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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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July 26, 1999

Alaska Department of Environmental Conservation
Contaminated Sites Remediation Program
555 Cordova Street
Anchorage, Alaska 99501

Attn: Mr. Richard Sundet

RE: PCE GROUNDWATER CHARACTERIZATION AND REQUEST FOR NFA, FAIRVIEW MANOR MAINTENANCE SHOP, FAIRBANKS, ALASKA

This letter presents the results of additional groundwater sampling to characterize the extent of the tetrachloroethene (PCE) plume from the Fairview Manor Apartments maintenance shop. This work supplements the off-site groundwater samples collected from Geoprobe® well points on May 27 and 28, 1999, and previous sampling events performed on the Fairview Manor Apartments property. Ms. Renee Evans of the ADEC verbally approved the proposed locations of the temporary well points on June 25, 1999.

Six downgradient and one upgradient well points were sampled in May 1999. These included three well points installed in the Gilmore Street right-of-way, two well points in the Kellum Street right-of-way, and two well points on the Fairview Manor Apartments property. PCE and trichloroethene (TCE) were detected in two of the well points on Gilmore Street. For this characterization, five well points were sampled farther downgradient along Lathrop Street and two sampled adjacent to Kellum Street, west-southwest of the maintenance shop. The locations and depths of the groundwater samples collected for the PCE characterization are shown on Figure 1.

Field Work

Temporary well points were installed on June 28 and 29, 1999, under the supervision of Mr. Sheldon Shaw, an engineer with our firm. The monitoring points, designated MP-18 through MP-24, were driven using the Geoprobe® system. The well points were purged and sampled using a peristaltic pump. Field measurements of temperature and dissolved oxygen were measured in several of the well points prior to collecting the sample. Groundwater samples were collected at 20 feet below the ground surface from each of the well points; additional samples were collected at 40 feet from MP-21 and MP-23, and a sample was collected at 50 feet from

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well point MP-22. The purge water was collected into a 55-gallon steel drum and three 5-gallon plastic buckets. The purge water will be treated and disposed at an off-site facility.

On June 30 and July 1, 1999, groundwater samples were collected from the four monitoring wells (MW-1, MW-3, MW-4, and MW-5) adjacent to the maintenance shop. The samples were collected, stored, and transported in accordance with our Quality Assurance Program Plan, which is on file with the ADEC.

The samples were submitted to CT&E Environmental Services, Inc. (CTE) for analysis of volatile organic compounds by United States Environmental Protection Agency (EPA) Method 8260. Quality control consisted of collecting a blind field duplicate sample from well point MP-22, and the laboratory's standard operation procedures.

In addition, water samples from well points MP-22, MP-22, and monitoring wells MW-1 and MW-3 were submitted to Northern Testing Laboratories for analysis of nitrate and sulfate by EPA method 300.0.

Results

Results of the groundwater samples from the monitoring points installed in November 1998, May 1999, and June 1999 are presented in Table 1. Table 2 presents the results of the groundwater samples collected between 1992 and 1999 from the on-site monitoring wells. The analytical laboratory report for the June sampling event is attached. Figures 2 and 3 show the results for PCE and TCE respectively, and figure 4 shows the results of *cis*-1,2-dichloroethane (cDCE) and *trans*-1,2-dichloroethane (tDCE). Other compounds detected in the monitoring points include trichlorofluoromethane and dichlorodifluoromethane. Both of these are Freon type chemicals not likely related to the PCE source.

Results of the analytical test indicate that PCE does not extend to Lathrop Street, approximately 1,000 feet northwest of the maintenance shop; none of the samples from the well points on or near Lathrop Street reported PCE above the practical quantitation limits (PQL). PCE was detected west-southwest of the maintenance shop in well points MP-18 and MP-19 at 4.31 µg/L and 1.61 µg/L, respectively. Results of this round of testing and previous samples indicate that PCE does not exceed the groundwater cleanup standard beyond the Fairview Manor Apartments property line.

