1 in the primary oil changing area within the proposed excavation/groundwater extraction footprint. All soils that have been found to contain detectable concentrations of TPH as gasoline are in the area proposed for excavation and disposal. Currently there are no buildings within 100 feet of the edge of the contaminant plumes. Future development may include vacation rentals that will not have basements.

As a precaution, prior to development of the soccer field, a soil gas survey will be conducted and will include sampling in the area between former borings 1-B1 and SF-8 (locations of highest concentrations of TPH as gasoline in soil and groundwater. A workplan will be submitted to the RWQCB for soil gas sampling. Soil gas sampling will be conducted per the approved workplan.

3.3 Groundwater

Groundwater analytical results from the Soccer Field are included in Appendix B. Groundwater concentrations of TPH as gasoline ranged from <50 to 160 µg/L and exceed the screening level of 50 µg/L. Groundwater concentrations of TPH as diesel range from <12 to 270 µg/L and exceed the screening level of 100 µg/L. TPH as motor oil was detected at concentrations ranging from <58 to 430 µg/L and exceed the screening level of 175 µg/L. Benzene concentrations in groundwater range from <0.15 to 1.4 µg/L and exceed the screening level of 1.0 µg/L. Ethylbenzene was not detected in groundwater samples above the detection limit. Toluene was detected in groundwater samples ranging from <0.5 to 6.2 µg/L below the screening level of 40 µg/L. Total xylenes were detected in the groundwater in concentrations ranging from <1.5 to 3.5 µg/L below the screening level of 17 µg/L. Dissolved arsenic was detected in groundwater in concentrations ranging from <2.0 to 120 µg/L and exceed the screening level of 10 µg/L. Dissolved chromium was detected in groundwater in concentrations ranging from 0.87 to 120 µg/L and exceeds the screening level of 50 µg/L. Dissolved lead was detected in groundwater at concentrations ranging form <0.50 to 31.8 µg/L and exceed the screening level of 2.5 µg/L. Dissolved nickel was detected in groundwater at concentrations ranging from 3.8 to 150 µg/L which exceed the screening level of 12 µg/L. Dissolved zinc was detected in groundwater in concentrations ranging from 3.12 to 170 µg/L and do not exceed the screening level of 2,000 µg/L. In summary, groundwater concentrations of TPH as diesel, TPH as motor oil, dissolved arsenic, dissolved chromium, dissolved lead, and dissolved nickel were detected above applicable screening levels.

The chemicals of concern in groundwater at the Soccer Field include TPH as diesel and motor oil, gasoline, benzene and dissolved arsenic, chromium, lead, and nickel. Except

for dissolved nickel, the horizontal extent of these chemicals of concern has been delineated in the groundwater and the estimated extent of TPH as diesel, motor oil, gasoline, benzene, dissolved arsenic, chromium, and lead are shown in Figures 3 through 8. As discussed above, due to the fluctuating groundwater levels, the wood fill has absorbed petroleum products from the groundwater and resulted in a relatively small area of groundwater impacted with petroleum products. Dissolved metals have a more widespread distribution in groundwater than the petroleum, which has been concentrated and held in the wood fill.

Dissolved nickel in groundwater has not been fully delineated to the north of the soccer field as shown on Figure 8. Due to physical access limitations (steep and heavily vegetated slope and lack of access), an additional boring that could provide for full delineation could not be drilled within a reasonable distance.

4.0 PROPOSED REMEDIAL ACTION GOALS

To remediate the Site to background levels of TPH as diesel and motor oil would involve the excavation/disposal and replacement of nearly all of the wood fill (estimated to be over 20,000 cubic yards) and underlying impacted sands (estimated to be approximately 1,000 cubic yards) for an estimated cost of 3 to 4 million dollars. This remedial action goal is not financially feasible.

Title 27 Section 20400 allows for a cleanup level greater than background (CLGB) if remediation to background is determined to be economically infeasible. FES proposes to remediate the soils at the site based on total TPH. Total TPH was determined by adding all of the TPH results together (TPH as gasoline, diesel and motor oil). The total TPH approach recognizes and accounts for the additive risk associated with each of the TPHs. FES recommends the following CLGBs;

Contaminant	Media	Proposed CLGB
Total TPH (gasoline, diesel, and motor oil)	Soil	2,000 mg/kg
Lead	Soil	60 mg/kg
Arsenic	Soil	3 mg/kg

The above CLGB could be accomplished technologically and financially feasible through the excavation/disposal and replacement of soil and wood fill (approximately 2,300 cubic yards) and removal of impacted groundwater at the primary oil changing area.

5.0 REMEDIAL ACTION ALTERNATIVE DEVELOPMENT

5.1 Introduction

Three remedial alternatives were evaluated in this remedial action plan. The conceptual framework of the remedial alternatives is described below. Upon approval of a remedial action, a specific workplan for implementation will be prepared and submitted to the RWQCB for review, comment and approval.

5.2 Alternative 1 - Capping, Natural Attenuation and Groundwater Monitoring

Alternative 1 includes the installation of a 2 foot thick cap layer as an allowable engineered alternative, natural attenuation and groundwater monitoring. The 2 foot protective cap could be accomplished by two possible courses of action:

1. Conducting an RWQCB approved assessment of the upper two feet of material to delineate areas of the Site that have impacted media present in the upper two feet. Areas found to contain contaminants in the upper two feet could be excavated and replaced with clean fill, or depending on the size of the area, could be covered with 2 feet of clean fill. In addition, upon completion of development of the area, the combination of foundations, slabs, driveways, parking areas, sidewalks, and installation of a membrane or other construction techniques would result in a cap in compliance with requirements for caps in Title 27 Section 20090.

2. Covering the entire area with 2 feet of clean fill without assessment of the upper 2-feet of material. In addition, upon completion of development of the area, the combination of foundations, slabs, driveways, parking lots, sidewalks, installation of a membrane or other construction techniques would result in a cap in compliance with requirements for a cap in Title 27 Section 20090.

Groundwater monitoring wells would be installed at the Site per an approved specific workplan. Groundwater monitoring would be conducted in compliance with Title 27 and with the approval of the RWQCB. Groundwater monitoring will be performed to monitor the progression of natural attenuation.

5.3 Alternative 2 - Limited Excavation Groundwater Extraction Capping and Groundwater Monitoring

Alternative 2 includes the excavation and disposal of impacted media at the primary oil changing area (Figure 12). During the excavation, groundwater will be extracted from a sump to dewater the area around the excavation allowing for deeper excavation. Groundwater extraction at the excavation would remove petroleum-impacted groundwater which would be transported and disposed following all appropriate rules and regulations. The use of fungus to treat the impacted media is being evaluated but at this time is not being recommended as part of this remedial action plan.

The excavation would be backfilled and a cap would be achieved as described in Alternative 1. Groundwater monitoring would be performed as described in Alternative 1.

5.4 Alternative 3 - Complete Excavation Groundwater Extraction and Groundwater Monitoring

Alternative 3 includes the excavation of all petroleum impacted media from both oil changing areas and much of the soccer field (Figure 13). During the excavation groundwater extraction would take place as described in Alternative 2. Backfilling would take place with clean fill and eliminate the requirement for capping. Groundwater monitoring would be conducted as described in Alternative 1.

6.0 COST ANALYSIS, TIME FRAME, AND COMPARATIVE ANALYSIS

6.1 Cost Analysis

The cost analysis and estimated completion time frame of the selected remedial alternatives are included in the table below. The table below summarizes each remedial alternative, the duration for their completion and their associated estimated costs. Please note that costs included in the table are order of magnitude costs that should be used for general evaluation of the different remedial alternatives.

