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September 29, 1999

Ms. Eva Chu
Alameda County Environmental Health Services
1131 Harbor Parkway, Second Floor
Alameda, CA 94502

Subject: 2351 Shoreline Drive, Alameda, California

Dear Ms. Chu:

Enclosed for your review is a copy of our report entitled "Comprehensive Risk Management and Site Closure Plan for the former Southshore Car Wash at the above subject site location.

If you have any questions or comments, please call me at (925) 244-6600. Your time is greatly appreciated in reviewing this report.

Sincerely,

Mansour Sepehr, Ph.D.,P.E.
Principal Hydrogeologist

MS/jb

Enclosure

cc: Mr. Murray Stevens w/enclosure

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COMPREHENSIVE RISK MANAGEMENT AND SITE CLOSURE PLAN

For the Former
Southshore Car Wash
2351 Shoreline Drive
Alameda, California

Project 99-2212

September 28, 1999

Prepared for

Kamur Industries
2351 Shoreline Drive
Alameda, CA 94501

Prepared by

SOMA Environmental Engineering, Inc.
2680 Bishop Drive, Suite 203
San Ramon, California 94583

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Table of Contents

List of Figures

List of Tables

1.0 Executive Summary

The following document is the Risk Management Plan (RMP) for the former Southshore Car Wash was located at 2351 Shoreline Drive, Alameda, California. This RMP has been prepared by SOMA Environmental Engineering, Inc. (SOMA) on behalf of Kamur Industries, Inc. The purpose of this RMP is to ensure that the following key issues have been adequately addressed in support of a No Further Action (NFA) regulatory decision for the Site:

- Has the site been adequately investigated?
- Have all sources been removed or stabilized?
- Is the groundwater plume stable?
- Does the site pose any current or future threats to public health or the environment?
- Does the site pose any current or future threat to water resources?
- Have all the necessary risk management precautions been incorporated to mitigate any threats to human health and the environment during Site construction activities?

Site background

The Site previously operated as a gasoline service station (former Texaco Service Station) and car wash facility. Previous Site activities resulted in gasoline contamination of both soil and groundwater. The source of soil and groundwater contamination was leaking underground storage tanks (USTs), which have been removed from the Site. Although petroleum impacted soil has been removed and replaced with clean soil, petroleum constituents in the form of benzene, toluene, etrhylbenzene and xylene (BTEX) still remain in the groundwater beneath the Site

Has the Site Been Adequately Characterized?

The nature and extent of soil contamination at the Site has been well characterized, especially with respect to BTEX in groundwater. In 1997, SOMA used the results of the Site investigations to 1) perform groundwater flow modeling; 2) perform groundwater contaminant transport modeling; 3) perform VOC emission modeling; and 4) evaluate potential risks to human health and the environment.

Have All Contaminant Sources been removed or stabilized?

Beginning in 1991, the nature and extent of soil and groundwater contamination was evaluated at the Site. The results of the investigations revealed total petroleum hydrocarbons as gasoline (TPH-g) and BTEX in soil and groundwater following the initial removal of the USTs and petroleum contaminated soil. In February 1991, an additional 1,500 cubic yards of TPH-contaminated soils from the original UST locations were removed and backfilled with clean soil. Consequently, no detectable TPH-g or BTEX remained in the soil at the Site and the soil was not further evaluated as a medium of concern in the HHRA, as discussed in more detail in Section 3.0. Although the petroleum impacted soils have been removed and replaced with clean soil, BTEX still remain in the groundwater beneath the Site.

Is the Groundwater Plume Beneath the Site Stable?

No pumping or slug tests have been conducted in on-Site monitoring wells. However, the lithologic logs for the monitoring wells indicate that the saturated sediments beneath the Site are comprised of fine to medium-grained sands. Based on the scientific literature, the hydraulic conductivity ranges between 2.8 and 28 feet per day For the purpose of groundwater modeling, the Site hydraulic conductivity was assumed to be 15 feet per day. Groundwater modeling results indicated that the benzene plume would migrate approximately 1,500 feet downgradient after 30 years

Does the Site Pose Any Threats to Human Health or the Environment?

Using the results of the Site groundwater investigations, SOMA performed 1) groundwater flow modeling; 2) groundwater contaminant transport modeling; 3) VOC emission modeling; and 4) a human health risk assessment (HHRA). The HHRA for the Site evaluated the following specific exposure scenarios:

- Current and future on-Site outdoor worker through inhalation of volatile groundwater emissions;
- Current and future off-Site outdoor worker through inhalation of volatile groundwater emissions;
- Current and future on-Site indoor worker through inhalation of volatile groundwater emissions;
- Future off-Site indoor worker through inhalation of volatile emissions;
- Future on-Site construction worker with dewatering through ingestion of wet sediments, dermal contact with wet sediments and inhalation of volatile emissions from wet sediments; and
- Future on-Site construction worker without dewatering through ingestion of groundwater, dermal contact with groundwater and inhalation of volatile emissions from groundwater.

Does the Site Pose Any Current or Future Threats to Water resources?

Apparently, there are no drinking water sources in the immediate vicinity of the Site. However, a surface water body located half a mile downgradient from the Site. To evaluate the potential impact of site related chemicals on the water quality of the lagoon, chemical transport modeling was conducted. The results of chemical transport modeling indicated that site related chemicals will travel about 2,000 feet to a downgradient location and therefore, will not reach to the lagoon The chemical modeling was conducted under very conservative assumptions. For instance, it was assumed that BTEX would not biodegrade in subsurface during the next 30 years.

Have all the necessary risk management precautions been incorporated to mitigate any threats to human health and the environment during Site construction activities?

Risk management during construction addresses precautions that will be taken to mitigate risks to human health and the environment from residual groundwater contaminants during Site construction activities. Precautions to be taken during construction will include the following:

- Protect construction workers who may directly (e.g., through dermal contact) or indirectly (e.g., through inhalation of volatile emissions) contact residual contaminants in groundwater (e.g., during site preparation, grading, foundation construction, or landscape installation) through implementation of a Site Health and Safety Plan;
- implement construction impact mitigation measures, including control of nuisance dust generation at the Site, decontamination of groundwater sampling equipment, prevention of sediment from leaving the Site in storm water runoff, and management of groundwater extracted from excavations;
- implement procedures to protect monitoring wells remaining on the Site, if any;
- implement construction methods that minimize the potential for creating conduits to deeper groundwater zones when driving piles.

2.0 INTRODUCTION

The Southshore Car Wash (Site) is the eastern portion of the Southshore Shopping Center, located at 2351 Shoreline Drive, Alameda, California (Figure 1). The Site previously operated as a gasoline service station (former Texaco Service Station) and car wash facility. The Site is owned by Harsch Investment Corporation and has been leased to Kamur Industries, who currently operates the Site. Previous Site activities resulted in gasoline contamination of both soil and groundwater. The source of soil and groundwater contamination was leaking underground storage tanks (USTs), which have been removed from the Site. Although petroleum impacted soil has been removed and replaced with clean soil, petroleum constituents in the form of benzene, toluene, etrhylbenzene and xylene still remain in the groundwater beneath the Site.

In 1997, Kamur Industries retained SOMA Environmental Engineering, Inc. (SOMA) to evaluate the potential risks to human health and the environment from the residual BTEX in groundwater at the Site. The results of the Human Health Risk Assessment (HHRA) concluded that the BTEX contamination in groundwater beneath the Site does not pose a health threat for on-site or off-site workers under current or future conditions (SOMA 1997). Groundwater flow and chemical transport modeling conducted as part of the HHRA further concluded that the residual BTEX contamination in groundwater will not impact downgradient environmental receptors, such as the lagoon located one-half mile downgradient of the Site (SOMA 1997).