Results of groundwater samples for off-site locations indicate TCE, cDCE, tDCE, dichlorodifluoromethane, and trichlorofluoromethane were detected in some of the well point sampling locations. The highest reported concentration for TCE is 19.5 µg/L in monitoring point MP-11 collected at a depth of 40 feet. TCE was also present in monitoring points MP-12, MP-14, and MP-18 at concentrations above the 5.0 µg/L cleanup standard. TCE was detected in concentrations not exceeding the cleanup standard in monitoring points installed along Lathrop Street. Results of groundwater samples collected in November 1998 and June 1999 from the on-site monitoring wells did not report TCE above the PQL.

MP-11 is the only sample location where PCE, TCE, cDCE, and tDEC are present exceeding the PQL and the only location where tDCE is present. cDCE was reported in seven monitoring points above the PQL ranging from 1.16 µg/L to 5.78 µg/L. The water quality cleanup standards for cDCE or tDCE have not been exceeded. cDCE or tDCE may represent breakdown products of TCE.

Water samples collected from monitoring wells MW-1 and MW-3 and well point MP-22 (20-foot and 50-foot samples) were submitted to Northern Testing Laboratories for analysis of nitrate and sulfate by EPA Method 300.0. Nitrate was not reported above the laboratory method reporting limit (MRL) of 0.03 mg/l in monitoring well MW-3 and both well point samples. Nitrate was detected at 0.32 mg/l in monitoring well MW-1. Sulfate was detected in each of the water samples, ranging in concentration from 31.3 mg/l in sample MP2220 to 49.1 mg/l in monitoring well MW-1. Field measurements of dissolved oxygen and temperature were collected in select wells. Results presented below indicate slightly-aerobic to aerobic conditions at the sample locations.

Sample Location	MW-1	MW-3	MW-4	MW-5	MP-22	MP-22	MP-23	MP-23	MP-24
Sample Depth (feet)	15	45	45	15	20	50	20	40	20
Nitrate-N (mg/L)	0.32	<0.03			<0.03	<0.03			
Sulfate (mg/L)	49.1	33.2			31.3	36.3			
Dissolved Oxygen (mg/L)	1.86	0.64	0.50	0.58	3.14	0.56	0.77	0.86	1.24
Temperature (C)	3.3	2.4	1.6	1.8	4.0	4.8	4.3	4.3	4.1

Quality Assurance/Quality Control

Quality Assurance (QA) for this project was present in the form of proper decontamination procedures, collection of a field duplicate sample, submitting a trip blank, and the laboratory's in-house QA program. Field duplicate samples were collected from monitoring well MW-1 and well point MP-22. PCE was the only analyte above the PQL in monitoring well MW-1, and trichlorofluoromethane was the only analyte above the PQL in well point MP-22. The relative percent difference (RPD) calculated for these sample pairs met our quality control objectives. The data reported by CTE are in conformance with their QAPP. None of the surrogates exceeded the established control limits.

Discussion

Source area characteristics indicate PCE released near/at the maintenance shop at the Fairview Manor apartments. The time or volume of the release is not known, but may represent very small quantities over a long period of time. Soils data indicate PCE as the only contaminant. Groundwater data collected from on-site monitoring wells from 1992 through 1998 indicate PCE as the main constituent on the property, with 1.0 to 3.0 µg/L TCE detected only in the deeper samples (41 feet) in monitoring well MW-4. Groundwater data from on-site monitoring wells indicate stable or decreasing PCE concentrations, and none of the groundwater data indicate that PCE has exceeded the groundwater cleanup standards at or beyond the property line. Results of this assessment have determined that the limits of PCE extend no further than Lathrop Street, approximately 1,000 feet downgradient from the maintenance shop.

TCE at concentrations exceeding the cleanup standard is evident from the groundwater data collected to assess the PCE plume. PCE and TCE were both detected in well points MP-18 and MP-19. The nature of contaminants south of well points MP-18 and MP-19 has not been characterized. Based on the northwesterly regional groundwater flow, it is our opinion that the PCE and TCE observed at these locations are from source(s) other than the Fairview Manor maintenance shop.

