

**ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS**

**TABLE 2
BASE-NEUTRAL FRACTION**

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 87-9

DATE SAMPLED: 01/21/87 TIME: 3:30 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 013087

SAMPLE NO. 70830

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
ACENAPHTHENE	*	0.002	3,3'-DICHLOROBENZIDINE	*	0.020
ACENAPHTHYLENE	*	0.001	DIETHYL PHTHALATE	*	0.002
ANTHRACENE	*	0.001	DIMETHYL PHTHALATE	*	0.002
BENZIDINE	*	0.050	2,4-DINITROTOLUENE	*	0.010
BENZO (A) ANTHRACENE	*	0.005	2,6-DINITROTOLUENE	*	0.009
BENZO (K) FLUORANTHENE	*	0.005	DI-N-OCTYLPHTHALATE	*	0.002
BENZO (A) PYRENE	*	0.005	1,2-DIPHENYLHYDRAZINE	*	0.001
BENZO (G,H,I) PERYLENE	*	0.010	FLUORANTHENE	*	0.001
BIS-(2-CHLOROETHYL) ETHER	*	0.004	FLUORENE	*	0.002
BIS(2-CHLOROETHOXY) METHANE	*	0.004	HEXACHLOROBENZENE	*	0.005
BIS(2-CHLOROISOPROPYL) - ETHER	*	0.001	HEXACHLOROBUTADIENE	*	0.005
BIS-(2-ETHYL HEXYL) - PHTHALATE	*	0.002	HEXACHLOROETHANE	*	0.007
4-BROMOPHENYL PHENYL ETHER	*	0.007	HEXACHLOROCYCLOPENTADIENE	*	0.005
BUTYL BENZYL PHTHALATE	*	0.003	INDENO (1,2,3-CD) PYRENE	*	0.010
2-CHLORONAPHTHALENE	*	0.002	ISOPHORONE	*	0.002
4-CHLOROPHENYL PHENYL ETHER	*	0.003	NAPHTHALENE	*	0.001
CHRYSENE	*	0.005	NITROBENZENE	*	0.004
DIBENZO (A,H) ANTHRACENE	*	0.010	N-NITROSODI-N-PROPYLAMINE	*	0.004
DI-N-BUTYL PHTHALATE	*	0.001	N-NITROSODIPHENYLAMINE	*	0.003
1,2-DICHLOROBENZENE	*	0.003	PHENANTHRENE	*	0.001
1,3-DICHLOROBENZENE	*	0.003	PYRENE	*	0.001
1,4-DICHLOROBENZENE	*	0.003	1,2,4-TRICHLOROBENZENE	*	0.003

*COMPOUND NOT PRESENT AT DETECTION LIMIT

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 3
ACID FRACTION

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 85-7

DATE SAMPLED: 01/21/87 TIME: 6:00 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 013087

SAMPLE NO. 70821

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
4-CHLORO-3-METHYLPHENOL	*	0.004	2-NITROPHENOL	*	0.005
2-CHLOROPHENOL	*	0.002	4-NITROPHENOL	*	0.015
2,4-DICHLOROPHENOL	*	0.003	PENTACHLOROPHENOL	*	0.020
2,4-DIMETHYLPHENOL	*	0.003	PHENOL	*	0.002
2,4-DINITROPHENOL	*	0.050	2,4,6-TRICHLOROPHENOL	*	0.005
2-METHYL-4,6-DINITROPHENOL	*	0.020			

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 3
ACID FRACTION

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 86-3

DATE SAMPLED: 01/21/87 TIME: 4:40 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 013087

SAMPLE NO. 70824

COMPOUND	RESULT	D.L.	COMPOUND	RESULT	D.L.
	(mg/l)			(mg/l)	
4-CHLORO-3-METHYLPHENOL	*	0.004	2-NITROPHENOL	*	0.005
2-CHLOROPHENOL	*	0.002	4-NITROPHENOL	*	0.015
2,4-DICHLOROPHENOL	*	0.003	PENTACHLOROPHENOL	*	0.020
2,4-DIMETHYLPHENOL	*	0.003	PHENOL	*	0.002
2,4-DINITROPHENOL	*	0.050	2,4,6-TRICHLOROPHENOL	*	0.005
2-METHYL-4,6-DINITROPHENOL	*	0.020			

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 3
ACID FRACTION

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 87-9

DATE SAMPLED: 01/21/87 TIME: 3:30 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 013087

SAMPLE NO. 70830

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
4-CHLORO-3-METHYLPHENOL	*	0.004	2-NITROPHENOL	*	0.005
2-CHLOROPHENOL	*	0.002	4-NITROPHENOL	*	0.015
2,4-DICHLOROPHENOL	*	0.003	PENTACHLOROPHENOL	*	0.020
2,4-DIMETHYLPHENOL	*	0.003	PHENOL	*	0.002
2,4-DINITROPHENOL	*	0.050	2,4,6-TRICHLOROPHENOL	*	0.005
2-METHYL-4,6-DINITROPHENOL	*	0.020			

*COMPOUND NOT PRESENT AT DETECTION LIMIT



**ANALYTICAL SERVICES
EDI LABORATORY REPORT**

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
LOCATION: GRAND RAPIDS, MI
SAMPLED BY: ELC
DESCRIPTION: PHASE III, HYDROGEO

DATE SAMPLED: 00/00/00 TIME: ...
DATE RECEIVED: 01/30/87 TIME: 5:00 PM
DATE COMPLETED: 020487
SCHEDULED COMPLETION: 02/20/87
ANALYST: JB,NJB,TL,BJM,BH
QUALITY CONTROL REVIEW BY: DEK
WORKSHEET NO: 9

	85-7	86-2	86-3	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	70821	70823	70824		
GREASE&OIL/FREON-EXT	1.2	<1.0	1.7	1.0	mg/l
IRON,TOTAL	44	12	2.8	0.01	mg/l
HARDNESS (as CaCO3)	350	350	360	2.0	mg/l
pH VALUE	7.68	7.89	7.82	----	std. units
DATE SAMPLED:	1/21/87	1/23/87	1/21/87		
TIME SAMPLED:	6:00 PM	3:15 PM	4:40 PM		

****SAMPLES COLLECTED JAN. 23 WERE UNREFRIDGERATED OVER THE WEEKEND.**



**ANALYTICAL SERVICES
EDI LABORATORY REPORT**

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
LOCATION: GRAND RAPIDS, MI
SAMPLED BY: ELC
DESCRIPTION: PHASE III, HYDROGEO

DATE SAMPLED: 01/21/87 TIME:
DATE RECEIVED: 01/30/87 TIME: 5:00 PM
DATE COMPLETED: 020487
SCHEDULED COMPLETION: 02/20/87
ANALYST: NJB,JB,TL,BJM,BH
QUALITY CONTROL REVIEW BY: DEK
WORKSHEET NO: 15

	87-8	87-9	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	70829	70830		
GREASE&OIL/FREON-EXT	<1.0	1.9	1.0	mg/l
IRON, TOTAL	150	0.50	0.01	mg/l
HARDNESS (as CaCO3)	410	360	2.0	mg/l
pH VALUE	7.82	7.94	---	std. units
DATE SAMPLED:	1/21/87	1/21/87		
TIME SAMPLED:	2:15 PM	3:30 PM		

ANALYSIS BY STANDARD METHODS 16TH EDITION AND/OR METHODS FOR
CHEMICAL ANALYSIS OF WATER AND WASTES, USEPA, 1983.



results of . . .

Phase IV-A Soil Vapor Pilot Study

for . . .



General Motors Corporation
CPC Group
Grand Rapids, Michigan

August, 1988

20763

EDI Engineering & Science
Environmental Engineering, Geology, Biology and Chemistry
Grand Rapids, MI (616) 942-0970



INTRODUCTION

The Phase III-A Hydrogeological Investigation (March 1987) of the soils around column T-27 indicated TCE contamination of the soils over an area 200 feet in diameter. The deeper soils were more contaminated than near the surface. Because of the location of these soils beneath the plant floor near the center of the building, soil removal would be prohibitatively expensive. An alternative method to remove the TCE in the soils was sought as part of an overall plan to reduce the TCE source. Soil vapor venting offers an excellent potential for removing TCE from the approximately 20 feet of soils between the water table and the plant floor. The twelve inch thick concrete floor capped with two inch wood block was expected to force the soil vapors to be drawn horizontally from outside the contaminated zone to a centrally located vapor recovery well. Because basic data for the design of a system was not available, the Phase IV-A study was constructed as a pilot program.

THEORY

The TCE in the soils beneath the floor of the plant exists in three phases; residual liquids, molecules adsorbed onto soil particles, and as a gas in the soil vapor. The TCE entered the soil in the liquid form and trickled through the soils. The major movement of TCE in the soil was this liquid flow downward. The liquid will not disperse horizontally to any great extent, however multiple entry points through the floor may have created a wider zone of residual liquids in the soils. The residual liquids are the remnants of that downward flow held between the soil particles by surface tension. Any soil particle with which the liquid came in contact also adsorbed TCE. As a percentage, the TCE adsorbed on the soil particles is very small compared to the residual liquids.

Once the TCE is in the soil, another mechanism for movement of TCE is vaporization of the residual liquid and movement by molecular diffusion through the soil pore space. Compared with the rate of mass movement from the downward flow, molecular diffusion is very slow. (Over the time since the liquid has been in the soils molecular diffusion has moved TCE over 200 feet horizontally.) As the TCE in the soil vapor diffuses through the soil pore space, it encounters soil particles which have not been contaminated. The TCE molecules are adsorbed onto these soil particles due to molecular forces.

The equilibrium between the TCE adsorbed on the soil and in the pore space is not well known. However, the ratio is likely to be on the order of ten molecules on the soil for each molecule in

the soil vapor. Thus, the amount of TCE in a given volume of soil is predominantly adsorbed on the soil. The adsorption process is at least partially reversible, or possibly completely reversible.

When air is pulled through the soils to the soil vapor well, the equilibrium between the soil and vapor in the pore space is affected. Cleaner air is pulled into contact with the TCE adsorbed onto the soils. Some or all of the adsorbed TCE will revolatilize into the soil vapor. In the areas where TCE is present in vapor and adsorbed phases only (no residual liquids) the concentration in the soil should fall off relatively fast with continued flow of air through the soils. In addition, concentrations in the soil's pore space should not increase to prior levels when the soil vapor is left stationary for a period of time.

Air pulled through the areas containing residual liquids also changes the equilibrium between the residual liquid and vapor in the pore space, driving TCE into the vapor. The kinetics of the vaporization/diffusion process also influence the equilibrium, lowering the concentration. In these areas, the TCE concentration in the soil vapor should stabilize at a plateau because of a constant driving force from pure liquid to the vapor phase in the flowing air. When the soils are left undisturbed for a period of time, the concentration of TCE in the soil vapor should increase toward saturation of the vapor phase.

Note that when vapor samples are taken from the soil, what is actually being sampled is the soil's pore space. Therefore, a soil vapor sample in and of itself will not distinguish between residual TCE liquids or TCE molecules adsorbed on the soil particles.

3-DAY TESTS

PURPOSE

The purpose of the enhanced volatilization pilot test was to develop the necessary data to design a full scale system. The questions that were addressed in this pilot test were:

- | How many air in-take wells are needed and their location.
- | Optimum air flow rate.
- | How the concentration of trichloroethylene (TCE) in the soils varied with air flow rate.
- | What was the origin of the air flow through the soils.
- | What effect will cycling the vacuum system (on and off) have on the concentration of TCE in the soils.

Note that the original scope of work was to evaluate the relative contribution of TCE from ambient plant air. However, because concentrations in the vacuum pump discharge were relatively high, and because TCE is no longer in use at the plant, this evaluation

would be more appropriate when a very low concentration in the vacuum pump discharge is evidenced.

DATA

Eight 1/2-inch probes (P1-P8) were installed at various distances and directions from the soil vapor recovery well as shown in Figure 1. The P1 sample depth is 10 feet below the floor. The other seven probes sample 15 feet below the floor. The soil vapor venting system is illustrated in Figure 2.

These three-day trial (#1, #2 and #3) runs of the system were completed at air flows of 38, 52 and 110 cubic feet per minute, respectively. After review of the data from these runs, an additional 30-day trial run at 110 cfm was completed. This additional trial run is discussed separately below. Table 1 summarizes the pump discharge data from all the trial runs. Table 2 summarizes the data from the 1/2-inch probes, P1-P8.

Appendix A contains the vacuum pressures that were collected at each of the 8 sample points, the recovery well, and the vacuum pump discharge for each of the runs. It also contains all the analytical data that was obtained for the vacuum pump discharge and the sample points. Two summaries begin the Appendix. The first summarizes the pressure and TCE concentration data. The second contains the data necessary to calculate the mass of TCE discharged per hour.

Calculations show that the approximate volume of air in the contaminated zone is 200,000 cubic feet (based on a 200' x 200' x 20' volume and a 25% void space). Run #1 evacuated approximately 157,000 cf of air, or approximately 3/4 of a pore volume. Run #2 evacuated approximately 217,000 cf of air, or approximately 1 pore volume. Run #3 evacuated approximately 448,000 cf or just over 2 pore volumes. Approximately four pore volumes were evacuated during the three week test.

Several graphs illustrate the data that was obtained during the three week pilot study at CPC:

Figure 3: TCE recovery (in lb/hr) vs. Time for run #1

Figure 4: TCE recovery (in lb/hr) vs. Time for run #2

Figure 5: TCE recovery (in lb/hr) vs. Time for run #3

Figure 6: Concentration in the pump discharge vs. cumulative run time

Figure 7: Concentration of TCE vs. Time for sample points 1,2,3 & 4

Figure 8: Concentration of TCE vs. Time for sample points 5,6,7 & 8

TABLE 1

CPC PILOT STUDY:
TCE MASS LOADING DATA

<u>DATE</u>	<u>AIR FLOW</u> <u>(CFM)</u>	<u>TCE</u> <u>CONCENTRATION</u> <u>(MG/M³)</u>
9/8	38	1400
9/9	38	420
9/10	38	800
9/11	38	580
9/15	52	510
9/16	52	530
9/17	52	340
9/18	52	340
9/21	110	300
9/22	110	280
9/23	110	220
9/24	110	130
9/25	110	150
11/3	110	300
11/4	110	320
11/5	110	290
11/6	110	270
11/9	110	320
11/12	110	360
11/16	110	350
11/19	110	340
11/23	110	210
12/1	110	160

TABLE 2

CPC PILOT STUDY:
ANALYTICAL DATA BY SAMPLE POINTTCE (mg/m³)

<i>SAMPLE POINT</i>	<i><u>DATE</u></i>						
	<i>9/8</i>	<i>9/15</i>	<i>9/18</i>	<i>9/21</i>	<i>9/24</i>	<i>11/3</i>	<i>12/1</i>
P1	300	190	340	190	17	140	7
P2	760	440	310	410	110	300	50
P3	1100	580	550	580	220	520	140
P4	360	200	130	180	22	74	9
P5	260	96	17	14	7	27	4.6
P6	800	490	320	280	120	350	53
P7	840	340	190	130	27	260	16
P8	57	120	15	13	5	23	5
AVERAGE	560	307	234	225	66	212	36

OBSERVATIONS/DISCUSSION

The detection of a vacuum condition in a sample point indicates that air is moving from that area to the recovery well (the vacuum indicates a negative pressure gradient). As data in the appendix indicates, the effect of pulling a vacuum on the air recovery well was detected at all the sample points. (Note: even though a reading was not *recorded* for sample points 7 and 8 during the first two runs, there was a *noticeable*, but not measurable, change in the pressure in these sample points.) As expected, when the airflow rate through the vacuum pump was increased, the pressure at each of the sample points decreased, indicating a greater air flow from that region.

It is important to note that for a majority of the test, the wells that were designated air intake wells (87-1, 87-2, 87-3 and 87-5) were *not* open. These wells were opened for the last day of the study to determine what effect they would have on the pressure in the sample points. The opening of these wells *did not* affect the pressure in the sample points, indicating that they were not necessary to supply air to the recovery well. The recovery well is drawing air from outside the contaminated area through the contaminated soils to the well. No additional recovery wells are required.

There was a potential that air was short circuiting the soils and travelling through a space between the plant floor and settled soils. (The plant floor was constructed on pilings. The backfilled soils could have settled, forming a headspace.) However, because negative pressures were evidenced in all the sample points (which were at 10' and 15' below grade) at least a portion of the air was moving through the soils at those levels.

An attempt was made to detect and/or measure the air flow rate into the sample points. A smoke source was placed near the inlet of the sample points to allow the detection of air flow. This test did not indicate air flow into the sample points. This seems consistent with the small pressure differences from ambient recorded in the sample points.

Figure 3 illustrates the recovery rate of TCE (in lb/hr) verses time of operation for Run #1 (38 ACFM). As expected, the first data point on this graph is relatively high due to the fact that the vapor in the pore space has had an indefinite period of time to equilibrate. After approximately 30 hours of operation, the recovery rate had decreased as expected. However, it appears that this second data point is artificially low when compared with the recovery rate determined at 50 hours of operation. If the 30 hour data point is excluded from the graph, a steady, more logical, decrease in the recovery rate is evidenced.

Figures 4 and 5 illustrate the recovery rate of TCE for Run #2 (52 ACFM) and Run #3 (110 ACFM). The data presented in these figures indicates a steady decrease in the recovery rate as expected. It is significant to note that the recovery rate for both air flows follows approximately

the same curve; i.e. the recovery rate for an air flow of 110 ACFM is not significantly higher than at an air flow of 50 ACFM.

Figure 6 illustrates the concentration of TCE in the vacuum pump discharge (and hence the concentration of air drawn from the recovery well) versus cumulative run time. As shown in this graph, there was a steady decline in the concentration during the course of the study. It is significant to note two things from this graph:

- | The concentration did not appear to level out with time, it was still decreasing when the study was terminated.
- | The concentration of TCE in the recovery well did not increase when the system was shut down for a short period between runs. This indicates that from an operating standpoint, it is probably more practical to leave the system operational, than to cycle it on and off. If the system were to be cycled, it would have to be shut down for a period greater than three days.

Figures 7 and 8 illustrate the concentration in the sample points verses sample date. The 9/08 sample was taken at the commencement of the study. The 9/15 and 9/21 samples were taken just prior to the start of Run #2 and Run #3 respectively. After Run #2 and Run #3 were completed, the 9/18 and 9/24 samples were taken respectively.

As Figure 7 illustrates, there was a decrease in concentration of sample points 1-4 during Run #1. This drastic reduction was due to the initial removal of the soil vapor that was saturated with TCE.

The 9/18 sample from P1 appears to be an anomaly. However, because during the "rest period" between runs #2 and #3 the concentration decreased to 200 mg/m³ (where it was at the beginning of run #2, which follows the pattern of the other sample points in its vicinity), it is logical to conclude that this data point is errant.

Figure 7 also illustrates that the concentration in sample points 3 and 4 did not change significantly during run #2. The fact that the concentration in these sample points did not significantly change is probably due to residual liquids in the area. At the 50 ACFM flow rate, the air moving through the soil had enough time to equilibrate with the residual liquids, and therefore the concentration of the vapors in the soil *apparently* stayed the same (even though TCE was removed). However, when the flow rate was increased to 100 ACFM, the residual liquids did not equilibrate with the air, and therefore the concentration apparently decreased.

A further indication that there are residual liquids in this area is the concentration profile of sample point #2. The fact that the concentration at this point significantly increased during the "rest period" indicates that there is a source of TCE in the area. We predict that if the sample points were sampled again (after a longer rest period), the concentration at sample points 1-4 would be close to those seen during run #2. If this in fact happens, this would indicate that there are residual liquids in these areas.

Figure 8 indicates that there was a continual decrease in concentration in sample points 5-8 *during* runs 1, 2 and 3. This is an indication that there are no residual liquids in the soils at these locations. If residual liquids were present in these areas, the expected curve would be similar to that for sample points 1-4; no decrease during Run #2.

CONCLUSIONS

The initial three-day trials of this pilot study answered critical questions such as:

- | Air intake wells are not necessary due to the porosity of the soils. The fact that negative pressures were evidenced in all the sample points indicates that air was moving through all areas. No additional recovery wells are required.
- | The concentration of TCE in the soils, or at least in the soil vapor space, did decrease at the 100 ACFM air flow rate.
- | During the 50 ACFM test, the concentrations in sample points 3 and 4 did not decrease possibly due to residual liquids in the area. This indicates that 50 ACFM would be the *minimum* air flow that should be used, because at this flow rate, the air in the pore space and TCE in or on the soils were in approximate equilibrium. If a flow rate less than 50 ACFM was used, the expected concentration of the soil vapor would be approximately equal to that evidenced at the 50 ACFM flow rate because the vapors for both flow rates would be at equilibrium; therefore the recovery rate in lb/hr would be lower due to the lower flow rate.
- | When all factors are considered (concentration, potential of air controls, length of cleanup time), 50 ACFM may not be the *optimum* operating flow rate. At this time there is not sufficient information to optimize the long-term operating flow rate.
- | The ultimate origin of the air flow through the soils was not determined in this study. There was however, air flow through the lower portion of the soils (10-15' below grade) because a negative pressure was evidenced during the tests at all the sampling points.

Cycling of the system (on and off) had no apparent affect on the recovery rate or the concentration of the vacuum pump discharge. The only sample point which it affected was #2. This was probably due to the volatilization of residual liquids in that area. A longer "rest period" should allow the concentrations in the other sample points to also increase.

The following questions remained at the conclusion of the three short-duration pilot tests:

- | What is the optimum air flow when the possibility that air controls will be required is considered? This question will be answered by air modeling of the discharge using differing concentration and flow rates. Preliminary estimates from the air quality model indicate that the effects of increasing the air flow from 50-100 cfm at the same discharge concentration will not be drastic. Increased air flow with the same pounds/hour rate will not significantly affect the modeled property line conditions. Estimated discharge for this run is 0.10 lb/hr or less. The estimate for previous runs was 0.15 lb/hr.
- | Will there be an "asymptotic" recovery rate be for this system? The recovery rate in all the runs was continuing to decline, i.e. it never reached an asymptotic value. If the recovery rate during a longer run time levels off to a constant value, this would indicate the presence of residual liquids in the soils. If the recovery rate does not level off, but continues to decline, this would indicate there is not a significant amount of residual liquids in the soils, but the TCE is desorbing from the soil particles.
- | What effect will blinding off an upper portion of the screen have on the recovery rate? Since TCE vapor is heavier than air, and therefore should settle, the expected recovery rate should increase if the dilution air is limited by blinding off the upper portion of the screen. Blinding off a portion of the screen may decrease the time of clean-up required, and therefore should be investigated.
- | What is the length of the cleanup time?

30-DAY TEST

PURPOSE

Because of the questions that remained following the three short-duration pilot tests, an additional 30-day test period was executed.

The air extraction rate for the 30-day pilot test was set at approximately 110 ACFM (the maximum capacity of the vacuum pump). The recovery well was modified slightly by blanking off the top 10 feet of the screen. Soil vapor was extracted only from the lower 10 feet of the recovery well.

DATA

Data obtained during this study phase is contained in Appendix A and summarized in Tables 1 and 2.

Several graphs illustrate the data that was obtained during the 30-day run.

Figure 9: TCE Recovery (in LB/HR) vs. Time

Figure 10: TCE Concentration vs. Cumulative Run Time

Figure 11: TCE Concentration vs. Sample Points 1-4

Figure 12: TCE Concentration vs. Sample Points 5-8

Figures 10, 11 and 12 combine data that was obtained in the 30-day test with the data that was collected in the first three short-duration runs.

OBSERVATIONS/DISCUSSIONS

As Figure 9 indicates, the recovery rate of TCE was fairly constant at 0.13-0.14 lb/hr. for the first 200 hours (two weeks) of the test. However, during the last two weeks of operation, the lb/hr of TCE discharged, and therefore the lb/hr. of TCE removed, decreased.

Based on the results of the first three short-duration tests, a gradual decrease in concentration over the entire length of the pilot study was expected (assuming that all variables remained constant). Over a given area, the concentration of TCE should be greater closer to the water table because the TCE liquids would tend to spread out slightly as they descended through the soils, and because of diffusion of the whole vadose zone, a gradual decrease in the concentration should be expected because the upper portion of the soils would rapidly clean up and then provide relatively clean dilution air. If only the lower portion of the vadose zone is screened, it

should take a greater period of time to see a decline in concentration because the upper portion of the soils does not provide clean dilution air.

This is graphically illustrated by comparing Figures 6 and 9. Figure 6 indicates that there was a continual decrease in TCE concentration during the study. This is in contrast to Figure 9 where the concentration was constant for a period of time, then it started to decrease. As indicated by this comparison, in order to optimize the recovery of TCE, the upper portion of the screen should be blanked off to prevent "dilution air" from entering the system through relatively "clean" soils.

Figure 10 compares the recovery rate during the 30-day test with the recovery rates in the three short-duration tests. As indicated in this figure, the concentration at the end of both runs was approximately 150 mg/m³ and still declining. Therefore, at this time, it is not possible to predict if there will be an asymptotic concentration or if the concentration will continue to decline. This factor also limits the ability to predict what the length of clean-up time will be.

Figures 11 and 12 illustrate the TCE concentration in the eight sample points. The November 3, 1987 samples were taken just prior to the commencement of the 30-day test. The December 1, 1987 samples were taken just after the end of the 30-day test. As indicated in these figures, the TCE concentration in all the sample points increased during the five-week rest period.

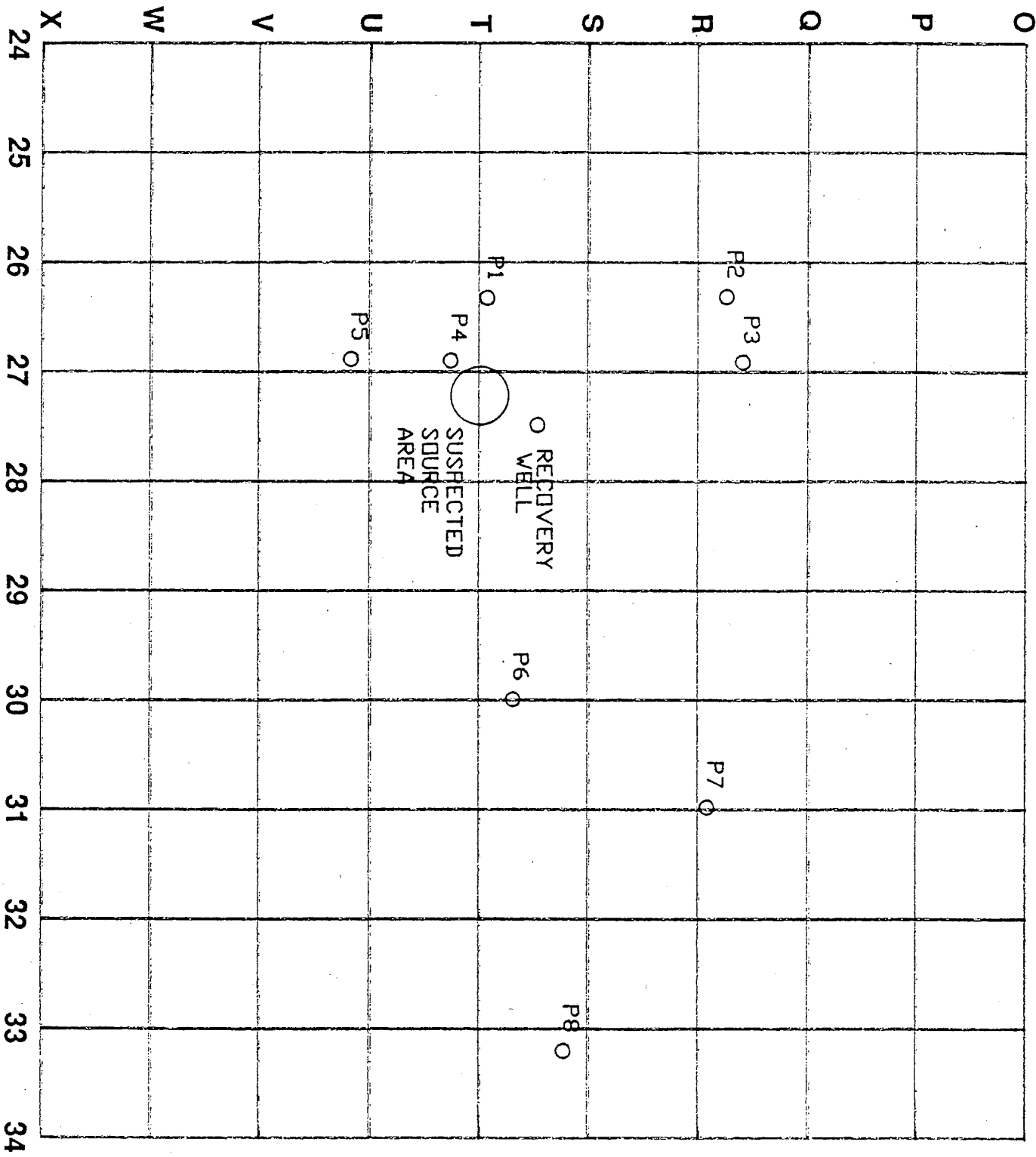
Even though the concentration in the sample points increased, the value of cycling the system at some rate (one month on, one month off) is questionable. As in any equilibrium process, the greater the driving force, the greater the removal. In this case, if the system is allowed to remain at rest, it is decreasing the driving force for removing the TCE from the soils by eliminating the "fresh air flush". The TCE will still vaporize and desorb from the soils, but as the air in the soils becomes more and more concentrated, the driving force decreases. If the air in the soils is continually replaced with "fresh" air, then the driving force will remain constant at a relatively higher rate. Due to this fact, it is anticipated that TCE recovery for a continuously versus cycling the system are approximately the same (the costs of operating a 5 hp motor), and there is little or no value in cycling the system.

The drastic increases in TCE concentration found at the start of the 30-day test, in sample points 1, 2, 3, 4, 6, and 7 indicate that there may be residual liquids in these areas. In most cases, the TCE concentration in the sample point increased to where it was prior to the commencement of run #2. As was previously indicated, this is probably due to the presence of residual TCE liquids in the soils.

CONCLUSIONS

The following conclusions can be drawn from the work that has been accomplished:

- | The upper portion of the screen should remain blanked off to enhance TCE recovery.
- | The 100 cfm air flow is sufficient for removing the TCE from the soils. There is no apparently economic advantage for increasing the air flow to anything greater than 100 cfm.
- | Available data does not allow the prediction of what an asymptotic concentration will be, and therefore, what the life of the clean-up will be.
- | Sufficient data is available to prepare a "Permit to Install" application to the Air Quality Division of the MDNR and, based on the expected concentrations at the property lines, to propose operation of the system without air controls.



SCALE 1" = 50'

Figure 1

Soil Vapor Probe Location

General Motors Corp./CPC Group

Grand Rapids, Michigan

August, 1988

20763

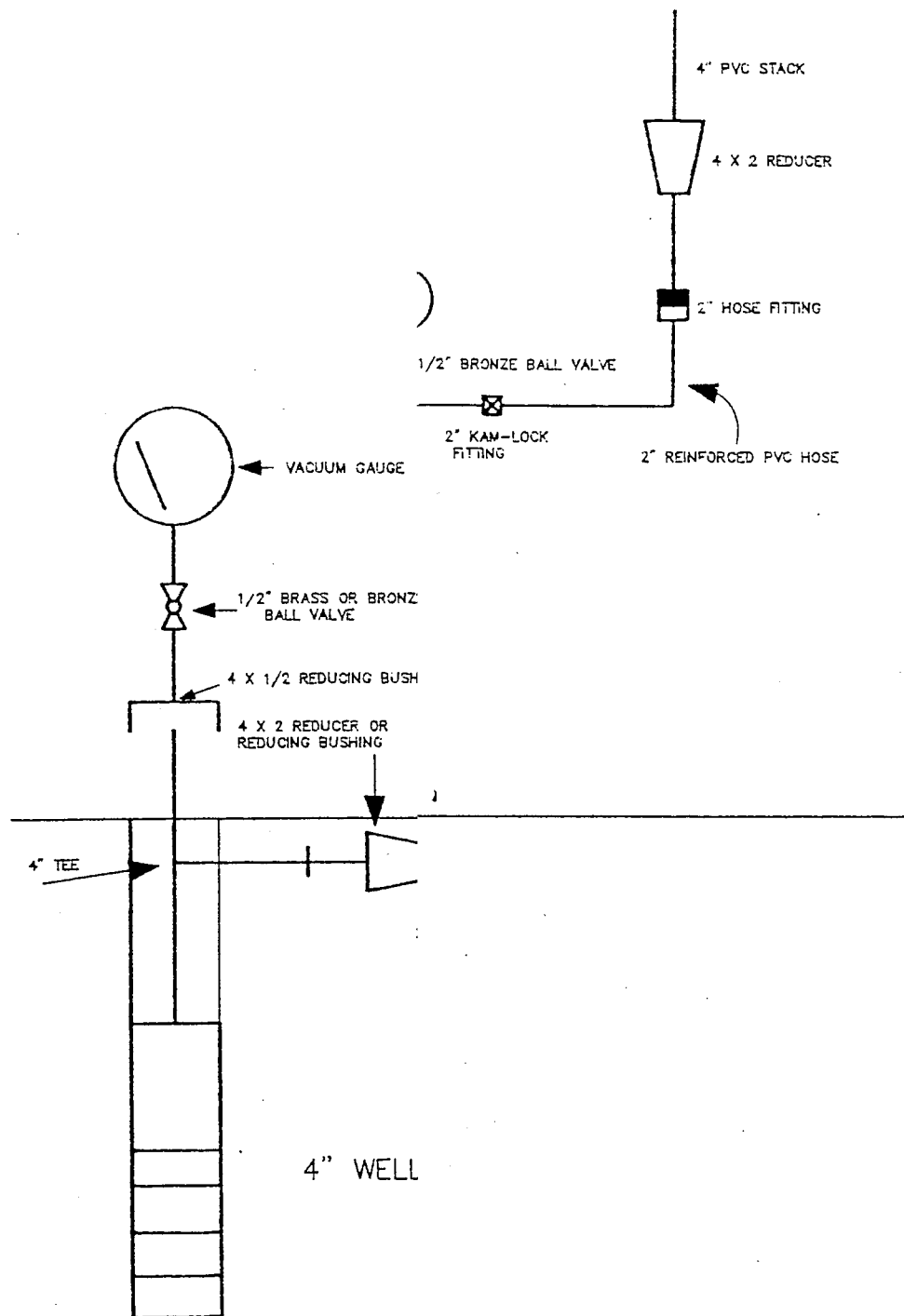


FIGURE 2
CPC - GRAND RAPIDS PLANT
SOIL VACUUM SYSTEM
SCHEMATIC

DATE	08/22/88
PROJECT NO.	20673
SHEET NO.	

Figure 3

LB/HR vs. RUN TIME (Run #1)

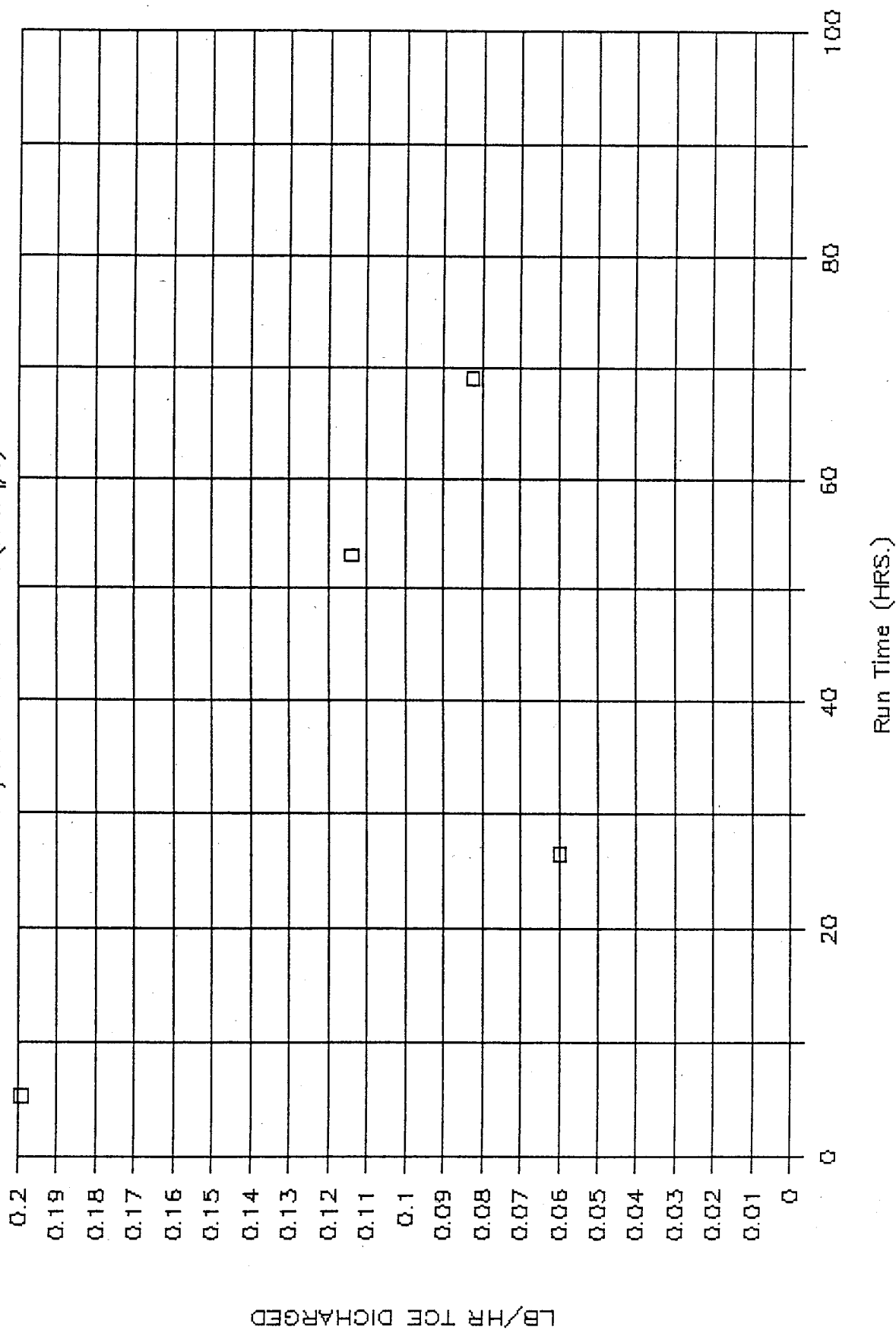


Figure 4

LB/HR vs. RUN TIME (Run #2)

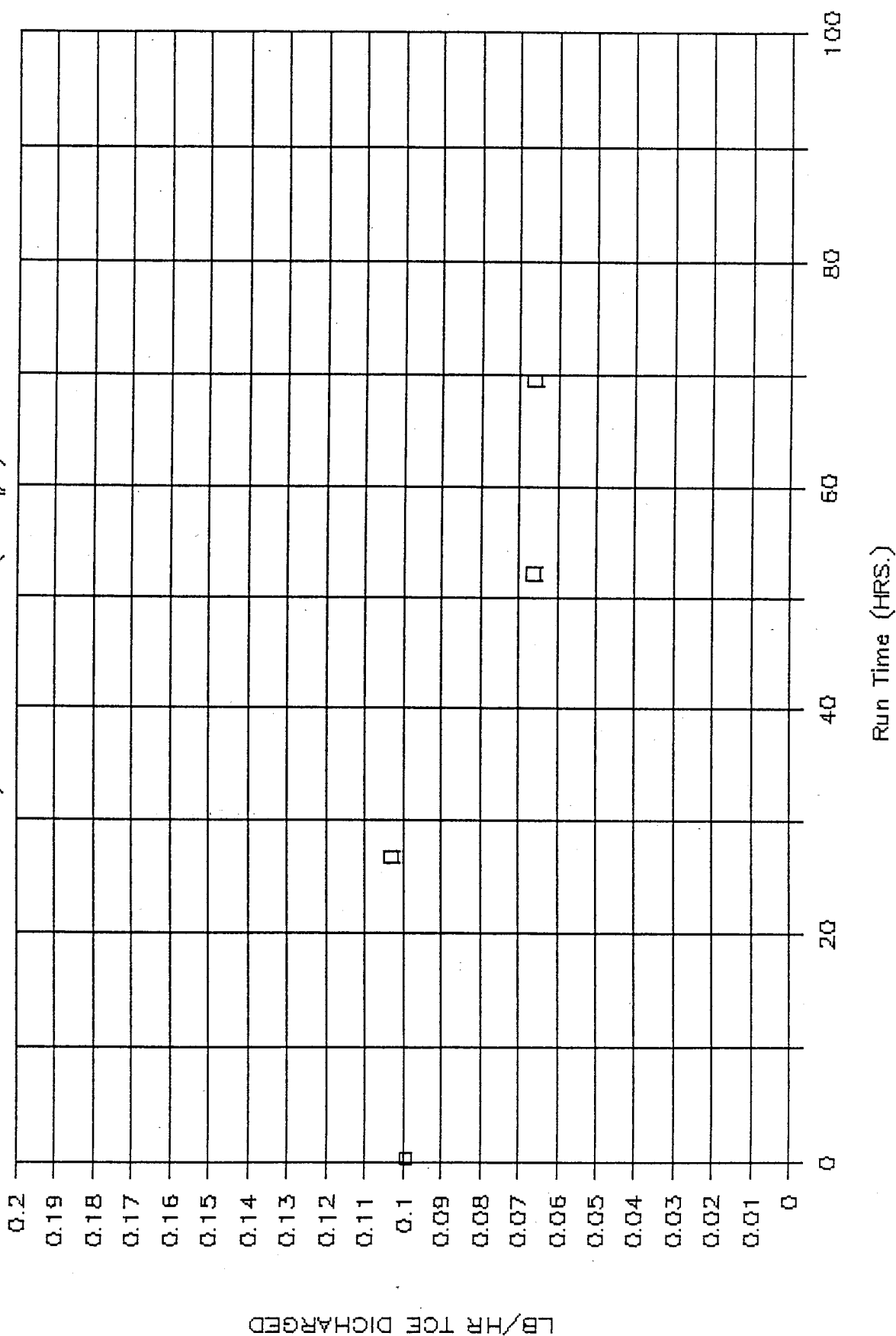


Figure 5

LB/HR vs. RUN TIME (Run #3)

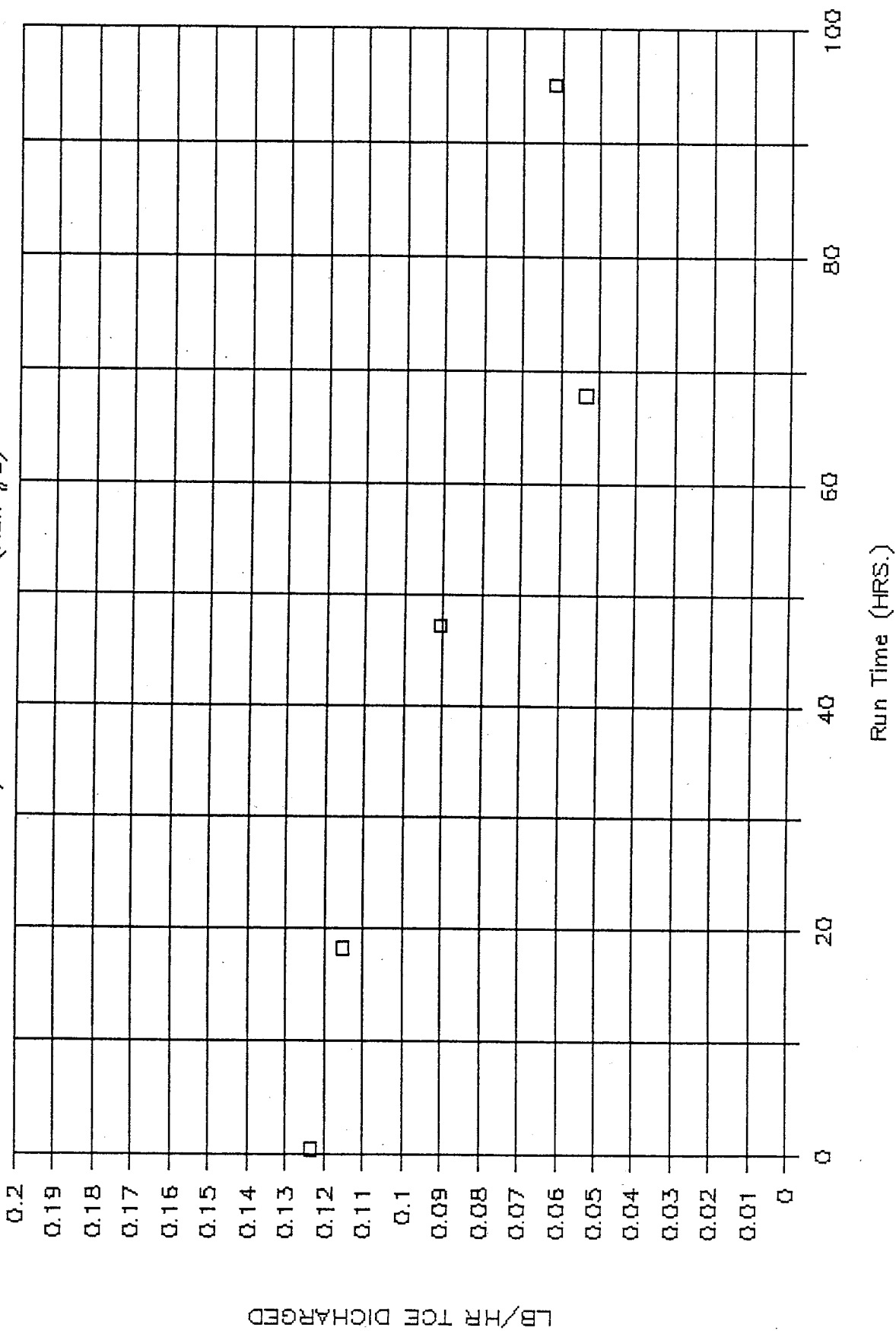


Figure 6

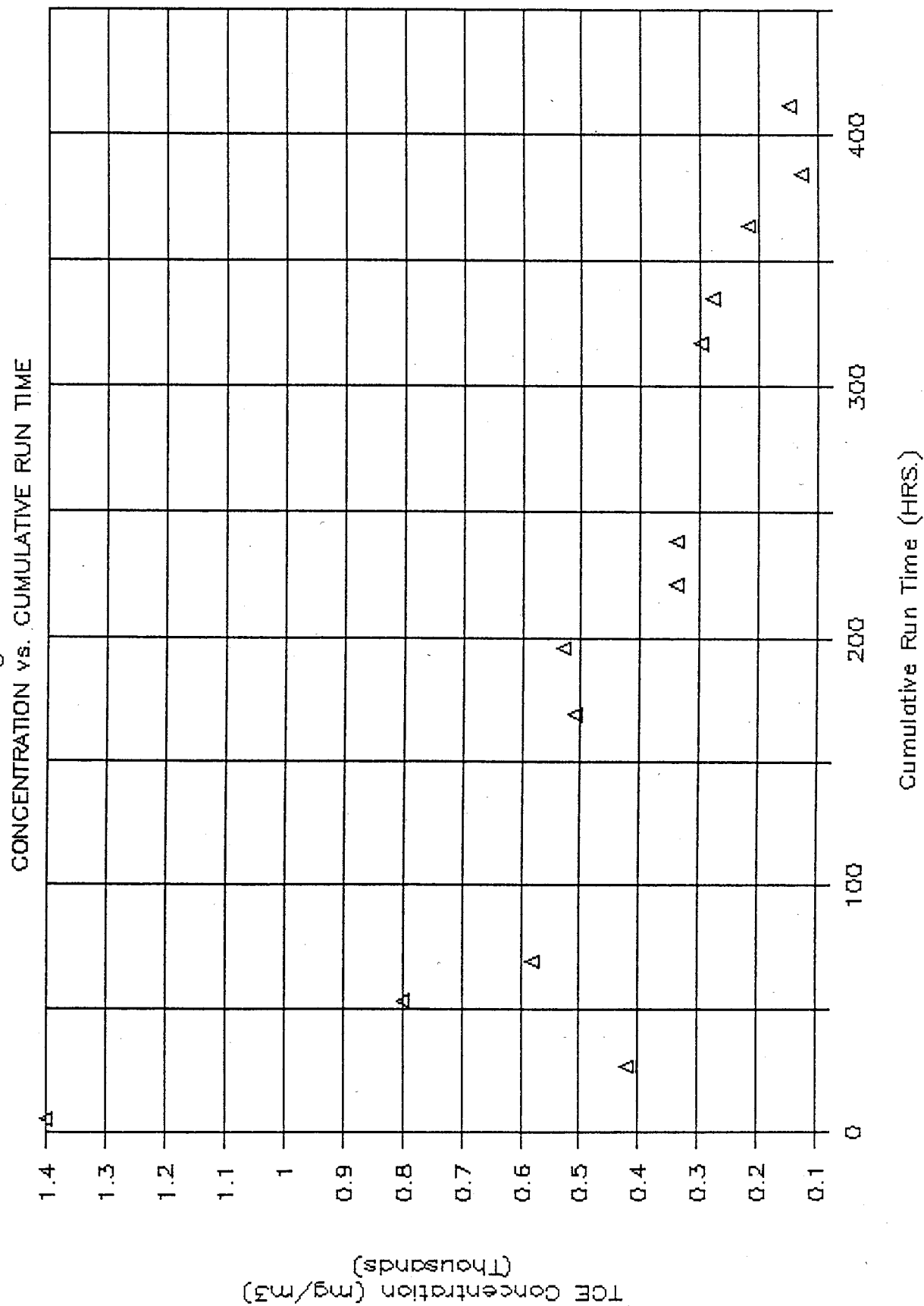


Figure 7

Concentration vs. Sample Point 1,2,3,4

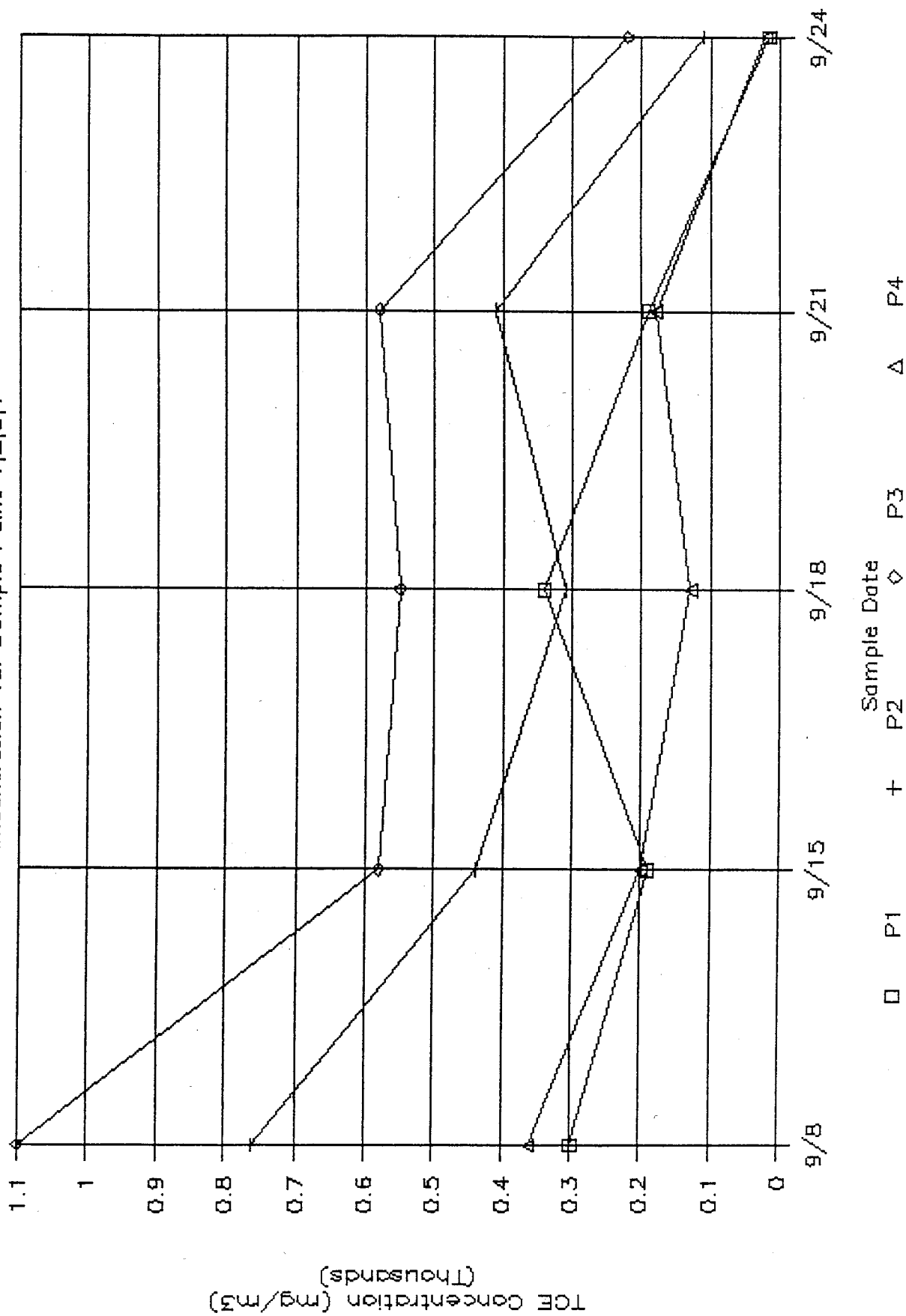


Figure 8
Concentration vs. Sample Point 5,6,7,8

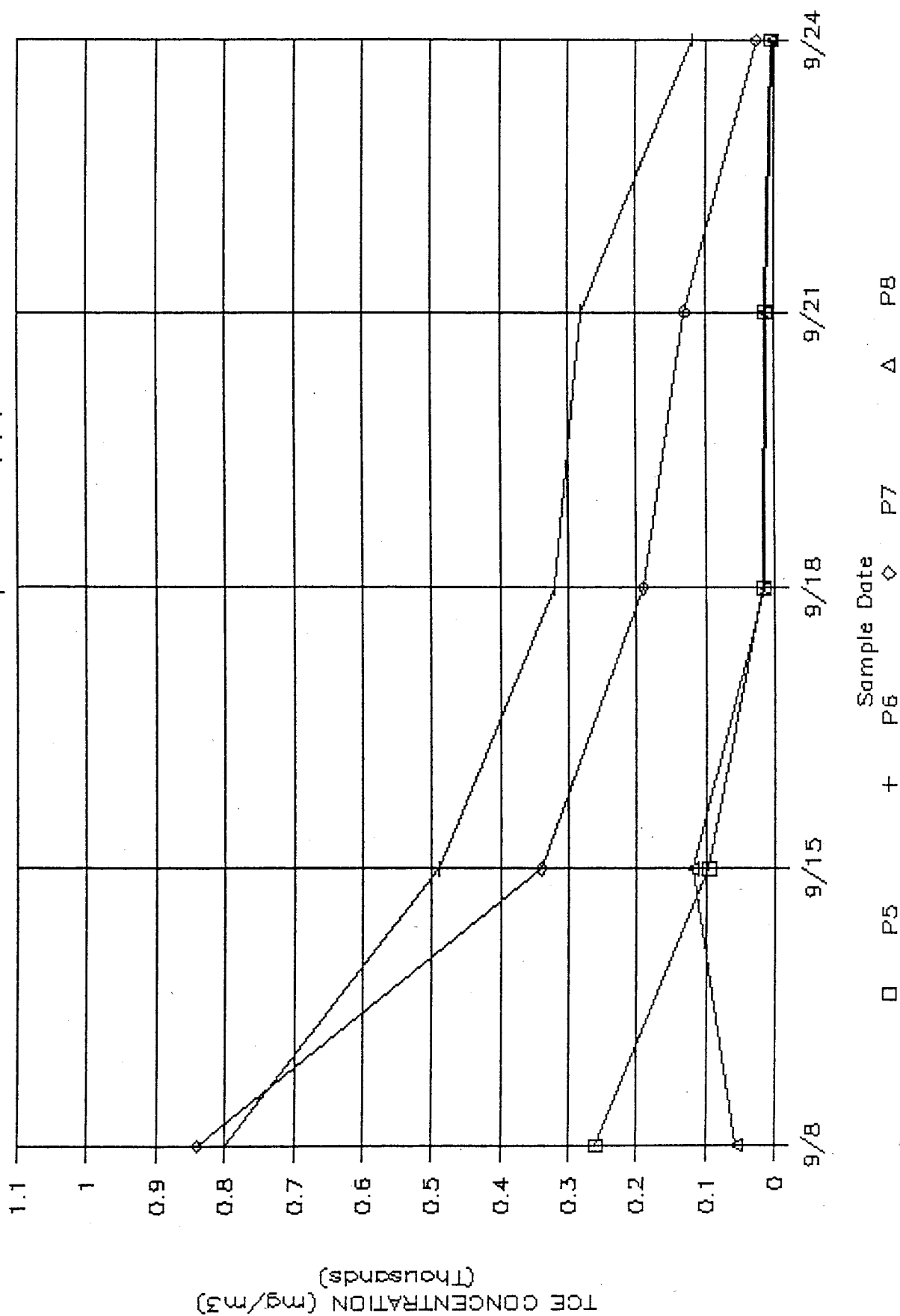


Figure 9

LB/HR TCE vs. TIME: PILOT RUN

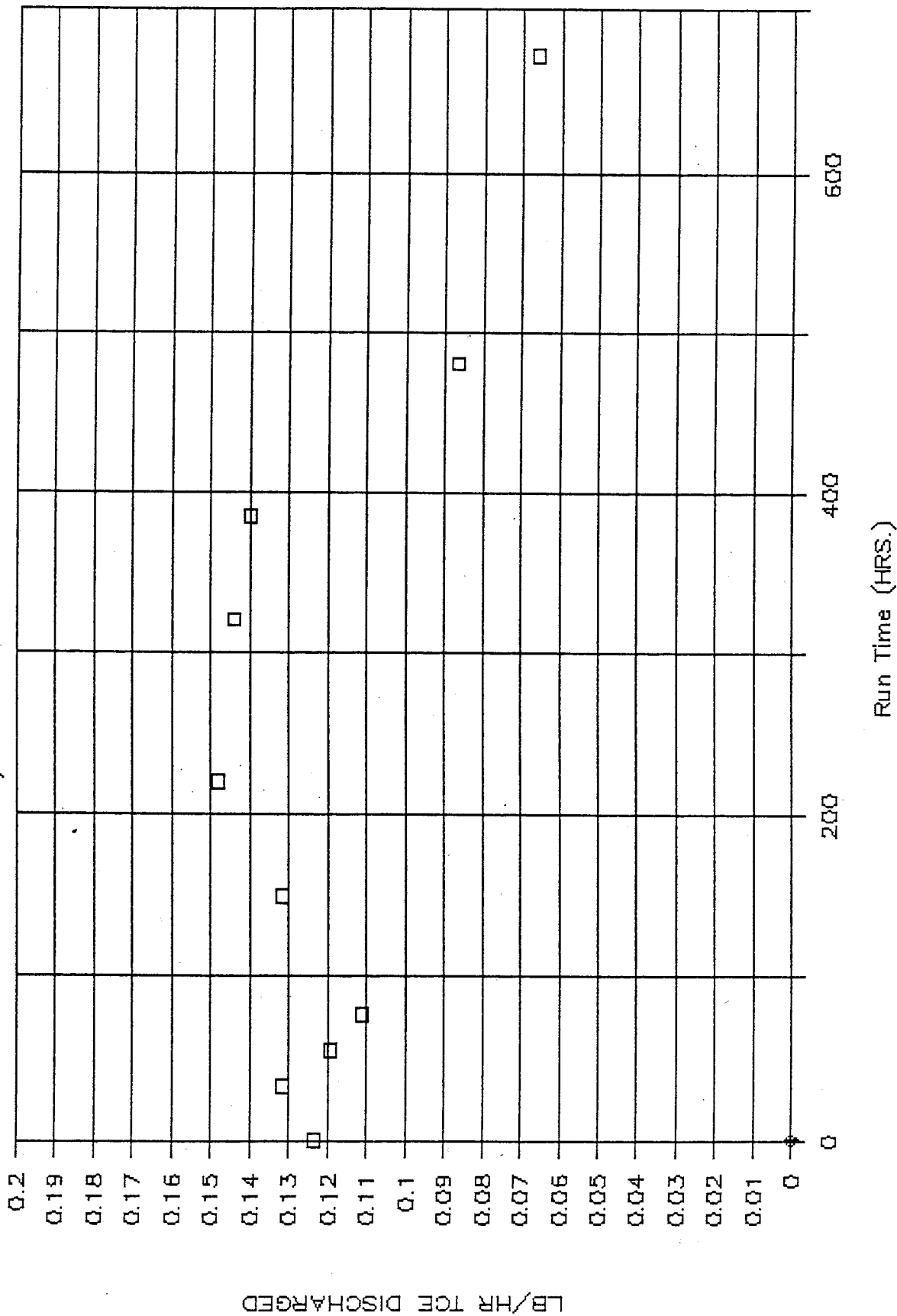


Figure 10

TCE CONC. vs CUMULATIVE RUN TIME

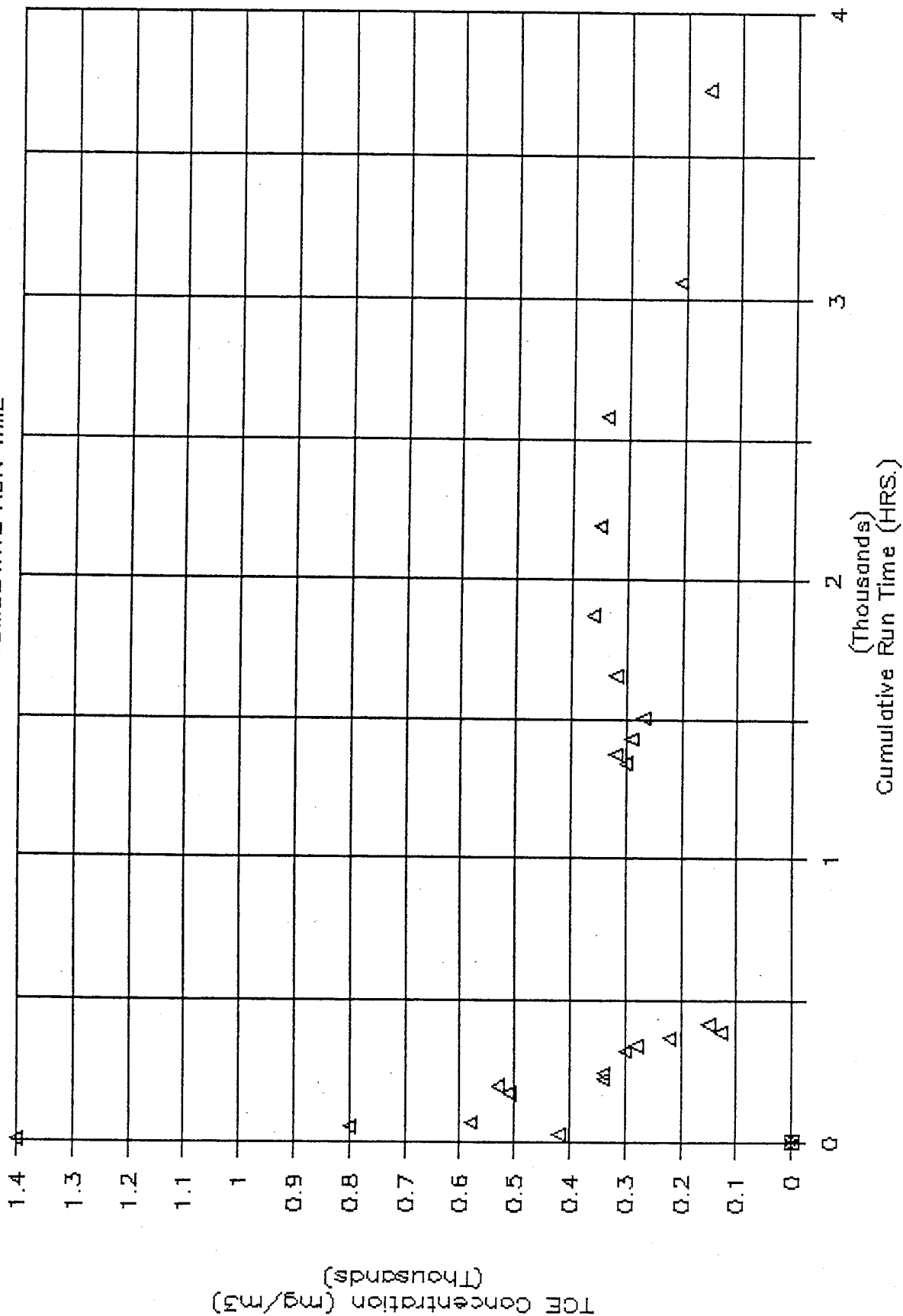


Figure 11
Concentration vs. Sample Point 1,2,3,4

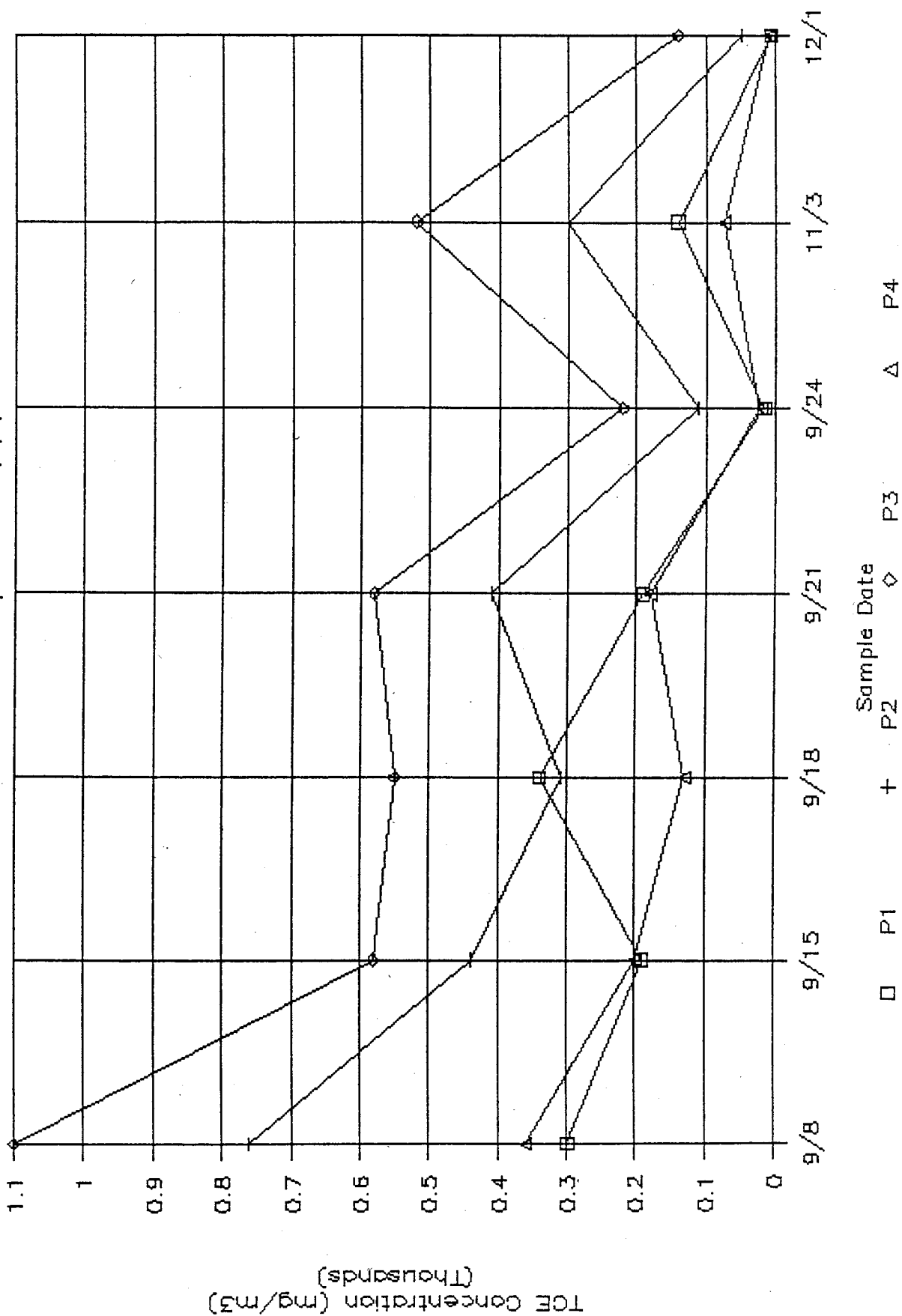
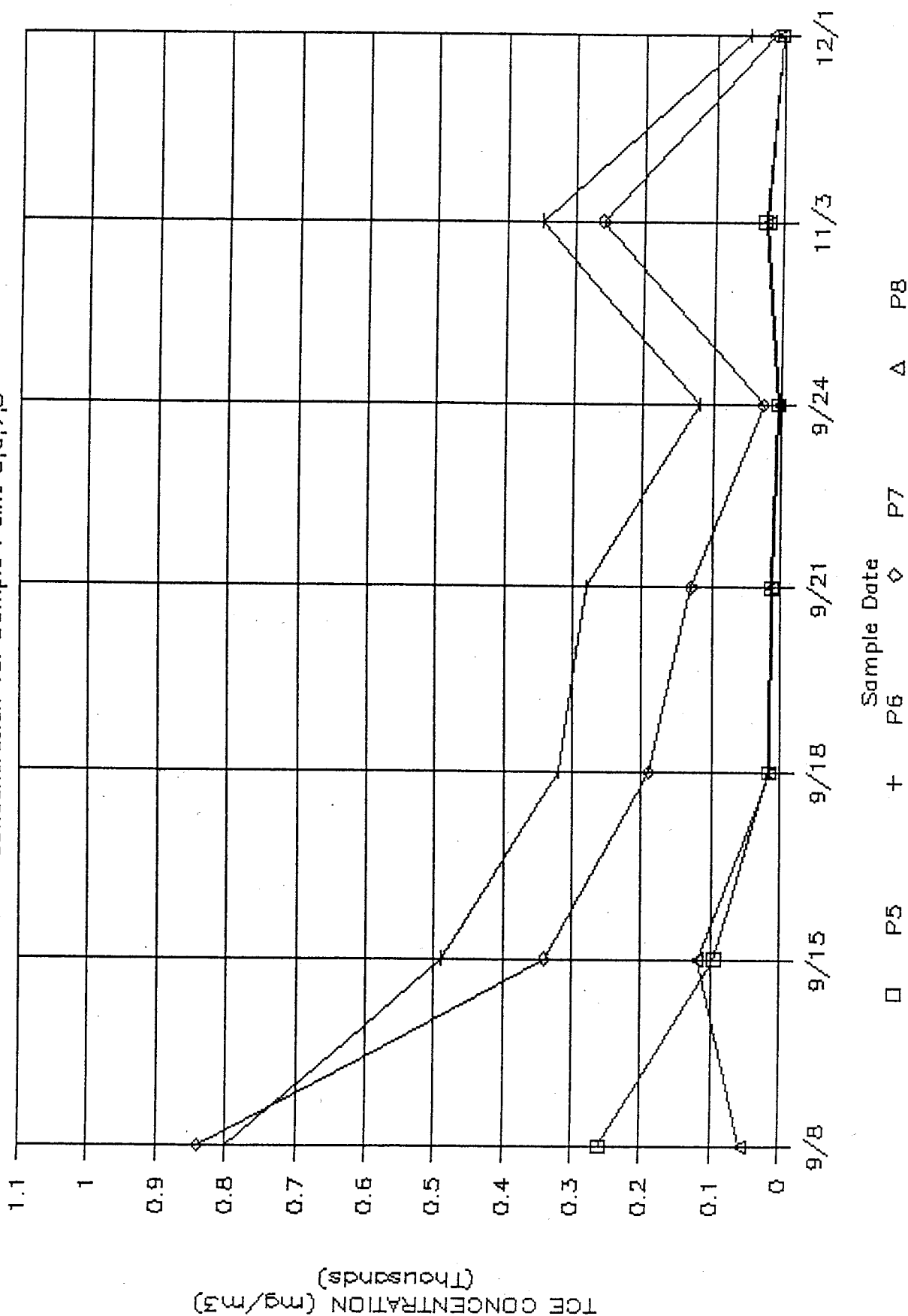