Remedial Alternative	Associated Activities	Duration	Estimated Cost
1. Capping, monitoring and natural attenuation.	-2 feet of clean fill over entire basin. -4 monitoring wells with semiannual groundwater sampling.	50+ years	$112,000 2-foot cap $20,000-first year monitoring $10,000 per additional years (49) **Total $622,000+**
2. Source excavation/disposal, groundwater extraction, capping, and monitoring.	-Excavation and offsite disposal of source. -Extraction and disposal of impacted groundwater during excavation -2 feet of clean fill over entire basin. -Groundwater Monitoring.	3-5 years	$112,000 2-foot cap $230,000-excavation/trans/dispose $20,000-FES observation/sampling/reporting $20,000-first year monitoring $10,000 per additional years (2-4) **Total $402,000 - $422,000**
3. Complete excavation, groundwater extraction, and monitoring.	-Excavation of entire impacted basin and backfill. -Extraction and disposal of impacted groundwater during excavation -Groundwater Monitoring.	1-2 years	**Total $3,000,000 to $4,000,000**

6.2 Effectiveness

A comparative analysis of effectiveness for each of the remedial alternatives is included in the table below.

Remedial Alternative	Effectiveness				
	Protection of Public Health & the Environment	Regulatory Compliance	Long Term Effectiveness	Reduce Toxicity	Short Term Effectiveness
1. Capping, monitoring and natural attenuation.	Possibly	Possibly	Possibly	Possibly	Low
2. Source excavation/disposal, groundwater extraction, capping, and monitoring.	Yes	Yes	Yes	Yes	High
3. Complete excavation, groundwater extraction, and monitoring.	Yes	Yes	Yes	Yes	High

Alternative 1 (capping, monitoring, natural attenuation) provides no additional protection to the environment. This alternative involves monitoring for and evaluation of geochemical parameters indicative of natural degradation processes. Chemicals of concern are degraded through microbial action and abiotic reactions.

Alternative 2 (Source excavation/disposal, groundwater extraction, capping, and monitoring) involves soil excavation and groundwater removal with disposal of extracted materials. Excavating impacted soil will remove most of the source of groundwater impact and limit future impacts to groundwater. The installation of a cap over all remaining impacted media would eliminate potential contact and exposure of the public. This alternative would provide protection to public health and the environment.

Based on modeling of contaminant mass, Alternative 2 would result in the removal of over 60 % of the total TPH present at the Site. The model defines six areas that include subdivisions of three primary media (upper sand, wood fill, and lower sand). Estimated unit density and average contaminant concentrations within each area and media were used to estimate the total mass of contaminants present in each unit. The model was then used to compare the total mass of contaminants before and after implementation of Alternative 2 to derive the estimated removal of over 60% of the total TPH present at the Site.

Alternative 3 (Complete excavation/disposal, groundwater extraction, and monitoring) involves soil excavation and groundwater removal with disposal of extracted materials. Excavating impacted soil would remove the entire source of groundwater impact and eliminates future impacts to groundwater. The removal of all impacted media would eliminate potential contact and exposure of the public. This alternative would provide protection to public health and the environment.

6.3 Implementability

A comparative analysis of implementability for each of the remedial alternatives is included in the table below.

Remedial Alternative	Implementability			
	Technical Feasibility	Administrative Feasibility	Regulatory Acceptance	Community Acceptance
1. Capping, monitoring and natural attenuation.	Yes	Yes	Possibly	Possibly
2. Source excavation/disposal, groundwater extraction, capping, and monitoring.	Yes	Yes	Yes	Yes
3. Complete excavation, groundwater extraction, and monitoring.	Yes	Yes	Yes	Yes

All of the chosen remedial alternatives are fully implementable using current technology.

7.0 RECOMMENDATIONS AND SCHEDULE

7.1 Recommendations

The cost, uncertainty, and time frame for completion of Alternative 1, results in it not being a reasonable alternative. Based on the high cost of Alternative 3 (Complete excavation, groundwater extraction, and monitoring) it is not economically feasible. Alternative 2 (Source excavation/disposal, groundwater extraction, capping, and monitoring) is expected to provide adequate protection of human health and the environment, attain remedial goals within a reasonable time frame, and is the most cost effective alternative. FES recommends implementation of remedial Alternative 2.

7.2 Schedule

The scope of work is intended to take place during 2010 and 2011. Prior to implementation of the remedial action, a detailed remedial action workplan will be prepared and provided to the RWQCB for review and approval.

8.0 REFERENCES

Branco, David, 2009, Personal communication with longtime resident of Samoa.

Freshwater Environmental Services, 2008, *Workplan for Additional Assessment, Town of Samoa, Samoa Peninsula Brownfields Site, Samoa, Humboldt County, California: December 9.*

Freshwater Environmental Services, 2009, *Additional Assessment Report, Samoa Peninsula Brownfields Site, Samoa, Humboldt County, California.*

Pacific Watershed Associates, 1991, *Physical Processes, Geomorphology and Management Options for the Coastal Sand Dunes of Humboldt Bay, Humboldt County, California.*

SCS, Engineers, 2008, *Feasibility Study and Corrective Action Plan, Former Lorenzo's Shell Station, 1 Cutten Street, Samoa, California*: February 19.

SCS, Engineers, 2003, *Results of Soil and Groundwater Investigation for the Soccer Field, Former Services Station and Chemical Storage Areas in the Town of Samoa, California*: October 17.

Winzler & Kelly Consulting Engineers, 2004, *Phase I Environmental Site Assessment for Assessor's Parcel Numbers 401-031-038, -44, -46, -55, -59, and -60 Samoa, California*: February.

Winzler & Kelly Consulting Engineers, 2004a, *Subsurface Investigation Report, Lorenzo's Shell Station, 1 Cutten Street, Samoa California, October.*

Winzler & Kelly Consulting Engineers, 2005, *Phase II Environmental Site Assessment for Assessor's Parcel Numbers 401-031-038, -44, -46, -55, -59, and -60 Samoa, Peninsula Brownfields Site Samoa, Humboldt, California*: June.

Winzler & Kelly Consulting Engineers, 2007, *Additional Phase II Environmental Site Assessment for Assessor's Parcel Numbers 401-031-038, -44, -46, -55, -59, and -60 Samoa, Peninsula Brownfields Site Samoa, Humboldt, California*: April.

Winzler & Kelly Consulting Engineers, 2008, *Final Report, Soil XRF Screening of Five Buildings, Samoa, Humboldt County, California*: July 7.