In our opinion, the TCE is from a source or sources other than the Fairview Manor apartments and may not be from degradation of PCE. Biological transformation from PCE to TCE occurs under anaerobic conditions and can occur under sulfate or nitrate reduced conditions; however, there is little evidence indicating that degradation of PCE to TCE occurs under aerobic conditions. Carbon, either from natural sources or anthropogenic sources, is required to serve as electron donors for bacterial growth allowing for anaerobic cometabolism. Site conditions are not conducive for PCE transformation to TCE by reductive dechlorination. Data collected at

Fairview Manor, and our experience conducting geotechnical and environmental assessments in Fairbanks, indicate that soils within the saturated zone consist of gravelly sands low in organic matter. Only on rare occurrences have organic matter (woody debris) in subsurface soils in Fairbanks been encountered. Anthropogenic sources of carbon (i.e., gasoline or diesel fuel spills) are not apparent in any of the well points sampled. Nitrate, sulfate and dissolved oxygen data collected for this assessment also indicate that conditions are not suitable for biotransformation of PCE. Potential sources of TCE have not been evaluated, but could include the sanitary sewer lines (as indicated in the Gaffney Road Area assessment), residential (shop) practices, commercial facilities, or historical releases.

Recommendations

The data collected to assess the nature of the PCE plume from the Fairview Manor Apartments maintenance shop indicate the plume is stable or decreasing and the groundwater cleanup standards have not been exceeded at the property line. The downgradient limits of contamination do not extend beyond Lathrop Street, approximately 1,000 feet from the maintenance shop. None of the data collected indicate PCE or TCE exceed ten times the drinking water cleanup standard. This area has been shown not to be a present source of drinking water wells, and is likely not to be a future source.

We request ADEC approve an alternate point of compliance at the property line of the Fairview Manor Apartments and recommend a No Further Action or NFRAP for the Fairview Manor Apartments.

Limitations

This report presents our conclusions based on a limited number of groundwater samples. The data presented in this report should be considered representative of the time of our observations and sample collection. Changes in the observed site conditions can occur with the passage of time. It is possible that our subsurface tests do not represent the highest levels of contamination and should not be construed as a comprehensive study of environmental conditions at the site. The samples were intended to characterize the PCE contaminated groundwater at the locations selected.

SHANNON & WILSON, INC.

If you have any questions please do not hesitate to call.

Sincerely,

SHANNON & WILSON, INC.

Mark S. Lockwood
Senior Geologist

David M. McDowell
Senior Associate

Enclosures:

	Table 1	Fairview Manor Monitoring Point Results
	Table 2	Fairview Manor Monitoring Well Results
	Figure 1	Well Point Locations and Sample Depths
	Figure 2	Tetrachloroethene Concentrations
	Figure 3	Trichloroethene Concentrations
	Figure 4	*cis*- and *trans*- 1,2-Dichloroethene Concentrations
	Analytical Laboratory Reports	

cc: Ms. Renee Evans
Mr. Thomas Hayward

TABLE 1
FAIRVIEW MANOR MONITORING POINT RESULTS
micrograms per liter (ug/L)

Monitoring Point	MP-7		MP-8			MP-9	MP-10	MP-11		MP-12	MP-13	MP-14		MP-15
Date	Nov-98		Nov-98			May-99	May-99	May-99		May-99	May-99	May-99		May-99
Sample Depth (feet)	14.5	40	14.5	14.5	40	14	14	14	40	14	14.5	14.5	14.5	14
Sample #	481-1113-MP7A	481-1113-MP7B	481-1113-MP8A	481-1113-MP20	481-1113-MP8B	481-052799-MP9	481-052799-MP10	481-052799-MP11	481-052899-MP11(2)	418-052799-MP12	481-052799-MP13	481-052799-MP14	481-052799-MP17	481-052799-MP15
Tetrachloroethene	5.69	1.42	<1.0	<1.0	<1.0	<1.0	<1.0	1.57	2.48	1.54	<1.0	2.79	2.20	4.21
Trichloroethene	3.71	1.36	<1.0	<1.0	<1.0	<1.0	<1.0	12.5	19.5	8.30	<1.0	9.66	7.58	3.31
trans 1,2-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.36	6.89	<1.0	<1.0	<1.0	<1.0	<1
cis 1.2-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.80	2.80	4.64	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane	<1.0	<1.0	1.06	1.00	1.03	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Monitoring Point	MP-18	MP-19	MP-20	MP-21		MP-22			MP-23		MP-24
Date	Jun-99	Jun-99	Jun-99	Jun-99		Jun-99			Jun-99		Jun-99
Sample Depth (feet)	20	20	20	20	40	20	20	50	20	40	20
Sample #	481-062899-MP1820	481-062899-MP1920	481-062899-MP2020	481-062899-MP2120	481-062899-MP2140	481-062999-MP2220	481-062999-MP2221	481-062999-MP2250	481-062999-MP2320	481-062999-MP2340	481-062999-MP2420
Tetrachloroethene	4.31	1.61	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	17.3	3.63	<1.0	<1.0	<1.0	<1.0	<1.0	3.04	<1.0	2.14	2.47
trans 1,2-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis 1.2-Dichloroethene	5.78	1.16	<1.0	<1.0	<1.0	<1.0	<1.0	1.55	1.36	2.80	1.95
Dichlorodifluoromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	<1.0	<1.0	1.92	4.63	<1.0	2.61	2.85	<1.0	6.19	<1.0	3.72