Figure 12

Concentration vs. Sample Point 5,6,7,8



CPC SOIL VAPOR STUDY DATA

RUN #1 : 38 ACFM flow rate

Sample Location	9/8 11:4 p.m.		9/9 1:30 p.m.		9/10 4 p.m.		9/11 8:30 a.m.	
	Temp. = 96°F		Temp. = 110°F		Temp. = 110°F		Temp. = 96°F	
	Flow = 38 ACFM		Flow = 38 ACFM		Flow = 38 ACFM		Flow = 38 ACFM	
	Pressure		Pressure		Pressure		Pressure	
	(" WC)	(mg/m ³)	(" WC)	(mg/m ³)	(" WC)	(mg/m ³)	(" WC)	(mg/m ³)
Pump Discharge		1400		420		800		580
Well Head	1.1		1		1		1	
P1	0.16	300	0.16		0.16		0.16	
P2	0.16	760	0.16		--		0.16	
P3	0.16	1100	0.16		0.16		0.16	
P4	0.16	360	0.16		0.16		0.16	
P5	0.1	260	0.1		0.1		0.16	
P6	0.1	800	0.1		0.1		0.1	
P7	0	840	0.1		0.1		0.1	
P8	0	57	0		0		0.1	

560

RUN #2 : 52 ACFM flow rate

Sample Location	9/15 12:2 p.m.		9/16 2-4 p.m.		9/17 4 p.m.		9/18 8:30 a.m.	
	Temp. = 89°F		Temp. = 82°F		Temp. = 89°F		Temp. = 96°F	
	Flow = 50 ACFM		Flow = 52 ACFM		Flow = 54 ACFM		Flow = 52 ACFM	
	Pressure		Pressure		Pressure		Pressure	
	(" WC)	(mg/m ³)	(" WC)	(mg/m ³)	(" WC)	(mg/m ³)	(" WC)	(mg/m ³)
Pump Discharge		510		530		340		340
Well Head	1.6		1.65		1.7		1.75	
P1	0.1	190	0.1		0.1		0.2	340
P2	--	440	0.1		0.15		0.15	310
P3	0.25	580	0.15		0.17		0.2	550
P4	0.15	200	0.2		0.2		0.2	130
P5	0.05	96	0.1		0.05		0.1	17
P6	0.05	490	0.1		0.1		0.2	320
P7	0	340	0.05		0.05		0.1	190
P8	0	120	0		0		0	15

307

234

RUN #3 : 110 ACFM flow rate

	9/21		9/22		9/23		9/24		9/25*	
	4 p.m.		9-10 a.m.		3-4 p.m.		8:30 a.m.		2 p.m.	
	Temp. = 94°F		Temp. = 98°F		Temp. = 94°F		Temp. = 96°F		Temp. = 96°F	
	Flow = 114 ACFM		Flow = 115 ACFM		Flow = 110 ACFM		Flow = 52 ACFM		Flow = 52 ACFM	
Sample Location	Pressure (" WC)	Conc. (mg/m3)	Pressure (" WC)	Conc. (mg/m3)	Pressure (" WC)	Conc. (mg/m3)	Pressure (" WC)	Conc. (mg/m3)	Pressure (" WC)	Conc. (mg/m3)
Pump Discharge		300		280		220		130		150
Well Head	4		4.1		4.5				4.4	
P1	0.3	190	0.3		0.3			17	0.3	
P2	0.35	410	0.3		0.3			110	0.3	
P3	--	580	0.4		0.35			220	0.35	
P4	--	180	0.4		0.4			22	0.4	
P5	0.2	14	0.2		0.2			7	0.2	
P6	0.25	280	0.25		0.2			120	0.2	
P7	0.2	130	0.2		0.15			27	0.15	
P8	0.1	13	0.1		0.05			5	0.05	
		225						66		

*opened 87-1/87-5

30 DAY PILOT RUN

	11/3		11/6		12/1	
	~4 p.m.		---		a.m.	
	Temp. = 94°F		Temp. = --°F		Temp. = 96°F	
	Flow = 110 ACFM		Flow = --- ACFM		Flow = 112 ACFM	
Sample Location	Pressure (" WC)	Conc. (mg/m3)	Pressure (" WC)	Conc. (mg/m3)	Pressure (" WC)	Conc. (mg/m3)
Pump Discharge		300		270		160 SEE MASS LOADING DATA
Well Head	**7.15		**7.4		7.5	FOR ADDITIONAL PUMP
P1	0.3	140	0.3		0.3	7 DISCHARGE SAMPLES.
P2	0.3	300	--		0.3	50
P3	0.35	520	0.3		0.35	140
P4	0.4	74	0.4		0.4	9
P5	0.15	27	0.15		0.15	4.6
P6	0.2	350	0.2		0.2	53
P7	0.15	260	0.1		0.1	16
P8	0.1	23	0.05		0.1	5
		212				36

** = 10' of the Well Screen Blinded Off

ANALYTICAL DATA BY SAMPLE POINT

SAMPLE POINT	DATE						
	9/8	9/15	9/18	9/21	9/24	11/3	12/1
P1	300	190	340	190	17	140	7
P2	760	440	310	410	110	300	50
P3	1100	580	550	580	220	520	140
P4	360	200	130	180	22	74	9
P5	260	96	17	14	7	27	4.6
P6	800	490	320	280	120	350	53
P7	840	340	190	130	27	260	16
P8	57	120	15	13	5	23	5
AVERAGE	560	307	234	225	66	212	36

CPC PILOT STUDY: MASS LOADING DATA

DATE	TIME	DELTA TIME SINCE START (hr.)	CUML. TIME (hr.)	AIRFLOW (cfm)	CONC. (mg/m3)	MASS DISCHARGED (lb/hr)
Run was started at approximately 11:00 a.m.						
9/8	4:15 p.m.	5.25	5.25	38	1400	0.199
9/9	1:30	26.50	26.5	38	420	0.060
9/10	4:00	53.00	53	38	800	0.114
9/11	8.30 a.m.	69.00	69	38	580	0.082
Run was started at 12:00 p.m.						
9/15	12:20 p.m.	0.33	169.33	52	510	0.099
9/16	2:45	26.75	195.75	52	530	0.103
9/17	4:15	52.25	221.25	52	340	0.066
9/18	9:25 a.m.	69.42	238.42	52	340	0.066
Run was started at 3:30 p.m.						
9/21	3:55 p.m.	0.42	316.92	110	300	0.123
9/22	9:46 a.m.	18.25	334.75	110	280	0.115
9/23	2:50	47.33	363.83	110	220	0.091
9/24	11:20 a.m.	67.83	384.33	110	130	0.054
9/25	2:30	95.00	411.50	110	150	0.062
Run was started at 9:30 a.m. (unit was down for app. 2 days)						
11/3	10:00 a.m.	0.50	1342.50	110	300	0.123
11/4	6:15 p.m.	32.75	1375.25	110	320	0.132
11/5	3:05 p.m.	54.58	1429.83	110	290	0.119
11/6	1:56 p.m.	76.50	1506.33	110	270	0.111
11/9	3:05 p.m.	149.50	1655.83	110	320	0.132
11/12	1:00 p.m.	219.5	1875.33	110	360	0.148
11/16	6:00 p.m.	320.5	2195.83	110	350	0.144
11/19	10:30 a.m.	385	2580.83	110	340	0.140
11/23	11:00 a.m.	481	3061.83	110	210	0.086
12/1	10:00 a.m.	672	3733.83	110	160	0.066

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: DUDLEY PIERCE
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/08/87 TIME:
DATE RECEIVED: 09/09/87 TIME: 7:15 AM
DATE COMPLETED: 09/11/87
SCHEDULED COMPLETION: 09/11/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 1

	P#1	P#2	P#3	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	79916	79917	79918		
TRICHLOROETHYLENE	56	140	210	0.10	ppm
TRICHLOROETHYLENE	300	760	1,100	0.58	mg/m3
TIME SAMPLED:	11:25 AM	12:25 PM	11:40 AM		



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: DUDLEY PIERCE
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/08/87 TIME:
DATE RECEIVED: 09/09/87 TIME: 7:15 AM
DATE COMPLETED: 09/11/87
SCHEDULED COMPLETION: 09/11/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 2

DETECTION UNITS
LIMIT

	P#4	P#5	P#6		
EDI SAMPLE NO:	79919	79920	79921		
TRICHLOROETHYLENE	68	49	150	0.10	ppm
TRICHLOROETHYLENE	360	260	800	0.58	mg/m3
TIME SAMPLED:	2:15 PM	2:40 PM	3:00 PM		



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: DUDLEY PIERCE
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/08/87 TIME:
DATE RECEIVED: 09/09/87 TIME: 7:15 AM
DATE COMPLETED: 09/11/87
SCHEDULED COMPLETION: 09/11/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 3

	P#7	P#8	VAPOR WELL	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	79922	79923	79924		
TRICHLOROETHYLENE	160	11	270	0.10	ppm
TRICHLOROETHYLENE	840	57	1,400	0.58	mg/m3
TIME SAMPLED:	3:45 PM	3:25 PM	4:15 PM		



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: DUDLEY PIERCE
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/09/87 TIME: 1:30 PM
DATE RECEIVED: 09/10/87 TIME: 9:00 AM
DATE COMPLETED: 09/11/87
SCHEDULED COMPLETION: 09/11/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 50

DETECTION UNITS
LIMIT

V. WELL

EDI SAMPLE NO: 80041

TRICHLOROETHYLENE	80	0.10	ppm
TRICHLOROETHYLENE	420	0.58	mg/m3



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: DUDLEY PIERCE
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/10/87 TIME: 4:00 PM
DATE RECEIVED: 09/11/87 TIME: 7:00 AM
DATE COMPLETED: 09/11/87
SCHEDULED COMPLETION: 09/11/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 51

DETECTION UNITS
LIMIT

	VAPOR WELL		
EDI SAMPLE NO:	80042		
TRICHLOROETHYLENE	150	0.10	ppm
TRICHLOROETHYLENE	800	0.58	mg/m3



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: DUDLEY PIERCE
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/11/87 TIME: 8:30 AM
DATE RECEIVED: 09/11/87 TIME: 11:40 AM
DATE COMPLETED: 09/11/87
SCHEDULED COMPLETION: 09/11/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 52

	VAPOR WELL	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	80053		
TRICHLOROETHYLENE	110	0.10	ppm
TRICHLOROETHYLENE	580	0.58	mg/m3



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: CATHIE COTTON
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/15/87 TIME:
DATE RECEIVED: 09/15/87 TIME: 2:50 PM
DATE COMPLETED: 09/18/87
SCHEDULED COMPLETION: 10/06/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 20

	P-1	P-3	P-4	P-5	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	80292	80293	80294	80295		
TRICHLOROETHYLENE	36	110	37	18	0.100	ppm
	190	580	200	96	0.530	mg/m3
TIME SAMPLED:	9:50 AM	10:50 AM	11:05 AM	11:12 AM		



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: CATHIE COTTON
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/15/87 TIME:
DATE RECEIVED: 09/15/87 TIME: 2:50 PM
DATE COMPLETED: 09/17/87
SCHEDULED COMPLETION: 10/06/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 21

	P-6	P-7	P-8	PUMP DICHARGE	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	80296	80297	80298	80299		
TRICHLOROETHYLENE	92	64	23	96	0.100	ppm
	490	340	120	510	0.530	mg/m3
TIME SAMPLED:	11:30 AM	11:38 AM	11:55 AM	12:20 PM		



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: SAM TAWNEY
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/17/87 TIME: 4:15 PM
DATE RECEIVED: 09/18/87 TIME: 7:15 AM
DATE COMPLETED: 09/19/87
SCHEDULED COMPLETION: 09/18/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 30

		DETECTION LIMIT	UNITS
	VAC. PUMP		
EDI SAMPLE NO:	80423		
TRICHLOROETHYLENE	63	0.100	ppm
	340	0.530	mg/m3



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: CC
DESCRIPTION:

DATE SAMPLED: 09/18/87 TIME:
DATE RECEIVED: 00/00/00 TIME:
DATE COMPLETED: 09/19/87
SCHEDULED COMPLETION: 09/22/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 35

	PUMP DISCHARGE	P1	P2	P3	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	80454	80455	80456	80457		
TRICHLOROETHYLENE	63	30	59	103	0.100	ppm
	340	160	310	550	0.530	mg/m3
TIME SAMPLED:	9:25 AM	11:08 AM	12:12 AM	11:16 AM		



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: CC
DESCRIPTION:

DATE SAMPLED: 00/00/00 TIME:
DATE RECEIVED: 00/00/00 TIME:
DATE COMPLETED: 09/19/87
SCHEDULED COMPLETION: 09/22/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 36

	P4	P5	P6	P7	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	80458	80459	80460	80461		
TRICHLOROETHYLENE	24	3.2	61	35	0.100	ppm
	130	17	320	190	0.530	mg/m3
TIME SAMPLED:	11:22 AM	11:32 AM	12:18 PM	12:25 PM		



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: CC
DESCRIPTION:

DATE SAMPLED: 09/18/87 TIME:
DATE RECEIVED: 00/00/00 TIME:
DATE COMPLETED: 09/19/87
SCHEDULED COMPLETION: 09/22/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 37

DETECTION UNITS
LIMIT

P8

EDI SAMPLE NO: 80462

TRICHLOROETHYLENE 2.8

0.100 ppm

15

0.530 mg/m3

TIME SAMPLED: 12:38 PM



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: CC
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/21/87 TIME:
DATE RECEIVED: 09/21/87 TIME: 2:20 PM
DATE COMPLETED: 09/25/87
SCHEDULED COMPLETION: 10/12/87
ANALYST: JE,PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 40

	P-1	P-2	P-3	P-4	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	80564	80565	80566	80567		
TRICHLOROETHYLENE	35	78	110	34	0.10	ppm
	190	410	580	180	0.53	mg/m3
TIME SAMPLED:	9:40 AM	9:47 AM	9:55 AM	10:03 AM		



**ANALYTICAL SERVICES
EDI LABORATORY REPORT**

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: CC
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/21/87 TIME:
DATE RECEIVED: 09/21/87 TIME: 2:20 PM
DATE COMPLETED: 09/25/87
SCHEDULED COMPLETION: 10/12/87
ANALYST: JE,PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 41

	P-5	P-6	P-7	P-8	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	80568	80569	80570	80571		
TRICHLOROETHYLENE	2.6	52	25	2.4	0.10	ppm
	14	280	130	13	0.53	mg/m3
TIME SAMPLED:	10:09 AM	10:18 AM	10:28 AM	10:37 AM		



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: CC
DESCRIPTION: SOIL VAPER PILOT STUDY

DATE SAMPLED: 00/00/00 TIME:
DATE RECEIVED: 09/23/87 TIME: 4:58 PM
DATE COMPLETED: 09/25/87
SCHEDULED COMPLETION: 09/24/87
ANALYST: JE,PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 60

	PUMP DISCHARGE	PUMP DISCHARGE	PUMP DISCHARGE	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	80653	80654	80655		
TRICHLOROETHYLENE	56	53	42	0.10	ppm
	300	280	220	0.53	mg/m3
DATE SAMPLED:	09/21/87	09/22/87	09/23/87		
TIME SAMPLED:	3:55 PM	9:48 AM	2:50 PM		



**ANALYTICAL SERVICES
EDI LABORATORY REPORT**

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: D.P.
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/24/87 TIME:
DATE RECEIVED: 09/24/87 TIME: 7:00 PM
DATE COMPLETED: 09/25/87
SCHEDULED COMPLETION: 09/29/87
ANALYST: JE,PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 7

	P#1	P#2	P#3	P#4	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	80756	80757	80758	80759		
TRICHLOROETHYLENE	3.2	20	42	4.2	0.10	ppm
	17	110	220	22	0.53	mg/m3
TIME SAMPLED:	1:30	1:55	2:10	2:15		



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: CATHIE COTTON
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 11/02/87 TIME:
DATE RECEIVED: 11/03/87 TIME: 4:10 PM
DATE COMPLETED: 11/06/87
SCHEDULED COMPLETION: 11/05/87
ANALYST: WH
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 2

	#5	#6	#7	#8	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	82586	82587	82588	82589		
TRICHLOROETHYLENE	5.0	65	49	4.3	0.10	ppm
	27	350	260	23	0.53	mg/m3



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: D.P.
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/24/87 TIME:
DATE RECEIVED: 09/24/87 TIME: 7:00 PM
DATE COMPLETED: 09/25/87
SCHEDULED COMPLETION: 09/29/87
ANALYST: JE, PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 8

	P#5	P#6	P#7	P#8	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	80760	80761	80762	80763		
TRICHLOROETHYLENE	1.3	23	5.0	0.97	0.10	ppm
	6.9	120	27	5.2	0.53	mg/m3
TIME SAMPLED:	2:30 PM	2:40 PM	3:00 PM	3:15 PM		



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: D.P.
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/24/87 TIME:
DATE RECEIVED: 09/24/87 TIME: 7:00 PM
DATE COMPLETED: 09/25/87
SCHEDULED COMPLETION: 09/29/87
ANALYST: JE,PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 9

DETECTION UNITS
LIMIT

V. WELL

EDI SAMPLE NO: 80764

TRICHLOROETHYLENE	25	0.10	ppm
	130	0.53	mg/m3

TIME SAMPLED: 11:20



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: TED L.
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 09/25/87 TIME: 2:40 PM
DATE RECEIVED: 09/25/87 TIME: 4:55 PM
DATE COMPLETED: 09/25/87
SCHEDULED COMPLETION: 09/28/87
ANALYST: JE,PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 6

		DETECTION LIMIT	UNITS
	PUMP DISCHARGE		
EDI SAMPLE NO:	80909		
TRICHLOROETHYLENE	29	0.10	ppm
	150	0.53	mg/m3



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY:
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 10/15/87 TIME:
DATE RECEIVED: 10/16/87 TIME: 8:00 AM
DATE COMPLETED: 10/21/87
SCHEDULED COMPLETION: 10/17/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 20

	LOC.#2 11:30 AM	LOC.#3 11:40 AM	LOC.#4 2:30 PM	LOC.#7 2:20 PM	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	81815	81816	81817	81818		
TRICHLOROETHYLENE	49	88	30	32	0.10	ppm
	260	470	160	170	0.53	mg/m3



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: PUMP DISCHARGE
SAMPLED BY: C.C.
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 11/03/87 TIME: 10:00 AM
DATE RECEIVED: 11/03/87 TIME: 4:55 PM
DATE COMPLETED: 11/06/87
SCHEDULED COMPLETION: 11/05/87
ANALYST: WH
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 6

	PUMP DISCHARGE	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	82627		
TRICHLOROETHYLENE	56	0.10	ppm/m3
	300	0.53	mg/m3



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36th STREET PLANT
SAMPLED BY: JST
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 11/04/87 TIME: 6:15 PM
DATE RECEIVED: 11/05/87 TIME: 8:00 AM
DATE COMPLETED: 11/06/87
SCHEDULED COMPLETION: 11/07/87
ANALYST: WH
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 3

		DETECTION LIMIT	UNITS
	VAC PUMP DISCHARGE		
EDI SAMPLE NO:	82744		
TRICHLOROETHYLENE	60	0.10	ppm
	320	0.53	mg/m3



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: CC
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 11/05/87 TIME: 3:05 PM
DATE RECEIVED: 11/05/87 TIME: 4:50 PM
DATE COMPLETED: 11/06/87
SCHEDULED COMPLETION: 11/09/87
ANALYST: WH
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 7

	PUMP DISCHARGE	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	82777		
TRICHLOROETHYLENE	55	0.10	ppm
	290	0.53	mg/m3



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: T.L.
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 11/06/87 TIME: 1:56 PM
DATE RECEIVED: 11/06/87 TIME: 3:55 PM
DATE COMPLETED: 11/06/87
SCHEDULED COMPLETION: 11/09/87
ANALYST: WH
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 30

	PUMP DISCHARGE	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	82789		
TRICHLOROETHYLENE	50	0.10	ppm
	270	0.53	mg/m3

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: CATHIE COTTON
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 11/02/87 TIME:
DATE RECEIVED: 11/03/87 TIME: 4:10 PM
DATE COMPLETED: 11/06/87
SCHEDULED COMPLETION: 11/05/87
ANALYST: WH
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 1

	#1	#2	#3	#4	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	82582	82583	82584	82585		
TRICHLOROETHYLENE	27	57	97	14	0.10	ppm
	140	300	520	74	0.53	mg/m3



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY:
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 00/00/00 TIME:
DATE RECEIVED: 11/12/87 TIME: 4:50 PM
DATE COMPLETED: 11/19/87
SCHEDULED COMPLETION: 11/19/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 40

			DETECTION LIMIT	UNITS
	PUMP 11/9 DISCHARGE	PUMP 11/12 DISCHARGE		
EDI SAMPLE NO:	83153	83154		
TRICHLOROETHYLENE	60	67	0.10	ppm
	320	360	0.53	mg/m3

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET PLANT
SAMPLED BY: JOE MAVES
DESCRIPTION: SOIL VAPOR PILOT STUDY

DATE SAMPLED: 00/00/00 TIME:
DATE RECEIVED: 11/19/87 TIME: 10:30 AM
DATE COMPLETED: 11/19/87
SCHEDULED COMPLETION: 11/24/87
ANALYST: JE
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 20

			DETECTION LIMIT	UNITS
	PUMP 11/16 DISCHARGE	PUMP 11/9 DISCHARGE		
EDI SAMPLE NO:	83359	83360		
TRICHLOROETHYLENE	65	64	0.10	ppm
	350	340	0.53	mg/m3



1. THE SYSTEM WILL BE SHIPPED TO THE PLANT IN THREE UNITS:
 - THE BLOWER/MUFFLER SYSTEM AND ELECTRICAL CONTROLS
 - THE KNOCK-OUT DRUM
 - HOSES
2. SYSTEM ASSEMBLY WILL BE LIMITED TO CONNECTING THE HOSES WITH HOSE CLAMPS OR KAM-LOCK QUICK DISCONNECTS. THE 2" LINE THAT RUNS FROM THE WELL TO THE BLOWER SYSTEM WILL BE INSTALLED BY CPC OR EDI IN THE FIELD.
3. CPC WILL BRING ELECTRICAL POWER TO THE SYSTEM. POWER REQUIREMENTS ARE:
 - 460 V, 3 PHASE FOR THE 5 HP BLOWER MOTOR
 - 120 V, 1 PHASE FOR THE FLOWMETER POWER SUPPLY

CPC - GRAND RAPIDS PLANT

**SOIL VACUUM SYSTEM
SCHEMATIC**

AUGUST, 1967

Results of ...

Phase IV - B Hydrogeological Investigation

for ...



**General Motors Corporation
CPC Group
Grand Rapids, Michigan**

July, 1988

20775

EDI Engineering & Science

Environmental Engineering, Geology, Biology and Chemistry
Grand Rapids, MI (616) 942-0930



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- 2.0 Scope of Work**
- 3.0 Methods**
- 4.0 Development of Well 87-5**
 - 4.1 Previous Work**
 - 4.2 Current Work**
- 5.0 Mini Pump Tests**
- 6.0 Conclusions**
- 7.0 Recommendations**

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- 2 Pump Test for Well 86-2 at 3/4 gpm**
- 3 Recovery for Well 86-2**
- 4 Well 86-2 Comparison of Recovery and Conductivity**
- 5 Estimated Areal Influence of Well 86-2 at 86 GPM**
- 6 Pump Test for Well 87-5 at 1 gpm**
- 7 Recovery for Well 87-5**

Appendices

- A Summary for Development of Well 87-5**
- B Pump Test Data**
- C Model Results and Plots**

SOURCE AREA GROUNDWATER REPORT PHASE IV-B

1.0 INTRODUCTION

Previous work in the former degreaser area at Column T-27 has delineated the extent of groundwater contamination from trichloroethylene (TCE) (See EDI report "Phase III-A Hydrogeological Investigation" dated March, 1987). The current phase of work was undertaken to assess the potential for removal of TCE from the groundwater and the control of groundwater flow in the source area to lessen the impact of the TCE source on the groundwater.

2.0 SCOPE OF WORK

The original scope of work included the development and an aquifer test of well 87-5 with monitoring of the nearby wells (Figure 1).

The scope of work was modified because of the poor yield of well 87-5 even after considerable development. The pumping test of well 87-5 was abandoned. Instead, mini-pump tests of wells 86-2, 87-1, 87-4, and 87-5 were conducted to determine the formation characteristics in those locations and to determine if adequate source area groundwater recovery and control was possible using these existing wells.

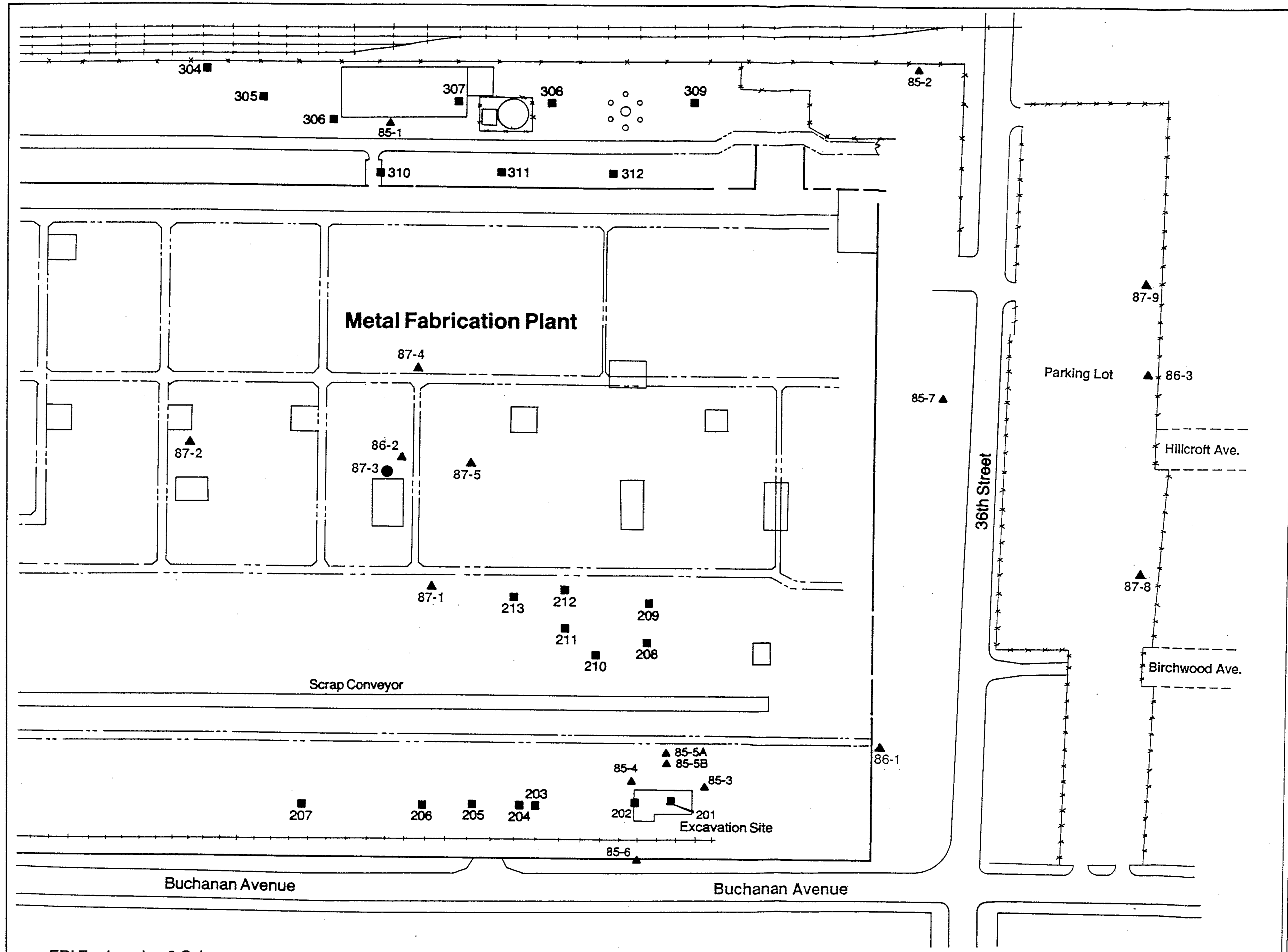
3. METHODS

The development work on well 87-5 was completed using CME 45 drilling equipment. Water levels were measured with a wetted tape. The development techniques are more fully described in the development section below and in Appendix A.

The mini-pump tests were conducted using an air-driven Isco bladder pump and *In-situ* Hermit data logger for recording groundwater levels. A wetted steel tape was used to reference the data logger. The groundwater recovered was pumped to barrels temporarily and transferred to the sanitary sewer at the steam-clean booth at column O-27.

The model of the influence of well 86-2 was constructed using a two-dimensional finite element numerical computer program.¹

(¹Townley, Lloyd R. and John L. Wilson, Description and User's Manual for a Finite Element Aquifer Flow Model Aquifer-1, Technology Adaptation Program Report No. 79-3, Massachusetts Institute of Technology, 1980.)



Legend

- ▲ Existing Monitoring Wells
- Soil Vapor Well
- Soil Boring Drilled By Soils and Materials Engineers March, 1985

0 100 150 200 300
 Scale in Feet

Figure 1

Well Locations

General Motors Corp./CPC Group
 Grand Rapids, Michigan

December, 1987 20775

4.0 DEVELOPMENT OF WELL 87-5

4.1 PREVIOUS WORK

Well 87-5 was set with 4 inch casing during the Phase III-A Investigation in anticipation that it was in the right place to intercept water from the source area, if necessary. The aquifer was sampled throughout its thickness with temporary wells set through 6-inch OD hollow stem augers. The augers were extended into the confining clay beneath the aquifer to confirm aquifer thickness. The permanent 4-inch well was set at its intended depth through the same boring using 10-inch OD hollow stem augers. The well was not developed when it was set because special procedures were required due to an additional upper screen set in the unsaturated soils. When the well was purged and sampled, the apparent yield of the well was less than 1 GPM. The expected pumping rate was 30 to 50 GPM. Our initial assessment of the low yield was that clay dragged upward by the augers coated the walls of the borehole.

4.2 CURRENT WORK

A considerable effort was made during the current phase of work to develop well 87-5 as a significant purge well for groundwater control of the source area. A summary and the field notes are included in Appendix A. The well was developed using several techniques.

In the first method, tri-sodium phosphate (TSP) was introduced to the well and allowed to react to disperse clay particles. Then, a rod pump was installed to remove water, clay and fine sand. The sequence of steps was repeated several times.

In the second method, TSP was again introduced to the well and allowed to react. Then surge blocks were installed in the well to push water through the screen in both directions. Finally, a submersible pump was used to remove water, clay, and fine sand. The sequence was repeated several times.

In the third method, completed later during the mini-pump tests, sulfamic acid was introduced to the well, allowed to react for two hours, and the well pumped with a bladder pump.

During the first two development sessions, significant clay and fine sand was recovered from the well. Clay and fine sand equivalent to 20% of the borehole volume adjacent to the screen was removed. The sustainable pumping rate increased only to 2 GPM. By the

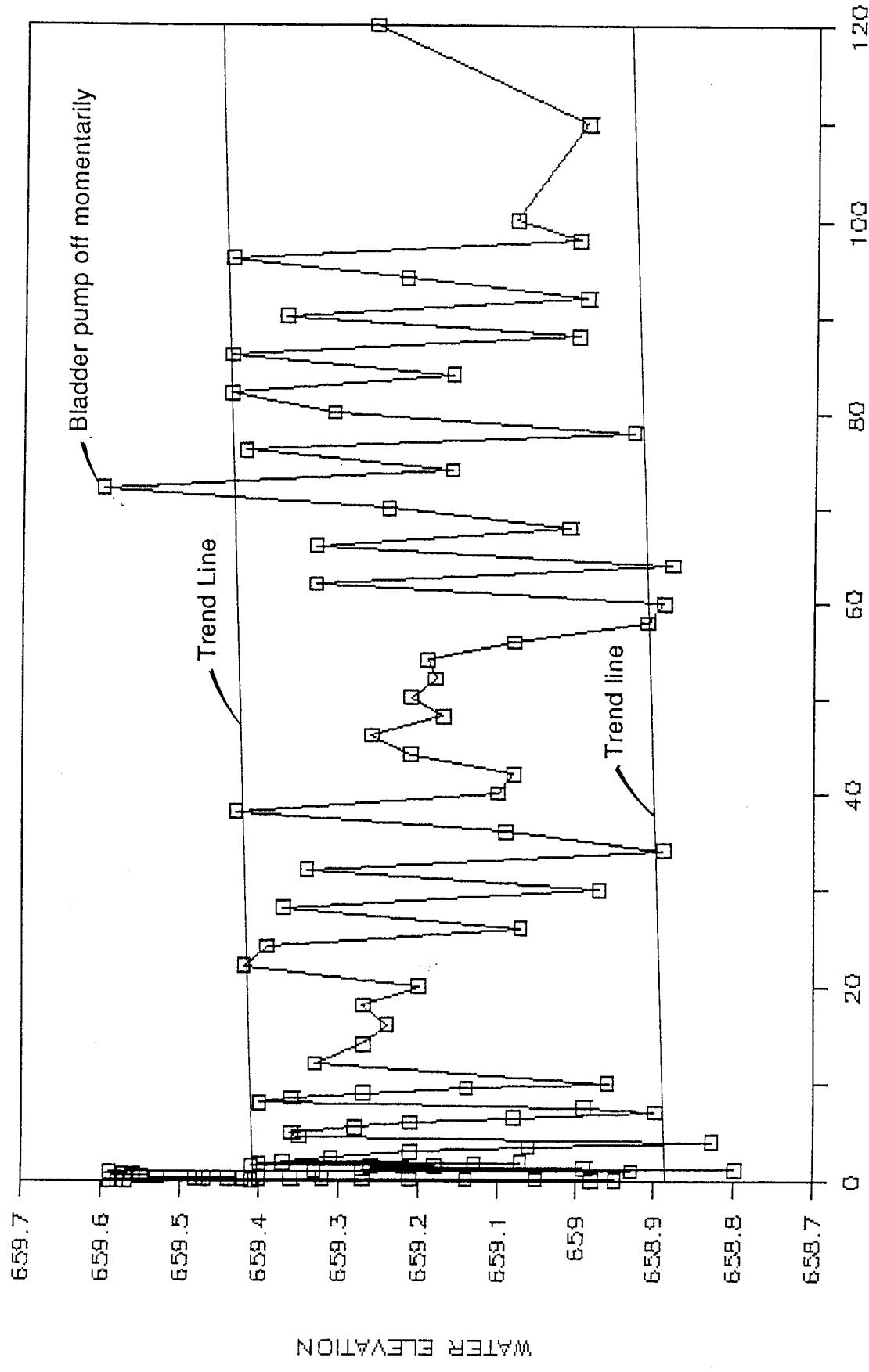
end of the second session, the groundwater recovered no longer contained significant quantities of clay. Further development would not change the yield of the well. The acid treatment of the well caused additional fine sand to be removed via the bladder pump. However, the sustainable pumping rate did not significantly improve.

The lack of significant increase in specific yield of the well during development despite removal of significant quantities of clay and fine sand indicates that the formation surrounding the well is less permeable than would be estimated from the original log. Continued development of the well is not warranted. A small increase in yield is all that could be expected and would not provide a significant recovery well for purging contaminated groundwater and for control of the groundwater flow in the source area.

5.0 MINI PUMP TESTS

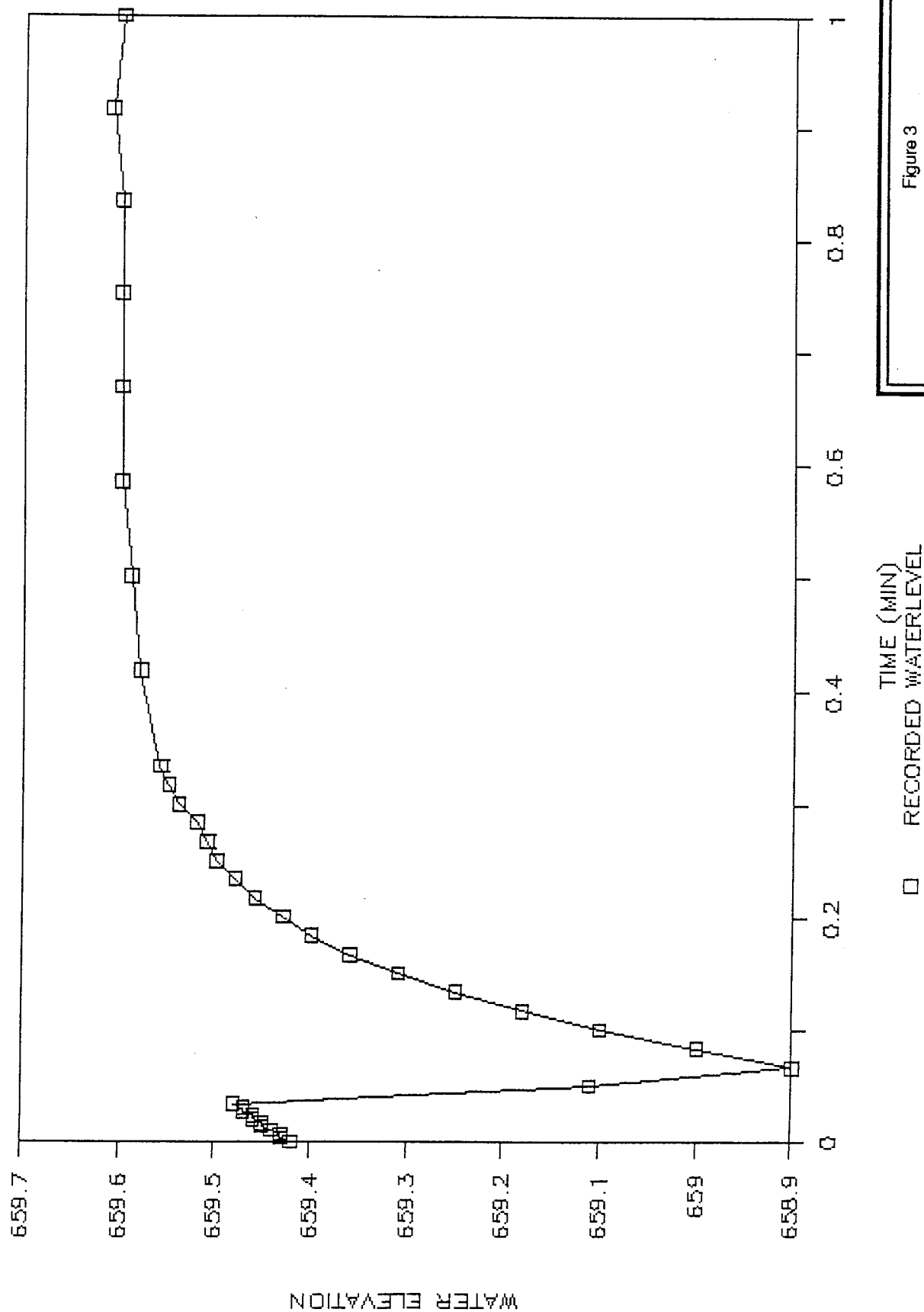
The water elevations resulting from pumping well 86-2 with an air-driven bladder pump are listed in Appendix B. Figure 2 is a graph of the water elevation versus time. The surging characteristic of the bladder pump is evident from the graph. The overall trend, however, showed the water level stabilizing very quickly in the well. Comparison of the drawdown curve with the recovery curve plotted in Figure 3 shows a very similar and rapid response to the change in water level. The hydraulic conductivity of the aquifer at well 86-2 had been previously calculated to be $K=30$ feet/day. Comparison in Figure 4 of the rate of stabilization for the conductivity test and the recovery from the pump test shows the recovery of the pump test to be slower. The well had not been pumped previous to the mini-pump test during the last year. Tests of hydraulic conductivity for non-pumping wells sometimes show a decrease in hydraulic conductivity over time. When these wells are pumped or redeveloped the response rate will recover at least partially.

The well was pumped at $3/4$ GPM for two hours to determine if the pumping rate is sustainable. The water level stabilized and within the accuracy allowed by the bladder pump surge shows a slight trend upward in water level during the test. The slight upward trend may indicate the well was regaining some of its response rate. The drawdown created by the $3/4$ GPM pumping rate was .45 ft as measured near the beginning of the pump test before the upward trend in water level is apparent. The conservatively calculated specific capacity of Well 86-2 is thus 1.67 GPM/ft. The top of the well screen is set 5.5 feet below the water table and the screen extends an additional five feet into the groundwater. The maximum long term pumping rate is that obtainable by pulling the



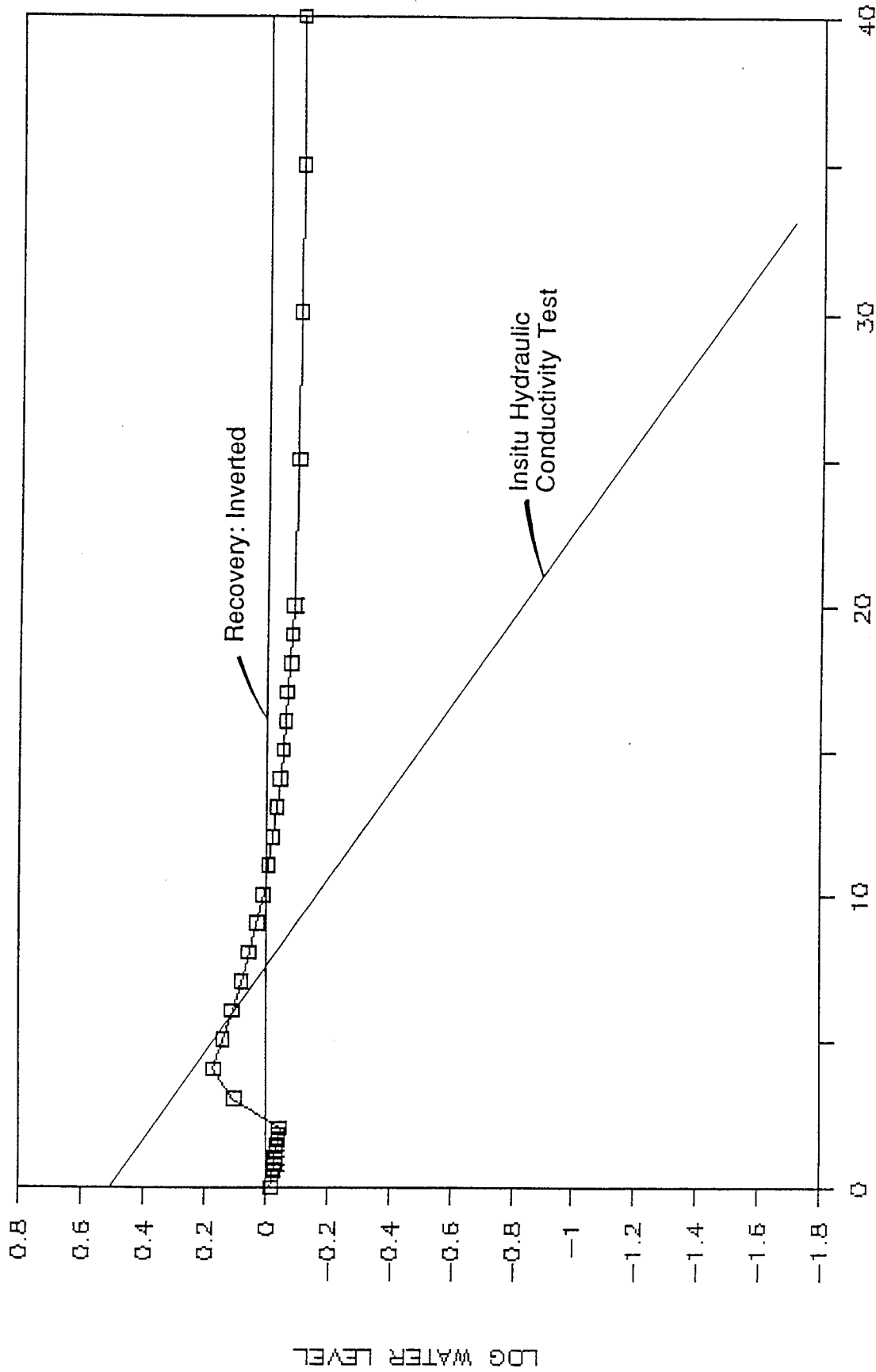
□ RECORDED WATERLEVEL

Figure 2
CPC Source Area Pump Tests
Well 86-2 9/23/87 3/4 GPM
 General Motors Corp./CPC Group
 Grand Rapids, Michigan



(Note Time Scale Change from Figure 2)

Figure 3
 CPC Source Area Pump Tests
 Well 86-2 9/23/87 Recovery
 General Motors Corp./CPC Group
 Grand Rapids, Michigan
 July, 1988



□ 9/87 INVERTED LEVEL

Figure 4

CPC Well 86-2 Comparison
9/87 Recovery VS 5/86 Conductivity
 General Motors Corp./CPC Group
 Grand Rapids, Michigan

water level at the well down to the top of the screen. The calculated sustainable pumping rate of the well would be $1.67 \text{ GPM/ft} \times 5.5\text{ft} = 9 \text{ GPM}$. For long term operating purposes, the pumping rate should be considered as 8 GPM. If the pumping of the well enhances the redevelopment of the well, the ultimate rate of sustainable pumping may be 10 GPM.

Well 86-2 is located immediately adjacent to the suspected source area, so the pumping of the well will pull groundwater through the most contaminated zone of the aquifer. The pumping of well 86-2 will create a cone of depression in the groundwater around the well. Since the source area is located centrally within the plant, the normal rainfall recharge to this water table aquifer will not be present in the source area. Recharge to the groundwater in the source area is only available through the movement of water along the flow gradient in the aquifer. A numerical model was constructed of the drawdown created by the pumping of well 86-2 within the normal gradient of the aquifer beneath the plant. The normal gradient beneath the plant was simulated in this simplified model by fixing the water levels on the north and south sides of the model area with an appropriate elevation difference for the gradient. The distributions of water levels around the well were calculated using a range of hydraulic conductivity from 3 ft/day to 30 ft/day and pumping rates bracketing 8 GPM. Pumping rates were adjusted for the maintenance of five feet of drawdown in some trials. The resulting cone of depression of the well is on the order of 100ft to 200ft radius. Figure 5 shows the estimated cone of depression and areal influence of well 86-2. The areal influence of the well is that area from which groundwater flows into the well. It extends upgradient far beyond the source in the shape of a parabola with the focus at the well. Representative graphs of the model runs are included in Appendix C.

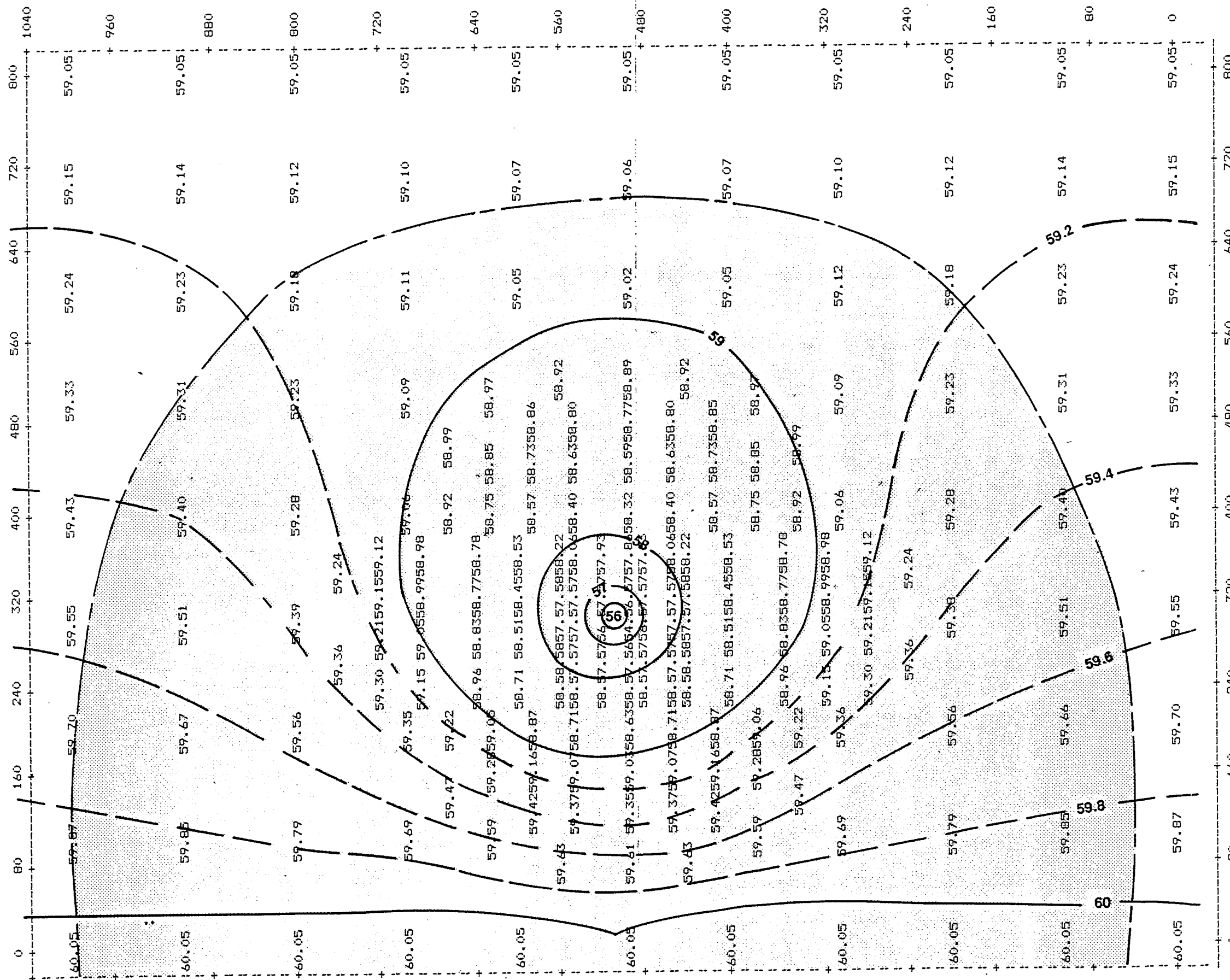
The other locations on site where hydraulic conductivity has been measured are a significant distance from the source area to the northeast, north, and northwest. The other locations all have higher values of hydraulic conductivity than does the source area. If the hydraulic conductivity of the aquifer in the source area increases rapidly away from well 86-2, the cone of depression of well 86-2 would be significantly reduced. The available information does not provide a definitive answer. Monitoring of the water levels in the plant wells and particularly the four wells around the source area will define the areal extent of the cone of depression if it extends at least 100 feet. If the cone is not defined at the nearby existing wells, two additional monitor wells nearer to well 86-2 would be useful for determining its area of influence.

The pumping of well 86-2 will flush the groundwater in the source area within its capture zone. The capture zone of the well is that area defined by both the areal influence of the well and the source area contamination. Approximately 20,000 square feet are in the capture zone. The volume of water in the aquifer in the capture zone would be the area in the capture zone X aquifer thickness X aquifer porosity = 20,000 sq ft X 25 ft X .25 = 125,000 cu ft. The well will remove 1540 cu ft/day at 8 gpm, so removal of one capture zone volume of water will take approximately 80 days.

The concentration of TCE measured in well 86-2 previously was 90 mg/l. Calculation of the rate of removal of TCE at 8 GPM yields .35 lb/hr or 8.4 lb/day. If the pumping of well 86-2 removes the volume of the capture zone in approximately 80 days, then the concentration of TCE would decrease over a time period of a few months (three volumes of the capture zone) to approximately half its previously measured concentration. Because of the likely circumstance that residual TCE liquids are in the soils below the water table, the concentration of TCE in the groundwater reaching well 86-2 should stabilize until the residuals are depleted. The removal rate of TCE should still be on the order of 4 lb/day. Operation of a pumping system in well 86-2 will remove a significant amount of TCE from the source area.

Wells 87-1 and 87-4 are two inch wells set east and west of the source area respectively. These wells were constructed with an upper screen in the soils above the water table for use with the soil vapor removal system. Because of the upper screens, the use of these wells for pumping of groundwater has to be approached in a different manner. The bladder pump could not be lowered completely through the upper screen. The lower portion of the bladder pump was submerged in the groundwater and the pump was operated at 1/2 GPM for a period of 1-1/2 hours on each well. The water level was not lowered below the level of the pump in either well during the test period. The top of the well screen is two feet below the surface of the groundwater in both wells 87-1 and 87-4. We estimate that 2 GPM is the maximum sustainable pumping rate for each well.

Well 87-5 was pumped with the bladder pump to determine its specific capacity following treatment with acid. Figure 5 is the drawdown caused by pumping at 1 GPM, and Figure 6 is the recovery of the well. The estimated specific capacity of the well is 0.10 GPM/ft. With approximately 20 feet of drawdown available to the top of the well screen, the sustainable pumping rate would be 2 GPM.



Legend

- Water Level Contour Line
- Zone of Influence

Aquifer Well Drawdown Model:
Pumping well 86-2 at 8gpm K=6

Time = 20.00000

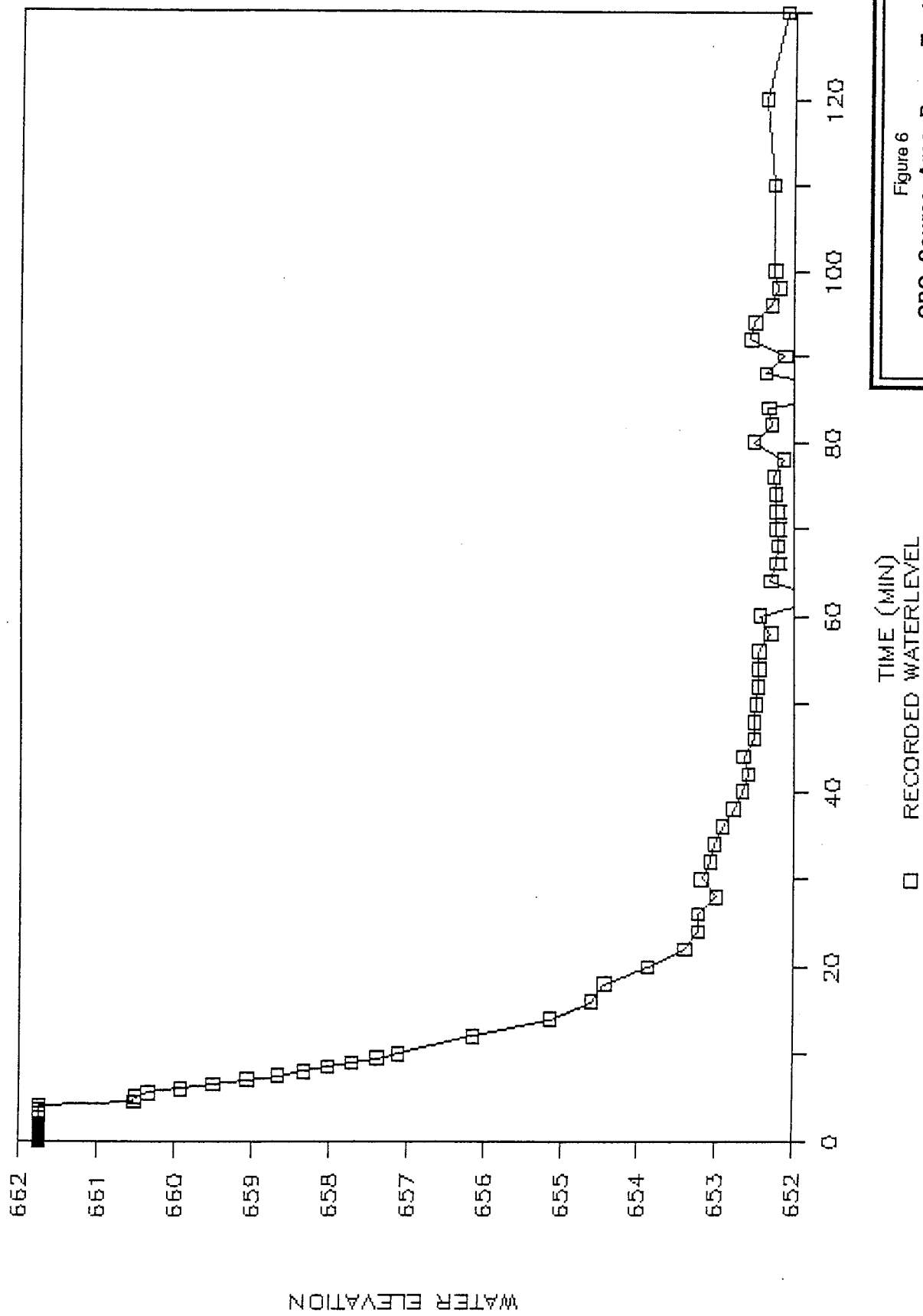
X Coordinates Range from .00 to 800.00

Y Coordinates Range from .00 to 1000.00

Scale: 1/3000.

Figure 5

General Motors Corp./CPC Group
Grand Rapids, Michigan



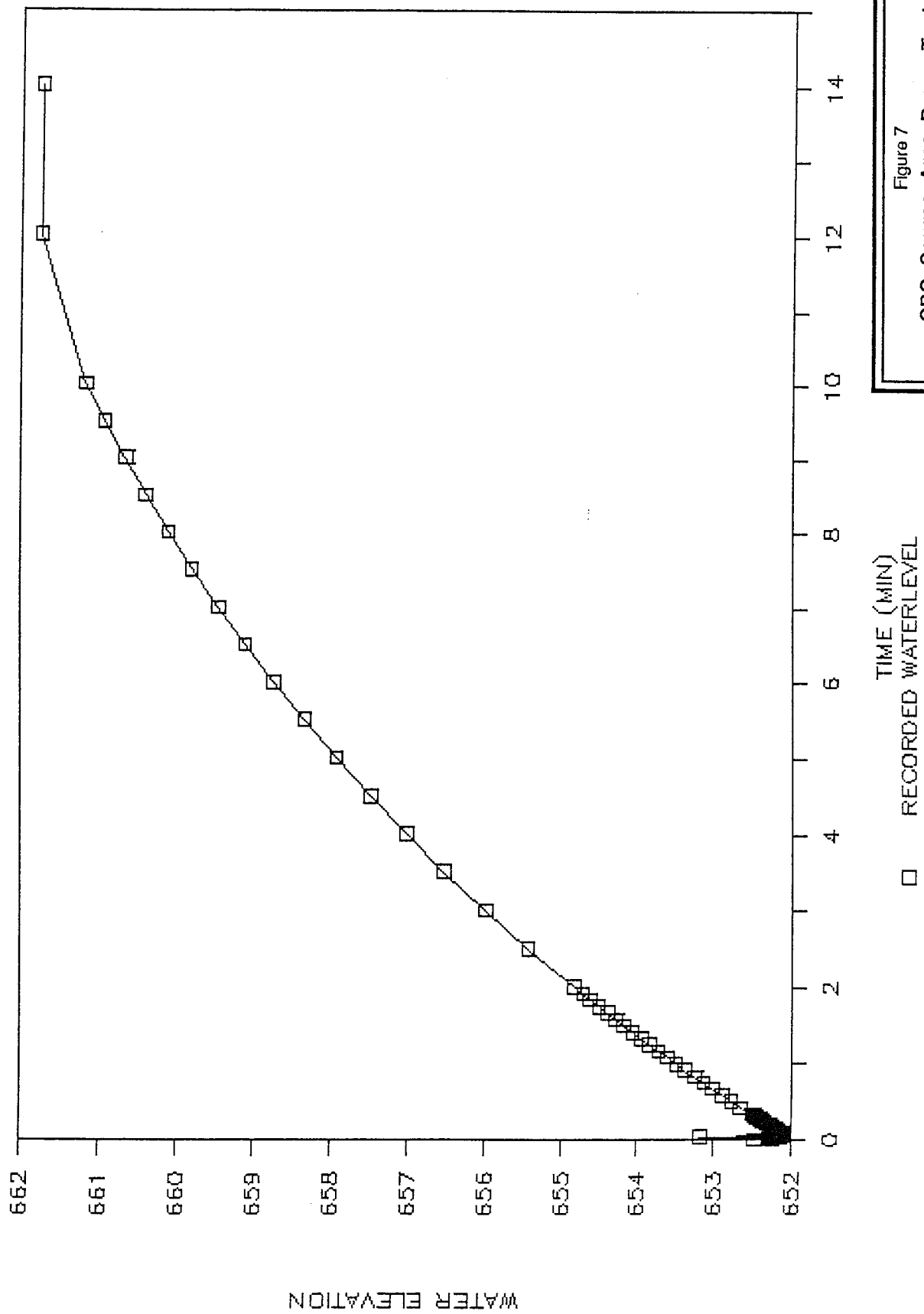


Figure 7

CPC Source Area Pump Tests
Well 87-5 9/24/87 Recovery
General Motors Corp./CPC Group
Grand Rapids, Michigan

July, 1988

20775

6.0 CONCLUSIONS

1. Additional development of well 87-5 is unwarranted. The well can be used for monitoring purposes but is not suitable for use as a groundwater purge well.
2. Well 86-2 should be used to recover groundwater with high levels of TCE. The rate of recovery would initially be approximately 8 lb/day. The concentrations will decrease over the time required to remove three volumes from the capture zone. Assuming the presence of residual liquids, an estimate of longer term recovery of TCE would be 4 lb/day. This estimate represents the high side of expected long-term recovery rates.
3. The zone of influence of well 86-2 appears to cover a significant portion of the source area, based on a simplified model of the site. Pumping of the well will impede the flow of TCE out of the source area.