On behalf of Kamur Industries, SOMA has prepared the following Risk Management Plan (RMP) for the former Southshore Car Wash. The purpose of the RMP is to ensure that the following key issues have been adequately addressed in support of a No Further Action (NFA) regulatory decision for the Site

- Has the site been adequately investigated?

- Have all sources been removed or stabilized?
- Is the groundwater plume stable?
- Does the site pose any current or future threats to public health or the environment?
- Does the site pose any current or future threat to water resources?
- Have all the necessary risk management precautions been incorporated to mitigate any threats to human health and the environment during Site construction activities?

This RMP is organized into the following sections:

1. **Introduction -** Provides a brief introduction to the Former Southshore Car Wash and the organization of this report.

2. **Site Characterization** – Summarizes the nature and extent of soil contamination, Site hydrogeology and the nature and extent of groundwater contamination.

3. **Human Health Risk Assessment -** Evaluates potential on-site and off-site human health impacts which might result from exposure to chemical contaminants in groundwater at the former Southshore Car Wash, under both current and future conditions.

4. **Risk Management** - Provides a comprehensive plan for groundwater management, surface water/sediment management, and protection of workers during all phases of construction.

3.0 SITE CHARACTERIZATION

The following section summarizes previous Site investigations, Site hydrogeology, and the nature and extent of groundwater contamination.

3.1 Nature and Extent of Site Soil Contamination

In July 1990, three 10,000-gallon capacity gasoline USTs were removed from the Site. Soil sampling conducted by Environmental Biosystems, Inc. (EBS) revealed TPH-g beneath the tank excavation at concentrations from 360 mg/kg to 9,500 mg/kg.

Beginning in 1991, Kamur Industries retained Soil Tech Engineering, Inc. (STE) to evaluate the nature and extent of soil and groundwater contamination at the Site. The results of the investigations performed by STE revealed that TPH-g and BTEX in soil and groundwater following the initial removal of petroleum contaminated soil (STE 1991). In February 1991, STE excavated and disposed of an additional 1,500 cubic yards of TPH-g contaminated soils from the original UST locations and backfilled the excavation with clean soil. Consequently, no detectable TPH-g or BTEX remained in the soil at the Site and soil was not further evaluated as a medium of concern in the HHRA, as discussed in more detail in Section 3.0.

3.2 Site Hydrogeology

The stratigraphy of soil beneath the site was investigated by STE and native soils beneath the Site were shown to consist mainly of fine to medium grained sands (STE 1991). Groundwater is encountered at depths between 8- and 9-feet below ground surface (bgs) (STE 1991).

In February 1991, STE installed four groundwater monitoring wells at the Site (STMW-1 through STMW-4) In January 1993, STW installed two additional monitoring wells (STMW-5 and –6). The Location of all six groundwater monitoring wells are shown in Figure 2. The groundwater elevation contour map based on water levels measured during the February 1993 groundwater monitoring event, are presented in Figure 3. Based on Figure 3, groundwater flows toward the north/northeast direction.

As discussed previously, the lithologic logs of the groundwater monitoring wells indicate that the saturated sediments beneath the Site consist of fine- to medium-grained sands. Based on Freeze and Cherry (1979), the hydraulic conductivity of fine-grained, clean sand ranges between 1×10^{-3} and 1×10^{-2} cm per sec or 2.8 and 28 feet per day.

3.3 Nature and Extent of Groundwater Contamination

Since 1991, STE has sampled the six groundwater monitoring wells for BTEX. Analytical results for BTEX are summarized for each monitoring well in Table 1. The maximum concentration of benzene in groundwater (48,500 µg/L) was detected in STMW-3 during the 10/21/91 sampling event. The maximum concentration of toluene in groundwater (41,000 µg/L) was detected in STMW-3 during the 01/17/92 sampling event. The maximum concentration of ethylbenzene (3,200 µg/L) was detected in STMW-1 during the 04/05/91 sampling event. Finally, the maximum concentration of total xylenes (46,000 µg/L) was detected in STMW-3 during the 10/21/91 sampling event. Based on the results presented in Table 1, the highest concentrations of BTEX were measured in 1991 and 1992, and have steadily decreased over time.

4.0 Human Health Risk Assessment

This section summarizes 1) the rationale used to evaluate the potential impacts to humans that might result from exposure to groundwater contaminants at the Site; and 2) presents the major findings of the human health risk assessment (HHRA). Detailed information can be found in Human Health Risk Assessment for the Former Southshore Car Wash (SOMA 1997).

4.1 Identification of Exposure Pathways and Potential Receptors

Since the TPH-g contaminated soils have been removed and backfilled with clean soil, the only source of chemicals at the Site is the groundwater containing BTEX. The Site and surrounding areas are presently zoned for industrial/commercial use and they are expected to remain industrial/commercial in the future. Therefore, only site-specific worker scenarios were evaluated, as described in the following section.

4.1.1 Site-Specific Receptors

Under current conditions, the only exposure pathway on-site is through inhalation of volatile emissions from groundwater beneath the Site. Therefore, an outdoor commercial worker was assumed to be exposed to BTEX emissions from groundwater into the ambient air. In the future, due to downgradient chemical transport in groundwater, off-site commercial workers could also be exposed to emissions from groundwater through the inhalation route. Therefore, both on-site and off-site commercial workers were evaluated under both current and future conditions. Because buildings exist nearby and could be constructed in the future, both on-site and off-site indoor workers were evaluated for potential exposure to BTEX emissions from groundwater.

During future construction activities at the Site construction workers could also be exposed to groundwater contaminants. Potential risks to construction workers were evaluated under two separate scenarios. First, since groundwater is so shallow, dewatering was assumed to be performed at the Site prior to construction activities. Under this dewatering scenario, a construction worker was assumed to come in contact with chemicals in wet sediments that were previously the saturated zone beneath the Site. In this first scenario, construction workers were assumed to be exposed to groundwater contaminants indirectly through inhalation of volatile emissions and directly through incidental ingestion of the wet sediments and dermal contact with the wet sediments. The second construction worker scenario assumed that no dewatering would occur prior to construction activities. Under the second scenario, a construction worker was assumed to be exposed directly to free groundwater through incidental ingestion and dermal contact and indirectly through inhalation of volatile emissions.

In summary, the HHRA for the Site evaluated the following specific exposure scenarios:

- Current and future on-Site outdoor worker through inhalation of volatile groundwater emissions;
- Current and future off-Site outdoor worker through inhalation of volatile groundwater emissions;
- Current and future on-Site indoor worker through inhalation of volatile groundwater emissions;
- Future off-Site indoor worker through inhalation of volatile emissions;
- Future on-Site construction worker with dewatering through ingestion of wet sediments, dermal contact with wet sediments and inhalation of volatile emissions from wet sediments; and
- Future on-Site construction worker without dewatering through ingestion of groundwater, dermal contact with groundwater and inhalation of volatile emissions from groundwater

4.2 *Exposure Point Concentrations*

Groundwater flow was simulated using the U.S. Geological Survey (USGS) Modular Three-Dimensional Finite-Difference Groundwater Flow Model (MODFLOW). MODFLOW was used to evaluate steady-state groundwater flow beneath the Site under ambient conditions. Chemical transport in groundwater was simulated using MT3D, a modular three-dimensional transport model for simulation of advection, dispersion and chemical reactions of contaminants in groundwater systems (S.S. Papadopulos and Associates, 1992). MT3D was used to simulate future chemical concentrations in groundwater (after 30 years), assuming that the source concentrations at the monitoring wells will remain constant. Given this conservative assumption, the estimated future chemical concentrations in groundwater represent a worst-case scenario that assumes no future groundwater remediation or source removal actions, and also neglects natural removal processes such as bioremediation and volatilization.

