



SITE HAZARD ASSESSMENT

WHITTEN OIL EXXON
COLVILLE, WASHINGTON

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1.0 INTRODUCTION

Whitten Exxon is an active retail gasoline station in Colville, Washington. Colville, with a population of 4,800, is located approximately 66 miles northwest of Spokane on State Highway 395. Highway 395 is designated as Main Street as it passes through Colville. Whitten Exxon is located at the intersection of Main Street and Dominion Avenue, as shown on Figure 1.

SAIC conducted a Site Hazard Assessment (SHA) at the Whitten Oil Exxon facility in Colville, Washington. Field work was performed on October 3, 1991. The purpose of an SHA (in accordance with WAC 173-340-320, Ecology, 1991) is to provide sufficient sampling data and other environmental information to:

- Confirm or rule out that a release or threatened release of a hazardous substance has occurred.
- Identify the hazardous substances and provide some information regarding the extent and concentration of the substance.
- Identify site characteristics that could result in the substance entering and moving through the environment.
- Evaluate the potential for the threat to human health and the environment.

This information is then used to compute a score using the Washington Ranking Method (Ecology, 1990) and the priority level of the site relative to other State cleanup sites.

This report includes a brief description of the facility and its environmental setting in Section 2.0, a description of the field sampling methodologies in Section 3.0; sampling results and discussion in Section 4.0 and a list of references in Section 5.0. Appendices include the following materials: (A) Data Collection Summary Sheets (DCSS); (B) Analytical Data, (C) Chain-of-Custody Forms; and (D) Field Notes.