Note: <1.0 = Less than given detection limit

TABLE 2
FAIRVIEW MANOR MONITORING WELL RESULTS
micrograms per liter (ug/L)

Monitoring Well	Well Screen Interval	Analyte	Date Sampled										
			7/23/92	7/28/93	11/4/93	9/29/94	1/5/95	4/10/95	7/27/95	11/1/96	3/4/97	11-13-99 11-23-99	6-30-99 7-1-99
MW-1	10-20'												
		Tetrachloroethene	16	55/53	62	30	10	13	19/22	20.9/20.1	14.7/15.6	22.2	24.9/25.0
		Trichloroethene										<1.0	<1.0/<1.0
		Dichlorodifluoromethane	-	-	-	<1	<1	<1	1/1	-	-	<1.0	<1.0/<1.0
		Dibromochloromethane									1.63/<1	<1.0	<1.0/<1.0
MW-3	40-50'												
		Tetrachloroethene		4	NC	3	3	2	<1	1.9	1.67	NC	<1.0
		Trichloroethene		2		1	<5	<5	<1	<1	<1		<1.0
		Dichlorodifluoromethane		-		<1	2	2	3	-	-		<1.0
MW-4	40-50'												
		Tetrachloroethene		4	NC	2/2	2	3	2	1.53	1.27	NC	<1.0
		Trichloroethene		3		2/2	<5	<5	1	0.948J	0.916J		<1.0
		Dichloromethane		-		8/6	<1	<1	<1	<10	<10		<1.0
		Dichlorodifluoromethane		-		<1	<1	1	2	-	-		<1.0
MW-5	10-20'												
		Tetrachloroethene		11	12	6	3/3	<5	3	5.58	3.84	5.97	3.04
		Trichloroethene		<1	<1	1	<5/<5	<5/<5	<1	<1	<1	<1.0	<1.0
		Dichlorodifluoromethane		-	-	<1	1/1	1/1	2	-	-	<1.0	<1.0
MW-6	10-20'												
		Tetrachloroethene		<0.1	NC	<1	NC	<1	<1	<1	<1	NC	NC
		Dichlorodifluoromethane		-		<1		2	3	-	-		
		Naphthalene		-		-		1	<1	-	-		

Note: 19/22 = Results reported for sample and field duplicate sample, respectively
NC = Not collected.
- = Sample not analyzed for this parameter
<1 = Less than given detection limit
MW-3, MW-4, MW-5 and MW-6 installed in July 1993
J = Indicates an estimated value that falls below PQL, but is greater than the MDL