Steady-state BTEX emissions from groundwater into the ambient air were estimated using the EPA approved volatile emission model developed by Farmer et al. (1980). Time-dependent emissions rates of BTEX from wet sediments were estimated using the EPA approved Jury's model (Jury 1990). Outdoor air concentrations of BTEX were estimated using a simple, steady-state mass balance "box" model (Pasquill 1975). Indoor air concentrations of BTEX were estimated using a simple mass balance mixing model (Daugherty 1991). This mixing model assumes that 1) chemical emissions entering a building are instantaneously mixed within the entire air space; and 2) indoor air is exchanged with clean outdoor air at a fixed rate. Detailed descriptions and parameters for each of the above models as well as the simulated BTEX concentrations in groundwater, outdoor air and indoor air are presented in the HHRA (SOMA 1997)

4.3 Receptor-Specific Risks and Hazards

This section summarizes the carcinogenic risks and noncarcinogenic health hazards for each of the exposure scenarios described previously.

4.3.1 On-Site Indoor Worker

For the on-Site, indoor commercial worker, the total excess cancer risk from inhalation of volatile emissions was 1×10^{-6}, under both current and future conditions. This calculated risk was at the lower end of the risk management range defined by EPA (1×10^{-6} to 1×10^{-4}) and was considered acceptable by the Alameda County Health Services, Department of Environmental Health (ACHS-DEH). The noncarcinogenic health hazard (0.02), under both current and future conditions, was well below the threshold level of concern (1.0) and was considered negligible.

4.3.2 On-Site Outdoor Commercial Worker

For the on-Site, outdoor commercial worker, the total excess cancer risk from inhalation of volatile emissions was 6×10^{-8}, under current and future conditions, and was considered negligible. The noncarcinogenic health hazard (0.001), under current and future conditions, was considered negligible.

4.3.3 Off-Site Indoor Commercial Worker

For the future off-Site, indoor commercial worker, the total excess cancer risk from inhalation of volatile emissions was 8×10^{-9} and considered negligible. The noncarcinogenic hazard (0 0001) was also considered negligible

4.3.4 Off-Site Outdoor Commercial Worker

Under current conditions, the off-Site risks and hazards were considered negligible since the on-Site risks and hazards were found to be negligible (e.g., off-site emissions would be significantly less than on-site emissions). For the future, off-Site outdoor commercial worker, the total excess cancer risk was 6 x 10-9 and considered negligible. The noncarcinogenic hazard (0.0001) was also considered negligible.

4.3.5 Future On-Site Construction Worker

For the future on-Site construction worker under dewatering conditions, the total excess cancer risk (2×10^{-10}) was considered negligible from incidental ingestion of wet sediments, dermal contact with wet sediments and inhalation of volatile emissions from wet sediments. The noncarcinogenic health hazard (0.0003) was considered negligible.

For the future on-Site construction worker without dewatering conditions, the total excess cancer risk (2×10^{-7}) was considered negligible from incidental ingestion of groundwater, dermal contact with groundwater and inhalation of volatile emissions from groundwater. The noncarcinogenic health hazard (0.4) was considered negligible.

4.4 Off-Site Environmental Impacts of Groundwater Contaminants

The nearest downgradient environmental receptor is a lagoon located approximately one-half mile to the northeast. Based on the results of the chemical transport modeling, none of the four groundwater contaminants (benzene, toluene, ethylbenzene and total xylenes) will reach the lagoon after 30 years Therefore, the BTEX in groundwater beneath the Site will not impact any aquatic or wildlife species associated with the lagoon The 30-year simulated plumes for benzene toluene ethylbenzene and xylene are presented in Figures 4 through 7, respectively. As shown in Figure 4, the benzene plume will only travel about 1,500 feet after 30 years.

Apparently, there are no drinking water sources in the immediate vicinity of the Site. However, a surface water body located half a mile in downgradient direction from the Site. To evaluate the potential impact of site related chemicals on water quality of the lagoon, chemical transport modeling was conducted. The results of chemical transport modeling indicated that site related chemicals will travel about 2,000 feet to downgradient location and therefore, will not reach to the lagoon. The chemical modeling was conducted under very conservative assumptions. For instance, it was assumed that BTEX would not biodegrade in subsurface during the next 30 years.

5.0 Risk Management

Risk management plan during construction addresses precautions that will be taken to mitigate risks to human health and the environment from residual soil and groundwater contaminants during Site construction activities. Since all petroleum-contaminated soil was removed and replaced with clean soil, only residual groundwater contaminants and nuisance dust will be addressed here. Precautions to be taken during construction will include the following:

- Protect construction workers who may directly contact residual contaminants in groundwater (e.g., during site preparation, grading, foundation construction, or landscape installation) through implementation of a Site Health and Safety Plan;
- implement construction impact mitigation measures, including control of nuisance dust generation at the Site, decontamination of equipment, prevention of wet sediment from leaving the Site in storm water runoff, and management of groundwater extracted from excavations;
- implement procedures to protect monitoring wells remaining on the Site, if any;
- implement construction methods that minimize the potential for creating conduits to deeper groundwater zones when driving piles;
- Monitor the exposures of on-site and off-site workers to site-related contaminants through personal and fenceline air monitoring and implement procedures to maintain airborne concentrations of site-related contaminants at or below acceptable levels.

5.1 *Site-Specific Health and Safety Worker Planning Requirements*

Even though the HHRA (Section 3.0) evaluated two construction worker scenarios and demonstrated that the BTEX in groundwater pose no threat for future construction workers at the Site under the most conservative assumptions, workers must be informed by law that residual chemical contaminants are present in groundwater. Further, these workers must be informed of the risks and hazards associated with these chemicals and precautions should be taken to minimize any exposures, no matter how minimal the estimated risk.

Prior to development of the Site, a Site Health and Safety Plan must be developed and implemented to address all aspects of construction-related activities associated with the development of the former Southshore Car Wash. Each construction contractor with workers that may be exposed to groundwater contaminants, either through direct (e.g., dermal contact) or indirect (e.g., through inhalation of emissions)contact must adhere to the procedures and work practices specified in the Health and Safety Plan.

The Site Safety Officer (SSO) has the primary responsibility for on-site implementation of the Health and Safety Plan (HSP). Additional responsibilities include, but are not limited to:

- Verify that contractor/subcontractor personnel are aware of hazardous materials protection procedures and have been instructed in proper work practices and emergency procedures;

- Verify that appropriate personal protective equipment (PPE) is available and is properly used by contractor/subcontractor personnel,

- Monitor contractor/subcontractor activities and ensure that required safe work practices are followed;

- Conduct daily safety meetings prior to commencing operations. Meetings will cover:
    1. Expected site conditions
    2. Daily activities
    3. Safety deficiencies noted previously
    4. Changes in safety and/or emergency procedures

Employees involved in disturbance of Site groundwater (e.g., dewatering activities, driving piles, etc.) known or suspected to contain potentially hazardous chemicals shall have received training covering the following items:

- Site safety plans
- Safe work practices
- Nature of anticipated hazards
- Handling emergencies and self-rescue
- Rules and regulations for vehicle use
- Safe use of field equipment
- Handling, storage and transportation of hazardous materials
- Employee rights and responsibilities
- Use, care and limitations of PPE

5.2 Construction Impact Mitigation Measures

This section presents the general measures that will be implemented to mitigate potential impacts to human health and the environment during construction activities.