7.0 RECOMMENDATIONS

1. Install a shallow well jet pump in well 86-2 to recover ground water at 8 to 10 GPM.
2. Treat the ground water with steam stripping or aqueous carbon adsorption depending upon the cost effectiveness of the alternatives.
3. Discharge the treated water to the sanitary sewer with TOX concentrations not to exceed 2.1 ppm, total.
4. Evaluate the performance of the ground water recovery system during the first thirty days of operation to 1) determine the effectiveness of the well in controlling the source area ground water, and 2) estimate the trend of the ground water TCE concentrations.
5. Install two additional shallow monitoring wells in the source area if the cone of depression of well 86-2 cannot be determined accurately by the other existing monitoring wells.

APPENDIX A
Summary for Development of
Well 87-5

DEVELOPMENT OF WELL 87-5

The following is a summary of the field work accomplished.

Monday, August 31, 1987

Previous attempts at pumping the well gave a yield of 1 gpm with submersible pump at a pwl of 50 feet.

Four-and-one-half pounds of TSP was pumped down the well which had a 30-foot water column. Pumping was then started with a 4-inch plunger. Volume was unable to be determined because water ran out of the upper screen. Pumping continued for 15 minutes. The plunger was then pulled and the well head closed.

Tuesday, September 1, 1988

1. Installed 2-inch casing and screen and then rod pumped at a rate of 1 gpm which resulted in very muddy water.
2. A 4-inch plunger pump was then installed, followed by the installation of a 2- by 4-inch K-packer above and below the upper screen. Pumping at 1 gpm resulted in muddy water.
3. Four-and-one-half pounds TSP was added and allowed to sit for 2 hours. The well pressurized with fresh water, 200 gallons backwash pumped with submersible pump at 1 gpm, backwash 100 gallons of water at 2.5 gpm.

September 3, 1987

1. Four-and-one-half pounds TSP was added.
2. A K-packer was installed to split the 10-foot screen into two sections for development surging. "A" is the lower section; "B" is the upper section.
3. Surge "A" for 40 minutes. Surge "B" for 20 minutes.
4. Pumped 70 gallons of muddy water with submersible pump (trace of sand).
5. Four-and-one-half pounds TSP was added.
6. Surge "A" for 30 minutes. Surge "B" for 30 minutes.
7. Pumped 50 gallons of cloudy water then 20 gallons of semi-cloudy water and 7 cc sand/liter.

September 4, 1987

1. Surge "A" for 40 minutes. Surge "B" for 40 minutes.
2. Pumped 30 gallons of cloudy water, then semi-cloudy, then semi-clear and 2 cc sand/liter; then clear and sand-free.
3. Four pounds TSP was added.
4. Surge "A" for 60 minutes. Surge "B" for 60 minutes.
5. Pumped 60 gallons of muddy water, then 20 gallons of cloudy water, then 20 gallons clear with some sand.

September 8, 1987

1. Four pounds TSP was added. Surged "A" 45 minutes (9-9:45).
2. Four pounds TSP was added and 2 gallons of water. Surged "B" 55 minutes (10:05-11:00).
3. Pumped 20 gallons in two minutes; very cloudy with fine sand. Flow rate then dropped to 1-3/4 gpm. Purged 15 minutes; cloudy to semi-cloudy, loss of sand. Sand cone 0.3 cc sand after settling 10 minutes.
4. Added 4 pounds TSP with 2-2.5 gallons of water. Surged "A" 30 minutes (12:30-1:00).
5. Added 4 pounds TSP with 2 gallons of water. Surged "B" 25 minutes (1:20-1:45).
6. Purged 20 gallons at 12 gpm with submersible pump; very cloudy with sand. After approximately 2 minutes dropped rate to 1-3/4 gpm. Purged at 1-3/4 for 15 minutes; sand cone 0.5 cc/liter. After 25 minutes, purging little to no sand.

APPENDIX B
Pump Test Data

Well 86-2

Drawdown		1.5000	22.12	84.0000	22.22
SE10008		1.5833	22.20	86.0000	21.94
Environmental Logger		1.6667	21.97	88.0000	22.38
09/23 17:09		1.7500	22.25	90.0000	22.01
		1.8333	21.98	92.0000	22.39
Unit# 00004 Test# 0		1.9167	22.31	94.0000	22.16
		2.0000	22.01	96.0000	21.94
INPUT 1: Level (F) TOC		2.5000	22.07	98.0000	22.38
		3.0000	22.17	100.0000	22.30
Reference 21.81		3.5000	22.32	110.0000	22.39
Scale factor 10.09		4.0000	22.55	120.0000	22.12
Offset 0.00		4.5000	22.03	END	
		5.0000	22.02		
Step# 0 09/23 13:16		5.5000	22.10		
		6.0000	22.17		
Elapsed Time Value		6.5000	22.30		
-----		7.0000	22.48		
0.0000 21.81		7.5000	22.39		
0.0033 21.81		8.0000	21.98		
0.0066 21.80		8.5000	22.02		
0.0099 21.80		9.0000	22.11		
0.0133 21.80		9.5000	22.24		
0.0166 21.80		10.0000	22.42		
0.0200 21.80		12.0000	22.05		
0.0233 21.80		14.0000	22.11		
0.0266 21.79		16.0000	22.14		
0.0300 21.80		18.0000	22.11		
0.0333 21.80		20.0000	22.18		
0.0500 21.79		22.0000	21.96		
0.0666 21.79		24.0000	21.99		
0.0833 21.79		26.0000	22.31		
0.1000 21.79		28.0000	22.01		
0.1166 21.97		30.0000	22.41		
0.1333 22.40		32.0000	22.04		
0.1500 22.43		34.0000	22.49		
0.1666 22.33		36.0000	22.29		
0.1833 22.24		38.0000	21.95		
0.2000 22.17		40.0000	22.28		
0.2166 22.11		42.0000	22.30		
0.2333 22.06		44.0000	22.17		
0.2500 22.02		46.0000	22.12		
0.2666 21.98		48.0000	22.21		
0.2833 21.96		50.0000	22.17		
0.3000 21.94		52.0000	22.20		
0.3166 21.91		54.0000	22.19		
0.3333 21.90		56.0000	22.30		
0.4167 21.85		58.0000	22.47		
0.5000 21.83		60.0000	22.49		
0.5833 21.82		62.0000	22.05		
0.6667 21.82		64.0000	22.50		
0.7500 21.81		66.0000	22.05		
0.8333 21.81		68.0000	22.37		
0.9167 21.79		70.0000	22.14		
1.0000 22.45		72.0000	21.78		
1.0833 22.05		74.0000	22.22		
1.1667 22.58		76.0000	21.96		
1.2500 22.11		78.0000	22.45		
1.3333 22.39		80.0000	22.07		
1.4166 22.16		82.0000	21.94		

Well 86-2 Recovery

SE10008	1.5000	21.78
Environmental Logger	1.5833	21.77
09/23 17:12	1.6667	21.77
	1.7500	21.77
	1.8333	21.77
Unit# 00004 Test# 0	1.9167	21.78
	2.0000	21.78
INPUT 1: Level (F) TOC	2.5000	21.77
	3.0000	21.77
Reference 21.81	3.5000	21.77
Scale factor 10.09	4.0000	21.77
Offset 0.00	4.5000	21.77
	5.0000	21.77
Step# 1 09/23 15:19	5.5000	21.77
	6.0000	21.77
Elapsed Time Value	6.5000	21.77
-----	7.0000	21.77
0.0000 21.96	7.5000	21.77
0.0033 21.95	8.0000	21.77
0.0066 21.95	8.5000	21.77
0.0099 21.94	9.0000	21.77
0.0133 21.93	9.5000	21.77
0.0166 21.93	10.0000	21.77
0.0200 21.92	12.0000	21.77
0.0233 21.92	14.0000	21.77
0.0266 21.91	16.0000	21.77
0.0300 21.91	18.0000	21.77
0.0333 21.90	20.0000	21.77
0.0500 22.27	22.0000	21.77
0.0666 22.48	24.0000	21.77
0.0833 22.38	26.0000	21.77
0.1000 22.28	28.0000	21.77
0.1166 22.20	30.0000	21.77
0.1333 22.13	32.0000	21.77
0.1500 22.07	34.0000	21.76
0.1666 22.02	36.0000	21.75
0.1833 21.98	38.0000	21.76
0.2000 21.95	40.0000	21.76
0.2166 21.92	42.0000	21.76
0.2333 21.90		
0.2500 21.88	END	
0.2666 21.87		
0.2833 21.86		
0.3000 21.84		
0.3166 21.83		
0.3333 21.82		
0.4167 21.80		
0.5000 21.79		
0.5833 21.78		
0.6667 21.78		
0.7500 21.78		
0.8333 21.78		
0.9167 21.77		
1.0000 21.78		
1.0833 21.77		
1.1667 21.77		
1.2500 21.78		
1.3333 21.78		
1.4166 21.77		

Well 87-5 Drawdown

SE1000B
Environmental Logger
09/25 08:50

Unit# 00004 Test# 0

INPUT 1: Level (F) TOC

Reference 19.03
Scale factor 10.09
Offset 0.00

Step# 1 09/24 15:19

Elapsed Time Value

0.0000	28.29
0.0033	28.51
0.0066	28.48
0.0099	28.49
0.0133	28.48
0.0166	28.48
0.0200	28.48
0.0233	28.47
0.0266	28.46
0.0300	28.62
0.0333	27.59
0.0500	28.54
0.0666	28.64
0.0833	28.64
0.1000	28.61
0.1166	28.59
0.1333	28.57
0.1500	28.53
0.1666	28.51
0.1833	28.49
0.2000	28.46
0.2166	28.43
0.2333	28.41
0.2500	28.39
0.2666	28.36
0.2833	28.32
0.3000	28.31
0.3166	28.28
0.3333	28.26
0.4167	28.11
0.5000	27.99
0.5833	27.87
0.6667	27.74
0.7500	27.63
0.8333	27.51
0.9167	27.38
1.0000	27.27
1.0833	27.16
1.1667	27.04
1.2500	26.93
1.3333	26.82
1.4166	26.70

1.5000	26.59
1.5833	26.49
1.6667	26.38
1.7500	26.27
1.8333	26.16
1.9167	26.06
2.0000	25.95
2.5000	25.35
3.0000	24.79
3.5000	24.25
4.0000	23.77
4.5000	23.30
5.0000	22.85
5.5000	22.44
6.0000	22.04
6.5000	21.67
7.0000	21.32
7.5000	20.98
8.0000	20.67
8.5000	20.38
9.0000	20.11
9.5000	19.85
10.0000	19.60
12.0000	19.03
14.0000	19.03
16.0000	19.03
18.0000	19.03
20.0000	19.03
22.0000	19.03
24.0000	19.03
26.0000	19.03
28.0000	19.03
30.0000	19.03

END

Well 87-5 Recovery

		1.5000	19.03	84.0000	28.44
SE10008		1.5833	19.03	86.0000	29.79
Environmental Logger		1.6667	19.03	88.0000	28.40
09/25 08:47		1.7500	19.03	90.0000	28.64
		1.8333	19.03	92.0000	28.21
Unit# 00004 Test# 0		1.9167	19.03	94.0000	28.26
		2.0000	19.03	96.0000	28.48
INPUT 1: Level (F) TOC		2.5000	19.03	98.0000	28.56
		3.0000	19.03	100.000	28.51
Reference 19.03		3.5000	19.03	110.000	28.50
Scale factor 10.09		4.0000	19.03	120.000	28.40
Offset 0.00		4.5000	20.24	130.000	28.66
		5.0000	20.26		
Step# 0 09/24 13:07		5.5000	20.42	END	
		6.0000	20.85		
Elapsed Time Value		6.5000	21.27		
-----		7.0000	21.71		
0.0000 19.03		7.5000	22.11		
0.0033 19.03		8.0000	22.44		
0.0066 19.03		8.5000	22.75		
0.0099 19.03		9.0000	23.06		
0.0133 19.03		9.5000	23.38		
0.0166 19.03		10.0000	23.65		
0.0200 19.03		12.0000	24.63		
0.0233 19.03		14.0000	25.63		
0.0266 19.03		16.0000	26.17		
0.0300 19.03		18.0000	26.33		
0.0333 19.03		20.0000	26.88		
0.0500 19.03		22.0000	27.36		
0.0666 19.03		24.0000	27.53		
0.0833 19.03		26.0000	27.52		
0.1000 19.03		28.0000	27.76		
0.1166 19.03		30.0000	27.57		
0.1333 19.03		32.0000	27.68		
0.1500 19.03		34.0000	27.73		
0.1666 19.03		36.0000	27.84		
0.1833 19.03		38.0000	27.98		
0.2000 19.03		40.0000	28.09		
0.2166 19.03		42.0000	28.17		
0.2333 19.03		44.0000	28.11		
0.2500 19.03		46.0000	28.24		
0.2666 19.03		48.0000	28.24		
0.2833 19.03		50.0000	28.27		
0.3000 19.03		52.0000	28.30		
0.3166 19.03		54.0000	28.31		
0.3333 19.03		56.0000	28.31		
0.4167 19.03		58.0000	28.46		
0.5000 19.03		60.0000	28.32		
0.5833 19.03		62.0000	29.16		
0.6667 19.03		64.0000	28.46		
0.7500 19.03		66.0000	28.54		
0.8333 19.03		68.0000	28.55		
0.9167 19.03		70.0000	28.54		
1.0000 19.03		72.0000	28.54		
1.0833 19.03		74.0000	28.53		
1.1667 19.03		76.0000	28.50		
1.2500 19.03		78.0000	28.63		
1.3333 19.03		80.0000	28.24		
1.4166 19.03		82.0000	28.48		

APPENDIX C
Model Results and Plots

[illegible]

NOVEMBER 1979 VERSION

PROBLEM DESCRIPTION	PROBABLE CAUSE	SOLUTION
1. The engine will not start.	a. Fuel pump is not working. b. Spark plug is not working. c. Battery is not charged.	a. Check fuel pump and replace if necessary. b. Check spark plug and replace if necessary. c. Charge battery or replace if necessary.
2. The engine is running but the car is not moving.	a. Transmission is not in gear. b. Clutch pedal is not working.	a. Check transmission and shift lever. b. Check clutch pedal and cable.
3. The car is running but the lights are not working.	a. Light bulbs are not working. b. Fuse is blown.	a. Check light bulbs and replace if necessary. b. Check fuse and replace if necessary.
4. The car is running but the brakes are not working.	a. Brake pads are worn. b. Brake fluid is low.	a. Check brake pads and replace if necessary. b. Check brake fluid level and top up if necessary.
5. The car is running but the steering is difficult.	a. Steering rack is worn. b. Power steering pump is not working.	a. Check steering rack and replace if necessary. b. Check power steering pump and belt.

FUNCTION ELEMENT GRID PARAMETERS

=====

NUMBER OF ELEMENTS.....NUMEL= 408
NUMBER OF NODE POINTS.....NUMNP= 223
FLAG FOR PRINTING GEOMETRIC DATA.....
PRGEOM=.T. PRINT GEOMETRIC DATA
PRGEON=.F. DO NOT PRINT GEOMETRIC DATA
FLAG FOR PRINT-FLUTTING GEOMETRIC DATA.....
FLGEOM=.T. PLOT GEOMETRIC DATA
FLGEON=.F. DO NOT PLOT GEOMETRIC DATA
SCALING FACTOR FOR X-COORDINATES.....XSCALE= 10.000
SCALING FACTOR FOR Y-COORDINATES.....YSCALE= 10.000
LARGEST ELEMENT IDENTIFICATION NUMBER.....MAXELT= 408
LARGEST NODE IDENTIFICATION NUMBER.....MAXNOD= 223

1
AQUIFER PROPERTY PARAMETERS
=====

NUMBER OF REGIONS WITH REGIONALLY DEFINED AQUIFER PROPERTIES.....NAOR= 0
NUMBER OF INDIVIDUAL ELEMENTS OR NODES WITH SPECIALLY DEFINED AQUIFER PROPERTIES.....NSPEC= 0
METHOD BY WHICH AQUIFER PROPERTIES ARE GIVEN.....
BYNODE=.T. BY NODES
BYNODE=.F. BY ELEMENTS
METHOD BY WHICH HYDRAULIC PROPERTIES ARE GIVEN.....
PERM=.T. PERMEABILITIES KXX,KYY ARE GIVEN
PERM=.F. TRANSMISSIVITIES TXX,TYY ARE GIVEN

1
BOUNDARY CONDITION PARAMETERS
=====

NUMBER OF PRESCRIBED BOUNDARY HEAD NODES.....NHNODE= 22
NUMBER OF TIMES WHEN PRESCRIBED HEAD BOUNDARY CONDITIONS ARE SET.....NTSH= 1
NUMBER OF NODES WHERE GROUND LEVELS ARE SPECIFIED.....NSGRD= 0
NUMBER OF TIMES WHEN GROUND LEVELS ARE SET.....NTGRD= 0
NUMBER OF FLUX ELEMENTS.....NFLXE= 0
NUMBER OF TIMES WHEN PRESCRIBED BOUNDARY FLUXES ARE SET.....NTFLXE= 0
NUMBER OF REGIONS WITH REGIONAL ELEMENT FLUX.....NEFR= 0
NUMBER OF FLUX SIDES.....NFLXS= 0
NUMBER OF TIMES WHEN PRESCRIBED SIDE FLUXES ARE SET.....NTFLXS= 0
NUMBER OF FLUX NODES.....NFLXN= 1
NUMBER OF TIMES WHEN PRESCRIBED NODE FLUXES ARE SET.....NTFLXN= 2

NUMBER OF 3RD-TYPE BOUNDARY SIDES.....NREC3= 0
 NUMBER OF TIMES WHEN 3RD-TYPE BOUNDARY HEADS ARE SET.....NTEC3= 0
 NUMBER OF NODES ON THE 3RD-TYPE BOUNDARY SIDES.....NNOD3= 0
 3RD-TYPE BOUNDARY PARAMETER.....REDEC3= .F.
 REDEC3=.T. USE RIVER BED LEVELS TO MODIFY 3RD-TYPE INFLOWS
 REDEC3=.F. DO NOT USE RIVER BED LEVELS
 NUMBER OF NODES WHERE HEADS IN ADJACENT AQUIFER ARE GIVEN.....NHADJ= 0
 NUMBER OF TIMES WHEN HEADS IN ADJACENT AQUIFER ARE SET.....NTHADJ= 0
 ADJACENT AQUIFER PARAMETER.....ATTOP= .F.
 ATTOP=.T. ADJACENT AQUIFER IS ABOVE AQUIFER UNDER STUDY
 ATTOP=.F. ADJACENT AQUIFER IS NOT AT TOP
 METHOD OF SUPPLYING ADJACENT HEADS.....HAVARY= .F.
 HAVARY=.T. ADJACENT HEADS VARY IN SPACE
 HAVARY=.F. ADJACENT HEADS ARE CONSTANT
 TYPE OF INITIAL CONDITIONS/GUESSES IF INITIAL=.F.....ICVARY= .T.
 ICVARY=.T. INITIAL CONDITIONS VARY IN SPACE
 ICVARY=.F. INITIAL CONDITIONS ARE CONSTANT

SOLUTION STRATEGY

=====

START TIME.....STRTIM= .0000
 END TIME.....ENDTIM= 100.0000
 TOLERANCE FOR CONVERGENCE.....TOL= .0500
 INDICATOR FOR CONVERGENCE CRITERION.....ITOL= 1
 ITOL=0 ROOT MEAN SQUARE ERROR CRITERION
 ITOL=1 MAXIMUM ABSOLUTE ERROR CRITERION
 MAXIMUM NUMBER OF ITERATIONS.....MAXIT= 5
 TIME STEP.....DT= .01000
 ALPHA PARAMETER FOR TIME INTEGRATION SCHEME.....ALPHA= .5000
 TIME STEP PARAMETER.....DIPARM= 1.1000
 INDICATOR FOR CHANGING TIME STEP.....IDT= 1
 IDT=0 NO CHANGE OF TIME STEP
 IDT=1 DT=DT*DTFARM AFTER NDT TIME STEPS
 IDT=2 DT=DT+DTPARM AFTER NDT TIME STEPS
 NUMBER OF CONSTANT LENGTH TIME STEPS BEFORE CHANGING ACCORDING TO IDT.....NDT= 1
 NUMBER OF ITERATIONS WITH SAME LEFT HAND SIDE SYSM MATRIX.....NSYS= 2
 NSYS=999 REFORM SYSM ONCE EACH TIME STEP

OUTPUT CONTROL

=====

FIRST TIME STEP FOR PRINTED OUTPUT.....ISTFRT= 1000000

NUMBER OF TIME STEPS BETWEEN PRINTED OUTPUTS.....NDTFRT= 1

NUMBER OF SPECIAL PRINTED OUTPUT TIMES.....NOUT= 2

FIRST TIME STEP FOR PLOTTED OUTPUT.....ISTFLT= 1000000

NUMBER OF TIME STEPS BETWEEN PLOTTED OUTPUTS.....NDTFLT= 1

NUMBER OF SPECIAL PLOTTED OUTPUT TIMES.....NFLT= 6

PLOT SCALING FACTOR.....FSCALE= 300.00

INCREMENT FOR LABELLING PLOT AXES.....FDELTA= .00

ROTATION PARAMETER.....NRFLAG= 1

NRFLAG=0 ROTATION OF PLOT IS ALLOWED

NRFLAG=1 NO ROTATION IS ALLOWED, X-AXIS ACROSS THE PAGE

NRFLAG=2 ROTATION IS FORCED, Y-AXIS ACROSS THE PAGE

NUMBER OF ROWS/COLUMNS AROUND PLOT BOUNDARY.....NBOUND= 3

NUMBER OF DECIMAL PLACES IN PLOTTED VALUES OF HEAD.....NDF= 2

THE TOTAL MODEL AREA IS .8000E+06

1 NUMBER OF ELEMENTS (NK) IN SYMMETRIC COMPACTED MATRIX IS 4848

BANDWIDTH OF MATRIX IN FULL FORM WOULD BE 55

27432 WORDS OF STORAGE HAVE BEEN USED OUT OF A TOTAL ALLOCATION OF 500000

CALCULATIONS ARE IN SINGLE PRECISION

1 AQUIFER CHARACTERISTICS

ELEMENT NO	BOTTOM ELEVATION	AQUIFER THICKNESS	KXX	KYY	STORATIVITY	SPECIFIC YIELD	CONF.LAYER K'/B
1	20.00	50.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
2	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
3	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
4	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
5	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
6	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
7	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
8	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
9	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
10	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
11	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
12	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
13	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
14	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00
15	20.00	60.00	6.000E+00	6.000E+00	.000E+00	1.000E-01	.000E+00

[illegible]

144	60,050
145	60,050
146	60,050
147	60,050
148	60,050
149	60,050
170	60,050
171	60,050
192	60,050
193	60,050
194	60,050
202	59,050
203	59,050
204	59,050
205	59,050
206	59,050
207	59,050
208	59,050
216	59,050
219	59,050
220	59,050

NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD	NODE	HEAD
1	59.68	2	59.70	3	59.70	4	59.68	5	59.65	6	59.65	7	59.65	8	59.68	9	59.70	10	59.73
11	59.73	12	59.73	13	59.73	14	59.70	15	59.68	16	59.65	17	59.65	18	59.63	19	59.63	20	59.63
21	59.63	22	59.65	23	59.65	24	59.68	25	59.73	26	59.73	27	59.75	28	59.75	29	59.75	30	59.75
31	59.75	32	59.73	33	59.70	34	59.68	35	59.65	36	59.63	37	59.60	38	59.60	39	59.60	40	59.60
41	59.60	42	59.60	43	59.60	44	59.63	45	59.65	46	59.68	47	59.70	48	59.73	49	59.75	50	59.80
51	59.80	52	59.80	53	59.80	54	59.80	55	59.75	56	59.70	57	59.65	58	59.60	59	59.55	60	59.55
61	59.55	62	59.55	63	59.55	64	59.60	65	59.65	66	59.70	67	59.75	68	59.80	69	59.85	70	59.85
71	59.85	72	59.85	73	59.85	74	59.80	75	59.75	76	59.70	77	59.65	78	59.60	79	59.55	80	59.50
81	59.50	82	59.50	83	59.50	84	59.50	85	59.55	86	59.60	87	59.65	88	59.70	89	59.75	90	59.80
91	59.85	92	59.90	93	59.90	94	59.90	95	59.90	96	59.90	97	59.85	98	59.80	99	59.75	100	59.70
101	59.65	102	59.60	103	59.55	104	59.50	105	59.45	106	59.45	107	59.45	108	59.45	109	59.45	110	59.50
111	59.55	112	59.60	113	59.65	114	59.70	115	59.75	116	59.80	117	59.85	118	59.93	119	59.95	120	59.95
121	59.95	122	59.93	123	59.88	124	59.80	125	59.75	126	59.70	127	59.65	128	59.60	129	59.55	130	59.48
131	59.43	132	59.40	133	59.40	134	59.40	135	59.43	136	59.48	137	59.55	138	59.60	139	59.65	140	59.70
141	59.75	142	59.80	143	59.93	144	60.05	145	60.05	146	60.05	147	60.05	148	60.05	149	59.93	150	59.93
151	59.80	152	59.73	153	59.68	154	59.63	155	59.55	156	59.43	157	59.30	158	59.30	159	59.30	160	59.30
161	59.30	162	59.43	163	59.55	164	59.68	165	59.80	166	59.93	167	60.05	168	60.05	169	60.05	170	60.05
171	60.05	172	59.93	173	59.80	174	59.68	175	59.55	176	59.43	177	59.43	178	59.30	179	59.18	180	59.18
181	59.18	182	59.18	183	59.18	184	59.18	185	59.18	186	59.18	187	59.18	188	59.18	189	59.18	190	59.18
191	59.93	192	60.05	193	60.05	194	60.05	195	59.93	196	59.80	197	59.68	198	59.55	199	59.43	200	59.30

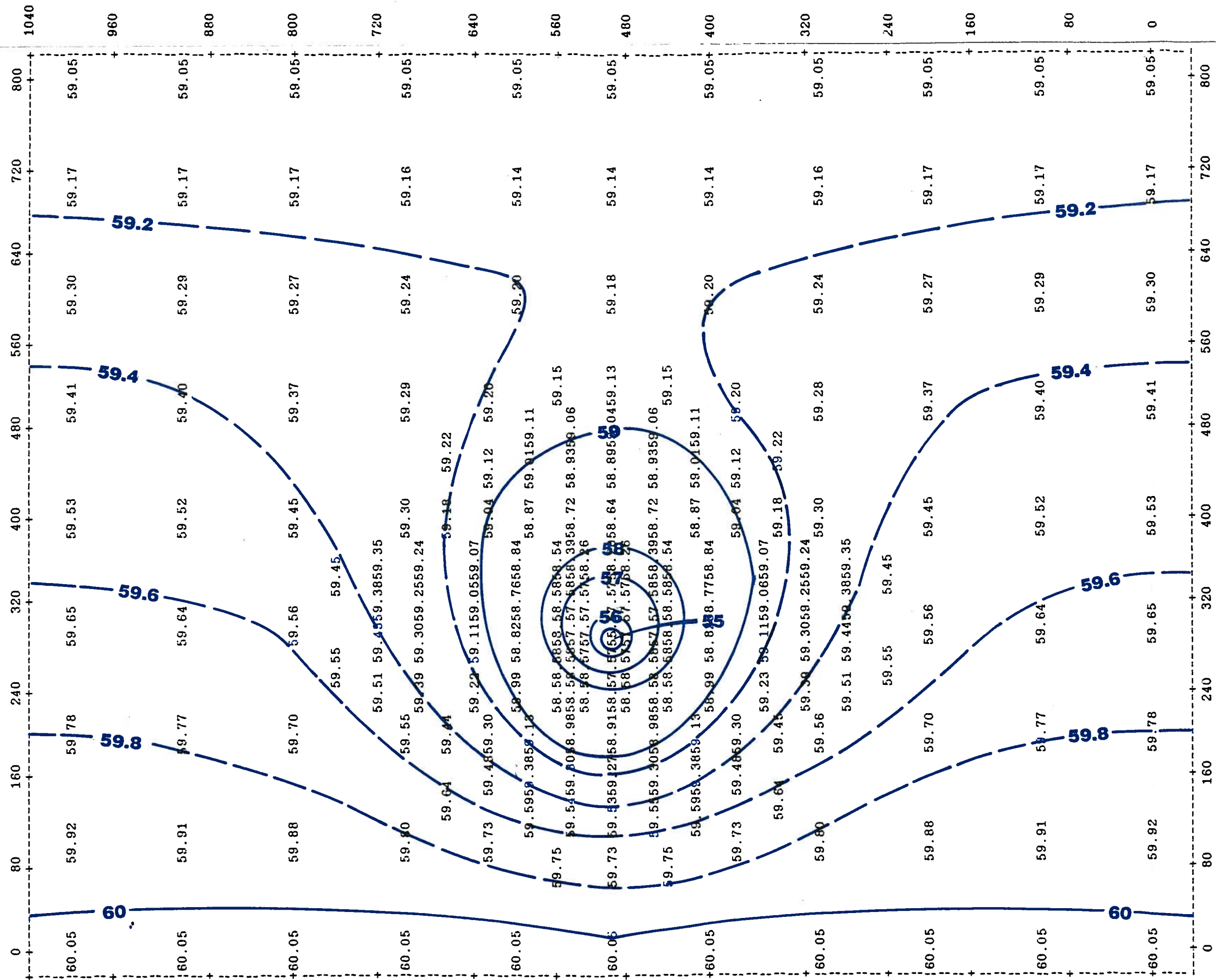
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211	59.43	212	59.55	213	59.68	214	59.30	215	59.18	216	59.05	217	59.05	218	59.18	219	59.05	220	59.05
221	59.18	222	59.30	223	59.43														

TABLE OF PRINTED OUTPUT TIMES

50.0000	100.0000

TABLE OF PRINT-PLOT TIMES

20.0000	40.0000	50.0000	60.0000	80.0000	100.0000



Aquifer Well Drawdown Model
Pumping Well 86-2 at 4gpm K=3

Time = 20.00000

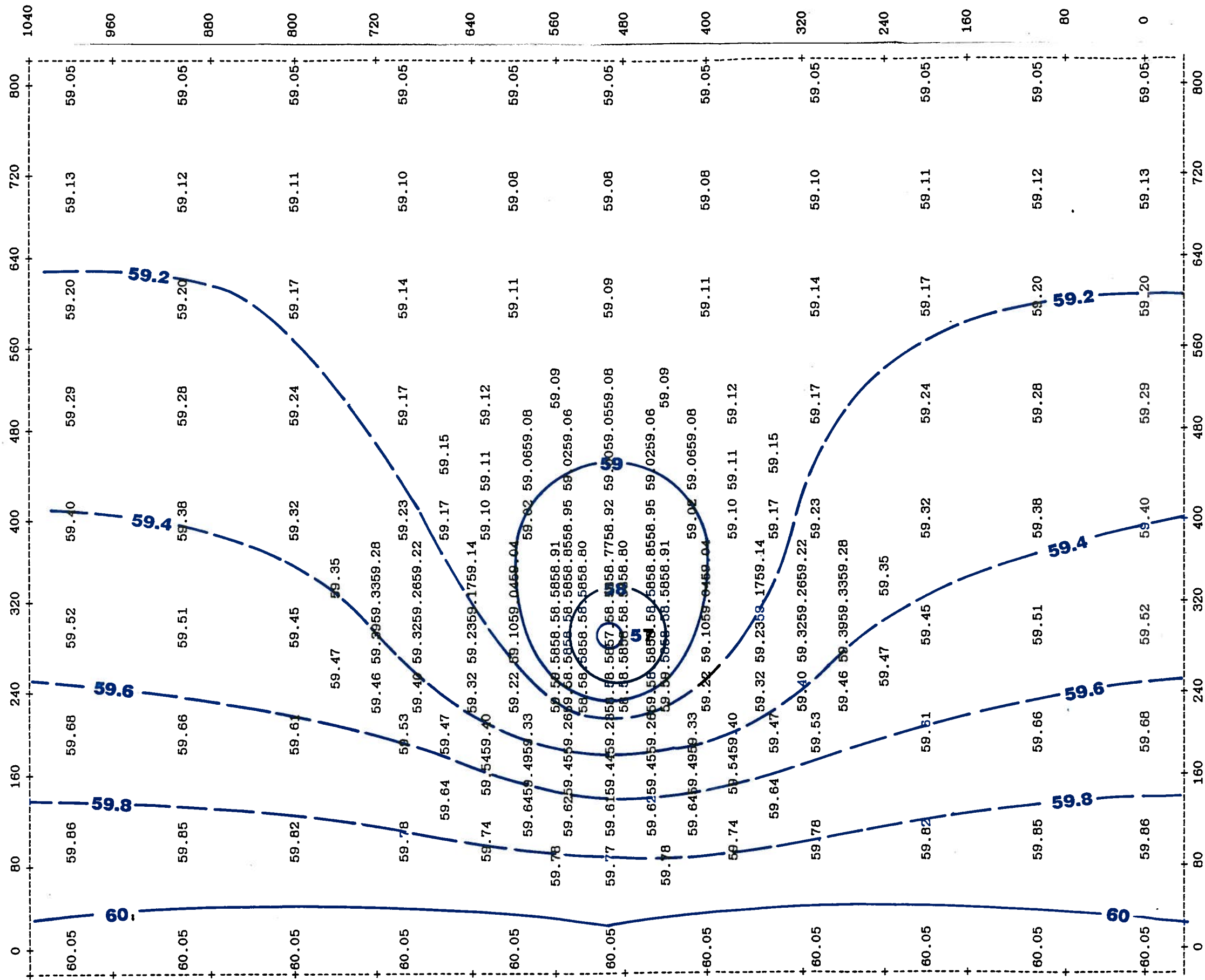
X Coordinates Range from .00 to 800.0

Y Coordinates Range from .00 to 1000.

Scale: 1/3000



CPC-Grand Rapids



Aquifer Well Drawdown Model:
Pumping Well 86-2 at 8 gpm K=15

Time = 20.00000

X Coordinates Range from .00 to 800.00

Y Coordinates Range from .00 to 1000.0

Scale: 1/3000



CPC-Grand Rapids

Aquifem Well Drawdown Mod
Pumping Well 86-2 at 8gpm K=6

Time = 20.00000

X Coordinates Range from .00 to 800

Y Coordinates Range from .00 to 1000

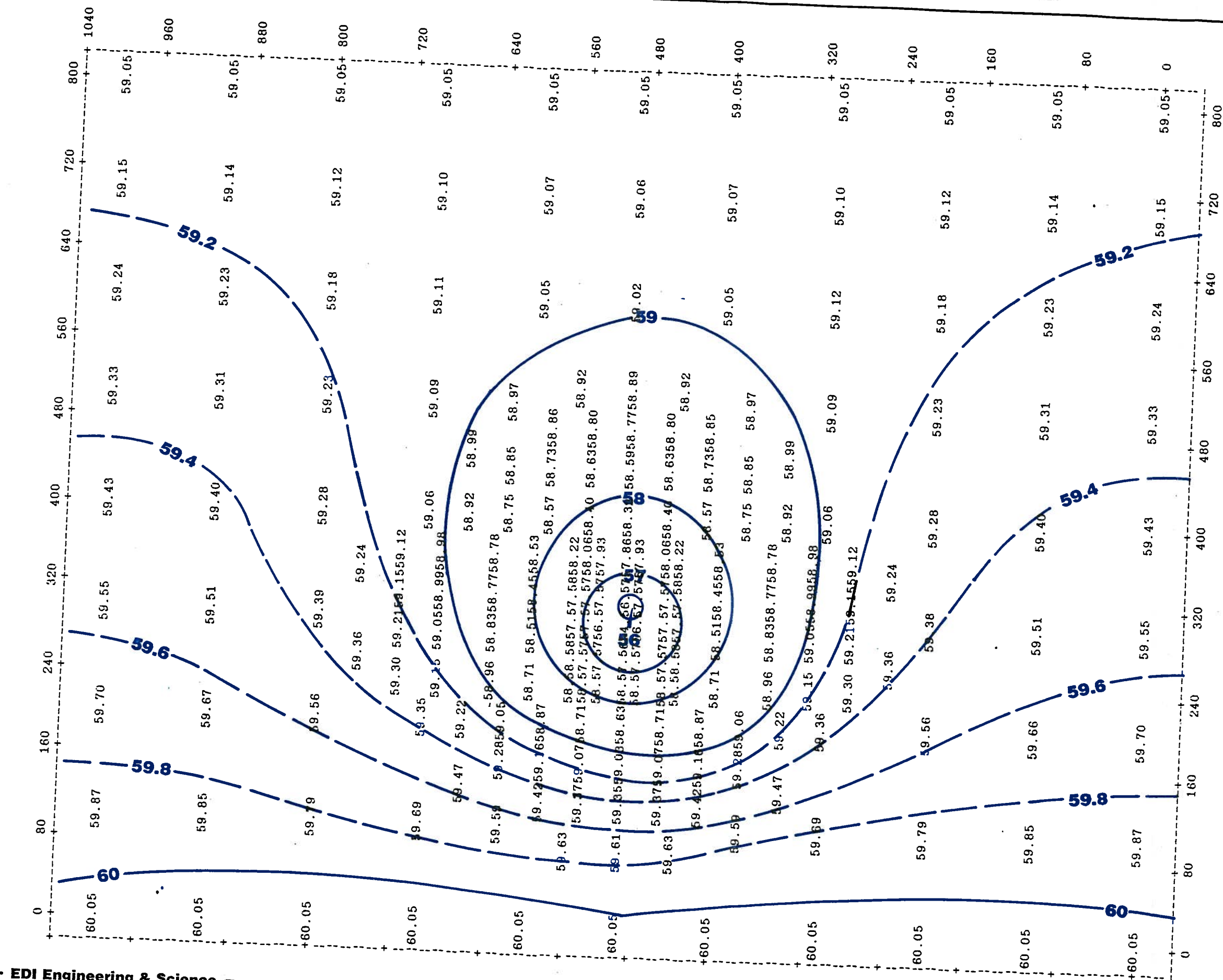
Scale: 1/3000



CPC-Grand Rapids

July, 1988

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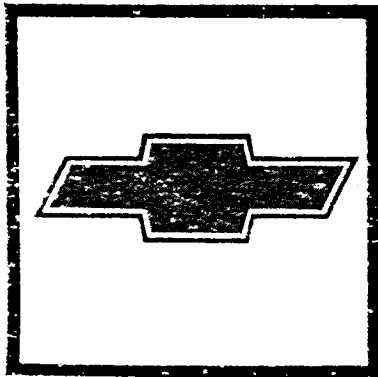


EDI Engineering & Science

Results of...

Phase IV-C Hydrogeological Investigation

for...



**General Motors Corporation
CPC Group**
Grand Rapids, Michigan

July, 1988

20790

EDI Engineering & Science

Environmental Engineering, Geology, Biology and Chemistry
Grand Rapids, MI 49503-1370



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1.0 INTRODUCTION

Previous hydrogeological investigations conducted by EDI at the General Motors Corporation/CPC Group Metal Fabrication Plant in Wyoming, Michigan have identified a location in the plant at Column T-27 where equipment leaked trichloroethylene (TCE) through the floor of the facility. The equipment, a parts cleaner, was removed from the plant in 1979. The soils below the floor have residuals of TCE, and the ground water has a plume of dissolved TCE which extends to the north of the source.

The previous studies, Phases I and II, have identified that TCE is present in the soils below the floor and that the plume extends to the north property line of the plant. The initial studies completed on the site were the March, 1986 report entitled "Results of Hydrogeological Investigation at the Column A-15 Excavation" and the June 1986 report entitled "Results of Phase II Hydrogeological Investigation".

The Phase III studies completed on the site were the March 1987 report entitled "Results of Phase III-A Hydrogeological Investigation" and the July 1987 report entitled "Results of Phase III-B Hydrogeological Investigation".

The highest priority of the Phase III-A investigation was to determine the dimensions and character of the source area soils that were contaminated with TCE. Another purpose was to set wells to remove TCE from the soils by soil vapor extraction and to provide additional information on the ground water in the source area. The purposes of the Phase III-B investigation were to evaluate the potential impact of the TCE plume in the ground water on the water quality of Cole Drain, determine the width of the plume in the northern portion of the property, and obtain information about the aquifer characteristics in the northern portion of the plant property.

2.0 PURPOSE AND SCOPE

The purposes of the present investigation were as follows:

- define the horizontal and vertical extent of the off-site plume, including the biodegradation products of TCE;
- determine the ground water flow direction and velocity in the plume area; and
- determine the relationship of the aquifer to Cole Drain.

To accomplish these goals, the following scope of work was completed.

- A. A soil gas (vapor) survey was conducted in the area bounded by 36th Street, Buchanan Avenue, US-131, and 32nd Street. The survey was initiated by placing locations along an east-west line near the north boundary of the GM-CPC property. Two additional lines were laid out northwest of the plant property and north of the plant property.

- B. Nine (9) additional soil borings were drilled in the area north of the plant property, including five (5) soil borings west of Cole Drain. Split-spoon soil samples were collected every five feet until reaching the water table. Temporary wells were set at 10-foot intervals vertically as the borings were advanced, and the ground water samples collected from the temporary wells were analyzed for trans-1,2-DCE, TCE, and vinyl chloride.
- C. Seven (7) monitoring wells were constructed at locations directly offset to the soil borings described in item B above. The permanent screens were set either within the interval determined to be the most contaminated from the analysis of the temporary ground water samples, or within the clean interval that is downgradient of the contaminated portion of the aquifer. The locations of the soil borings and monitoring wells are shown in Figure 1.
- D. In-situ permeability tests were performed by the falling head method on the seven new monitoring wells, using a vacuum pump and Hermit data logger. The permeability measurements were combined with other data to determine the velocity of ground water flow.

3.0 METHODS OF INVESTIGATION

3.1 SOIL GAS SURVEY

A soil gas (vapor) survey was conducted in the area bounded by 36th street, Buchanan Avenue, US-131, and 32nd Street to aid in the selection of the drilling locations (Figure 2). The survey was initiated by placing locations SVP-1 (soil vapor probe-1) through SVP-7 along an east-west line near the north boundary of the GM-CPC property. Locations SVP-8 through SVP-11 were placed along an east-west line near the south boundary of the City of Wyoming Hillcroft Park. Locations SVP-12 through SVP-14 were placed along the Consumers Power Company right-of-way between two sets of high voltage wires (Figure 2).

The soil vapors were collected by driving a hollow metal rod into the soil to a depth of three feet. The soil vapors were extracted by a battery-operated air pump pulling 1,000 cubic centimeters of soil vapor per minute. The soil vapors were pulled through the hollow rod, Teflon tubing, and air pump for at least five minutes to purge the equipment. The samples were collected in 1-liter Tedlar bags from the outlet of the air pump. The metal rod was brushed to remove soils and heated with a propane torch to decontaminate it between samples.

The soil vapor samples were analyzed with a gas chromatograph (GC) for TCE at EDI's laboratory in Grand Rapids. The results of the soil vapor survey were intended to guide additional soil vapor sampling and ultimately aid in the selection of boring locations..

However, the soil vapor study was terminated after the completion of the three lines because the samples did not yield detectable TCE.

3.2 SOIL BORINGS AND TEMPORARY WELLS

A total of nine additional soil borings were drilled in the area north of the plant property; namely 87-10, 87-11, 87-12, 87-13, 88-1, 88-2, 88-2D, 88-3, and 88-4 (Figure 1). The five 1988 series borings were drilled west of Cole Drain within the Consumers Power Company right-of-way. The well/boring log sheets are contained in Appendix A.

All soil borings were drilled using a 3 1/4" I.D. hollow-stem auger with split-spoon cores collected every five feet until reaching the water table. In addition, at least one split-spoon sample was recovered in each boring from the clay at depths varying from approximately 30 to 60 feet below the surface. At least five feet of the clay was penetrated in each boring to verify that the bottom of the aquifer had been reached.

Boring 88-2D is a "deep" boring that was drilled directly offset to 88-2 to verify that the base of the aquifer had been reached at 31 feet and that the clay was not a "thin lens". Boring 88-2D was drilled to a depth of 70 feet with a continuous clay encountered from 31 feet to total depth.

An Hnu photoionization detector was calibrated for TCE was used to help in determining the presence of TCE-contaminated soil. As each split-spoon was recovered at the surface, it was opened and immediately scanned with the detector.

Temporary wells consisting of 2-inch galvanized steel casing and 1 to 3-foot long stainless steel screens were set at approximately 10-foot intervals below the water table. The temporary wells were developed with either a rod pump or a centrifugal pump. Bailers were also used to collect the ground water samples from the temporary wells after development.

The ground water samples were analyzed with a gas chromatograph for trans-1,2-DCE, TCE, and vinyl chloride at EDI's laboratory in Grand Rapids. The analysis of the ground water samples determined the concentration variation of the three solvents with depth and was used to determine the screen depth for the permanent wells.

The soil borings were backfilled with bentonite within the clay and a combination of bentonite and natural soils from the top of the clay to the surface.

3.3 MONITORING WELLS

Seven monitoring wells were constructed at locations directly offset to the respective soil borings. These wells are designated W-87-10, W-87-11, W-87-13, W-88-1, W-88-2, W-88-3, and W-88-4 (Figure 1). The wells were constructed with 2-inch diameter galvanized steel casing attached to a 3-foot long, 2-inch diameter stainless steel, wire-

wrapped, slotted screen. Monitoring wells W-87-10, W-87-11, and W-87-13 were set within the interval determined to be the most contaminated from the analysis of the temporary ground water samples. Wells W-88-1, W-88-2, W-88-3, and W-88-4 have their 3-foot screens set at a depth comparable to the depth at which contamination showed in the W-87 wells.

The monitoring wells were backfilled with natural soils around the screen and a mixture of natural soils and bentonite up to near the surface. Flush-mount caps with internally locking caps were placed at the surface with cement placed around the ground level portion of the caps.

The monitoring wells were developed with either a rod pump or a centrifugal pump. Bailers were used to collect the ground water samples from the wells after development (after three casing volumes were recovered).

The U.S.G.S. elevations of the ground and top of casings were determined, using standard instrument surveying techniques. From these data the elevation of the ground water was calculated, and the direction of ground-water flow was determined.

3.4 DECONTAMINATION

The split-spoon samplers, bailers, and temporary well points (both screens and casing) were steam-cleaned between sampling to prevent cross-contamination. The augers were steam-cleaned between wells and borings, and the permanent galvanized steel casings and screens were steam-cleaned before being lowered into the boreholes.

3.5 SAMPLING AND ANALYSIS

Ground water samples were collected from the seven new monitoring wells and wells W-86-3, W-87-8, and W-87-9 during April and June 1988. The ground water samples were analyzed for complete volatile organic scans at EDI's laboratory in Grand Rapids, using EPA Method 624.

3.6 COLE DRAIN

Water samples were collected from Cole Drain on June 8, 1988 at locations 8, 9, and 10 as shown in Figure 3. The map also shows the previous sampling locations 1 through 7 from which water samples were collected during 1987. The water samples were analyzed for TCE at EDI's laboratory in Grand Rapids.

3.7 IN-SITU PERMEABILITY MEASUREMENTS

In-situ permeability tests were performed on the seven new monitoring wells on May 10, 1988 using a vacuum pump and Hermit data logger. The tests were performed according to EDI's standard operating procedure, and the data were analyzed according to the

Bouwer-Rice Method. Descriptions of the methods used for the measurement and analysis of the in-situ permeability data are shown in Appendix B. The permeability measurements were combined with other geological data to determine the velocity of ground-water flow.

4.0 RESULTS AND DISCUSSION

4.1 GEOLOGY

The general geology of the Metal Fabrication plant site is discussed in the Phase III-A Hydrological Investigation. The locations of the cross sections D-D', E-E', and F-F' are indicated in Figure 4. Figures 5 through 7 are the geological cross sections in the area north of the plant. Cross sections D-D' (Figure 5) and E-E' (Figure 6) display the geology of the aquifer from southeast to northwest. Cross section F-F' displays the geology in the area near 32nd Street and the US-131 expressway.

Cross sections D-D' and E-E' indicate a very rapid thinning of the aquifer from southeast to northwest, particularly on the west side of Cole Drain where the aquifer thickness is reduced to as little as 14 feet (W-88-4). To verify that the base of the aquifer had been reached on the west side of Cole Drain (at depths varying from 22 to 32 feet) a deep boring B-88-2D was drilled directly offset to W-88-2. The deep boring encountered 39 feet of continuous clay below the base of the aquifer at 31 feet.

Cross section F-F' does indicate either a deeper aquifer or a sand lens within the clay in the area of soil boring B-2 below elevation 620 feet. Boring B-2 is one of three soil borings (indicated in Figure 4) that were drilled for the US-131 Expressway during the 1950's. However, the deeper aquifer in B-2 does not extend to the southeast because of the 39-foot thick clay encountered in B-88-2D.

4.2 GROUND WATER HYDROLOGY

The ground water levels were measured twice during the completion of this investigation, and they are reported on Tables 1 and 2. Table 1 is a summary of the ground water levels for April 7, 1988, and Table 2 is a summary for April 27, 1988. The summary tables also include culvert C-1 (south of 36th street) and C-2 (south of 32nd Street) that were used to measure water levels in Cole Drain.

The water level measurements were used to construct water table contour maps for April 7, 1988 (Figure 8) and April 27, 1988 (Figure 9). The directions of ground-water flow north of the plant property are generally toward the northwest in the area east of Cole Drain and toward the northeast in the area west of Cole Drain. The water level contours and the directions of ground water flow strongly suggest that the ground water that is flowing north of the plant property is moving to the northwest and eventually discharging into Cole Drain.

TABLE 1

GROUND WATER LEVELS
NORTH OF THE
GM CPC METAL FABRICATION PLANT

APRIL 7, 1988

<i>WELL No./ CULVERT No.</i>	<i>M.P.(1) ELEVATION (FEET)</i>	<i>WATER LEVEL BELOW M.P. (FEET)</i>	<i>WATER LEVEL ELEVATION (FEET)</i>
86-3	676.47	18.29	658.18
87-8	677.62	19.31	658.31
87-9	673.87	15.76	658.11
87-10	668.83	12.20	656.63
87-11	677.17	10.84	656.33
87-13	664.24	10.09	654.15
88-1	666.66	10.21	656.45
88-2	666.38	11.20	655.18
88-3	665.26	10.72	654.54
88-4	661.63	8.02	653.61
C-1	663.24	5.50	657.74
C-2	657.08	NM(2)	NM

(1) *M.P. means "measuring point" and it refers to either top of casing or top of culvert.*

(2) *N.M. means "not measured" on that particular date.*

TABLE 2

GROUND WATER LEVELS
NORTH OF THE
GM CPC METAL FABRICATION PLANT

APRIL 27, 1988

<u>WELL No./</u> <u>CULVERT No.</u>	<u>M.P.(1)</u> <u>ELEVATION</u> <u>(FEET)</u>	<u>WATER LEVEL</u> <u>BELOW M.P.</u> <u>(FEET)</u>	<u>WATER LEVEL</u> <u>ELEVATION</u> <u>(FEET)</u>
86-3	676.47	18.23	658.24
87-8	677.62	19.23	658.39
87-9	673.87	15.69	658.18
87-10	668.83	12.16	656.67
87-11	677.17	10.82	656.35
87-13	664.24	10.03	654.21
88-1	666.66	10.30	656.36
88-2	666.38	11.24	655.14
88-3	665.26	10.81	654.45
88-4	661.63	8.16	653.47
C-1	663.24	5.51	657.73
C-2	657.08	5.49	651.59

(1) *M.P. means "measuring point" and it refers to either top of casing or top of culvert.*

The hydraulic conductivities for the seven new monitoring wells were measured on May 10, 1988. The results of these tests are shown on Table 3 along with the results of the previous tests run on W-86-3, W-87-8 and W-87-9.

The velocity of ground-water flow has been estimated by using the average gradient for the area north of the plant property (as indicated on the water table contour maps) and the average of the three highest hydraulic conductivities for the area east of Cole Drain. The highest hydraulic conductivities were used so that the highest or "worst case" ground water velocity could be calculated. The velocity of ground water flow can be calculated as follows, and the calculations are given in Appendix C.

$$V = Ki/P$$

where:

V is the velocity of groundwater flow

K is the hydraulic conductivity

i is the hydraulic gradient

P is the porosity

The average of the three highest conductivities is 178 ft/day, and hydraulic gradient is 0.002. The porosity is estimated at 25 percent. The calculated velocity using these parameters is 1.42 ft/day or 518 ft/year. The velocity of 1.42 ft/day is higher than the velocity of 0.8 ft/day estimated in the Phase III-B report because of the higher gradient north of the plant property and the higher hydraulic conductivity (178 ft/day versus 149 ft/day).

4.3 SOIL GAS SURVEY

The soil gas (vapor) survey illustrated in Figure 2 was terminated after the completion of the three lines because of the lack of detectable TCE. The soil vapor survey was designed to delineate the area of soil impact above the ground water. The absence of TCE vapors at a depth of three feet in the soil may have been caused by the relatively coarse-grained sand and gravel at a depth of three feet and the relatively low levels of TCE in the ground water near the water table surface.

4.4 EXTENT OF TCE CONTAMINATION

The ground water samples collected from the temporary wells installed during the drilling of monitoring wells W-86-3, W-87-8 and W-87-9 were analyzed for TCE. The ground water samples (from the temporary wells) collected from the more recently drilled wells (W-87-10 through W-88-4) were analyzed for trans-1,2-DCE, TCE, and vinyl chloride. The results of these analyses are presented in Table 4. The results of the laboratory analyses of ground water samples collected from the permanent wells are presented on Table 5. A contour map showing the extent of the dissolved TCE in the

TABLE 3
GM-CPC METAL PLANT
HYDRAULIC CONDUCTIVITIES

<u>WELL NUMBER</u>	<u>SCREENED INTERVAL (FEET BELOW GROUND SURFACE)</u>	<u>HYDRAULIC CONDUCTIVITY (FT/DAY)</u>
W-86-3	41.5-46.5	192.6
W-87-8	19.7-22.7	99.4
W-87-9	50.5-53.5	156.4
W-87-10	29-32	92
W-87-11	30-33	72
W-87-13	40-43	186 ¹
W-88-1	27-30	211 ¹
W-88-2	26-29	166
W-88-3	27-30	80
W-88-4	18-21	12.3 ¹
AVERAGE	---	127
AVERAGE OF 86-3, 87-9 and 87-13	---	178

¹ Average of two hydraulic conductivities.

TABLE 4

**RESULTS OF LABORATORY ANALYSES OF GROUND WATER SAMPLES
TEMPORARY WELLS**

<u>SAMPLING LOCATION</u>	<u>DATE SAMPLED</u>	<u>WELL/BORING</u>			<u>CLAY</u>			<u>GROUND WATER</u>			<u>(RESULTS IN MG/L)</u>		
		<u>DEPTH (FEET)</u>	<u>DEPTH (FEET)</u>	<u>DEPTH (FEET)</u>	<u>DEPTH (FEET)</u>	<u>DEPTH (FEET)</u>	<u>DEPTH (FEET)</u>	<u>SAMPLE DEPTH (FEET)</u>	<u>TRANS- 1,2-DICHLORO- ETHYLENE</u>	<u>TRICHLORO- ETHYLENE</u>	<u>VINYL CHLORIDE</u>		
W-86-3	05/01/86	72	69					21-24	NS ¹	0.045	NS		
								34-36	NS	0.210	NS		
								44-46	NS	0.600	NS		
								53-55	NS	0.230	NS		
								63-65	NS	0.015	NS		
								64-69	NS	0.014	NS		
W-87-8	01/13/87	66.5	63					18.7-19.7	NS	0.017	NS		
								28-31	NS	0.0054	NS		
								38-41	NS	ND ²	NS		
								48-51	NS	ND	NS		
								58-61	NS	0.0052	NS		
W-87-9	01/14/87	85	81					16-17.5	NS	0.014	NS		
								22-25	NS	0.042	NS		
								32-35	NS	0.027	NS		
								41-44	NS	0.041	NS		
								52-55	NS	0.063	NS		
								62-65	NS	0.019	NS		
W-87-10	09/29/87	70	Not Reached					72-75	NS	0.0029	NS		
								19.5-22.5	0.003	0.081	ND		
								29-32	0.008	0.091	ND		
								38.5-41.5	ND	0.037	ND		
								48-51	ND	0.024	ND		
								58-61	ND	0.032	ND		

TABLE 4, CONTINUED

SAMPLING LOCATION	DATE SAMPLED	GROUND WATER		SAMPLE DEPTH (FEET)	TRANS- 1,2-DICHLORO- ETHYLENE	TRICHLORO- ETHYLENE	VINYL CHLORIDE
		WELL/BORING DEPTH (FEET)	CLAY DEPTH (FEET)				
W-87-11	09/30/87	55.5	53	18-21	0.017	ND	ND
	10/01/87			28-31	0.029	0.26	ND
				36.4-39.4	0.026	0.17	ND
				48-51	0.013	0.046	ND
B-87-12	10/05/87	44.5	39.1	19-22	ND	ND	ND
				29-32	ND	ND	ND
W-87-13	10/06/87	51	49.5	20-23	ND	0.005	ND
				30-33	ND	0.005	ND
				40-43	ND	0.007	ND
W-88-1	03/30/88	40	32.5	12-13	ND	ND	ND
				22-23	ND	ND	ND
				29-32	ND	ND	ND
W-88-2	03/31/88	35	31	12-15	ND	ND	ND
				22-25	ND	ND	ND
				30-31	ND	ND	ND
W-88-3	04/01/88	41	31.5	12-15	ND	ND	ND
				22-25	ND	ND	ND
				30-31	ND	ND	ND
W-88-4	04/04/88	30	22	9-12	ND	ND	ND
				18-21	ND	ND	ND
Detection Limit	---	---	---	---	0.002	0.001-0.002	0.010

¹ Material not sampled on indicated sampling date.² Not detectable for indicated detection limit.

TABLE 5

RESULTS OF LABORATORY ANALYSES OF GROUND WATER SAMPLES
PERMANENT WELLS

SAMPLING LOCATION	DATE SAMPLED	SCREENED INTERVAL (FEET)	(RESULTS IN MG/L)						PH ¹	OTHER COMPOUNDS
			TRANS- 1,2-DICHLORO- ETHYLENE	1,1,1- TRICHLORO- ETHANE	TRICHLORO- ETHYLENE	GREASE & OIL	TOTAL IRON	HARDNESS (as CaCO ₃)		
W-86-3	05/05/86- 01/21/87	41.5-46.5	0.010 0.004	0.011 0.006	1.40 0.34	NS ² 1.7	NS 2.8	NS 360	NS 7.82	bis-(2-ethyl hexyl)-phthalate
W-87-8	06/08/88 01/21/87	19.7-22.7	0.010 ND ³	ND ND	0.17 0.009	NS ND	NS 150	NS 410	NS 7.82	0.026
W-87-9	06/08/88 01/21/87	50.5-53.5	ND ND	ND ND	0.006 0.062	NS 1.9	NS 0.50	NS 360	NS 7.94	
W-87-10	06/08/87		ND	ND	0.021	NS	NS	NS	NS	
W-87-11	06/08/88	29-32	0.008	ND	0.046	NS	NS	NS	NS	chloroform, 0.003
W-87-13	06/08/88	30-33	0.076	ND	0.320	NS	NS	NS	NS	1,1,1-DCA, 0.002
W-88-1	06/08/88	40-43	ND	ND	0.010	NS	NS	NS	NS	
W-88-2	04/05/88	27-30	ND	ND	ND	NS	NS	NS	NS	
W-88-3	04/05/88	26-29	ND	ND	ND	NS	NS	NS	NS	
W-88-4	04/05/88	27-30	ND	ND	ND	NS	NS	NS	NS	
W-88-4	04/05/88	18-21	ND	ND	ND	NS	NS	NS	NS	
Detection Limit	---	---	0.002-0.01	0.002-0.01	0.002-0.01	1.0	0.01	2.0	---	---

¹ pH is measured in standard units.² Material not sampled on indicated sampling date.³ Not detectable for indicated detection limit.

ground water from the permanent wells is shown in Figure 10. The laboratory data sheets for the temporary and permanent wells can be found in Appendix D.

The pattern of TCE contamination within W-86-3, W-87-8, and W-87-9 was reported in the Phase III-B hydrological investigation. The analytical results from W-87-10 indicate that the TCE concentrations are highest within the top portion of the aquifer and generally decrease with depth. The permanent well sample from W-87-10 contains 0.046 mg/l of TCE which approximates the average of the TCE concentrations from the temporary wells.

Monitoring well W-87-11 has TCE concentrations within the temporary well samples that vary from 0.046 mg/l to 0.26 mg/l, and the permanent well sample contains 0.32 mg/l of TCE. The ground water samples from W-87-11 also contain trans-1,2-DCE varying from 0.013 to 0.076 mg/l. Trans-1,2-DCE is a common contaminant in TCE and is also a degradation product of TCE. The relatively high concentration of 0.32 mg/l TCE in W-87-11 compared with the levels contained in W-86-3 indicates that W-87-11 is near the center of the TCE plume, as indicated in Figure 10.

Well W-87-13 is positioned near the north edge of the plume with TCE levels in the temporary wells varying from 0.005 to 0.007 mg/l. The permanent well sample contains 0.01 mg/l of TCE. Boring B-87-12 did not yield any detectable TCE within the temporary wells, indicating that it is north of the extent of TCE impacted ground water.

Monitoring wells W-88-1, W-88-2, W-88-3, and W-88-4 on the west side of Cole Drain are positioned directly opposite TCE contaminated wells on the east side of the drain, but the four 1988 series wells showed no contamination either in the temporary or the permanent well samples. The absence of TCE contamination (or breakdown products) on the west side of the Cole Drain compared with the pattern of TCE concentrations on the east side of the drain, in combination with the ground water flow pattern, strongly suggests that the contaminated ground water is discharging directly into the surface waters of the drain.

A summary table of the analytical results of surface water samples collected from Cole Drain is presented as Table 6. The Cole Drain sample locations and TCE concentrations are indicated in Figure 3. Water samples were collected from sample locations 8, 9 and 10 on June 8, 1988. The other seven locations were sampled during previous investigations (during 1987). The laboratory data sheets for the Cole Drain samples are presented in Appendix D.

The center of the TCE ground water plume (between the 0.10 mg/l contours) is discharging into the area of Cole Drain occupied by sample locations 2 and 9. Sample location 2 contained 0.0036 mg/l TCE in the water sample, and sample location 9 was below the detection limit. Sample locations 3, 10, and 4 downstream (north) of the plume contained 0.0048 mg/l TCE, 0.002 mg/l TCE, and 0.0027 mg/l TCE respectively.

TABLE 6

**GM-CPC METAL PLANT
COLE DRAIN SURFACE WATER SAMPLES**

(RESULTS IN MG/L)

<u>SAMPLE DATE</u>	<u>SAMPLE NUMBER</u>	<u>LOCATION</u>	<u>TRICHLORO- ETHYLENE</u>	<u>TETRA- CHLORO- ETHYLENE</u>	<u>BROMO- DICHLORO- METHANE</u>	<u>CHLOROFORM</u>	<u>1,1,1- TRICHLORO- ETHANE</u>
01/07/87	1	West Side of Drain Downstream of GM Retention Pond	0.0044				
01/07/87	2	1,300 ft. South of 32nd Street Bridge	0.0036				
01/07/87	3	20 ft. North of 32nd Street Bridge	0.0048			NOT ANALYZED	
01/07/87	4	1,450 ft North of 32nd Street Bridge	0.0027				
06/15/87	5	Retention Pond Inlet	0.002	ND ¹	0.003	0.005	0.008
06/15/87	6	Retention Pond Outlet	0.002	ND	ND	0.003	0.004
06/15/87	7	Cole Drain Adjacent to Clay Avenue	0.004	0.011	ND	ND	ND
06/08/88	8	North Side of 36th Street Bridge	ND				
06/08/88	9	1,600 ft. North of 36th Street Bridge	ND			NOT ANALYZED	
06/08/88	10	300 ft. North of 32nd Street Bridge	0.002				
Detection							
Limit	---	---	0.001-0.002	0.002	0.002	0.001	0.002

¹ Not detectable at indicated detection limit.

The relatively low levels of TCE in the Cole drain samples in relation to the higher TCE levels in the monitoring wells suggests that the TCE levels are being diluted as the contaminated ground water enters the drain. As a result, the drain is positioned along the northwestern extent of ground water contamination.

Using the calculated ground water velocity of 518 ft/year, an estimate of the distance that the TCE plume has traveled can be made. The parts cleaner near the T-27 column was removed during 1979. It is not known when the ground water contamination inside the plant started, but it occurred some time after the parts cleaner went into service in 1954. Assuming a "best case" scenario that assumes the ground water contamination inside the plant started in 1979, the plume could have traveled approximately 4,600 feet up to the present time.

The distance from the source area in the plant to the discharge point in Cole Drain (near W-87-11) is approximately 2,500 feet. This indicates that the TCE plume has had sufficient time to reach Cole Drain from the source area.

An estimate was made of the quantity of TCE-contaminated ground water moving north of the GM-CPC property line (down to an arbitrary concentration 0.01 mg/l). The ground water flow rate can be calculated as follows, and the calculations are shown in Appendix C.

$$Q = Ki A$$

where:

K is the hydraulic conductivity

i is the hydraulic gradient

A is the cross-sectional area of the contaminant plume

The flow rate was calculated by using a cross-sectional area that includes W-86-3, W-87-8, and W-87-9.