FIGURES

N
W E
S

Feet
0 500 1,000 2,000 3,000 4,000

LEGEND

Base Image Data Source:
1:24,000 Digital Raster Graph Mosaic of Humboldt County, California

ALL LOCATIONS APPROXIMATE

Samoa Pacific Group

Figure 1
Site Location Map
Soccer Field
Samoa, California

Freshwater Environmental Services

Date: 7-10-09

By: SJT

LEGEND

Former Garage Locations

Approximate Location of 3" Water Line as shown on Town of Samoa Map

Base Image Data Source: Obtained from City of Eureka Engineering/GIS Department Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N W E S

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 2
Site Plan
Soccer Field

Date: 7-10-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater
- Former Garage Locations

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N W E S

Feet
0 10 20 40 60 80 100 120

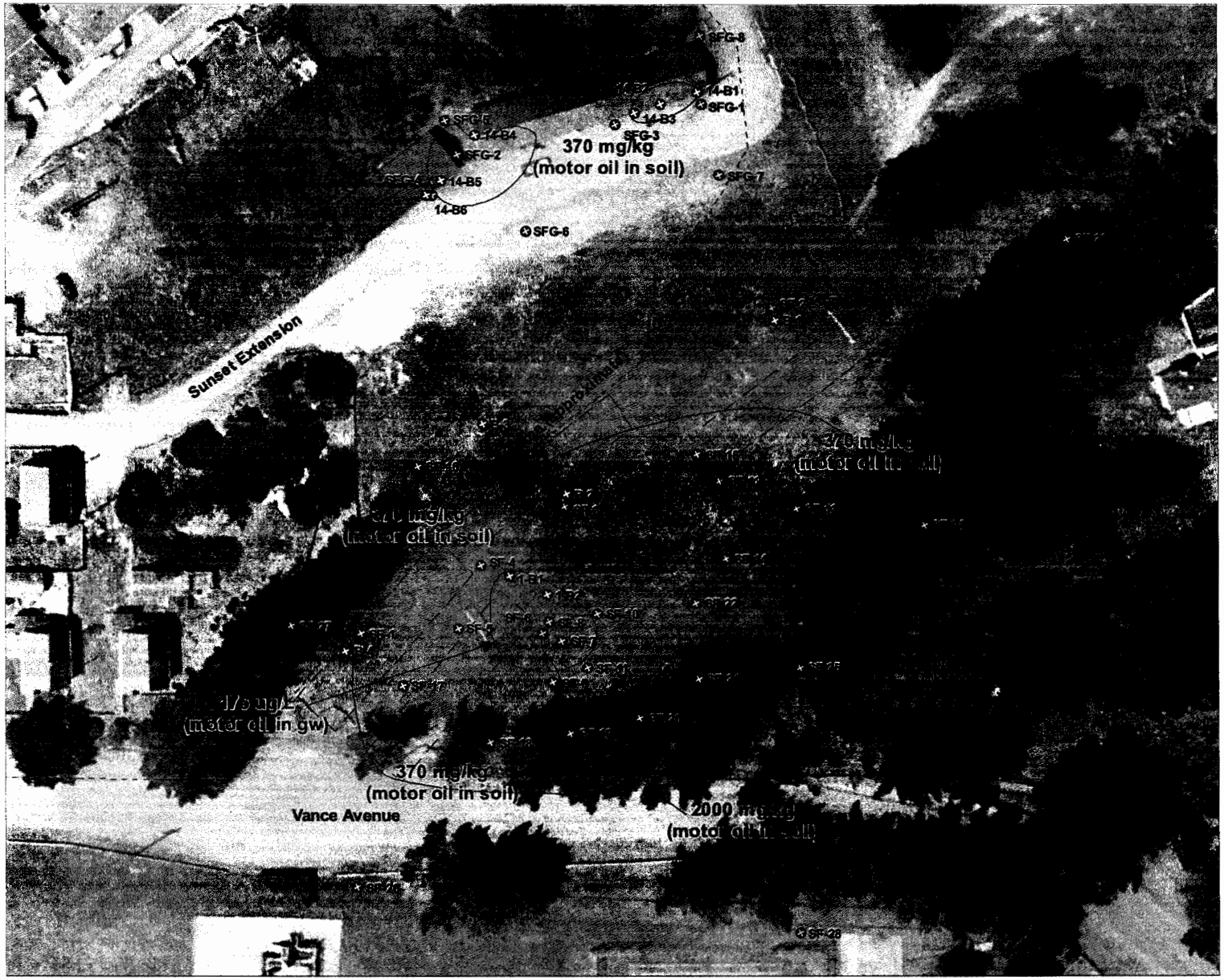
Samoa Pacific Group, LLC.

Figure 3
Soccer Field
Diesel in Soil and Groundwater
Delineation Map

Date: 7-10-09

By: SJT

Freshwater Environmental Services



LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater
- Former Garage Locations

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N
W
E
S

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 4
Soccer Field
Motor Oil in Soil and Groundwater Delineation Map

Date: 7-10-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater
- Former Garage Locations

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N W E S

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 5
Soccer Field
Gasoline in Groundwater
Delineation Map

Date: 7-10-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater
- Former Garage Locations

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 6
Soccer Field
Arsenic in Soil and Groundwater Delineation Map

Date: 7-10-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater
- Former Garage Locations

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N W E S

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 7
Soccer Field
Lead in Soil and Groundwater
Delineation Map

Date: 7-10-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Screening Level Delineation in Soil
- Screening Level Delineation in Groundwater
- Former Garage Locations

Base Image Data Source:
Obtained from City of Eureka Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 60 80 100 120

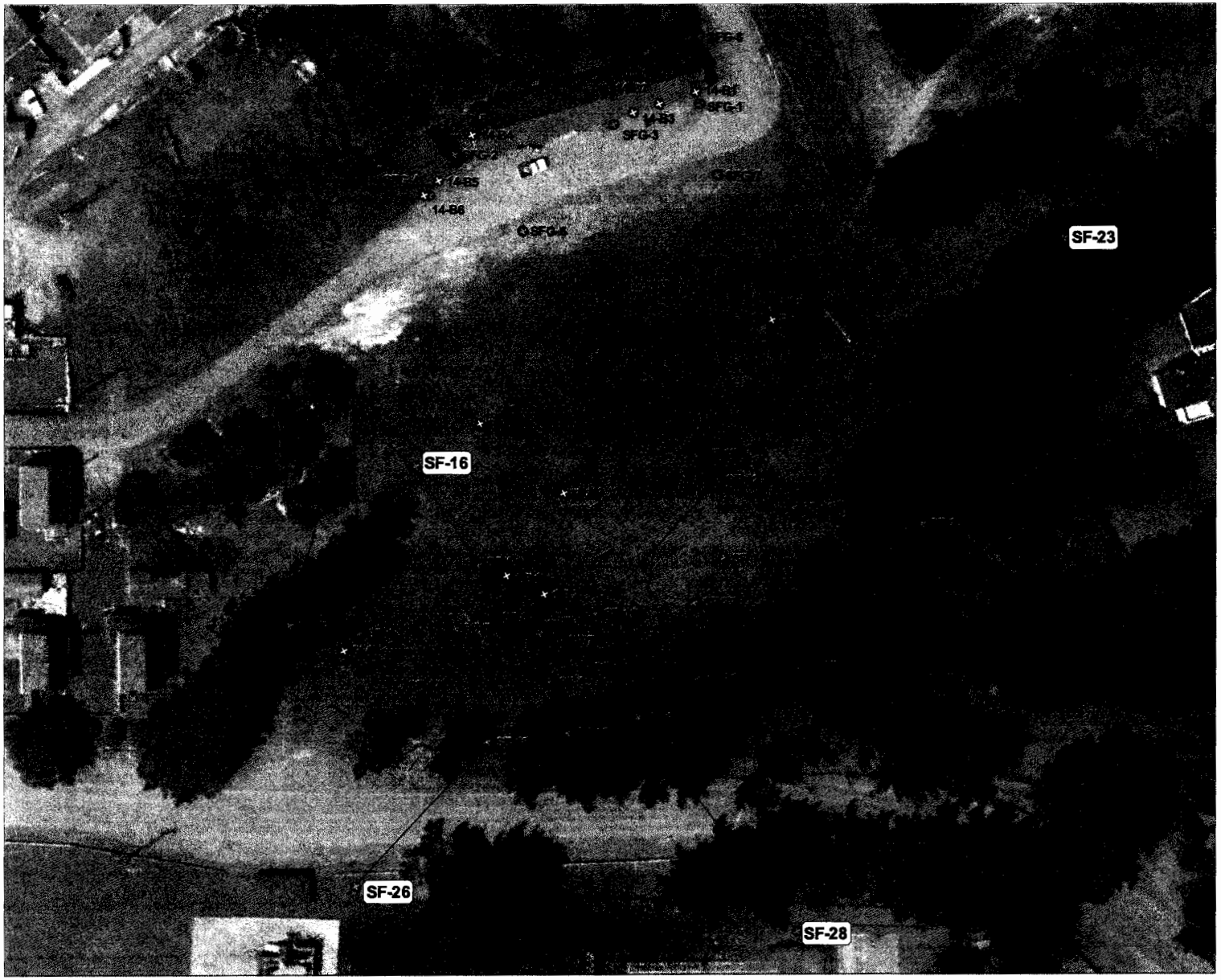
Samoa Pacific Group, LLC.