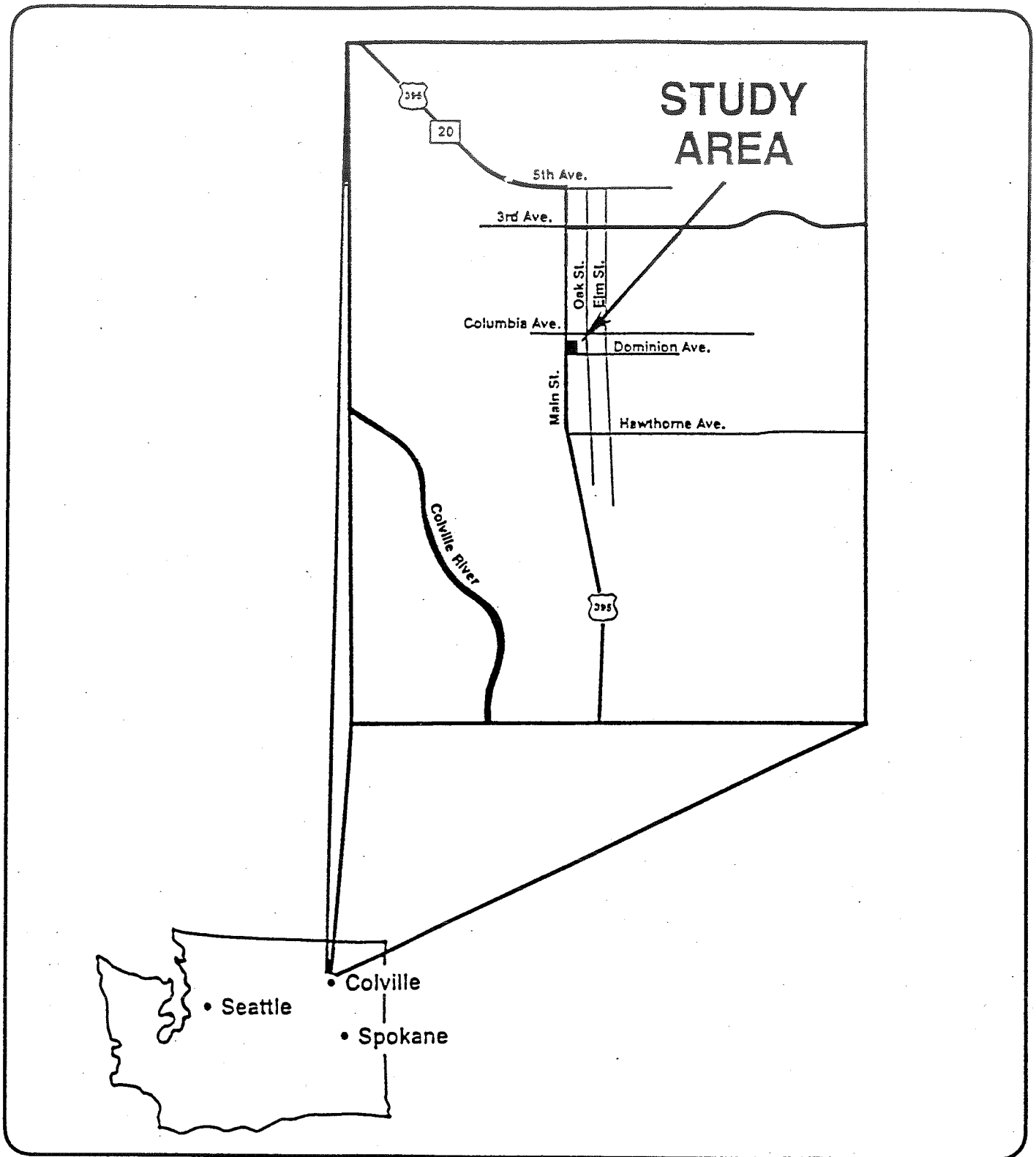


Figure 1

STUDY LOCATION

2.0 FACILITY DESCRIPTION AND ENVIRONMENTAL SETTING

2.1 FACILITY DESCRIPTION

The Whitten Oil Exxon gas station occupies approximately 0.75 acres of land and is bordered on the north and east by residential housing. A small laundromat and the Colville Auto Repair Shop occupy the block of Dominion Street to the south.

Four underground storage tanks (USTs) are present on the southcentral portion of the Whitten Exxon property. Whitten Exxon owns two 6,000-gallon USTs (one for leaded and one for unleaded gasoline), one 10,000-gallon unleaded gasoline tank, and one 2,000-gallon diesel tank. The four tanks are in close proximity to one another. Three USTs were removed from the Colville Auto Repair property to the south during the summer of 1990. At this time, the nearest offsite UST is approximately 0.5 mile north. (SAIC, 1991)

A small unnamed creek flows westwardly within the Dominion Avenue right-of-way to the south of the gas station. The creek is diverted into an underground 24-inch diameter concrete pipe east of the gas station property and exits back to a surface drainage 150 feet southwest at 533 Wynne Street. Petroleum product has been noted on a sporadic basis in the creek as it exits the culvert downstream of the site. Petroleum contamination has been observed in the diversion pipe at the Main-Dominion Streets intersection numerous times, and has been documented since at least 1984. (SAIC, 1991)

A remedial investigation conducted by SAIC for Ecology (SAIC, 1991) provides information on the source and nature of subsurface and surface contamination at the Whitten Exxon facility. The contamination observed at the culverted creek flowing past the site is attributed to the Whitten Exxon site based on the following data:

- Ground water flow is to the west across the northern portion of the site and to the south in the southern area of the site.
- Significant levels of soil and ground water contamination were detected at all locations downgradient from the USTs and distribution system at the facility.

- No significant soil or ground water contamination was detected at any upgradient location. Contamination was not detected at the Colville Auto Repair facility to the south.
- Visible contamination of water in the storm drain underneath Main Street was documented at locations downstream of the facility, but was not observed at upstream locations. This was also reflected in analytical results of surface water sampling.
- The highest concentrations of ground water contamination were detected in MW8, west and downgradient of the product distribution system at the facility.
- Ground water contamination is predominantly composed of aromatic hydrocarbons, benzene, ethylbenzene, toluene, and xylenes. These constituents are less stable in the environment than other gasoline constituents, and their relative proportions indicate that the source of contamination is gasoline derived from recent or ongoing releases that have not been significantly altered by environmental fate and transport mechanisms.
- Surface water contamination in the creek adjacent to the site has been documented on a transient basis, and contamination occurrences can be related to hydraulic communication between the contaminated ground water and the storm drain at the site.