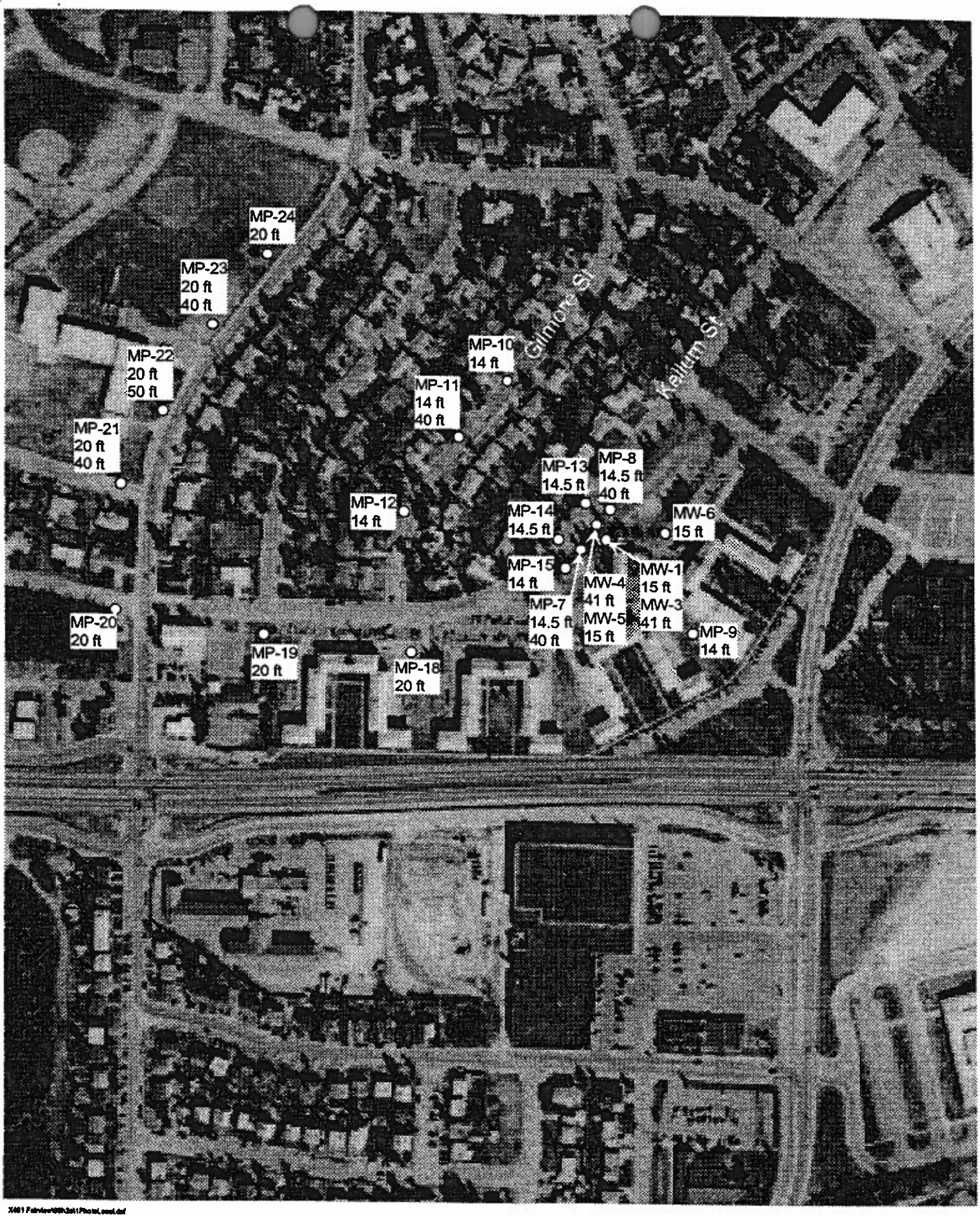