Specifically, mitigation of the following potential impacts will be discussed:

- Nuisance dust generation associated with excavation and loading activities, construction or transportation equipment and wind suspension of stockpiled soil;

- Transport of site-sediments in surface water runoff; and

- Management of groundwater extracted during construction activities (dewatering activities).

5.2.1 Dust Control

The generation of nuisance dust should be controlled in order to minimize 1) the on-Site generation of particulate matter; and 2) the migration of airborne particulate off-site. Dust control measures should include but should not be limited to:

- use of water spray or mist during excavation and vehicle loading;
- limit maximum vehicle speed on-site to 5 miles per hour;
- minimize drop heights during transportation vehicle loading; and
- cover stockpiled soil with plastic sheeting or tarps to prevent wind erosion.

5.2.2 Decontamination

During groundwater sampling on-site (e.g., for the purpose of off-site disposal of collected groundwater), decontamination of sampling equipment will be conducted according to the HSP decontamination procedures.

5.2.3 Storm Water Pollution Controls

In the event of rainfall during construction activities, storm water pollution controls will be implemented to minimize storm water runoff On-Site sediment and erosion protection controls will be implemented, including

- construction of berms or silt fences at entrances to the site,

- placing straw bale barriers around storm drains and catch basins; and
- during heavy rainfall, covering stockpiled soil with plastic sheeting or tarps.

5.2.4 Dewatering

Since groundwater contains residual chemical contaminants, including a known carcinogen (benzene), all groundwater encountered during construction (e.g., driving piles) will be collected and stored on-site in a Baker Tank for appropriate disposal at an off-site facility.

5.3 Worker and Community Air Quality Exposure Assessment During Excavation And Pile Driving Activities

During any on-Site construction activities involving groundwater (e.g., dewatering or pile-driving), personnel and fenceline air samples should be collected and analyzed for volatile organic compounds (VOCs), in particular benzene, toluene, ethylbenzene and total xylenes. All of the air monitoring sample results should be well below occupational Permissible Exposure Levels (PELs).

5.4 Protection of Monitoring Wells

For any construction or development activities that may occur at the Site, precautions will be taken to protect any existing wells that will remain part of the long-term groundwater monitoring program. All other monitoring wells associated with the Site will be abandoned in accordance with all applicable local and state laws and regulations.

5.5 *Use of Construction Methods to Minimize the Potential for Creating Conduits to Deeper Groundwater Zones*

If development plans call for construction of a pile foundation, mitigation measures are required to minimize 1) the potential to drive shallow groundwater contaminants (e.g., BTEX) into deeper soils; and 2) the potential to create conduits or preferential flow paths for the migration of shallow groundwater contaminants to deeper groundwater. Mitigation measures may include pre-drilling through saturated sediments containing residual contamination and utilizing conductor casing to prevent downward migration of contaminants.

5.6 *Post-Construction Risk Management*

The post-construction part of the risk management plan outlines precautions that should be undertaken to mitigate any long-term potential threats to human health or the environment from residual contaminants in groundwater following development of the Site.

5.6.1 Summary of Human Health Risks

From the results of the HHRA (Section 3.0), carcinogenic risk and noncarcinogenic health hazards were acceptable for all industrial/commercial scenarios evaluated, including:

- Current and future on-Site outdoor worker;
- Current and future off-Site outdoor worker;
- Current and future on-Site indoor worker ;
- Future off-Site indoor worker;
- Future on-Site construction worker with dewatering; and
- Future on-Site construction worker without dewatering

For the construction worker, potential exposures to groundwater contaminants should be minimized or eliminated through implementation of the Site Health and Safety Plan. Therefore, based on the planned commercial development of the site, there would be no long-term risks to human health.

5.6.2 Future Construction Activities

Based on the results of the HHRA (Section 3.0), residual contamination in soil and groundwater does not pose an unacceptable risk for the intended commercial development of the site. However, any future construction-related activities must follow the procedures defined in the Site Health and Safety Plan and Risk Management Plan.

5.6.3 Long-Term Compliance

This risk management plan, including any addenda, will be on file with the RWQCB and ACDEH. As part of standard due diligence, the owner(s) of the site will be required to disclose the risk management plan to potential buyers during future property transactions.

Procedures will be developed by the site owner(s) and tenants to inform workers and contractors about the risk management plan, as needed, and to maintain compliance with the risk management plan.

The planned site land use is commercial. Land use at the site will not change significantly (e.g., the site will not be developed for single family housing) without approval from the RWQCB and ACDEH.