In the fall of 1990, additional remedial measures were implemented by Olympus Environmental, Inc. that included the installation of 125 lineal feet of porous trenching and vacuum extraction equipment. According to their report (Olympus, 1990), 75 lineal feet of porous trench were installed along the west side of the property and 50 feet along the south side. Trenching performed on the west side effectively removed the shallow collection trench installed by Soil Exploration, Inc. Trenching was performed to a constant depth of 9 feet below grade. The 3-foot-wide trenches were backfilled with 6-inch minus gravel, overlain by finer gravel and an asphalt cap. Slotted 4-inch diameter PVC pipe was installed at a depth of 3 feet along the first 60 feet of north-south trench and 40 feet of east-west trench. The pipe is attached to a 3/4-hp blower which can deliver approximately 125 scfm of air flow. Offgas is vented to the atmosphere through a 15-foot long exhaust stack.

2.2 ENVIRONMENTAL SETTING

Colville, Washington is located in Stevens County, in the Chamokane Valley. The Colville-Chamokane Valley has a gently rolling topography and ranges from 1 mile to 3 miles in width. The valley floor is made up of water-laid deposits of considerable thickness throughout its entire length. The sides of the valley slope gradually and appear as the weathered slopes of an aggrading system or of a youthful stream that is actively eroding its valley. In the Colville area, the floor of the valley slopes south and west from Colville Mountain to the Colville River (approximately 1.5 miles West of the site). (DeLorme Mapping Co., 1988)

In Colville and Stevens County, summers are warm or hot in most valleys with cold winters. Valleys are colder than lower slopes of the adjacent mountains because of cold air drainage. In the mountains, precipitation occurs throughout the year, and a deep snowpack accumulates during winter. Snowmelt generally supplies much more water than can be used for farming in the area. In the valleys, precipitation in summer falls as showers, although some thunderstorms occur. The ground is covered with snow much of the winter time. However, warm and dry chinook winds blow downslope and often melt and evaporate the snow reducing infiltration and recharge of shallow aquifers. (SCS, 1982)

Total annual precipitation is 17.5 inches per year. About 40 percent generally falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 6 inches. The heaviest 1-day rainfall during the period of record was 1.44 inches at Colville on January 7, 1962. Average seasonal snowfall is 47 inches. The greatest snow depth at any one time during the period of record was 34 inches. (USGS, 1989)

2.3 GEOLOGY AND SOILS

The area encompassing the Whitten Exxon station is underlain by fill to a depth of 2 to 3 feet. Natural soils are dominantly a Hodgson silt loam, which is a thick silt loam of glaciolacustrine origin. This soil is classified as very deep and moderately well drained with a vertical hydraulic conductivity of 0.2 to 0.6

in./hr (SCS, 1982). A perched water table is present at a depth of 2 to 3 feet between February and April (SCS, 1982). The surficial fill layer is described as "primarily silty sand and silty clay" and may extend to 6 feet thick along the property boundary with Main Street (Soil Exploration Company, 1984). Natural soils are moderately plastic, and contain 32 and 40 percent clay, less than 20 percent sand, and 1 to 2 percent organic matter. The soils have a drainable porosity ranging from 18 to 20 percent. Soil pH at depth is alkaline, reflecting its lacustrine origin (pH 7.4 to 9.0).

2.4 LOCAL HYDROLOGY

2.4.1 Surface Water

A small unnamed creek is channeled into a culvert and beneath the alley immediately to the east of Whitten Oil. Based on visual observation of the stream on November 6, 1990, the flow appears to be in the range of 0.04 to 0.08 cfs. At the outfall, approximately 500 feet to the west-southwest, the residents of 533 South Wynne reported the annual occurrence of a petroleum slick each spring. The Main Street storm sewer flows into the creek culvert near the intersection of Main and Dominion Streets. To date, no evidence of petroleum contamination at the culvert intake has been observed. The creek flows to the Colville River.