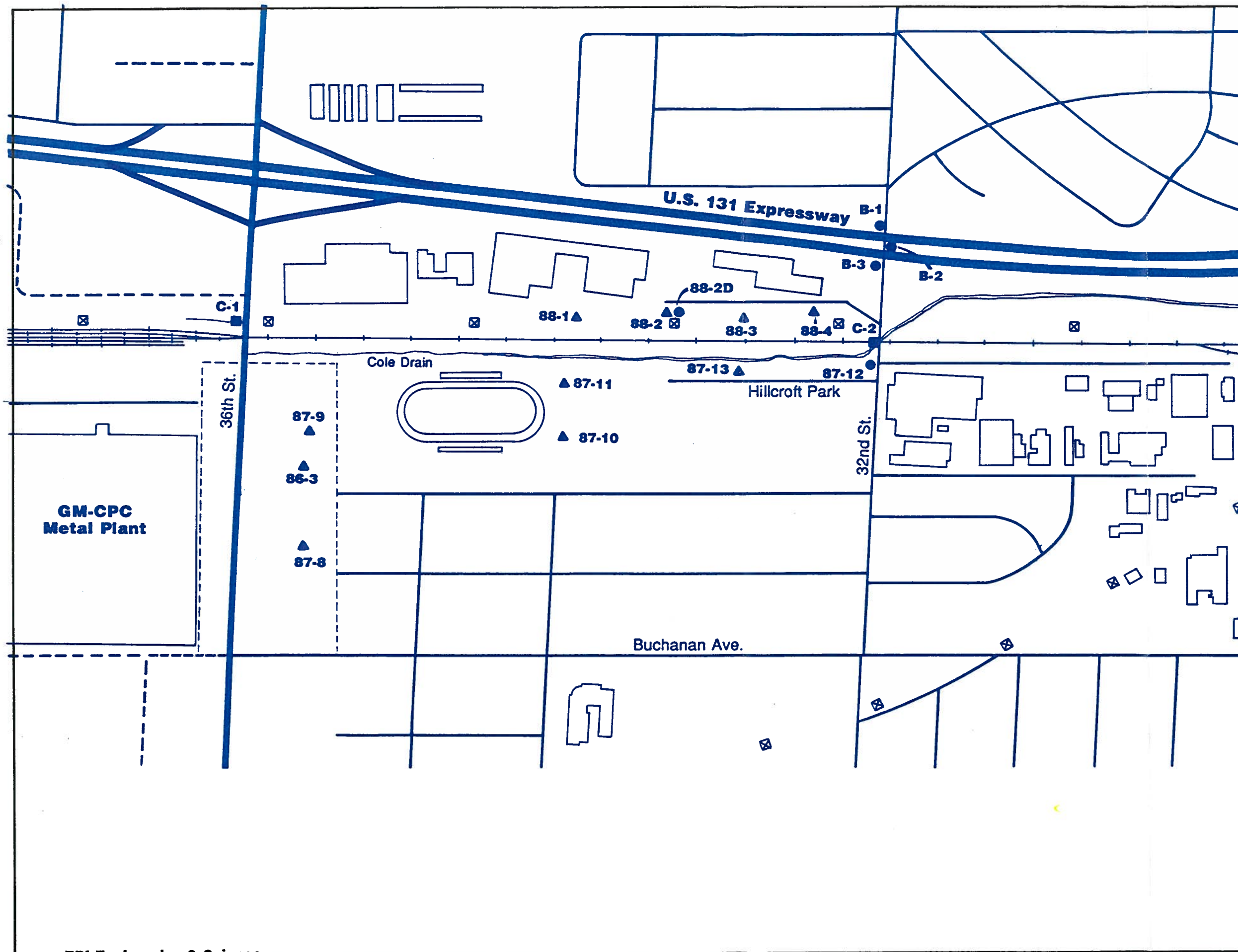
The location of the cross-sectional area is shown in Figure 10, and it has a length of approximately 600 feet. The cross-sectional area stops at the limiting concentration of 0.01 mg/l, also shown in Figure 10. The total cross-sectional area is approximately 20,200 square feet. The parameters that were used to estimate the flow rate are the hydraulic conductivity of 178 ft/day, the gradient of 0.002, and the cross-sectional area of 20,200 square feet. The resulting flow rate is approximately 35 to 40 gpm of ground water moving north of the property line.

A similar flow rate calculation was made for the cross-sectional area of the plume that includes W-87-10 and W-87-11, for comparison purposes. The location of the cross-sectional area is shown in Figure 10. The cross-sectional area is only 17,500 square feet because part of the contaminated ground water has already moved into Cole Drain. The resulting flow rate is approximately 47,600 gallons per day or 30 to 35 gpm.

5.0 CONCLUSIONS

As a result of the Phase IV study, the following conclusions can be made:

1. There is a very rapid thinning of the aquifer northwest of monitoring well W-87-11, particularly on the west side of Cole Drain.
2. The average of the three highest field-measured hydraulic conductivities east of Cole Drain is 178 ft/day. The estimated velocity of ground water flow is 1.42 ft/day (518 ft/year), using a hydraulic gradient of 0.002 and a porosity of 25%.
3. The TCE-contaminated ground water flows toward the northwest after exiting the GM-CPC property, with ultimate discharge into Cole Drain near monitoring well W-87-11.
4. Contaminated ground water does not travel west of Cole Drain, because monitoring wells W-88-1, W-88-2, W-88-3, and W-88-4 are not contaminated, and ground water flow converges toward Cole Drain from both the east and west sides..
5. The levels of TCE in the water samples collected from Cole Drain vary from non-detect to 0.0048 mg/l.
6. The relatively low levels of TCE in the Cole Drain samples in relation to the higher TCE levels in the monitoring wells suggests that the TCE levels are being diluted as the contaminated ground water enters the drain.
7. Assuming that the TCE plume developed at least nine years ago (under the plant), the TCE plume likely would have had sufficient time to reach the discharge point at Cole Drain.
8. Approximately 35 to 40 gpm of ground water with low levels of TCE is estimated to be moving north of the GM-CPC property line.



LEGEND

- ▲ Monitoring Wells
- Culverts Used to Measure Water Levels in Cole Drain
- Soil Borings Drilled During this Investigation (87-12, 88-20)
- Soil Borings Drilled for US-131 Expressway During the 1950's (B-1, B-2, B-3)
- ⊠ Electrical Towers

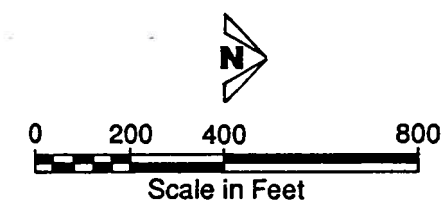


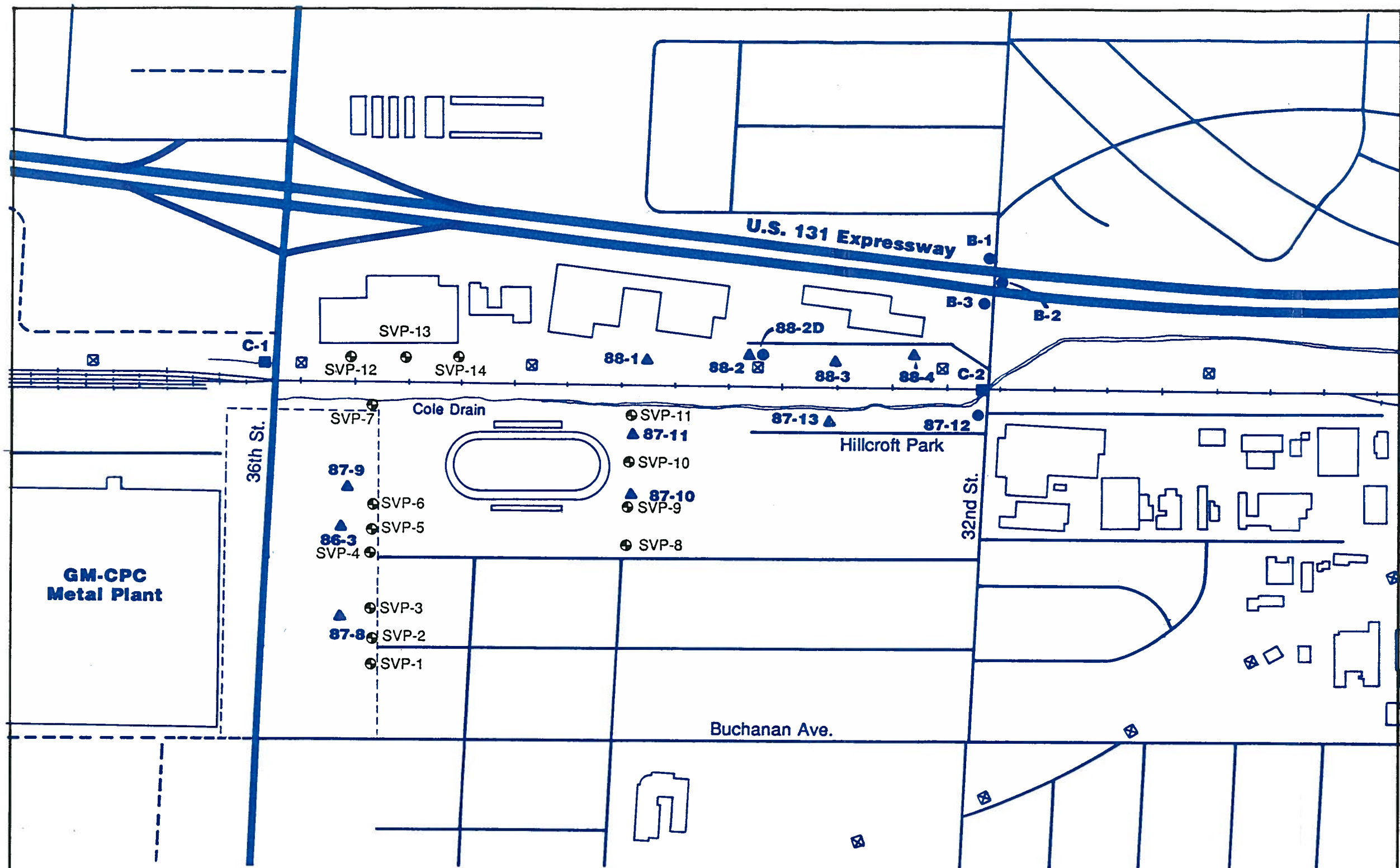
Figure 1

Locations of Borings and Wells

General Motors Corporation/CPC Group
Grand Rapids, Michigan

June, 1988

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LEGEND

- ▲ Monitoring Wells
- Culverts Used to Measure Water Levels in Cole Drain
- Soil Borings Drilled During this Investigation (87-12, 88-2D)
- Soil Borings Drilled for US-131 Expressway During the 1950's (B-1, B-2, B-3)
- ⊠ Electrical Towers
- SVP-1 ● Soil Vapor Sampling Point

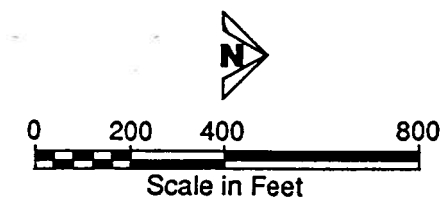
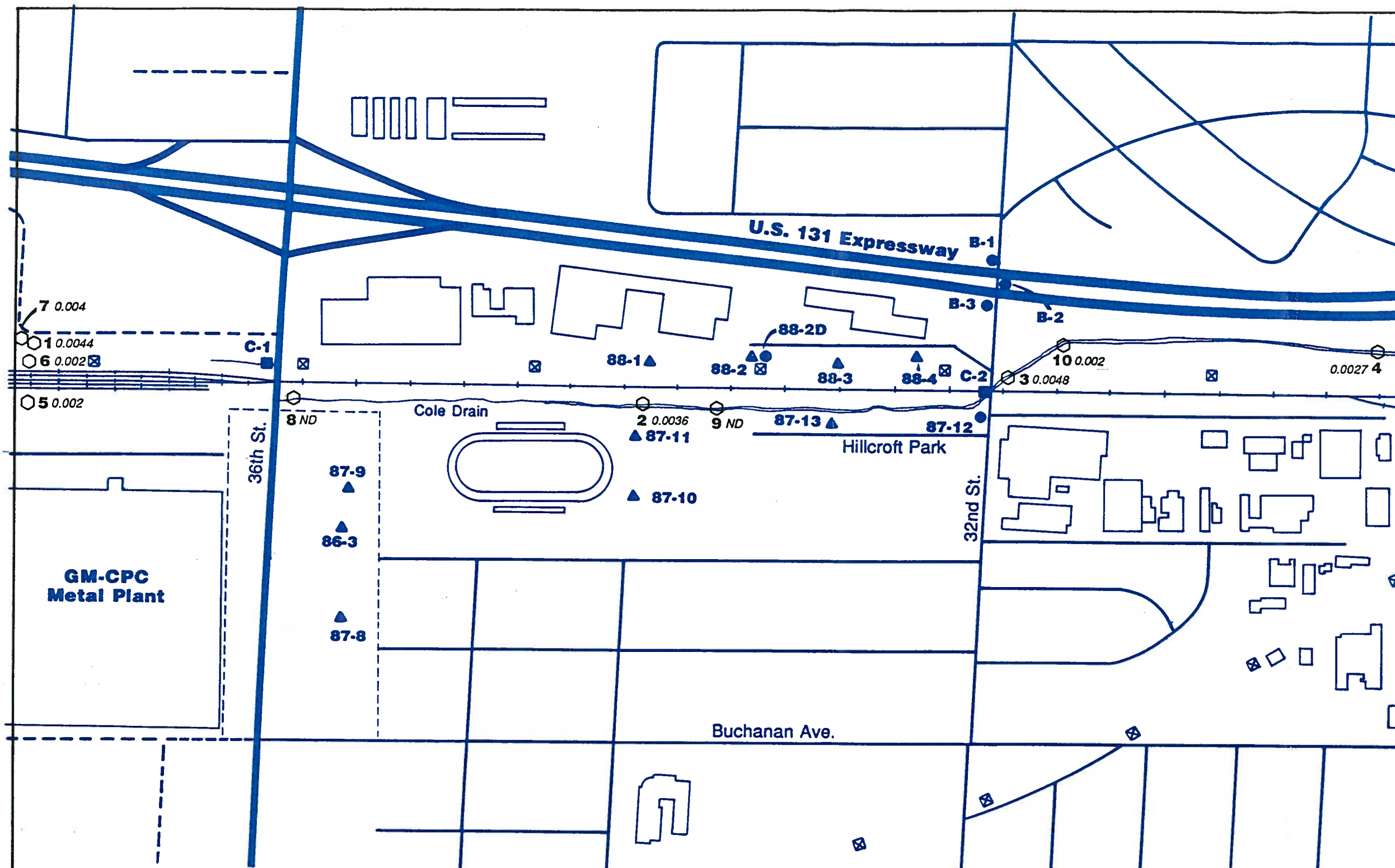
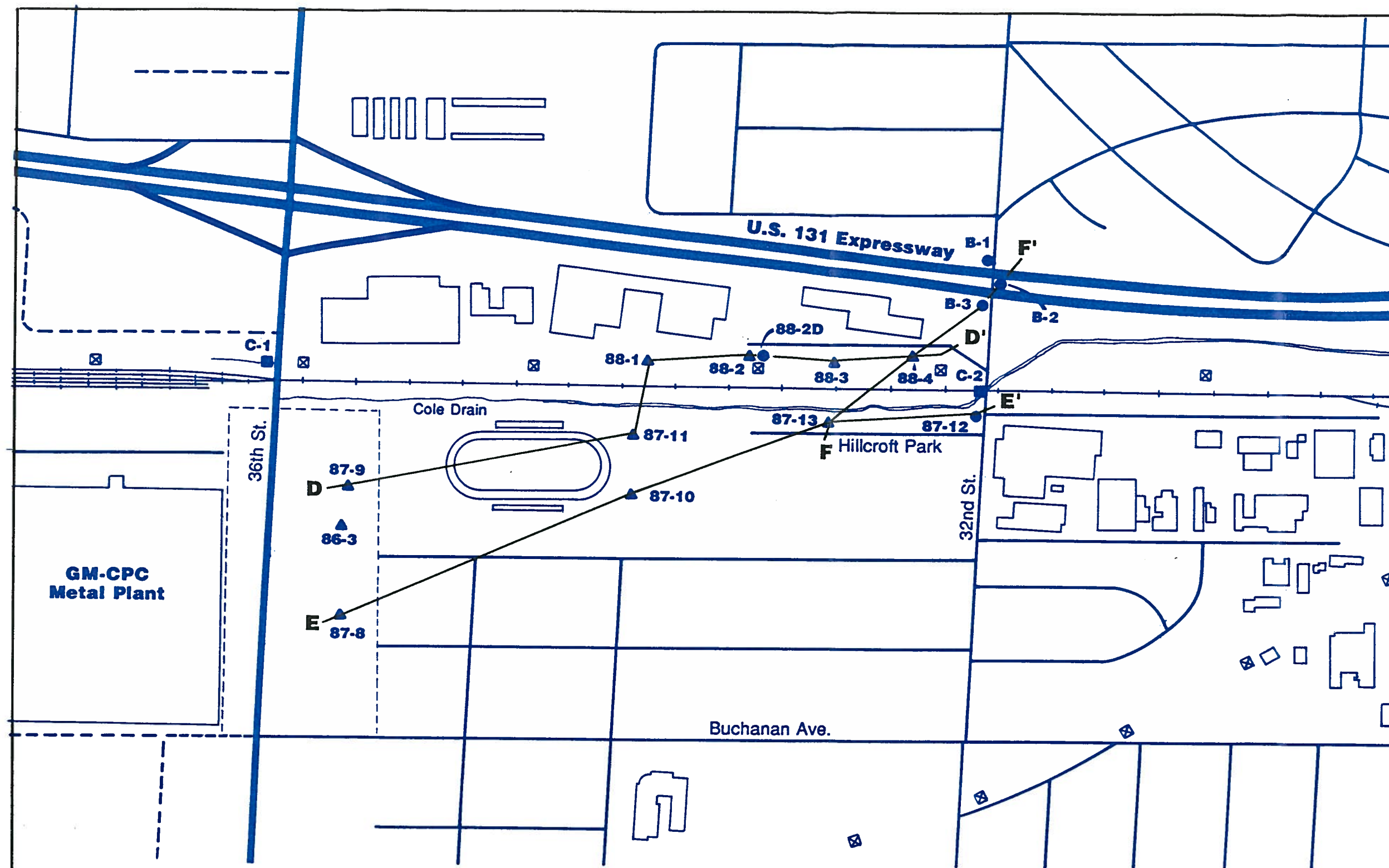


Figure 2

Soil Vapor Survey Sampling Locations

General Motors Corporation/CPC Group
Grand Rapids, Michigan





LEGEND

- ▲ Monitoring Wells
- Culverts Used to Measure Water Levels in Cole Drain
- Soil Borings Drilled During this Investigation (87-12, 88-2C)
- Soil Borings Drilled for US-131 Expressway During the 1950's (B-1, B-2, B-3)
- ⊗ Electrical Towers
- D—D' Geological Cross Section Trace

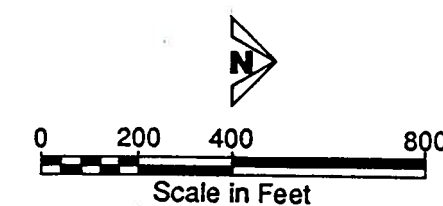
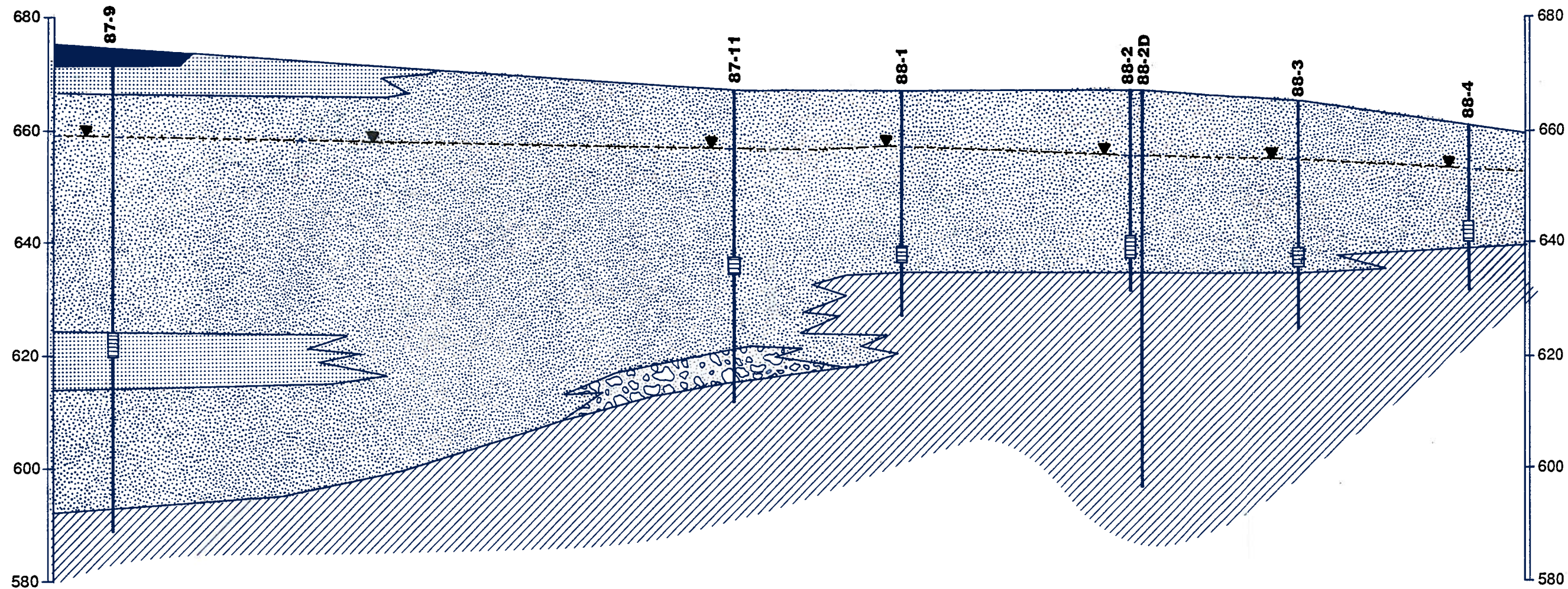


Figure 4
Locations of Cross Section
 General Motors Corporation/CPC Group
 Grand Rapids, Michigan

South

North



LEGEND

 Concrete	 Clay
 Fine Sand	 Water Level
 Sand	 Well Screen
 Sand & Gravel	



Figure 5

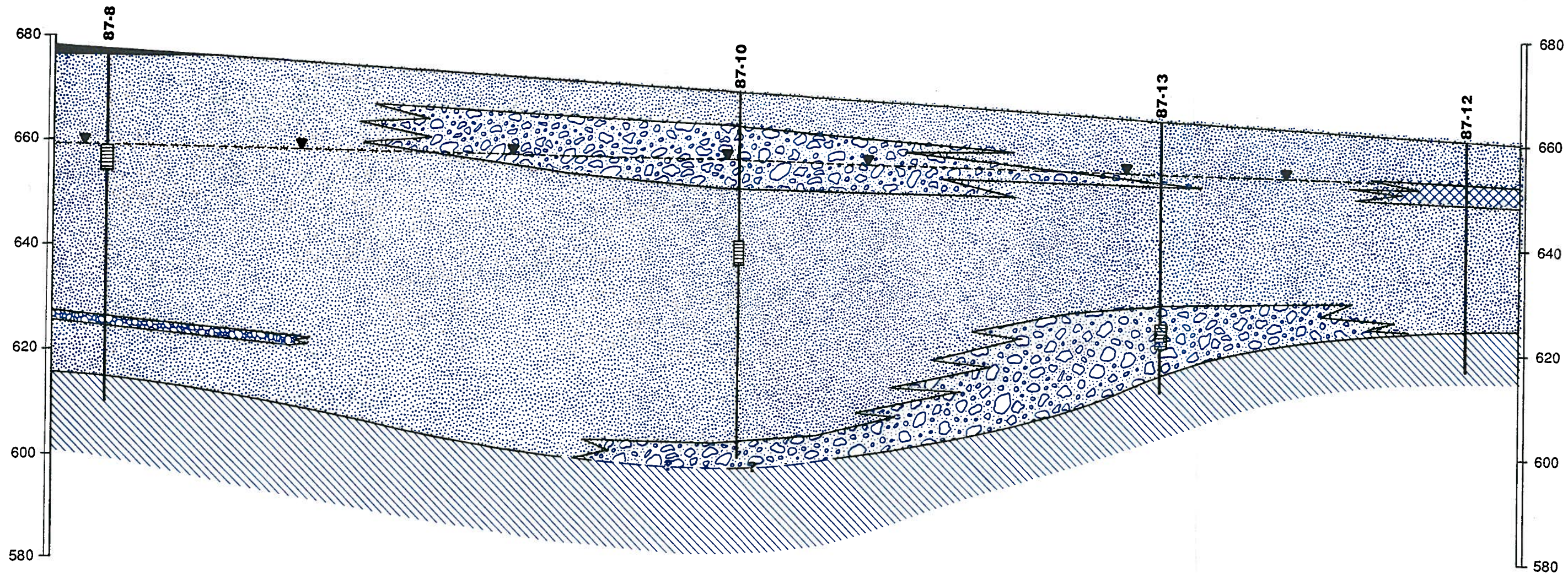
Cross Section D-D'

General Motors Corporation/CPC Group
Grand Rapids, Michigan

June, 1988

South

North



LEGEND

Concrete

Sand

Sand & Gravel

Gravel

Peat

Clay

Water Level

Well Screen

Elevations NGVD

0 100 200 400
Horizontal Scale in Feet

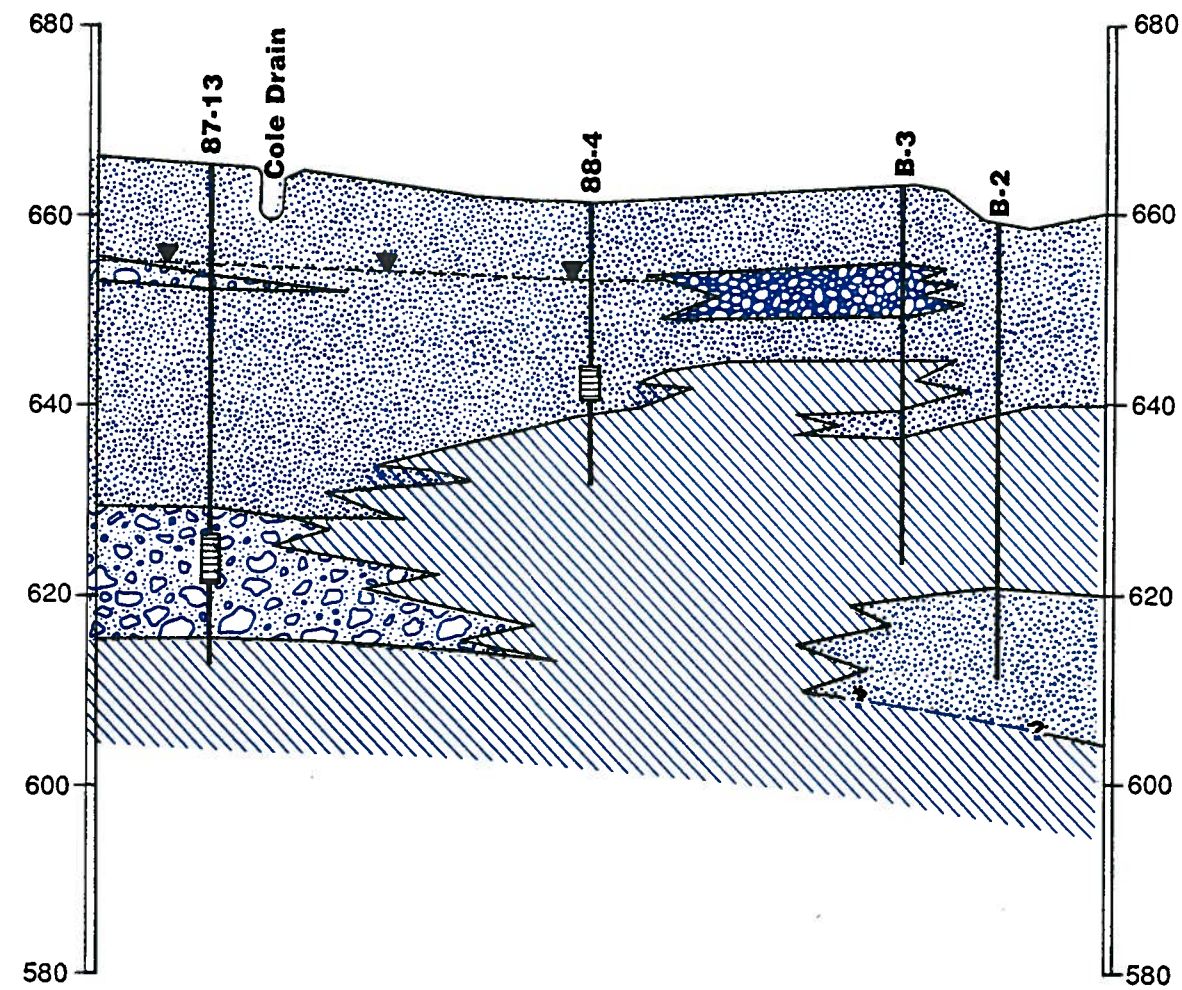
Figure 6

Cross Section E-E'

General Motors Corp. CPC Group
Grand Rapids, Michigan

Southeast

Northwest



LEGEND

Concrete

Sand

Sand & Gravel

Gravel

Peat

Clay

Water Level

Well Screen

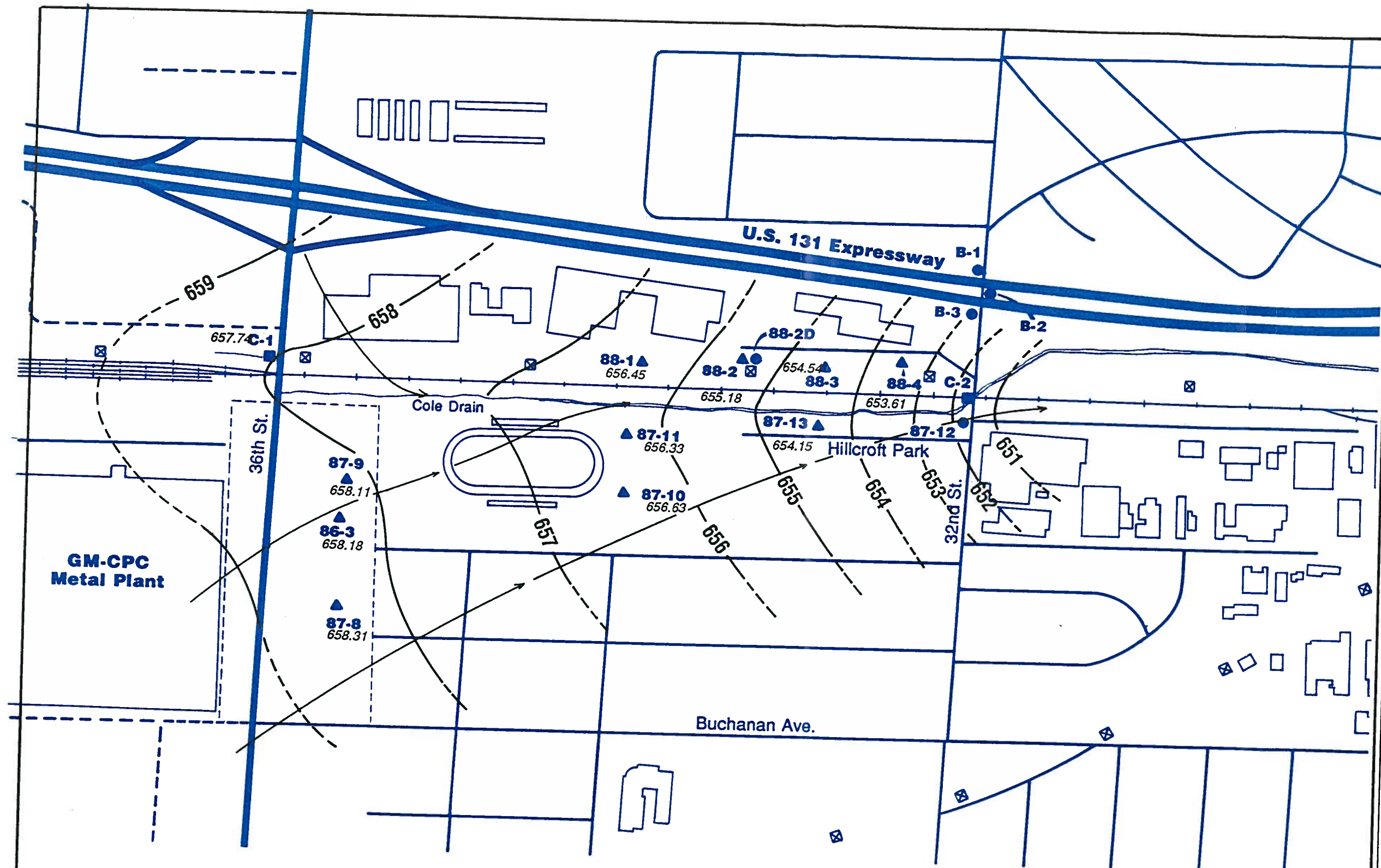
Elevations NGVD

0 100 200 400
Horizontal Scale in Feet

Figure 7

Cross Section F-F'

General Motors Corp. CPC Group
Grand Rapids, Michigan



LEGEND

- ▲ Monitoring Wells
- Culverts Used to Measure Water Levels in Cole Drain
- Soil Borings Drilled During this Investigation (87-12, 88-2D)
- Soil Borings Drilled for US-131 Expressway During the 1950's (B-1, B-2, C-1, C-2)
- ⊠ Electrical Towers

Direction of Groundwater Flow

Contour Interval = 1 ft.

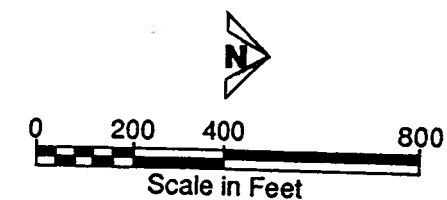
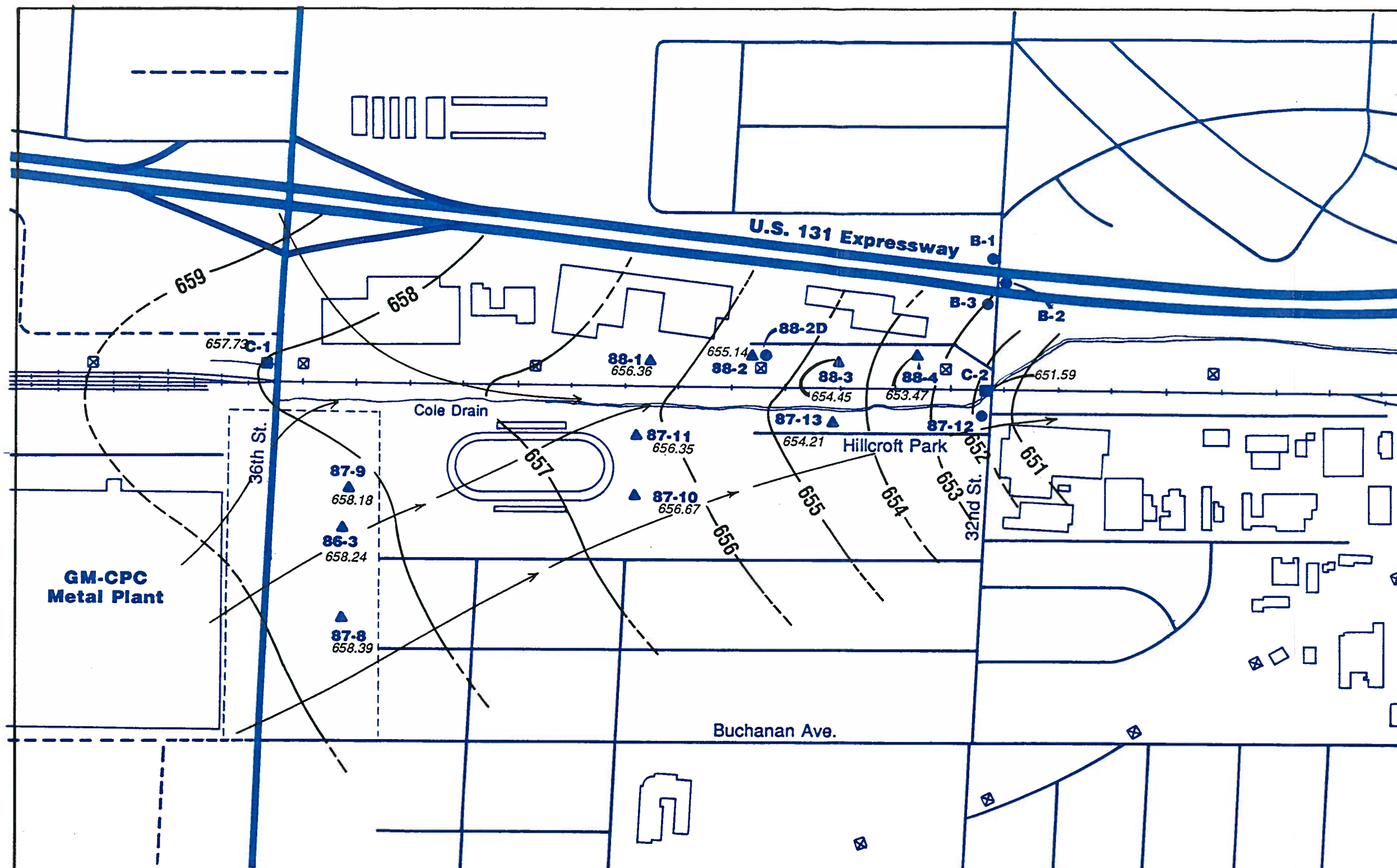


Figure 8
Water Table Contour Map
April 7, 1988

General Motors Corporation/CPC Group
 Grand Rapids, Michigan

June, 1988



LEGEND

- ▲ Monitoring Wells
- Culverts Used to Measure Water Levels in Cole Drain
- Soil Borings Drilled During this Investigation (87-12, 88-2C)
- Soil Borings Drilled for US-131 Expressway During the 1950's (B-1, B-2, B-3)
- ⊠ Electrical Towers
- Direction of Groundwater Flow
- Contour Interval = 1 ft.

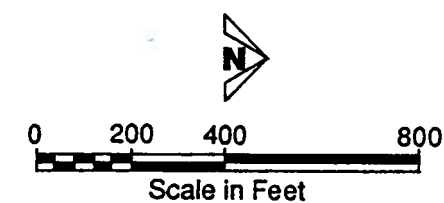
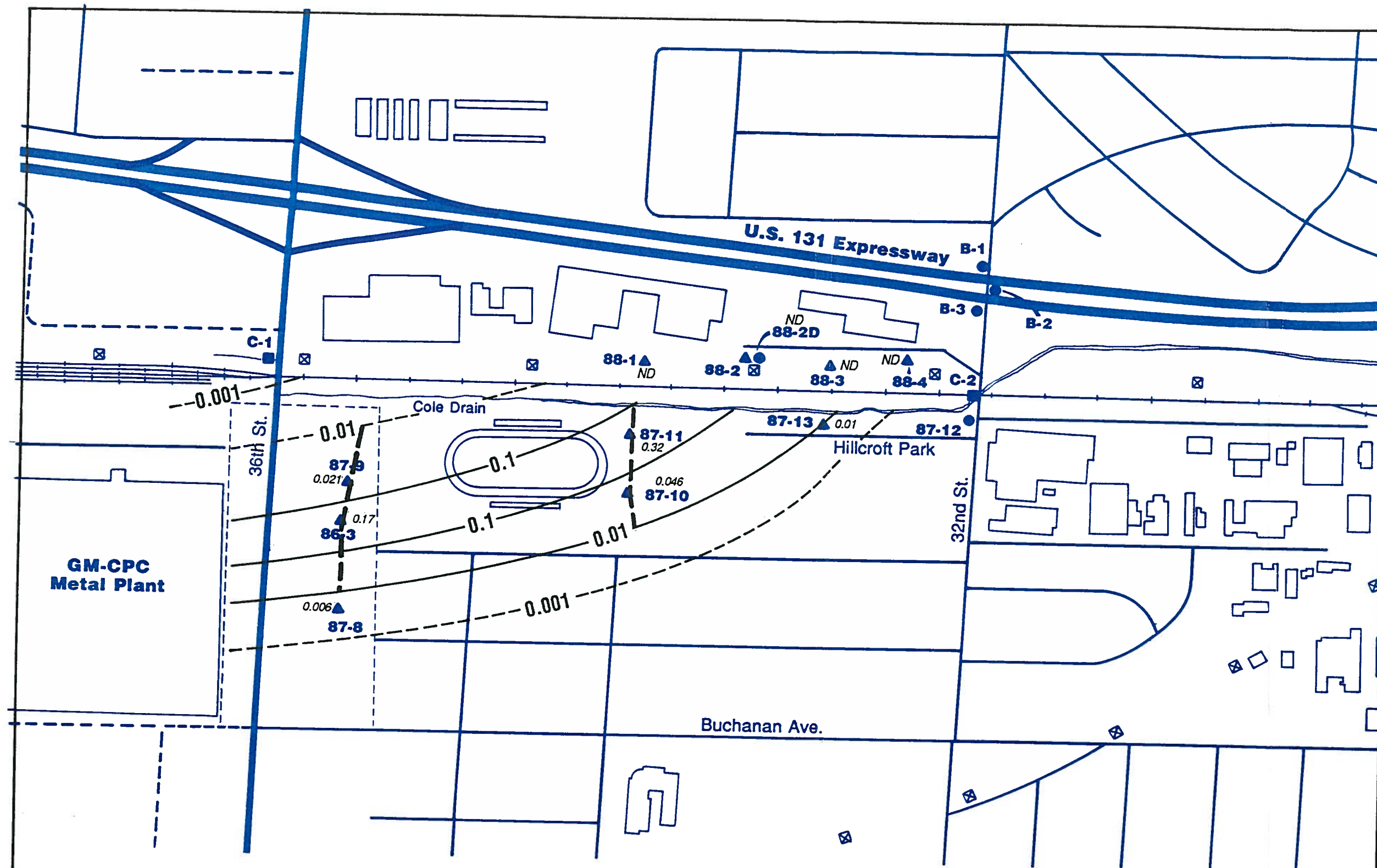


Figure 9
Water Table Contour Map
April 27, 1988

General Motors Corporation/CPC Group
 Grand Rapids, Michigan

June, 1988

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LEGEND

- ▲ Monitoring Wells
- Culverts Used to Measure Water Levels in Cole Drain
- Soil Borings Drilled During this Investigation (87-12, 88-2)
- Soil Borings Drilled for US-131 Expressway During the 1950's (B-1, B-2)
- ⊗ Electrical Towers

0.046 Concentrations in mg/l

Contouring Based on April and June, 1988 Sample Data

--- Inferred Contours

ND Non-Detect

Contour Values are in mg/l

— Locations of Cross-Section Areas of Plume

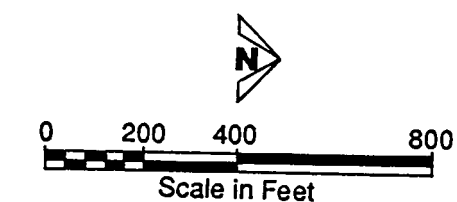


Figure 10

Extent of Dissolved TCE in Groundwater

General Motors Corporation/CPC Group
Grand Rapids, Michigan

June, 1988

2079

Appendix A
Well/Boring Log Sheets

Date Started 1/13 Finished 1/14/87

County KENT	Township CITY OF WYOMING	Fraction 1/4 NE 1/4 NW 1/4	Section 18	T 6N	R 12W

Screen: _____
 Manufacturer: Johnson
 Material: stainless steel
 Model: 936
 Slot/Gauze: 7 slot Dia.: 2"
 Length: 3'
 Depth Set: 19.7' To: 22.7'

Location Sketch : SEE LOCATION MAP

Manufacturer: Johnson
Material: stainless steel
Model: 936
Slot/Gauze: 7 slot Dia.: 2"
Length: 3'
Depth Set: 19.7' To: 22.7'

Slot/Gauze: 7 slot Dia.: 2"
Length: 3'
Depth Set: 19.7' To: 22.7'

Length: 3'
Depth Set: 19.7' To: 22.7'

Depth Set: 19.7' To: 22.7

Casing

Dia.	Type	Depth Set
<u>2"</u>	<u>Galv.</u>	<u>0.3 To 19.7</u>
		To

Elevation	
Casing:	677.62'
Ground:	677.9'
Ref. Pt :	NGVD

Depth	To	Material
0.0	0.4'	Concrete
0.4	18.0'	Nat'l Soils & Bentonite

Development: @ 30' / 40' / 50' / 60'; Temporary Wells w/ Rod Pump

Water Level: 18.7 Ft. Below: GD
Measured On: _____

Remarks (include here, other data available)

Temporary Wells @	18.7
	28.0
	38.0
	48.0
	58.0

DEVELOPMENT:

Bailed	
Rod Pump	45 gal
Rod Pump	45 gal
Rod Pump	75 gal
Rod Pump	30 gal

Samples Taken w/Teflon Bailer

S = Soil / W = Water		Remarks		*Sample Type:	
(feet) Thick- ness	(feet) Depth To Base	Description	Sample Depth (ft)		
0.3	0.3	ASPHALT	3 1/2	5	S/REP
0.7	1.0	GRAVEL	8 1/2	10	S/REP
5.0	6.0	SAND - fine to medium, brown	13 1/2	15	S/REP
7.0	13.0	SAND - coarse to medium, brown	18 1/2	20	S/REP
5.5	18.5	SAND - medium, brown	18.7	19.7	W/QVA
33.5	52.0	SAND - medium, brown, wet	28	31	W/QVA
1.0	53.0	GRAVEL - wet	38	41	W/QVA
10.0	63.0	SAND - fine to very fine, wet, layers of brown and gray clay	48	51	W/QVA
			58	61	W/QVA
3.5	66.5	CLAY - gray, sandy, firm	65	66 1/2	S/QVA
		NOTE: Well caps have been stamped with ID# and locked with #506 padlock.			

County	Kent	Township	City of Wyoming	Fraction	$\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$	Section	13	T	6N	R	12W

No odor detected when drilling.

~~See site map~~

		Remarks	
Thick- ness	Depth To Base	Description	
0.2	0.2	ASPHALT	
0.8	1.0	SAND and GRAVEL	
2.0	3.0	SAND - fine, yellow-brown	
2.0	5.0	SAND - medium to coarse, tan	
14.0	19.0	SAND - fine, tan	
4.0	23.0	SAND - fine, brown, wet	
20.0	43.0	SAND - very fine, brown, wet	
22.0	65.0	SAND - coarse to fine gravel, wet	
4.0	69.0	GRAVEL - medium, wet	
1.0	70.0	CLAY - brown	
	72.0	CLAY - gray	
		EOB @ 72.0	

Well / Boring Log Sheet

County KENT	Township CITY OF WYOMING	Fraction 1/4 NE 1/4 NW 1/4	Section 18	T 6N	R 12W

Contractor: Stearns Drilling

Address: Dutton, MI

Equipment: Acker AD 11

Equipment: 8" HSA

Supervisor: E. Culver

Drilling Method(s)	Depth
8" HSA	7 - 50'

Grouting/Seal

Depth	To	Material
0.0	0.6'	Concrete

Development: Permanent Well
Developed w/Centrifugal
Pump @ 20 gpm

Water Level: 16.0 Ft. Below: GD
Measured On: 1/15/87

Screen:

Manufacturer: Johnson

Material: stainless steel

Model: 936

Slot/Gauze: 7 slot Dia: 2"

Length: 3'

Depth Set: 50.5' To: 53.5'

Casing

2 Dia. Type Galv. Depth Set 0.3 To 50.3'

Elevation

Elevation 673.87'

Casing: 674.1
Ground:

Ground: _____
Ref. Pt.: NGVD

Remarks (include here, other data available)

Remarks (include here, other data available)
Temporary Wells @ 16 - 17.5'

22 - 25.0'

32 - 35.0'

41 - 44.0'

Samples Taken w/Teflon Bailers

T.D. = 53.49' T.O.C.

Location Sketch : SEE LOCATION MAP

Development:

Bailed 10 gals

Centrifugal Pump 30 gals

Rod Pump	75 gals

Rod Pump	75 gals

*S = Soil / W = Water		*Sample	
(FEET)	(FEET)	Remarks	Type:
Thick- ness	Depth To Base	Description	Sample Depth (ft)
0.25	0.25	ASPHALT	3 $\frac{1}{2}$ 5 S/REP
2.75	3.0	RUBBLE - black, metal, concrete	8 $\frac{1}{2}$ 10 S/REP
2.0	5.0	SAND - fine, black, rubble	13 $\frac{1}{2}$ 15 S/REP
3.0	8.0	SAND - fine, brown	16 17 $\frac{1}{2}$ W/VOA
8.0	16.0	SAND - fine to medium, brown	22 25 W/VOA
34.0	50.0	SAND - fine to medium, brown, wet	32 35 W/VOA
10.0	60.0	SAND - fine, brown, wet	41 44 W/VOA
21.0	81.0	SAND - medium, brown, wet	52 55 W/VOA
4.0+	85.0	CLAY - gray, sandy, pebbles	62 65 W/VOA
			72 75 W/QVA
			83 $\frac{1}{2}$ 85 W/QVA
		NOTE: Well caps have been stamped with ID # and	
		locked with #506 padlock.	

Well/Boring Log Sheet

County Kent	Township City of Wyoming	Fraction 1/4 NW 1/4 SE 1/4	Section 13	T 6N	R 12W

Contractor Stearns Drilling
Address: Dutton, Mich

Equipment: CME 45
Roger/Dennis
Supervisor: Don Johnson

Screen
 Manufacturer: Johnson
 Material: Stainless Steel
 Model: wire wound
 Slot/Gauze: 7 Dia.: 2"
 Length: 3'
 Depth Set: 29' To: 32'

Date
Started: 10/2/87 Finished: 10/2/87

Elevation
Casing: 668.83
Ground: 669.13
Ref. Pt.: _____

Drilling Method(s)	Depth
Auger (HSA)	0.0'- 30'
Mud Rotary	0.0'- 35'

Casing			
Dia.	Type	Depth Set	
2"	galv.	0.0	To 29'
			To

Water Level _____ Ft. Below _____
Measure On: _____

Location See location Map

Grouting/Seal		
Depth	To	Material/Method
0.0'	1.0'	Cement/flush Mt. Cap
1.0'	24	Nat. soils & hole plug
24'	32	Natural soils

Remarks (include here, other data available) _____
Well equipped with flush-mount cap

Development Rod pumped for
15 minutes - until sediment free

[illegible]

County Kent	Township City of Wyoming	Fraction 1/4 NW 1/4 SE 1/4	Section 13	T 6N	R 12W

Date
Started: 9/28/87 Finished: 9/29/87

Elevation
Casing: _____
Ground: 669.13
Ref. Pt.: _____

Water Level 13.3 Ft. Below G.D.
Measure On: inside Augers

Location See location Map

Remarks (include here, other data available)				
Temp. well set @:	Purged:	Purge Method:	Time Sampled:	Sampled Method:
19.5'- 22.5' (10 min)	until sed. free	Rod Pumped	12:05pm	S.S. Bailer
29 - 32' (10 min)	until sed. free	Rod Pumped	2:00pm	S.S. Bailer
38.5 - 41.5' (15 min)	until sed. free	Rod Pumped	4:15pm	S.S. Bailer
48 - 51' (20 min)	until sed. free	Rod Pumped	9:29-9:50am	S.S. Bailer
58 - 61' (25 min)	until sed. free	Rod Pumped	9:29-12:25am	S.S. Bailer

Remarks

Last 6"]
Second 6" — blow counts
First 6"]
Sampled to: (ft)
Sampled from: (ft)

[illegible]

Well/Boring Log Sheet

County Kent	Township City of Wyoming	Fraction 1/4 NW 1/4 SE 1/4	Section 13	T 6N	R 12W

Contractor: Stearns Drilling
Address: Dutton, Mich
Equipment: CME 45
Roger/Dennis
Supervisor: Don Johnson

Screen
 Manufacturer: Johnson
 Material: Stainless Steel
 Model: wire wound
 Slot/Gauze: 7 Dia.: 2"
 Length: 3'
 Depth Set: 30' To: 33'

Date
Started: 10/2/87 Finished: 10/2/87

Elevation
Casing: 667.17
Ground: 667.47
Ref. Pt.: _____

Drilling Method(s)	Depth
Auger (HSA)	0.0-35'

Casing		
Dia.	Type	Depth Set
2"	galv.	0.0 To 30'
		To

Water Level _____ Ft. Below _____
Measure On: _____

Grouting/Seal		
Depth	To	Material/Method

Location See location Map

Remarks (include here, other data available) Well equipped with flush-mount cap

Development Rod pumped for
20 minutes - until sediment free

[illegible]

Well/Boring Log Sheet

County Kent	Township City of Wyoming	Fraction 1/4 NW 1/4 SE 1/4	Section 13	T 6N	R 12W

Contractor Stearns Drilling

Address: Dutton, Mich

Equipment: CME 45

Roger/Dennis

Supervisor: Don Johnson

Screen "temporary"

Manufacturer: Johnson

Material: Stainless Steel

Model: wire wound

Slot/Gauze: 7 Dia.: 2"

Length: 3'

Depth Set: see below To:

Date _____

Started: 9/30/87 Finished: 10/1/87

Elevation

Casing: _____

Ground: 667.47

Ref. Pt.: _____

Drilling Method(s)	Depth

Auger (HSA) 0.0'- 30'

Mud Rotary	0.0'- 55'

Grouting/Seal

Depth	To	Material/Method

0.0' 55.5' Natural soils

& Bentonite slurry

Casing

Dia.	Type	Depth Set

2" galv. see below To

To _____

Water Level 11.3' Ft. Below G.D.

Measure On: Inside Augers

Location See location Map

Development See "Remarks"

Remarks (include here, other data available) 18'-21' - purged 10 min until sediment
free with rod pump - sampled with 2" S.S. bailer 1:55pm. 28' -31' - purged 15 min. until
sediment free with rod pump - sampled with 2" S.S. bailer 4:05pm. 36.4' -39.4' - purged
20 min. until sediment free with rod pump - sampled with 2" S.S. bailer 9:15am.
48'-51' - purged min. until sediment free with rod pump - sampled with 2" S.S. bailer
12:15om

[illegible]

Well/Boring Log Sheet

County Kent	Township City of Wyoming	Fraction 1/4 NW 1/4 SE 1/4	Section 13	T 6N	R 12W

Contractor: Stearns Drilling
Address: Dutton, Mich
Equipment: CME 45
Roger/Dennis
Supervisor: Don Johnson

Screen "temporary"
 Manufacturer: Johnson
 Material: Stainless Steel
 Model: wire wound
 Slot/Gauze: 7 Dia.: 2"
 Length: 3'
 Depth Set: 30' To: 33'

Date
Started: 10/5/87 Finished: 10/6/87

Elevation
Casing: _____
Ground: 661.41 _____
Ref. Pt.: _____

Drilling Method(s)	Depth
Auger (HSA)	0.0-35'
Mud Rotary	35-44.5

Casing

Dia.	Type	Depth Set
2"	galv.	see below To _____ To _____

Water Level 9.2 Ft. Below G.D.
Measure On: Inside Augers

Grouting/Seal		
Depth	To	Material/Method

Location See location Map

Development see "Remarks"

Remarks (include here, other data available) Temporary well set @: 19-22
rod pumped for 15 minutes until sediment free/sampled with 2" S.S. bailer @ 12:20 pm
29-32 rod pumped for 10 min until sediment free/sampled with 2" S.S. bailer @ 1:35 pm

[illegible]

Well/Boring Log Sheet

County Kent	Township City of Wyoming	Fraction 1/4 NW 1/4 SE 1/4	Section 13	T 6N	R 12W

Contractor: Stearns Drilling
Address: Dutton, Mich
Equipment: CME 45
Roger/Dennis
Supervisor: Don Johnson

Screen
 Manufacturer: Johnson
 Material: Stainless Steel
 Model: wire wound
 Slot/Gauze: 7 Dia.: 2"
 Length: 3' (36")
 Depth Set: 40' To: 43'

Date
Started: 10/7/87 Finished: 10/7/87

Elevation
Casing: 664.24
Ground: 664.53
Ref. Pt.:

Drilling Method(s)	Depth
Auger (HSA)	0.0-45'

Casing			
Dia.	Type	Depth Set	
2"	galv.	0.0 To 40'	To

Water Level _____ Ft. Below _____
Measure On: _____

Grouting/Seal		
Depth	To	Material/Method
0.0	1.0	Cement w/ Flush Mt. Cap
1	15	Nat. soils & Hole plug
15	45	Natural soils

Location See location Map

Remarks (include here, other data available) Well equipped with flush-mount cap

Development Rod pumped for _____
20 minutes-until sediment free

[illegible]

Well/Boring Log Sheet

County Kent	Township City of Wyoming	Fraction 1/4 NW 1/4 SE 1/4	Section 13	T 6N	R 12W

Contractor Stearns Drilling

Address: Dutton, Mich

Equipment: CME 45

Roger/Dennis

Supervisor: Don Johnson

Screen "temporary"

Manufacturer: Johnson

Material: Stainless Steel

Model: wire wound

Slot/Gauze: 7 Dia.: 2"

Length: 3'

Depth Set: see below To:

Date _____

Started: 10/6/87 Finished: 10/6/87

Elevation

Casing:

Ground: 664.53

Ref. Pt.:

Drilling Method(s)	Depth

Auger (HSA)	0.0-35'

Mud Rotary	35'-51'

Casing

Dia.	Type	Depth Set

2" galv. see below To

_____ gav. see below to _____
To _____

Water Level 10.5 Ft. Below G.D.

Measure On: Inside Augers

Location See location Map

Grouting/Seal

Depth	To	Material/Method

Remarks (include here, other data available) Temporary well set @:

20'-23' rod pumped for 10 min.- until sediment free/sampled w/ 2" S.S. bailer at 11:00am

30'-33' rod pumped for 10 min.-until sediment free/sampled w/ 2" S.S. bailer at 12:15pm

40'-43' rod pumped for 15 min.-until sediment free/sampled w/ 2" S.S. bailer at 2:45pm

Development see "Remarks"

[illegible]

County Kent	Township City of Wyoming	Fraction 1/4 NE 1/4 SW1/4	Section 13	T 6N	R 12W

Screen
 Manufacturer: Johnson
 Material: Stainless Steel
 Model: _____
 Slot/Gauze: 7 Dia.: 2"
 Length: 3'
 Depth Set: 27' To: 30'

Elevation
Casing: 666.66
Ground: 666.95
Ref. Pt.: _____

Casing		
Dia.	Type	Depth Set
2"	galv.	0 To 27'
		To

Location See location Map

Remarks (include here, other data available) _____
 Temporary stainless steel screens set 12 to 13 feet, 22 to 23 feet and 29 to 32 feet
 12 to 13 foot sample: 50 gallons recovered (ditch pump)
 22 to 23 foot sample: 30 gallons recovered (ditch pump)
 29 to 32 foot sample: 40 gallons recovered (ditch pump)

[illegible]

County Kent	Township City of Wyoming	Fraction 1/4 NE 1/4 SW1/4	Section 13	T 6N	R 12W

Elevation
Casing: 666.38
Ground: 666.68
Ref. Pt.: _____

Location See location Map

Remarks (include here, other data available)

Temporary stainless steel screens set 12 to 15 feet, 22 to 25 feet and 30 to 31 feet

12 to 15 foot sample: 40 gallons recovered (ditch pump)

22 to 25 foot sample: 100 gallons recovered (ditch pump)

30 to 31 foot sample: 50 gallons recovered (ditch pump)

Well equipped with Flush-mount cap

[illegible]

County Kent	Township City of Wyoming	Fraction 1/4 NE 1/4 SW 1/4	Section 13	T 6N	R 12W

Screen
 Manufacturer: _____
 Material: _____
 Model: _____
 Slot/Gauze: _____ Dia.: _____
 Length: _____
 Depth Set: _____ To: _____

Elevation
Casing: _____
Ground: 666.68 _____
Ref. Pt.: _____

Casing

Dia.	Type	Depth Set
		To
		To

Location See location Map

Remarks (include here, other data available) _____
This soil boring is located 2.5 feet north of monitoring well 88-2

Development	N/A

[illegible]

County	Township	Fraction	Section	T	R
Kent	City of Wyoming	1/4 NE 1/4 SW 1/4	13	6N	12W

Screen
 Manufacturer: Johnson
 Material: Stainless Steel
 Model: _____
 Slot/Gauze: 7 Dia.: 2"
 Length: 3'
 Depth Set: 27' To: 30'

Elevation
Casing: 665.26
Ground: 665.55
Ref. Pt.:

Casing		
Dia.	Type	Depth Set
2"	galv.	0 To 27'

Grouting/Seal		
Depth	To	Material/Method
0.0'	24'	Nat. soils & Hole Plug
24'	30'	Nat. soils

Location See location Map

Remarks (include here, other data available)
Temporary stainless steel screens set at 12 to 15 feet and 22 to 25 feet
12 to 15 foot sample; 45 gallons recovered (ditch pump)
22 to 25 foot sample; 50 gallons recovered (ditch pump)
30 to 31 foot sample; 50 gallons recovered (ditch pump)
Well equipped with flush-mount cap

[illegible]

County	Township	Fraction	Section	T	R
Kent	City of Wyoming	1/4 NE 1/4 SW 1/4	13	6N	12W

Screen
 Manufacturer: Johnson
 Material: Stainless Steel
 Model: _____
 Slot/Gauze: 7 Dia.: 2"
 Length: 3'
 Depth Set: 18' To: 21'

Elevation
Casing: 661.63
Ground: 661.92
Ref. Pt.:

Casing

Dia.	Type	Depth Set
2"	galv.	0 To 18'
		To

Location See location Map

Remarks (include here, other data available)

Temporary stainless steel screens set at 9 to 12 feet and 18 to 21 feet

9 to 12 foot sample: 30 gallons recovered (ditch pump)

18 to 21 foot sample: 40 gallons recovered (ditch pump)

Well equipped with flush-mount cap

[illegible]

Appendix B
In-Situ Permeability Data

IN-SITU HYDRAULIC CONDUCTIVITY TEST

Hydraulic conductivity can be estimated by a variety of techniques. One of the most common techniques is to subject a water well to stress by changing the water level and then monitoring how the water level responds to this stress. The stress is often applied by pumping water from the well. In a slug test (or "in-situ" permeability test), a known quantity of water is injected (or withdrawn) "instantaneously" into the well. After the well has been injected, the water level is monitored as it returns to the original static or pre-stress level.

Of the various methods for stressing the water level in a well, EDI has found that application of a vacuum which draws water into the well is very efficient. After a constant vacuum has been applied and flow into the well has been stabilized, the vacuum can be released creating the effect of an instantaneous slug.

Rapid measurement of the water level decline is mandatory for some test situations. Normally, such measurements are not possible with measuring tapes or electronic sounding devices. However, a pressure transducer instrument linked to a data logger allows accurate measurement and recording of water levels. With this instrumentation, measurements begin upon release of the vacuum. Subsequent measurements are recorded thereafter. The resulting water level records are accurate to ± 0.01 foot.

The degree of well development may affect test results. Wells should be developed to insure that the well screen freely transmits water, but overdevelopment should be avoided.

Methods

An understanding of the subsurface conditions is a prerequisite to proper interpretation of test results. This includes knowledge of the type of geologic materials being tested, the thickness of the test zone, the type of geologic materials overlying and underlying the test zone, and the position of the well screen within the test zone. In addition, the physical dimensions of the well must be known.

The Bouwer and Rice (1976) solution to water level decay after stress is applicable to unconfined conditions, but the authors note that the technique is applicable to confined aquifers if the water enters the aquifer through the upper confining layer through compression or leakage. Their equations are based on a modification of the Thiem equation and assumes:

1. Drawdown of the water table around the well is negligible.
2. Flow above the water table can be ignored.
3. Head losses as water enters the well are negligible.
4. The aquifer is homogeneous and isotropic.

The equations of importance are:

$$K = \frac{r_w^2 \ln(R_e/r_w) \ln(Y_o/Y_t)}{2 l t}$$

and (for partially penetrating wells):

$$\ln(R_e/r_w) = \frac{1.1}{\ln(h/r_w)} + \frac{A + B \ln(D-h)/r_w}{1/r_w}$$

Where:

l = screen length

Y_o, Y_t = water level, static, and at time t

- R_e = effective radius over which Y is dissipated
 r_w = horizontal distance from well center to original aquifer
 t = time between measurements
 H = distance between static water level and base of screen
 D = aquifer thickness
 A, B = dimensionless coefficients that are a function of $1/r_w$
and determined graphically

Values of time and water level are selected from the straight-line portion of the plot of water level (log scale) versus time (arithmetic scale). These values plus the values for well construction and aquifer thickness are substituted into the above equations to determine horizontal hydraulic conductivity.

CPC G.R. METALS
20790
WELL 87-10
TESTED MAY 10, 1988 @ 12:31 A.M.

TIME (SEC)	HEAD (FT)	LOG OF HEAD (FT)
1.398	4.14	0.61700
1.596	4.44	0.64738
1.800	4.47	0.65031
1.998	4.28	0.63144
3.000	2.76	0.44091
3.996	1.66	0.22011
4.998	0.97	-0.01323
6.000	0.55	-0.25964
6.996	0.31	-0.50864
7.998	0.17	-0.76955
9.000	0.09	-1.04576
9.996	0.05	-1.30103
10.998	0.03	-1.52288
12.000	0.01	-2.00000

CPC G.R. METALS
20790
WELL 87-11
TESTED MAY 10, 1988 @ 10:53 A.M.

TIME (SEC)	HEAD (FT)	LOG OF HEAD (FT)
0.798	4.11	0.61384
0.996	4.36	0.63949
1.200	4.33	0.63649
1.398	4.11	0.61384
1.596	3.82	0.58206
1.800	3.48	0.54158
1.998	3.15	0.49831
3.000	1.95	0.29003
3.996	1.22	0.08636
4.998	0.79	-0.10237
6.000	0.51	-0.29243
6.996	0.35	-0.45593
7.998	0.23	-0.63827
9.000	0.15	-0.82391
9.996	0.10	-1.00000
10.998	0.06	-1.22185
12.000	0.04	-1.39794
12.996	0.03	-1.52288
13.998	0.02	-1.69897
15.000	0.01	-2.00000

CPC G.R. METALS

20790

WELL 87-11 SEL_0

TESTED MAY 10, 1988 @ 10:00 A.M.

TIME (SEC)	HEAD (FT)	LOG OF HEAD (FT)
1.596	4.15	0.61805
1.800	4.28	0.63144
1.998	4.18	0.62118
3.000	2.74	0.43775
3.996	1.69	0.22789
4.998	1.06	0.02531
6.000	0.70	-0.15490
6.996	0.47	-0.32790
7.998	0.32	-0.49485
9.000	0.22	-0.65758
9.996	0.15	-0.82391
10.998	0.11	-0.95861
12.000	0.07	-1.15490
12.996	0.05	-1.30103
13.998	0.03	-1.52288
15.000	0.02	-1.69897
15.996	0.01	-2.00000
16.998	0.01	-2.00000
18.000	0.01	-2.00000

CPC G.R. METALS

20790

WELL 87-13

TESTED MAY 10, 1988 @ 13:10 A.M.