6.0 References

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Figures

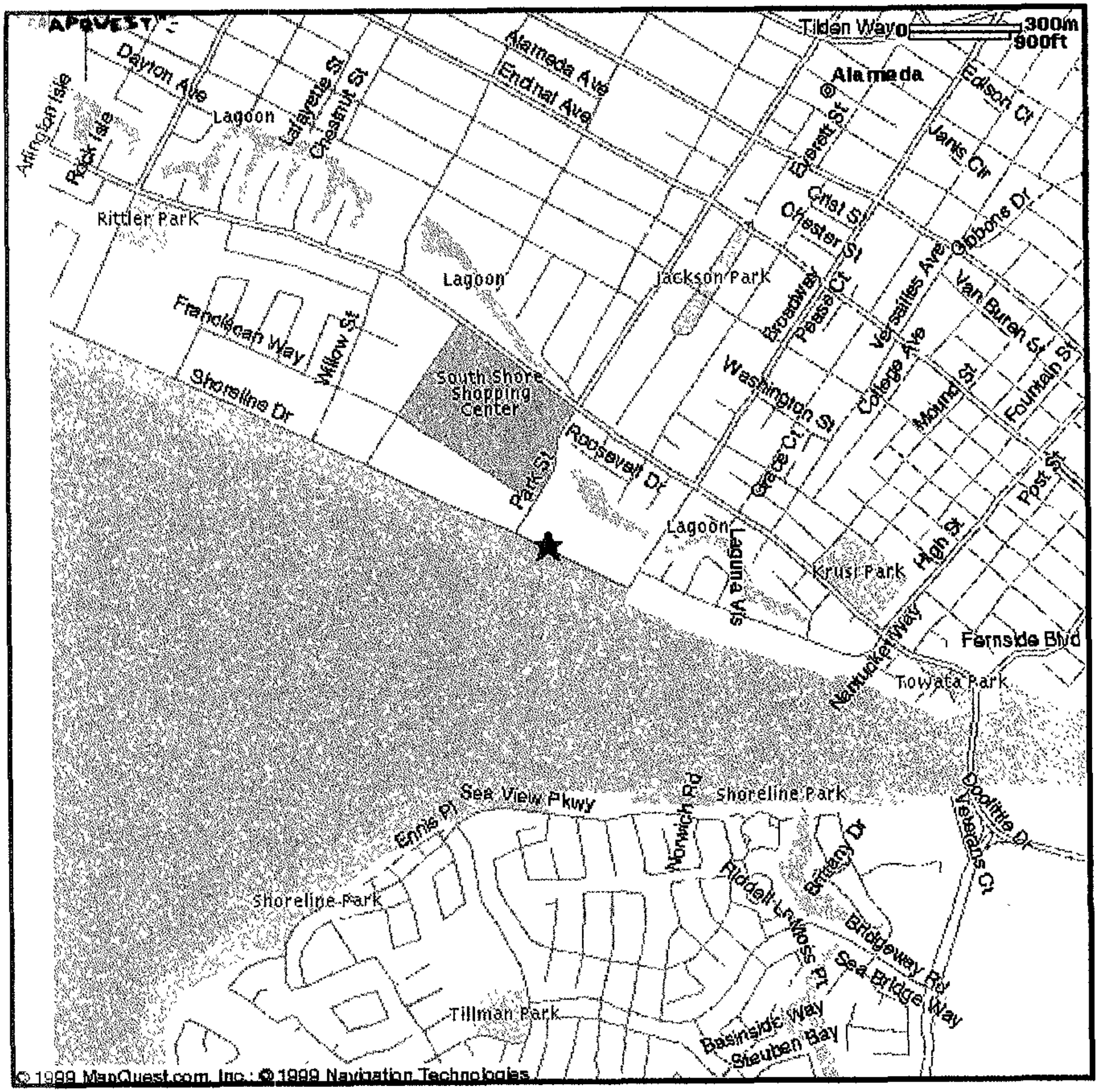

Figure 1: Site Location Map

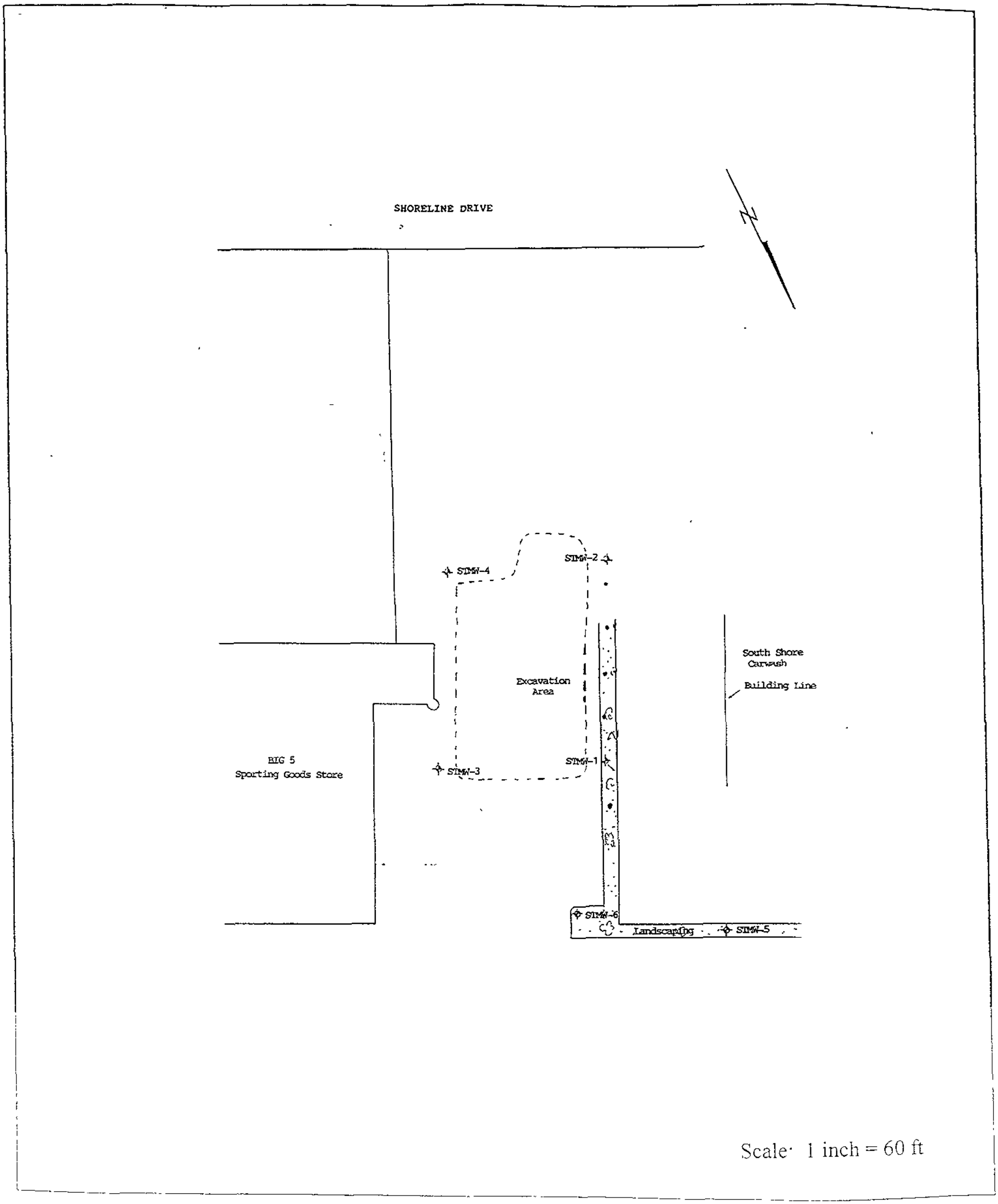

Figure 2: Location of the Soil Tech Monitoring Wells

