

Office of Environmental Cleanup
US EPA Region 10

Five-Year Review Summary Form

Site Name: South Tacoma Field
Superfund Site: WAB0023301
Location: Tacoma, Washington

First Five-Year Review Report

for

South Tacoma Field

**One of Three Operable Units
Commencement Bay, South Tacoma Channel
Superfund Site**

Tacoma, Washington

June 2003

Prepared By:

United States Environmental Protection Agency
Region 10
Seattle, Washington

Approved By:

Date:



6-13-03

Michael F. Gearheard, Director

Five-Year Review Summary Form

Site Identification

Site Name: South Tacoma Field, OU3 for Commencement Bay, South Tacoma Channel
Superfund Site
CERCLIS Number: WA980726301
Location: Tacoma, Washington

Site Status

NPL Status: OU RA complete
Remedial Status: Construction complete & inspection conducted April 22, 1999
Operable Unit(s): This is the third of three OUR
Site has not been put into reuse

Review Status

Lead Agency: US EPA
Author: Kristine A. Flint, Project Manager
US EPA, Region 10
Review Period: October 2002 - February 2003
Type of Review: Statutory

Review Number: First Five-Year Review
Triggering Action: Formal Initiation of RA
Triggering Action Date: March 16, 1998
Due Date: March 16, 2003

Issues:

Monitored Natural Attenuation (MNA) for groundwater in the Pioneer Builders Supply area was the subject of an Explanation of Significant Differences (issued September 29, 1999). Groundwater MNA data from the October 2002 sampling indicates the need to modify the monitoring scheme for a more accurate assessment of MNA in the future.

Recommendations and Follow-up Actions:

Site-wide O&M: The current program of inspection and maintenance of capped and consolidated contamination should be continued. General groundwater monitoring for lead should continue.

Groundwater MNA at Pioneer Builders Supply area: The monitoring strategy for MNA is being evaluated and will be revised as necessary, taking into account the changes in flow direction and monitoring results to-date. Over the course of one year, water levels should be taken on at least a quarterly basis (recommend April, July, October and January) from this new network and any existing monitoring wells in the vicinity (within at least 1000 ft). If a clear flow direction can be determined,

groundwater samples should be taken from any PBS wells within a 180' swath around that direction plus NMW-1A. If not, all the Pioneer Builders Supply wells should be sampled. After one year, these data should be evaluated to determine the need for future sampling outside NMW-1A, and the timing of that sampling.

Protectiveness Statement

The remedy at STF currently protects human health and the environment. The remedies for soil and general groundwater protection (STF and Amsted monitoring wells) are complete except for O&M and protective of human health and the environment in both short and long term. The MNA groundwater remedy in the area of Pioneer Builders Supply is protective in the short term, based on drinking water prohibitions which will remain in place until it can be clearly shown that MCLs are being met.

**First Five-Year Review Report
South Tacoma Field
OU 3, South Tacoma Channel (Commencement Bay)
Tacoma, Washington**

I. INTRODUCTION

The purpose of the Five-Year Review is to determine whether the remedy at the site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The United States Environmental Protection Agency (EPA), Region 10, conducted this Five-Year Review of the remedy implemented at the South Tacoma Field (STF) operable unit (OU) of the South Tacoma Channel (STC) Superfund Site which is located in Tacoma Washington. Conducting a 5-Year Review for this individual OU of the STC site is consistent with the Region's approach to tracking the OUs as separate sites throughout the remedial process. This review for the STF OU was conducted by the Remedial Project Manager (RPM) from October 2002 through March 2003. With respect to the other OUs of STC, Well 12A is currently being reviewed and the report is scheduled for June 2003. The 5-Year Review for Tacoma Municipal Landfill will be issued shortly with the finding that additional investigation is needed to determine protectiveness.

II. SITE CHRONOLOGY

In 1981 the Commencement Bay site was listed on the National Priorities List. In a Record of Decision (ROD) dated September 8, 1983, the Agency divided the CB into two distinct sites, South Tacoma Channel and Commencement Bay Nearshore/Tideflats site. The South Tacoma Channel site consists of three operable units; South Tacoma Field, Well 12A, and Tacoma Municipal Landfill. A short summary of events on the STF OU follows.

<u>Date</u>	<u>Event</u>
September 1994	ROD for South Tacoma Field STF is further divided into 3 areas: STF soils, Tacoma City Light dry wells, and Pioneer Builders Supply (sub-surface soil and groundwater)
January 1996	Unilateral Administrative Order (UAO) for remedial design and action - soil and groundwater contamination
January 1997	Consent Decree (CD) for remedial design and action supersedes the UAO - tasks are divided among the signing parties according to ownership and access. EPA completes additional wetland monitoring along drainage channels on west of site and determines no further remedial monitoring or action required Tacoma City Light completes remedial design and action for dry wells from January to September (remedial action initiated August 1997)
March 1998 April 1998 June 10, 1998	The balance of remedial design is complete Remedial Action (RA) Work Plan presented RA begins
April 1999	Remedial action inspected for completeness Workplan for UST removal submitted to Ecology First semi-annual groundwater monitoring conducted 3 quarters of groundwater monitoring at Pioneer Builders Supply
July 1999	Final RA inspection performed
September 1999	ESD issued to explain a change from the groundwater remedy proposed in the ROD - from active treatment to monitored natural attenuation Construction complete (Preliminary Closeout Report)
March 2000	Final Site Development & Institutional Controls Plan submitted Operations & Maintenance Plan submitted
September 2000	RA Report approved

III. BACKGROUND

Location & Use

The site is located in Tacoma, Pierce County, Washington, and is located from approximately South 36th Street on the north, South 56th Street on the south, Tyler Way on the west, and Adams Street on the east. The STF site is approximately 260 acres that have been used for a variety of industrial and commercial purposes for more than 100 years. The area is lower than surrounding upland areas by as much as 150 feet on the west. The site is mostly a grassed, open field with a few industrial and commercial facilities. The site includes a former swamp and lake bed that has been filled and covered with grass over time. There is a small wetland in this area too, along with open stormwater discharge to an open channel on the north end of the site.

The site is currently zoned for commercial/industrial use with the exception of an 18 acre strip along the western border which is zoned for residential-commercial transitional use. The western portion of the site, generally in the area of the old airport, is also used for casual recreation (e.g., biking, dog-walking) Businesses operating on the site include Pioneer Builders Supply, General Plastics, and Industrial Properties which leases warehouse, office and yard space to businesses.

Site and Contamination History

A variety of industrial and commercial operations have occupied different portions of the site in the past 100 years. The South Tacoma Car Shops area operated as a railroad manufacturing and repair facility from 1892 to 1974. The area was used for manufacturing, repair, and maintenance of railroad equipment. Rail cars were also cleaned and dismantled. Foundry facilities operated on-site from 1890 through 1980. An iron foundry produced iron wheels until 1957. A brass foundry produced journal bearings composed primarily of lead, tin, copper, zinc and antimony until 1980. Aircraft maintenance and refueling operations were performed at the South Tacoma Airport from 1936 to 1973. A lake was located beyond the south end of the former runway and, in the late 1940's, was used by seaplanes. A variety of filling activities occurred during the history of the site. Foundry, construction, and domestic wastes reportedly were disposed of as fill material in the Former Swamp/Lake bed area. In the 1930's and 1940's portions of the site reportedly were used as unauthorized dumping areas for household and commercial wastes.

Currently, several businesses operate on-site and there are some residential properties located uphill from and just off the northwest side of the site. During remedial investigation (RI) contamination was identified in the former railroad maintenance area, at the Tacoma Public Utilities area, and at the Pioneer Builders Supply. Pioneer used two underground storage tanks (USTs) for about five years to store gasoline and diesel fuel. During tank excavation in 1991, petroleum contamination was discovered in surrounding soils. Also, in 1990 three other tanks were uncovered and removed. Attached Figure 1 shows historic use across the site and general areas of contamination.

The Preliminary Closeout Report (Long-Term Remedial Action), prepared and issued by EPA in September 1999, contains a detailed summary of what types of contamination were found at various concentrations and locations across the site. Surface soils, and to a lesser extent, subsurface soils in the railyard and foundry areas were contaminated with high levels of lead, arsenic, copper and zinc. Metal concentrations in surface soils samples from the former swamp/lakebed area were found to be elevated, but to a lesser degree than the more active industrial areas. In the foundry area, hydrocarbon contamination was found in groundwater. In addition, elevated concentrations of PAHs, PCBs and several other organics were detected in subsurface soils at and underlying some of the dry wells at the Tacoma City Light Property.

At Pioneer Builders Supply, 1,2,4-trichlorobenzene, ethylbenzene, and benzene were detected above maximum contaminant levels (MCLs) in groundwater. PCBs, benzene, toluene, ethylbenzene and xylenes were detected in subsurface soil in the unsaturated zone beneath and immediately surrounding the location of three USTs.

IV. REMEDIAL ACTION

Remedy Selection

The ROD for the STF site was signed September 29, 1994, and an ESD that modified the groundwater remedy at Pioneer Builders Supply was issued on September 29, 1999. The selected remedies for

each portion of the site addressed human health risks through exposure to contamination via soil ingestion or contact and groundwater ingestion. For soils, the protectiveness of selected active remedies (excavation, removal, and or capping) was bolstered with requirements limiting land use to commercial/industrial. For groundwater at Pioneer Builders Supply, the selected remedy of MNA is also protective given the institutional control (prohibited use) to be imposed until the numeric cleanup goals for groundwater are met. To address groundwater for the balance of the STF, EPA determined that groundwater quality would not be compromised by leaching from metals-contaminated soils.