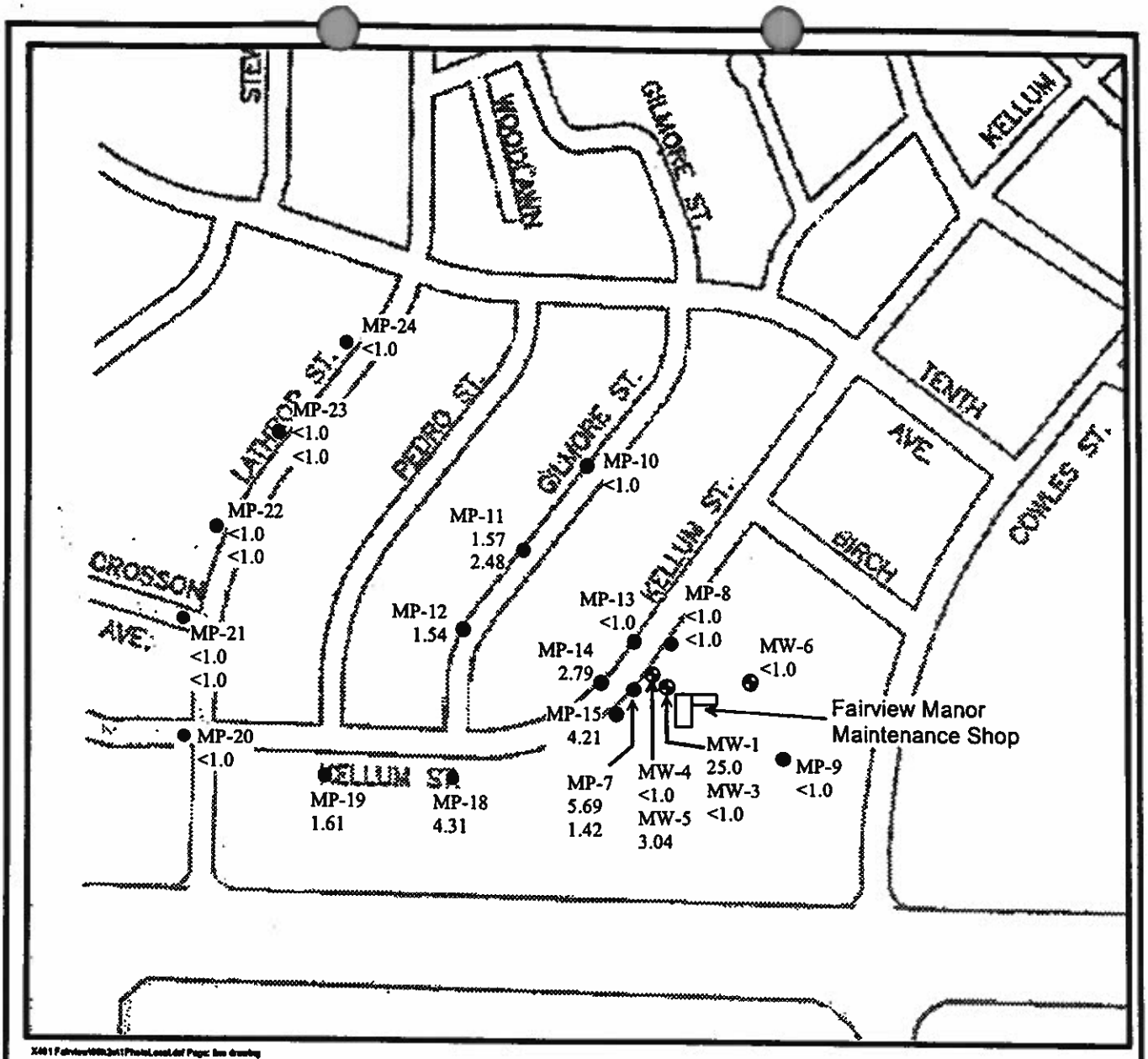