TIME (SEC)	HEAD (FT)	LOG OF HEAD (FT)
1.200	4.64	0.66652
1.398	4.65	0.66745
1.596	4.42	0.64542
1.800	4.26	0.62941
1.998	3.94	0.59550
3.000	2.22	0.34635
3.996	0.97	-0.01323
4.998	0.32	-0.49485
6.000	0.08	-1.09691
6.996	0.02	-1.69897
7.998	0.01	-2.00000
9.000	0.01	-2.00000

CPC G.R. METALS

20790

WELL 88-1

TESTED MAY 10, 1988 @ 15:53 A.M.

TIME (SEC)	HEAD (FT)	LOG OF HEAD (FT)
0.594	4.11	0.61384
0.798	4.19	0.62221
0.996	4.02	0.60423
1.200	3.68	0.56585
1.398	3.22	0.50786
1.596	2.71	0.43297
1.800	2.19	0.34044
1.998	1.71	0.23300
3.000	0.28	-0.55284
3.996	0.03	-1.52288
4.998	0.02	-1.69897

CPC G.R. METALS
20790
WELL 88-2
TESTED MAY 10, 1988 @ 15:19 A.M.

TIME (SEC)	HEAD (FT)	LOG OF HEAD (FT)
0.594	4.33	0.63649
0.798	4.25	0.62839
0.996	3.99	0.60097
1.200	3.59	0.55509
1.398	3.13	0.49554
1.596	2.68	0.42813
1.800	2.26	0.35411
1.998	1.89	0.27646
3.000	0.73	-0.13668
3.996	0.28	-0.55284
4.998	0.12	-0.92082
6.000	0.05	-1.30103
6.996	0.02	-1.69897

CPC G.R. METALS

20790

WELL 88-3

TESTED MAY 10, 1988 @ 14:46 A.M.

TIME (SEC)	HEAD (FT)	LOG OF HEAD (FT)
0.996	4.17	0.62014
1.200	4.56	0.65896
1.398	4.51	0.65418
1.596	4.27	0.63043
1.800	3.96	0.59770
1.998	3.58	0.55388
3.000	2.13	0.32838
3.996	1.34	0.12710
4.998	0.86	-0.06550
6.000	0.57	-0.24413
6.996	0.39	-0.40894
7.998	0.26	-0.58503
9.000	0.17	-0.76955
9.996	0.11	-0.95861
10.998	0.07	-1.15490
12.000	0.05	-1.30103
12.996	0.03	-1.52288
13.998	0.02	-1.69897
15.000	0.01	-2.00000
15.996	0.01	-2.00000

CPC G.R. METALS

20790

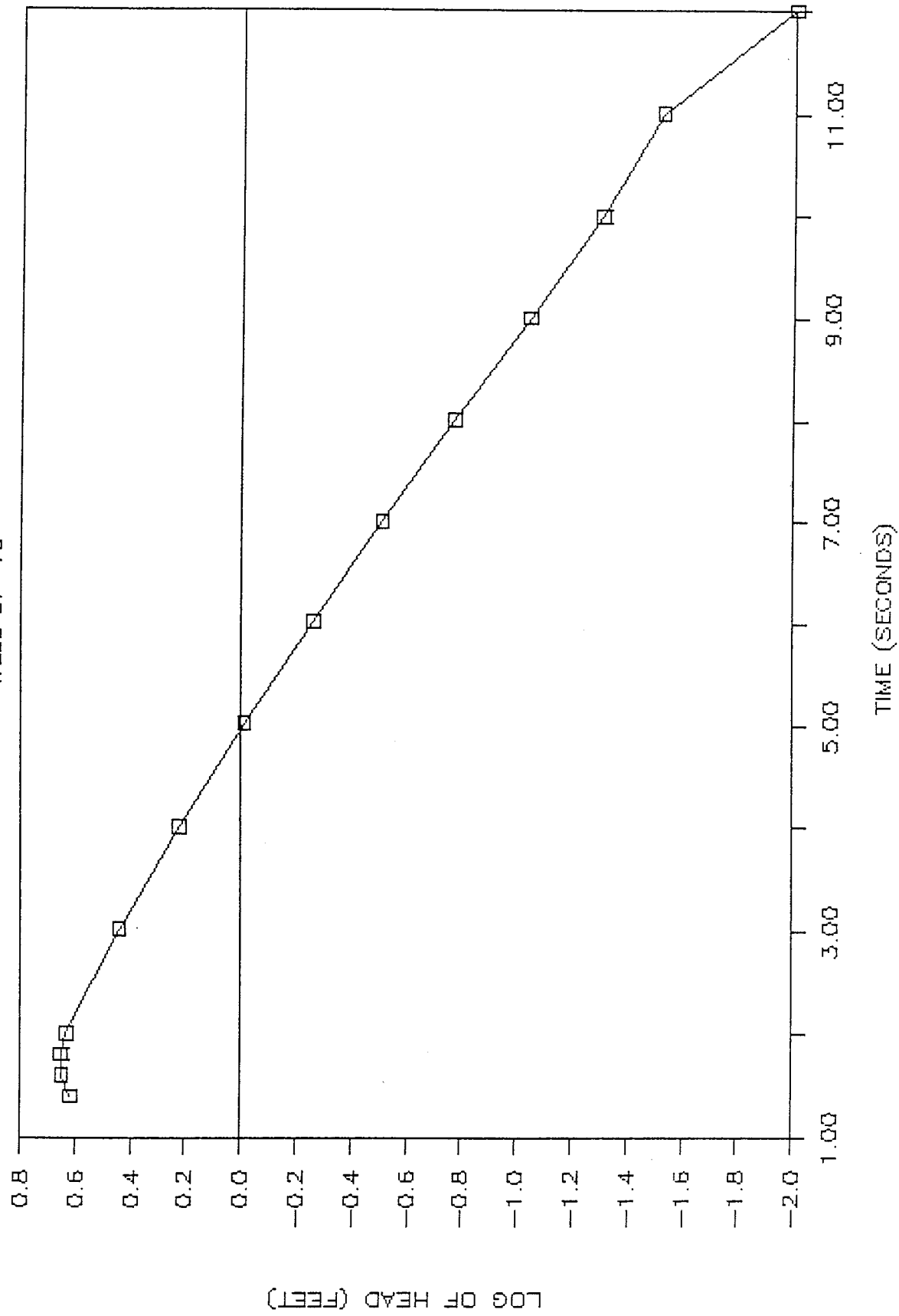
WELL 88-4

TESTED MAY 10, 1988 @ 14:14 A.M.

TIME (SEC)	HEAD (FT)	LOG OF HEAD (FT)
0.594	5.99	0.77743
0.798	5.22	0.71767
0.996	5.18	0.71433
1.200	5.08	0.70586
1.398	5.01	0.69984
1.596	4.96	0.69548
1.800	4.88	0.68842
1.998	4.82	0.68305
3.000	4.54	0.65706
3.996	4.29	0.63246
4.998	4.07	0.60959
6.000	3.85	0.58546
6.996	3.66	0.56348
7.998	3.47	0.54033
9.000	3.3	0.51851
9.996	3.13	0.49554
10.998	2.98	0.47422
12.000	2.83	0.45179
12.996	2.7	0.43136
13.998	2.57	0.40993
15.000	2.45	0.38917
15.996	2.33	0.36736
16.998	2.22	0.34635
18.000	2.12	0.32634
18.996	2.02	0.30535
19.998	1.92	0.28330
25.002	1.52	0.18184
30.000	1.21	0.08279
34.998	0.96	-0.01773
40.002	0.75	-0.12494
45.000	0.59	-0.22915
49.998	0.45	-0.34679
55.002	0.32	-0.49485
60.000	0.22	-0.65758
64.998	0.14	-0.85387
70.002	0.09	-1.04576
75.000	0.06	-1.22185
79.998	0.03	-1.52288
84.996	0.02	-1.69897

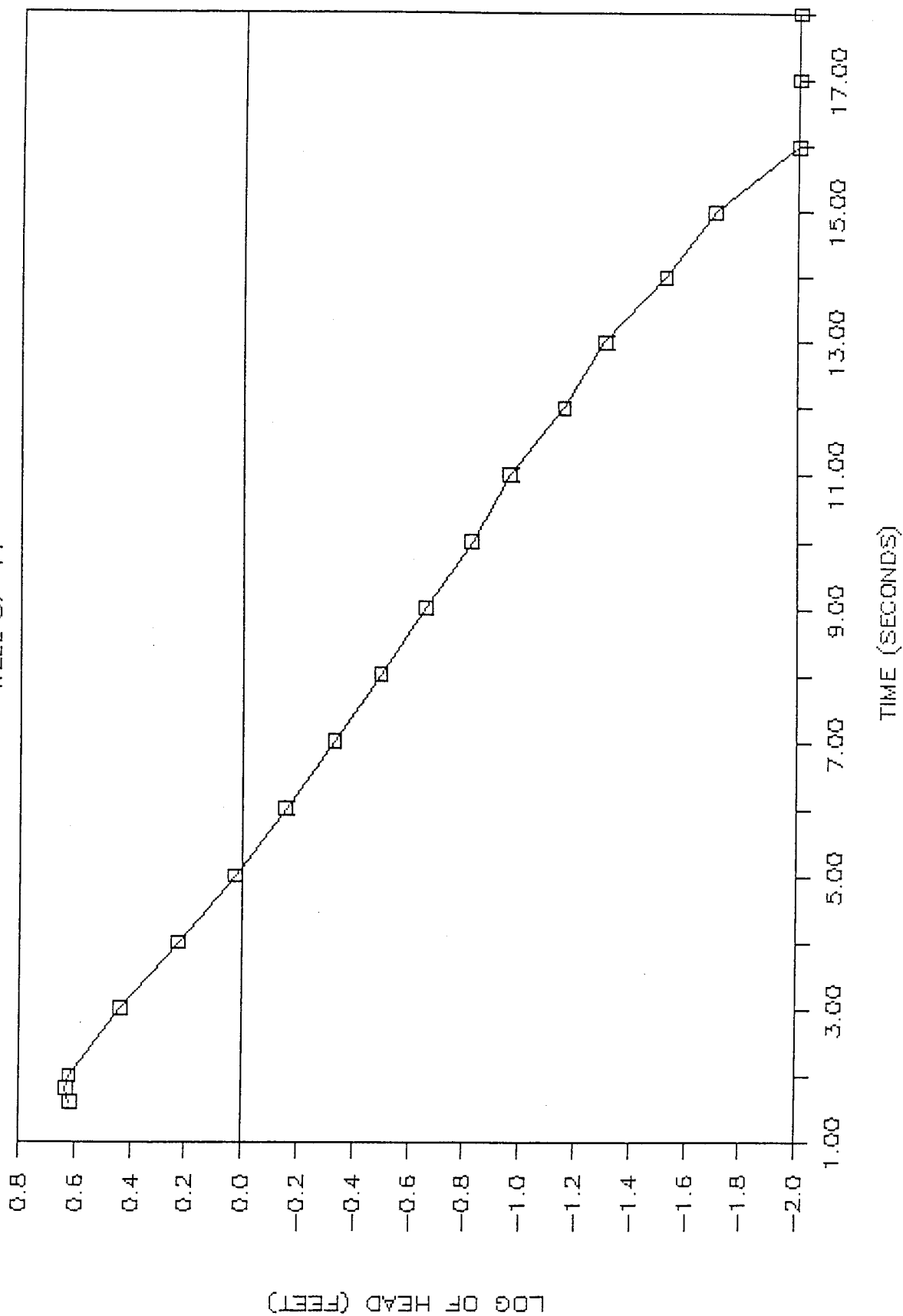
CPC G.R. METALS

WELL 87-10



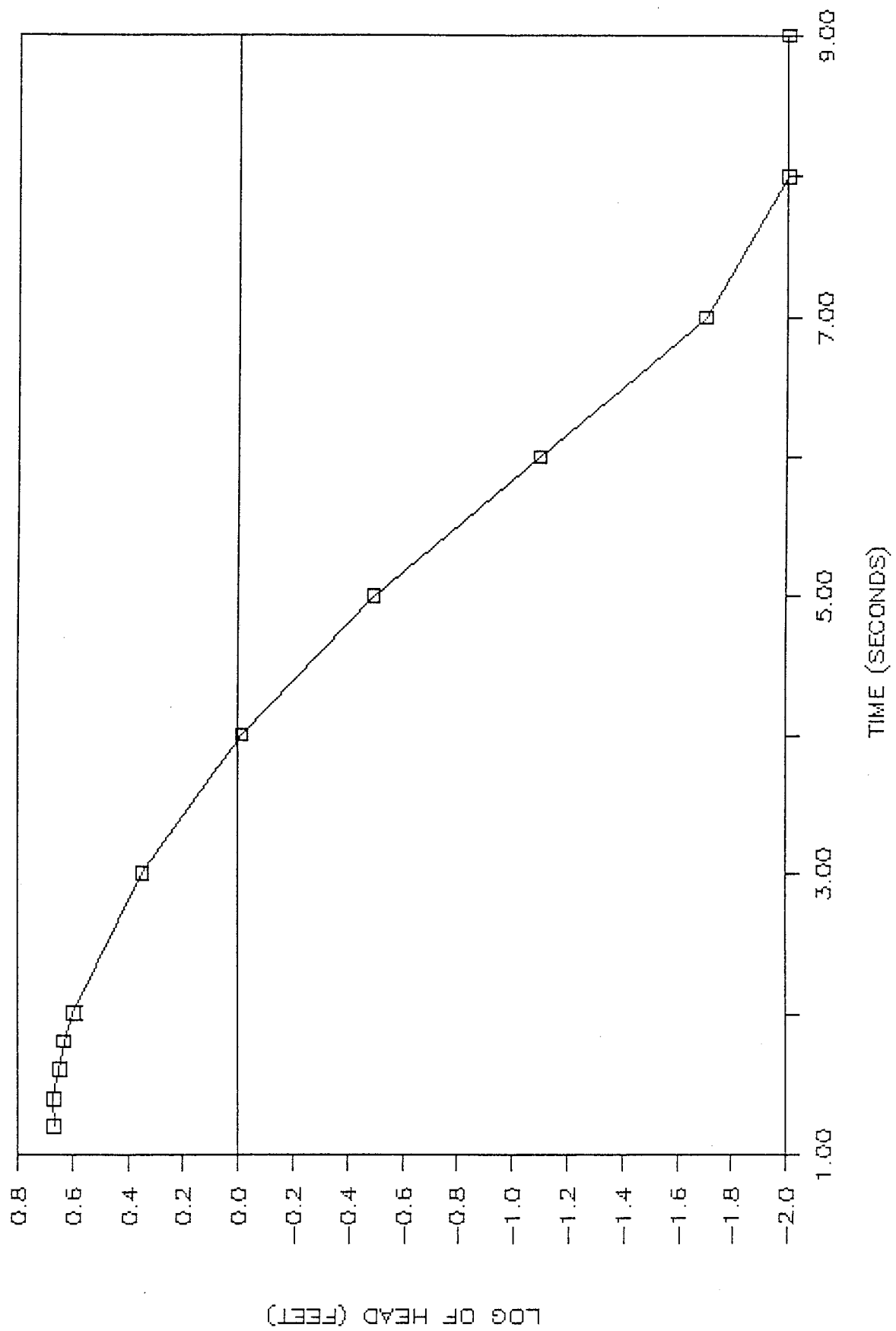
CPC G.R. METALS

WELL 87-11



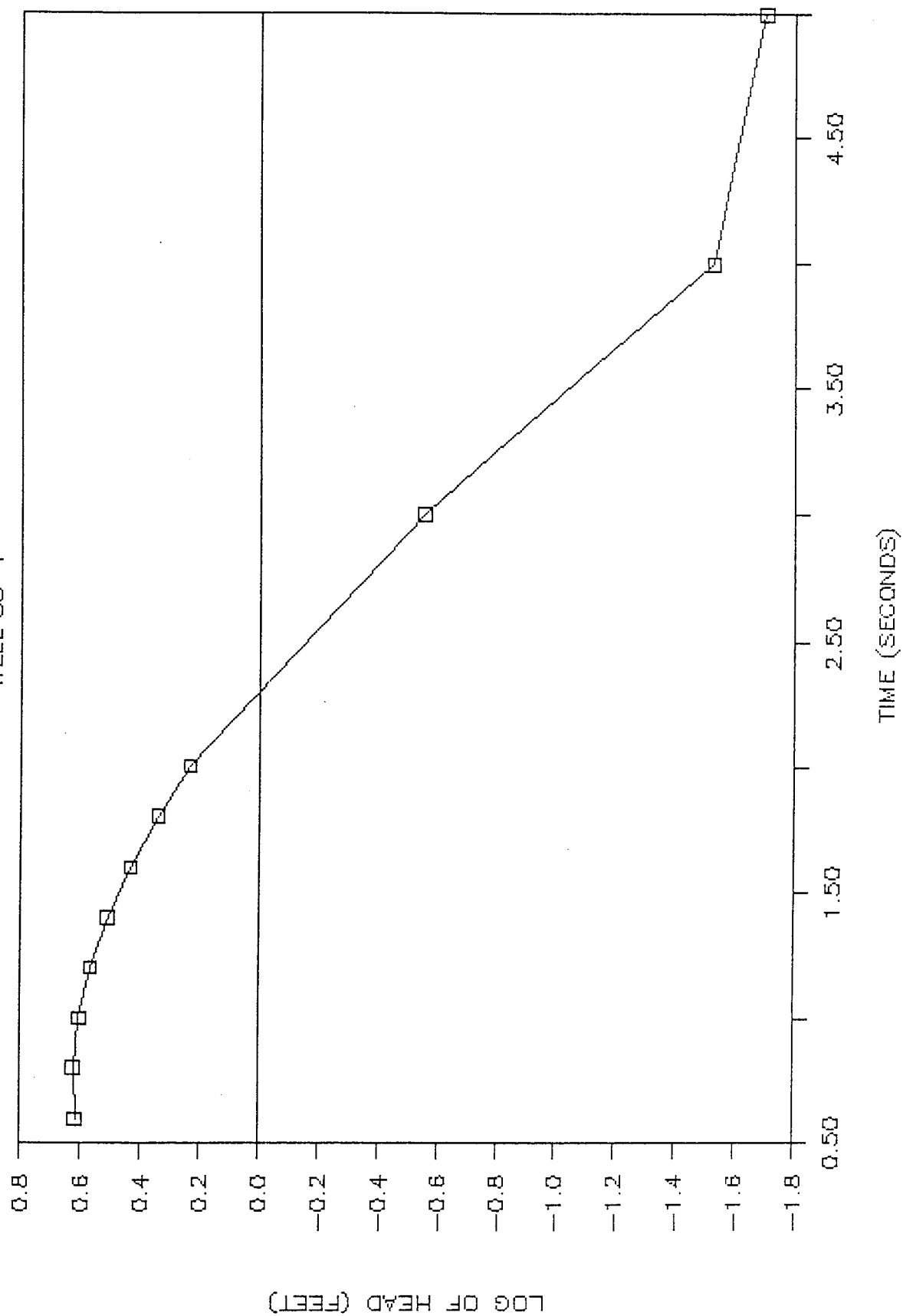
CPC G.R. METALS

WELL 87-13



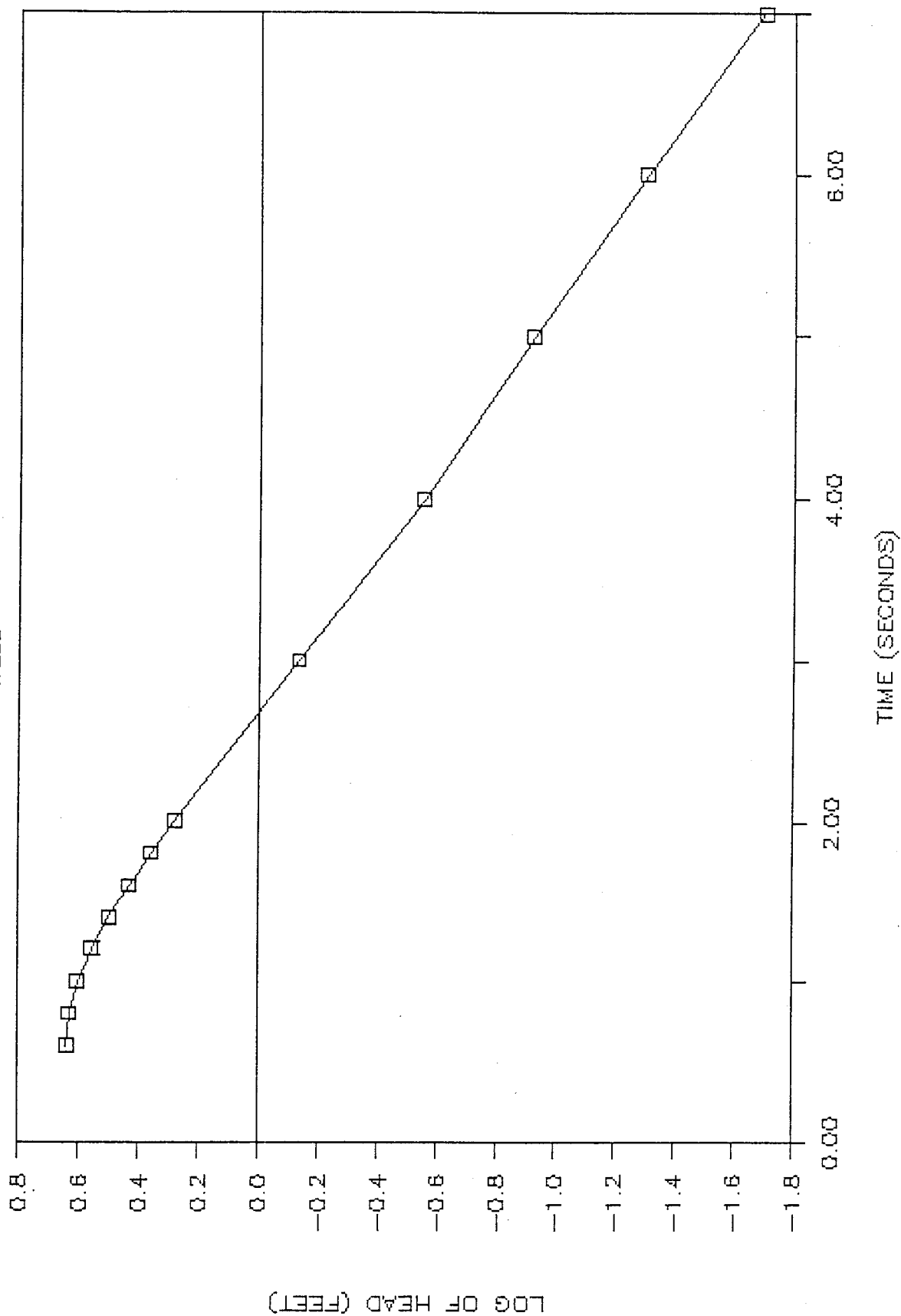
CPC G.R. METALS

WELL 88-1



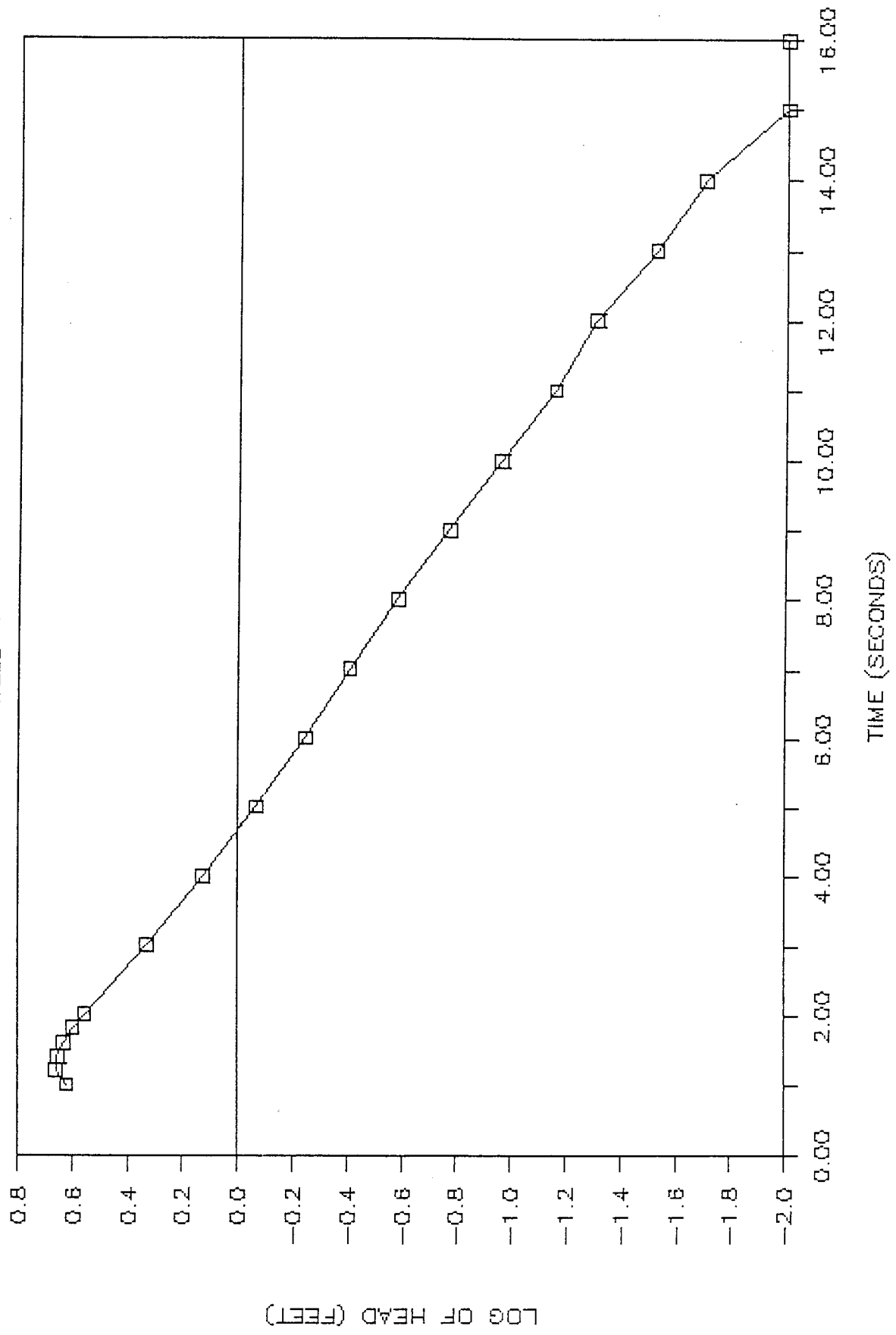
CPC G.R. METALS

WELL 88-2



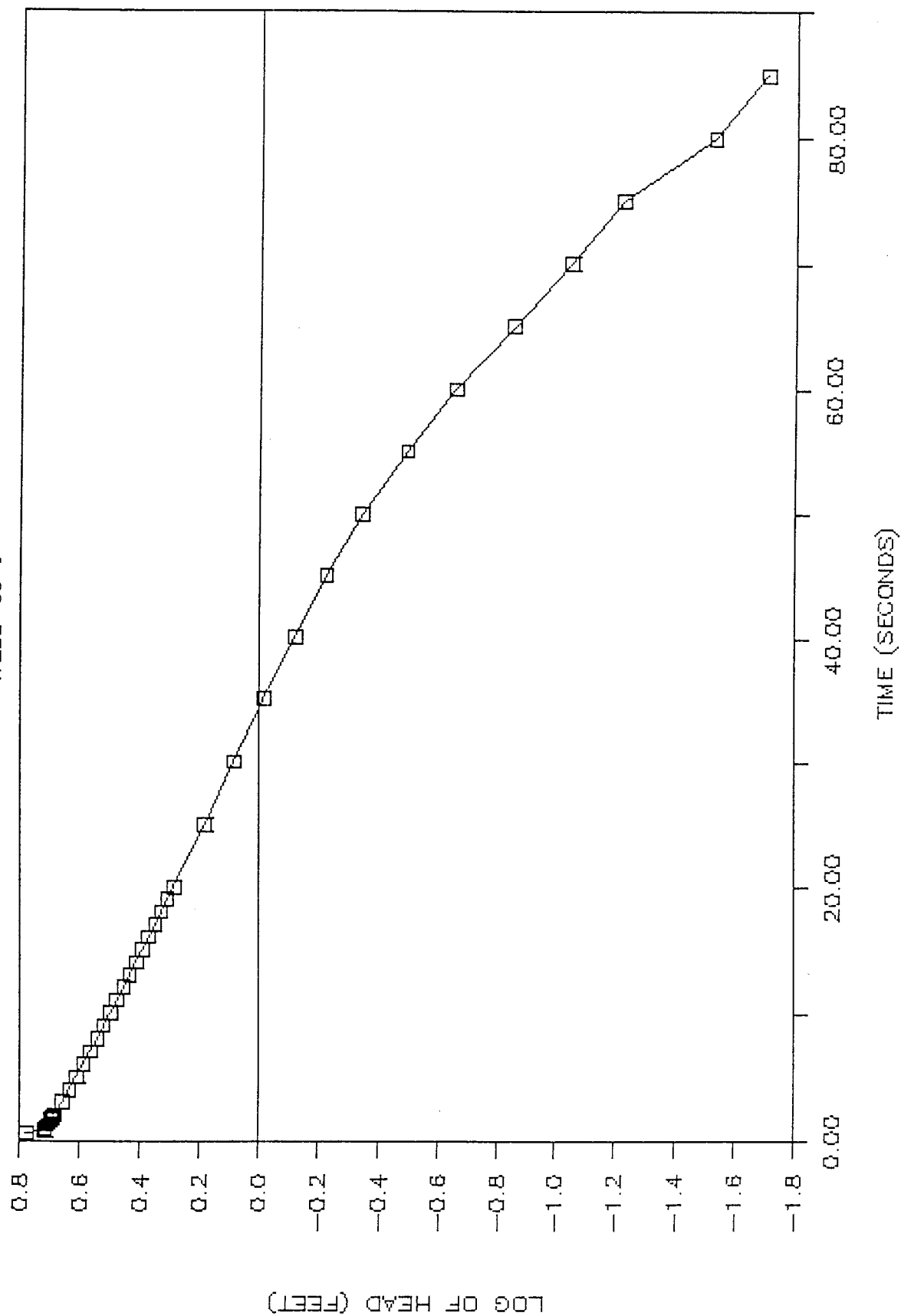
CPC G.R. METALS

WELL 88-3



CPC G.R. METALS

WELL 88-4



Appendix C
Ground-Water Velocity
and Flow Rate Calculations



Calculation Sheet

Computed by J6V
Checked by _____

Subject Flow Rate
Calculations
Client GM-CPE

Sheet 1 of _____
Job No. 20790
Date 6/15/88

1. Determine flow rate in gpm within plume along north edge of plant property (87-9, 86-3, 87-8 line) $k_{86-3} = 192.6 \text{ ft/day}$

$A = 20,200 \text{ ft}^2$ (down to 10 ppb TCE contaminated groundwater)

Average $k = 178 \text{ ft/day}$ coverage of 3' highest permeabilities east of Cole Drain (86-3, 87-9, and 87-13)

$$V = \frac{(k)(i)}{P}$$

$P = \text{porosity}$

$$i = 4 \text{ ft} / 2000 \text{ ft} = 0.002 = 10.56 \text{ ft/mi}$$

Estimated $P = 25\%$

$$V = \frac{(178 \text{ ft/day})(0.002)}{0.25} = 1.42 \text{ ft/day} = 518 \text{ ft/year}$$

$$Q = (k)(i)(A)$$

$$k = 178 \text{ ft/day} =$$

$$Q = (1331 \text{ gal/day/ft}^2)$$

$$Q = (1331 \text{ gal/day/ft}^2) \times (0.002) (20,200 \text{ ft}^2) = \frac{(178 \text{ ft/day}) (7.48 \text{ gal/ft}^3)}{\text{day}}$$

$$Q = 53,800 \text{ gal/day}$$

$$k = 1331 \text{ gal/day/ft}^2$$

$$Q = 19,600,000 \text{ gal/year}$$

$$Q = 37.4 \text{ gpm}$$



Calculation Sheet

Computed by J6U
Checked by _____

Subject Flow Rate
Calculations
Client GM-CPC

Sheet 2 of _____
Job No. 20790
Date 5/15/88

1. Determine Flow Rate in gpm within plume along line including 87-10 and 87-11 west to Cole Drain.

$$A = 17,500 \text{ ft}^2$$

$$\text{Average } k = 178 \text{ ft/day (average of 3 highest permeabilities east of Cole Drain)}$$

$$V = \frac{(k)(i)}{P}$$

$$i = 4 \text{ ft} / 2000 \text{ ft} = 0.002 = 10.56 \text{ ft/m}$$

$$\text{Estimated } P = 25\%$$

$$V = \frac{(178 \text{ ft/day})(0.002)}{0.25} = 1.42 \text{ ft/day} = 518 \text{ ft/year}$$

$$Q = (k)(i)(A)$$

$$Q = (1331)(0.002)(17,500)$$

$$Q = 46,585 \text{ gal/day}$$

$$Q = 17,000,000 \text{ gal/year}$$

$$Q = 32.4 \text{ gal/min}$$

$$k = \left(\frac{178 \text{ ft}^3/\text{ft}^2}{\text{day}} \right) \left(\frac{7.48 \text{ gal}}{\text{ft}^3} \right)$$

$$k = 1,331 \text{ gal/day/ft}$$

Appendix D
Laboratory Data Sheets for
Ground-Water and Surface Water Samples

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: GMC CPC DIVISION
PROJECT NO.: 25615
SAMPLE: MW 86-3

DATE SAMPLED: 05/05/86 TIME: 7:29 PM
DATE RECEIVED: 05/05/86 TIME: 8:10 PM
DATE COMPLETED: 05/09/86

SAMPLE NO. 62229

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
BENZENE	*	0.005	TRANS-1,2-DICHLOROETHYLENE	0.010	0.010
BROMODICHLOROMETHANE	*	0.010	1,2-DICHLOROPROPANE	*	0.015
BROMOFORM	*	0.075	CIS-1,3-DICHLOROPROPYLENE	*	0.020
BROMOMETHANE	*	0.050	TRANS-1,3-DICHLOROPROPYLENE	*	0.020
CARBON TETRACHLORIDE	*	0.020	ETHYL BENZENE	*	0.005
CHLOROBENZENE	*	0.005	METHYLENE CHLORIDE	*	0.010
CHLORODIBROMOMETHANE	*	0.015	1,1,2,2-TETRACHLOROETHANE	*	0.010
CHLOROETHANE	*	0.050	TETRACHLOROETHYLENE	*	0.010
2-CHLOROETHYL VINYL ETHER	*	0.050	TOLUENE	*	0.005
CHLOROFORM	*	0.005	1,1,1-TRICHLOROETHANE	0.011	0.010
CHLOROMETHANE	*	0.010	1,1,2-TRICHLOROETHANE	*	0.015
1,1-DICHLOROETHANE	*	0.010	TRICHLOROETHYLENE	1.4	0.010
1,2-DICHLOROETHANE	*	0.010	TRICHLOROFLUOROMETHANE	*	0.015
1,1-DICHLOROETHYLENE	*	0.010	VINYL CHLORIDE	*	0.050

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 86-3

DATE SAMPLED: 01/21/87 TIME: 4:40 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 012787

SAMPLE NO. 70824

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
BENZENE	*	0.001	TRANS-1,2-DICHLOROETHYLENE	0.004	0.002
BROMODICHLOROMETHANE	*	0.002	1,2-DICHLOROPROPANE	*	0.003
BROMOFORM	*	0.015	CIS-1,3-DICHLOROPROPYLENE	*	0.004
BROMOMETHANE	*	0.010	TRANS-1,3-DICHLOROPROPYLENE	*	0.004
CARBON TETRACHLORIDE	*	0.004	ETHYL BENZENE	*	0.001
CHLOROBENZENE	*	0.001	METHYLENE CHLORIDE	*	0.002
CHLORODIBROMOMETHANE	*	0.003	1,1,2,2-TETRACHLOROETHANE	*	0.002
CHLOROETHANE	*	0.010	TETRACHLOROETHYLENE	*	0.002
2-CHLOROETHYL VINYL ETHER	*	0.010	TOLUENE	*	0.001
CHLOROFORM	*	0.001	1,1,1-TRICHLOROETHANE	0.006	0.002
CHLOROMETHANE	*	0.010	1,1,2-TRICHLOROETHANE	*	0.003
1,1-DICHLOROETHANE	*	0.002	TRICHLOROETHYLENE	0.34	0.002
1,2-DICHLOROETHANE	*	0.002	TRICHLOROFLUOROMETHANE	*	0.003
1,1-DICHLOROETHYLENE	*	0.002	VINYL CHLORIDE	*	0.010

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 86-3

DATE SAMPLED: 01/21/87 TIME: 4:40 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 012787

SAMPLE NO. 70824

COMPOUND	RESULT (mg/l)	D.L.
XYLENE	<0.010	0.010



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: GM-CPC
PROJECT NO.: 25615
SAMPLE: 86-3

DATE SAMPLED: 06-08-1988 TIME: 01:40 PM
DATE RECEIVED: 06-08-1988 TIME: 03:50 PM
TEST DATE: 06-14-1988

SAMPLE NO. 91243

COMPOUND	RESULT (mg/L)
Benzene	< 0.001
Bromodichloromethane	< 0.002
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
Chloroform	< 0.001
2-Chloroethyl Vinyl Ether	< 0.010
Chloromethane	< 0.010
1,1-Dichloroethane	< 0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	0.010
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethylbenzene	< 0.001
Methylene Chloride	< 0.002
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.002
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	0.17
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010
Xylene	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.



**ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS**

**TABLE 1
VOLATILE FRACTION**

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 87-8

DATE SAMPLED: 01/21/87 TIME: 2:15 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 012787

SAMPLE NO. 70829

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
BENZENE	*	0.001	TRANS-1,2-DICHLOROETHYLENE	*	0.002
BROMODICHLOROMETHANE	*	0.002	1,2-DICHLOROPROPANE	*	0.003
BROMOFORM	*	0.015	CIS-1,3-DICHLOROPROPYLENE	*	0.004
BROMOMETHANE	*	0.010	TRANS-1,3-DICHLOROPROPYLENE	*	0.004
CARBON TETRACHLORIDE	*	0.004	ETHYL BENZENE	*	0.001
CHLOROBENZENE	*	0.001	METHYLENE CHLORIDE	*	0.002
CHLORODIBROMOMETHANE	*	0.003	1,1,2,2-TETRACHLOROETHANE	*	0.002
CHLOROETHANE	*	0.010	TETRACHLOROETHYLENE	*	0.002
2-CHLOROETHYL VINYL ETHER	*	0.010	TOLUENE	*	0.001
CHLOROFORM	*	0.001	1,1,1-TRICHLOROETHANE	*	0.002
CHLOROMETHANE	*	0.010	1,1,2-TRICHLOROETHANE	*	0.003
1,1-DICHLOROETHANE	*	0.002	TRICHLOROETHYLENE	0.009	0.002
1,2-DICHLOROETHANE	*	0.002	TRICHLOROFLUOROMETHANE	*	0.003
1,1-DICHLOROETHYLENE	*	0.002	VINYL CHLORIDE	*	0.010

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 87-8

DATE SAMPLED: 01/21/87 TIME: 2:15 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 012787

SAMPLE NO. 70829

COMPOUND	RESULT (mg/l)	D.L.
XYLENE	<0.010	0.010



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: GM CPC
PROJECT NO.: 25615
SAMPLE: 87-8

DATE SAMPLED: 06-08-1988 TIME: 12:30 PM
DATE RECEIVED: 06-08-1988 TIME: 03:50 PM
TEST DATE: 06-14-1988

SAMPLE NO. 91244

COMPOUND	RESULT (mg/L)
Benzene	< 0.001
Bromodichloromethane	< 0.002
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
Chloroform	< 0.001
2-Chloroethyl Vinyl Ether	< 0.010
Chloromethane	< 0.010
1,1-Dichloroethane	< 0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	< 0.002
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethylbenzene	< 0.001
Methylene Chloride	< 0.002
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.002
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	0.006
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010
Xylene	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 87-9

DATE SAMPLED: 01/21/87 TIME: 3:30 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 012787

SAMPLE NO. 70830

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
BENZENE	*	0.001	TRANS-1,2-DICHLOROETHYLENE	*	0.002
BROMODICHLOROMETHANE	*	0.002	1,2-DICHLOROPROPANE	*	0.003
BROMOFORM	*	0.015	CIS-1,3-DICHLOROPROPYLENE	*	0.004
BROMOMETHANE	*	0.010	TRANS-1,3-DICHLOROPROPYLENE	*	0.004
CARBON TETRACHLORIDE	*	0.004	ETHYL BENZENE	*	0.001
CHLOROBENZENE	*	0.001	METHYLENE CHLORIDE	*	0.002
CHLORODIBROMOMETHANE	*	0.003	1,1,2,2-TETRACHLOROETHANE	*	0.002
CHLOROETHANE	*	0.010	TETRACHLOROETHYLENE	*	0.002
2-CHLOROETHYL VINYL ETHER	*	0.010	TOLUENE	*	0.001
CHLOROFORM	*	0.001	1,1,1-TRICHLOROETHANE	*	0.002
CHLOROMETHANE	*	0.010	1,1,2-TRICHLOROETHANE	*	0.003
1,1-DICHLOROETHANE	*	0.002	TRICHLOROETHYLENE	0.062	0.002
1,2-DICHLOROETHANE	*	0.002	TRICHLOROFLUOROMETHANE	*	0.003
1,1-DICHLOROETHYLENE	*	0.002	VINYL CHLORIDE	*	0.010

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 87-9

DATE SAMPLED: 01/21/87 TIME: 3:30 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 012787

COMPOUND	RESULT (mg/l)	SAMPLE NO. 70830 D.L.
XYLENE	<0.010	0.010



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: GM-CPC
PROJECT NO.: 25615
SAMPLE: 87-9

DATE SAMPLED: 06-08-1988 TIME: 01:00 PM
DATE RECEIVED: 06-08-1988 TIME: 03:50 PM
TEST DATE: 06-14-1988

SAMPLE NO. 91245

COMPOUND	RESULT (mg/L)
Benzene	< 0.001
Bromodichloromethane	< 0.002
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
Chloroform	< 0.001
2-Chloroethyl Vinyl Ether	< 0.010
Chloromethane	< 0.010
1,1-Dichloroethane	< 0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	< 0.002
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethylbenzene	< 0.001
Methylene Chloride	< 0.002
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.006
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	0.021
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010
Xylene	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: GM-CPC
PROJECT NO.: 25615
SAMPLE: 87-10

DATE SAMPLED: 06-08-1988 TIME: 11:40 AM
DATE RECEIVED: 06-08-1988 TIME: 03:50 PM
TEST DATE: 06-14-1988

SAMPLE NO. 91246

COMPOUND	RESULT
	(mg/L)
Benzene	< 0.001
Bromodichloromethane	< 0.002
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
Chloroform	0.003
2-Chloroethyl Vinyl Ether	< 0.010
Chloromethane	< 0.010
1,1-Dichloroethane	< 0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	0.008
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethylbenzene	< 0.001
Methylene Chloride	< 0.002
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.005
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	0.046
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010
Xylene	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: GM-CPC
PROJECT NO.: 25615
SAMPLE: 87-11

DATE SAMPLED: 06-08-1988 TIME: 12:01 PM
DATE RECEIVED: 06-08-1988 TIME: 03:50 PM
TEST DATE: 06-14-1988

SAMPLE NO. 91247

COMPOUND	RESULT (mg/L)
Benzene	< 0.001
Bromodichloromethane	< 0.002
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
Chloroform	< 0.001
2-Chloroethyl Vinyl Ether	< 0.010
Chloromethane	< 0.010
1,1-Dichloroethane	0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	0.076
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethylbenzene	< 0.001
Methylene Chloride	< 0.002
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.006
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	0.32
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010
Xylene	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: GM-CPC
PROJECT NO.: 25615
SAMPLE: 87-13

DATE SAMPLED: 06-08-1988 TIME: 11:00 AM
DATE RECEIVED: 06-08-1988 TIME: 03:50 PM
TEST DATE: 06-14-1988

SAMPLE NO. 91248

COMPOUND	RESULT (mg/L)
Benzene	< 0.001
Bromodichloromethane	< 0.002
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
Chloroform	< 0.001
2-Chloroethyl Vinyl Ether	< 0.010
Chloromethane	< 0.010
1,1-Dichloroethane	< 0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	< 0.002
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethylbenzene	< 0.001
Methylene Chloride	< 0.002
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.006
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	0.010
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010
Xylene	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: CPC
PROJECT NO.: 25554
SAMPLE: W-88-1

DATE SAMPLED: 04-05-1988 TIME: 12:30 PM
DATE RECEIVED: 04-07-1988 TIME: 12:30 PM
TEST DATE: 04-08-1988

SAMPLE NO. 88438

COMPOUND	RESULT (mg/L)
Benzene	< 0.001
Bromodichloromethane	< 0.002
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
Chloroform	< 0.001
2-Chloroethyl Vinyl Ether	< 0.010
Chloromethane	< 0.010
1,1-Dichloroethane	< 0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	< 0.002
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethylbenzene	< 0.001
Methylene Chloride	< 0.002
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.002
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	< 0.002
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: CPC
PROJECT NO.: 25554
SAMPLE: W-88-2

DATE SAMPLED: 04-05-1988 TIME: 01:00 PM
DATE RECEIVED: 04-07-1988 TIME: 12:30 PM
TEST DATE: 04-08-1988

SAMPLE NO. 88439

COMPOUND	RESULT (mg/L)
Benzene	< 0.001
Bromodichloromethane	< 0.002
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
Chloroform	< 0.001
2-Chloroethyl Vinyl Ether	< 0.010
Chloromethane	< 0.010
1,1-Dichloroethane	< 0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	< 0.002
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethylbenzene	< 0.001
Methylene Chloride	< 0.002
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.002
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	< 0.002
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: CPC
PROJECT NO.: 25554
SAMPLE: W-88-3

DATE SAMPLED: 04-05-1988 TIME: 10:00 AM
DATE RECEIVED: 04-07-1988 TIME: 12:30 PM
TEST DATE: 04-08-1988

SAMPLE NO. 88440

COMPOUND	RESULT (mg/L)
Benzene	< 0.001
Bromodichloromethane	< 0.002
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
Chloroform	< 0.001
2-Chloroethyl Vinyl Ether	< 0.010
Chloromethane	< 0.010
1,1-Dichloroethane	< 0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	< 0.002
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethylbenzene	< 0.001
Methylene Chloride	< 0.002
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.002
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	< 0.002
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: CPC
PROJECT NO.: 25554
SAMPLE: W-88-4

DATE SAMPLED: 04-05-1988 TIME: 11:45 AM
DATE RECEIVED: 04-07-1988 TIME: 12:30 PM
TEST DATE: 04-08-1988

SAMPLE NO. 88441

COMPOUND	RESULT (mg/L)
Benzene	< 0.001
Bromodichloromethane	< 0.002
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
Chloroform	< 0.001
2-Chloroethyl Vinyl Ether	< 0.010
Chloromethane	< 0.010
1,1-Dichloroethane	< 0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	< 0.002
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethylbenzene	< 0.001
Methylene Chloride	< 0.002
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.002
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	< 0.002
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.

**ANALYTICAL SERVICES
EDI LABORATORY REPORT**

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
LOCATION: GRAND RAPIDS, MI
SAMPLED BY: ELC
DESCRIPTION: PHASE III, HYDROGEO

DATE SAMPLED: 00/00/00 TIME:
DATE RECEIVED: 01/30/87 TIME: 5:00 PM
DATE COMPLETED: 020487
SCHEDULED COMPLETION: 02/20/87
ANALYST: JB,NJB,TL,BJM,BH
QUALITY CONTROL REVIEW BY: DEK
WORKSHEET NO: 9

	85-7	86-2	86-3	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	70821	70823	70824		
GREASE&OIL/FREON-EXT	1.2	<1.0	1.7	1.0	mg/l
IRON, TOTAL	44	12	2.8	0.01	mg/l
HARDNESS (as CaCO3)	350	350	360	2.0	mg/l
pH VALUE	7.68	7.89	7.82	----	std. units
DATE SAMPLED:	1/21/87	1/23/87	1/21/87		
TIME SAMPLED:	6:00 PM	3:15 PM	4:40 PM		

****SAMPLES COLLECTED JAN. 23 WERE UNREFRIDGERATED OVER THE WEEKEND.**

**ANALYTICAL SERVICES
EDI LABORATORY REPORT**

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
LOCATION: GRAND RAPIDS, MI
SAMPLED BY: ELC
DESCRIPTION: PHASE III, HYDROGEO

DATE SAMPLED: 01/21/87 TIME:
DATE RECEIVED: 01/30/87 TIME: 5:00 PM
DATE COMPLETED: 020487
SCHEDULED COMPLETION: 02/20/87
ANALYST: NJB,JB,TL,BJM,BH
QUALITY CONTROL REVIEW BY: DEK
WORKSHEET NO: 15

	87-8	87-9	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	70829	70830		
GREASE&OIL/FREON-EXT	<1.0	1.9	1.0	mg/l
IRON, TOTAL	150	0.50	0.01	mg/l
HARDNESS (as CaCO3)	410	360	2.0	mg/l
pH VALUE	7.82	7.94	---	std. units

DATE SAMPLED: 1/21/87 1/21/87
TIME SAMPLED: 2:15 PM 3:30 PM

ANALYSIS BY STANDARD METHODS 16TH EDITION AND/OR METHODS FOR
CHEMICAL ANALYSIS OF WATER AND WASTES, USEPA, 1983.

**ANALYTICAL SERVICES
EDI LABORATORY REPORT**

CLIENT: GMC CPC DIVISION
PROJECT NO.: 25615
LOCATION: GRAND RAPIDS, MI
SAMPLED BY: ELC
DESCRIPTION: PHASE II HYDROGEO INVEST.

DATE SAMPLED: 05/01/86 TIME:
DATE RECEIVED: 05/01/86 TIME: 11:40 AM
DATE COMPLETED: 05/01/86
SCHEDULED COMPLETION: 5/01/86
ANALYST: JE
QUALITY CONTROL REVIEW BY: DEK
WORKSHEET NO: 4

	86-3 21'-24'	86-3 34'-36'	86-3 44'-46'	86-3 53'-55'	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	62106	62107	62108	62109		
TRICHLOROETHYLENE	45	210	600	230	1.0	ug/l

ANALYSIS BY STANDARD METHODS 16TH EDITION AND/OR METHODS FOR
CHEMICAL ANALYSIS OF WATER AND WASTES, USEPA, 1983.



**ANALYTICAL SERVICES
EDI LABORATORY REPORT**

CLIENT: GMC CPC DIVISION
PROJECT NO.: 25615
LOCATION: GRAND RAPIDS, MI
SAMPLED BY: ELC
DESCRIPTION: PHASE II HYDROGEO INVEST.

DATE SAMPLED: 05/01/86 TIME:
DATE RECEIVED: 05/01/86 TIME: 11:40 AM
DATE COMPLETED: 05/01/86
SCHEDULED COMPLETION: 5/01/86
ANALYST: JE
QUALITY CONTROL REVIEW BY: DEK
WORKSHEET NO: 5

DETECTION UNITS
LIMIT

	86-2 *	86-2 45'- 48'	86-3 63'- 65'	86-3 64'- 69'		
EDI SAMPLE NO:	62110	62145	62146	62147		
TRICHLOROETHYLENE	5.6	9.8	15	14	1.0	ug/l

DATE SAMPLED: 4/30/86

*WATER SAMPLE FROM FIRE LINE USED TO MAINTAIN HYDROSTATIC
HEAD IN THE HOLLOW STEM AUGERS.



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
LOCATION: 36th ST. PLANT
SAMPLED BY: ELC
DESCRIPTION: PHASE III HYDROGEO

DATE SAMPLED: 01/13/87 TIME:
DATE RECEIVED: 01/13/87 TIME: 6:45 PM
DATE COMPLETED: 01/13/87
SCHEDULED COMPLETION: 01/27/87
ANALYST: PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 22

	87-8 18.7-19.7'	87-8 28-31'	87-8 38-41'	87-8 48-51'	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	70536	70537	70538	70583		
TRICHLOROETHYLENE	17	5.4	<1.0	<1.0	1.0	ug/l

ANALYSIS BY "METHODS FOR ORGANIC CHEMICAL ANALYSIS OF
MUNICIPAL AND INDUSTRIAL WASTEWATER", USEPA-600/4-82-057.

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
LOCATION: 36th ST. PLANT
SAMPLED BY: ELC
DESCRIPTION: PHASE III HYDROGEO

DATE SAMPLED: 01/13/87 TIME:
DATE RECEIVED: 01/13/87 TIME: 6:45 PM
DATE COMPLETED: 01/13/87
SCHEDULED COMPLETION: 01/27/87
ANALYST: PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 23

DETECTION UNITS
LIMIT

87-8
58-61'

EDI SAMPLE NO: 70584

TRICHLOROETHYLENE	5.2	1.0	ug/l

ANALYSIS BY "METHODS FOR ORGANIC CHEMICAL ANALYSIS OF
MUNICIPAL AND INDUSTRIAL WASTEWATER", USEPA-600/4-82-057.

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
LOCATION: 36th ST. PLANT
SAMPLED BY: ELC
DESCRIPTION: PHASE III HYDROGEO

DATE SAMPLED: 01/13/87 TIME: PM
DATE RECEIVED: 01/13/87 TIME: 6:45 PM
DATE COMPLETED: 011387
SCHEDULED COMPLETION: 01/27/87
ANALYST: PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 36

DETECTION UNITS
LIMIT

87-8
65-66.5'

EDI SAMPLE NO: 70585

TRICHLOROETHYLENE <4.0 4.0 ug/kg

ANALYSIS BY "TEST METHODS FOR EVALUATING A SOLID WASTE
PHYSICAL/CHEMICAL METHODS", USEPA SW-846 SECOND EDITION,
JULY, 1982.

**ANALYTICAL SERVICES
EDI LABORATORY REPORT**

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
LOCATION: 36th ST. PLANT
SAMPLED BY: ELC
DESCRIPTION: PHASE III HYDROGEO

DATE SAMPLED: 01/14/87 TIME:
DATE RECEIVED: 01/14/87 TIME: 1:15 PM
DATE COMPLETED: 011487
SCHEDULED COMPLETION: 01/27/87
ANALYST: PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 24

	87-9 16-17.5'	87-9 22-25'	87-9 32-35'	87-9 41-44'	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	70564	70565	70566	70567		
TRICHLOROETHYLENE	14	42	27	41	1.0	ug/l

ANALYSIS BY "METHODS FOR ORGANIC CHEMICAL ANALYSIS OF
MUNICIPAL AND INDUSTRIAL WASTEWATER", USEPA-600/4-82-057.



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
LOCATION: 36th ST. PLANT
SAMPLED BY: ELC
DESCRIPTION: PHASE III HYDROGEO

DATE SAMPLED: 01/15/87 TIME:
DATE RECEIVED: 01/15/87 TIME: 11:20 AM
DATE COMPLETED: 011587
SCHEDULED COMPLETION: 01/30/87
ANALYST: PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 25

	87-9 52-55'	87-9 62-65'	87-9 72-75'	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	70590	70591	70592		
TRICHLOROETHYLENE	63	19	2.9	1.0	ug/l

ANALYSIS BY "METHODS FOR ORGANIC CHEMICAL ANALYSIS OF
MUNICIPAL AND INDUSTRIAL WASTEWATER", USEPA-600/4-82-057.



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
LOCATION: 36th ST. PLANT
SAMPLED BY: ELC
DESCRIPTION: PHASE II HYDROGEO

DATE SAMPLED: 01/15/87 TIME: 12:00
DATE RECEIVED: 01/16/87 TIME: 7:00 AM
DATE COMPLETED: 01/19/87
SCHEDULED COMPLETION: 01/30/87
ANALYST: PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 28

DETECTION UNITS
LIMIT

87-9
83.5-85'

EDI SAMPLE NO: 70609

TRICHLOROETHYLENE	<4.0	4.0	ug/kg

ANALYSIS BY "TEST METHODS FOR EVALUATING A SOLID WASTE -
PHYSICAL/CHEMICAL METHODS", USEPA SW-846 SECOND EDITION,
JULY, 1982.

**ANALYTICAL SERVICES
EDI LABORATORY REPORT**

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: TEMP. WELL #87-10
SAMPLED BY: DON JOHNSON
DESCRIPTION: WATER ANALYSIS

DATE SAMPLED: 09/28/87 TIME: PM
DATE RECEIVED: 09/28/87 TIME: 6:00 PM
DATE COMPLETED: 09/28/87
SCHEDULED COMPLETION: 09/29/88
ANALYST: TVT
QUALITY CONTROL REVIEW BY: KLM
WORKSHEET NO: 71

	19.5-22.5'	29'-32'	38.5-41.5'	FIELD BLANK	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	80964	80965	80966			
VINYL CHLORIDE	<0.010	<0.010	<0.010	<0.010	0.010	mg/l
TRICHLOROETHYLENE	0.081	0.091	0.037	<0.002	0.002	mg/l
1,2-DICHLOROETHYLENE	0.003	0.008	<0.002	<0.002	0.002	mg/l



**ANALYTICAL SERVICES
EDI LABORATORY REPORT**

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: TEMP. WELL #87-10
SAMPLED BY: DON JOHNSON
DESCRIPTION: WATER ANALYSIS

DATE SAMPLED: 09/29/87 TIME: AM
DATE RECEIVED: 09/29/87 TIME: 5:50 PM
DATE COMPLETED: 09/29/87
SCHEDULED COMPLETION: 09/30/88
ANALYST: TVT
QUALITY CONTROL REVIEW BY: KLM
WORKSHEET NO: 70

	48-51'	58- 61'	FIELD BLANK	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	80967	80968	80969		
VINYL CHLORIDE	<0.010	<0.010	<0.010	0.010	mg/l
TRICHLOROETHYLENE	0.024	0.032	<0.002	0.002	mg/l
1,2-DICHLOROETHYLENE	<0.002	<0.002	<0.002	0.002	mg/l



**ANALYTICAL SERVICES
EDI LABORATORY REPORT**

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: TEMP. WELL # 87-11
SAMPLED BY: DON JOHNSON
DESCRIPTION: WATER ANALYSIS

DATE SAMPLED: 09/30/87 TIME:
DATE RECEIVED: 09/30/87 TIME: 5:15 PM
DATE COMPLETED: 09/30/87
SCHEDULED COMPLETION: 10/01/87
ANALYST: TVT
QUALITY CONTROL REVIEW BY: KLM
WORKSHEET NO: 15

	18'-21'	28'-31'	FIELD BLANK	TRIP BLANK	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	81055	81056	81057	81058		
VINYL CHLORIDE	<0.010	<0.010	<0.010	<0.010	0.010	mg/l
TRICHLOROETHYLENE	<0.002	0.26	<0.002	<0.002	0.002	mg/l
1,2-DICHLOROETHYLENE	0.017	0.029	<0.002	<0.002	0.002	mg/l
TIME SAMPLED:	1:55 PM	4:05 PM				



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: TEMP. WELL # 87-11
SAMPLED BY: DON JOHNSON
DESCRIPTION: WATER ANALYSIS

DATE SAMPLED: 10/01/87 TIME:
DATE RECEIVED: 10/01/87 TIME: 2:40 PM
DATE COMPLETED: 10/02/87
SCHEDULED COMPLETION: 10/01/87
ANALYST: TVT
QUALITY CONTROL REVIEW BY: KLM
WORKSHEET NO: 16

	36.4-39.4'	48'-51'	FIELD BLANK	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	81059	81060	81061		
VINYL CHLORIDE	<0.010	<0.010	<0.010	.010	mg/l
TRICHLOROETHYLENE	0.17	0.046	<0.002	0.002	mg/l
1,2-DICHLOROETHYLENE	0.026	0.013	<0.002	0.002	mg/l
TIME SAMPLED:	9:15 AM	12:15 PM			



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: TEMP. WELL #87-12
SAMPLED BY: DJJ
DESCRIPTION: WATER ANALYSIS

DATE SAMPLED: 10/05/87 TIME:
DATE RECEIVED: 10/05/87 TIME: 6:45 PM
DATE COMPLETED: 10/05/87
SCHEDULED COMPLETION: 10/06/87
ANALYST: TVT
QUALITY CONTROL REVIEW BY: KLM
WORKSHEET NO: 1

	19'-22'	29'-32'	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	81236	81237		
VINYL CHLORIDE	<10	<10	10	ug/l
TRICHLOROETHYLENE	<2	<2	2	ug/l
1,2-DICHLOROETHYLENE	<2	<2	2	ug/l



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET
SAMPLED BY: DUDLEY PIERCE
DESCRIPTION: HYDROGEO STUDY

DATE SAMPLED: 03/31/88 TIME:
DATE RECEIVED: 03/31/88 TIME: 7:45 PM
DATE COMPLETED: 03/31/88
SCHEDULED COMPLETION: 04/01/88
ANALYST: TVT
QUALITY CONTROL REVIEW BY: KIM
WORKSHEET NO: 3

DETECTION UNITS
LIMIT

	W-88-2 12'-15'	W-88-2 22'-25'	W-88-2 30'-31'		
EDI SAMPLE NO:	88249	88250	88251		
1,2-DICHLOROETHYLENE	<0.002	<0.002	<0.002	0.002	mg/l
TRICHLOROETHYLENE	<0.002	<0.002	<0.002	0.002	mg/l
VINYL CHLORIDE	<0.010	<0.010	<0.010	0.010	mg/l
TIME SAMPLED:	2:25 PM	3:00 PM	3:30 PM		



**ANALYTICAL SERVICES
EDI LABORATORY REPORT**

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET
SAMPLED BY: DUDLEY PIERCE
DESCRIPTION: HYDROGEO STUDY

DATE SAMPLED: 04/01/88 TIME:
DATE RECEIVED: 04/01/88 TIME: 1:30 PM
DATE COMPLETED: 04/01/88
SCHEDULED COMPLETION: 04/04/88
ANALYST: TVT
QUALITY CONTROL REVIEW BY: KLM
WORKSHEET NO: 6

	W-88-3 12'-15'	W-88-3 22'-25'	W-88-3 30'-31'	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	88326	88327	88328		
1,2-DICHLOROETHYLENE	<0.002	<0.002	<0.002	0.002	mg/l
TRICHLOROETHYLENE	<0.002	<0.002	<0.002	0.002	mg/l
VINYL CHLORIDE	<0.010	<0.010	<0.010	0.010	mg/l
TIME SAMPLED:	9:30 AM	10:00 AM	11:15 AM		

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36TH STREET
SAMPLED BY: DUDLEY PIERCE
DESCRIPTION: HYDROGEO STUDY

DATE SAMPLED: 04/04/88 TIME:
DATE RECEIVED: 04/04/88 TIME: 4:30 PM
DATE COMPLETED: 04/04/88
SCHEDULED COMPLETION: 04/05/88
ANALYST: TVT
QUALITY CONTROL REVIEW BY: KIM
WORKSHEET NO: 20

DETECTION UNITS
LIMIT

	W-88-4 9'-12'	W-88-4 18'-21'		
EDI SAMPLE NO:	88342	88343		
1,2-DICHLOROETHYLENE	<0.002	<0.002	0.002	mg/l
TRICHLOROETHYLENE	<0.002	<0.002	0.002	mg/l
VINYL CHLORIDE	<0.010	<0.010	0.010	mg/l

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 2
BASE-NEUTRAL FRACTION

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 86-3

DATE SAMPLED: 01/23/87 TIME: 3:15 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 013087

SAMPLE NO. 70824

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
ACENAPHTHENE	*	0.002	3,3'-DICHLOROBENZIDINE	*	0.020
ACENAPHTHYLENE	*	0.001	DIETHYL PHTHALATE	*	0.002
ANTHRACENE	*	0.001	DIMETHYL PHTHALATE	*	0.002
BENZIDINE	*	0.050	2,4-DINITROTOLUENE	*	0.010
BENZO (A) ANTHRACENE	*	0.005	2,6-DINITROTOLUENE	*	0.009
BENZO (K) FLUORANTHENE	*	0.005	DI-N-OCTYLPHTHALATE	*	0.002
BENZO (A) PYRENE	*	0.005	1,2-DIPHENYLHYDRAZINE	*	0.001
BENZO (G,H,I) PERYLENE	*	0.010	FLUORANTHENE	*	0.001
BIS-(2-CHLOROETHYL) ETHER	*	0.004	FLUORENE	*	0.002
BIS(2-CHLOROETHOXY) METHANE	*	0.004	HEXACHLOROBENZENE	*	0.005
BIS(2-CHLOROISOPROPYL)- ETHER	*	0.001	HEXACHLOROBUTADIENE	*	0.005
BIS-(2-ETHYL HEXYL)- PHTHALATE	0.026	0.002	HEXACHLOROETHANE	*	0.007
4-BROMOPHENYL PHENYL ETHER	*	0.007	HEXACHLOROCYCLOPENTADIENE	*	0.005
BUTYL BENZYL PHTHALATE	*	0.003	INDENO (1,2,3-CD) PYRENE	*	0.010
2-CHLORONAPHTHALENE	*	0.002	ISOPHORONE	*	0.002
4-CHLOROPHENYL PHENYL ETHER	*	0.003	NAPHTHALENE	*	0.001
CHRYSENE	*	0.005	NITROBENZENE	*	0.004
DIBENZO (A,H) ANTHRACENE	*	0.010	N-NITROSODI-N-PROPYLAMINE	*	0.004
DI-N-BUTYL PHTHALATE	*	0.001	N-NITROSODIPHENYLAMINE	*	0.003
1,2-DICHLOROBENZENE	*	0.003	PHENANTHRENE	*	0.001
1,3-DICHLOROBENZENE	*	0.003	PYRENE	*	0.001
1,4-DICHLOROBENZENE	*	0.003	1,2,4-TRICHLOROBENZENE	*	0.003

*COMPOUND NOT PRESENT AT DETECTION LIMIT



**ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS**

**TABLE 2
BASE-NEUTRAL FRACTION**

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 87-8

DATE SAMPLED: 01/21/87 TIME: 2:15 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 013087

SAMPLE NO. 70829

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
ACENAPHTHENE	*	0.002	3,3'-DICHLOROBENZIDINE	*	0.020
ACENAPHTHYLENE	*	0.001	DIETHYL PHTHALATE	*	0.002
ANTHRACENE	*	0.001	DIMETHYL PHTHALATE	*	0.002
BENZIDINE	*	0.050	2,4-DINITROTOLUENE	*	0.010
BENZO (A) ANTHRACENE	*	0.005	2,6-DINITROTOLUENE	*	0.009
BENZO (K) FLUORANTHENE	*	0.005	DI-N-OCTYLPHTHALATE	*	0.002
BENZO (A) PYRENE	*	0.005	1,2-DIPHENYLHYDRAZINE	*	0.001
BENZO (G,H,I) PERYLENE	*	0.010	FLUORANTHENE	*	0.001
BIS-(2-CHLOROETHYL) ETHER	*	0.004	FLUORENE	*	0.002
BIS(2-CHLOROETHOXY) METHANE	*	0.004	HEXACHLOROBENZENE	*	0.005
BIS(2-CHLOROISOPROPYL) - ETHER	*	0.001	HEXACHLOROBUTADIENE	*	0.005
BIS-(2-ETHYL HEXYL) - PHTHALATE	*	0.002	HEXACHLOROETHANE	*	0.007
4-BROMOPHENYL PHENYL ETHER	*	0.007	HEXACHLOROCYCLOPENTADIENE	*	0.005
BUTYL BENZYL PHTHALATE	*	0.003	INDENO (1,2,3-CD) PYRENE	*	0.010
2-CHLORONAPHTHALENE	*	0.002	ISOPHORONE	*	0.002
4-CHLOROPHENYL PHENYL ETHER	*	0.003	NAPHTHALENE	*	0.001
CHRYSENE	*	0.005	NITROBENZENE	*	0.004
DIBENZO (A,H) ANTHRACENE	*	0.010	N-NITROSODI-N-PROPYLAMINE	*	0.004
DI-N-BUTYL PHTHALATE	*	0.001	N-NITROSODIPHENYLAMINE	*	0.003
1,2-DICHLOROBENZENE	*	0.003	PHENANTHRENE	*	0.001
1,3-DICHLOROBENZENE	*	0.003	PYRENE	*	0.001
1,4-DICHLOROBENZENE	*	0.003	1,2,4-TRICHLOROBENZENE	*	0.003

*COMPOUND NOT PRESENT AT DETECTION LIMIT

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 2
BASE-NEUTRAL FRACTION

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 87-9

DATE SAMPLED: 01/21/87 TIME: 3:30 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 013087

SAMPLE NO. 70830

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
ACENAPHTHENE	*	0.002	3,3'-DICHLOROBENZIDINE	*	0.020
ACENAPHTHYLENE	*	0.001	DIETHYL PHTHALATE	*	0.002
ANTHRACENE	*	0.001	DIMETHYL PHTHALATE	*	0.002
BENZIDINE	*	0.050	2,4-DINITROTOLUENE	*	0.010
BENZO (A) ANTHRACENE	*	0.005	2,6-DINITROTOLUENE	*	0.009
BENZO (K) FLUORANTHENE	*	0.005	DI-N-OCTYLPHTHALATE	*	0.002
BENZO (A) PYRENE	*	0.005	1,2-DIPHENYLHYDRAZINE	*	0.001
BENZO (G,H,I) PERYLENE	*	0.010	FLUORANTHENE	*	0.001
BIS-(2-CHLOROETHYL) ETHER	*	0.004	FLUORENE	*	0.002
BIS(2-CHLOROETHOXY) METHANE	*	0.004	HEXACHLOROBENZENE	*	0.005
BIS(2-CHLOROISOPROPYL)- ETHER	*	0.001	HEXACHLOROBUTADIENE	*	0.005
BIS-(2-ETHYL HEXYL)- PHTHALATE	*	0.002	HEXACHLOROETHANE	*	0.007
4-BROMOPHENYL PHENYL ETHER	*	0.007	HEXACHLOROCYCLOPENTADIENE	*	0.005
BUTYL BENZYL PHTHALATE	*	0.003	INDENO (1,2,3-CD) PYRENE	*	0.010
2-CHLORONAPHTHALENE	*	0.002	ISOPHORONE	*	0.002
4-CHLOROPHENYL PHENYL ETHER	*	0.003	NAPHTHALENE	*	0.001
CHRYSENE	*	0.005	NITROBENZENE	*	0.004
DIBENZO (A,H) ANTHRACENE	*	0.010	N-NITROSODI-N-PROPYLAMINE	*	0.004
DI-N-BUTYL PHTHALATE	*	0.001	N-NITROSODIPHENYLAMINE	*	0.003
1,2-DICHLOROBENZENE	*	0.003	PHENANTHRENE	*	0.001
1,3-DICHLOROBENZENE	*	0.003	PYRENE	*	0.001
1,4-DICHLOROBENZENE	*	0.003	1,2,4-TRICHLOROBENZENE	*	0.003

*COMPOUND NOT PRESENT AT DETECTION LIMIT

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 3
ACID FRACTION

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 86-3

DATE SAMPLED: 01/21/87 TIME: 4:40 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 013087

SAMPLE NO. 70824

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
4-CHLORO-3-METHYLPHENOL	*	0.004	2-NITROPHENOL	*	0.005
2-CHLOROPHENOL	*	0.002	4-NITROPHENOL	*	0.015
2,4-DICHLOROPHENOL	*	0.003	PENTACHLOROPHENOL	*	0.020
2,4-DIMETHYLPHENOL	*	0.003	PHENOL	*	0.002
2,4-DINITROPHENOL	*	0.050	2,4,6-TRICHLOROPHENOL	*	0.005
2-METHYL-4,6-DINITROPHENOL	*	0.020			

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 3
ACID FRACTION

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 87-8

DATE SAMPLED: 01/21/87 TIME: 2:15 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 013087

SAMPLE NO. 70829

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
4-CHLORO-3-METHYLPHENOL	*	0.004	2-NITROPHENOL	*	0.005
2-CHLOROPHENOL	*	0.002	4-NITROPHENOL	*	0.015
2,4-DICHLOROPHENOL	*	0.003	PENTACHLOROPHENOL	*	0.020
2,4-DIMETHYLPHENOL	*	0.003	PHENOL	*	0.002
2,4-DINITROPHENOL	*	0.050	2,4,6-TRICHLOROPHENOL	*	0.005
2-METHYL-4,6-DINITROPHENOL	*	0.020			

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 3
ACID FRACTION

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
SAMPLE: 87-9

DATE SAMPLED: 01/21/87 TIME: 3:30 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 013087

SAMPLE NO. 70830

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
4-CHLORO-3-METHYLPHENOL	*	0.004	2-NITROPHENOL	*	0.005
2-CHLOROPHENOL	*	0.002	4-NITROPHENOL	*	0.015
2,4-DICHLOROPHENOL	*	0.003	PENTACHLOROPHENOL	*	0.020
2,4-DIMETHYLPHENOL	*	0.003	PHENOL	*	0.002
2,4-DINITROPHENOL	*	0.050	2,4,6-TRICHLOROPHENOL	*	0.005
2-METHYL-4,6-DINITROPHENOL	*	0.020			

*COMPOUND NOT PRESENT AT DETECTION LIMIT

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
LOCATION: COLE DRAIN
SAMPLED BY: DIRK DOORENBOS
DESCRIPTION: WASTEWATER ANALYSIS

DATE SAMPLED: 01/07/87 TIME: PM
DATE RECEIVED: 01/07/87 TIME: 4:40 PM
DATE COMPLETED: 010787
SCHEDULED COMPLETION: 01/21/87
ANALYST: PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 1

	C.D. #1	C.D. #2	C.D. #3	C.D. #4	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	70424	70425	70426	70427		
TRICHLOROETHYLENE	4.4	3.6	4.8	2.7	1.0	ug/l

ANALYSIS BY "METHODS FOR ORGANIC CHEMICAL ANALYSIS OF
MUNICIPAL AND INDUSTRIAL WASTEWATER", USEPA-600/4-82-057.