Basis for Taking Action & Numeric Cleanup Objectives

EPA's ROD for this site includes a human health risk assessment (HHRA). This HHRA evaluated risks due to contamination in the soil, groundwater, surface water and sediment (in ditches). The routes of exposure considered in the HHRA included soil ingestion, skin contact with soil, and ingestion of groundwater. The HHRA also assumed future use of the site would be industrial and considered the risks posed by ingestion and direct contact based on an industrial use scenario.

In the ROD EPA also considered that surface and sub-surface soils might be carried by wind, surface water runoff, and earth moving activities. If carried off the site by surface runoff, contamination could have reached either Chambers or Flett Creeks via the stormwater drainage ditch on the west side of the site. It was also possible that Tacoma's drinking water aquifer could be threatened via the surface water run-off or by its hydrologic connection to groundwater at the site. In conjunction with EPA's ROD, the Agency for Toxic Substances and Disease Registry (ATSDR) issued a public health assessment for the site which reached much the same conclusion as EPA's ROD.

The numeric bases for different levels of action selected in the ROD for surface and sub-surface soil contamination are outlined below and are shown with more detail on attached Table 1.

- ▶ Soil 'hotspots' defined as areas with contamination exceeding levels shown below. These soils were to be excavated and treated (stabilization) and consolidated on-site. Areas of consolidated wastes were to be capped either with asphalt or one-foot of clean soil.

Arsenic	570 mg/kg
Lead	18,000 mg/kg
Carcinogenic PAHs	50 mg/kg
Total PCBs	50 mg/kg
Copper	45,000 mg/kg

- ▶ Soils with contamination between the 'hotspot' definition and the capping levels were to be excavated, consolidated and capped.

Arsenic	200 mg/kg
Lead	1,000 mg/kg
Carcinogenic PAHs	20 mg/kg
Total PCBs	10 mg/kg

- ▶ At the Tacoma City Light portion of STF (north end), soils with PCBs above 50 parts per million were to be excavated and transported off-site for appropriate disposal.
- ▶ Soils with contamination concentrations above the residential standards (Washington Model Toxics Control Act (MTCA)) but below the capping levels in the ROD, were to be controlled by

limiting future land use with a program of institutional controls, including: deed restrictions, an educational program, and a Site Development Plan.

For groundwater at Pioneer Builders Supply, the 1994 ROD selected air sparging and soil vapor extraction as the remedy based on the HHRA; however, EPA noted that concentrations of groundwater contaminants had dropped significantly from the levels observed in 1990-1991 and used to support the HHRA. Combined with the knowledge that much of the groundwater contamination source was removed during UST excavations, EPA re-evaluated the need for air sparging and soil vapor extraction. In 1999, EPA issued an ESD to the ROD with the determination that these active remedies were not necessary and that the PRPs should monitor groundwater for natural attenuation. Based on calculations made for the ESD, it was estimated that cleanup levels would be reached in four years. In addition, EPA required institutional controls in the form of deed and lease restrictions for groundwater use at the site (i.e., no drinking water use allowed). The cleanup levels for groundwater at Pioneer Builders Supply are shown below.

Contaminant	Concentration	Footnotes from EPA ROD 1994
Total Petroleum Hydrocarbons	1,000 ug/L ^{a,b}	^a MTCA Industrial Method A ^b Enforcement for this standard will be taken by Ecology at its discretion
Xylene	10,000 ug/L ^b	^b Enforcement for this standard will be taken by Ecology at its discretion
1,1,2-Trichloroethane	5 ug/L ^c	^c Cleanup level set at federal drinking water standard. If cleanup to these federal drinking water standards is achieved and the groundwater still does not achieve the MTCA cumulative risk requirement of risks no greater than 1 in 100,000 or a Hazard Index of no greater than 1, then ground water use will be restricted to non-drinking water purposes.
Napthalene	32 ug/l ^c	
Benzene	5 ug/L ^c	
Toluene	1,000 ug/L ^c	
Ethylbenzene	700 ug/L ^c	

For other groundwater (i.e., not Pioneer Builders Supply), EPA collected data from monitoring wells for four (4) quarters, including offsite wells nearby, during the Remedial Investigation (RI). The Agency determined there was no site-wide plume of groundwater contamination, but did identify three areas of localized, shallow groundwater contamination in addition to Pioneer Builders Supply. Two areas were (a) contiguous portions of the airport and former swamp/lakebed (on west edge of site) and (b) the former railcar cleanout area at the south end of the Burlington Northern railyard (see Figure 1). Monitoring showed concentrations of iron and manganese occasionally exceeded the secondary drinking water MCLs. The third additional area of localized groundwater contamination was at the Amsted property where a relatively small volume of nearly immiscible, heavy fuel oil floated on the surface of the water table.

During the Feasibility Study (FS), a groundwater study confirmed that inorganic metals leaching from contaminated soils did not pose a threat to groundwater. Total lead was chosen as the indicator chemical in this study due the high volume and concentrations of lead-contaminated soil at the site. Consequently, lead in groundwater is monitored at locations across the site, particularly where contaminated soils are consolidated. At the Amsted property, groundwater contamination proved not to be mobile and EPA required monitoring for individual PAH compounds as well as the State's MTCA parameters of TPH_{oil} and TPH_{diesel}. Monitoring data are shown on Table 2A and monitoring well locations are shown in Figure 2A.

For surface water and run-off, the PRPs responsible for monitoring the contamination and stormwater discharges to the channel declined to participate in further investigation or cleanup. Consequently, EPA sampled and determined that contamination associated with the drainage channel in the wetlands area did not present an imminent or substantial threat to human health or the environment. Stormwater discharges are currently managed under the City of Tacoma's Stormwater Management Plan.

Narrative Objectives for Remedial Action

In the EPA ROD primary cleanup standards for STF soils portion of the site were:

- ▶ Excavate soil hot spots (with exception of PCB-contaminated soil at Tacoma City Light) and treat on-site using soilidification.
- ▶ Cap soils where contaminant concentrations exceeded the State's Model Toxics Control Act (MTCA) criteria for industrial use area.
- ▶ Limit site use, and thus human exposure, strictly to industrial where contaminant concentrations ranged between the MTCA criteria for industrial and residential uses.
- ▶ Where the site was zoned for residential/commercial use and contaminant concentrations exceeded the MTCA criteria for residential use, soils were to be cleaned up (excavated and back-filled) to a depth of 15 feet, as prescribed in MTCA.

The primary cleanup standards for subsurface soil and ground water at Pioneer Builders Supply portion of the site were to reduce cancer risk from all carcinogens to no greater than 1 in 100,000 (10^{-5}) and a hazard index of not more than 1.

- ▶ Prevent further groundwater contamination by removing source materials and limit use until the following standards are met.
- ▶ Meet federal drinking water standards, MCLs, for contaminants that have these levels developed.
- ▶ Meet MTCA groundwater cleanup levels (based on drinking water protection) for contaminants that have no federal MCL.
- ▶ For individual contaminants that comprise the State class of contamination total petroleum hydrocarbons (TPH), the objectives of federal drinking water or MTCA groundwater cleanup (above) would apply; however, EPA listed the MTCA standard for TPH as a goal even though the total concentration of individual compounds did not exceed the State values for TPH.

The primary cleanup objectives for the Tacoma City Light dry wells were to remove contaminated soils off-site where concentrations exceeded MTCA industrial or residential uses. This objective was determined by the PRP for this portion of the site who elected to perform a more aggressive cleanup than was selected for the balance of the site. Soils with PCB concentrations above 50 mg/kg and endrin concentrations above 0.13 mg/kg were excavated and transported off-site for incineration.

The Consent Decree for remedial action also required general groundwater monitoring at selected wells on- and off-site. These wells are identified according to historic site use and contamination found there: Amsted Foundry wells are located in the vicinity of immobile PAH groundwater contamination

and STF wells (non-MNA) are located at sentinel sites around stabilized and consolidated soil contamination and off-site. The CD required monitoring in April and October for two years and allowed a reduced, annual monitoring frequency if data from the first two years showed no significant change in groundwater quality. Attached Figure 2A shows locations of the general groundwater monitoring wells and Figure 2B shows the location of MNA wells at Pioneer Builders Supply. Groundwater monitoring data from these wells are shown on Tables 2A and 2B, respectively.

Remedy Implementation

In the 1994 ROD, the STF OU was broken down into three areas for remediation: STF soils, Tacoma City Light drywells, and Pioneer Builders Supply sub-surface soil and groundwater contamination. After the ROD, EPA issued a UAO in 1996 for remedial design and action for soil and groundwater. The UAO was superseded when EPA and the PRPs signed a CD for soil and groundwater remedial action (filed January 1997). Tacoma Public Works stormwater utility declined to participate in monitoring a wetland stormwater drainage channel; therefore EPA conducted this portion of the remedy and subsequently determined no further action would be required.

In 1997 Tacoma City Light remediated their dry well contamination in accordance with the ROD, choosing to perform a more aggressive cleanup than pursued by other PRPs for other areas of the site. Soils contaminated with 50 mg/kg or more PCBs and 0.13 mg/kg or more endrin were excavated and incinerated off-site. The balance of RA activities at the STF site began in June 1999. The following work was conducted in accordance with the ROD and the CD.