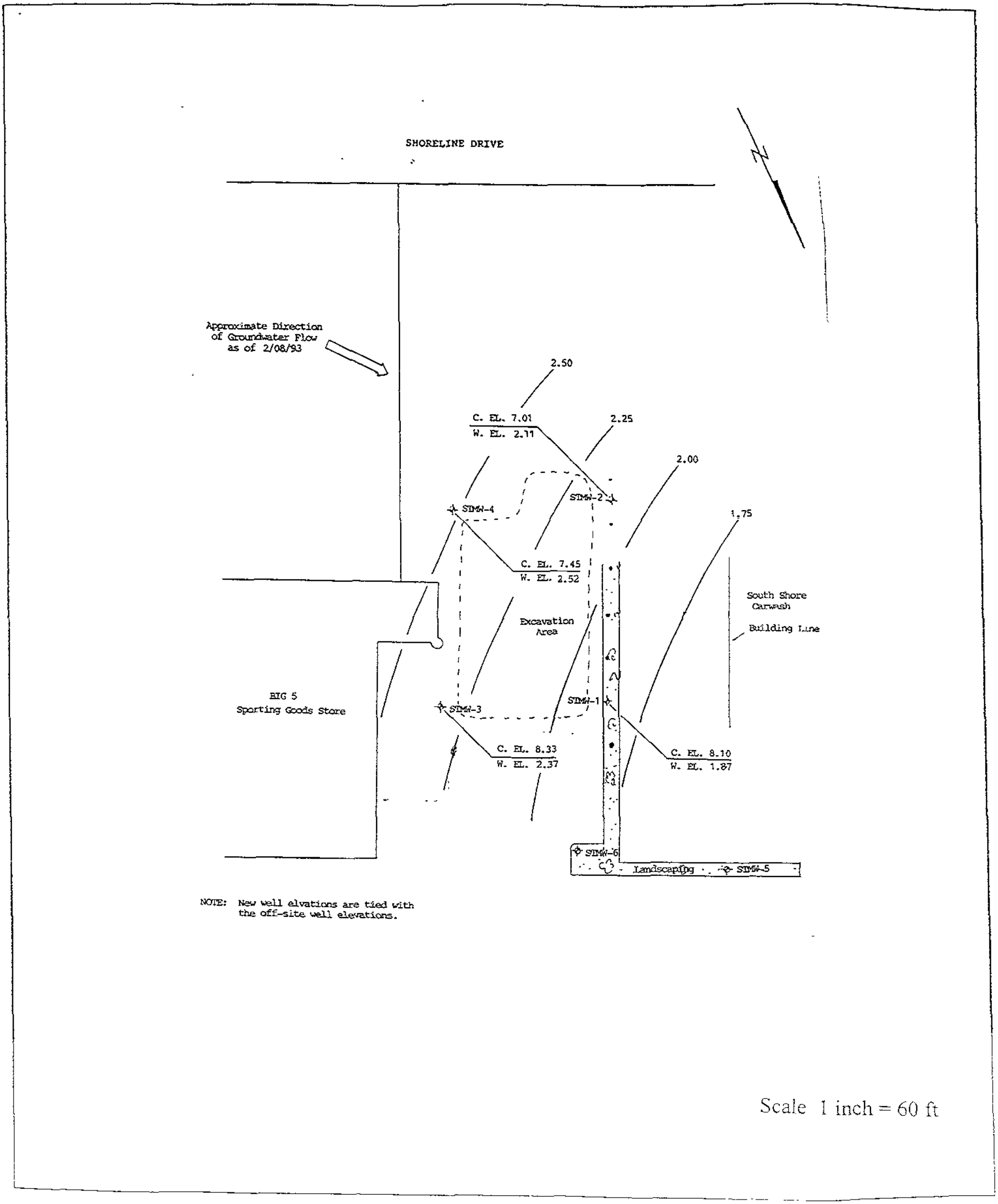

Figure 3: Groundwater Elevation Contour Map (February 1993)

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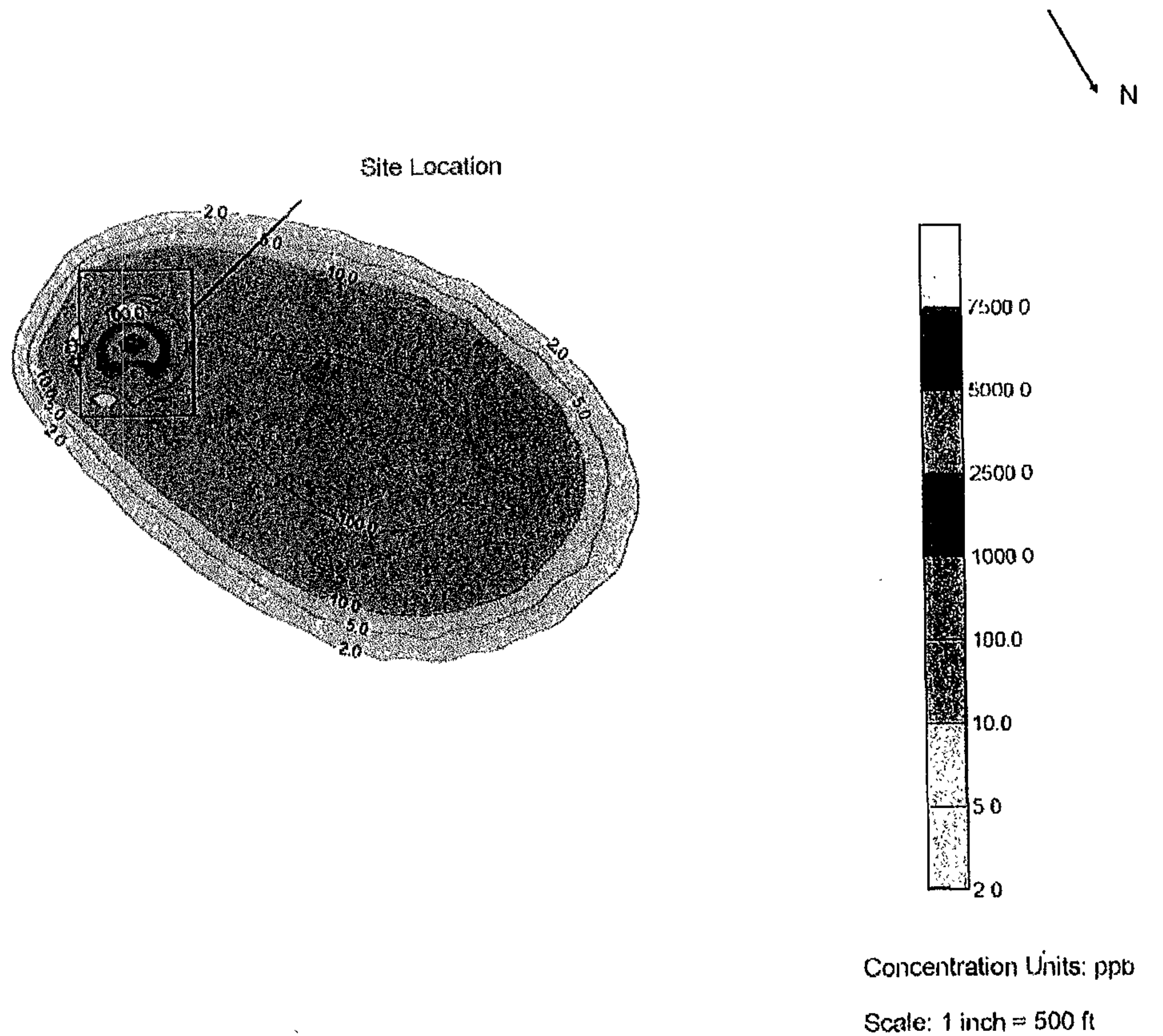