Figure 8
Soccer Field
Chromium and Nickel in Groundwater
Delineation Map

Date: 7-10-09

By: SJT

Freshwater Environmental Services



LEGEND

- Boring Location (this investigation)
- Boring Locations (previous investigations)
- Former Garage Locations

Base Image Data Source: Obtained from City of Eureka Engineering/GIS Department Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N W E S

Feet
0 10 20 40 60 80 100 120

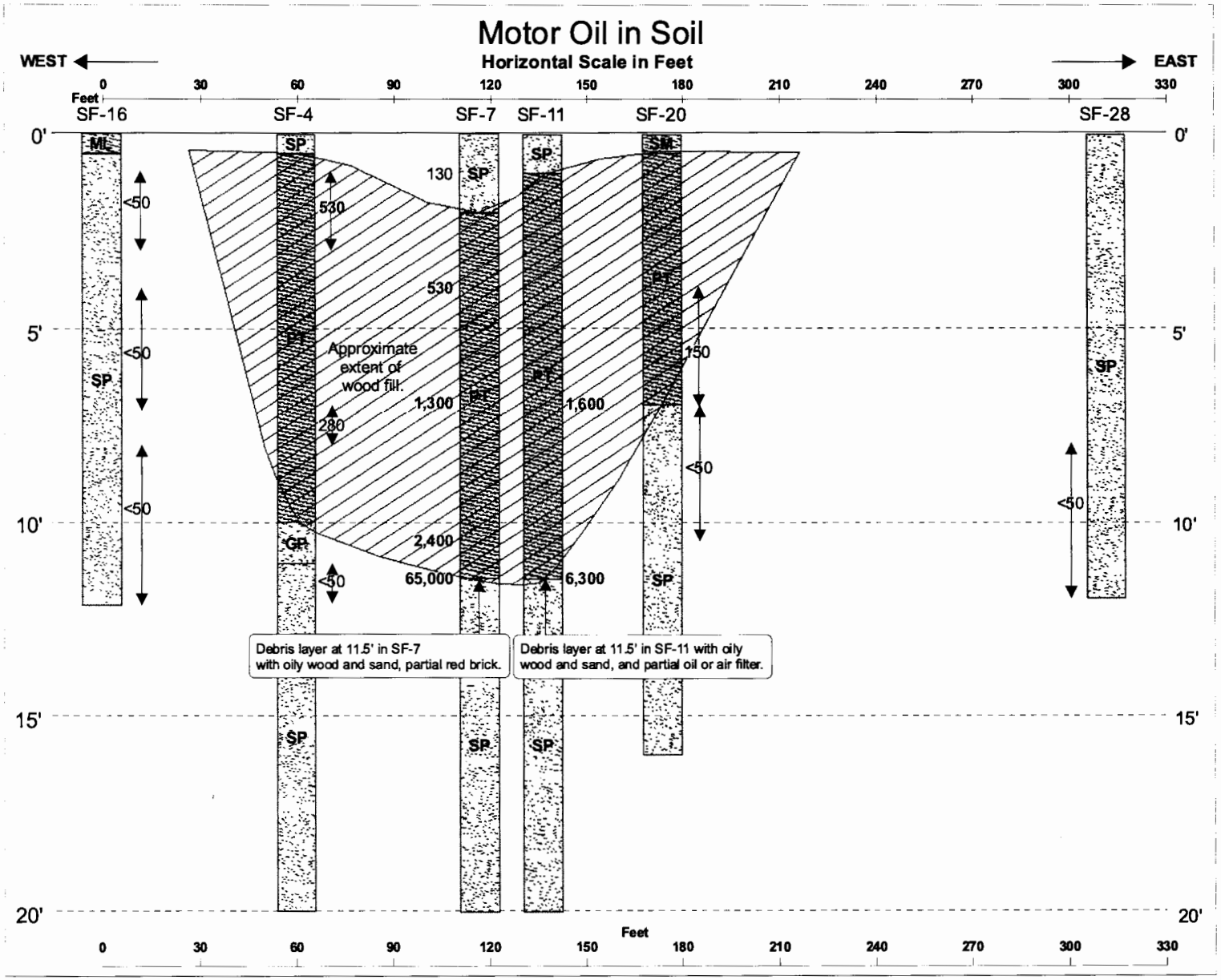
Samoa Pacific Group, LLC.