- ▶ Approximately 6,300 tons of soil exceeding hot-spot concentrations were excavated and treated (i.e., stabilized with a phosphate-based reagent). These soils were consolidated on-site and covered with a clean soil cap.
- ▶ At Pioneer Builders Supply 15.4 tons of soil with PCBs exceeding 50 mg/kg were excavated and disposed of off-site.
- ▶ 113,607 tons of soil with contaminant concentrations between the capping and hot-spot concentrations were consolidated and capped.
- ▶ An estimated area 13.7 acres of the STF OU was capped (of 260 total acres).
- ▶ Buried tanks, drums and contents were removed and disposed of. Associated contaminated soils and solid wastes were also removed and disposed of at a permitted facility.
- ▶ Sub-surface soils contaminated over capping concentrations were capped where excavation and consolidation were not cost-effective.
- ▶ Institutional controls prohibiting residential development and limiting exposure were installed (e.g., drinking water deed restrictions, vegetation on caps, fencing, grid markers for surveying integrity of capped areas over time).
- ▶ During construction, air was monitored to assess airborne contaminant concentrations in the work area and at site boundaries.

Only three minor deviations from the ROD and approved Remedial Design occurred. First, the RD called for portland cement as a stabilizing agent, instead, a proprietary phosphate-based reagent was

used to render metal contaminants stable and insoluble. Second, because the RD assumed portland cement as the stabilizer, a retaining wall and stormwater drainage were designed for the Amsted property. However, the volume of soil needing treatment was smaller than expected and since cement was not used, the retaining wall and associated stormwater drainage were unnecessary. Finally, because near-term development was expected on the STF portion of the site, all excavated soil was not fully replaced in anticipation of additional backfill from development. (Note a minimum of six inches of topsoil was placed over all soils requiring a cap.)

Some small areas of contamination at concentrations exceeding capping levels could not be excavated because they fell beneath active rail lines. Operation and monitoring requirements were developed for these areas.

Operation & Maintenance

The 1997 CD requires PRPs to perform inspections for operation and maintenance (O&M) of the remedy. In the first annual O&M report a number of issues were identified for further monitoring and/or resolution. These included minor settling on some areas that had been capped, stormwater ponding, cap erosion, and dead vegetation in areas where public vehicles had access to capped area (cap was 1.5 ft thick, ruts from public vehicles were approximately 6 inches deep). Over the course of the first year, one small cap area was re-graded to address settling and associated drainage problems. Two other capped areas with dead vegetation were prepped, successfully re-seeded and temporarily fenced to protect vegetation.

Since the first year, maintenance has consisted of re-locating grid markers, replacing lost marker tags, monitoring public vehicle access areas for erosion, and monitoring vegetation to prevent wind/water erosion. EPA received one complaint about odor coming from a tenant business in the southwest corner of the property at the head of Proctor Street; however, this complaint was not associated with the remedial action and was referred to the Puget Sound Clean Air Authority for action.

Semi-annual monitoring is effective in preserving the integrity of capped areas and consolidated/capped areas of the site. Groundwater monitoring results are discussed in the Technical Assessment and Recommendations sections of this report.

V. PROGRESS SINCE LAST 5-YEAR REVIEW

There has been no progress since this is the first five-year review.

VI. FIVE YEAR REVIEW PROCESS

Community Involvement

Since the remedy was completed and MNA established on the Pioneer Builders Supply portion of this site, the public has not demonstrated particular interest in the site. A public notice that Region 10 was conducting this review was placed in the *Tacoma News Tribune* on February 24, 2003. In addition, approximately 215 notices were sent to addressees on the public mailing list for this site. Only one citizen responded by calling to learn more about the soil remedy based on concerns about eating wild blackberries from, and walking dogs on, unoccupied portions of the site. Staff from the Tacoma-Pierce County Health Department (TPCHD) and Washington Department of Ecology also contacted Region 10

with technical input for the review. Another notice to the community will be mailed indicating that this Five-Year Review has been completed and that the remedies are still protective.

Prior to public notices for this Five-Year Review, Region 10 has hosted several reviews of the site file by citizens interested in the development potential for various portions of the site. Recently, EPA received notice for development on the Amsted Foundry portion of the site and plans to provide appropriate oversight per the Site Development Plan to ensure integrity of capped soils is maintained.

Document Review

A complete reference list of the documents reviewed is attached. The list includes the ROD and ESD for monitored natural attenuation in groundwater at Pioneer Builders Supply as well as the annual groundwater and maintenance monitoring reports.

Groundwater monitoring reports for MNA at Pioneer Builders Supply until the fall 2002 sampling event, indicated that concentrations of chemicals of concern were generally decreasing (see Table 2B for data). However, last fall's sampling event showed a significant spike in pollutant concentrations in one of the MNA wells. This raised questions about the remedy, which had been predicted in the ESD to be nearly complete by 2003. In turn, re-evaluation of the MNA remedy raised questions about the adequacy of the current monitoring program to clearly demonstrate MNA at Pioneer Builders Supply. Other groundwater monitoring in wells across the site (see Table 2A) shows no significant change.

Site Inspections

A site inspection was conducted on June 17, 2002, by the EPA RPM, representative from Burlington Northern and Santa Fe Railway Company, and the technical consultant for the PRPs. The inspection consisted of walking over the site to check monitoring well locations, survey markers for capped grid units, soil caps and vegetation, fencing around consolidated waste units, and general land-use. The inspection served mainly to verify annual maintenance reports and to provide spatial context of the site for the recently assigned RPM. The only issue identified during this inspection was the potential fire hazard generally associated with dry vegetation due to prolonged dry weather.

Technical Assessment

The technical assessment is based on three questions. For this site, the First Five-Year Review is occurring five years after remedial action began, but with only three years of post-RA groundwater data for MNA and the general wells. Three years of operation and maintenance monitoring have not indicated any significant changes in the site.

Question A: Is the remedy functioning as intended by the decision documents?

Soils and General Groundwater: The selected remedy for contaminated soils (clean capping) is working and meets the goals specified in the ROD. Institutional controls are in place and effective as evidenced by frequent inquiries from developers interested in various portions of the site. Consolidation of "hot-spot" contamination with thick cap coverage is protective and will remain so as long as commitments to the integrity of caps and fences are kept. Although local groundwater is highly variable (see below), general groundwater monitoring (Amsted and STF wells, Table 2A) associated with soil contamination or consolidation shows no change has occurred and inorganic metals, based on the

indicator of total lead, is not posing a threat to groundwater.

MNA Groundwater at Pioneer Builders Supply: The local groundwater regime in this area is highly variable. The direction of groundwater flow at Pioneer Builders Supply varies 360° over the course of the year, depending on seasonal precipitation recharge and pumping activities elsewhere in the aquifer (e.g., Well 12A, City of Tacoma wells). MNA groundwater data did not provide adequate information to assess whether MNA is occurring because of problems with how the monitoring network and timing were set up. The 1999 ESD indicates MNA was expected to reach MCL levels in four years (i.e., 2003) in the Pioneer Builders Supply area, even beneath the tank and soil removal area; however, MNA is not occurring as rapidly as predicted in the ESD. Based on the available data, we conclude that groundwater quality is not getting worse at Pioneer Builders Supply and that it may be slowly improving; thus, the groundwater portion of the remedy (i.e., removal of source material) is effective and, when combined with institutional controls, remains protective as well.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

The assumptions, data, cleanup levels and cleanup objectives used at the time of the remedies are still valid. Although Washington Department of Ecology modified MTCA substantially in 2001, it does not appear that modifications to the industrial standards affect validity of either soil or groundwater remedies prescribed in the 1994 ROD or the 1999 ESD.

General groundwater monitoring data are shown on Table 2A (see Figure 2A for locations of STF and Amsted wells). Concentrations of lead in the wells associated with the large consolidated waste pad, VMW-2, VMW-3, exceeded the action level of 0.015 ug/l by small amounts in 2000 and 2002, respectively; however, total lead concentrations were below the action level by an order of magnitude in 2001. In the area of consolidation at Amsted, VMW-1 exceeded the lead action level in 2001, but not in 2000 or 2002, and nearby MW-1A exceeded the State MTCA level for TPH_{diesel} once in 2000, but not in 2001 or 2002.

For groundwater monitoring for MNA at Pioneer Builders Supply, the ROD and ESD state that cleanup levels for benzene, ethylbenzene, toluene, total xylenes, 1,2-dichloroethane, and naphthalene were based on the federally set MCLs for drinking water with the caveat that if the MCLs do not achieve the MTCA cumulative risk requirement of no greater than 1 in 100,000 or a Hazard Index not exceeding 1, groundwater use will be restricted to non-drinking water. Table 3 provides comparison between the ESD and recently revised MTCA cleanup levels, specifically revised default concentrations under Methods A and B. MNA data from Pioneer Builders Supply are shown on Table 2B (see Figure 2B for well locations). Dichlorobenzenes (1,2- and 1,4-) and 1,2,4-trichlorobenzene are contaminants that were not specifically addressed in the ROD or ESD; however, they are frequently detected at this site and have also been addressed by revisions to MTCA and so were added to Table 3. Although calculated concentrations for some analytes are lower under the revised MTCA regulations, the total site cancer risk under MTCA must still meet 1 in 100,000 or a Hazard Index not exceeding 1, which is equivalent to the ROD and ESD.

Question C: Has any other information come to light that could call into question the protectiveness of human health and the environment?

No, the remedy at STF currently protects human health and the environment. The remedies for soil and general groundwater protection (STF and Amsted monitoring wells) are protective of human health and the environment in both short and long term. The MNA groundwater remedy in the area of Pioneer

Builders Supply is protective in the short term, based on drinking water prohibitions which will remain in place until it can be clearly shown that MCLs are being met. Only the ability to clearly determine whether MNA at Pioneer Builders Supply is happening or not is in question. Based on recommendations from technical review of MNA at Pioneer Builders Supply, Region 10 will work with the PRPs to determine a more accurate well network and monitoring scheme to assess MNA over the next five-year period. We will also consider any input or suggestions either Ecology or TPCHD may have.