Figure 1. Well Point Locations and Sample Depths
Fairview Manor Maintanence Shop
Scale: 1 inch = 300 feet X-0481-007



LEGEND:
- ● - Well Point Location
- ⊗ - Monitoring Well Location

APPROXIMATE SCALE: 1 inch = 300 feet

0 300 600 900
(feet)

N

Fairview Manor Maintenance Shop
Fairbanks, Alaska

TETRACHLOROETHENE (PCE) CONCENTRATIONS (µg/L)

July 1999 X-0481-007

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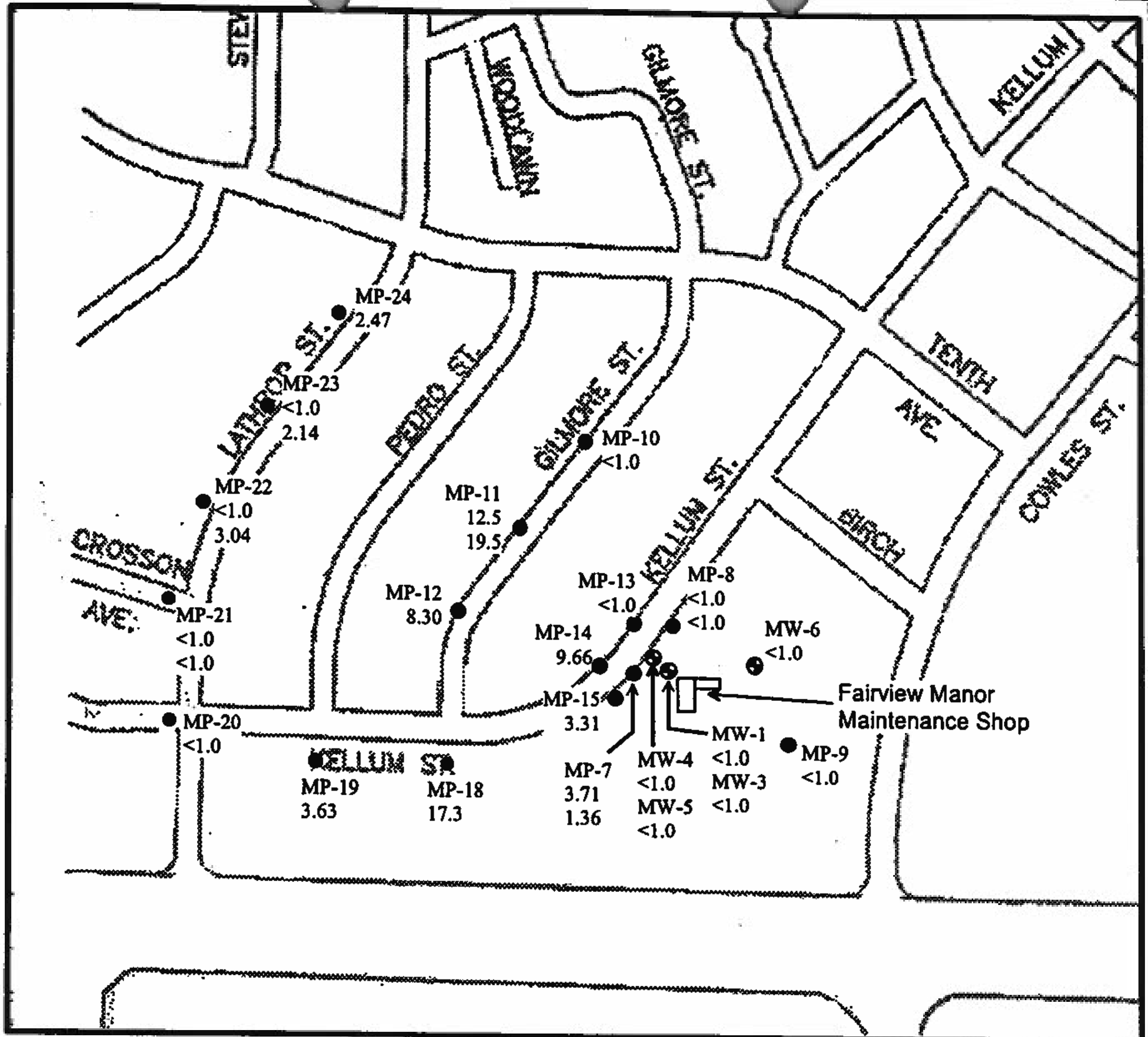
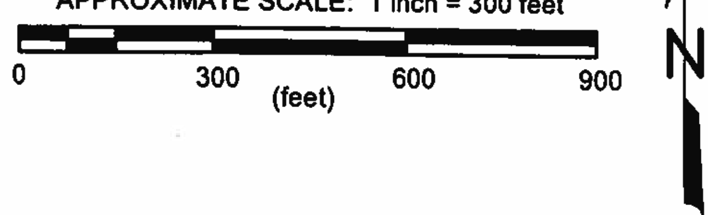
Figure 2



LEGEND:

- ● - Well Point Location
- ⊕ - Monitoring Well Location

APPROXIMATE SCALE: 1 inch = 300 feet



Fairview Manor Maintenance Shop
Fairbanks, Alaska

TRICHLOROETHENE (TCE)
CONCENTRATIONS (μg/L)