Nine gauging locations on the Colville River are monitored periodically by Ecology and one location is monitored regularly by the U.S. Geological Survey (USGS). None of the Ecology locations are in close proximity to Colville (USGS, 1990). The USGS gauging station is located 600 feet downstream from the Washington Power Company's hydroelectric plant at the foot of Meyers Falls. A historical maximum discharge of 3,440 cfs was measured in 1974 and a minimum of 0.5 cfs in 1930. In 1989, the maximum discharge was 1,210 cfs and the minimum was 16 cfs (USGS, 1989). Peak flows are developed in the months of March, April, and May, with maximum mean flow in April of 745 cfs. Lowest flows in the Colville River are recorded in August, September, and October, with a historical mean flow of 67.9 cfs in September. It is evident that even minor point source pollutant contributions to the Colville River could have significant impacts on water quality during low-flow months.

2.4.2 Ground Water

Depths to ground water in open soil borings ranged from 4 to 6 feet on July 31, 1984 and August 1, 1984, and suggest a west-southwest ground water flow direction roughly corresponding to local topography. Direct infiltration is limited to the unpaved portions of the Whitten Exxon property, an area roughly one-third the total. Locally, a high degree of ground-surface water interconnection is indicated by the shallow ground water table and by the existence of a series of springs approximately 2/3 mile to the northeast.

USGS monitoring of ground water levels and quality in Stevens County is limited (USGS, 1989). Three shallow monitoring wells drilled in Holocene alluvium on the Spokane Indian Reservation show the phreatic surface is within 5 feet of ground surface and the Pre-Cambrian granites found less than 20 feet from the surface. In valley fill along the Colville River alluvium may exceed 100 feet.

3.0 FIELD SAMPLING ACTIVITIES

A site visit and ground water sampling were conducted at the Whitten Oil Exxon site on October 3, 1991. Sampling activities were performed by Stuart Strum and Brett Freier of SAIC. Patty Carter, Mike Boatsman, and Sherman Spencer of Ecology's Eastern Regional Office accompanied the sampling team. Figure 2 shows the where borings and wells have been installed at Whitten Oil Exxon. The field sampling team sampled wells MW2 through MW8.

The sampling team arrived at the site at 0810, inspected the well covers, opened the wells and measured static water levels in each well. The volume of water in each well was calculated based on well diameter, total depth and static water level in order to determine purge volumes (3 times the calculated well volume) prior to sampling. Field parameters were also measured on water purged from the wells in order to determine the representativeness of water evacuated from the wells for sampling.

Wells were purged and sampled using dedicated, disposable polyethylene bailers. Each bailer was disposed after purging and sampling of each monitoring well. All purge water was contained in drums, sealed and labelled for removal by a vendor contracted by Ecology.

Samples were collected from each well for analysis of aromatic hydrocarbons and total volatile petroleum hydrocarbons. Sampling was initiated at 1345 and was completed at 1500 hours. Quality assurance sampling included collection of a field duplicate sample at MW5 and collection of a field blank. Trip blanks supplied by the analytical laboratory were transported with the samples and were analyzed for aromatic hydrocarbons. One surface water sample was collected at the point where the creek discharges from the culvert downstream of the site, approximately 150 feet west-southwest of the intersection of the Main and Dominion Streets.

All samples were analyzed for total volatile hydrocarbons using EPA SW-846 method 8015 modified, and for aromatic hydrocarbons, using EPA SW-846 method 8020. Laboratory results are included in Appendix B; chain of custody sheets are included in Appendix C.