Technical Assessment Summary

The remedies and monitoring for contaminated soils and groundwater across the site (i.e., STF and Amsted groundwater wells) are functioning as expected and effective.

At Pioneer Builders Supply where the selected groundwater remedy is MNA, the current monitoring plan calls for sampling five wells each year in the October-November time frame. This timing was determined by contaminant patterns observed in three quarters of sampling done in spring, summer and fall of 1999; however, there are two main problems with the current monitoring plan.

- 1 One of the contaminants of concern, 1,2,4-trichlorobenzene, was at its maximum in the spring and summer of 1999 (above the MCL-based cleanup level) and dropped off to non-detect in the fall. This was an exception to the observation that contaminant levels at NMW-1A were highest in the fall. Therefore, sampling only in the fall cannot demonstrate whether this chemical is attenuating or has cleaned up.
- 2 It seems illogical that contaminant levels should be highest in the fall at this site, since both recharge and water levels are lowest at that time of year. One would expect any contaminant releases from residual soil contamination to groundwater be highest when the most water flows through the system, i.e., when precipitation and the water table are highest, in the spring.

These issues raised the question of whether the observed fall contaminant maximum (1999) was an artifact of the seasonal flow patterns coupled with the orientation of the monitoring well network.

As part of this 5-Year review, Region 10 hydrogeologist reviewed the water table contour maps from the RI report and realized that the groundwater flow patterns are highly erratic, varying over 360 degrees during the course of the year. Late summer through fall is when the flow direction is most stable, heading northwest (in the direction of current MNA wells NMW-10A and -9A) for three months in a row. It is possible that the reason levels of most contaminants are highest in fall is because that is when the least dilution/dispersion happens as a result of changing flow directions. However, it may also be that contamination is migrating in other unmonitored directions at other times of year, since it is unclear whether the two existing wells in other directions have even been sampled when groundwater is flowing in their direction. The direction most likely to reflect springtime releases is unmonitored. (See Section VIII below for recommendations for the MNA groundwater monitoring network at Pioneer Builders Supply.)

VII. ISSUES

Issues	Affects Protectiveness (Y/N)	
	Current	Future
Monitored Natural Attenuation (MNA) for groundwater was the subject of an ESD (issued September 29, 1999). Groundwater MNA data from the October 2002 sampling indicates the need to modify the monitoring scheme for a more accurate assessment of MNA in the future.	N	Y*

* The cleanup goal is to reach drinking water MCLs with MNA and remove institutional controls on groundwater. Resolving this issue will further the protective, long-term goal.

VIII. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Recommendation / Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-Up Affects Protectiveness? (Y/N)	
				Current	Future
<u>O&M:</u> The current program of inspection and maintenance should be continued since there are no issues with site inspection and maintenance to-date. General groundwater monitoring (STF and Amsted wells) should continue.	PRPs	EPA	October (monitoring) January (reporting)	N	N
<u>Site development:</u> Plans require Agency involvement, but the level of that involvement will depend on specific plans for any given portion of the site. The current requirements of the Consent Decree and Long Term Site Development Plan should be maintained. When specific plans for a given area of the site are proposed, the Agency will provide appropriate oversight specific to areas of consolidated soils, contamination at depth in compliance with State industrial land use standards, and/or groundwater.	PRPs (notify proponent) Project Proponent (provide details of project to EPA)	EPA with input from City of Tacoma (stormwater, water protection), TPCHD, or Ecology as appropriate	Depends on submittal of plans. 90 days to complete oversight based on local permitting process	N	Y*

Recommendation / Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-Up Affects Protectiveness? (Y/N)	
				Current	Future
<p><u>Groundwater MNA at Pioneer Builders Supply area:</u></p> <ul style="list-style-type: none"> ▶ <i>Re-evaluate and revise the monitoring strategy</i>, taking into account the changes in flow direction. Three additional wells equidistant, about 70-80 feet, from NMW-1A (source) are recommended. ▶ Of the three additional wells, one should go to the west of the south end of the source excavation area, one to the south of the west end of the excavation area, and one along the property boundary between NMW-11A and NMW-8A. (See Figure 2B for location of current MNA wells.) ▶ Existing well NMW-9A is down gradient of NMW-10A, so is redundant. It does sometimes barely exceed the MTCA TPH-diesel cleanup level but warrants sampling if Ecology wishes to pursue enforcement as noted in the ROD and ESD. 	PRPs	EPA	<p>8/03 Agree on locations of wells</p> <p>9-10/03 Install wells</p>	N	Y**
<p><u>Groundwater MNA at Pioneer Builders Supply area:</u></p> <ul style="list-style-type: none"> ▶ <i>Monitor the revised network of wells.</i> Over the course of one year, water levels should be taken on at least a quarterly basis (recommend April, July, October and January) from this new network and any existing monitoring wells in the vicinity (within at least 1000 ft). ▶ If a clear flow direction can be determined, groundwater samples should be taken and chemically analyzed from any PBS wells within a 180' swath around that direction plus NMW-1A. If not, all the PBS wells should be sampled and analyzed. ▶ After one year, these data should be evaluated to determine the need for future sampling outside NMW-1A, and the timing of that sampling. 	PRPs	EPA	<p>10/04 1st year of revised monitoring complete</p> <p>12/04 PRPs report on findings</p> <p>03/05 Agree on final revised monitoring plan, begin monitoring</p>	N	Y**

* Development will add capping depth, protect capping from erosion and surface water runoff.

** See footnote under Issues table in Section VII.

IX. PROTECTIVENESS STATEMENT

The remedy at STF currently protects human health and the environment. The remedies for soil and general groundwater protection (STF and Amsted monitoring wells) are complete except for O&M and protective of human health and the environment in both short and long term. The MNA groundwater remedy in the area of Pioneer Builders Supply is protective in the short term, based on drinking water prohibitions which will remain in place until it can be clearly shown that MCLs are being met.

X. NEXT REVIEW

In addition to addressing all of the remedy components, issues for the next Five-Year Review report should especially focus on are:

- ▶ MNA at the Pioneer Builders Supply groundwater unit and whether the modified monitoring network clearly shows MNA
- ▶ General groundwater monitoring (STF and Amsted wells) and whether exceedances of the action level for lead are consistent and may require action
- ▶ Development at the site and EPA's involvement with those activities and whether local zoning has changed potential use of the site

XI. ATTACHMENTS

Acronyms and Abbreviations

Figure 1: Major Historical Uses of the STF Site (annotated). Kennedy/Jenks figure 1-2.

Figure 2A: Locations of General Groundwater Monitoring Wells, STF (combined drawings from Remedial Design

Figure 2B: Location of Groundwater Wells for Monitored Natural Attenuation at Pioneer Builders Supply, STF

Table 1: South Tacoma Field Soil Cleanup Levels from EPA ROD 1994

Table 2A: Post-Remedial GW Monitoring STF Site (Amsted & STF Wells)

Table 2B: Post-Remedial Groundwater Monitoring for Natural Attenuation (1999-2002), Pioneer Builders Supply, South Tacoma Fields Site

Table 3: Comparison EPA Cleanup Levels with Revised MTCA Groundwater Cleanup Levels (2001): Pioneer Builders Supply Goundwater (MNA) Portion of the South Tacoma Field Site

XII. REFERENCES

Kennedy Jenks Consultants. Site Development and Institutional Controls Plan for South Tacoma Field Site, Tacoma, Washington. Prepared for Burlington Northern & Santa Fe Railway Company and Amsted Industries. Dated March 2000.

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Acronyms

BETX	Benzene, Ethylbenzene, Toluene, Xylene (common combination of organic hydrocarbon compounds)
CD	Consent Decree (Superfund document)
CERCLA	Comprehensive Environmental Resource Conservation and Liability Act (Superfund)
ESD	Explanation of Significant Differences (Superfund document issued to explain significant changes in remedy from the ROD)
FS	Feasibility Study
HHRA	Human Health Risk Assessment
MCL	Maximum Contaminant Level
MNA	Monitored Natural Attenuation
MTCA	Model Toxics Control Act (Washington law and regulations)
O&M	Operation and Maintenance
OU	Operable Unit as defined in a ROD
PAH	Polyaromatic hydrocarbons (general class of chemical compounds)
PCB	Poly-chlorinated biphenyls (group of specific chemical compounds)
PRP	Potentially Responsible Party for a given Superfund action
RA	Remedial Action
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
STC	South Tacoma Channel
STF	South Tacoma Field
TPCHD	Tacoma-Pierce County Health Department
TPH	Total Petroleum Hydrocarbons (specific parameter monitored under MTCA, divides PAHs into TPH _{heavy oil} , TPH _{gas} , TPH _{diesel})
UAO	Unilateral Agreed Order (Superfund document)
UST/LUST	Underground Storage Tank/Leaking Underground Storage Tank