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: GM CPC 36TH ST.
PROJECT NO.: 25554
SAMPLE: RETENTION POND OUTLET

DATE SAMPLED: 06-15-1987 TIME: 09:10 AM
DATE RECEIVED: 06-15-1987 TIME: 11:40 AM
TEST DATE: 06-16-1987

SAMPLE NO. 76551

COMPOUND	RESULT (mg/L)
Benzene	< 0.001
Bromodichloromethane	< 0.002
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
2-Chloroethyl Vinyl Ether	< 0.010
Chloroform	0.003
Chloromethane	< 0.010
1,1-Dichloroethane	< 0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	< 0.002
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethyl Benzene	< 0.001
Methylene Chloride	< 0.002
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	0.004
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	0.002
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

VOLATILE FRACTION

CLIENT: GM CPC 36TH ST.
PROJECT NO.: 25554
SAMPLE: RETENTION POND INLET

DATE SAMPLED: 06-15-1987 TIME: 08:55 AM
DATE RECEIVED: 06-15-1987 TIME: 11:40 AM
TEST DATE: 06-16-1987

SAMPLE NO. 76553

COMPOUND	RESULT (mg/L)
Benzene	< 0.001
Bromodichloromethane	0.003
Bromoform	< 0.015
Bromomethane	< 0.010
Carbon Tetrachloride	< 0.004
Chlorobenzene	< 0.001
Chlorodibromomethane	< 0.003
Chloroethane	< 0.010
2-Chloroethyl Vinyl Ether	< 0.010
Chloroform	0.005
Chloromethane	< 0.010
1,1-Dichloroethane	< 0.002
1,2-Dichloroethane	< 0.002
1,1-Dichloroethylene	< 0.002
trans-1,2-Dichloroethylene	< 0.002
1,2-Dichloropropane	< 0.003
cis-1,3-Dichloropropylene	< 0.004
trans-1,3-Dichloropropylene	< 0.004
Ethyl Benzene	< 0.001
Methylene Chloride	< 0.002
1,1,2,2-Tetrachloroethane	< 0.002
Tetrachloroethylene	< 0.002
Toluene	< 0.001
1,1,1-Trichloroethane	0.008
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	0.002
Trichlorofluoromethane	< 0.003
Vinyl Chloride	< 0.010

** A less than (<) sign indicates that the compound was nondetectable at the specified detection limit.



ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC-GR METAL FAB PLANT
PROJECT NO.: 25615
LOCATION:
SAMPLED BY: MJ
DESCRIPTION: GROUNDWATER ANALYSIS

DATE SAMPLED: 06/08/88 TIME:
DATE RECEIVED: 06/08/88 TIME: 3:50 PM
DATE COMPLETED: 06/14/88
SCHEDULED COMPLETION: 06/29/88
ANALYST: SH,TVT
QUALITY CONTROL REVIEW BY: KLM
WORKSHEET NO: 1

	CD-8 2:00 PM	CD-9 10:00 AM	CD-10 10:15 AM	86-3 1:40 PM	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	91240	91241	91242	91243		
VOA-624	-----	-----	-----	-----	ENCLOSED	
TRICHLOROETHYLENE	<0.002	<0.002	0.002	-----	0.002	mg/l



GRMP ENVIR. FILE

RESULTS OF
HYDROGEOLOGICAL INVESTIGATION
AT THE COLUMN A-15 EXCAVATION
FOR
GENERAL MOTORS CORPORATION
CHEVROLET-PONTIAC-CANADA GROUP
GRAND RAPIDS, MICHIGAN

MARCH, 1986

PHASE I

EDI Engineering & Science

Environmental Engineering, Geology, Biology and Chemistry
Grand Rapids, MI: (616) 942-0970



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- B - ANALYTICAL RESULTS FOR VOLATILE ORGANIC COMPOUNDS
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INTRODUCTION

EDI Engineering & Science has conducted a Phase I study of the hydrogeology at the General Motors Corporation CPC Metal Fabrication Plant in Grand Rapids, Michigan. The specific area of investigation is a large excavation located in the northeast section of the plant in the area of column A-15. The excavation is part of the plant modernization program.

The General Motors Corporation CPC Metal Fabrication Plant is located approximately five miles south of downtown Grand Rapids and one-third mile east of Highway US-131. More specifically, the plant is located within the NE 1/4 of Section 24, T6W-R12W, Kent County, Michigan at the corner of 36th Street and Buchanan Avenue. A map showing the GM CPC plant site in relation to nearby roads and other features is shown in Figure 1.

The excavation that was constructed during June, 1985 went down to a depth of approximately 20 feet (Figure 2). In some areas, soil was removed down to the water table where a distinct layer of hydrocarbons consisting of mineral spirits was discovered (in contact with the groundwater). After the oil was discovered in the excavation by General Motors, EDI began a hydrogeological investigation to determine the impact of the oil, if any, on the underlying upper saturated zone and to establish more information on the hydrogeology.

The Phase I study determined the subsurface conditions near the excavation and in three monitoring wells on the west and north sides of the plant. The study was accomplished by: 1) drilling and completing seven monitoring wells; 2) measuring the oil layer in wells near the excavation; 3) determining groundwater elevations in the wells; and 4) taking water samples from the wells for laboratory analysis. This report also makes an estimate of the extent of oil-impacted groundwater in the area of the excavation. The existing information was reviewed and incorporated into the study.

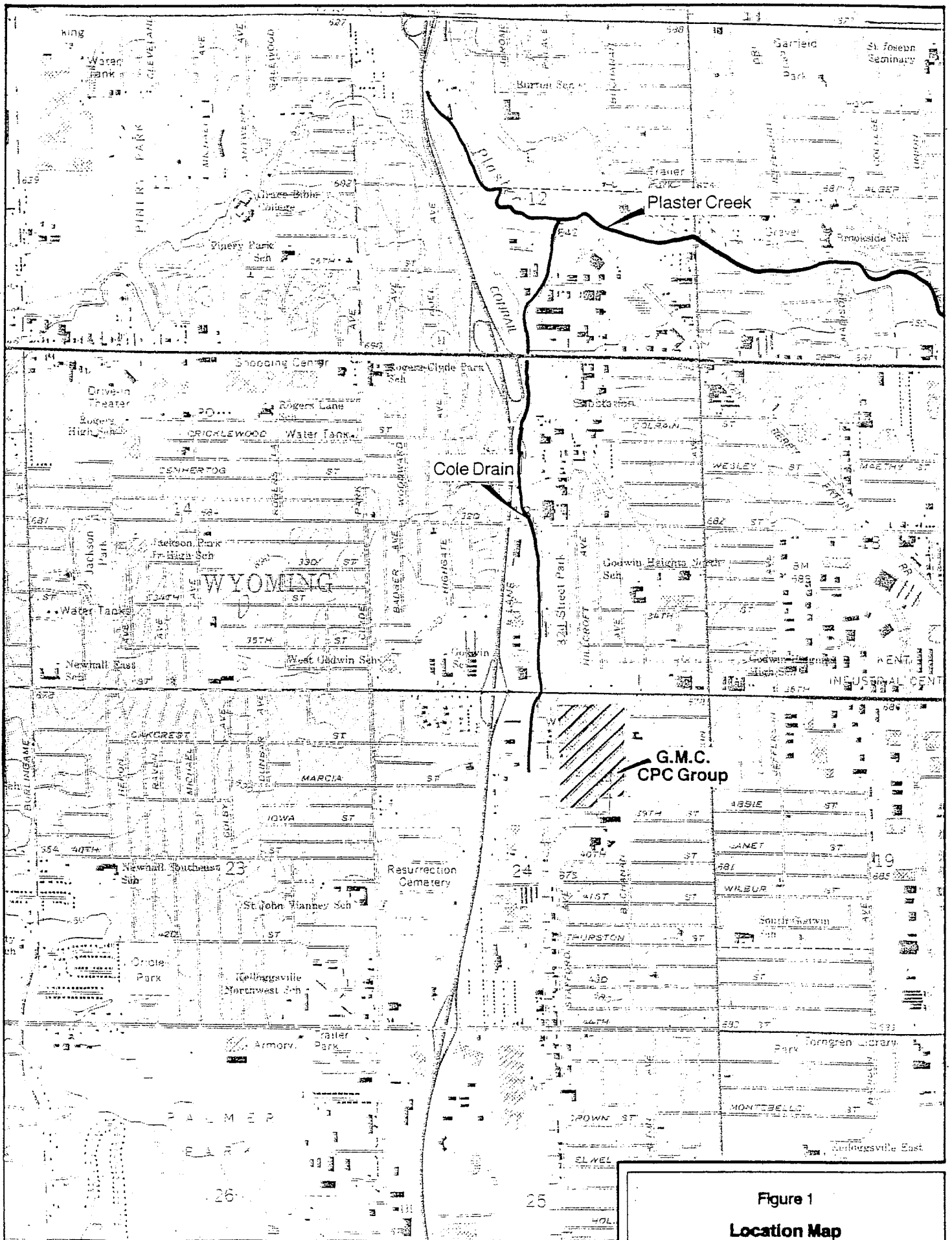
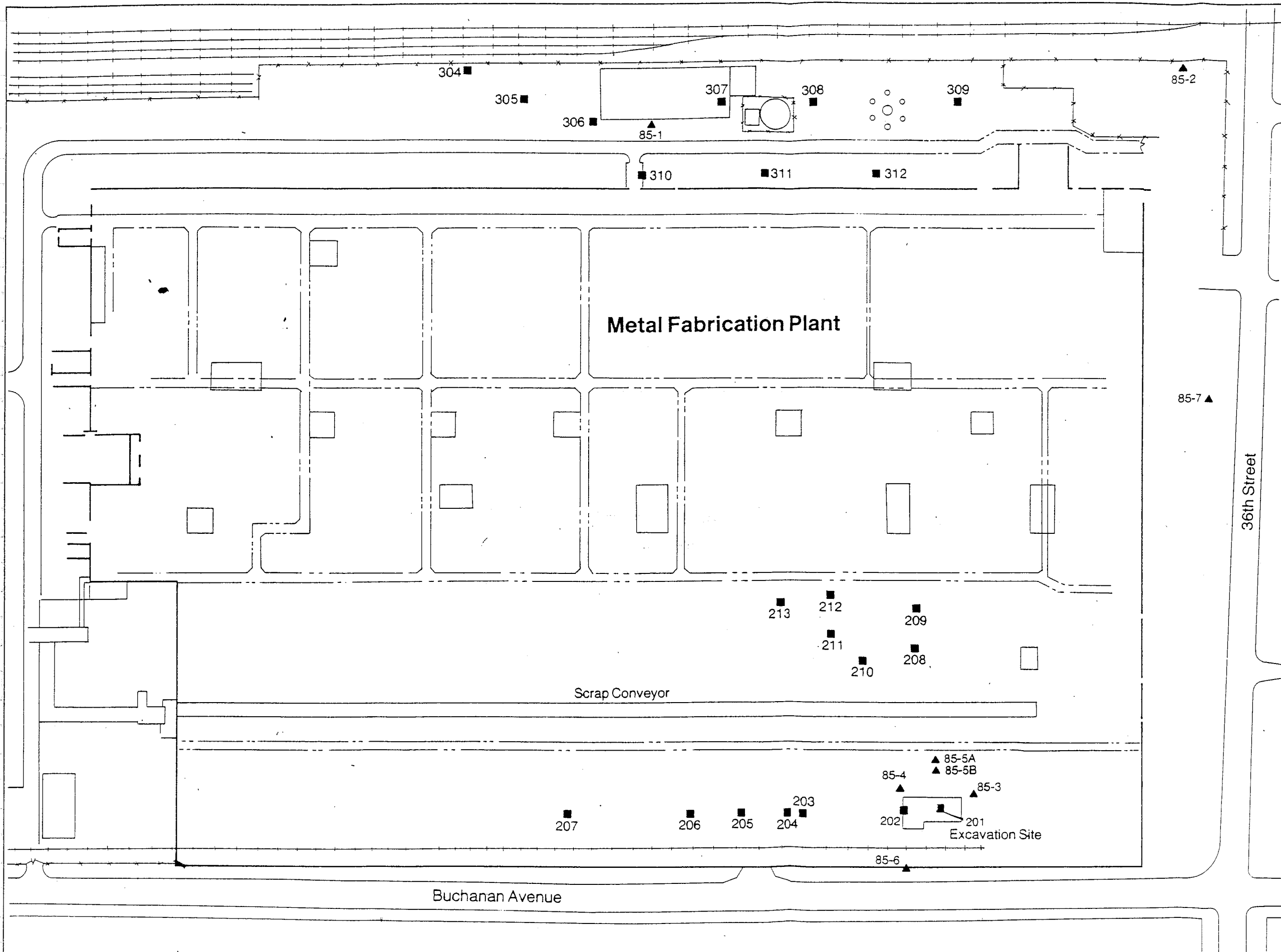


Figure 1
Location Map
General Motors Corp.-CPC Group
February, 1986 20458



- Legend**
- ▲ Monitor Well
Drilled by EDI November, 1985
 - Soil Boring
Drilled by Soils and Materials
Engineers March, 1985

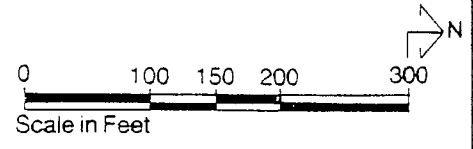


Figure 2
**Plan Showing Metal Fabrication Plant
 with Sampling Locations**
 General Motors Corporation-CPC Group
 February, 1986 20456

In addition to the Phase I study outlined above, water samples were collected from dewatering wells and discharge points in the area of new construction at the south end of the plant. The sampling was done at the request of the MDNR, and the water samples were collected during November, 1985 and January, 1986. The results are summarized in a letter report to Merl Petzold at General Motors dated February 14, 1986.

METHODS OF INVESTIGATION

All of the monitoring wells terminated in a shallow sand or gravelly sand saturated zone and range in depth from 20 feet to 33 feet. The monitoring wells were drilled using a hollow stem auger and split spoon cores were collected every 5 feet starting at a depth of 5 feet below the surface.

The seven monitoring wells were completed with 2-inch galvanized steel casing attached to a wire-wrapped stainless steel screen. The casing and screen for each well were steam cleaned prior to being lowered into the hole. Wells 85-1, 85-2, 85-6 and 85-7 have 5-foot screens and wells 85-3, 85-4, and 85-5B, have 10-foot screens. The wells were constructed to have the screens only partially submerged below the water table so that floatable hydrocarbons could be detected and the thickness measured. The wells were backfilled with natural soils and bentonite, and cement grout was placed around the wells at the surface. Detailed information about each of the monitoring wells and borings can be found in Appendix A.

The elevation of the top of casing was determined for each monitoring well using standard instrument surveying techniques. The wells were completed with flush-mounted sealed caps with enclosed locking caps. At all of the locations, the top of casing was measured at the top of the surface pipe. Within the plant, the top of the casing is at the same elevation as the top of concrete floor. The seal-type flush-mounts eliminate the need for raising the tops of the casing above the level of the concrete. Because the well screens straddle the water table, venting of the wells is not required.

Water levels in the monitoring wells were measured on December 6, 1985 using a steel tape. The thickness of the hydrocarbon layer was measured in Wells 85-4, 85-5B, and 85-3 at the same time as sampling occurred. A clear acrylic bailer was used except in the case of 85-3. The bailer was lowered into the well and recovered the oil and water through a bottom check valve. The clear bailer would not fit inside the screen of Well 85-3. The stainless steel

bailer which is slightly smaller in diameter was lowered into the well so that the oil and water entered through the bottom check valve. The liquid was then poured into the clear acrylic bailer for measurement. The difference in internal diameter of the two bailers is 1/8-inch so the difference measured is not significant.

After the hydrocarbon thickness measurement at each well inside the plant; three casing volumes of water were removed from the well with the stainless steel bailer. The stainless steel bailer was rinsed at each well before sampling.

The seven monitoring wells were sampled in the following order: 85-4, 85-5B, 85-3, 85-1, 85-2, 85-7, and 85-6. The two bailers were thoroughly washed with detergent and water after the sampling of well 85-3 which was the last of the wells containing floatables.

The acrylic bailer was not employed in the sampling of the wells outside the plant as these wells had shown no indication of oil during drilling and did not show a sheen while the three casing volumes were being removed to purge the well.

Because of the sampling procedure, there is the possibility of cross contamination between the wells containing the oil. However, the two wells having less oil were sampled prior to 85-3. A second concern in sampling a well straddling the water table and containing oil is that the bailer goes through the oil and may bring the sample water into more contact with the oil.

The analyses of the water samples for priority pollutants were performed in EDI's laboratory. The volatiles on the priority pollutant list were analyzed using gas chromatography/mass spectrometry (GC/MS). The GC/MS volatile analyses were done according to EPA Method 624. The analyses of the base neutrals on the priority pollutant list were done according to EPA Method 625.

FINDINGS

A total of seven monitoring wells were drilled at the General Motors CPC Metal Fabrication Plant during November and December, 1985.

Four of the wells were drilled around the excavation which is located within the northeastern portion of the plant. Three additional wells were drilled outside of the plant on the north, northwest and west sides of the building. The locations of the seven wells are shown in Figure 2.

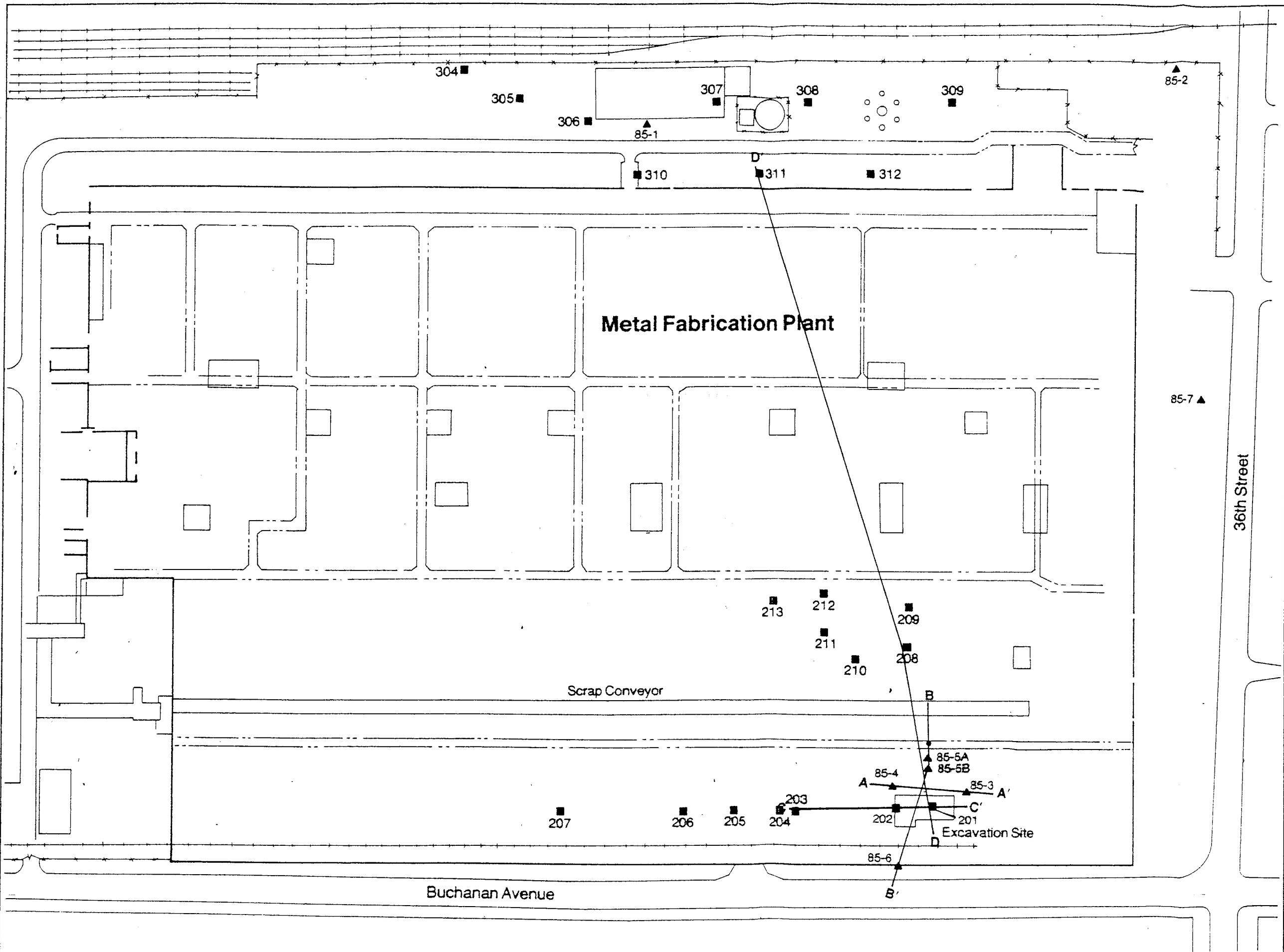
Boring #85-5A, which was not completed as a monitoring well, was drilled to a depth of 7.7 feet where concrete was encountered. Difficulty in penetrating the concrete resulted in the abandonment of 85-5A and moving to a new location 10.5 feet east which is designated as 85-5B.

The borings designated 201 through 213 and 304 through 312 were drilled by Soil and Materials Engineers, Inc. in March and April, 1985 prior to the construction of the excavation at column A-15. The excavation was completed during June, 1985.

Geology:

The area occupied by the plant is underlaid by glacial outwash sediments consisting of sand and gravelly sand. Figure 3 shows the locations of cross sections A-A', B-B', and C-C' (Figures 4, 5, and 6) in the immediate area of Column A-15. Cross section C-C' (Figure 6) has the subsurface units dashed in the area of the excavation because part of boring 201 was removed during the construction of the excavation.

Monitoring wells 85-3, 85-4 and 85-5B, and boring 85-5A, are located inside the plant near the excavation. All of these wells penetrate a 0.3-foot wood block floor underlaid by a concrete floor varying in thickness from 0.8 foot



- Legend**
- ▲ Monitor Well
Drilled by EDI November, 1985
 - Soil Boring
Drilled by Soils and Materials
Engineers March, 1985

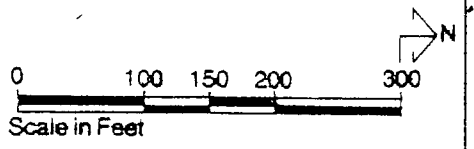
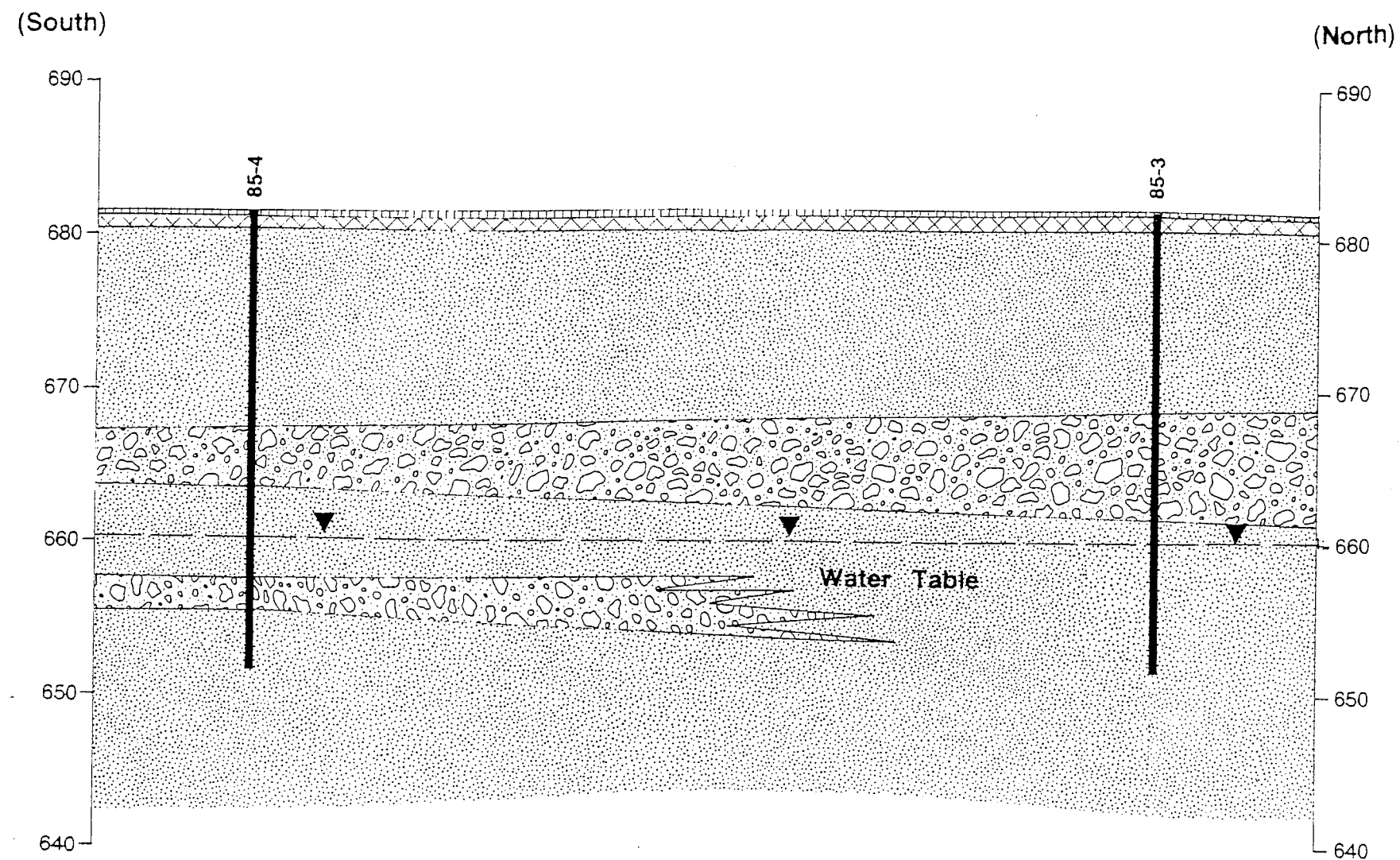


Figure 3
 Plan Showing Locations
 of Cross-Sections
 General Motors Corporation-CPC Group
 February, 1986 20456



Legend

-  Wood Block Floor
-  Concrete Sub-Floor
-  Sand, Fine to Medium Grained
-  Sand, Gravelly, Medium to Coarse Grained

Horizontal Scale: 1 inch = 20'
Vertical Exaggeration: 2X

Figure 4

Cross Section A-A'

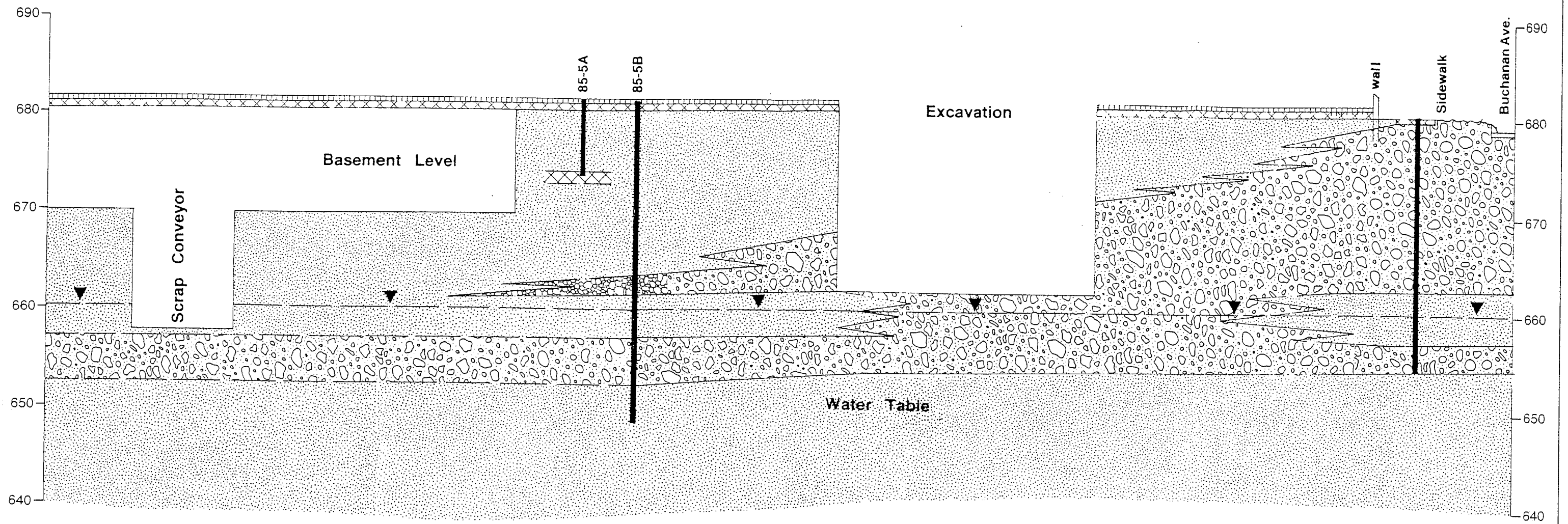
General Motors Corporation-CPC Group

February, 1986

20456

(West)

(East)



Legend

-  Wood Block Floor
-  Concrete Sub-Floor
-  Sand, Fine to Medium Grained
-  Sand, Gravelly, Medium to Coarse Grained
-  Gravel, Medium to Coarse Grained

Horizontal Scale: 1 inch = 20'
Vertical Exaggeration: 2X

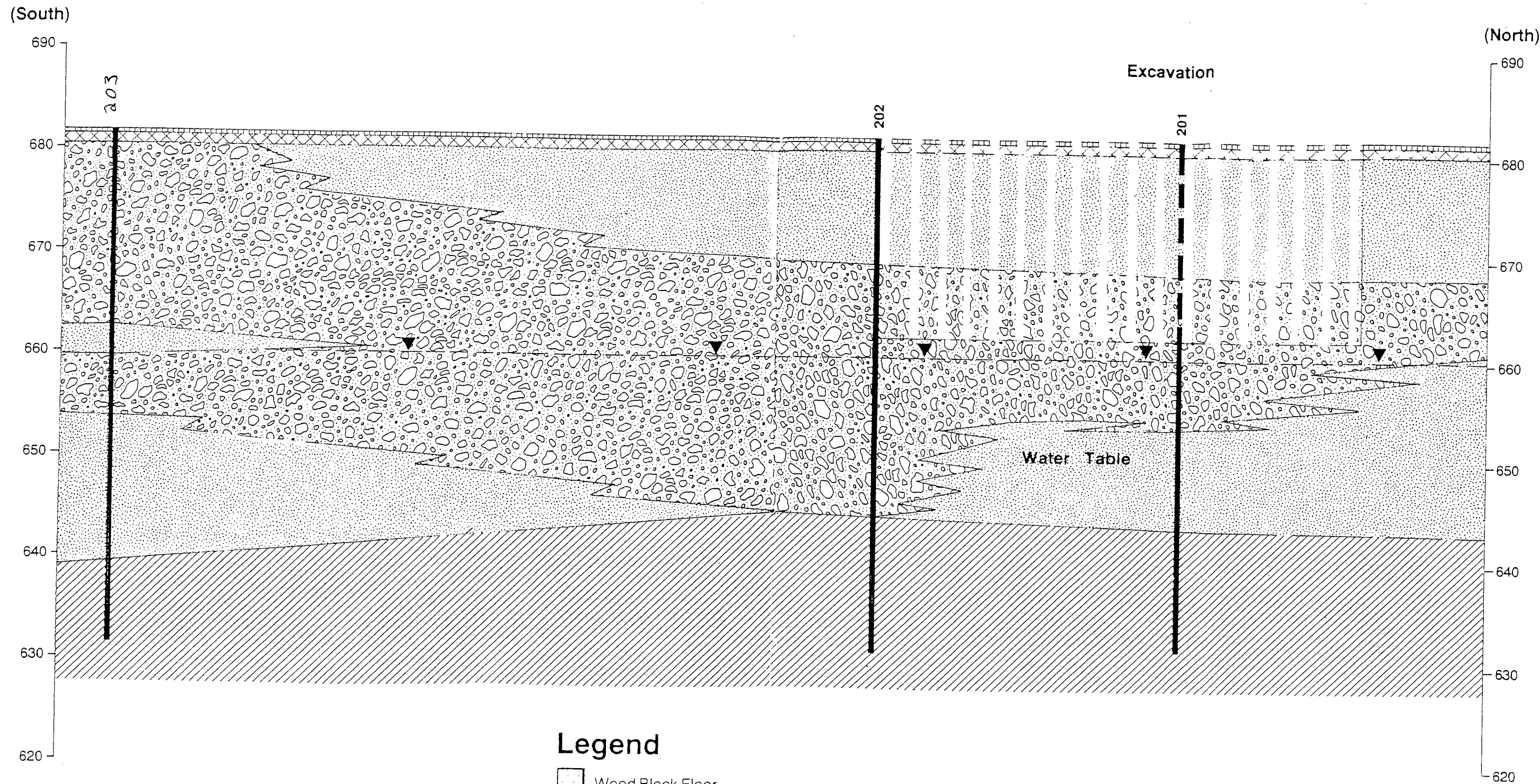
Figure 5

Cross Section B-B'

General Motors Corporation-CPC Group

February, 1986

20456



Legend

-  Wood Block Floor
-  Concrete Sub-Floor
-  Sand, Fine to Medium Grained
-  Sand, Gravelly, Medium to Coarse Grained
-  Clay, Silty, Dark Brown

Horizontal Scale: 1 inch = 20'
Vertical Exaggeration: 2X

Note: Wells 201 and 202 were drilled prior to the excavation.

Figure 6

Cross Section C-C'

General Motors Corporation-CPC Group

February, 1986

20456

to 1 foot. Below the concrete floor is an upper fine-to-medium grained sand ranging in thickness from 11 to 17 feet, and this sand unit is continuous in the immediate area of the excavation.

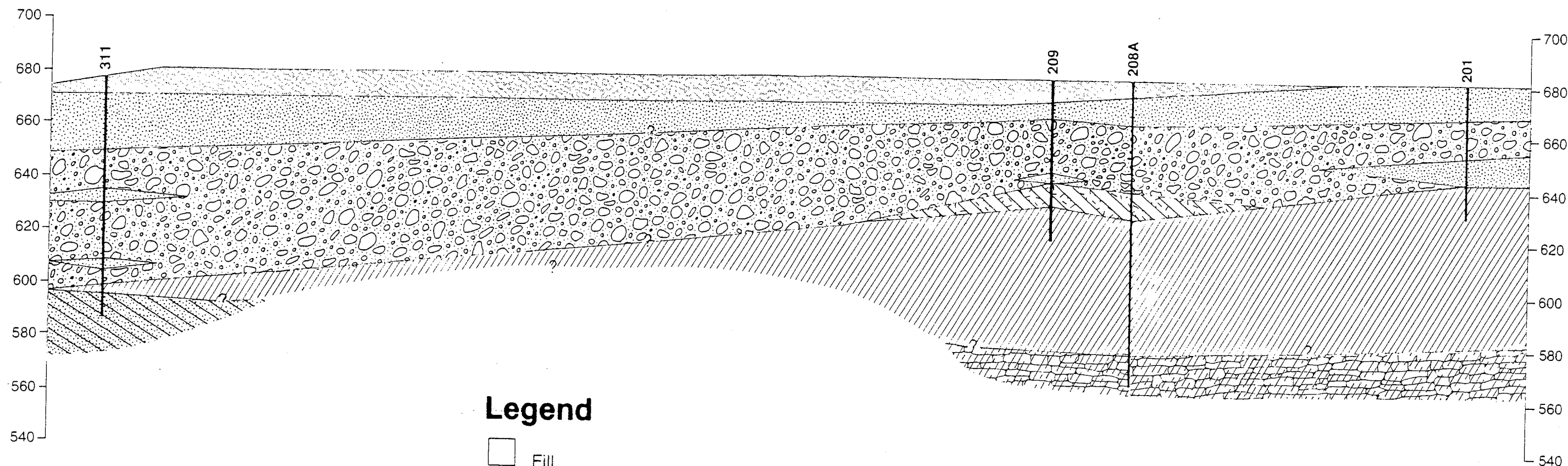
The upper sand thins to the east and interfingers with a fine-to-coarse grained gravelly sand unit found extensively in well 85-6 (see cross section B-B' which is Figure 5). The fine-to-coarse grained gravelly sand unit is interbedded with fine-to-medium grained sand toward the bottom of the unit. The total thickness of the gravelly sand layer varies from 7 to 25 feet within and near the excavation.

Below the gravelly sand is a lower unit of fine-to-medium grained sand. Only boring 201 penetrated completely through the lower sand into the underlying dark brown silty clay. The lower sand unit found in boring 201 is 10 feet thick, as shown on cross section C-C' (Figure 6).

The SME borings provide information deeper in the ground than the wells. In the area of the excavation there appears to be a clay layer beneath the sand and gravel at approximately 40 feet. To the west, the sand and gravel thicken substantially as shown in cross section D-D' (Figure 7). Note the change of scale of cross section D-D' compared to the others. However, the vertical exaggeration is two times the same as the other cross sections. On the west side of the plant the clay is much deeper. The clay is of substantial thickness in boring 208. On the west side of the plant, the one boring which penetrated it only encountered three feet.

The sedimentary units of fine-to-medium grained sand and gravelly sand contain no clay lenses or stringers and would behave as one unit hydraulically down to the top of the silty clay. The clay appears to be thick enough to segregate the upper saturated zone from water below the east side of the plant. On the west side of the plant the interpretation is less clear. Additional deep borings and wells would be required to define the shape of the clay. A pump test might then be necessary to prove or disprove connections between the upper saturated zone and a deeper aquifer.

D



Legend

-  Fill
-  Clayey Sand
-  Silt & Clay Layers
-  Sand, Fine to Medium Grained
-  Sand, Gravelly, Medium to Coarse Grained
-  Clay, Silty, Dark Brown
-  Silty Clay, Bedrock

Horizontal Scale: 1" = 80'
Vertical Scale: 1" = 40'
Exaggeration: 2X

Note: Change of scale from
previous cross sections.

Figure 7

Cross Section D-D'

General Motors Corporation-CPC Group

February, 1986

20456

Groundwater Flow and Presence of Hydrocarbons:

A measurable hydrocarbon layer was found in monitoring wells 85-3, 85-4 and 85-5B. Table 1 shows the thickness of the hydrocarbon layer in three wells and the equivalent thickness of water. It was necessary to convert the thickness of the hydrocarbon layer to an equivalent thickness of water so that accurate water level elevations could be calculated. A density of 0.752 g/cm^3 was used for the hydrocarbon layer to convert from oil to water. Mineral spirits has a density of 0.752 g/cm^3 , and this density was used because the sampling of the oil in the pit identified mineral spirits.

The thickest hydrocarbon layer was found in monitoring well 85-3 which is located at the north end of the excavation. Well 85-3 is located immediately adjacent to the large Verson cutting press #SE4-400-186-102. Thinner but measurable quantities of hydrocarbons were found in monitoring wells 85-4 and 85-5B, which are also located on the perimeter of the excavation.

A measurable hydrocarbon layer was not detected in wells 85-1, 85-2, 85-6, and 85-7. Monitoring well 85-6 is located immediately outside of the plant on the east side (Figure 2). This well is located upgradient of the excavation.

Water table elevations are shown on Table 2, and a water table contour map with the indicated directions of groundwater flow is shown in Figure 8. The water table contour map indicates that the principal direction of groundwater flow is toward the north and northwest. The gradient is 0.0032. Groundwater is moving toward Cole Drain and Plaster Creek, both of which are illustrated in Figure 1.

All of the wells were placed with the screen straddling the water table so in-situ permeability testing cannot be done on the wells. Based on the soil types, the permeability can be estimated to be between $2 \times 10^{-5} \text{ m/sec}$ and $2 \times 10^{-4} \text{ m/sec}$, with an assumed average porosity of 25%. With the gradient of 0.0032, the groundwater velocity would range between 25 feet per year and 250 ft/yr.

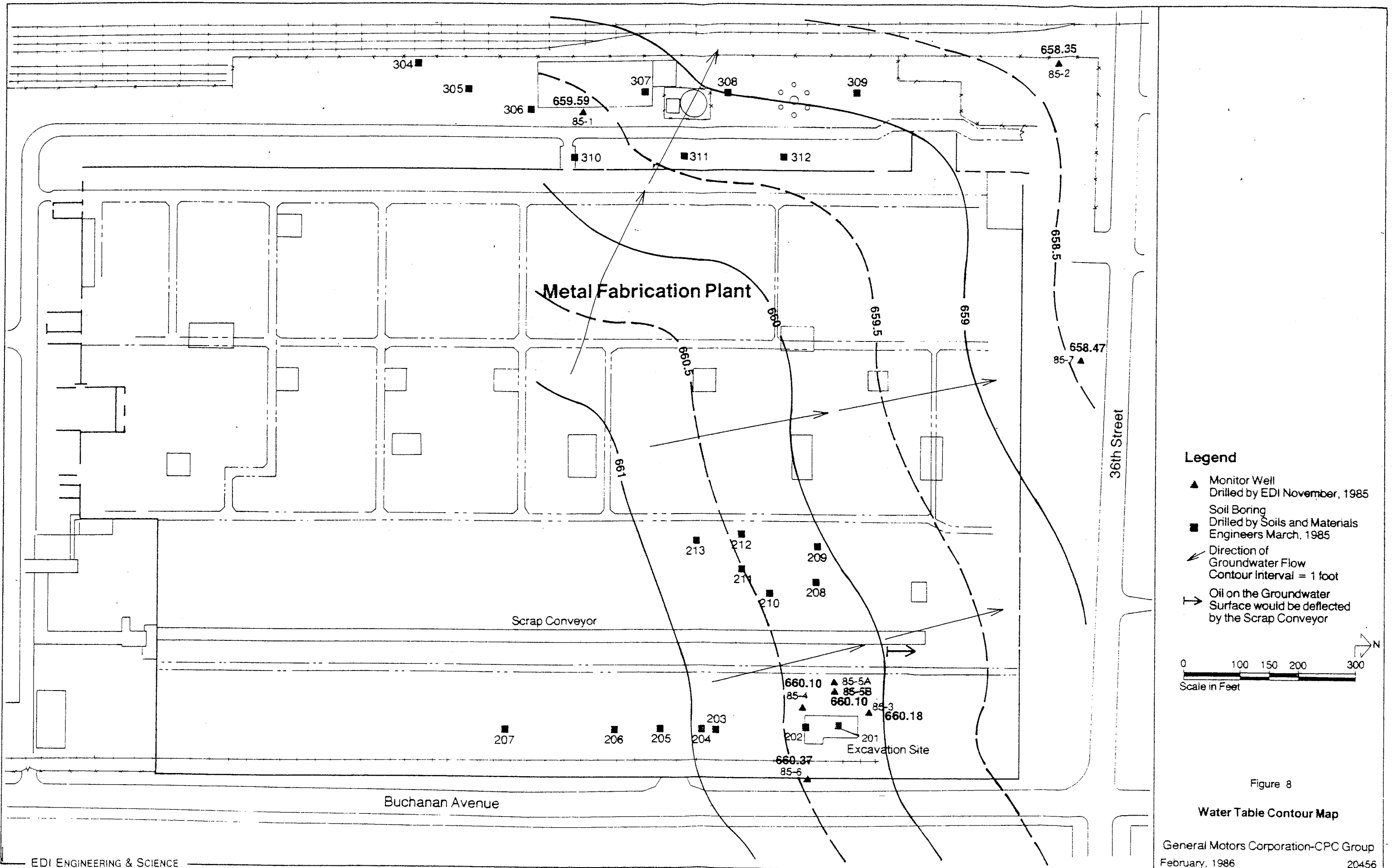


Figure 8

Water Table Contour Map

TABLE 1
THICKNESS OF HYDROCARBON LAYER
IN THE AREA OF THE EXCAVATION

WELL NUMBER	HYDROCARBON THICKNESS* (feet)	HYDROCARBON THICKNESS (inches)	EQUIVALENT WATER THICKNESS* (feet)
85-3	0.033	0.40	0.025
85-4	0.016	0.20	0.012
85-5B	0.008	0.10	0.006

*To convert from oil to water, a density of 0.725 g/cm³ was used (the density of mineral spirits).

TABLE 2
GROUNDWATER LEVELS
AT THE
GENERAL MOTORS - CPC METAL FABRICATION PLANT
December 6, 1985

<u>WELL NUMBER</u>	<u>TOC ELEVATION (feet)</u>	<u>WATER LEVEL BELOW TOC* (feet)</u>	<u>WATER LEVEL ELEVATION (feet)</u>
85-1	675.87	16.28	659.59
85-2	672.48	14.13	658.35
85-3	681.37	21.19	660.18
85-4	681.29	21.19	660.10
85-5B	681.33	21.23	660.10
85-6	680.35	19.98	660.37
85-7	678.69	20.22	658.47

*The water level below top of casing for the three wells with an oil layer is calculated as follows: Water level below TOC = actual observed water level below TOC less the equivalent water thickness for the hydrocarbon layer.

The metal scrap conveyor that is illustrated in Figures 5 and 8 runs through the entire length of the plant except for a small portion at the north end. In the area west of the excavation, the base of the scrap conveyor wall is approximately 2 feet below the water table with an elevation which is approximately 658 feet.

The direction of groundwater flow in the area of the scrap conveyor is toward the north-northwest. This suggests that if floatable hydrocarbons were present upgradient of the conveyor that they would not be trapped at the base of the conveyor wall. The conveyor would cause a perturbation of the flow of the groundwater at the surface and have the effect of diverting the floatables to the north until reaching the end of the conveyor system.

The lateral extent of the oil layer is estimated to be confined to the plant with floatables probably not going beyond the downgradient end of the scrap conveyor.

Groundwater Quality:

Water samples that were collected from each of the seven monitoring wells were analyzed for volatile and base neutral organic compounds that are on the priority pollutant list. The results for the volatile compounds are shown in Table 3, and the results for the base neutral compounds are shown in Table 4. The complete analytical results for volatiles and base neutrals are shown in Appendices B and C.

All of the water samples had detectable quantities of volatile organic compounds. The samples from wells 85-4 and 85-5B, located near the excavation, had the largest number of volatile compounds. Both samples contained detectable amounts of 1,1-dichloroethane, tetrachloroethylene, 1,1,1-trichloroethane, and trichloroethylene.

Water samples from wells 85-1, 85-2, 85-5B, and 85-7 had detectable amounts of trans-1,2-dichloroethylene. The highest concentrations of this compound were

TABLE 3

RESULTS OF CHEMICAL ANALYSES
OF WATER SAMPLES
VOLATILE FRACTION*

(Concentrations in mg/l)

WELL	TRANS-1,2-DICHLORO- ETHYLENE	TRICHLORO- ETHYLENE	TOLUENE	1,1-DICHLORO- ETHANE	TETRACHLORO- ETHYLENE	1,1,1-TRICHLORO- ETHANE
85-1	0.012	---	---	---	---	---
85-2	0.021	0.006	---	---	---	---
85-3	---	---	0.003	---	---	---
85-4	---	0.002	---	0.002	0.002	0.005
85-5B	0.012	0.004	---	0.006	0.002	0.003
85-6	---	---	---	---	0.004	---
85-7	0.004	0.084	---	---	---	---
DETECTION LIMIT	0.002	0.002	0.001	0.002	0.002	0.002

*The compounds shown here are those compounds in detectable concentrations from a scan of 28 volatile compounds.

TABLE 4

RESULTS OF CHEMICAL ANALYSES
OF WATER SAMPLES
BASE NEUTRAL FRACTION¹

(Concentrations in mg/l)

<u>WELL</u>	<u>FLUORANTHENE</u>	<u>FLUORENE</u>	<u>NAPHTHALENE</u>	<u>PHENANTHRENE</u>	<u>PYRENE</u>	<u>BIS-(2-ETHYL HEXYL)- PHTHALATE</u>	<u>DI-N-BUTYL- PHTHALATE</u>
85-3 ²	0.46	3.2	0.17	2.8	0.56	---	---
85-4	0.004	---	---	0.010	0.003	0.002	0.007
85-5B	---	0.004	---	0.003	0.005	---	---
DETECTION ² LIMIT	0.001	0.002	0.10	0.001	0.001	0.002	0.001

¹ The compounds shown here are those compounds found in detectable concentrations from a scan of 44 base neutral compounds.

² The detection limits for well 85-3 are 0.10 mg/l for fluoranthene, phenanthrene, and pyrene; and 0.20 mg/l for fluorene.

from wells 85-1, 85-2, and 85-5B; namely, 0.012 mg/l, 0.021 mg/l, and 0.012 mg/l, respectively.

Only toluene with a concentration of 0.003 mg/l was detected in the water sample from well 85-3. This well is located immediately downgradient of the excavation and has the thickest hydrocarbon layer (0.033 feet). A relatively high concentration of trichloroethylene (0.084 mg/l) was detected in the water sample from well 85-7.

Base neutral compounds were detected in water samples from wells 85-3, 85-4, and 85-5B (Table 4). Well 85-3 has relatively high concentrations of fluoranthene (0.46 mg/l), fluorene (3.2 mg/l), naphthalene (0.17 mg/l), phenanthrene (2.8 mg/l), and pyrene (0.56 mg/l). Lesser amounts of fluoranthene, phenanthrene and pyrene were detected in the samples from wells 85-4 and 85-5B.

CONCLUSIONS

Information obtained during the drilling of the seven monitoring wells and the previous borings indicates that the plant area is underlaid by a continuous sand and gravelly sand unit which is approximately 35 to 40 feet thick in the area of the excavation. The saturated thickness is 15 to 20 feet. To the west the unit thickens substantially downward.

Locally, groundwater flows to the north and northwest from the plant toward Cole Drain and Plaster Creek. The shallow saturated zone has a gently sloping gradient. The water table falls only two feet from the east wall of the building to the northwest corner of the plant.

A layer of hydrocarbons probably consisting mainly of mineral spirits was detected in the three wells on the perimeter of the excavation. The thickness of the hydrocarbon layer varies from 0.008 to 0.033 feet.

Only monitoring wells 85-3, 85-4 and 85-5B have detectable levels of base neutral compounds that are on the priority pollutant list. Well 85-3 has the highest concentrations of base neutrals with detectable levels of fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene.

Because the oil in the soils is under the building, rainfall should not drive the oil down to the water table. Also, a significant portion of the oil-contaminated soil was removed in the excavation, reducing the amount of oil likely to reach the groundwater. Coupled with the limited thickness of the oil presently on the surface of the groundwater, the potential for significant movement of the oil is low. Although the conveyor foundations are deep enough to intersect the water levels, the flow direction is to the north-northwest. The foundation would divert the oil if it moves, but probably not act as a significant barrier.

A thick pad with slopes to a sump will be placed under new equipment in the

area of the excavation. This will prevent spills or leakage from the new equipment from getting into the groundwater.

Volatile organic compounds appear in all of the monitoring wells, although the levels in some of the wells are at or near the detection limit. The wells near the excavation which contained oil showed minimal amounts of volatile compounds. Wells 85-1 and 85-2 showed levels of trans-1,2-dichloroethylene in the 10 to 20 ppb range. Well 85-7 had trichloroethylene (TCE) at 84 ppb. This well is downgradient of the plant based on the water levels of the seven wells. A source for the TCE is not known at present.

RECOMMENDATIONS

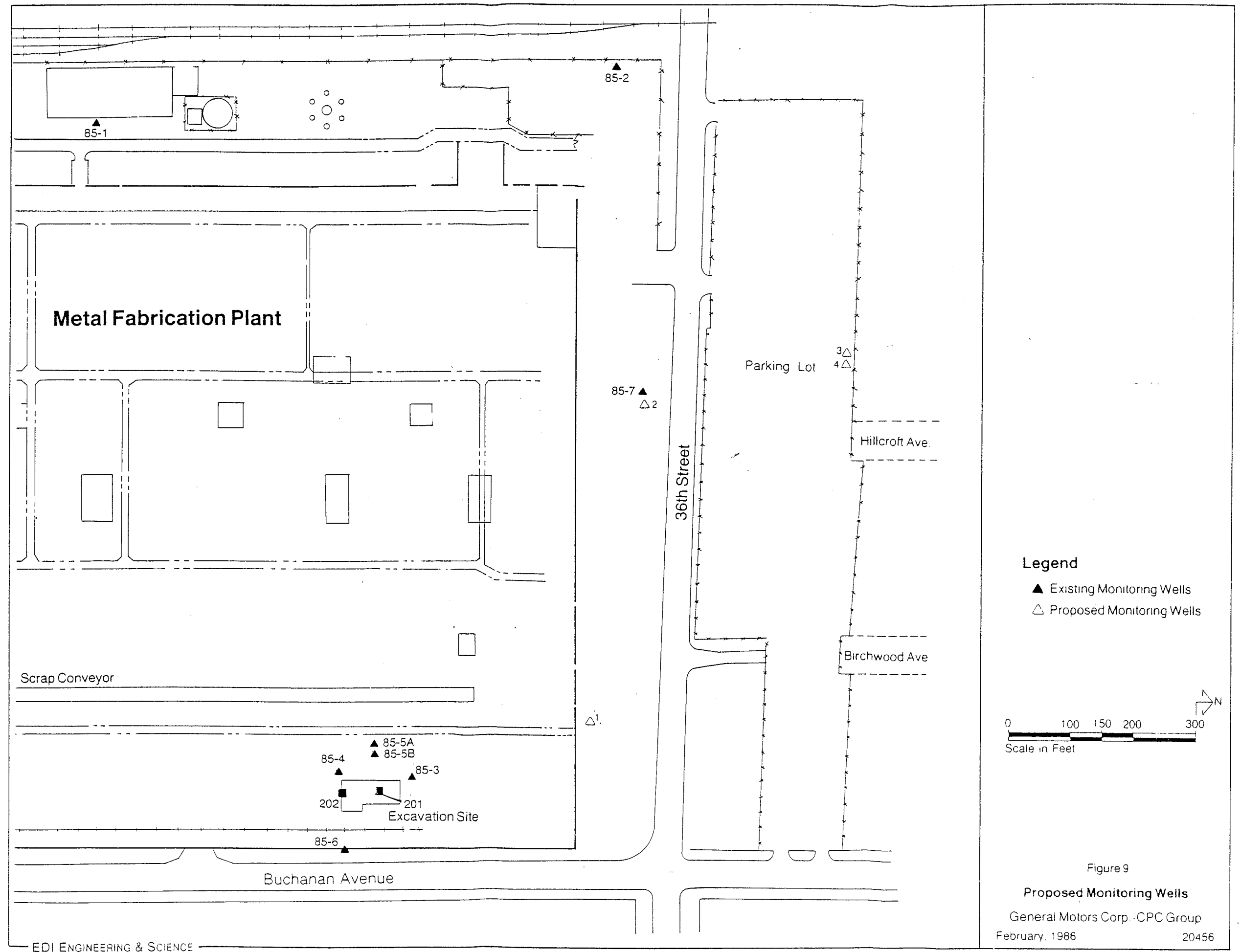
Water samples from the seven monitoring wells should be collected semi-annually. The samples from wells 85-3, 85-4, and 85-5B should be analyzed for volatiles and base neutrals; and wells 85-1, 85-2, 85-6, and 85-7 should be analyzed for volatiles only (using priority pollutant scans).

After one year, the monitoring should include only those compounds that were detectable and had significant concentrations during previous analyses.

It is recommended that four monitoring wells be drilled on the north side of the plant (Figure 9). One well should be drilled northwest of the excavation just north of the plant wall. The well should be set with the screen straddling the water table (for the detection of hydrocarbons). The water samples from this well should be analyzed for volatiles and base neutrals.

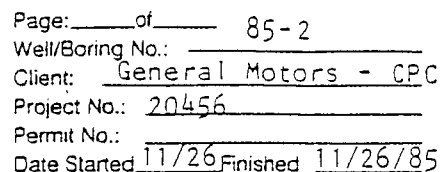
A second well should be drilled next to monitoring well 85-7. The screen should be placed near the bottom of the upper saturated zone for the detection of trichloroethylene (TCE). TCE is denser than water and can sink to the bottom of the sand unit as a separate phase.

It is recommended that a well cluster consisting of two wells be drilled on the north edge of the plant property downgradient of well 85-7 (Figure 8). One well should have its screen submerged just below the water table. A second well should have its screen placed near the bottom of the saturated zone. The water samples from both wells should be analyzed for volatiles using priority pollutant scans.



APPENDIX A
CONSTRUCTION RECORDS FOR
MONITORING WELLS AND BORINGS

[illegible]



Date Started 11/26 Finished 11/26/85

Contractor: Stearns Drilling
Address: Dutton, MI

Equipment: CME 45

Supervisor: D. Johnson
J. Venn

Drilling Method(s)	Depth
Hollow Stem	0-20'
Auger & Split Spoons	

Grouting/Seal		
Depth	To	Material
0	18.5'	Natural Soils
		and Benseal;
		Cement at Sur
		face

Development: Ball lowered
on rope; three casing
volumes removed.

Water Level: 14.13 Ft. Below: TQC
Measured On: 12/6/85

Screen:
 Manufacturer: Johnson
 Material: Stainless Steel
 Model: 960
 Slot/Gauze: 10 Dia.: 2"
 Length: 5'
 Depth Set: 13.5 To: 18.5'

Casing
Dia. 2" Type Galv. Depth Set 0 To 13.5'
To

Elevation 672.5'
Casing: _____
Ground: _____
Ret. Pt: _____

Remarks (include here, other data available)

Well has flush-mounted sealed metal cap with enclosed locking cap. Top of casing is cemented into asphalt parking lot.

[illegible]

Well has flush-mounted sealed metal cap with enclosed locking cap. Top of casing is cemented into concrete floor.

[illegible]

Well has flush-mounted sealed metal cap with enclosed locking cap. Top of casing is cemented into concrete floor.

[illegible]

Auger hit concrete with rebar at 7.5 feet below surface. After penetrating 0.2 feet into concrete, we decided to abandon well and move over and drill 85-58.

[illegible]

Well has flush-mounted sealed metal cap with enclosed locking cap. Top of casing is cemented into concrete floor. This well was drilled after Well 85-5A was plugged and abandoned.

[illegible]

[illegible]



Page: _____ of _____ 85-7
Well/Boring No.: _____
Client: General Motors - CPC
Project No.: 20456
Permit No.: _____
Date Started 11/27 Finished 11/27/85

Well / Boring Log Sheet

County KENT	Township CITY OF WYOMING	Fraction NE 1/4 NW 1/4 NE 1/4	Section 24	T 6N	R 12W

Contractor: Stearns Drilling
Address: Dutton, MI

Equipment: CME 45

Supervisor: D. Johnson
J. Venn

Drilling Method(s)	Depth
Hollow Stem	0-25'
Auger & Split Spoons	

Grouting/Seal

Depth	To	Material
0	25.6'	Natural Soils
		and Benseal;
		Cement at Sur
		face

Development: Ball lowered
on rope; three casing
volumes removed.