Figure 4: Benzene Plume After 30 Years

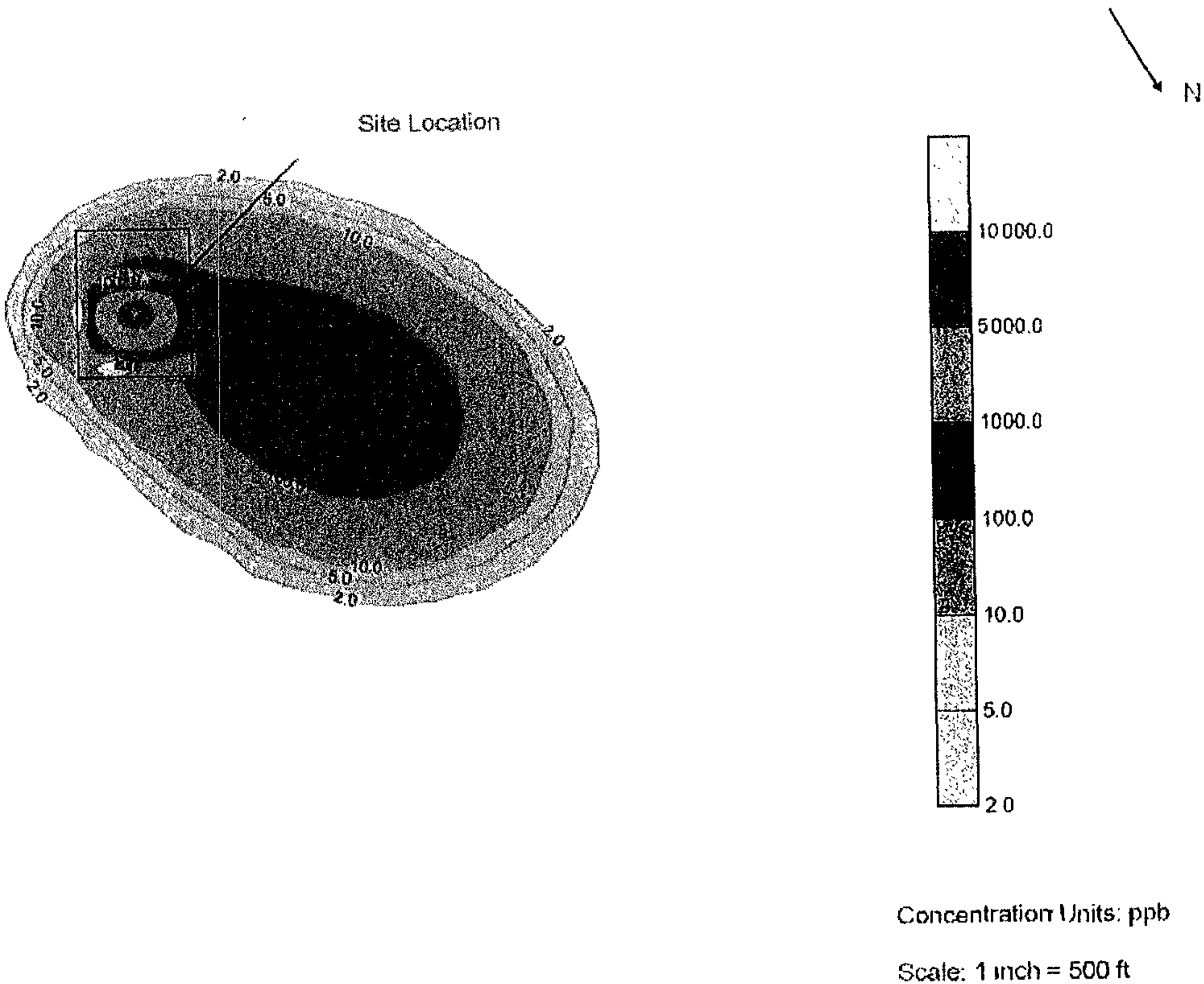

Figure 5: Toluene Plume After 30 Years

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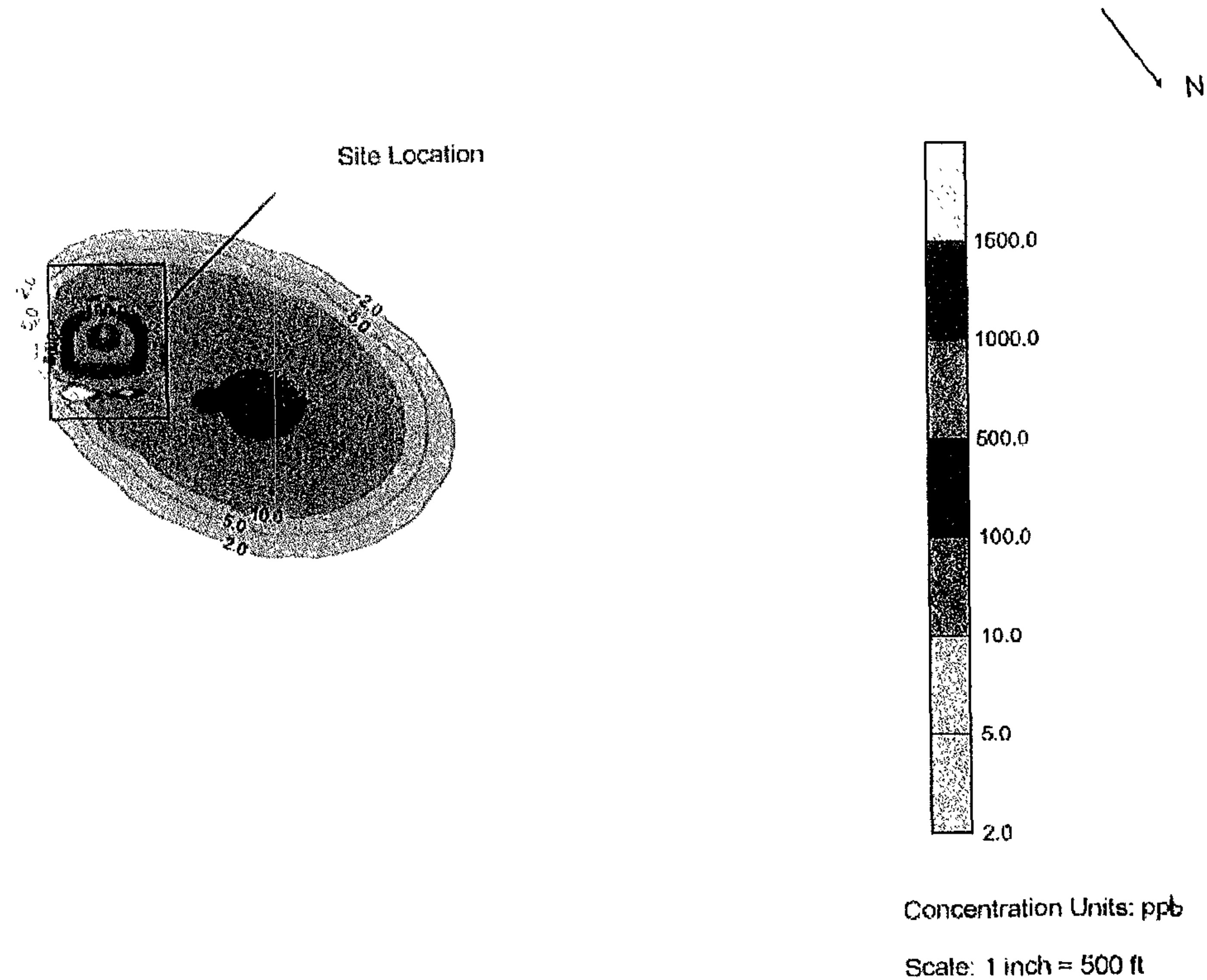