TABLE 1: South Tacoma Field Soil Cleanup Levels from EPA ROD 1994

Soil Contaminant	Hotspot Concentration ¹	Capping Concentration ²	Institutional Control Concentration ³	Footnotes & Notes from 1994 ROD
Aluminum	---	---	80,000 mg/kg	
Antimony	---	---	32 mg/kg	
Arsenic	570 mg/kg	200 mg/kg	20 mg/kg	Hotspot concentration set at 1X10 ⁴ MTCA exposure assumption. Capping concentration based on MTCA A industrial soil cleanup level. Institutional control concentration based on MTCA A residential cleanup level.
Beryllium	---	---	0.23 mg/kg	
Copper	45,000 mg/kg	----	2,960 mg/kg	Hotspot concentration based on leaching concentration to groundwater.
Lead	18,000 mg/kg	1, 000 mg/kg	250 mg/kg	Hotspot concentration based on cost effectiveness of treatment at concentrations below 18,000 mg/kg. Capping concentration based on MTCA A industrial soil cleanup level. Institutional control concentration based on MTCA A residential cleanup level.
Manganese	---	---	11,200 mg/kg	
Zinc	---	---	24,000 mg/kg	
Aldrin	—	—	0.059 mg/kg	
Carcinogenic PAHs	50 mg/kg	20 mg/kg	1 mg/kg	Hotspot concentration set at 2.5X the MTCA industrial Method A concentration. Capping concentration based on MTCA A industrial soil cleanup level. Institutional control concentration based on MTCA A residential cleanup level.
3,3-Dichlorobenzidine	—	—	2 mg/kg	
Total PCBs	50 mg/kg	10 mg/kg	1 mg/kg	Hotspot concentration based on TSCA requirements. Capping concentration based on MTCA A industrial soil cleanup level. Institutional control concentration based on MTCA A residential cleanup level.
Pentachlorophenol	—	—	8.3 mg/kg	

¹ EPA ROD 1994, Table 9-1: Hot Spot Concentration Threshold for STF Soil. These are the concentrations at and above which treatment (defined as excavation, solidification with cement, and consolidation) was required.

² EPA ROD 1994, Table 9-2: Soil Capping Levels for South Tacoma Field. These are the concentrations at and above which soils would be excavated to a minimum depth of 1ft. Removed soils were then treated (see above). At 1ft depth, the ROD offered two options: (A) cap if any contaminant concentration still exceeded MTCA A level, or (B) excavation to a depth of 15 ft, the MTCA point of compliance, was allowed with clean backfill as a cap.

³ EPA ROD 1994, Table 9-3: MTCA Method B Residential Soil Cleanup Levels for South Tacoma Field. For any areas which exceeded the MTCA Method B residential soil levels for any contaminant.

Table 2A: Post-Remedial GW Monitoring STF Site

Well Names & Numbers	April 2000				October 2000				October 2001				October 2002			
	PAH	TPH _{diesel}	TPH _{oil}	Total Lead	PAH	TPH _{diesel}	TPH _{oil}	Total Lead	PAH	TPH _{diesel}	TPH _{oil}	Total Lead	PAH	TPH _{diesel}	TPH _{oil}	Total Lead
	ug/L with EPA 8270	mg/L with NWTPHd	mg/L with NWTPHd	mg/L with EPA 742	ug/L with EPA 8270	mg/L with NWTPHd	mg/L with NWTPHd	mg/L with EPA 742	ug/L with EPA 8270	mg/L with NWTPHd	mg/L with NWTPHd	mg/L with EPA 742	ug/L with EPA 8270	mg/L with NWTPHd	mg/L with NWTPHd	mg/L with EPA 742
AMSTED																
MW-1A	non detect	0.32	<0.50	<.001	non detect	<.25	<.50	0.002	non detect	0.32	<.5	<.001	non detect	<.250	<.500	0.00124
CBS-4A	non detect	<0.25	<0.50	<.001	non detect	<.25	<.50	<.001	non detect	<.25	<.5	<.001	non detect	<.250	<.500	<.001
VMW-1	non detect	<0.25	<0.50	0.005	non detect	<.25	<.50	0.004	non detect	<.25	<.5	0.022	non detect	<.250	<.500	<.001
STF																
STM-1A	not analyzed	not analyzed	not analyzed	0.005	not analyzed	not analyzed	not analyzed	0.011	not analyzed	not analyzed	not analyzed	<.001	not analyzed	not analyzed	not analyzed	well damaged
STM-3A	not analyzed	not analyzed	not analyzed	0.005	not analyzed	not analyzed	not analyzed	0.001	not analyzed	not analyzed	not analyzed	0.003	not analyzed	not analyzed	not analyzed	0.00139
*STM-4A	not analyzed	not analyzed	not analyzed	0.016	not analyzed	not analyzed	not analyzed	0.01	not analyzed	not analyzed	not analyzed	0.004	not analyzed	not analyzed	not analyzed	0.00995
* STM-100(a)	not analyzed	not analyzed	not analyzed	0.018	not analyzed	not analyzed	not analyzed	0.009	not analyzed	not analyzed	not analyzed	0.003	not analyzed	not analyzed	not analyzed	0.00826
CBS-7A	not analyzed	not analyzed	not analyzed	<.001	not analyzed	not analyzed	not analyzed	0.005	not analyzed	not analyzed	not analyzed	<.001	not analyzed	not analyzed	not analyzed	0.00117
CBS-9A	not analyzed	not analyzed	not analyzed	<.001	not analyzed	not analyzed	not analyzed	<.001	Closed after 2000				Closed after 2000			
CBS-10A	not analyzed	not analyzed	not analyzed	0.008	not analyzed	not analyzed	not analyzed	<.001	not analyzed	not analyzed	not analyzed	<.001	not analyzed	not analyzed	not analyzed	0.00537
VMW-2	not analyzed	not analyzed	not analyzed	0.006	not analyzed	not analyzed	not analyzed	0.009	not analyzed	not analyzed	not analyzed	0.004	not analyzed	not analyzed	not analyzed	0.0182
VMW-3	not analyzed	not analyzed	not analyzed	0.002	not analyzed	not analyzed	not analyzed	0.018	not analyzed	not analyzed	not analyzed	0.002	not analyzed	not analyzed	not analyzed	0.00292
MNW-17A1	not analyzed	not analyzed	not analyzed	<.001	not analyzed	not analyzed	not analyzed	<.001	not analyzed	not analyzed	not analyzed	0.001	not analyzed	not analyzed	not analyzed	<.001
Action Level		not available	not available	0.015		not available	not available	0.015		not available	not available	0.015		not available	not available	0.015

NOTES

- bold type** indicates analyte found at the given concentration above detection level
- colored** indicates analyte found above the specified action level
- "<##.##"** indicates analyte not found below the given detection level
- * STM-100(a) is a duplicate for STM-4A

Table 2B: Post-Remedial Groundwater Monitoring for Natural Attenuation (1999-2002), Pioneer Builders Supply, South Tacoma Fields Site

	NMW-1A									NMW-8A						NMW-9A						
	May-99	Aug-99	Nov-99	Jan-00	1/00 dup (NMW-100)	Oct-01	10/01 dup (NMW-100)	Oct-02	10/02 dup (NMW-100)	May-99	Aug-99	Nov-99	Jan-00	Oct-01	Oct-02	May-99	Aug-99	Nov-99	Jan-00	Oct-01	Oct-02	
VOCs (ug/L)																						
Acetone	11	<13				<5.0	<5.0	<25.0	<25.0	13	<5.0			<5.0	<25.0	<1.0	<5.0			<5.0	<25.0	
1,2-Dichloroethane			<1.0									<1.0						<1.0				
2-Butanone		<5.0				<5.0	<5.0	<10.0	<10.0	not analyzed	<5.0			<5.0	<10.0	not analyzed	<5.0			<5.0	<10.0	
Benzene	32	11	21	12	14	3.1	3.2	7.81	7.26	<1.0	<1.0	<1.0	<1.0	<1.0	<1.00	<1.0	<1.0	1.0	<1.0	<1.0	<1.00	
Chloroform	<1.0									1.3						<1.0						
Toluene	8.1	9.0	120	1.6	1.7	16	16	38.3	24.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.00	<1.0	<1.0	1.9	<1.0	<1.0	<1.00	
Ethylbenzene	20	20	280	1.0	<1.0	78	80	148	116	<1.0	<1.0	<1.0	<1.0	1.2	<1.00	<1.0	<1.0	3.8	<1.0	<1.0	<1.00	
Total Xylenes	5.2	31.7	552	3.3	3.0	113	113	272.3	207.9	<2.0	<2.0	<2.0	<2.0	2.0	<2.00	<2.0	<2.0	8.3	<2.0	<2.0	<2.00	
n-Butylbenzene			13					9.16	6.48			<1.0			<1.00			<1.0			<1.00	
sec-Butylbenzene								7.53	6.69						<1.00						<1.00	
p-Isopropyltoluene								24.8	18.0						<1.00						<1.00	
4-Isopropyltoluene			12									<1.0						<1.0				
1,2-Dichlorobenzene	1.2	1.7				<1.0	<1.0	<1.00	<1.00	<1.0	<1.0			<1.0	<1.00	<1.0	<1.0			<1.0	<1.00	
1,3-Dichlorobenzene			5.0					<1.00	13.8			<1.0			<1.00			<1.0			<1.00	
1,4-Dichlorobenzene	2.0	1.6	8.2			1.1	1.1	4.15	17.4	<1.0	<1.0	<1.0		<1.0	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.00	
sec-Butylbenzene			12									<1.0						2.9				
1,3,5-Trimethylbenzene	<1.0	5.7	130			22	25	70.7	50.8	<1.0	<1.0	<1.0		<1.0	<1.00	<1.0	<1.0	1.7		<1.0	<1.00	
1,2,4-Trimethylbenzene	1.4	8.8	180	1.7	1.8	85	95	180	118	<1.0	<1.0	<1.0	<1.0	1.1	<1.00	<1.0	<1.0	2.9	<1.0	<1.0	<1.00	
tert-Butylbenzene			1.7									<1.0						<1.0				
Isopropylbenzene	11	4.9	54	2.0	2.5	16	18	37.9	32.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.00	<1.0	<1.0	4.6	<1.0	<1.0	<1.00	
n-Propylbenzene	5.8	3.1	48			18	20	45.2	34.7	<1.0	<1.0	<1.0		<1.0	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.00	
1,2,4-Trichlorobenzene	98	110	7.4	13	13	<5.0	<5.0	<1.00	<1.00	<5.0	<5.0	<5.0	<5.0	<5.0	<1.00	<5.0	<5.0	<5.0	<5.0	<5.0	<1.00	
Naphthalene		7.6	84			14	15	88.3	66.6		<5.0	<5.0		<5.0	<1.00		<5.0	<5.0	<5.0	<5.0	<1.00	
1,2,3-Trichlorobenzene	110	120	12	16	16	<5.0	<5.0	3.14	<1.00	<5.0	<5.0	<5.0	<5.0	<5.0	<1.00	<5.0		<5.0	<5.0	<5.0	<1.00	
Methane (ug/L)	<0.50									<0.50						<0.50						
TOTAL PETROLEUM HYDROCARBONS (mg/L)																						
Diesel range	0.68	.44	0.38	0.38	0.31	<0.25	<0.25	0.859	0.910	<0.25	<0.25	<0.25	<0.25	<0.25	<0.250	<0.25	0.26	<0.25	<0.25	<0.25	<0.25	0.765
Gasoline range	1	0.97	7.1	0.46	0.44	3.4	3.4	5.660	5.180	<0.25	<0.25	<0.25	<0.25	<0.25	<0.050	<0.25	<0.25	0.40	<0.25	<0.25	<0.050	
Oil range		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.500	<0.500		<0.50	<0.50	<0.50	<0.50	<0.500		<0.50	<0.50	<0.50	<0.50	<0.500	