Figure 9
Soccer Field
Cross Section Locations

Date: 7-10-09

By: SJT

Freshwater Environmental Services



LEGEND

530 Motor Oil in Soil (concentration in mg/kg greater than the screening level of 370 mg/kg)

280 Motor Oil in Soil (concentration in mg/kg less than the screening level of 370 mg/kg)

Depths are below ground level at the boring location

Approximate 12x Vertical Exaggeration

- SP-Sand
- SM-Silty Sand
- GP-Gravel
- ML-Silt
- PT-Peat
- Wood Fill Extent

ALL LOCATIONS APPROXIMATE

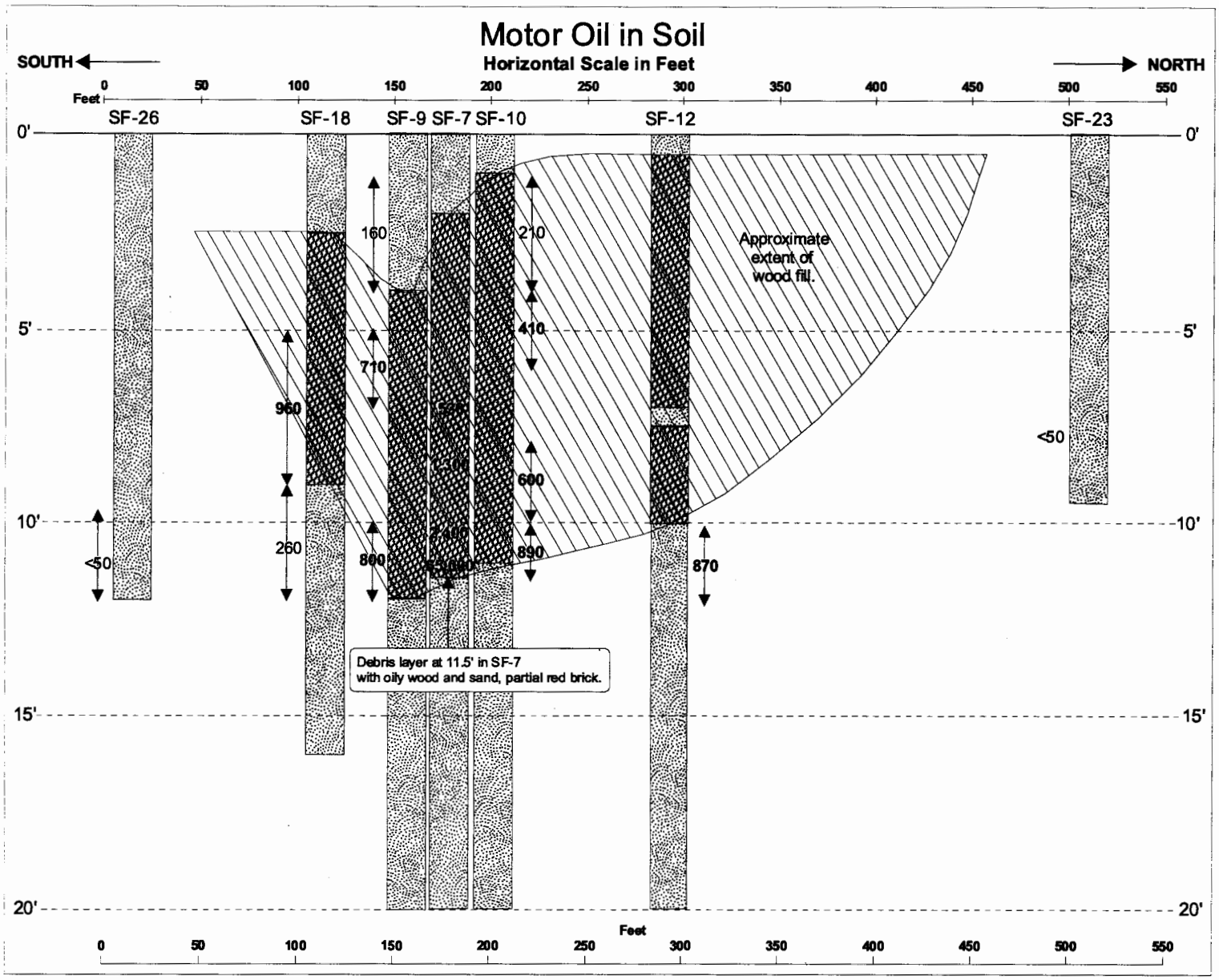
Feet
0 10 20 40 60 80

Samoa Pacific Group, LLC.

Figure 10
Soccer Field
Cross Section SF-16 to SF-28
Motor Oil in Soil (mg/kg)

Date: 7-10-09
By: SJT

Freshwater Environmental Services



LEGEND

530 Motor Oil in Soil (concentration in mg/kg greater than the screening level of 370 mg/kg)

280 Motor Oil in Soil (concentration in mg/kg less than the screening level of 370 mg/kg)

Approximate 20x Vertical Exaggeration

Wood Fill Extent

SP-Sand

PT-Peat

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 60 80 100 120

Samoa Pacific Group, LLC.

Figure 11
Soccer Field
Cross Section SF-23 to SF-26
Motor Oil in Soil (mg/kg)

Date: 7-10-09

By: SJT

Freshwater Environmental Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Approximate Extent of Petroleum-Impacted Soil
- Former Garage Locations

Base Image Data Source:
Obtained from City of Eureka
Engineering/GIS Department
Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

N W E S

Feet
0 10 20 40 60 80 100

Samoa Pacific Group, LLC.

Figure 12
Soccer Field
Proposed Excavation
(Alternative 2)

Date: 7-10-09

By: SJT

Freshwater
Environmental
Services

LEGEND

- Boring Location (this investigation)
- Boring Location (previous investigations)
- Approximate Extent of Petroleum-Impacted Soil Exceeding Total TPH of 2,000 mg/kg
- Former Garage Locations

Base Image Data Source: Obtained from City of Eureka Engineering/GIS Department Image date March 2, 2007.

ALL LOCATIONS APPROXIMATE

Feet
0 10 20 40 60 80 100

Samoa Pacific Group, LLC.

Figure 13
Soccer Field
Proposed Excavation
(Alternative 3)

Date: 7-10-09

By: SJT

Freshwater Environmental Services

APPENDIX A

EDR Well Search Results

Samoa Soccer Field
Vance Avenue
Samoa, CA 95564

Inquiry Number: 2533072.1s
July 02, 2009

The EDR GeoCheck® Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION **PAGE**

GEOCHECK ADDENDUM

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

GEOCHECK® - PHYSICAL SETTING SOURCE REPORT

TARGET PROPERTY ADDRESS

SAMOA SOCCER FIELD
VANCE AVENUE
SAMOA, CA 95564

TARGET PROPERTY COORDINATES

Latitude (North):	40.81990 - 40° 49' 11.6"
Longitude (West):	124.1862 - 124° 11' 10.3"
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	399964.0
UTM Y (Meters):	4519230.0
Elevation:	24 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	40124-G2 EUREKA, CA
Most Recent Revision:	1972

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

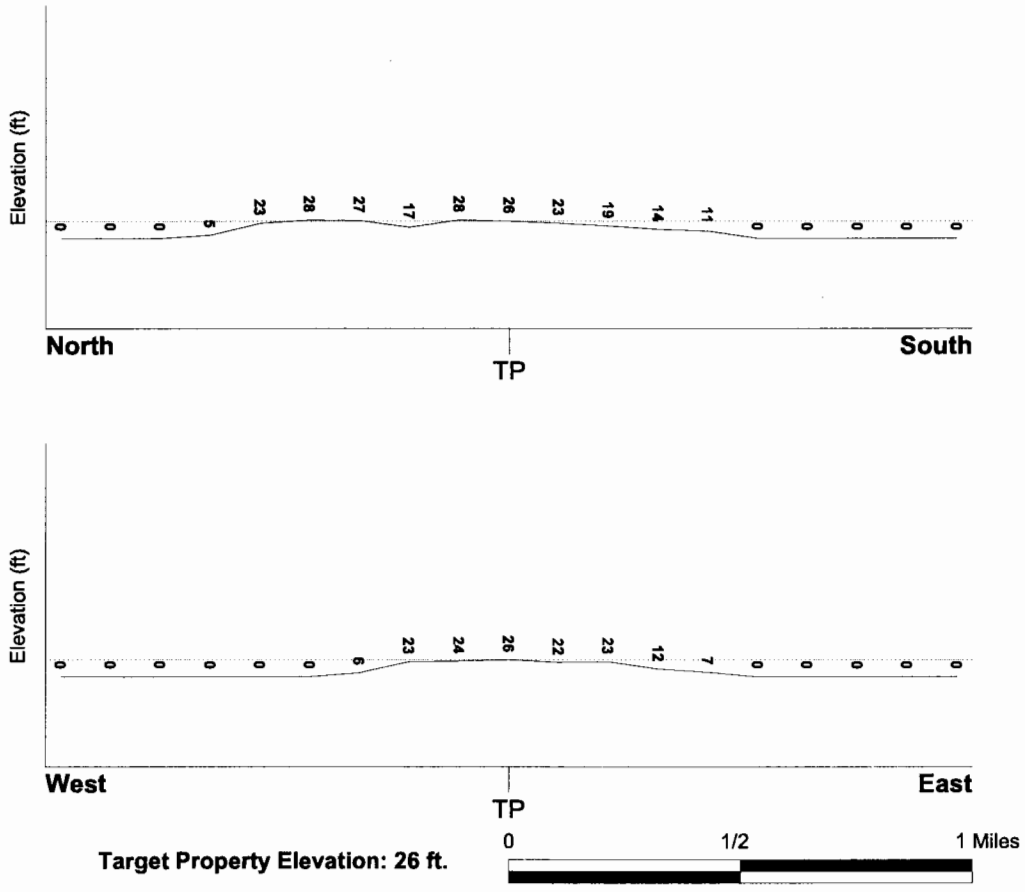
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SSW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
HUMBOLDT, CA	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 0600600775C