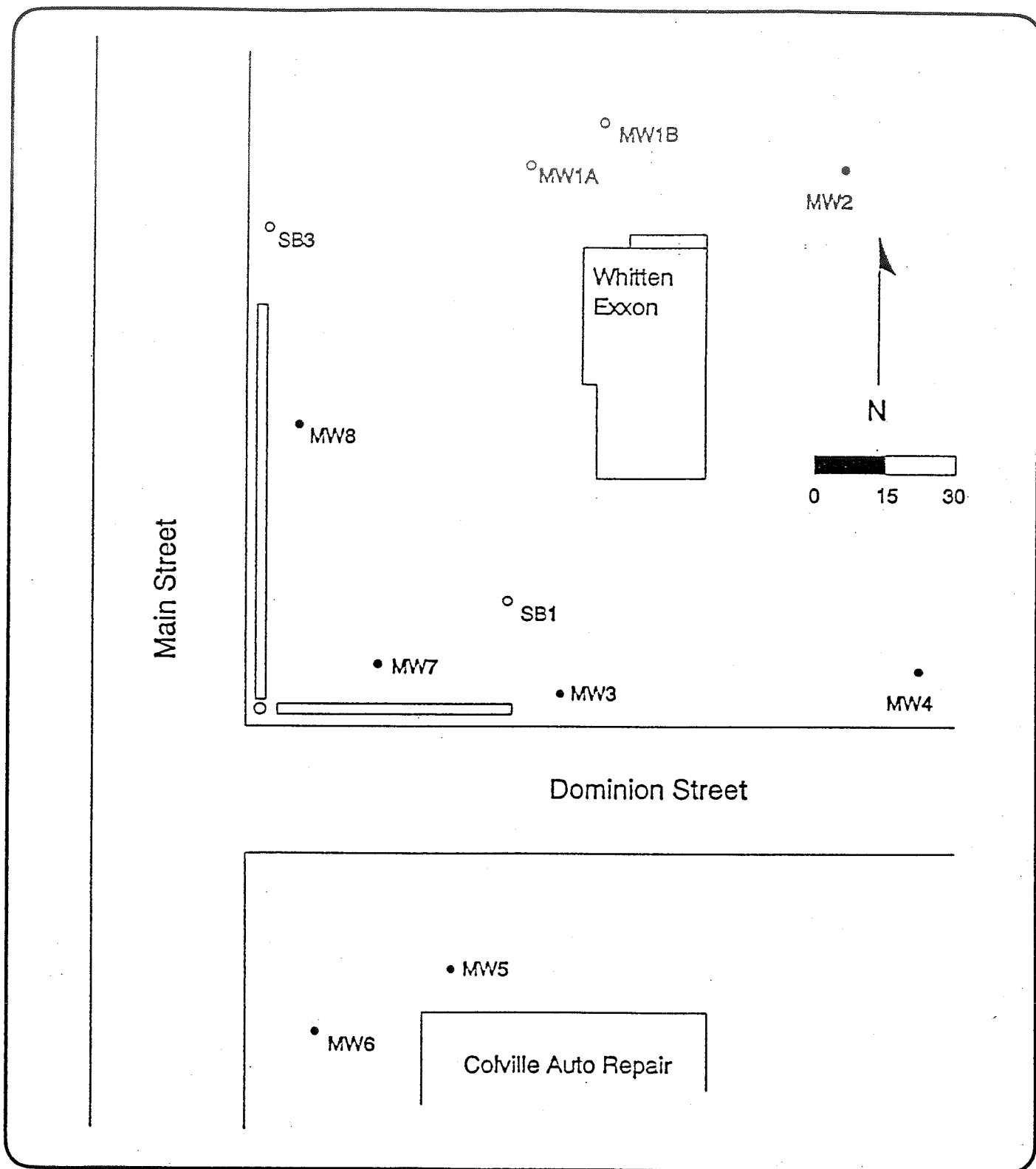


Figure 2

SAMPLING LOCATIONS AT WHITTEN EXXON

4.0 RESULTS AND DISCUSSION

4.1 FIELD MEASUREMENTS

Water level measurements were obtained upon arriving at the site and are listed in Table 1. The water level measurements indicated that ground water was present at a maximum depth of 7 feet below land surface at the site. Water level measurements indicated that the water table has a similar configuration to that observed in March, 1991, with ground water flow to the west and southwest at the site.

All wells were purged prior to sampling. Less than three well volumes were purged from MW4 and MW8 because these wells were bailed dry; they were allowed to recover prior to sampling. Field parameters measured during purging indicated that ground water temperatures ranged from 13.3°C to 20.8°C, and specific conductivity ranged from 0.42 to 1.03 $\mu\text{mhos/cm}$. The wells yielded cloudy to clear water, with the turbidity present due to fine-grained materials resuspended from the silt trap in the wells during purging. An odor was noted during purging of MW6 that was probably due to woody debris present in fill materials at that location. Organic debris was documented at MW6 during the installation of the monitoring well in March, 1991.