Figure 6: Ethylbenzene Plume After 30 Years

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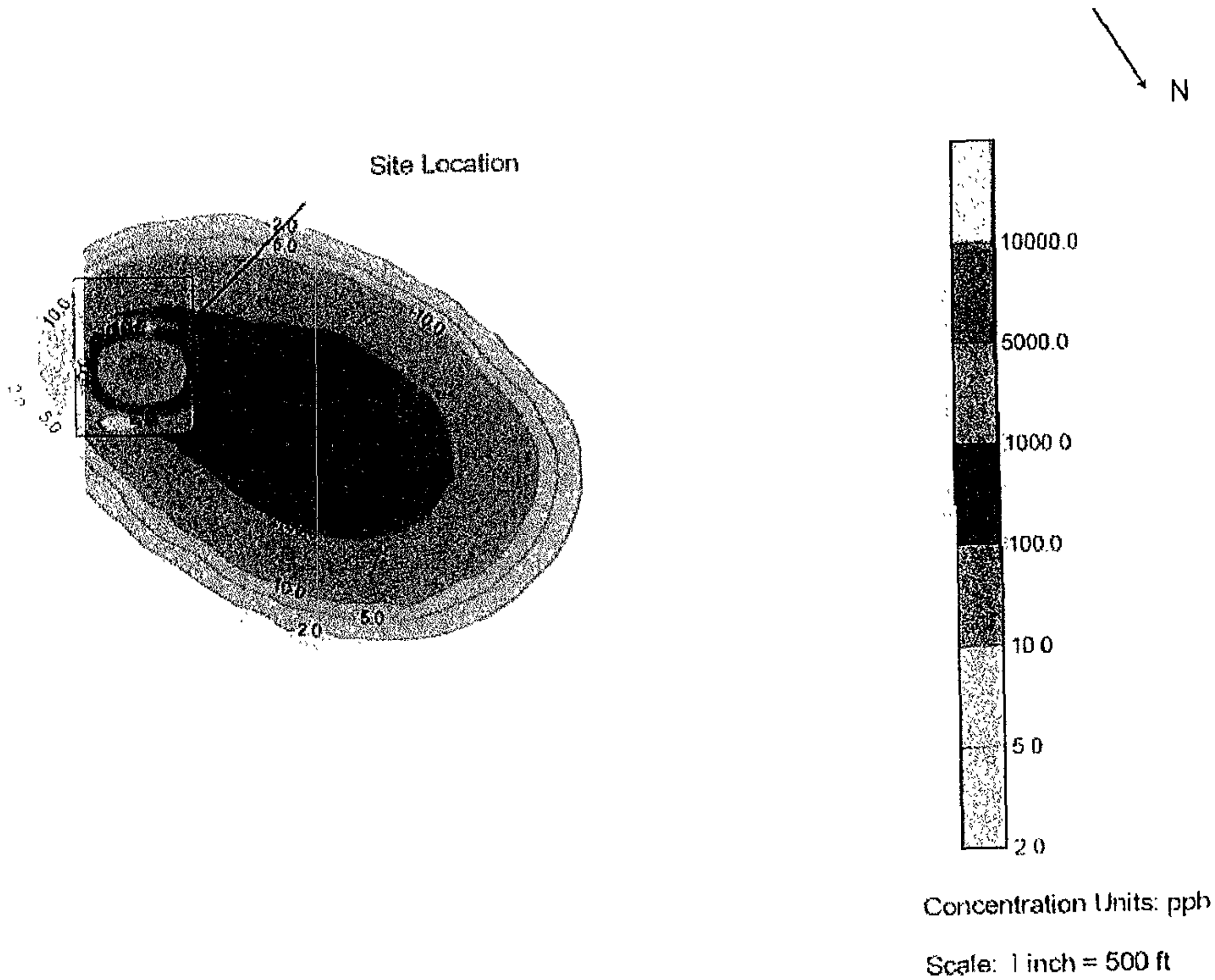

Figure 7: Xylene Plume After 30 Years

TABLES

TABLE 1

Groundwater Analytical Results at STMW-1

Date	Benzene (ppb)	Toluene (ppb)	Ethyl Benzene (ppb)	Total Xylenes (ppb)
4/5/91	11,000	20,000	3,200	18,000
7/4/91	14,000	7,000	2,700	8,300
10/21/91	19,600	19,000	ND	16,400
1/17/92	16,000	6,800	2,600	16,000
4/27/92	720	200	500	1,300
7/30/92	1,200	770	1,100	2,740
2/8/93	210	480	510	1,200
4/27/94	3,600	3,200	1,200	5,300
10/18/94	NA	NA	NA	NA
2/14/95	NA	NA	NA	NA
5/9/95	NA	NA	NA	NA
11/10/95	82	22	37	47
12/20/96	180	330	140	300
Max	19,600 0	20,000.0	3,200.0	18,000.0
Average	6,659 2	5,780.2	1,331.9	6,958.7

Groundwater Analytical Results at STMW-2

Date	Benzene (ppb)	Toluene (ppb)	Ethyl Benzene (ppb)	Total Xylenes (ppb)
4/5/91	ND	ND	ND	ND
7/4/91	ND	ND	ND	ND
10/21/91	4	ND	ND	ND
1/17/92	ND	ND	ND	ND
4/27/92	ND	ND	ND	ND
7/30/92	ND	2.5	0.9	11
2/8/93	NA	NA	NA	NA
4/27/94	ND	ND	ND	ND
10/18/94	NA	NA	NA	NA
2/14/95	NA	NA	NA	NA
5/9/95	NA	NA	NA	NA
11/10/95	NA	NA	NA	NA
12/20/96	ND	ND	ND	ND
Max	4.0	2.5	0.9	11.0
Average	4.0	2.5	0.9	11.0

TABLE 1

Groundwater Analytical Results at STMW-3

Date	Benzene (ppb)	Toluene (ppb)	Ethyl Benzene (ppb)	Total Xylenes (ppb)
4/5/91	20,000	34,000	3,600	19,000
7/4/91	11,000	17,000	1,900	8,900
10/21/91	48,500	19,000	ND	46,000
1/17/92	21,000	41,000	6,400	4,700
4/27/92	660	900	480	1,800
7/30/92	1,200	2,200	1,400	9,300
2/8/93	620	1,900	2,200	6,000
4/27/94	1,300	6,300	1,400	12,000
10/18/94	5,200	6,200	2,200	13,000
2/14/95	120	200	180	710
5/9/95	71	130	110	200
11/10/95	NA	NA	NA	NA
12/20/96	15	45	26	59
Max	48,500	41,000	6,400	46,000
Average	9,140.5	10,739.6	1,808.7	10,139.1

Groundwater Analytical Results at STMW-4

Date	Benzene (ppb)	Toluene (ppb)	Ethyl Benzene (ppb)	Total Xylenes (ppb)
4/5/91	300.0	300.0	ND	700.0
7/4/91	ND	ND	ND	ND
10/21/91	11.0	5.0	ND	37.0
1/17/92	0.8	2.4	0.5	4.0
4/27/92	ND	ND	ND	ND
7/30/92	ND	ND	ND	ND
2/8/93	NA	NA	NA	NA
4/27/94	NA	NA	NA	NA
10/18/94	NA	NA	NA	NA
2/14/95	NA	NA	NA	NA
Max	300.0	300.0	0.5	700.0
Average	103.9	102.5	0.5	247.0

TABLE 1

Groundwater Analytical Results at STMW-6

Date	Benzene (ppb)	Toluene (ppb)	Ethyl Benzene (ppb)	Total Xylenes (ppb)
4/5/91				
7/4/91				
10/21/91				
1/17/92				
4/27/92				
7/30/92				
2/8/93	100	230	270	500
4/27/94	3,000	1,200	710	2,000
10/18/94	NA	NA	NA	NA
2/14/95	53	21	20	46
5/9/95	180	48	61	150
11/10/95	26	1.7	11	4.7
12/20/96	54	27	22	31
Max	3,000 0	1,200.0	710.0	2,000.0
Average	568 8	254.6	182.3	455.3

Groundwater Analytical Results at STMW-5

Date	Benzene (ppb)	Toluene (ppb)	Ethyl Benzene (ppb)	Total Xylenes (ppb)
4/5/91				
7/4/91				
10/21/91				
1/17/92				
4/27/92				
7/30/92				
2/8/93	ND	ND	ND	ND
4/27/94	ND	ND	ND	ND
10/18/94	ND	ND	ND	ND
2/14/95	NA	NA	NA	NA
5/9/95	NA	NA	NA	NA
11/10/95	NA	NA	NA	NA
12/20/96	ND	ND	0.8	4.6
Max	ND	ND	0.8	4.6
Average	ND	ND	0.8	4.6