Water Level: 20.22 Ft. Below: TOC
Measured On: 12/6/85

Screen:

Manufacturer: Johnson

Material: Stainless Steel

Model: 960

Slot/Gauze: 10 Dia.: 2"

Length: 5'

Depth Set: 20.6 To: 25.6'

Casing

Dia.	Type	Depth Set
2"	Galy.	0 To 20.6'
		To

Elevation

Casing: 678.7'

Ground: _____

Ref. Pt.: _____

Remarks (include here, other data available)

Well has flush-mounted sealed metal cap with enclosed locking cap. Top of casing is cemented into area of loose soil surrounding well.

[illegible]

OWNER GENERAL MOTORS CORPORATION-CPC GROUP				ARCHITECT / ENGINEER ALBERT KAHN ASSOCIATES, INC.			
LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

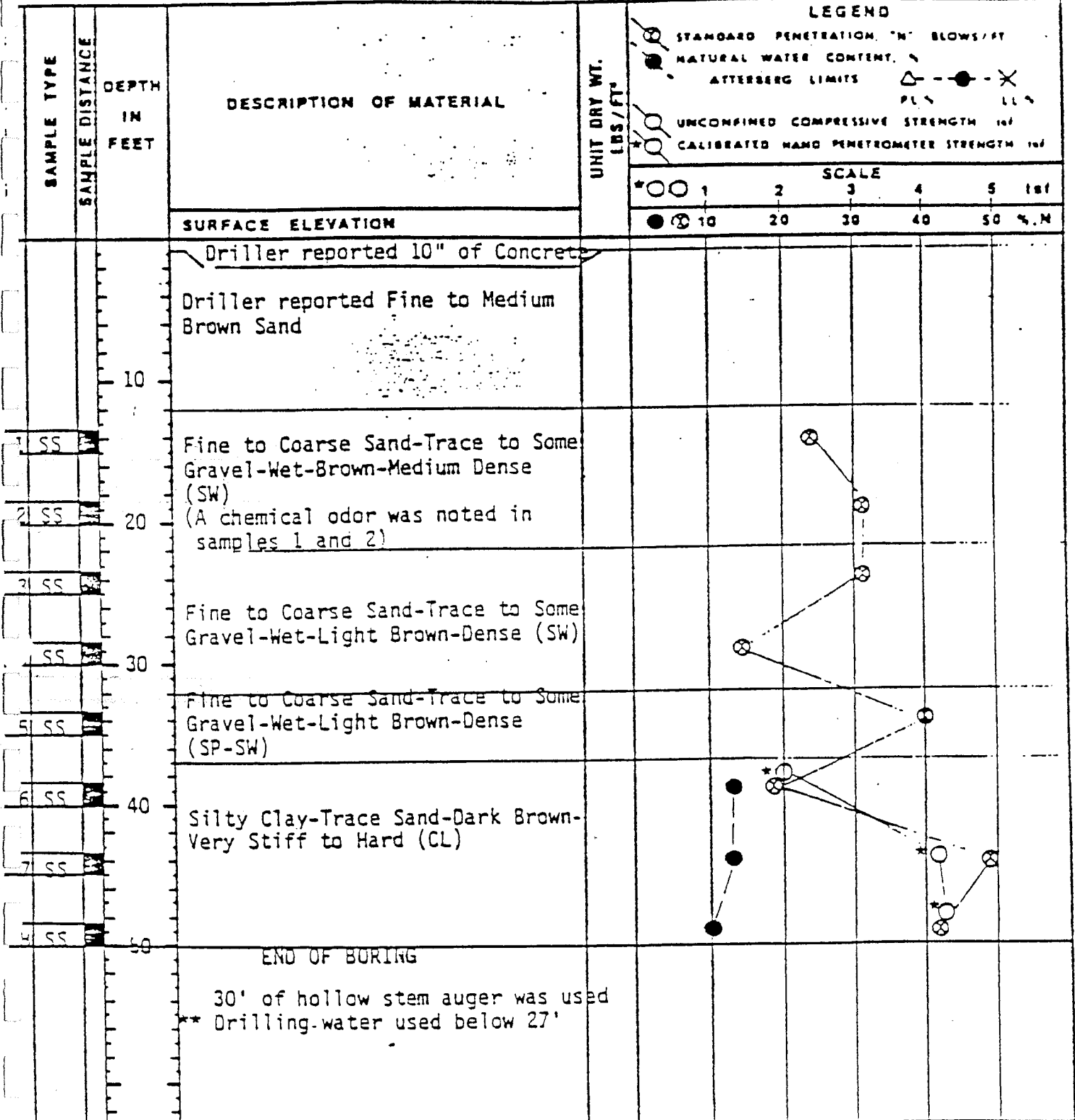
SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND	
						STANDARD PENETRATION, "N BLOWS/FT NATURAL WATER CONTENT, % ATTERBERG LIMITS UNCONFINED COMPRESSIVE STRENGTH, lbf CALIBRATED HAND PENETROMETER, STRENGTH, lbf	SCALE 1 2 3 4 5 lbf 10 20 30 40 50 %N
				Driller reported 3" of Wood Blocks over 15" of Concrete			
			10	Driller reported Fine Sand with a 1.5' thick layer of fine to coarse sand & gravel at 4.5'- Dark Brown to Black changing to Brown at 4.5'			
1	SS			Fine to Coarse Sand-Trace to Some Gravel-Moist-Light Brown-Medium (SW)			
2	SS		20	Fine to Coarse Sand-Trace Silt & Gravel-Wet-Brown-Dense (SP) (Chemical odor noted in Sample 2)			
3	SS			Fine to Coarse Sand & Gravel-Trace to Some Silt-Wet-Brown-Dense (SP)			
4	SS		30	Silty Fine Sand-Wet-Light Brown- Dense (SM)			
5	SS						
6	SS		40				
7	SS			Silty Clay-Trace Sand-Dark Brown- Stiff to Hard (CL)			
8	SS		50				
				END OF BORING			
				30' of hollow stem auger was used			
				*Drilling water was used below 27"			
				Boring backfilled with bentonite and natural soils.			

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.		MINERAL WELL PERMIT NO.	
WATER LEVEL OBSERVATIONS **		BORING STARTED	3/31/85
22' WHILE SAMPLING OR WHILE DRILLING 19' 11" IMMEDIATELY AFTER COMPLETION _____ AFTER COMPLETION		BORING COMPLETED	
		RIG: SD	DRAWN BY: PT
		FOREMAN: Heff	APPROVED: AMS/GM
		JOB: L8109	SHEET: 1/1
NOTE: Boring backfilled with natural soils unless otherwise noted.			


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LOCATION
GRAND RAPIDS, MICHIGAN

PROJECT NAME
PLANT MODERNIZATION PROGRAM



NOTE: The indicated stratification lines are approximate.
In situ, the transition between materials may be gradual.

MINERAL WELL
PERMIT NO.

WATER LEVEL OBSERVATIONS **

BORING STARTED 3/31/85

BORING COMPLETED

RIG: SD

DRAWN BY: PT

FOREMAN: JG

APPROVED: AMS/GM

JOB: L6109

SHEET: 1 of 1

NOTE: Boring backfilled with natural soils unless otherwise noted.



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LOCATION GRAND RAPIDS, MICHIGAN	PROJECT NAME PLANT MODERNIZATION PROGRAM

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.	LEGEND					
						○ STANDARD PENETRATION, "N" (BLOWS/FT.)	● NATURAL WATER CONTENT, %	△ - ● - X ATTERBERG LIMITS	○ UNCONFINED COMPRESSIVE STRENGTH (100)	○ CALIBRATED HAND PENETROMETER STRENGTH (100)	P.L. %
						SCALE					
						1	2	3	4	5	10
						10	20	30	40	50	% N
				Driller Reported 18" of Concrete							
				Driller Reported Dark Brown Sand & Gravel							
			10								
1	SS			Fine to Coarse Sand-Trace to Some Gravel-Trace Silt-Light Brown-Moist-Medium Dense (SW)							
2	SS		20	Fine Sand-Brown-Moist-Dense (SP)							
3	SS			Silty Fine to Coarse Sand-Trace to Some Gravel-Brown-Wet-Medium Dense (SM)							
4	SS		30	Silty Fine Sand-Brown-Wet-Dense to Medium Dense (SM)							
5	SS										
6	SS		40	Silty Fine Sand-Gray-Saturated-Loose (SM)							
7	SS			Silty Clay-Trace Sand & Gravel-With Occasional Silt Seams-Gray-Very Stiff to Hard (CL)							
8	SS		50								
				END OF BORING							
				NOTE: 50' of Hollow Stem Auger Used							

NOTE: The indicated stratification lines are approximate.
In situ, the transition between materials may be gradual.

MINERAL WELL
PERMIT NO.

WATER LEVEL OBSERVATIONS

BORING STARTED 4-21-85
BORING COMPLETED 4-21-85

RIG: CME 45B DRAWN BY: PT
FOREMAN: ST, APPROVED: AS/PL
JOB: L8109 SHEET: 1 of 1



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18' WHILE SAMPLING OR WHILE DRILLING
10.5' IMMEDIATELY AFTER COMPLETION
AFTER COMPLETION

OWNER

GENERAL MOTORS CORPORATION-CPC GROUP

ARCHITECT / ENGINEER

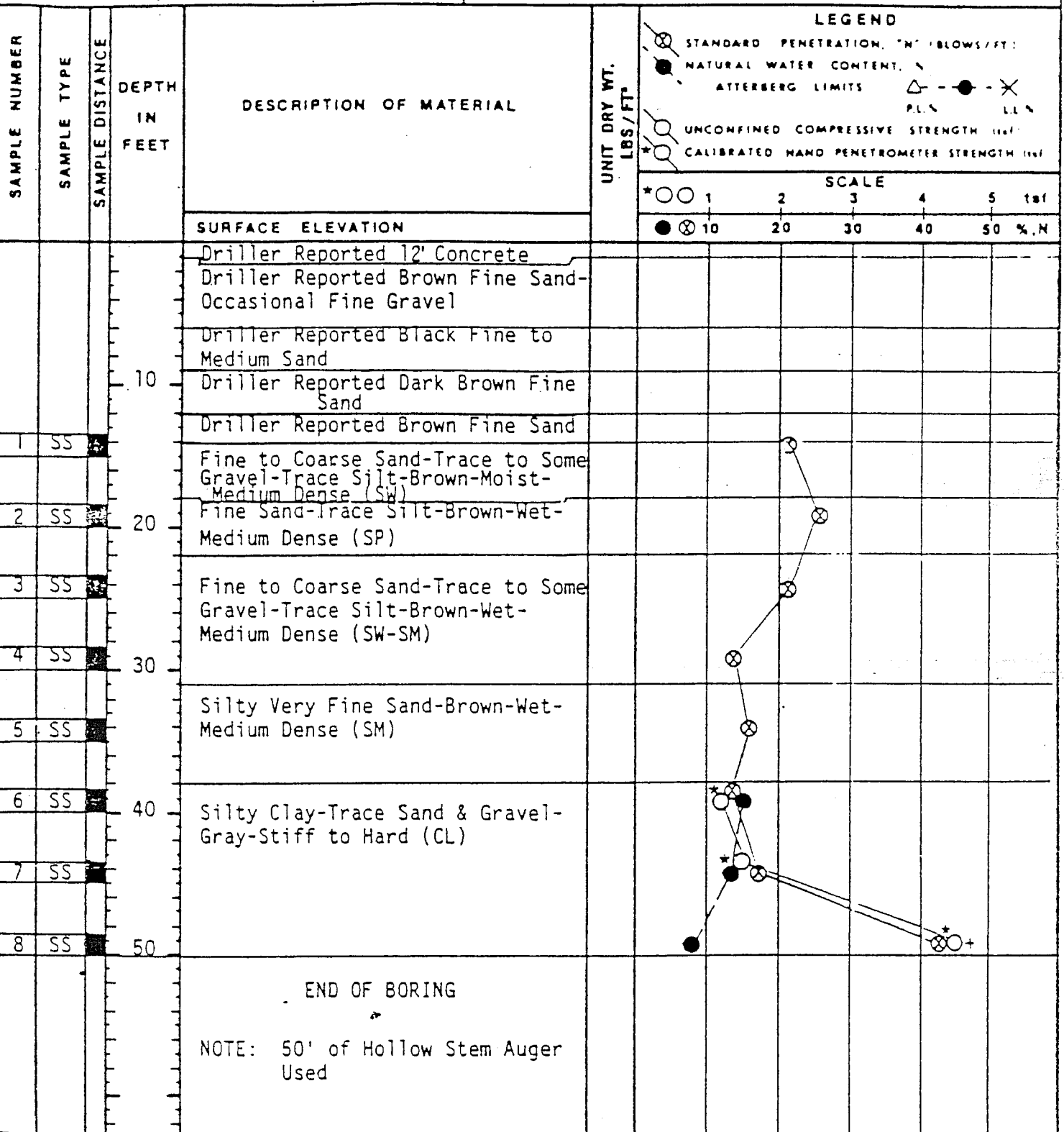
ALBERT KAHN ASSOCIATES, INC.

LOCATION

GRAND RAPIDS, MICHIGAN

PROJECT NAME

PLANT MODERNIZATION PROGRAM



NOTE: The indicated stratification lines are approximate.

In situ, the transition between materials may be gradual.

MINERAL WELL

PERMIT NO.

WATER LEVEL OBSERVATIONS

BORING STARTED

4-21-85

BORING COMPLETED

4-21-85

RIG: Acker

DRAWN BY: PT

FOREMAN: Heff

APPROVED: AS/TM

JOB: L8109

SHEET: 1 of 1

NOTE: Boring backfilled with nat

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20'

 WHILE SAMPLING OR WHILE DRILLING
 IMMEDIATELY AFTER COMPLETION
 AFTER COMPLETION

OWNER GENERAL MOTORS CORPORATION CPC GROUP				ARCHITECT / ENGINEER ALBERT KAHN ASSOCIATES, INC.			
LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND	
						STANDARD PENETRATION, "N" (BLOWS/FT.)	NATURAL WATER CONTENT, %
						ATTERBERG LIMITS	
						STANDARD PENETRATION, "N" (BLOWS/FT.) NATURAL WATER CONTENT, % ATTERBERG LIMITS P.L.L. U.C.L. UNCONFINED COMPRESSIVE STRENGTH (TSF) CALIBRATED HAND PENETROMETER STRENGTH (TSF)	
						SCALE	
						1 2 3 4 5 tsf 10 20 30 40 50 %N	

				Driller Reported 12" of Concrete Driller Reported Fine to Coarse Sand-Some Fine Gravel-Dark Brown			
			10				
1	SS			Fine to Coarse Sand-Trace Gravel-Brown-Moist Loose to Medium Dense (SP)			
2	SS						
3	SS		20	Fine Sand-Trace to Some Silt-Brown-Wet-Dense (SM)			
4	SS			Fine to Coarse Sand-Trace to Some Silt & Gravel-Brown-Wet-Medium Dense (SM)			
5	SS		30	Fine Sand-Trace to Some Silt-Brown-Wet-Very Dense to Dense (SM)			
6	SS						
7	SS		40	Fine Sandy Silt-With Occasional Fine Sand Layers-Gray-Saturated-Medium Dense to Dense (ML)			
8	SS						
9	SS		50	Silty Clay-Trace Sand & Gravel-Gray-Hard (CL)			
				END OF BORING			
				NOTE: 50' of Hollow Stem Auger Used-Boring Performed Below A 25' Depth			

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.		MINERAL WELL PERMIT NO.	
WATER LEVEL OBSERVATIONS		BORING STARTED	4-14-85
		BORING COMPLETED	4-14-85
20' WHILE SAMPLING OR WHILE DRILLING 28' IMMEDIATELY AFTER COMPLETION WCI @ 19.5' AFTER COMPLETION		RIG: CME 550 DRAWN BY: PT FOREMAN: GRY APPROVED: AS/PL JOB: L 8109 SHEET: 1 of 1	
NOTE: Boring backfilled with natural soils unless otherwise noted.			

OWNER GENERAL MOTORS CORPORATION-CPC GROUP				ARCHITECT / ENGINEER ALBERT KAHN ASSOCIATES, INC.			
LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND	
						STANDARD PENETRATION, "N" (BLOWS/FT.)	NATURAL WATER CONTENT, % ATTERBERG LIMITS
						UNCONFINED COMPRESSIVE STRENGTH (tsf) CALIBRATED HAND PENETROMETER STRENGTH (tsf)	
						SCALE * ○ 1 2 3 4 5 tsf ● ⊗ 10 20 30 40 50 %N	
SURFACE ELEVATION							
1	SS			Driller reported 12" Concrete			
2	SS			Fine to Coarse Sand Fill-Trace to Some Silt & Gravel Dark Brown Moist-Dense (SP-Fill)			
3	SS			Fine to Coarse Sand-Trace Gravel			
4	SS		10	Light Brown-Moist-Medium Dense (SP)			
5	SS			Fine to Medium Sand-Trace Gravel			
6	SS		20	Light Brown-Moist to Wet-Medium Dense to Dense (SP) NOTE: Sample 6 Had a Chemical Odor			
7	SS			Fine to Coarse Sand-Trace to Some Gravel-Brown-Wet-Medium Dense (SW)			
8	SS		30				
9	SS						
10	SS		40	Fine Sandy Silt-Gray-Saturated-Medium Dense (ML)			
11	SS						
12	SS		50	Silty Clay-Trace Sand & Gravel-Gray-Hard (CL)			
				End of Boring NOTE: 50' of Hollow Stem Auger Used			

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual		MINERAL WELL PERMIT NO.	
WATER LEVEL OBSERVATIONS		BORING STARTED	4-14-85
22.5' WHILE SAMPLING OR WHILE DRILLING		BORING COMPLETED	4-14-85
CI @ 9.5' IMMEDIATELY AFTER COMPLETION		RIG: CME 45B DRAWN BY: PT	
AFTER COMPLETION		FOREMAN: ST APPROVED: AS/PL	
		JOB: L8109 SHEET: 1 of 1	
NOTE: Boring backfilled with natural soils unless otherwise noted.			



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LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND	
						⊗ STANDARD PENETRATION, "N" (BLOWS/FT.) ● NATURAL WATER CONTENT, % △ - - - ⊗ ATTERBERG LIMITS P.L.N. U.L.N. ○ UNCONFINED COMPRESSIVE STRENGTH (tsf) * CALIBRATED HAND PENETROMETER STRENGTH (tsf)	SCALE * ○ 1 2 3 4 5 tsf ● ⊗ 10 20 30 40 50 % N
SURFACE ELEVATION							
1	SS			Driller Reported 12" Concrete Fine to Medium Sand Fill-Trace Silt & Gravel-Brown-Moist-Very Dense (SP-Fill)			
2	SS			Fine to Coarse Sand Fill-Trace to Some Black Cinders-Black-Moist- Dense (SP-Fill)			
3	SS						
4	SS		10				
5	SS			Fine to Coarse Sand -Trace Silt & Gravel-Brown-Moist to Wet-Medium Dense to Loose (SP)			
6	SS		20	NOTE: Sample 6 had a chemical Odor.			
7	SS						
8	SS		30	Silty Fine to Coarse Sand-Trace to Some Gravel-Brown-Wet-Medium to Dense (SM-GM)			
9	SS						
10	SS		40	Fine Sandy Silt-Gray-Saturated- Medium Dense (ML)			
11	SS			Silty Clay-Trace Sand & Gravel- Gray-Very Stiff (CL)			
12	SS		50½	Trace to Some Sand-Trace Gravel- Gray-Hard-Silty Clay (CL)			
END OF BORING							
NOTE: 50' of Hollow Stem Auger Used.							

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.		MINERAL WELL 335-832-141 PERMIT NO.	
WATER LEVEL OBSERVATIONS		BORING STARTED 4-14-85	
18' WHILE SAMPLING OR WHILE DRILLING - IMMEDIATELY AFTER COMPLETION CI @ 8' AFTER COMPLETION		BORING COMPLETED 4-14-85	
		RIG: CME 45B DRAWN BY: PT FOREMAN: ST APPROVED: AS/PL JOB: L8109 SHEET: 1 of 1	
NOTE: Boring backfilled with natural soils unless otherwise noted.			


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LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND						
						STANDARD PENETRATION, "N" (BLOWS/FT.) NATURAL WATER CONTENT, % ATTERBERG LIMITS UNCONFINED COMPRESSIVE STRENGTH (tsf) CALIBRATED HAND PENETROMETER STRENGTH (tsf)						
						SCALE * O O 1 2 3 4 5 tsf ● ⊗ 10 20 30 40 50 %N						
				SURFACE ELEVATION								
				Driller Reported 11" Concrete								
1	SS			Fine Sand-Fill-Light Brown-Moist- Very Loose (SP-Fill)		⊗						
			9	Driller Reported Concrete With Reinforcing Steel								
				END OF BORING								
				Boring Offset and redrilled - See Boring 208A								
				NOTE: 10' of Hollow Stem Auger Used.								

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.				MINERAL WELL PERMIT NO.	
WATER LEVEL OBSERVATIONS				BORING STARTED 4-14-85	
None WHILE SAMPLING OR WHILE DRILLING				BORING COMPLETED 4-14-85	
None IMMEDIATELY AFTER COMPLETION				RIG: DRAWN BY: PT	
None AFTER COMPLETION				FOREMAN: APPROVED: AS/PL	
				JOB: L8109 SHEET: 1 of 1	
NOTE: Boring backfilled with natural soils unless otherwise noted.					


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LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			
SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. ³	LEGEND	
						STANDARD PENETRATION, "N" BLOWS/FT. NATURAL WATER CONTENT, % ATTERBERG LIMITS UNCONFINED COMPRESSIVE STRENGTH (psi) CALIBRATED HAND PENETROMETER STRENGTH (psi)	PLU CLN
SURFACE ELEVATION					SCALE		
					1 2 3 4 5 tsf 10 20 30 40 50 % N		
				Driller Reported 11" of Concrete			
1	SS			Fine to Medium Sand Fill-Trace Silt, Gravel & Cinders-Brown- Moist-Very Loose- (SP-Fill)			
2	SS		10	Fine to Medium Sand-Trace Silt & Gravel-Brown-Moist-Very Loose (SP)			
3	SS						
4	SS		20	Fine to Coarse Sand-Trace to Some Gravel-Trace Silt-Brown- Moist to Wet-Medium Dense to Loose (SW)			
5	SS						
6	SS		30				
7	SS						
8	SS		40				125
9	SS			Fine Sandy Silt With Occasional Silty Clay Layers-Gray-Medium Dense (ML)			
10	SS		50				
11	SS			Silty Clay-Trace Sand-With Oc- casional Silt Layers-Gray- Medium (CL)			
12	SS		60				
13	SS						
14	SS		70	Silty Clay-Trace to Some Sand- Trace Gravel-Gray-Stiff to Very Stiff (CL)			

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OWNER GENERAL MOTORS CORPORATION-CPC GROUP				ARCHITECT / ENGINEER ALBERT KAHN ASSOCIATES, INC.			
LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND	
						(X) STANDARD PENETRATION, "N" (BLOWS/FT.) (●) NATURAL WATER CONTENT, % (Δ) ATTERBERG LIMITS (○) UNCONFINED COMPRESSIVE STRENGTH (tsf) (*) CALIBRATED HAND PENETROMETER STRENGTH (tsf)	P.L.N. U.L.N. SCALE 1 2 3 4 5 tsf 10 20 30 40 50 %N
				CONTINUED FROM PAGE 2 ▼			
15	SS		70	Silty Clay-Trace to Some Sand- Trace Gravel-Gray-Stiff to Very Stiff (CL)			
16	SS		80				
17	SS		85				
18	SS		90				
19	SS		95				
20	SS		100	Fine Sandy Silt-Saturated-Very Dense (ML)			
21	SS		115	Silty Clay-Trace to Some Sand- Trace Weathered Black Shale & Limestone-Gray (CL)			
				END OF BORING NOTE: 40' of Hollow Stem Auger Used. Rotary Drilling Was Performed Below a 40' Depth			

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.		MINERAL WELL PERMIT NO.	
WATER LEVEL OBSERVATIONS		BORING STARTED	4-21-85
22' WHILE SAMPLING OR WHILE DRILLING _____ IMMEDIATELY AFTER COMPLETION _____ AFTER COMPLETION		BORING COMPLETED	4-21-85
		RIG: CME 550 DRAWN BY: PT FOREMAN: GRY APPROVED: AS/PL JOB: L8109 SHEET: 2 of 2	
		NOTE: Boring backfilled with natural soils unless otherwise noted.	

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LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND	
						STANDARD PENETRATION, "N" (BLOWS/FT.) NATURAL WATER CONTENT, % ATTERBERG LIMITS UNCONFINED COMPRESSIVE STRENGTH (tsf) CALIBRATED HAND PENETROMETER STRENGTH (tsf)	SCALE 1 2 3 4 5 tsf 10 20 30 40 50 %N
				SURFACE ELEVATION			
1	SS			Driller Reported 7" of Concrete Fine to Medium Sand Fill-Trace Gravel-Brown-Moist-Medium Dense (SP-Fill)			
2	SS		10	Fine Sand-Light Brown-Moist- Loose (SP)			
3	SS						
4	SS		20	Fine to Coarse Sand-Trace to Some Gravel-Trace Silt-Brown- Moist to Wet-Medium Dense (SW)			
5	SS						
6	SS		30				
7	SS			Silty Fine Sand-Trace to Some Gravel-Brown-Wet-Dense (SM)			
8	SS		40	Fine Sandy Silt-Wet-Gray-Dense (ML)			
9	SS						
10	SS		50	Silty Clay-Trace to Some Sand- Trace Gravel-Very Stiff to Hard (CL)			
11	SS						
12	SS		60				
				END OF BORING	NOTE: 60' of Ho low Stem Auger Used-Wash Boring Performed Below a 30' Depth.		

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.		MINERAL WELL PERMIT NO.	
WATER LEVEL OBSERVATIONS		BORING STARTED 4-14-85	
22' WHILE SAMPLING OR WHILE DRILLING 32' IMMEDIATELY AFTER COMPLETION CI @ 17' AFTER COMPLETION		BORING COMPLETED 4-14-85	
		RIG: CME 550 DRAWN BY: PT FOREMAN: GRY APPROVED: AS/PL JOB: L8109 SHEET: 1 of 1	
		NOTE: Boring backfilled with natural soils unless otherwise noted.	



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LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND					
						STANDARD PENETRATION, "N" (BLOWS/FT.) NATURAL WATER CONTENT, % ATTERBERG LIMITS UNCONFINED COMPRESSIVE STRENGTH (147) CALIBRATED HAND PENETROMETER STRENGTH (147)					
						SCALE					
				SURFACE ELEVATION		* ○ 1 2 3 4 5 1st ● ⊗ 10 20 30 40 50 %N					
				Driller Noted 12" Concrete							
1	SS			Fine Sand Fill-Trace Medium Sand- Light Brown-Moist-Loose (SP-Fill)							
2	SS		10	Fine to Medium Sand-Trace Silt & Gravel-Brown-Moist-Loose (SP-SM)							
3	SS										
4	SS		20	Fine to Coarse Sand-Trace to Some Gravel-Trace Silt Brown- Moist to Wet-Loose to Medium Dense (SW)							
5	SS										
6	SS		30	NOTE: Samples 5 & 6 had a chemical odor.							
7	SS										
8	SS		40	Silty Fine Sand With Fine Sandy Silt Layers-Gray-Saturated- Dense (SM-ML)							
9	SS										
10	SS		50	Silty Clay-Trace to Some Sand- Trace Gravel-With Occasional Silt Seams-Gray-Stiff to Very Stiff (CL)							
11	SS										
12	SS		60								
				END OF BORING							
				NOTE: 60' of Hollow Stem Auger Used							

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.		MINERAL WELL PERMIT NO.	
WATER LEVEL OBSERVATIONS		BORING STARTED	4-21-85
22.2' WHILE SAMPLING OR WHILE DRILLING _____ IMMEDIATELY AFTER COMPLETION _____ AFTER COMPLETION		BORING COMPLETED	4-21-85
		RIG: Acker DRAWN BY: PT FOREMAN: Heff APPROVED: AS/PL JOB: L8109 SHEET:	
		NOTE: Boring backfilled with natural soils unless otherwise noted.	

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LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND	
						(X) STANDARD PENETRATION, "N" BLOWS/FT (●) NATURAL WATER CONTENT, % (Δ) - (●) - (X) ATTERBERG LIMITS (○) UNCONFINED COMPRESSIVE STRENGTH, (psi) (*) CALIBRATED HAND PENETROMETER STRENGTH, (psi)	SCALE
						1 2 3 4 5 (psi) 10 20 30 40 50 % N	
1	SS			Fine to Medium Sand-Trace Gravel-Moist-Brown-Loose (SP) - Possible Fill		(X)	
2	SS					(X)	
3	SS					(X)	
4	SS		10			(X)	
5	SS			Fine to Coarse Sand-Some Gravel-Trace Silt-Moist-Brown-Medium Dense (SW)		(X)	
6	SS		20			(X)	
7	SS					(X)	
8	SS		30			(X)	
9	SS			Fine to Medium Sand-Wet- Brown-Medium Dense (SP)		(X)	
10	SS		40			(X)	
11	SS			Fine Sand-Trace Silt & Clay-Wet-Gray- Dense (SP-SC)			(X)
12	SS		50	Silty Clay-Trace Sand-Gray-Very Stiff to Hard (CL)		(X)	
13	SS					(●)	(*)
14	SS		60			(●)	(*)
				END OF BORING			
				30' of hollow stem auger was used			

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.		MINERAL WELL PERMIT NO.	
WATER LEVEL OBSERVATIONS		BORING STARTED	3/31/85
23' _____ WHILE SAMPLING OR WHILE DRILLING _____ IMMEDIATELY AFTER COMPLETION _____ AFTER COMPLETION Drilling water used below 30'		BORING COMPLETED	"
		RIG: SD	DRAWN BY: PT
		FOREMAN: Heff	APPROVED: AMS/GH
		JOB: L8109	SHEET: 1 of 1
NOTE: Boring backfilled with natural soils unless otherwise noted.			


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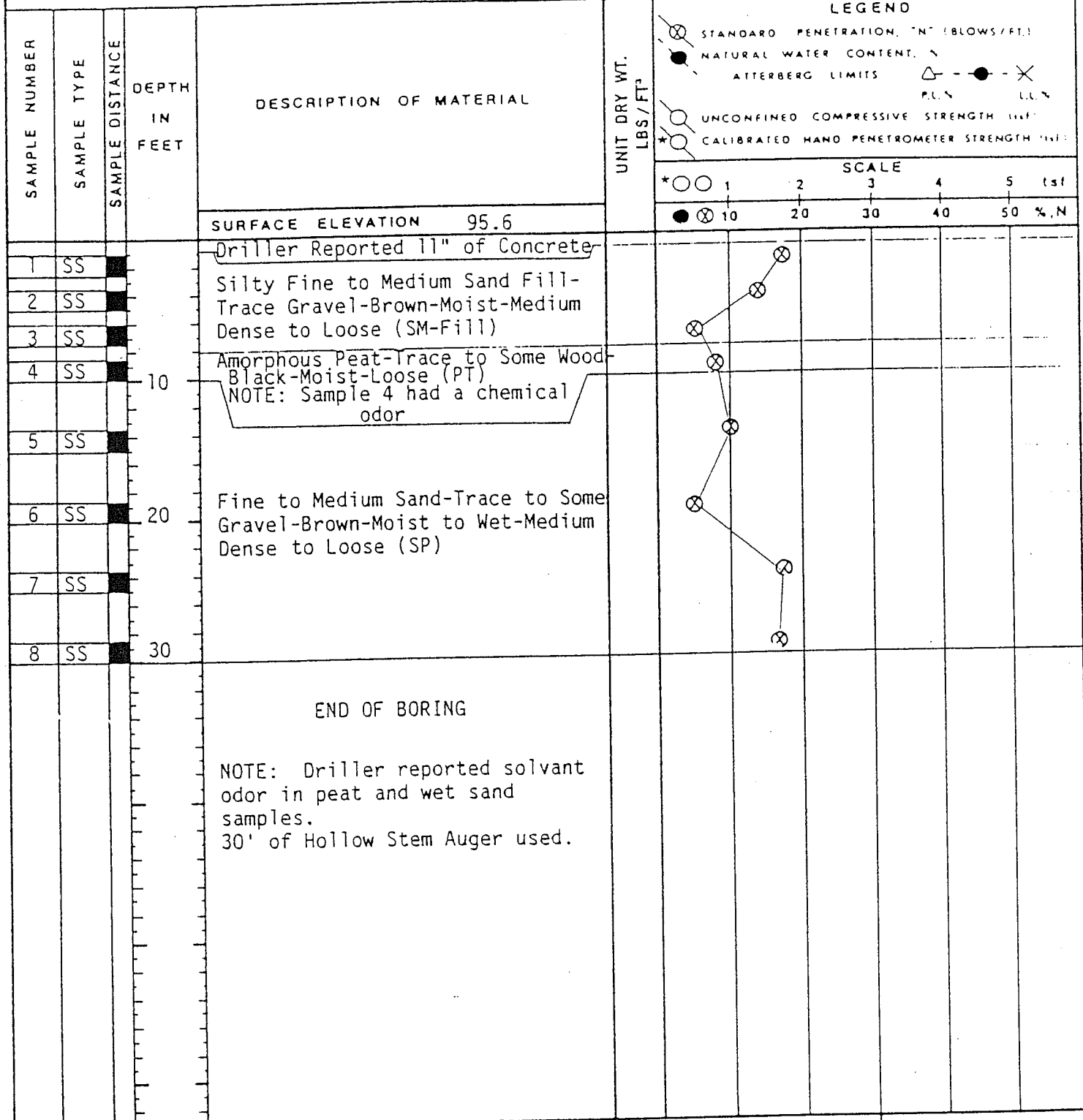
OWNER GENERAL MOTORS CORPORATION-CPC GROUP				ARCHITECT / ENGINEER ALBERT KAHN ASSOCIATES, INC.			
LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND					
						STANDARD PENETRATION, "N" (BLOWS/FT.) NATURAL WATER CONTENT, % ATTERBERG LIMITS P.L.N. U.L.N. UNCONFINED COMPRESSIVE STRENGTH (14F) CALIBRATED HAND PENETROMETER STRENGTH (14F)					
						SCALE * 1 2 3 4 5 (sf) 10 20 30 40 50 % N					
CONTINUED FROM PAGE 1											
			70	Silty Clay-Trace Sand & Gravel- Gray-Hard (CL)							
15	SS										
16	SS		80								
17	SS										
18	SS		90	Fine Sand-Trace Silt-Gray-Wet- Very Dense (SP)							
19	SS										
20	SS		100	Medium to Coarse Sand With Gravel-Gray -Wet-Dense (SW)							
END OF BORING											
NOTE: 35' of Hollow Stem Auger Used. Rotary Drilling per- formed Below a 35' depth.											

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.		MINERAL WELL PERMIT NO.	
WATER LEVEL OBSERVATIONS		BORING STARTED 4-14-85	
22' WHILE SAMPLING OR WHILE DRILLING None IMMEDIATELY AFTER COMPLETION _____ AFTER COMPLETION		BORING COMPLETED 4-14-85	
		RIG: Acker DRAWN BY: PT FOREMAN: Heff APPROVED: AS/TM JOB: L8109 SHEET: 2 of 2	
		NOTE: Boring backfilled with nat- ural soils unless otherwise noted.	


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LOCATION GRAND RAPIDS, MICHIGAN	PROJECT NAME PLANT MODERNIZATION PROGRAM



NOTE: The indicated stratification lines are approximate.
 In situ, the transition between materials may be gradual.

MINERAL WELL
 PERMIT NO.

WATER LEVEL OBSERVATIONS

17' WHILE SAMPLING OR WHILE DRILLING
 15' IMMEDIATELY AFTER COMPLETION
 AFTER COMPLETION

WCI @ 13'

BORING STARTED 4-11-85
 BORING COMPLETED 4-11-85
 RIG: CME 550 DRAWN BY: PT
 FOREMAN: GRY APPROVED: AS/PL
 JOB: L8109 SHEET: 1 of 1

NOTE: Boring backfilled with natural soils unless otherwise noted.

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OWNER GENERAL MOTORS CORPORATION-CPC GROUP			ARCHITECT / ENGINEER ALBERT KAHN ASSOCIATES, INC.									
LOCATION GRAND RAPIDS, MICHIGAN			PROJECT NAME PLANT MODERNIZATION PROGRAM									
SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS / FT ³	LEGEND						
						STANDARD PENETRATION, "N" (BLOWS / FT.) NATURAL WATER CONTENT, % ATTERBERG LIMITS UNCONFINED COMPRESSIVE STRENGTH (TSF) CALIBRATED HAND PENETROMETER STRENGTH (HPS)						
						SCALE						
						* 1 2 3 4 5 tsf 10 20 30 40 50 % N						
1	SS			Driller Reported 9 1/2" of Concrete								
2	SS			Silty Fine to Coarse Sand Fill-Trace to Some Gravel-Dark Gray								
3	SS			Turning Brown @ 4'-Moist-Dense to Medium Dense (SM-Fill)								
4	SS		10	Driller Reported 12" Concrete See Note A								216
5	SS			Amorphous Peat-Trace Wood Fibers-Black-Moist-Loose (PT)								
6	SS		20	Fine to Medium Sand-Trace Silt & Gravel-Brown-Wet-Loose to Medium Dense (SP)								
7	SS											
8	SS		30									
END OF BORING												
Note A: Fine to Medium Sand Fill-Trace Silt & Gravel-Brown-Moist-Very Loose (SP-Fill)												
NOTE: 30' of Hollow Stem Auger Used												
NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.						MINERAL WELL PERMIT NO.						
WATER LEVEL OBSERVATIONS						BORING STARTED 4-11-85						
						BORING COMPLETED 4-11-85						
16' WHILE SAMPLING OR WHILE DRILLING						RIG: CME 45 B DRAWN BY: PT						
9.7' IMMEDIATELY AFTER COMPLETION						FOREMAN: ST APPROVED: AS/PL						
						JOB: L8109 SHEET: 1 of 1						
						NOTE: Boring backfilled with natural soils, unless otherwise noted.						

OWNER GENERAL MOTORS CORPORATION-CPC GROUP				ARCHITECT/ENGINEER ALBERT KAHN ASSOCIATES, INC.			
LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND	
						STANDARD PENETRATION, "N" (BLOWS/FT.)	NATURAL WATER CONTENT, % ATTERBERG LIMITS
						UNCONFINED COMPRESSIVE STRENGTH (LBS/IN ²) CALIBRATED HAND PENETROMETER STRENGTH (LBS)	
						SCALE * O O 1 2 3 4 5 1st ● ⊗ 10 20 30 40 50 %N	
SURFACE ELEVATION 96.2							
Driller Reported 9" of Concrete							
1	SS			Fine to Medium Sand fill-Trace to Some Silt-Brown-Moist-Medium Dense to Very Loose (SM-Fill)		⊗	
2	SS					⊗	
3	SS					⊗	
4	SS		10	Fine to Medium Sand-Trace Gravel With Occasional Peat Layers-Gray-Wet-Very Loose (SP)		⊗	
5	SS					⊗	
6	SS		20	Fine to Coarse Sand-Trace to Some Gravel-Brown-Wet-Loose to Medium Dense (SW)		⊗	
7	SS					⊗	
8	SS		30			⊗	
9	SS					⊗	
10	SS		40	Fine Sand-Trace Silt-Brown-Wet-Dense (SP)		⊗	
END OF BORING							
NOTE: 40' of Hollow Stem Auger Used.							

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.		MINERAL WELL PERMIT NO.	
WATER LEVEL OBSERVATIONS		BORING STARTED	4-11-85
17' WHILE SAMPLING OR WHILE DRILLING 20' IMMEDIATELY AFTER COMPLETION CI @ 10' AFTER COMPLETION		BORING COMPLETED	4-11-85
		RIG: CME 550	DRAWN BY: PT
		FOREMAN: GRY	APPROVED: AS/PL
		JOB: L8109	SHEET: 1 of 1
NOTE: Boring backfilled with natural soils unless otherwise noted.			

OWNER GENERAL MOTORS CORPORATION-CPC GROUP				ARCHITECT / ENGINEER ALBERT KAHN ASSOCIATES, INC.			
LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND	
						STANDARD PENETRATION, "N" BLOWS/FT.	NATURAL WATER CONTENT, %
						ATTERBERG LIMITS Δ --- $\bullet$ --- $\times$ P.L.N. LL.N. UNCONFINED COMPRESSIVE STRENGTH (psi) CALIBRATED HAND PENETROMETER STRENGTH (1/4")	
SURFACE ELEVATION 93.4						SCALE * $\circ$ $\circ$ 1 2 3 4 5 (psi) $\bullet$ $\times$ 10 20 30 40 50 % N	
1	SS			Driller Reported 3" of Asphalt			
2	SS			Fine-Medium Sand Fill-Trace			
3	SS			Silt & Gravel-Brown-Moist-			
4	SS		10	Medium Dense to Loose (SP-Fill)			
5	SS			Fine to Medium Sand-Trace Silt			
6	SS		20	& Gravel-Brown-Moist to Wet-			
7	SS			Loose to Medium Dense (SP)			
8	SS		30	Silty Fine Sand-Brown-Wet-			
9	SS			Medium Dense to Dense (SM)			
10	SS.		40				
11	SS						
12	SS		50	Fine to Coarse Sand-Trace to			
13	SS			Some Gravel-Brown-Wet-Medium			
14	SS		60	Dense to Loose (SW)			

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OWNER GENERAL MOTORS CORPORATION-CPC GROUP				ARCHITECT / ENGINEER ALBERT KAHN ASSOCIATES, INC.			
LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND					
						STANDARD PENETRATION, "N" (BLOWS/FT.) NATURAL WATER CONTENT, % ATTERBERG LIMITS P.L. % L.L. % UNCONFINED COMPRESSIVE STRENGTH (tsf) CALIBRATED HAND PENETROMETER STRENGTH (tsf)					
						SCALE					
						1	2	3	4	5	tsf
						10	20	30	40	50	% N
CONTINUED FROM PAGE 1											
			60								
14	SS										
15	SS		70								
END OF BORING											
NOTE: 55' of Hollow Stem Auger Used. Rotary Drilling was performed below a 55' depth.											

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.				MINERAL WELL PERMIT NO.			
WATER LEVEL OBSERVATIONS				BORING STARTED		4-11-85	
				BORING COMPLETED		4-11-85	
14.5' WHILE SAMPLING OR WHILE DRILLING 15' IMMEDIATELY AFTER COMPLETION _____ AFTER COMPLETION				RIG: CME 550		DRAWN BY: PT	
				FOREMAN: GRY		APPROVED: AS/PL	
				JOB: L8109		SHEET: 2 of 2	
CT @ 15'				NOTE: Boring backfilled with natural soils unless otherwise noted.			

OWNER GENERAL MOTORS CORPORATION-CPC GROUP	ARCHITECT / ENGINEER ALBERT KAHN ASSOCIATES, INC.
LOCATION GRAND RAPIDS, MICHIGAN	PROJECT NAME PLANT MODERNIZATION PROGRAM

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. ³	LEGEND	
						⊗ STANDARD PENETRATION, "NT" (BLOWS/FT.) ● NATURAL WATER CONTENT, % △ -- ● -- X PL% LL% ○ UNCONFINED COMPRESSIVE STRENGTH (ksf) * CALIBRATED HAND PENETROMETER STRENGTH (lbf)	SCALE
				SURFACE ELEVATION 96.5			* ○ 1 2 3 4 5 tsf ● ⊗ 10 20 30 40 50 %N
1	SS			Driller Reported 8 1/2" of Concrete			
2	SS			Fine to Medium Sand fill-Trace to Some Silt-Trace Gravel-Brown-Moist-Loose to Medium Dense (SM-Fill)			
3	SS						
4	SS		10	Mixed Sand & Cinder Fill-Gray-Moist-Loose (SP-Fill)			
5	SS			Amorphous Peat-Trace to Some Roots-Black-Loose (PT)			349
6	SS		20				
7	SS						
8	SS		30	Fine to Medium Sand-Trace Silt-Brown-Wet-Loose to Medium Dense (SP)			
9	SS						
10	SS		40 1/2				
				END OF BORING			
				NOTE: 40' of Hollow Stem Auger Used.			

NOTE: The indicated stratification lines are approximate.
In situ, the transition between materials may be gradual.

MINERAL WELL 335-832-141
PERMIT NO.

WATER LEVEL OBSERVATIONS

BORING STARTED 4-11-85
BORING COMPLETED 4-11-85

18 1/2' WHILE SAMPLING OR WHILE DRILLING
11' 8" IMMEDIATELY AFTER COMPLETION
CI @ 11' 8" AFTER COMPLETION

RIG: CME 45 BOROWN BY: PT
FOREMAN: ST APPROVED: AS./PL
JOB: L8109 SHEET: 1 of 1

NOTE: Boring backfilled with natural soils unless otherwise noted.



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LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM					
SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND			
						STANDARD PENETRATION, "N" (BLOWS/FT.) NATURAL WATER CONTENT, % ATTERBERG LIMITS UNCONFINED COMPRESSIVE STRENGTH (tsf) CALIBRATED HAND PENETROMETER STRENGTH (tsf)			
						SCALE			
						* 1 2 3 4 5 tsf			
						● ⊗ 10 20 30 40 50 %N			
SURFACE ELEVATION 96.8									
1	SS			Driller Reported 7" of Concrete					
2	SS			Silty Fine Sand Fill-Trace to					
3	SS			Some Cinders-Trace Gravel-Dark					
4	SS		10	Gray-Moist-Medium Dense (SM-Fill)					
5	SS			Silty Fine to Medium Sand Fill-					
				Trace Gravel Brown-Moist-Medium					
				Dense (SP-SM-Fill)					
6	SS		20	Fine to Medium Sand-Trace Silt-					
				Brown-Moist-Loose to Very Loose					
				(SP)					
7	SS			Fine to Medium Sand-Brown-Wet-					
				Loose to Medium Dense (SP)					
8	SS		30	Fine to Coarse Sand-Trace to					
				Some Gravel-Brown-Wet-Dense to					
				Medium Dense (SW)					
9	SS								
10	SS		40	Fine Sand-Trace Silt-Brown-Wet-					
				Medium Dense (SP)					
11	SS								
12	SS		50	Fine to Coarse Sand-Trace to Some					
				Gravel-Seams of Very Fine Sand-					
				Brown-Wet-Medium Dense to Loose					
				(SP)					
13	SS								
14	SS		60						

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CONTINUED ON PAGE 2

OWNER GENERAL MOTORS CORPORATION-CPC GROUP				ARCHITECT / ENGINEER ALBERT KAHN ASSOCIATES, INC.			
LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND								
						STANDARD PENETRATION, "N" (BLOWS/FT.) NATURAL WATER CONTENT, % ATTERBERG LIMITS UNCONFINED COMPRESSIVE STRENGTH (KSI) CALIBRATED HAND PENETROMETER STRENGTH (LBS)								
						SCALE								
						1	2	3	4	5	1st			
						10	20	30	40	50	%N			
SURFACE ELEVATION 96.8 CONTINUED FROM PAGE 1 ▼														
15	SS		60	Fine to Coarse Sand-Trace to Some Gravel-Seams of Very Fine Sand-Brown-Wet-Medium Dense to Loose (SP)										
16	SS		70	Fine Sand-Trace to Some Medium Sand-Brown-Wet-Medium Dense (SP)										
17	SS			Fine to Coarse Sand-Trace to Some Gravel-Seams of Fine Sand-Brown-Wet-Loose (SW)										
18	SS		80	Silty Clay-Trace Sand & Fine Gravel-Gray (CL)										
				Clayey Fine to Coarse Sand-Trace Gravel-Gray-Saturated (SC)										
19	SS		90											
END OF BORING NOTE: Driller lost mud circulation at 81' borehole collapsed-Borehole redrilled. Lost mud again plus 8 bags Bentonite. 25' of Hollow Stem Auger Used. Rotary Drilling Performed Below a 25'Depth.														

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.		MINERAL WELL 335-832-141 PERMIT NO.	
WATER LEVEL OBSERVATIONS		BORING STARTED 4-12-85	
18' WHILE SAMPLING OR WHILE DRILLING None IMMEDIATELY AFTER COMPLETION AFTER COMPLETION		BORING COMPLETED 4-12-85	
		RIG: Acker DRAWN BY: PT FOREMAN: Heff APPROVED: AS/TM JOB: L8109 SHEET: 2 of 2	
		NOTE: Boring backfilled with natural soils unless otherwise noted.	


 soil and materials engineers, inc.

OWNER GENERAL MOTORS CORPORATION-CPC GROUP				ARCHITECT / ENGINEER ALBERT KAHN ASSOCIATES, INC.			
LOCATION GRAND RAPIDS, MICHIGAN				PROJECT NAME PLANT MODERNIZATION PROGRAM			

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE	DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT ³	LEGEND						
						STANDARD PENETRATION, "N" (BLOWS/FT.) NATURAL WATER CONTENT, % ATTERBERG LIMITS UNCONFINED COMPRESSIVE STRENGTH (LBS/IN ²) CALIBRATED HAND PENETROMETER STRENGTH (LBS)						
						SCALE						
						* ○ 1 2 3 4 5 (LBS) ● ⊗ 10 20 30 40 50 % N						
				SURFACE ELEVATION 96.5								
1	SS			Driller Reported 8" of Concrete								
2	SS			Fine to Medium Sand Fill-Trace to Some Silt-Trace Gravel-Dark Brown-Moist-Medium Dense to Loose (SM-Fill)								
3	SS											
4	SS		10									
5	SS			Fine to Medium Sand-Trace Silt-Brown-Moist to Wet-Loose (SP)								
6	SS		20									
7	SS			Fine to Coarse Sand-Trace Silt & Gravel-Brown-Wet-Loose (SW)								
8	SS		30									
9	SS			Fine Sand-Trace Silt-Brown-Wet-Loose to Medium Dense (SP)								
10	SS		40									
				END OF BORING								
				NOTE: 40' of Hollow Stem Auger Used.								

NOTE: The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.		MINERAL WELL 335-832-141 PERMIT NO.	
WATER LEVEL OBSERVATIONS		BORING STARTED 4-11-85	
18' WHILE SAMPLING OR WHILE DRILLING 15' IMMEDIATELY AFTER COMPLETION _____ AFTER COMPLETION		BORING COMPLETED 4-11-85	
CI @ 15'		RIG: CME 550 DRAWN BY: PT FOREMAN: GRY APPROVED: AS/PL JOB: L8109 SHEET: 1 of 1	
		NOTE: Boring backfilled with nat- ural soils unless otherwise noted.	


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APPENDIX B

ANALYTICAL RESULTS FOR
VOLATILE ORGANIC COMPOUNDS

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
SAMPLE: 85-1

DATE SAMPLED: 12/06/85 TIME: 2:30 PM
DATE RECEIVED: 12/09/85 TIME: 7:00 AM
DATE COMPLETED: 12/16/85

SAMPLE NO. 58324

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
BENZENE	*	0.001	TRANS-1,2-DICHLOROETHYLENE	0.012	0.002
BROMODICHLOROMETHANE	*	0.002	1,2-DICHLOROPROPANE	*	0.003
BROMOFORM	*	0.015	CIS-1,3-DICHLOROPROPYLENE	*	0.004
BROMOMETHANE	*	0.010	TRANS-1,3-DICHLOROPROPYLENE	*	0.004
CARBON TETRACHLORIDE	*	0.004	ETHYL BENZENE	*	0.001
CHLOROBENZENE	*	0.001	METHYLENE CHLORIDE	*	0.002
CHLORODIBROMOMETHANE	*	0.003	1,1,2,2-TETRACHLOROETHANE	*	0.002
CHLOROETHANE	*	0.010	TETRACHLOROETHYLENE	*	0.002
2-CHLOROETHYL VINYL ETHER	*	0.010	TOLUENE	*	0.001
CHLOROFORM	*	0.001	1,1,1-TRICHLOROETHANE	*	0.002
CHLOROMETHANE	*	0.010	1,1,2-TRICHLOROETHANE	*	0.003
1,1-DICHLOROETHANE	*	0.002	TRICHLOROETHYLENE	*	0.002
1,2-DICHLOROETHANE	*	0.002	TRICHLOROFLUOROMETHANE	*	0.003
1,1-DICHLOROETHYLENE	*	0.002	VINYL CHLORIDE	*	0.010

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
SAMPLE: 85-3

DATE SAMPLED: 12/06/85 TIME: 12:10 PM
DATE RECEIVED: 12/09/85 TIME: 7:00 AM
DATE COMPLETED: 12/16/85

SAMPLE NO. 58326

COMPOUND	RESULT D.L. (mg/l)	COMPOUND	RESULT D.L. (mg/l)
BENZENE	* 0.001	TRANS-1,2-DICHLOROETHYLENE	* 0.002
BROMODICHLOROMETHANE	* 0.002	1,2-DICHLOROPROPANE	* 0.003
BROMOFORM	* 0.015	CIS-1,3-DICHLOROPROPYLENE	* 0.004
BROMOMETHANE	* 0.010	TRANS-1,3-DICHLOROPROPYLENE	* 0.004
CARBON TETRACHLORIDE	* 0.004	ETHYL BENZENE	* 0.001
CHLOROBENZENE	* 0.001	METHYLENE CHLORIDE	* 0.002
CHLORODIBROMOMETHANE	* 0.003	1,1,2,2-TETRACHLOROETHANE	* 0.002
CHLOROETHANE	* 0.010	TETRACHLOROETHYLENE	* 0.002
2-CHLOROETHYL VINYL ETHER	* 0.010	TOLUENE	0.003 0.001
CHLOROFORM	* 0.001	1,1,1-TRICHLOROETHANE	* 0.002
CHLOROMETHANE	* 0.010	1,1,2-TRICHLOROETHANE	* 0.003
1,1-DICHLOROETHANE	* 0.002	TRICHLOROETHYLENE	* 0.002
1,2-DICHLOROETHANE	* 0.002	TRICHLOROFLUOROMETHANE	* 0.003
1,1-DICHLOROETHYLENE	* 0.002	VINYL CHLORIDE	* 0.010

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
SAMPLE: 85-4

DATE SAMPLED: 12/06/85 TIME: 10:50 AM
DATE RECEIVED: 12/09/85 TIME: 7:00 AM
DATE COMPLETED: 12/17/85

SAMPLE NO. 58327

COMPOUND	RESULT	D.L.	COMPOUND	RESULT	D.L.
	(mg/l)			(mg/l)	
BENZENE	*	0.001	TRANS-1,2-DICHLOROETHYLENE	*	0.002
BROMODICHLOROMETHANE	*	0.002	1,2-DICHLOROPROPANE	*	0.003
BROMOFORM	*	0.015	CIS-1,3-DICHLOROPROPYLENE	*	0.004
BROMOMETHANE	*	0.010	TRANS-1,3-DICHLOROPROPYLENE	*	0.004
CARBON TETRACHLORIDE	*	0.004	ETHYL BENZENE	*	0.001
CHLOROBENZENE	*	0.001	METHYLENE CHLORIDE	*	0.002
CHLORODIBROMOMETHANE	*	0.003	1,1,2,2-TETRACHLOROETHANE	*	0.002
CHLOROETHANE	*	0.010	TETRACHLOROETHYLENE	0.002	0.002
2-CHLOROETHYL VINYL ETHER	*	0.010	TOLUENE	*	0.001
CHLOROFORM	*	0.001	1,1,1-TRICHLOROETHANE	0.005	0.002
CHLOROMETHANE	*	0.010	1,1,2-TRICHLOROETHANE	*	0.003
1,1-DICHLOROETHANE	0.002	0.002	TRICHLOROETHYLENE	0.002	0.002
1,2-DICHLOROETHANE	*	0.002	TRICHLOROFUOROMETHANE	*	0.003
1,1-DICHLOROETHYLENE	*	0.002	VINYL CHLORIDE	*	0.010

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
SAMPLE: 85-5B

DATE SAMPLED: 12/06/85 TIME: 11:30 AM
DATE RECEIVED: 12/09/85 TIME: 7:00 AM
DATE COMPLETED: 12/17/85

SAMPLE NO. 58328

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
BENZENE	*	0.001	TRANS-1,2-DICHLOROETHYLENE	0.012	0.002
BROMODICHLOROMETHANE	*	0.002	1,2-DICHLOROPROPANE	*	0.003
BROMOFORM	*	0.015	CIS-1,3-DICHLOROPROPYLENE	*	0.004
BROMOMETHANE	*	0.010	TRANS-1,3-DICHLOROPROPYLENE	*	0.004
CARBON TETRACHLORIDE	*	0.004	ETHYL BENZENE	*	0.001
CHLOROBENZENE	*	0.001	METHYLENE CHLORIDE	*	0.002
CHLORODIBROMOMETHANE	*	0.003	1,1,2,2-TETRACHLOROETHANE	*	0.002
CHLOROETHANE	*	0.010	TETRACHLOROETHYLENE	0.002	0.002
2-CHLOROETHYL VINYL ETHER	*	0.010	TOLUENE	*	0.001
CHLOROFORM	*	0.001	1,1,1-TRICHLOROETHANE	0.003	0.002
CHLOROMETHANE	*	0.010	1,1,2-TRICHLOROETHANE	*	0.003
1,1-DICHLOROETHANE	0.006	0.002	TRICHLOROETHYLENE	0.004	0.002
1,2-DICHLOROETHANE	*	0.002	TRICHLOROFLUOROMETHANE	*	0.003
1,1-DICHLOROETHYLENE	*	0.002	VINYL CHLORIDE	*	0.010

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
SAMPLE: 85-6

DATE SAMPLED: 12/06/85 TIME: 3:25 PM
DATE RECEIVED: 12/09/85 TIME: 7:00 AM
DATE COMPLETED: 12/16/85

SAMPLE NO. 58329

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
BENZENE	*	0.001	TRANS-1,2-DICHLOROETHYLENE	*	0.002
BROMODICHLOROMETHANE	*	0.002	1,2-DICHLOROPROPANE	*	0.003
BROMOFORM	*	0.015	CIS-1,3-DICHLOROPROPYLENE	*	0.004
BROMOMETHANE	*	0.010	TRANS-1,3-DICHLOROPROPYLENE	*	0.004
CARBON TETRACHLORIDE	*	0.004	ETHYL BENZENE	*	0.001
CHLOROBENZENE	*	0.001	METHYLENE CHLORIDE	*	0.002
CHLORODIBROMOMETHANE	*	0.003	1,1,2,2-TETRACHLOROETHANE	*	0.002
CHLOROETHANE	*	0.010	TETRACHLOROETHYLENE	0.004	0.002
2-CHLOROETHYL VINYL ETHER	*	0.010	TOLUENE	*	0.001
CHLOROFORM	*	0.001	1,1,1-TRICHLOROETHANE	*	0.002
CHLOROMETHANE	*	0.010	1,1,2-TRICHLOROETHANE	*	0.003
1,1-DICHLOROETHANE	*	0.002	TRICHLOROETHYLENE	*	0.002
1,2-DICHLOROETHANE	*	0.002	TRICHLOROFLUOROMETHANE	*	0.003
1,1-DICHLOROETHYLENE	*	0.002	VINYL CHLORIDE	*	0.010

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
SAMPLE: 85-7

DATE SAMPLED: 12/06/85 TIME: 3:10 PM
DATE RECEIVED: 12/09/85 TIME: 7:00 AM
DATE COMPLETED: 12/16/85

SAMPLE NO. 58330

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
BENZENE	*	0.001	TRANS-1,2-DICHLOROETHYLENE	0.004	0.002
BROMODICHLOROMETHANE	*	0.002	1,2-DICHLOROPROPANE	*	0.003
BROMOFORM	*	0.015	CIS-1,3-DICHLOROPROPYLENE	*	0.004
BROMOMETHANE	*	0.010	TRANS-1,3-DICHLOROPROPYLENE	*	0.004
CARBON TETRACHLORIDE	*	0.004	ETHYL BENZENE	*	0.001
CHLOROBENZENE	*	0.001	METHYLENE CHLORIDE	*	0.002
CHLORODIBROMOMETHANE	*	0.003	1,1,2,2-TETRACHLOROETHANE	*	0.002
CHLOROETHANE	*	0.010	TETRACHLOROETHYLENE	*	0.002
2-CHLOROETHYL VINYL ETHER	*	0.010	TOLUENE	*	0.001
CHLOROFORM	*	0.001	1,1,1-TRICHLOROETHANE	*	0.002
CHLOROMETHANE	*	0.010	1,1,2-TRICHLOROETHANE	*	0.003
1,1-DICHLOROETHANE	*	0.002	TRICHLOROETHYLENE	0.084	0.002
1,2-DICHLOROETHANE	*	0.002	TRICHLOROFLUOROMETHANE	*	0.003
1,1-DICHLOROETHYLENE	*	0.002	VINYL CHLORIDE	*	0.010

*COMPOUND NOT PRESENT AT DETECTION LIMIT



APPENDIX C
ANALYTICAL RESULTS FOR
BASE NEUTRAL ORGANIC COMPOUNDS

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 2
BASE-NEUTRAL FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
SAMPLE: 85-1

DATE SAMPLED: 12/06/85 TIME: 2:30 PM
DATE RECEIVED: 120985 TIME: 7:00 AM
DATE COMPLETED: 12/19/85

SAMPLE NO. 58324

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
ACENAPHTHENE	*	0.002	3,3'-DICHLOROBENZIDINE	*	0.020
ACENAPHTHYLENE	*	0.001	DIETHYL PHTHALATE	*	0.002
ANTHRACENE	*	0.001	DIMETHYL PHTHALATE	*	0.002
BENZIDINE	*	0.050	2,4-DINITROTOLUENE	*	0.010
BENZO (A) ANTHRACENE	*	0.005	2,6-DINITROTOLUENE	*	0.009
BENZO (K) FLUORANTHENE	*	0.005	DI-N-OCTYLPHTHALATE	*	0.002
BENZO (A) PYRENE	*	0.005	1,2-DIPHENYLHYDRAZINE	*	0.001
BENZO (G,H,I) PERYLENE	*	0.010	FLUORANTHENE	*	0.001
BIS-(2-CHLOROETHYL) ETHER	*	0.004	FLUORENE	*	0.002
BIS(2-CHLOROETHOXY) METHANE	*	0.004	HEXACHLOROBENZENE	*	0.005
BIS(2-CHLOROISOPROPYL) - ETHER	*	0.001	HEXACHLOROBUTADIENE	*	0.005
BIS-(2-ETHYL HEXYL) - PHTHALATE	*	0.002	HEXACHLOROETHANE	*	0.007
4-BROMOPHENYL PHENYL ETHER	*	0.007	HEXACHLOROCYCLOPENTADIENE	*	0.005
BUTYL BENZYL PHTHALATE	*	0.003	INDENO (1,2,3-CD) PYRENE	*	0.010
2-CHLORONAPHTHALENE	*	0.002	ISOPHORONE	*	0.002
4-CHLOROPHENYL PHENYL ETHER	*	0.003	NAPHTHALENE	*	0.001
CHRYSENE	*	0.005	NITROBENZENE	*	0.004
DIBENZO (A,H) ANTHRACENE	*	0.010	N-NITROSODI-N-PROPYLAMINE	*	0.004
DI-N-BUTYL PHTHALATE	*	0.001	N-NITROSODIPHENYLAMINE	*	0.003
1,2-DICHLOROBENZENE	*	0.003	PHENANTHRENE	*	0.001
1,3-DICHLOROBENZENE	*	0.003	PYRENE	*	0.001
1,4-DICHLOROBENZENE	*	0.003	1,2,4-TRICHLOROBENZENE	*	0.003

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 2
BASE-NEUTRAL FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
SAMPLE: 85-2

DATE SAMPLED: 12/06/85 TIME: 2:50 PM
DATE RECEIVED: 120985 TIME: 7:00 AM
DATE COMPLETED: 12/20/85

SAMPLE NO. 58325

COMPOUND	RESULT	D.L.	COMPOUND	RESULT	D.L.
	(mg/l)			(mg/l)	
ACENAPHTHENE	*	0.002	3,3'-DICHLOROBENZIDINE	*	0.020
ACENAPHTHYLENE	*	0.001	DIETHYL PHTHALATE	*	0.002
ANTHRACENE	*	0.001	DIMETHYL PHTHALATE	*	0.002
BENZIDINE	*	0.050	2,4-DINITROTOLUENE	*	0.010
BENZO (A) ANTHRACENE	*	0.005	2,6-DINITROTOLUENE	*	0.009
BENZO (K) FLUORANTHENE	*	0.005	DI-N-OCTYLPHTHALATE	*	0.002
BENZO (A) PYRENE	*	0.005	1,2-DIPHENYLHYDRAZINE	*	0.001
BENZO (G,H,I) PERYLENE	*	0.010	FLUORANTHENE	*	0.001
BIS-(2-CHLOROETHYL) ETHER	*	0.004	FLUORENE	*	0.002
BIS(2-CHLOROETHOXY) METHANE	*	0.004	HEXACHLOROBENZENE	*	0.005
BIS(2-CHLOROISOPROPYL) - ETHER	*	0.001	HEXACHLOROBUTADIENE	*	0.005
BIS-(2-ETHYL HEXYL) - PHTHALATE	*	0.002	HEXACHLOROETHANE	*	0.007
4-BROMOPHENYL PHENYL ETHER	*	0.007	HEXACHLOROCYCLOPENTADIENE	*	0.005
BUTYL BENZYL PHTHALATE	*	0.003	INDENO (1,2,3-CD) PYRENE	*	0.010
2-CHLORONAPHTHALENE	*	0.002	ISOPHORONE	*	0.002
4-CHLOROPHENYL PHENYL ETHER	*	0.003	NAPHTHALENE	*	0.001
CHRYSENE	*	0.005	NITROBENZENE	*	0.004
DIBENZO (A,H) ANTHRACENE	*	0.010	N-NITROSODI-N-PROPYLAMINE	*	0.004
DI-N-BUTYL PHTHALATE	*	0.001	N-NITROSODIPHENYLAMINE	*	0.003
1,2-DICHLOROBENZENE	*	0.003	PHENANTHRENE	*	0.001
1,3-DICHLOROBENZENE	*	0.003	PYRENE	*	0.001
1,4-DICHLOROBENZENE	*	0.003	1,2,4-TRICHLOROBENZENE	*	0.003

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 2
BASE-NEUTRAL FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
SAMPLE: 85-3