Additional Panels in search area: 0600620005C

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
EUREKA	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

Era:	Cenozoic
System:	Quaternary
Series:	Quaternary
Code:	Q *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratifed Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name:	DUNE LAND
Soil Surface Texture:	sand
Hydrologic Group:	Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.
Soil Drainage Class:	Not reported

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel:	Not Reported
Depth to Bedrock Min:	> 60 inches
Depth to Bedrock Max:	> 60 inches

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	6 inches	sand	Granular materials (35 pct. or less passing No. 200), Fine Sand.	COARSE-GRAINED SOILS, Sands, Clean Sands, Poorly graded sand.	Max: 20.00 Min: 6.00	Max: 0.00 Min: 0.00
2	6 inches	60 inches	sand	Granular materials (35 pct. or less passing No. 200), Fine Sand.	COARSE-GRAINED SOILS, Sands, Clean Sands, Poorly graded sand.	Max: 20.00 Min: 6.00	Max: 0.00 Min: 0.00

OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: fine sand
gravelly - coarse sand
silty clay loam

Surficial Soil Types: fine sand
gravelly - coarse sand
silty clay loam

Shallow Soil Types: No Other Soil Types

Deeper Soil Types: coarse sand
fine sand
stratified
clay

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	1.000
State Database	1.000

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

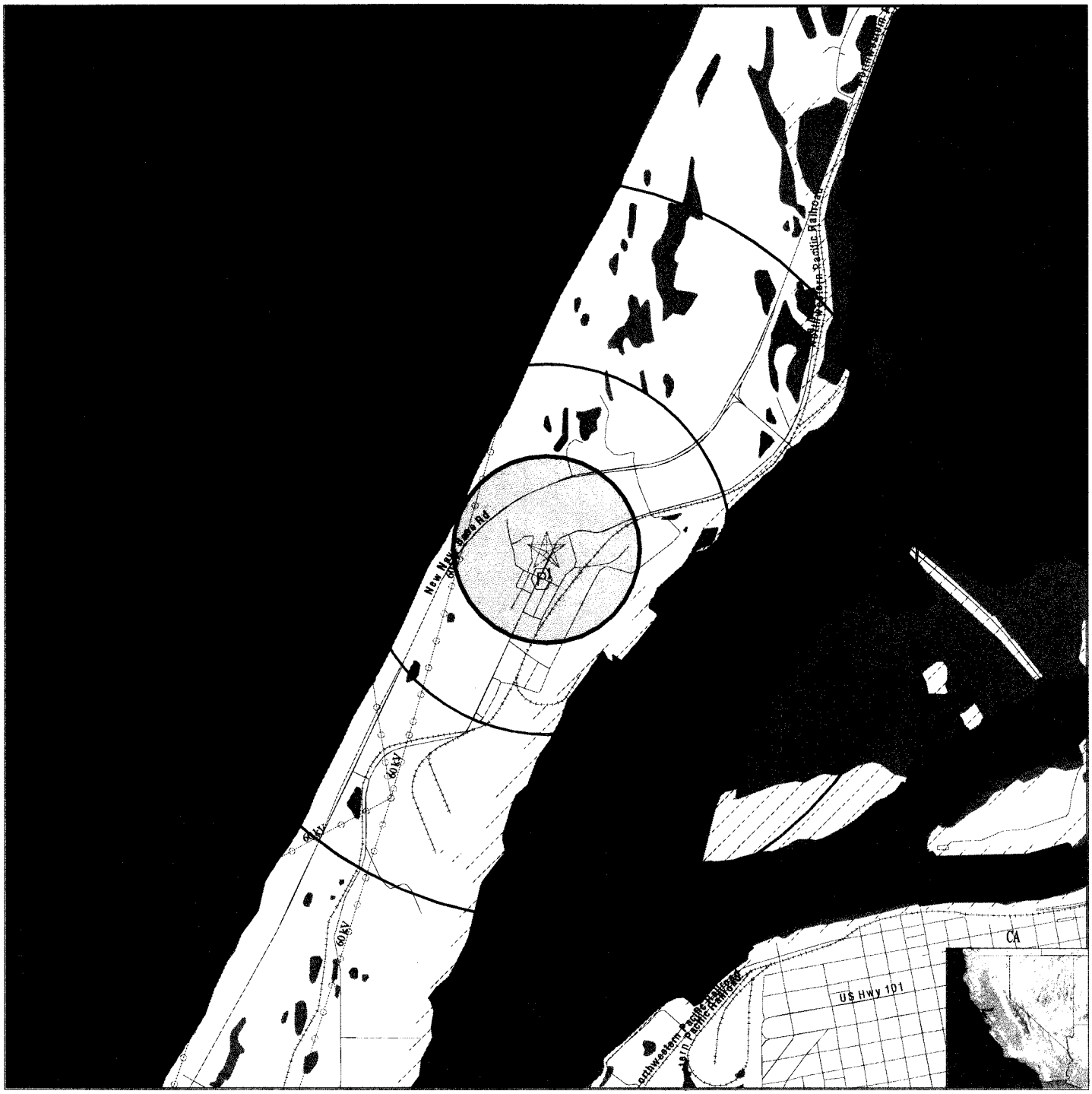
MAP ID	WELL ID	LOCATION FROM TP
1	CA1200788	0 - 1/8 Mile South

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

PHYSICAL SETTING SOURCE MAP - 2533072.1s



- County Boundary
- Major Roads
- Contour Lines
- Power transmission lines
- Earthquake Fault Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- (GI) Indeterminate Groundwater Flow at Location
- (GV) Groundwater Flow Varies at Location
- (HD) Closest Hydrogeological Data
- Oil, gas or related wells
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

SITE NAME: Samoa Soccer Field	CLIENT: Freshwater Environmental Service
ADDRESS: Vance Avenue	CONTACT: Orrin Plocher
Samoa CA 95564	INQUIRY #: 2533072.1s
LAT/LONG: 40.8199 / 124.1862	DATE: July 02, 2009 5:05 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
1 **South** **0 - 1/8 Mile** **Lower**	**FRDS PWS**	**CA1200788**

Pwsid:	CA1200788	Epa region:	09
State:	CA	County:	Not Reported
Pws name:	Green Diamond Resource Co.-Big Lagoon		
Population Served:	45	Pwssvcconn:	15
PWS Source:	Surface_water		
Pws type:	CWS		
Status:	Active	Owner type:	Private
Facility id:	1		
Facility name:	PITCHER CREEK - RAW - INACTIVE XCLD		
Facility type:	Intake	Treatment process:	hypochlorination, post
Treatment objective:	disinfection		
Contact name:	Jeff Lane		
Original name:	Green Diamond Resource Co.-Big Lagoon		
Contact phone:	7076684481	Contact address1:	P. O. Box 68
Contact address2:	Not Reported	Contact city:	Korbel
Contact zip:	95550		