July 1999 | X-0481-007

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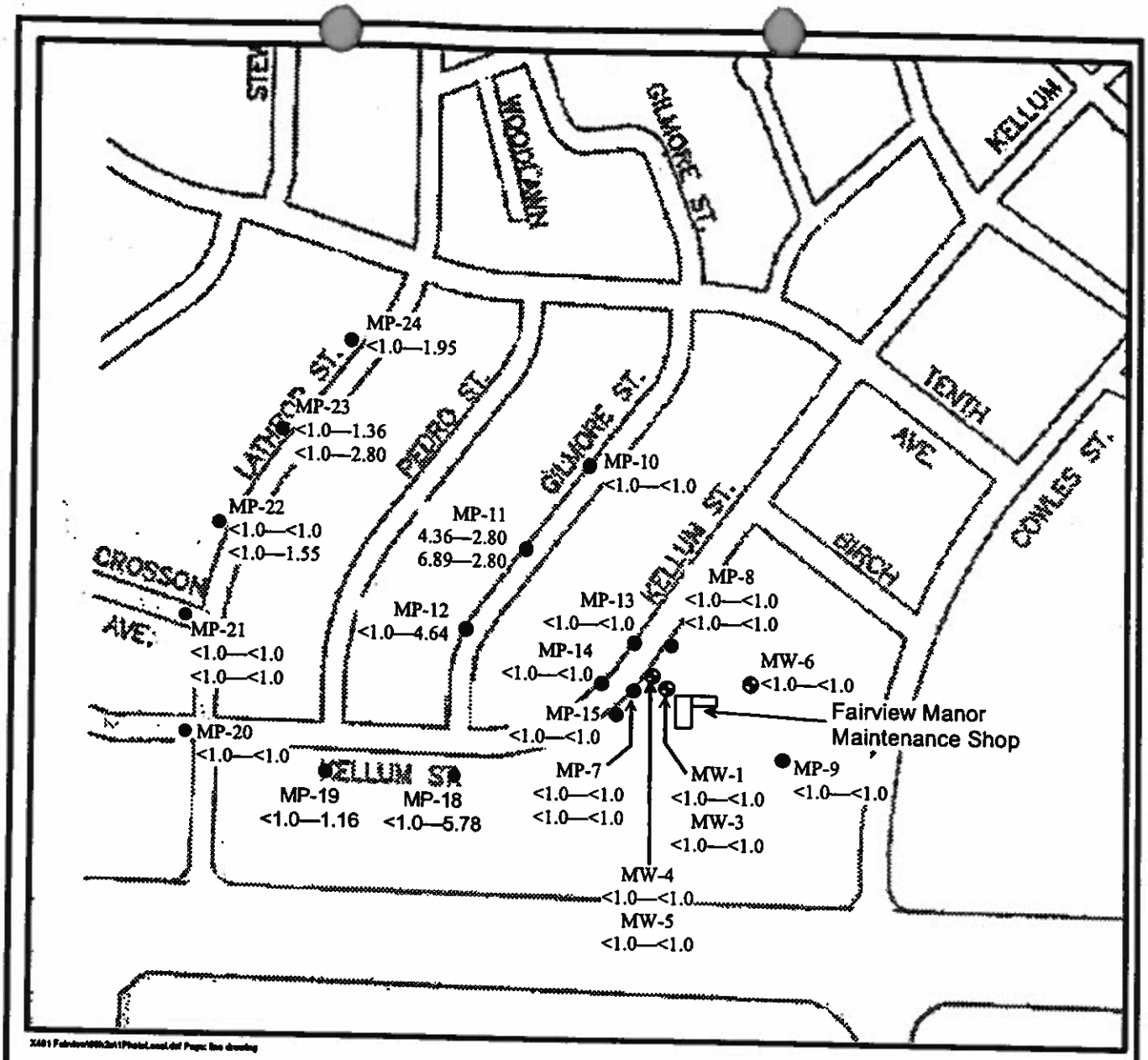
Figure 3



LEGEND:

- ● - Well Point Location
- ⊕ - Monitoring Well Location

<1.0—1.55 : t DCE—c DCE

APPROXIMATE SCALE: 1 inch = 300 feet

0 300 600 900
(feet)

N

Fairview Manor Maintenance Shop
Fairbanks, Alaska

trans 1,2-Dichloroethene (t DCE)
cis 1,2-Dichloroethene (c DCE)

July 1999 **Concentrations (µg/L)** X-0481-007

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Figure 4