Gasoline odors were detected at MW7 and MW8, and a sheen was observed on water purged from MW8. In addition, up to 210 ppm total organic vapors were detected with a photoionization detector at MW8 when the cap was removed from the well.

4.2 ANALYTICAL RESULTS AND DISCUSSION

Laboratory QA/QC samples include surrogate spiked samples, matrix spike/matrix spike duplicated (MS/MSD) method blanks and trip blanks. All laboratory QA/QC results were within limits for acceptable quality. All data can be used without qualifiers. Sample holding times were within method guidelines; no holding time violations occurred. All laboratory QA/QC samples were within control limits for the individual methods and compounds. No compounds were detected in trip blanks or in field blanks.

Table 1		
WATER TABLE ELEVATIONS AT THE WHITTEN OIL EXXON SITE		
(Elevations in feet above MSL)		
	3/91	10/91
MW2	1582.00	1579.63
MW3	1579.72	1578.80
MW4	1578.50	1578.13
MW5	1578.25	1578.44
MW6	1578.32	1577.64
MW7	1579.92	1578.84
MW8	1579.94	1578.51

Analytical results for the field sampling conducted in October, 1991 are shown in Table 2. In this table, comparisons are made to the results of ground water sampling conducted in March, 1991 for the same wells and surface water sampling location. Petroleum contamination was observed in ground water in wells MW3, MW7, and MW8 with highest concentrations in MW8. This repeats the pattern observed in the March, 1991 round of sampling. Contaminant concentrations in MW3 and MW8 have decreased significantly since the March sampling event. Concentrations of benzene, ethylbenzene, xylenes and TPH have increased in MW7, while toluene has shown a slight decrease in concentration.

The facility repaired a leak in the gasoline distribution lines in the summer of 1991, and it is believed that the overall decrease in concentrations in MW3 and MW8 may be due to the removal of a continuous source of gasoline to these wells. The increase in contaminant concentrations in MW7 may reflect the migration of contaminants from the pump island and MW8 downgradient and toward the vapor extraction system, which is still in use at the site.

Surface water contamination was not detected during this sampling event. Since October may be considered is low flow period for streams and based on the seasonally dry weather, this result is not surprising. It suggests that surface water contamination is a result of seasonal high water table conditions where the contaminants in the ground water may rise to the storm sewer and be carried into the stream. (See SAIC, 1991, for more detail on this phenomenon.)

Table 2

ANALYTICAL RESULTS FROM WHITTEN OIL EXXON
GROUND WATER SAMPLES

SAMPLE LOCATION	BENZENE $\mu\text{g/L}$		TOLUENE $\mu\text{g/L}$		ETHYLBENZENE $\mu\text{g/L}$		TOTAL XYLENES $\mu\text{g/L}$		TPH, VOLATILE $\mu\text{g/L}$	
	3/91	10/91	3/91	10/91	3/91	10/91	3/91	10/91	3/91	10/91
MW2	0.3U	5U	0.3U	5U	0.3U	5U	0.6U	5U	1000U	1000U
MW3	410	340	120	25U	150	97	790	350	2900	1000U
MW4	0.3U	5U	0.3U	5U	0.3U	5U	0.6U	5U	1000U	1000U
MW5*	0.3U	5U	0.3U	5U	0.3U	5U	0.6U	5U	1000U	1000U
MW6	0.3U	5U	0.3U	5U	0.3U	5U	0.6U	5U	1000U	1000U
MW7	610	2,400	1,100	980	630	1,400	3,500	7,300	6,400	6,000
MW8	20,000	11,000	37,000	26,000	3,500	2,100	16,000	14,000	34,000	12,000
SW2	130	5U	660	5U	150	5U	1,000	5U	2000	1000U

NOTES:

* A duplicate sample was taken on October 3, 1991 for this well. Sample results showed no detectable concentrations of contaminants.