Pwsid:	CA1200788	Epa region:	09
State:	CA	County:	Not Reported
Pws name:	Green Diamond Resource Co.-Big Lagoon		
Population Served:	45	Pwssvcconn:	15
PWS Source:	Surface_water		
Pws type:	CWS		
Status:	Active	Owner type:	Private
Facility id:	2		
Facility name:	WELL 001		
Facility type:	Well	Treatment process:	hypochlorination, post
Treatment objective:	disinfection		
Contact name:	Jeff Lane		
Original name:	Green Diamond Resource Co.-Big Lagoon		
Contact phone:	7076684481	Contact address1:	P. O. Box 68
Contact address2:	Not Reported	Contact city:	Korbel
Contact zip:	95550		

Pwsid:	CA1200788	Epa region:	09
State:	CA	County:	Not Reported
Pws name:	Green Diamond Resource Co.-Big Lagoon		
Population Served:	45	Pwssvcconn:	15
PWS Source:	Surface_water		
Pws type:	CWS		
Status:	Active	Owner type:	Private
Facility id:	CA1200788001		
Facility name:	PITCHER CREEK - RAW - INACTIVE XCLD		
Facility type:	Reservoir	Treatment process:	hypochlorination, post
Treatment objective:	disinfection		
Contact name:	Jeff Lane		
Original name:	Green Diamond Resource Co.-Big Lagoon		
Contact phone:	7076684481	Contact address1:	P. O. Box 68
Contact address2:	Not Reported	Contact city:	Korbel
Contact zip:	95550		

Pwsid:	CA1200788	Epa region:	09
State:	CA	County:	Not Reported
Pws name:	Green Diamond Resource Co.-Big Lagoon		
Population Served:	45	Pwssvcconn:	15
PWS Source:	Surface_water		
Pws type:	CWS		
Status:	Active	Owner type:	Private
Facility id:	CA1200788002		
Facility name:	WELL 001		
Facility type:	Well	Treatment process:	hypochlorination, post
Treatment objective:	disinfection		
Contact name:	Jeff Lane		
Original name:	Green Diamond Resource Co.-Big Lagoon		
Contact phone:	7076684481	Contact address1:	P. O. Box 68
Contact address2:	Not Reported	Contact city:	Korbel
Contact zip:	95550		

Pwsid:	CA1200788	Epa region:	09
State:	CA	County:	Not Reported
Pws name:	Green Diamond Resource Co.-Big Lagoon		
Population Served:	45	Pwssvcconn:	15
PWS Source:	Surface_water		
Pws type:	CWS		
Status:	Active	Owner type:	Private
Facility id:	CA1200788003		
Facility name:	WELL 001 - TREATED	XCLD	
Facility type:	Treatment_plant	Treatment process:	hypochlorination, post
Treatment objective:	disinfection		
Contact name:	Jeff Lane		
Original name:	Green Diamond Resource Co.-Big Lagoon		
Contact phone:	7076684481	Contact address1:	P. O. Box 68
Contact address2:	Not Reported	Contact city:	Korbel
Contact zip:	95550		

PWS ID:	CA1200788		
Date Initiated:	Not Reported	Date Deactivated:	Not Reported
PWS Name:	BIG LAGOON CAMP - LP CORP SAMOA, CA 95564		
Addressee / Facility:	System Owner/Responsible Party LOUISIANA PACIFIC CORP P O BOX 1 SAMOA, CA 95564		
Facility Latitude:	40 49 08	Facility Longitude:	124 11 07
City Served:	Not Reported		
Treatment Class:	Untreated	Population:	60

PWS currently has or had major violation(s) or enforcement: YES

VIOLATIONS INFORMATION:

Violation ID:	9300001	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	12/01/92	Vio. end Date:	12/31/92	Vio. Period:	001 Months
Num required Samples:	Not Reported	Number of Samples Taken:		Not Reported	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	MCL, Monthly (TCR)				
Contaminant:	COLIFORM (TCR)				
Vio. Awareness Date:	013093				

Violation ID:	9301001	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	09/01/93	Vio. end Date:	09/30/93	Vio. Period:	001 Months
Num required Samples:	Not Reported	Number of Samples Taken:		Not Reported	
Analysis Result:	Not Reported	Maximum Contaminant Level:		Not Reported	
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Routine Major (TCR)				
Contaminant:	COLIFORM (TCR)				
Vio. Awareness Date:	111593				

ENFORCEMENT INFORMATION:

System Name:	BIG LAGOON CAMP - LP CORP		
Violation Type:	MCL, Average		
Contaminant:	Turbidity		
Compliance Period:	1994-01-01 - 1994-02-28		
Violation ID:	9401003		
Enforcement Date:	1994-05-10	Enf. Action:	State Public Notif Requested
System Name:	Green Diamond Resource Co.-Big Lagoon		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	7/1/1993 0:00:00 - 12/31/2003 0:00:00		
Violation ID:	95V0001		
Enforcement Date:	12/31/2003 0:00:00	Enf. Action:	Fed Compliance Achieved
System Name:	SIMPSON TIMBER CO, BIG LAG		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1993-07-01 - 2015-12-31		
Violation ID:	95V0001		
Enforcement Date:	Not Reported	Enf. Action:	Not Reported
System Name:	SIMPSON TIMBER CO BIG LAGOO		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1993-07-01 - 2015-12-31		
Violation ID:	95V0001		
Enforcement Date:	Not Reported	Enf. Action:	Not Reported
System Name:	SIMPSON TIMBER CO BIG LAGOON CAMP		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	1993-07-01 - 2015-12-31		
Violation ID:	95V0001		
Enforcement Date:	Not Reported	Enf. Action:	Not Reported
System Name:	Green Diamond Resource Co.-Big Lagoon		
Violation Type:	Initial Tap Sampling for Pb and Cu		
Contaminant:	LEAD & COPPER RULE		
Compliance Period:	07/01/93 - 12/31/03		
Violation ID:	95V0001		
Enforcement Date:	12/31/03	Enf. Action:	Fed Compliance Achieved

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: CA Radon

Radon Test Results

Zip	Total Sites	> 4 Pci/L	Pct. > 4 Pci/L
95564	1	0	0.00

Federal EPA Radon Zone for HUMBOLDT County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for HUMBOLDT COUNTY, CA

Number of sites tested: 32

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.375 pCi/L	97%	3%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	-0.900 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^R Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Health Services
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779
Oil and Gas well locations in the state.

RADON

State Database: CA Radon
Source: Department of Health Services
Telephone: 916-324-2208
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

STREET AND ADDRESS INFORMATION

APPENDIX B

Historic Soil and Groundwater Data

Results of Soil and Groundwater Investigation for the Soccer Field, Former Service Station, and Chemical Storage Areas in the Town of Samoa, California

October 7, 2003

SCS Engineers

SCS ENGINEERS
3645 WESTWIND BOULEVARD
SANTA ROSA, CA 95403
PH. (707) 546-9461 FAX (707) 544-5769

Site Plan

Boring Locations - Soccer Field
Vance Avenue
Town of Samoa, California

FIGURE
2

Drawn by:	File Name:		Job Number:		Date:
MRO	M150 SitePlan		01203415.00		OCTOBER 17, 2003

Key to Tables
Town of Samoa, California

TPH-g	=	Total petroleum hydrocarbons in the gasoline range
TPH-d	=	Total petroleum hydrocarbons in the diesel range
B	=	Benzene
T	=	Toluene
E	=	Ethylbenzene
X	=	Xylenes
MTBE	=	Methyl tertiary butyl ether
5-Oxys	=	MTBE, DIPE, ETBE, TAME, TBA
DIPE	=	Di-isopropyl ether
ETBE	=	Ethyl tert-butyl ether
TAME	=	Tert amyl-methyl ether
TBA	=	Tert-butyl alcohol
VOCs	=	Volatile organic compounds
mg/kg	=	Milligrams per kilogram
ug/L	=	Micrograms per liter
ND	=	Non detect
NA	=	Not analyzed