Bold values are detected concentrations.

Table 2B: Post-R

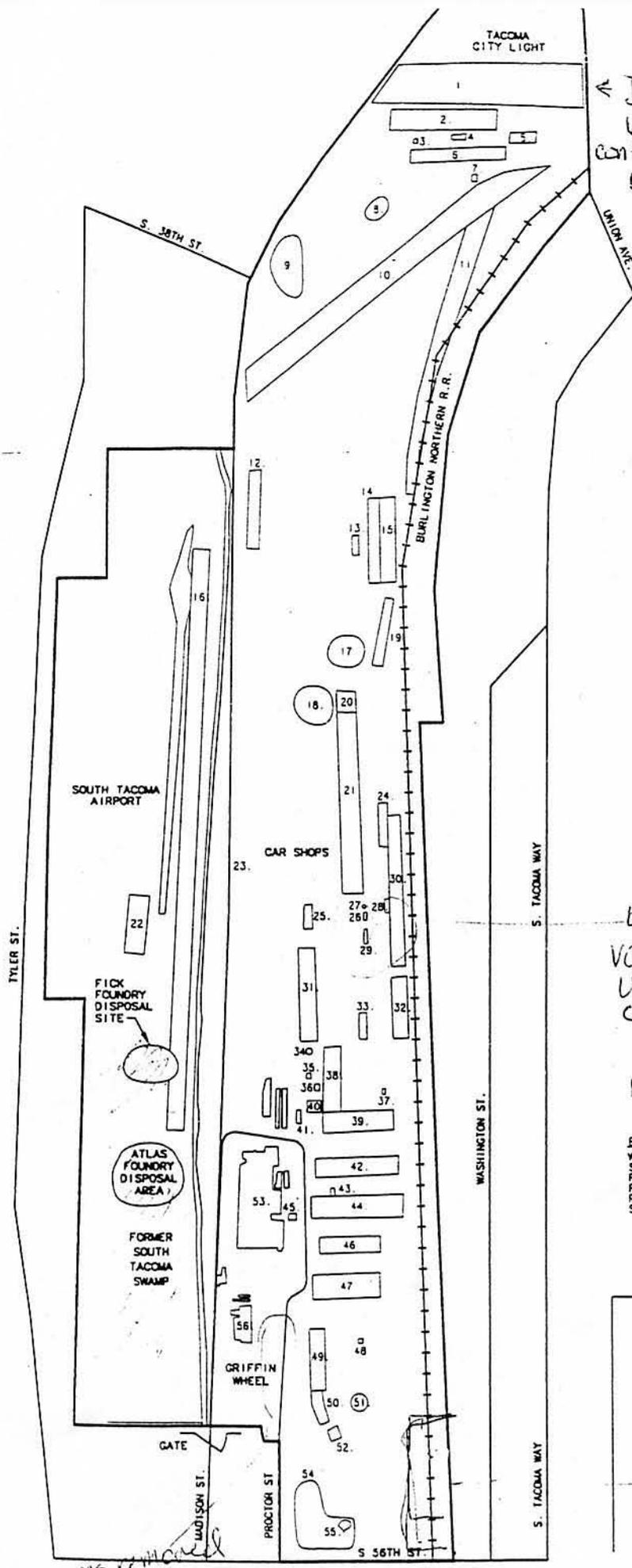
	NMW-10A									NMW-11A					
	May-99	May-99 dup	Aug-99	Aug-99 dup	Nov-99	Nov-99 dup	Jan-00	Oct-01	Oct-02	May-99	Aug-99	Nov-99	Jan-00	Oct-01	Oct-02
VOCs (ug/L)		NMW-100		NMW-0A		NMW-100									
Acetone	<1.0	<1.0	<5.0	11				<5.0	<25.0	<1.0	<5.0			<5.0	<25.0
1,2-Dichloroethane					<1.0	1.2						<1.0			
2-Butanone			<9.6	5.2				<5.0	<10.0		<5.0			<5.0	<10.0
Benzene	<1.0	<1.0	7.6	7.1	<1.0	<1.0	<1.0	1.0	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.00
Chloroform	<1.0	<1.0								<1.0					
Toluene	<1.0	<1.0	20	17	1.1	1.0	<1.0	7.9	<1.00	<1.0	<1.0	1.9	<1.0	<1.0	<1.00
Ethylbenzene	3.1	3	52	46	3.3	3.5	<1.0	5.4	<1.00	<1.0	<1.0	5.5	<1.0	<1.0	<1.00
Total Xylenes	8.1	8.2	63.6	53.7	5.7	5.9	<2.0	8.6	<2.00	<2.0	<2.0	12.4	<2.0	<2.0	<2.00
n-Butylbenzene						<1.0			<1.00			<1.0			<1.00
sec-Butylbenzene									<1.00						<1.00
p-Isopropyltoluene									<1.00						<1.00
4-Isopropyltoluene					<1.0	<1.0						<1.0			
1,2-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0				<1.0	<1.00	<1.0	<1.0			<1.0	<1.00
1,3-Dichlorobenzene					<1.0	<1.0		<1.0	<1.00			<1.0			<1.00
1,4-Dichlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0			<1.00	<1.0	<1.0	<1.0		<1.0	<1.00
sec-Butylbenzene					<1.0	<1.0						<1.0			
1,3,5-Trimethylbenzene	<1.0	4.2	<1.0	<1.0	1.0	1.1		<1.0	<1.00	<1.0	<1.0	1.9		<1.0	<1.00
1,2,4-Trimethylbenzene	1.5	1.7	5.1	3.8	1.7	1.9	<1.0	2.7	<1.00	<1.0	<1.0	2.4	<1.0	<1.0	<1.00
tert-Butylbenzene					<1.0	<1.0						<1.0			
Isopropylbenzene	<1.0	<1.0	3.2	2.6	<1.0	<1.0	<1.0	<1.0	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.00
n-Propylbenzene	1.3	1.2	2.6	2.1	<1.0	<1.0		<1.0	<1.00	<1.0	<1.0	<1.0		<1.0	<1.00
1,2,4-Trichlorobenzene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<1.00	<5.0	<5.0	<5.0	<5.0	<5.0	<1.00
Naphthalene			25	24	<5.0	<5.0		<5.0	<1.00		<5.0	<5.0		<5.0	<1.00
1,2,3-Trichlorobenzene	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<1.00	<5.0	<5.0	<5.0	<5.0	<5.0	<1.00
Methane (ug/L)	<0.50	<0.50								<0.50					
TOTAL PETROLEUM HYDROCARBONS (mg/L)															
Diesel range	0.44		1.6		<0.25	<0.25	0.25	<0.25	0.536	<0.25	<0.25	<0.25	<0.25	<0.25	<0.250
Gasoline range	<0.25		0.68		<0.25	<0.25	<0.25	<0.25	0.984	<0.25	<0.25	<0.25	<0.25	<0.25	<0.050
Oil range			<0.5		<0.50	<0.50	<0.50	<0.50	<0.500		<0.50	<0.50	<0.50	<0.25	<0.500

Bold values are detected

TABLE 3: Comparison EPA Cleanup Levels to Revised MTCA Groundwater Cleanup Levels (2001): Pioneer Builders Supply Groundwater (MNA) Portion of the South Tacoma Field Site

	At The Time of EPA 1994 ROD, 1999 ESD		Notes	2001 MTCA Revisions		Notes
	MCL	Cleanup Levels		MCLs	Cleanup Levels	
	units	ug/L		ug/L	ug/L	
Acetone	--	800	Not specified for cleanup at Pioneer Builders Supply.	--	800	Method B formula calculation for non-carcinogenic effects
1,2,4-Trichlorobenzene	70	80	Not specified for cleanup at Pioneer Builders Supply.	70	80	MCL unchanged. Calculated concentration per Revised Method B is 80 ug/L for non-carcinogenic effects
1,2-Dichlorobenzene	600	720	Not specified for cleanup at Pioneer Builders Supply.	600	720	MCL unchanged. Calculated concentration per Revised Method B is 720 ug/L for non-carcinogenic effects
1,4-Dichlorobenzene	75	1.82	Not specified for cleanup at Pioneer Builders Supply.	75	1.82	MCL unchanged. Calculated concentration per Revised Method B is 1.82 ug/L for non-carcinogenic effects
1,2-Dichloroethane	5		Not specified for cleanup at Pioneer Builders Supply.	5	0.481	MCL unchanged. Concentration per Revised Method A is 5 ug/L, and per Revised Method B calculation is 0.481 ug/L for carcinogenic effects
1,1,2-Trichloroethane	5	5	Cleanup level based on federal drinking water standard. Must achieve MTCA cumulative risk not exceeding 1 per 100,000 or a Hazard Index not greater than 1. Otherwise, drinking water use will not be allowed.	5	5	MCL is unchanged. Calculated concentration per Revised Method B calculation is 0.768 ug/L for carcinogenic effects, and 320 ug/L for non-carcinogenic effects. Revised MTCA allows use of MCL for this contaminant.
Toluene	1000	1000	Based on MTCA Method B calculated concentration. Must achieve MTCA cumulative risk not exceeding 1 per 100,000 or a Hazard Index not greater than 1. Otherwise, drinking water use will not be allowed.	1000	1,600	MCL unchanged. Calculated concentration per Revised Method B is 1,600 ug/L for non-carcinogenic effects.
Benzene	5	5	Must achieve MTCA cumulative risk not exceeding 1 per 100,000 or a Hazard Index not greater than 1. Otherwise, drinking water use will not be allowed.	5	5	MCL unchanged. Concentration per Revised Method A is 5ug/L, and per Revised Method B calculation is 0.795 ug/L for carcinogenic effects, 24 ug/L for non-carcinogenic effects. Revised MTCA allows use of MCL for this contaminant.
Ethylbenzene	700	700	Must achieve MTCA cumulative risk not exceeding 1 per 100,000 or a Hazard Index not greater than 1. Otherwise, drinking water use will not be allowed.	700	700	MCL unchanged. Concentration per Revised Method A is 700 ug/L, and per Revised Method B calculation is 800 ug/L for non-carcinogenic effects
Naphthalene	none	32	Based on MTCA Method B calculated concentration.	none	20	No MCL. ROD concentration based on MTCA Method B calculation. 2001 revised MTCA Method A is 20 ug/L, and for Method B calculation is 160 ug/L for non-carcinogenic effects.
Xylene (total)	10000	10000	Enforcement for this concentration will be at discretion of Ecology.	10000	1,000	MCL unchanged. Concentration per Revised Method A is 1,000 ug/L, and per Revised Method B calculation is 16,000 ug/L for non-carcinogenic effects
Total Petroleum Hydrocarbons	none	1000 (for State)	Based on MTCA Method A. Enforcement for this concentration will be at discretion of Ecology.	none	see note	Revised MTCA calculations for Method B are 500 ug/L (non-carcinogenic) for diesel and heavy oil by NWTPH-Dx analyses. For gas range organics, revised Method B concentration is 800 ug/L (with benzene), 1000 ug/L (w/out benzene).

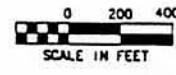
Cleanup Levels and Risk Calculations under the MTCA Cleanup Regulation, CLARC, Version 3.1. Table for Potable Ground Water -- ARARs and Standard Method B and C Formula Values. Updated August 2001. Washington State Department of Ecology, Pub. No. 95-145. November 2001.



LEGEND

- STF-NPL SITE BOUNDARY
- 1 TCL YARD AREA
- 2 GANTRY CRANE AREA
- 3 FUEL TANK
- 4 SHED
- 5 LANTERN SHED
- 6 STOREHOUSE, BELTHOUSE, ROLLING MILL, STORAGE BLOC
- 7 FUEL CELLAR
- 8 BURN PIT
- 9 TRASH DUMP
- 10 STORAGE YARD
- 11 RUBBISH TRACK CORRIDOR
- 12 CONCRETE CASTING PLANT
- 13 SANDBLAST SHED
- 14 BLACKSMITH SHOP
- 15 CONCRETE FLOOR
- 16 LANDING STRIP
- 17 TRASH BURNING AREA
- 18 TRASH PIT (PAINT SHOP)
- 19 CAR CASTINGS PLATFORM
- 20 PAINT SHOP
- 21 CAR SHOP
- 22 AIRPORT BLDG
- 23 MADISON STREET
- 24 OPEN SHED
- 25 DRY KILN
- 26 WASTE SOAKING VAT
- 27 UST (OIL)
- 28 PAINT SHOP
- 29 PAINT HOUSE
- 30 FREIGHT REPAIR SHED
- 31 FINISHED LUMBER SHED
- 32 WHEEL SHOP
- 33 GENERATOR HOUSE
- 34 UST (OIL)
- 35 PUMPS
- 36 DIP TANK
- 37 DROP PIT
- 38 WOODWORKING SHOP
- 39 COACH SHOP
- 40 BOILER HOUSE
- 41 OIL TANKS
- 42 PAINT SHOP
- 43 BRASS
- 44 MACHINE SHOP
- 45 SOLVENT SHED
- 46 BOILER, TIN TANK, AND COPPER SHOP
- 47 SOUTH MACHINE SHOP
- 48 TRASH BURNER
- 49 BLACKSMITH SHOP
- 50 IRON & STEEL STORAGE
- 51 TURNTABLE
- 52 COKE & COAL
- 53 FORMER IRON FOUNDRY
- 54 RAILCAR CLEANOUT AREA
- 55 BURIED DRUMS (REMOVED)
- 56 FORMER BRASS FOUNDRY SITE

← Dry Well Contamination (PCBs)



BASE MAP REFERENCE
 WALKER & ASSOC. 10-22-86
 SURFACE DEBRIS SAMPLING PLAN
 FEBRUARY 1987
 FOR SITTS & HILL ENGINEERS, INC
 RETEC REMEDIATION TECHNOLOGIES, INC.
 SOUTH TACOMA SWAMP