Table 1: Soil Boring Analytical Results - Soccer Field - 2000
Town of Samoa, California

Soccer-B-1-4'	<1.0	87	<100	<0.005	0.01	0.091	<0.015	<0.025
Soccer-B-1-10'	<1.0	<5.0	<50	<0.005	<0.005	<0.005	<0.015	<0.025
Soccer-B-2-6'*	2.6	180	260	0.009	<0.005	0.097	0.031	<0.025
Soccer-B-2-10'	<1.0	<5.0	<50	<0.005	<0.005	<0.005	<0.015	<0.025
Soccer-B-3-6'	<1.0	<5.0	<50	<0.005	<0.005	<0.005	<0.015	<0.025
Soccer-B-3-10'	<1.0	<5.0	<50	<0.005	<0.005	<0.005	<0.015	<0.025
Soccer-B-4-3'	<1.0	160	220	<0.005	0.015	0.036	<0.015	<0.025
Soccer-B-4-8'	<1.0	<5.0	<50	<0.005	<0.005	<0.005	<0.015	<0.025

* pH = 4.35.

Table 2: Soil Boring Analytical Results - Former Service Station - 2000
Town of Samoa, California

Sample ID	TPH-g	TPH-d	TPH-mo	B	T	E	X	MTBE	Lead
	mg/kg								
SSTN-B-5-5'	<1.0	<5.0	<50	<0.002	<0.002	<0.002	<0.002	<0.002 to <0.05	<0.002	<3.0
SSTN-B-5-10'	4.2	<5.0	<50	0.0048	0.76	0.57	2.91	<0.002 to <0.05	<0.002	<3.0
SSTN-B-6-5'	<1.0	<5.0	<50	<0.002	<0.002	<0.002	<0.002	<0.002 to <0.05	<0.002	6.1
SSTN-B-6-8.5'	1,100	1,900*	170*	<0.5	20	23	266	<0.5 to <5.0	<0.5	3.0
SSTN-B-7-5'	<1.0	<5.0	<50	<0.002	<0.002	<0.002	<0.002	<0.002 to <0.05	<0.002	<3.0
SSTN-B-7-9'	<1.0	<5.0	<50	<0.002	<0.002	<0.002	<0.002	<0.002 to <0.05	<0.002	3.0
SSTN-B-8-5'	<1.0	<5.0	<50	<0.002	<0.002	<0.002	<0.002	<0.002 to <0.05	<0.002	<3.0
SSTN-B-8-9'	<1.0	<5.0	<50	<0.002	<0.002	<0.002	<0.002	<0.002 to <0.05	<0.002	3.0
SSTN-B-9-4'	<1.0	<5.0	<50	<0.002	<0.002	<0.002	<0.002	<0.002 to <0.05	<0.002	3.2
SSTN-B-9-7'	<1.0	<5.0	<50	<0.002	<0.002	<0.002	<0.002	<0.002 to <0.05	<0.002	3.5
SSTN-B-10-3'	<1.0	<5.0	<50	<0.002	<0.002	<0.002	<0.002	<0.002 to <0.05	<0.002	3.0
SSTN-B-10-5'	<1.0	<5.0	<50	<0.002	<0.002	<0.002	<0.002	<0.002 to <0.05	<0.002	<3.0
SSTN-B-11-5'	<1.0	<5.0	<50	<0.002	<0.002	<0.002	<0.002	<0.002 to <0.05	<0.002	<3.0
SSTN-B-11-7'	<1.0	<5.0	<50	<0.002	<0.002	<0.002	<0.002	<0.002 to <0.05	<0.002	<3.0

* The chromatogram does not exhibit a pattern for diesel or motor oil. Higher boiling point components of gasoline are present.

Table 3: Groundwater Boring Analytical Results - 2000
Town of Samoa, California

[redacted]											
Soccer B-1-Water	<50	<50	<200	<1.0	<1.0	<1.0	<1.0	<1.0 to <50	NA	NA	<1.0
Soccer B-2-Water	<50	<50	<200	<1.0	<1.0	<1.0	<1.0	<1.0 to <50	NA	NA	<1.0
Soccer B-3-Water	<50	<50	<200	<1.0	<1.0	<1.0	<1.0	<1.0 to <50	NA	NA	<1.0
Soccer B-4-Water[1]	<50	<50	<200	<1.0	<1.0	<1.0	<1.0	<1.0 to <50	NA	NA	<1.0
SSTN-B-5-Water[2]	48,000	1,300*	<200	170	9,000	3,100	18,400	<5.0 to <200	<0.1	NA	NA
M1502-SSTN-B-5-Water (Alpha)	110,000	1,900	NA	220	11,000	3,900	22,000	<50 to <1,000	NA	610 isopropylbenzene 840 naphthalene 760 n-propylbenzene 2,000 1,2,4-trimethylbenzene 1,100 1,3,5-trimethylbenzene	<50
SSTN-B-6-Water	110,000	2,800*	<300	<100	15,000	7,200	46,000	<100 to <5,000	<0.1	NA	<100
SSTN-B-7-Water	<50	<50	<200	<1.0	<1.0	<1.0	<1.0	<1.0 to <50	NA	2.4 tetrachloroethene	<1.0
SSTN-B-8-Water	<50	<50	<200	<1.0	<1.0	<1.0	<1.0	<1.0 to <50	NA	<1.0	<1.0
SSTN-B-9-Water	<50	<50	<200	<1.0	<1.0	<1.0	<1.0	<1.0 to <50	NA	<1.0	<1.0
SSTN-B-10-Water	<50	<50	<200	<1.0	<1.0	<1.0	<1.0	<1.0 to <50	NA	<1.0	<1.0
SSTN-B-11-Water	<50	<50	<200	<1.0	<1.0	<1.0	<1.0	<1.0 to <50	NA	<1.0	<1.0

1 Also contained 49 ug/L 2-methylnaphthalene, 43 ug/L 2,4-dimethylphenol, 15 ug/L 2,6-nitrotoluene, 36 ug/L 4-methylphenol, and 220 ug/L naphthalene.

2 Also ND for EPA Method 8270 analytes.

* The chromatogram does not exhibit a characteristic pattern for diesel. Higher boiling point constituents of gasoline are present.

Table 4: Groundwater Boring Analytical Results - Semi-Volatile Organics - 2000
Town of Samoa, California

Sample ID	[illegible]
Soccer B-1-Water	<10 to <50
Soccer B-2-Water	<10 to <50
Soccer B-3-Water	<10 to <50
Soccer B-4-Water	<10 to <50
SSTN-B-7-Water	<10 to <50
SSTN-B-8-Water	<10 to <50
SSTN-B-9-Water	<10 to <50
SSTN-B-10-Water	<10 to <50
SSTN-B-11-Water	<10 to <50

Phase II Environmental Site Assessment for Assessor's Parcel Numbers 401-031-038, -044, -046, -055, -059, and -060 Samoa, Peninsula Brownfields Site Samoa, Humboldt, California

June, 2005

Winzler & Kelly Consulting Engineers

J:\CAD\JOBS\2004\04166701\dwg\66760052 7.dwg 6/6/2005

SITE PLAN
SAMOA BROWNFIELD SAP
HUMBOLDT COUNTY COMMUNITY DEVELOPMENT SERVICES
FIGURE 2.2

WINZLER & KELLY