Ecology
 VCP
 UST removed
 c 1991-92

Kennedy/Jenks Consultants

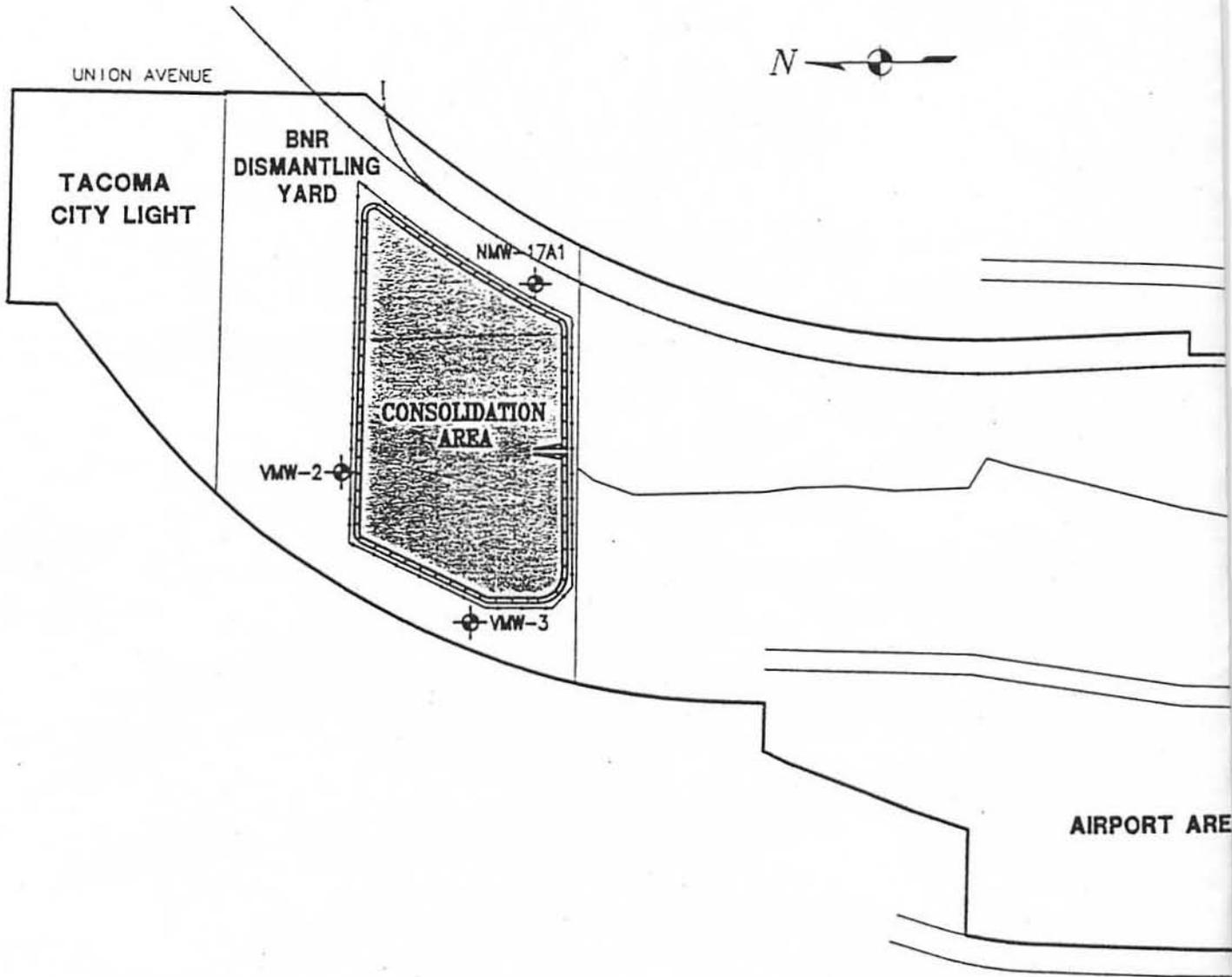
SOUTH TACOMA FIELD
 TACOMA, WA

**MAJOR HISTORICAL USES
 OF THE STF SITE**

Pre VCP days
 '90/'91 UST
 removal

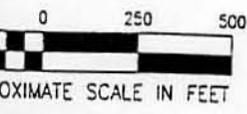
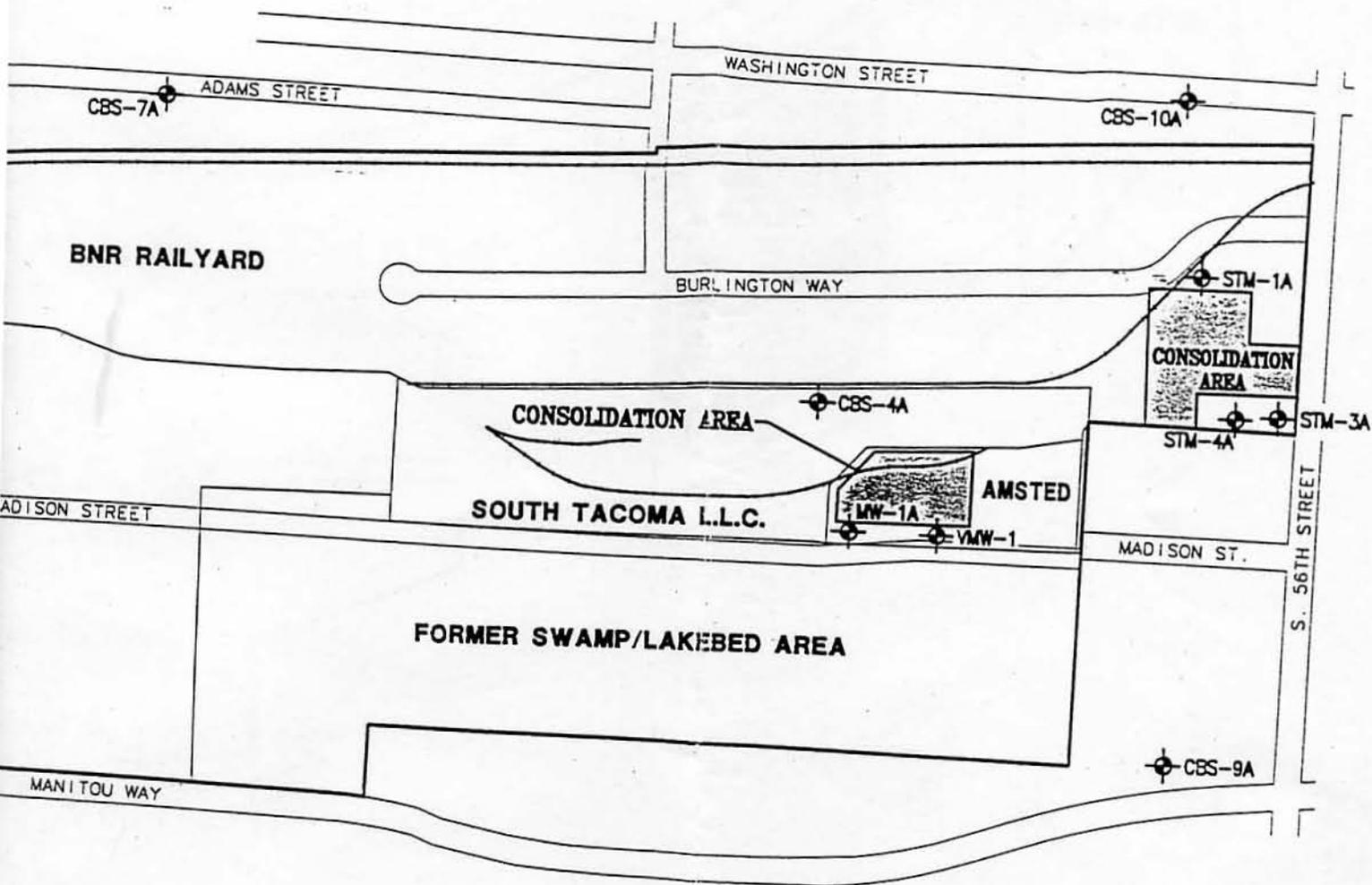
Drums removed
 Retec
 for BNSF in
 the lake 80's
 drums

Figure 1 for STF First 5-Yr Review Report - April 2003



LEGEND

NMW-1A  EXISTING MONITORING WELL LOCATION

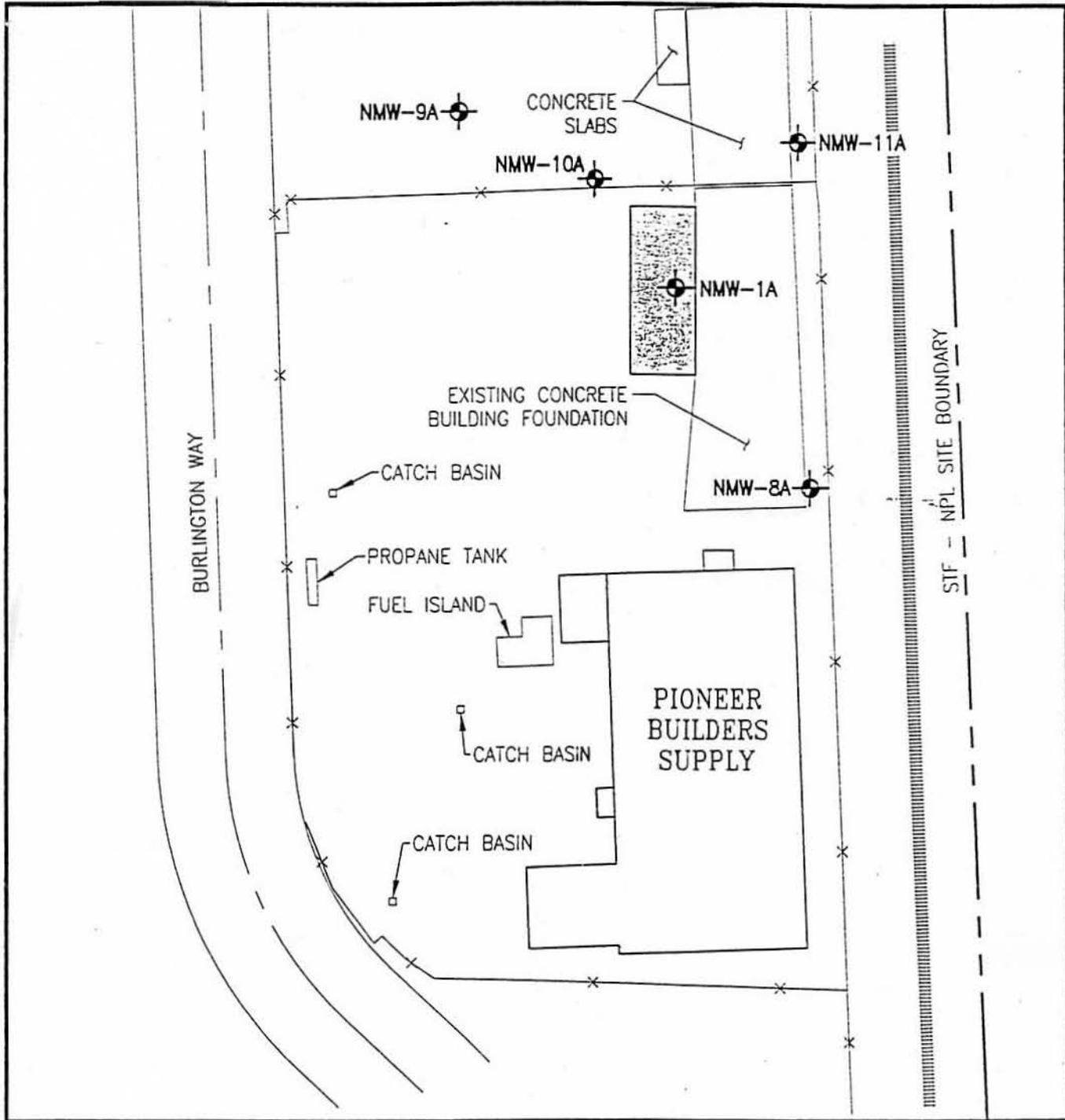


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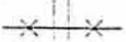
SOUTH TACOMA FIELD
TACOMA, WA

MONITORING WELL LOCATIONS

Figure 2A for STF
First 5-Yr Review Report
April 2003

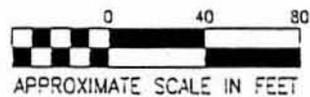


LEGEND

- NMW-1A  MONITORING WELL
-  EXISTING RAILROAD TRACKS
-  EXISTING FENCE
-  UNDERGROUND TANK EXCAVATION

NOTE:

1) ALL LOCATIONS ARE APPROXIMATE.



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SOUTH TACOMA FIELD
TACOMA, WA

**PIONEER BUILDERS SUPPLY
MONITORING WELL LOCATIONS**

Figure 2B for STF
First 5-Yr Review Report
April 2003