DATE SAMPLED: 12/06/85 TIME: 12:10 PM
DATE RECEIVED: 120985 TIME: 7:00 AM
DATE COMPLETED: 12/23/85

SAMPLE NO. 58326

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
ACENAPHTHENE	*	0.20	3,3'-DICHLOROBENZIDINE	*	2.0
ACENAPHTHYLENE	*	0.10	DIETHYL PHTHALATE	*	0.20
ANTHRACENE	*	0.10	DIMETHYL PHTHALATE	*	0.20
BENZIDINE	*	5.0	2,4-DINITROTOLUENE	*	1.0
BENZO (A) ANTHRACENE	*	0.50	2,6-DINITROTOLUENE	*	0.90
BENZO (K) FLUORANTHENE	*	0.50	DI-N-OCTYLPHTHALATE	*	0.20
BENZO (A) PYRENE	*	0.50	1,2-DIPHENYLHYDRAZINE	*	0.10
BENZO (G,H,I) PERYLENE	*	1.0	FLUORANTHENE	0.46	0.10
BIS-(2-CHLOROETHYL) ETHER	*	0.40	FLUORENE	3.2	0.20
BIS(2-CHLOROETHOXY) METHANE	*	0.40	HEXACHLOROBENZENE	*	0.50
BIS(2-CHLOROISOPROPYL) - ETHER	*	0.10	HEXACHLOROBUTADIENE	*	0.50
BIS-(2-ETHYL HEXYL) - PHTHALATE	*	0.20	HEXACHLOROETHANE	*	0.70
4-BROMOPHENYL PHENYL ETHER	*	0.70	HEXACHLOROCYCLOPENTADIENE	*	0.50
BUTYL BENZYL PHTHALATE	*	0.30	INDENO (1,2,3-CD) PYRENE	*	1.0
2-CHLORONAPHTHALENE	*	0.20	ISOPHORONE	*	0.20
4-CHLOROPHENYL PHENYL ETHER	*	0.30	NAPHTHALENE	0.17	0.10
CHRYSENE	*	0.50	NITROBENZENE	*	0.40
DIBENZO (A,H) ANTHRACENE	*	1.0	N-NITROSODI-N-PROPYLAMINE	*	0.004
DI-N-BUTYL PHTHALATE	*	0.10	N-NITROSODIPHENYLAMINE	*	0.40
1,2-DICHLOROBENZENE	*	0.30	PHENANTHRENE	2.8	0.10
1,3-DICHLOROBENZENE	*	0.30	PYRENE	0.56	0.10
1,4-DICHLOROBENZENE	*	0.30	1,2,4-TRICHLOROBENZENE	*	0.30

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 2
BASE-NEUTRAL FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
SAMPLE: 85-4

DATE SAMPLED: 12/06/85 TIME: 10:50 AM
DATE RECEIVED: 120985 TIME: 7:00 AM
DATE COMPLETED: 12/19/85

SAMPLE NO. 58327

COMPOUND	RESULT	D.L.	COMPOUND	RESULT	D.L.
	(mg/l)			(mg/l)	
ACENAPHTHENE	*	0.002	3,3'-DICHLOROBENZIDINE	*	0.020
ACENAPHTHYLENE	*	0.001	DIETHYL PHTHALATE	*	0.002
ANTHRACENE	*	0.001	DIMETHYL PHTHALATE	*	0.002
BENZIDINE	*	0.050	2,4-DINITROTOLUENE	*	0.010
BENZO (A) ANTHRACENE	*	0.005	2,6-DINITROTOLUENE	*	0.009
BENZO (K) FLUORANTHENE	*	0.005	DI-N-OCTYLPHTHALATE	*	0.002
BENZO (A) PYRENE	*	0.005	1,2-DIPHENYLHYDRAZINE	*	0.001
BENZO (G,H,I) PERYLENE	*	0.010	FLUORANTHENE	0.004	0.001
BIS-(2-CHLOROETHYL) ETHER	*	0.004	FLUORENE	*	0.002
BIS(2-CHLOROETHOXY) METHANE	*	0.004	HEXACHLOROBENZENE	*	0.005
BIS(2-CHLOROISOPROPYL) - ETHER	*	0.001	HEXACHLOROBUTADIENE	*	0.005
BIS-(2-ETHYL HEXYL) - PHTHALATE	0.002	0.002	HEXACHLOROETHANE	*	0.007
4-BROMOPHENYL PHENYL ETHER	*	0.007	HEXACHLOROCYCLOPENTADIENE	*	0.005
BUTYL BENZYL PHTHALATE	*	0.003	INDENO (1,2,3-CD) PYRENE	*	0.010
2-CHLORONAPHTHALENE	*	0.002	ISOPHORONE	*	0.002
4-CHLOROPHENYL PHENYL ETHER	*	0.003	NAPHTHALENE	*	0.001
CHRYSENE	*	0.005	NITROBENZENE	*	0.004
DIBENZO (A,H) ANTHRACENE	*	0.010	N-NITROSODI-N-PROPYLAMINE	*	0.004
DI-N-BUTYL PHTHALATE	0.007	0.001	N-NITROSODIPHENYLAMINE	*	0.003
1,2-DICHLOROBENZENE	*	0.003	PHENANTHRENE	0.010	0.001
1,3-DICHLOROBENZENE	*	0.003	PYRENE	0.003	0.001
1,4-DICHLOROBENZENE	*	0.003	1,2,4-TRICHLOROBENZENE	*	0.003

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 2
BASE-NEUTRAL FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
SAMPLE: 85-5B

DATE SAMPLED: 12/06/85 TIME: 11:30 AM
DATE RECEIVED: 12/09/85 TIME: 7:00 AM
DATE COMPLETED: 12/19/85

SAMPLE NO. 58328

COMPOUND	RESULT	D.L.	COMPOUND	RESULT	D.L.
	(mg/l)			(mg/l)	
ACENAPHTHENE	*	0.002	3,3'-DICHLOROBENZIDINE	*	0.020
ACENAPHTHYLENE	*	0.001	DIETHYL PHTHALATE	*	0.002
ANTHRACENE	*	0.001	DIMETHYL PHTHALATE	*	0.002
BENZIDINE	*	0.050	2,4-DINITROTOLUENE	*	0.010
BENZO (A) ANTHRACENE	*	0.005	2,6-DINITROTOLUENE	*	0.009
BENZO (K) FLUORANTHENE	*	0.005	DI-N-OCTYLPHTHALATE	*	0.002
BENZO (A) PYRENE	*	0.005	1,2-DIPHENYLHYDRAZINE	*	0.001
BENZO (G,H,I) PERYLENE	*	0.010	FLUORANTHENE	*	0.001
BIS-(2-CHLOROETHYL) ETHER	*	0.004	FLUORENE	0.004	0.002
BIS(2-CHLOROETHOXY) METHANE	*	0.004	HEXACHLOROBENZENE	*	0.005
BIS(2-CHLOROISOPROPYL) - ETHER	*	0.001	HEXACHLOROBUTADIENE	*	0.005
BIS-(2-ETHYL HEXYL) - PHTHALATE	*	0.002	HEXACHLOROETHANE	*	0.007
4-BROMOPHENYL PHENYL ETHER	*	0.007	HEXACHLOROCYCLOPENTADIENE	*	0.005
BUTYL BENZYL PHTHALATE	*	0.003	INDENO (1,2,3-CD) PYRENE	*	0.010
2-CHLORONAPHTHALENE	*	0.002	ISOPHORONE	*	0.002
4-CHLOROPHENYL PHENYL ETHER	*	0.003	NAPHTHALENE	*	0.001
CHRYSENE	*	0.005	NITROBENZENE	*	0.004
DIBENZO (A,H) ANTHRACENE	*	0.010	N-NITROSODI-N-PROPYLAMINE	*	0.004
DI-N-BUTYL PHTHALATE	*	0.001	N-NITROSODIPHENYLAMINE	*	0.003
1,2-DICHLOROBENZENE	*	0.003	PHENANTHRENE	0.003	0.001
1,3-DICHLOROBENZENE	*	0.003	PYRENE	0.005	0.001
1,4-DICHLOROBENZENE	*	0.003	1,2,4-TRICHLOROBENZENE	*	0.003

*COMPOUND NOT PRESENT AT DETECTION LIMIT

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 2
BASE-NEUTRAL FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
SAMPLE: 85-6

DATE SAMPLED: 12/06/85 TIME: 3:25 PM
DATE RECEIVED: 12/09/85 TIME: 7:00 AM
DATE COMPLETED: 12/19/85

SAMPLE NO. 58329

COMPOUND	RESULT	D.L.	COMPOUND	RESULT	D.L.
	(mg/l)			(mg/l)	
ACENAPHTHENE	*	0.002	3,3'-DICHLOROBENZIDINE	*	0.020
ACENAPHTHYLENE	*	0.001	DIETHYL PHTHALATE	*	0.002
ANTHRACENE	*	0.001	DIMETHYL PHTHALATE	*	0.002
BENZIDINE	*	0.050	2,4-DINITROTOLUENE	*	0.010
BENZO (A) ANTHRACENE	*	0.005	2,6-DINITROTOLUENE	*	0.009
BENZO (K) FLUORANTHENE	*	0.005	DI-N-OCTYLPHTHALATE	*	0.002
BENZO (A) PYRENE	*	0.005	1,2-DIPHENYLHYDRAZINE	*	0.001
BENZO (G,H,I) PERYLENE	*	0.010	FLUORANTHENE	*	0.001
BIS-(2-CHLOROETHYL) ETHER	*	0.004	FLUORENE	*	0.002
BIS(2-CHLOROETHOXY) METHANE	*	0.004	HEXACHLOROBENZENE	*	0.005
BIS(2-CHLOROISOPROPYL)- ETHER	*	0.001	HEXACHLOROBUTADIENE	*	0.005
BIS-(2-ETHYL HEXYL)- PHTHALATE	*	0.002	HEXACHLOROETHANE	*	0.007
4-BROMOPHENYL PHENYL ETHER	*	0.007	HEXACHLOROCYCLOPENTADIENE	*	0.005
BUTYL BENZYL PHTHALATE	*	0.003	INDENO (1,2,3-CD) PYRENE	*	0.010
2-CHLORONAPHTHALENE	*	0.002	ISOPHORONE	*	0.002
4-CHLOROPHENYL PHENYL ETHER	*	0.003	NAPHTHALENE	*	0.001
CHRYSENE	*	0.005	NITROBENZENE	*	0.004
DIBENZO (A,H) ANTHRACENE	*	0.010	N-NITROSODI-N-PROPYLAMINE	*	0.004
DI-N-BUTYL PHTHALATE	*	0.001	N-NITROSODIPHENYLAMINE	*	0.003
1,2-DICHLOROBENZENE	*	0.003	PHENANTHRENE	*	0.001
1,3-DICHLOROBENZENE	*	0.003	PYRENE	*	0.001
1,4-DICHLOROBENZENE	*	0.003	1,2,4-TRICHLOROBENZENE	*	0.003

*COMPOUND NOT PRESENT AT DETECTION LIMIT



ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 2
BASE-NEUTRAL FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
SAMPLE: 85-7

DATE SAMPLED: 12/06/85 TIME: 3:10 PM
DATE RECEIVED: 120985 TIME: 7:00 AM
DATE COMPLETED: 12/19/85

SAMPLE NO. 58330

COMPOUND	RESULT	D.L.	COMPOUND	RESULT	D.L.
	(mg/l)			(mg/l)	
ACENAPHTHENE	*	0.002	3,3'-DICHLOROBENZIDINE	*	0.020
ACENAPHTHYLENE	*	0.001	DIETHYL PHTHALATE	*	0.002
ANTHRACENE	*	0.001	DIMETHYL PHTHALATE	*	0.002
BENZIDINE	*	0.050	2,4-DINITROTOLUENE	*	0.010
BENZO (A) ANTHRACENE	*	0.005	2,6-DINITROTOLUENE	*	0.009
BENZO (K) FLUORANTHENE	*	0.005	DI-N-OCTYLPHTHALATE	*	0.002
BENZO (A) PYRENE	*	0.005	1,2-DIPHENYLHYDRAZINE	*	0.001
BENZO (G,H,I) PERYLENE	*	0.010	FLUORANTHENE	*	0.001
BIS-(2-CHLOROETHYL) ETHER	*	0.004	FLUORENE	*	0.002
BIS(2-CHLOROETHOXY) METHANE	*	0.004	HEXACHLOROBENZENE	*	0.005
BIS(2-CHLOROISOPROPYL) - ETHER	*	0.001	HEXACHLOROBUTADIENE	*	0.005
BIS-(2-ETHYL HEXYL) - PHTHALATE	*	0.002	HEXACHLOROETHANE	*	0.007
4-BROMOPHENYL PHENYL ETHER	*	0.007	HEXACHLOROCYCLOPENTADIENE	*	0.005
BUTYL BENZYL PHTHALATE	*	0.003	INDENO (1,2,3-CD) PYRENE	*	0.010
2-CHLORONAPHTHALENE	*	0.002	ISOPHORONE	*	0.002
4-CHLOROPHENYL PHENYL ETHER	*	0.003	NAPHTHALENE	*	0.001
CHRYSENE	*	0.005	NITROBENZENE	*	0.004
DIBENZO (A,H) ANTHRACENE	*	0.010	N-NITROSODI-N-PROPYLAMINE	*	0.004
DI-N-BUTYL PHTHALATE	*	0.001	N-NITROSODIPHENYLAMINE	*	0.003
1,2-DICHLOROBENZENE	*	0.003	PHENANTHRENE	*	0.001
1,3-DICHLOROBENZENE	*	0.003	PYRENE	*	0.001
1,4-DICHLOROBENZENE	*	0.003	1,2,4-TRICHLOROBENZENE	*	0.003

*COMPOUND NOT PRESENT AT DETECTION LIMIT





**CONESTOGA-ROVERS
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MEMORANDUM

DRAFT

PRIVILEGED AND CONFIDENTIAL
PREPARED AT ENCORE COUNSEL'S REQUEST

TO: Kurt Blizzard/GM ENCORE REF. NO.: 17360-10

FROM: Gary R. Klepper/bm/47/Lan. DATE: January 6, 2006

C.C.: Jeni Quigley/CRA

RE: **Results of Press Pit and Perforated Sump System Sampling
General Motors Corporation Metal Fabrication Division
Grand Rapids Metal Plant
Wyoming, Michigan**

This memorandum presents the results of the Excavation Pit and Sump sampling conducted by Conestoga-Rovers & Associates, Inc. (CRA) at the General Motors Corporation (GM) Metal Fabrication Division (MFD) Grand Rapids Metal Plant (Plant) located at 300 36th Street in Wyoming, Michigan (Site). The Press Pit (Pit) sampling was performed over four weeks with samples collected on April 25, 2005, May 2, 2005, May 13, 2005 and May 20, 2005. Perforated Sump System (Sump) sampling was performed on August 25, 2005 and September 1, 2005. This memorandum includes the following sections:

- 1.0 Purpose
- 2.0 Scope Of Work
 - 2.1 Press Pit Sampling
 - 2.2 Perforated Sump System Sampling
- 3.0 Results
- 4.0 Conclusions And Recommendations

1.0 PURPOSE

The purpose of these environmental investigations was to further evaluate the potential for off site, upgradient, tetrachloroethene (PCE) contamination to migrate onto and into the MFD passive sump drain system.

2.0 SCOPE OF WORK

Investigation activities included the collection of six groundwater samples (four for the Pit and two for the Sump) for laboratory analysis of select volatile organic compounds (VOCs).

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2.1 EXCAVATION PIT SAMPLING

Four groundwater samples were collected from the dewatering activities during the installation of the new press pit foundation. Dewatering activities took place during April 2005 and May 2005. Water was pumped from the excavation through a six-inch diameter pipe into a temporary equalization basin, then pumped to the City of Wyoming Wastewater Treatment Plant through a four-inch diameter pipe. Figure 1 presents the approximate press pit location.

The groundwater samples were collected on April 25, 2005, May 2, 2005, May 13, 2005 and May 20, 2005 from the six-inch diameter pipe outfall to the temporary equalization basin. Samples were collected as direct fill samples and placed into pre-cleaned laboratory-provided containers, properly labeled, and shipped under chain-of-custody (COC) protocol via overnight courier to Severn Trent Laboratories (STL) in North Canton, Ohio to be analyzed on a 72-hour turnaround time (TAT). Samples were analyzed for select VOCs: 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), tetrachloroethene (Perchloroethylene or PCE), trichloroethene (TCE), and vinyl chloride (VC).

2.2 PREFORATED SUMP SYSTEM SAMPLING

Two groundwater samples were collected from the Sump system. The Sump system is a passive perforated drain system used by the MFD Plant to prevent water from entering the basement. Perforated drainpipe runs on the southern portion of the plant along the east side parallel to Buchanan Street. Water flows through the perforated drainpipe into a sump where the water is then pumped to the on site storm water retention pond.

The groundwater samples were collected on August 25, 2005 and September 1, 2005 from the spout that was installed in the basement pipe above the sump pump. Samples were collected as direct fill samples and placed into pre-cleaned laboratory-provided containers, properly labeled, and shipped under COC protocol via overnight courier to STL in North Canton, Ohio to be analyzed on a two-week TAT. Samples were analyzed for select VOCs: 1,1,1-TCA, 1,1-DCA, 1,1-DCE, cis-1,2-DCE, PCE, TCE, and VC.

3.0 RESULTS

Laboratory analytical results were compared to Michigan Public Act 451, Part 201 Cleanup Criteria for Residential Drinking Water (RDW), Industrial/Commercial Drinking Water (ICDW), Groundwater Surface Water Interface (GSI), Residential Groundwater Volatilization to Indoor Air Inhalation (RGVIAI), Industrial Groundwater Volatilization to Indoor Air Inhalation (IGVIAI), and Groundwater Contact (GC).

PCE was detected in three Pit samples, May 5, 2005, May 13, 2005 and May 20, 2005, at 12 ug/L, 12 ug/L and 14 ug/L, respectively, and in both Sump samples, August 25, 2005 and September 1, 2005, at 10 ug/L and 18 ug/L, respectively, above the RDW and ICDW criteria of 5 ug/L.

PCE was detected above the laboratory detection limit, but below criteria, in the April 25, 2005 Pit samples

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at 4.2 ug/L. TCE was detected above the laboratory detection limit, but below criteria, in all the Pit samples, April 25, 2005, May 5, 2005, May 13, 2005 and May 20, 2005, and in both Sump samples, August 25, 2005 and September 1, 2005, at 1.8 ug/L, 4.3 ug/L, 4.0 ug/L, 4.1 ug/L, 2.8 ug/L, and 4.4 ug/L, respectively. Cis-1,2-DCE was detected above the laboratory detection limit, but below criteria, in the May 5, 2005, May 13, 2005, May 20, 2005, and September 1, 2005 samples, at 1.9 ug/L, 1.3 ug/L, 2.9 ug/L, and 1.8 ug/L, respectively. No other select VOCs were detected above laboratory detection limits.

Table 1 presents a sample summary and Table 2 presents a summary of the analytical results. Attachment A provides the laboratory report and Attachment B provides the validation memorandum.

4.0 CONCLUSION AND RECOMMENDATIONS

Sample results indicate that PCE is present in the Sump system at levels above Part 201 Criteria which is protective for drinking water. However, levels of PCE and other substances are not above Part 201 GSI, RGVIAI, IGVIAI, or GC criteria, which are more relevant and applicable Part 201 Criteria at this location.

It is recommended that the Sump system continue to be sampled on a regular basis (sampled with other regular scheduled sampling events), to ensure levels of PCE do not exceed relevant criteria.

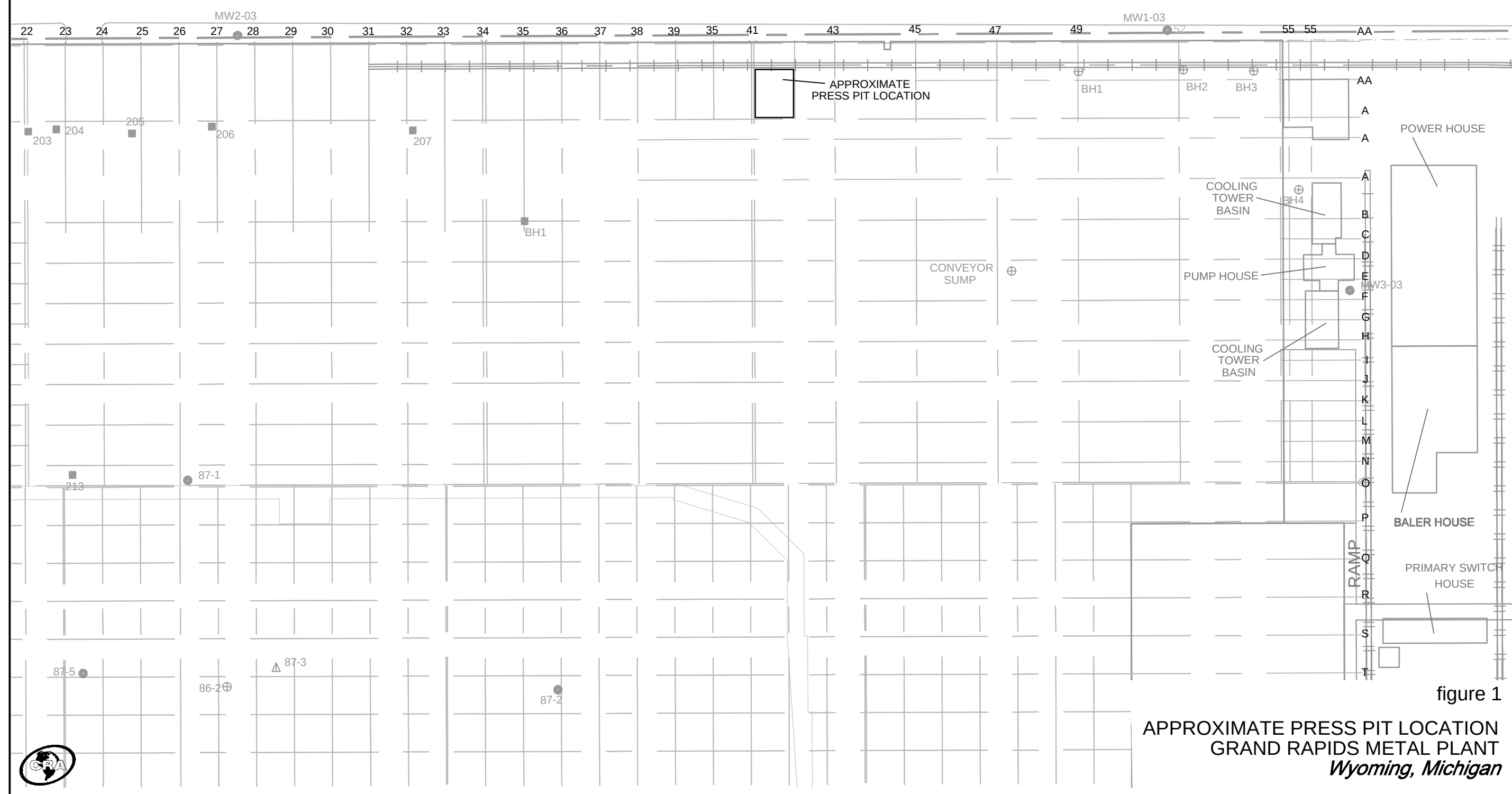
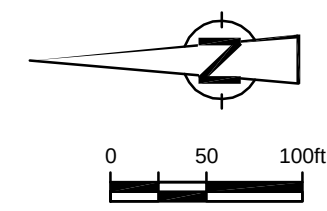


figure 1
APPROXIMATE PRESS PIT LOCATION
GRAND RAPIDS METAL PLANT
Wyoming, Michigan



TABLE 1

**SAMPLE SUMMARY
GENERAL MOTORS CORPORATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN**

<u>Sample Identification</u>	<u>Sample Location</u>	<u>QA/QC</u>	<u>Analysis</u>
GW-042505-BM-001	Pit/6 in Dewatering Pipe		Site-Specific VOCs
WQ-042505-TRIP BLANK		Trip Blank	Site-Specific VOCs
GW-17360-082505-BM-001	Sump Tap		Site-Specific VOCs
TB-17360-082505-BM-002		Trip Blank	Site-Specific VOCs
WG-17360-090105-BM-003	Sump Tap		Site-Specific VOCs
WQ-17360-090105-BM-004		Trip Blank	Site-Specific VOCs
GW-050205-BM-003	Pit/6 in Dewatering Pipe		Site-Specific VOCs
TB-050205-BM-004		Trip Blank	Site-Specific VOCs
GW-051305-BM-005	Pit/6 in Dewatering Pipe		Site-Specific VOCs
WQ-051305-BM-006		Trip Blank	Site-Specific VOCs
GW-052005-BM-007	Pit/6 in Dewatering Pipe		Site-Specific VOCs
WQ-052005-BM-008		Trip Blank	Site-Specific VOCs

TABLE 2

PRESS PIT AND PERFORATED SUMP SYSTEM ANALYTICAL RESULTS SUMMARY
GENERAL MOTORS CORPORATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

	Michigan Act 451, Part 201 Groundwater: Residential and Industrial-Commercial Generic Cleanup Criteria ⁽¹⁾										Pit	Pit	Pit	Pit		
Sample Location	Residential & Commercial I	Industrial & Commercial II, II, IV	Groundwater Surface Water	Residential & Commercial I Groundwater	Industrial & Commercial II, II & IV Groundwater	Groundwater Contact	Water Solubility	Flammability and Explosivity	Acute Inhalation	6 in Dewatering Pipe GW-042505-BM-001	6 in Dewatering Pipe GW-050205-BM-003	6 in Dewatering Pipe GW-051305-BM-005	6 in Dewatering Pipe GW-052005-BM-007	Sump Tap GW-17360-082505-BM-001	Sump Tap WG-17360-090105-BM-003	
Sample Identification	Drinking Water	Drinking Water	Interface	Volatilization to Indoor Air Inhalation	Volatilization to Indoor Air Inhalation			Screening Levels	Screening Levels	4/23/2005	5/2/2005	5/13/2005	5/20/2005	8/25/2005	9/1/2005	
Sample Date																
Sample Type	Units	a	b	c	d	e	f	g	h	i						
VOCs																
1,1,1-Trichloroethane	ug/L	200	200	200	660000	1300000	1300000	1330000	ID	1300000	1.0 U	0.22 J	0.34 J	0.31 J	0.61 J	
1,1-Dichloroethane	ug/L	880	2500	740	1000000	2300000	2400000	5060000	380000	ID	1.0 U	1.0 U	0.21 J	1.0 U	1.0 U	
1,1-Dichloroethene	ug/L	7	7	65	200	1300	11000	2250000	97000	140000	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
cis-1,2-Dichloroethene	ug/L	70	70	620	93000	210000	200000	3500000	530000	ID	0.50 J	1.9	1.3 J	2.9	1.0 U	
Tetrachloroethene	ug/L	5	5	45	25000	170000	12000	200000	ID	200000	4.2	12 ^{ab}	12 J ^{ab}	14 ^{ab}	10 ^{ab}	
trans-1,2-Dichloroethene	ug/L	100	100	1500	85000	200000	220000	6300000	230000	ID	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Trichloroethene	ug/L	5	5	200	15000	97000	22000	1100000	ID	1100000	1.8	4.3	4.0	4.1	2.8	
Vinyl chloride	ug/L	2	2	15	1100	13000	1000	2760000	33000	ID	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	

Notes:

U - Not present at or above the associated value.

J - Estimated concentration.

(1) Cleanup criteria identified by MDEQ RRD Op Memo No. 1 dated 6/24/2005 pursuant to 1994 PA 451 as amended.



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MEMORANDUM

***PRIVILEGED AND CONFIDENTIAL
PREPARED AT ENCORE COUNSEL'S REQUEST***

TO: Kurt Blizzard

REF. NO.: 017360-10

FROM: *KK For* Jeni Quigley/Kevin Kowalk/54/Lan.

DATE: September 12, 2007

C.C.: Gary Klepper

RE: Summary of Adjacent Property Review - Conical Tool Company
General Motors Corporation
Grand Rapids Metal Plant
Wyoming, Michigan

FILE COPY

1.0 INTRODUCTION

The purpose of this memorandum is to summarize the adjacent property Freedom of Information Act (FOIA) review completed by Conestoga-Rovers & Associates (CRA). These activities were completed in conjunction with the ongoing groundwater and soils investigations at the General Motors Corporation (GM) Grand Rapids Metal Plant, located at 300 36th Avenue in Wyoming, Michigan (Site). The adjacent Conical Tool Company (Conical Tool) property, located at 3890 Buchanan Avenue, is located hydraulically upgradient and immediately adjacent to the southeast of the Site.

2.0 BACKGROUND

CRA previously completed an adjacent property review in the immediate upgradient vicinity of the Site on April 24, 2003. Based on the results of the adjacent property identification, a written FOIA request was submitted to the Michigan Department of Environmental Quality (MDEQ) Remediation and Redevelopment Division (RRD) on April 29, 2003. The FOIA request included numerous properties adjacent to the Site.

One file was identified for all requested properties: Conical Tool, located at 3890 Buchanan Avenue. On May 13, 2003, CRA performed a file review at the MDEQ RRD office located in Wyoming, Michigan. Documentation that was available for CRA's review on May 13, 2003 included:

- Phase II Environmental Site Assessment (ESA) prepared by Dixon Environmental Consulting, Inc. (Dixon), dated January 28, 2002; and
- Preliminary Soil and Groundwater Data for Conical Tool Company prepared by Dixon, dated September 3, 2002.

Based on the review of available documentation during the previous FOIA summary, CRA provided the following conclusions:

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- TCE was detected in soil, and TCE and PCE have been identified in groundwater on the Conical Tool property, located hydraulically upgradient of the Site. Insufficient information was available to determine whether PCE is present in soil at this property;
- The vertical extent of TCE and PCE in groundwater at the Conical Tool site was not determined;
- Insufficient information was available to determine the actual source of PCE upgradient of the Grand Rapids Metal Plant. However, the file review does confirm that PCE is present in groundwater located hydraulically upgradient of the Site at concentrations above the Residential Criterion, pursuant to Part 201 of Michigan Act 451 of 1994, as amended; and
- Additional potential upgradient properties including Accurate Metal Finishing and Travis Collision were observed; however, no documentation was available during the FOIA review for these properties.

3.0 SCOPE OF WORK

3.1 FREEDOM OF INFORMATION ACT FILE REVIEW

CRA completed a subsequent FOIA review of the Conical Tool property to determine if additional information was available regarding soil and/or groundwater impacts to the property had been identified since the initial file review. A written FOIA request was submitted to the MDEQ RRD on July 30, 2007. It should be noted that the FOIA request covered the period from April 24, 2003 to July 30, 2007 only.

Two file documents were identified for Conical Tool for the requested time period, including:

- National Pollutant Discharge Elimination System (NPDES) Certificate of Coverage (COC) and termination of COC; and
- Category S Baseline Environmental Assessment (BEA) for Conical Tool Company 3890 Buchanan Avenue, SW, Wyoming, Michigan dated April 21, 2004 and conducted by Dixon Environmental Consulting, Inc. (DEC).

A copy of the documents obtained from the FOIA request are presented in Attachment A. The following summarizes the information obtained during the review of these documents.

3.2.1 CONICAL TOOL COMPANY NPDES COC

A NPDES COC was approved in a May 28, 1996 letter to Harriet Stanaback of Conical Tool under COC No. MIR11G119. The COC classified the facility as an A.1.i Storm Water Management Industrial Site. The effective date of the coverage for the COC was May 24, 1996. According to a letter to Harriet Stanaback of Conical Tool, dated April 22, 1996, an investigation of the facility was conducted on April 18, 1996, which determined that the facility discharges to Buck Creek. An anonymous complaint was attached to the letter, which was submitted to the MDEQ Surface Water Quality Division on April 18, 1996. The complaint stated that oils, coolants, cutting fluids and mineral spirits were being disposed outside of the site buildings and acid was being disposed into sinks within the buildings.

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The NPDES COC was terminated in a letter to Harriet Stanaback, dated December 16, 1998. The coverage was terminated on December 14, 1998 based on the fact that storm water discharges were no longer coming into contact with industrial activities at the property.

3.2.2 CONICAL TOOL COMPANY CATEGORY S BEA

A Category S BEA, dated April 21, 2004, was completed for the Conical Tool facility by DEC.

According to the BEA, the site consisted of a commercial building, an asphalt paved parking area and an unpaved parking area. No underground storage tanks (USTs) or discarded containers were identified during completion of the BEA. Conical Real Estate, L.L.C. planned to purchase the property on or about April 30, 2004 and Cut Above Tool Company, Inc. intended to begin metallic tooling operations, similar to current operations, as soon as engineering controls and isolation zones were installed at the property.

According to the BEA, tooling operations were anticipated to consist of grinding, cutting and shaping metallic rods into tapered end mill bits, storage of rods and the storage and use of cutting oils, cooling oils, and lubricant oil. The processes at the site produce shavings and grinding sludge, which are recycled off-site by a third party. Hazardous substances (chromium, iron, molybdenum and nickel) that were previously encountered in shallow site soils are found in the shavings and grinding sludge.

According to the BEA, Cut Above Tool Company did not intend to use, store, handle or manage significant quantities of trichloroethene (TCE) or tetrachloroethene (PCE) at the property. Cut Above Tool Company would utilize engineering controls and isolation zones as a means of distinguishing any new release after acquisition from any pre-existing contamination. The site would be divided into Zone A (Proposed Isolation Zone) and Zone B (Proposed Concrete and Asphalt Engineering Control).

According to the BEA, Cut Above Tool Company did not intend to have any significant hazardous substance use within Zone A at the site and clean topsoil would be installed, seeded and maintained in the area. Zone B would be utilized for hazardous substance use during site operations, which include metal grinding operations and storage of metal shavings. Zone B included the concrete flooring within the site building and any outside concrete or asphalt areas. Future releases of hazardous substances in Zone B would be separated from the pre-existing contamination by a physical barrier. The concrete asphalt areas will be visually inspected quarterly and repaired as necessary to maintain this barrier.

According to the BEA, previous investigations indicated that chromium, iron, molybdenum and nickel were detected at concentrations which exceeded the Michigan Act 451, Part 201 Residential and Commercial I (Residential) Drinking Water Protection Criteria (DWPC) for soil. One shallow soil sample under the site building contained detections of TCE above the Michigan Act 451, Part 201 Residential DWPC. Concentrations of PCE and TCE were also detected in groundwater at the site above the Michigan Act 451, Part 201 Residential Drinking Water Criteria (DWC).

The following previous environmental investigation reports prepared by DEC were utilized for the development of the BEA:

- Phase I Environmental Site Assessment (ESA) dated April 7, 2004;

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- Phase II ESA dated February 14, 2002;
- Contamination Delineation Sampling and Chemical Analysis Report dated April 10, 2002; and
- Verification of Soil Remediation and Sampling Event dated July 2002.

The Phase II ESA dated February 14, 2002 was previously reviewed and summarized in a memorandum to GM dated November 13, 2003. The previous memorandum to GM referenced the Phase II ESA date as January 28, 2007. This document is the same as the Phase II ESA dated February 14, 2002, which was included in the Dixon BEA. The preliminary soil and groundwater data, dated September 3, 2002, summarized in the previous memorandum, is also the same data present in the Contamination Delineation Sampling and Chemical Analysis Report, dated April 10, 2002 and the Verification of Soil and Remediation and Sampling Event dated July 2002, which are summarized below.

Contamination Delineation Sampling and Chemical Analysis Report, April 10, 2002

A Contamination Delineation Sampling and Chemical Analysis Report (Report), dated April 10, 2002, was prepared for the site by DEC and included in the Category S BEA.

The scope of work (SOW) for the report was to define the vertical and horizontal extent of the hazardous substances chromium, iron, molybdenum, nickel, 1,3,5-trimethylbenzene (1,3,5-TMB) and TCE detected in two locations during the Phase II ESA completed on February 14, 2002 by DEC. Additionally, the SOW included the investigation of surficial soil staining observed adjacent to the solid waste dumpster located north of the site building. The two areas of contamination were east of the site building and in the central portion of the site building, respectively.

Investigation activities were conducted on March 26 and 27, 2002 by DEC and included the advancement of 10 soil borings in the two contamination areas and the area of surficial soil staining. In order to vertically delineate contamination in the area near previous soil borings conducted during the Phase II ESA (SB-1 and SB-2), DEC advanced two soil borings (GP-1 and GP-5) utilizing earthprobe technology to the groundwater table, which was encountered at approximately 17 feet below ground surface (bgs). Soil samples were collected from 10 feet bgs in each soil boring and grab groundwater samples were collected from the terminus of each borehole. Soil and groundwater samples were analyzed for volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PNAs), metals, TCE, and 1,3,5-TMB. Soil samples were field screened for VOCs using a photoionization detector (PID) and groundwater samples were field filtered for dissolved metals analysis. Seven additional borings (GP-2, GP-3, GP-4, GP-6, GP-7, GP-8 and GP-10) were advanced in various directions approximately 15 to 20 feet horizontally away from the vertical delineation borings. Soil samples were collected from each boring at approximately 1 to 3 feet bgs.

One additional soil boring (GP-9) was advanced in the surficial stained area near the solid waste dumpster. This boring was advanced to approximately 17 feet bgs. Soil samples were collected at 0.5 to 1 feet bgs and 9 to 11 feet bgs and a groundwater sample was collected from the terminus of the borehole.

All soil samples were analyzed for 1,3,5-TMB, TCE, total and dissolved chromium, total and dissolved nickel, total and dissolve molybdenum, and total and dissolved iron. Analytical results are summarized below.

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Chromium was detected in the soil samples collected from GP-2 (from 1 to 3 feet bgs), GP-3 (from 1 to 3 feet bgs), GP-4 (from 1 to 3 feet bgs), GP-5 (from 13 to 15 feet bgs), GP-8 (from 1 to 1.5 feet bgs) and GP-9 (from 0.5 to 1 foot bgs) above Michigan Act 451, Part 201 Residential DWPC of 30,000 micrograms per kilogram ($\mu\text{g}/\text{kg}$).

Iron was detected in the soil samples collected from GP-2 (from 1 to 3 feet bgs), GP-3 (from 1 to 3 feet bgs) and GP-9 (from 0.5 to 1 foot bgs) above Michigan Act 451, Part 201 Residential DWPC of 12,000,000 $\mu\text{g}/\text{kg}$.

Molybdenum was detected in the soil samples collected from GP-2 (from 1 to 3 feet bgs), GP-3 (from 1 to 3 feet bgs), GP-4 (from 1 to 3 feet bgs), GP-5 (from 13 to 15 feet bgs), GP-6 (from 1 to 1.5 feet bgs), GP-7 (from 1 to 1.5 feet bgs), GP-8 (from 1 to 1.5 feet bgs) GP-9 (from 0.5 to 1 foot bgs and from 9 to 11 feet bgs) and GP-10 (1 foot bgs) above Michigan Act 451, Part 201 Residential DWPC of 1,500 $\mu\text{g}/\text{kg}$.

Nickel was detected in the soil sample collected from GP-9 (from 0.5 to 1-foot bgs) above Michigan Act 451, Part 201 Residential DWPC of 100,000 $\mu\text{g}/\text{kg}$.

Silver was detected in the soil sample collected from GP-9 (0.5 to 1-foot bgs) above Michigan Act 451, Part 201 Residential DWPC of 4,500 mg/kg .

1,2,4-TMB was detected above Michigan Act 451, Part 201 Residential DWPC of 2,100 $\mu\text{g}/\text{kg}$ in the soil sample collected from GP-9 (from 0.5 to 1-foot bgs).

1,3,5-TMB was detected above Michigan Act 451, Part 201 Residential DWPC of 1,800 $\mu\text{g}/\text{kg}$ in the soil sample collected in GP-9 (from 0.5 to 1-foot bgs).

Dibenzo(a,h)anthracene was detected above Michigan Act 451, Part 201 Residential DWPC of 2,000 $\mu\text{g}/\text{kg}$ in the soil sample collected in GP-9 (from 0.5 to 1-foot bgs).

Groundwater samples were analyzed for volatile organic compounds and metals. Based on review of the analytical results, TCE was detected in the groundwater samples collected from GP-1 (17 feet bgs) and GP-5 (17 feet bgs) at concentrations of 14 $\mu\text{g}/\text{L}$ and 100 $\mu\text{g}/\text{L}$, respectively, which are above the Michigan Act 451, Part 201 Residential DWPC of 5 $\mu\text{g}/\text{L}$.

Based on the aforementioned results, DEC concluded that soil and groundwater impacts to the Site were more extensive than identified in the previous Phase I and II ESAs conducted at the subject property.

Verification of Soil Remediation and Sampling Event, July 2002 (No Report)

Based on review of the BEA conducted by DEC, soil excavations were conducted at the property in two locations with approximately 60 cubic yards of soil removed from the property on July 9, 2002. Verification soil sampling was conducted as part of the Verification of Soil Remediation and Sampling Event in July 2002 in the locations of previously excavated soil due to metals impacts.

Twelve soil verification samples (VSR-1 through VSR-12) were collected from the floors and sidewalls of the two excavation areas. VSR-1 through VSR-6 were collected from the area adjacent to the east of the Conical

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Tool site building and VSR-7 through VSR-12 were collected from an area to the north of the site building, to the west of the solid waste dumpster location, respectively.

Analytical results were reviewed as part of the BEA and summarized below.

Chromium was detected at concentrations exceeding Michigan Act 451, Part 201 Residential DWPC of 30,000 µg/kg in the soil sample collected at VSR-2 (at 2.5 feet bgs), VSR-7 (at 0.5 feet bgs) and VSR-8 (at 0.5 feet bgs), respectively.

Iron was detected at concentrations exceeding Michigan Act 451, Part 201 Residential DWPC of 12,000,000 µg/kg in the soil samples collected at VSR-7 (at 0.5 feet bgs) and VSR-8 (at 0.5 feet bgs), respectively.

Molybdenum was detected at concentrations exceeding Michigan Act 451, Part 201 Residential DWPC of 1,500 µg/kg in the soil samples collected at VSR-1 (at 2.5 feet bgs), VSR-2 (at 2.5 feet bgs), VSR-3 (at 3 feet bgs), VSR-4 (at 1.5 feet bgs), VSR-5 (at 2 feet bgs), VSR-6 (at 1-foot bgs), VSR-7 (at 0.5 feet bgs), VSR-8 (at 0.5 feet bgs), VSR-9 (at 0.5 feet bgs), VSR-10 (at 0.5 feet bgs), VSR-11 (at 1.5 feet bgs) and VSR-12 (at 1.5 feet bgs), respectively.

Phase I ESA, April 7, 2004

A Phase I ESA conducted at the site by DEC, dated April 7, 2004, was reviewed as part of the BEA.

Based on review of the Phase I ESA, the subject site consisted of a 0.88-acre parcel with a commercial building, asphalt paved parking area and an unpaved parking area. According to the Phase I ESA, the subject site was vacant prior to 1947 and developed in two stages. The original building was constructed in 1947 and operated by Commercial Grinding and Manufacturing Company until 1957 when Conical Tool Company began operating the site. The eastern portion of the site was acquired and building additions constructed in the 1970s. DEC identified the following recognized environmental conditions (RECs) based on the Phase I ESA:

- Based on previous investigations conducted by DEC, impacted soil was encountered on the eastern portion of the site and impacted groundwater was encountered throughout the site. Chromium, iron, molybdenum, nickel and TCE are currently present in the soil at concentrations exceeding Michigan Act 451 Part 201 DWPC. In addition, TCE and PCE were detected in the groundwater at concentrations exceeding Michigan Act 451 Part 201 DWPC.

An off-Site REC was also identified with respect to numerous instances of hazardous substance uses at the surrounding industrial and commercial properties.

Based on review of the Phase I ESA, a background survey was conducted by DEC after completing the verification and soil remediation sampling event in order to determine whether the metal concentrations detected at the site were representative of the natural occurring soil conditions. Based on the conclusions of the survey, it was determined that the concentrations of metals in site soils were not representative of natural conditions.

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Additional information reviewed in the Phase I ESA included the historical installation of five monitoring wells at the site and several groundwater sampling events. On July 17 and 19, 2002, DEC installed five permanent monitoring wells (MW-1 through MW-5) at the site. Groundwater samples were collected from the monitoring wells on July 22, 2002, November 12, 2002, February 14, 2003, and March 26, 2004.

Based on analytical results presented in the Phase I ESA, TCE was detected in MW-1, MW-2, MW-3 and MW-4 above Michigan Act 451, Part 201 Residential DWC of 5 µg/L in July 2002. PCE was detected in MW-4 at a concentration exceeding Michigan Act 451, Part 201 Residential DWC of 5 µg/L in July 2002.

TCE was detected in MW-2, MW-3 and MW-4 above Michigan Act 451, Part 201 Residential DWC of 5 µg/L in November 2002. PCE was detected in MW-4 at a concentration exceeding Michigan Act 451, Part 201 Residential DWC of 5 µg/L in November 2002.

TCE was detected in MW-3 above Michigan Act 451, Part 201 Residential DWC of 5 µg/L in February 2003. No sample was collected from MW-4 in February 2003.

TCE was detected in MW-2 and MW-3 above Michigan Act 451, Part 201 Residential DWC of 5 µg/L in March 2004. PCE was detected in MW-2 at a concentration exceeding Michigan Act 451, Part 201 Residential DWC of 5 µg/L in March 2004. Monitoring well MW-4 was not sampled in March 2004.

4.0 DISCUSSION

Based on the observed groundwater flow direction at the Grand Rapids Metal Plant, the Conical Tool property is assumed to be located hydraulically upgradient. However, no property-specific groundwater flow direction information for the Conical Tool site was presented in the documentation reviewed by CRA.

Based on the review of available information obtained from the FOIA request, it appears possible that there was a former or current source of TCE and PCE at the Conical Tool site. TCE was identified in soil and groundwater at concentrations above the Michigan Act 451, Part 201 Residential DWPC and DWC, respectively. PCE was also detected in groundwater above the Michigan Act 451, Part 201 Residential DWC from the Conical Tool site. However, it is not clear from the information reviewed whether all soil samples were analyzed for PCE. Insufficient information from the MDEQ files was present to determine a possible source location for PCE at the Conical Tool site. Additionally, the vertical extents of TCE and PCE in groundwater were not determined, based on the information reviewed.

Selected excavation was conducted in two areas at the Conical Tool site. Neither of these excavations were conducted where the TCE was detected in soil above the Michigan Act 451, Part 201 Residential Criteria.

During the investigations conducted by DEC, five monitoring wells, MW-1 through MW-5, were installed at the Conical Tool site. Groundwater samples collected from these wells ranged from 12 feet bgs to 17.5 feet bgs. Additional delineation grab groundwater samples were collected from depths of approximately 17 to 19 feet bgs.

Concentrations of PCE and TCE in groundwater samples collected during ongoing groundwater monitoring activities from monitoring wells MW1-03 and MW2-03 of the GM Site, indicated that samples

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collected from near the water table, similar to those collected at the Conical Tool site, are at lower concentrations than in samples collected at greater depths. This is consistent with the hypothesis of an upgradient source located some distance from the Grand Rapids Metal Plant.

5.0 CONCLUSIONS

Based on the review of available documentation, CRA provides the following conclusions:

- TCE was detected in soil, and TCE and PCE have been identified in groundwater on the Conical Tool property, located hydraulically upgradient of the Site. Insufficient information was available to determine whether PCE is present in soil at this property;
- The vertical extent of TCE and PCE in groundwater at the Conical Tool site was not determined; and
- Insufficient information was available to determine the actual source of PCE upgradient of the Grand Rapids Metal Plant. However, the file review does confirm that PCE is present in groundwater located hydraulically upgradient of the Site at concentrations above the Michigan Act 451, Part 201 Residential Criteria.

Should you have any questions regarding this memorandum, please contact Kevin Kowalk or Gary Klepper at (517) 316-2397.

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ATTACHMENT A



JENNIFER M. GRANHOLM
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
WYOMING



STEVEN E. CHESTER
DIRECTOR

**SUBMITTAL OF A
BASELINE ENVIRONMENTAL ASSESSMENT**

Submitter: Conical Real Estate, LLC
Attention: Mr. David W. Melinn
3890 Buchanan Avenue SW
Wyoming, Michigan 49548

BEA ID#: B200401428GR

Property Address/Location: 3890 Buchanan Avenue SW
Wyoming, Michigan

The Department of Environmental Quality (DEQ) has received on May 19, 2004, a Baseline Environmental Assessment (BEA) dated April 21, 2004, and prepared by Dixon Environmental Consulting, Inc. for the above submitter. This BEA disclosure was submitted pursuant to Section 20126(1)(c) of Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), MCL 324.20126.

The submitter has not requested a written determination by the DEQ on the adequacy of the BEA, as allowed in Section 20129a of Part 201 of the NREPA. The BEA may be reviewed in the future to determine its adequacy. If the BEA is determined to be inadequate, the submitter may be liable under Part 201 for the contamination at the facility.

The DEQ is not at this time making any findings about whether the submitter is otherwise liable or covered by any other exemption from liability under Part 201. This BEA does not alter liability with regard to a subsequent release or threat of release or any exacerbation of existing conditions. This BEA is only for the person and property identified in the petition. The use of the property and any response activity undertaken must be in accordance with the requirements of all applicable or relevant and appropriate state and federal laws and regulations. Liability protection is conditioned on the timely and satisfactory completion of any response activities described in the submittal. Pursuant to R 299.5919(2), if the submitter sells or transfers the property, the submitter is required to disclose the BEA to a subsequent owner or operator in order to be entitled to an exemption from liability.

The BEAs are based on the proposed use of hazardous substances as identified in the BEA. The DEQ will maintain an administrative record of each BEA. If at any time you provide the DEQ with post-BEA information related to your BEA, the DEQ will retain such information with the administrative record. Such post-BEA information will not be considered part of the BEA and acceptance of such information by the DEQ should in no way be construed to mean the DEQ will review or advise the submitter regarding the adequacy of such information for any purpose.

The DEQ will maintain an administrative record of each BEA. If at any time you provide the DEQ with post-BEA information related to your BEA, the DEQ will retain such information with the administrative record. Such post-BEA information will not be considered part of the BEA, and acceptance of such information by the DEQ should in no way be construed to mean the DEQ will review or advise the submitter regarding the adequacy of such information for any purpose.

The submitter, as the owner and/or operator of a facility, has the following Due Care responsibilities under Section 20107a of Part 201 and Part 10 of the Part 201 Rules, unless covered by the exemptions in Section 20107a(4) or (5):

- Undertake measures as are necessary to prevent exacerbation of the existing contamination.
- Exercise due care by undertaking response activity necessary to mitigate unacceptable exposure to hazardous substances, mitigate fire and explosion hazards due to hazardous substances, and allow for the intended use of the facility in a manner that protects the public health and safety.
- Take reasonable precautions against the reasonably foreseeable acts or omissions of a third party and the consequences that foreseeably could result from those acts or omissions.
- Notify the DEQ if there are discarded or abandoned containers that contain hazardous substances on the property using Form EQP4476.
- Notify the DEQ and adjacent property owners if contaminants are migrating off the property (refer to Form EQP4482).
- Notify the local fire department if there is a fire or explosion hazard.
- Notify utility and easement holders if contaminants could cause unacceptable exposures and/or fire and explosion hazards.

Rule 1003(5) requires a person who is subject to the provisions of Section 20107a to maintain documentation of compliance with these requirements and to provide such documentation to the DEQ upon request. If the property use changes in the future, additional due care measures may be necessary. The property owner and operator must re-evaluate and document their continued compliance with Section 20107a.

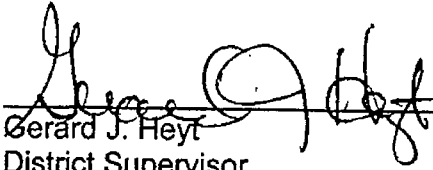
The submitter may also have responsibility under applicable state and federal laws, including, but not limited to Part 201, Environmental Remediation; Part 111, Hazardous Waste Management; Part 211, Underground Storage Tank Regulations; Part 213, Leaking Underground Storage Tanks; Part 615, Supervisor of Wells of the NREPA; and the Michigan Fire Prevention Code, 1941 PA 207, as amended.

The BEA constitutes a response activity, consequently, this submittal is subject to Section 20137(4) and (5) of the NREPA.

Submitter: Conical Real Estate, LLC

Page Three

Authorized signature:


Gerard J. Heyt
District Supervisor
Remediation & Redevelopment Division
Grand Rapids District
616-246-1720

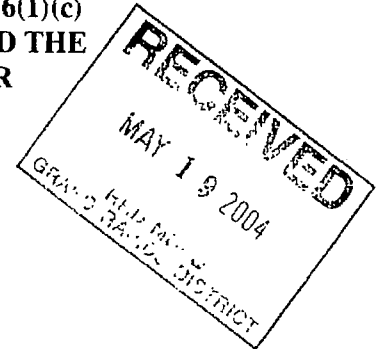
5/21/04
Date

Attachment

cc: Mr. James Dixon, Dixon Environmental Consulting, Inc.

DIXON ENVIRONMENTAL CONSULTING, INC., PROJECT NUMBER 04-02-014c

**BASELINE ENVIRONMENTAL ASSESSMENT
CONDUCTED PURSUANT TO SECTION 20126(1)(c)
OF 1994 PA 451, PART 201, AS AMENDED, AND THE
RULES PROMULGATED THEREUNDER**



**CATEGORY S
BASELINE ENVIRONMENTAL ASSESSMENT
CONICAL TOOL COMPANY
3890 BUCHANAN AVENUE, SW
WYOMING, MICHIGAN**

Prepared for:

*Mr. David W. Melinn
Conical Real Estate, LLC &
Cut Above Tool Company, Inc.
3890 Buchanan Avenue, SW
Wyoming, Michigan 49508*

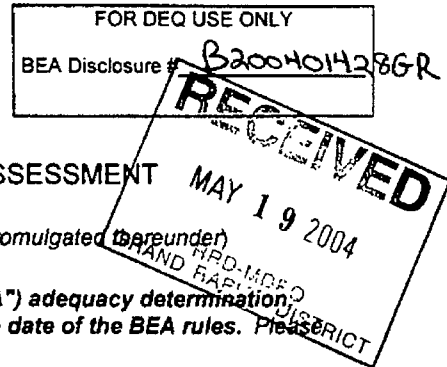
Prepared by:

*Dixon Environmental Consulting, Inc.
750 Ottawa Avenue, NW
Grand Rapids, Michigan 49503*

April 21, 2004



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
REMEDATION AND REDEVELOPMENT DIVISION



DISCLOSURE OF A BASELINE ENVIRONMENTAL ASSESSMENT
(FORM EQP4446 (REV. 4/03))

(Under the authority of Part 201, 1994 Act 451, as amended, and the Rules promulgated thereunder)

DO NOT use this form for requesting a Baseline Environmental Assessment ("BEA") adequacy determination OR if the property is not a facility, OR if the BEA was complete before the effective date of the BEA rules. Please answer the following questions as completely as possible.

Name and address of submitter*
(individual or legal entity):

Conical Real Estate, LLC
3890 Buchanan Avenue, SW
Wyoming, Michigan 49548

Status relative to the property:

Former Current Prospective
Owner* ☐ ☐ ☒
Operator* ☐ ☐ ☐

Address/location of property where
BEA was conducted:

Conical Tool Company
3890 Buchanan Avenue, SW
Wyoming, Michigan

County: Kent

Provide the property tax identification number(s) or, if applicable, the ward and item number(s) for the property identified in the BEA. Required pursuant to Rule 907.

41-17-24-276-014

Contact person: James E. Dixon

Telephone #: (616) 742-5511

If the address of the person seeking liability protection above is different from the address that should be used to correspond with the contact person, please provide the contact person's address:

750 Ottawa Avenue, NW
Grand Rapids, Michigan 49503

Check the appropriate response to each of the following questions.

1. Is it known that the source of contamination at the property is primarily from any of the following?

- A leaking underground storage tank (UST) regulated under Part 213, 1994 PA 451, as amended.
- A licensed landfill or solid waste management facility.
- A licensed hazardous waste treatment, storage, or disposal facility.
- Oil and gas development related activities.

YES	NO
☐	☒
☐	☒
☐	☒
☐	☒

The source of the release that resulted in this property becoming a "facility" will determine which DEQ division will maintain a file regarding this BEA.

2. Based on the Part 201 Rules, this BEA is a:

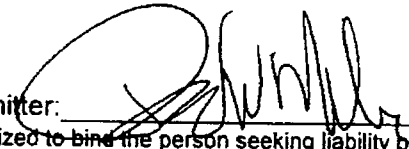
Category N ☐
Category D ☐
Category S ☒

3. Is the property at which the BEA was conducted a "facility" as defined by Section 20101? If the answer to this question is NO, do not submit the BEA to the DEQ.

YES	NO
☒	☐

4. Was the BEA conducted* prior to or within 45 days after the date of purchase*, occupancy, or foreclosure of the property, whichever is earliest, and completed* not more than 15 days after the date required by Section 20126(1)(c) or Rule 299.5903(8)?
If the answer to either portion of this question is no, you are ineligible for an exemption from liability based on the BEA. YES NO
☒ ☐
5. Is the BEA being disclosed to the DEQ no later than 8 months after the earliest of the date of purchase, occupancy, or foreclosure? All disclosures pursuant to Rule 919(3) must be submitted to the DEQ no later than 8 months after the earliest of the date of purchase, occupancy, or foreclosure. YES NO
☒ ☐
6. Are any USTs or abandoned or discarded containers identified in the BEA? If yes, this information must be provided on Form EQP4476. YES NO
☐ ☒
7. Does this BEA rely on an isolation zone or an engineering control that requires an affidavit pursuant to Rule 299.5909(3) or 299.5909(4)? If yes, a completed affidavit, Form EQP4479, must be attached or the BEA will not be considered complete. YES NO
☒ ☐

With my signature below, I certify that the enclosed BEA and all related materials are complete and accurate to the best of my knowledge and belief. I understand that intentionally submitting false information to the DEQ is a felony and may result in fines up to \$25,000 for each violation.

Signature of Submitter: 
(Person legally authorized to bind the person seeking liability protection)

4/22/01
Date

Name (Typed or Printed) David W. Melinn

Title Member



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
REMEDATION AND REDEVELOPMENT DIVISION

**AFFIDAVIT IN SUPPORT OF A DISCLOSURE RELYING ON ISOLATION ZONES OR
ENGINEERING CONTROLS OR OTHER SIMILAR FEATURES
FOR A BASELINE ENVIRONMENTAL ASSESSMENT (FORM EQP4479 (REV. 4/03))**
(Under the authority of Part 201, 1994 Act 451, as amended, and the Rules promulgated thereunder)

STATE OF Michigan)
)
COUNTY OF Kent)

The purpose of this Affidavit is to set forth certain information and documentation to enable the Michigan Department of Environmental Quality (hereinafter the "DEQ") to make a finding of adequacy, at a time the DEQ determines to be appropriate, on the Baseline Environmental Assessment ("BEA") disclosed pursuant to Section 20126(1)(c) of Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act (hereinafter the "NREPA"), 1994 PA 451, as amended. All terms found in this document which are defined in the NREPA, Part 3, Part 201, and the Part 201 Rules, shall have the same meaning as in the statute and the Part 201 Rules.

The undersigned Affiant, being first duly sworn, deposes and says as follows:

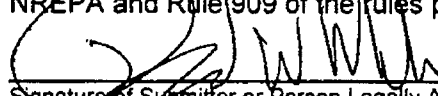
1. **THIS AFFIDAVIT** is executed by the undersigned David W. Melinn, whose title is Member, on behalf of Conical Real Estate, LLC, (hereinafter "the Submitter") located at 3890 Buchanan Avenue, SW, Wyoming, Michigan 49548.
 2. The Submitter intends to purchase a property located at 3890 Buchanan Avenue, SW Grand Rapids, Michigan (hereinafter the "Property") on April 30, 2004.
 3. The Property referred to in this BEA is a "Facility."
 4. The language in this Affidavit does not deviate from that in the model Affidavit, Form EQP4479, except as provided for in item #6.
 5. The BEA included in this disclosure was conducted on April 21, 2004 and completed on April 21, 2004. The BEA, to the best of the Submitter's knowledge and belief, reasonably defines the existing conditions and circumstances at the facility so that in the event of a release subsequent to the Submitter's purchase of the Property, there is a means of distinguishing any new release from existing contamination.
 6. Engineering Controls:
The submitter acknowledges that if there is a failure of an engineering control or similar feature identified in the BEA, and if a release occurs as a result of the failure, the BEA does not provide an exemption to liability for response activity necessary to address contamination resulting from the failure. The burden of distinguishing the release attributable to the failure of the engineering control from existing contamination shall be borne by the submitter according to Section 29 of Part 201.
- Isolation Zone:
The submitter acknowledges that if hazardous substance is detected in the isolation zone, the BEA does not provide an exemption to liability for necessary response activity. The burden of distinguishing a new release that has migrated beyond the isolation zone from existing contamination shall be borne by the submitter according to Section 29 of Part 201.

I affirm that the above representations are true and are based upon my personal knowledge and belief after all reasonable inquiry.

I certify that I am legally authorized to execute this Affidavit and to bind the Submitter to the terms and conditions of this Affidavit.

I understand that intentionally submitting false information to the DEQ is a felony and may result in fines of up to \$25,000 for each violation.

I acknowledge that this Affidavit has been provided pursuant to Section 20126(1)(c) of the NREPA and Rule 909 of the rules promulgated thereunder.


Signature of Submitter or Person Legally Authorized to Bind Submitter

4/22/04
Date

David W. Melinn
Print or Type Legal Name

SUBSCRIBED AND SWORN to before me this 22nd day of April, 2004, a
Notary Public in and for Kend County, Michigan.


Notary Public

My Commission Expires: January 22, 2008

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Figure 3:	Control Zone Diagram

APPENDICES

- Appendix A: Qualifications of Environmental Professional.
- Appendix B: Phase I Environmental Site Assessment completed by Dixon Environmental Consulting, Inc. on April 7, 2004.
- Appendix C: Phase II Environmental Site Assessment completed by Dixon Environmental Consulting on February 14, 2002.
- Appendix D: Contaminant Delineation Sampling and Chemical Analysis Report completed by Dixon Environmental Consulting on April 10, 2002.
- Appendix E: Verification of Soil Remediation Sample Location Diagram and Chemical Analysis Results conducted in July 2002 (no report).
- Appendix F: Property Legal Description.

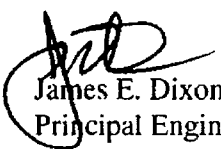
**Baseline Environmental Assessment
Conducted Pursuant to Section 20126(1)(c)
of 1994 PA 451, Part 201, as amended,
and the Rules promulgated thereunder**

1.0 IDENTIFICATION OF AUTHOR AND DATE COMPLETED

The Category S - Baseline Environmental Assessment (BEA) for the Conical Tool Company Site located at 3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan (Tax Parcel Identification Number: 41-17-24-276-014) was prepared by Mr. James E. Dixon, P.E. of Dixon Environmental Consulting, Inc. A copy of Mr. Dixon's Professional Resume is included as Appendix A.

The Category S - BEA was conducted on April 21, 2004 and completed on April 21, 2004.

DIXON ENVIRONMENTAL CONSULTING, INC.


James E. Dixon, P.E.
Principal Engineer

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2.0 INTRODUCTION

Dixon Environmental Consulting, Inc. (DEC) was retained to prepare a Category S - BEA for the Conical Tool Company Site located at 3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan (hereafter referred to as the "subject site" or "subject property"). The Tax Parcel Identification Number for the 0.88-acre subject site is 41-17-24-276-014. The subject site currently consists of a commercial building structure, an asphalt paved parking area and an unpaved parking area. Figures 1, 2 and 3 are included as a Project Location Map, Boring Location/Monitor Well Location Diagram, and Control Zone Diagram, respectively.

Conical Real Estate, L.L.C. intends to purchase the subject property on or about April 30, 2004. Cut Above Tool Company, Inc. intends to begin operations on the subject property after the engineering controls/isolation zones are installed/in-place. Cut Above Tool Company, Inc. intends to operate a metallic tooling operation, similar to current operations on the subject site. The tooling operation primarily consists of grinding, cutting and shaping metallic rods (blanks) into tapered end mill bits. The operations also includes storage of these rods (of varying metallic compositions) and the storage and use of cutting and coolant oils and machine lubricant oil. The metal working process produces metallic shavings and a grinding sludge. The shavings/grinding sludge are periodically disposed of or recycled off-site by third party service vendors. These metallic products and by-products (blanks, shavings, sludge) contain the same hazardous substances that were encountered in the shallow soil samples collected from the subject site.

In conducting this BEA, DEC utilized information presented in an environmental investigation previously conducted for the subject site. The previous investigation resulted in a Phase I Environmental Site Assessment (ESA), a Phase II ESA (Appendix C), a Contaminant Delineation Sampling and Chemical Analysis Report (Appendix D) and the Verification of Soil Remediation Excavation and Sampling Event (Appendix E). The previous investigation was conducted in January through July of 2002.

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The previous investigation indicated that chromium, iron, molybdenum and nickel were encountered at concentrations which exceeded the Residential and Commercial I Drinking Water Protection Criteria, which is also the Generic Residential Cleanup Criteria (GRCC) for soil. DEC also identified one shallow soil sample under the subject building, which exhibited concentrations of trichloroethene above the GRCC. Groundwater beneath the subject property also exhibited concentrations of tetrachloroethene and trichloroethene in exceedance of the GRCC.

An updated Phase I ESA (Appendix B) was recently conducted utilizing the methodology outlined in American Society for Testing and Materials, Standard Practice E 1527-00. Based on the results of the updated Phase I ESA, the conditions at the subject site have not significantly changed since the previous Phase I ESA was performed in 2002. DEC assumes that the concentrations of metallic constituents (chromium, iron, molybdenum and nickel) have not significantly changed in the shallow soils of the subject site since the 2002 sampling events.

As part of this BEA, DEC also conducted a groundwater sampling event for the five existing on-site monitor wells. The purpose of the sampling event was to provide updated chemical analysis for the volatile organic compounds (VOCs) and certain metallic constituents encountered within the groundwater. The results of the groundwater sampling event confirm that tetrachloroethene and trichloroethene still exist at concentrations exceeding the GRCC.

The results of the previous environmental investigation and recent groundwater sampling event (Tables 2 through 7) establish the subject site as a "facility" as defined in Part 201. DEC considers the data reported herein to be accurate and reliable for purposes of the BEA.

Based on the Phase I ESA, the subject site was undeveloped and vacant until 1947. The subject site was developed in two portions. The western portion of the subject site was developed in 1947. The original building structure (central portion of the currently existing building) was constructed in

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1947. In 1949, the first occupant of the subject site was identified as Commercial Grinding and Manufacturing Company. From 1957 through the present, Conical Tool Company has been the operator of the subject site. Conical Tool Company manufactures end mill bits for the tool and die industry. The eastern portion of the subject site appears to have been historically utilized as an unpaved parking lot/access driveway for the northern adjoining property. The historical operators identified at the northern adjoining property included an aluminum foundry (1940's), Boss Cushion and Spring Shop (1949), C & B Silo Company (1949 through 1966) and Cliff's Garage Truck Repair (1965 and 1966). The Conical Tool Company acquired the eastern portion of the subject site in the early 1970's. Conical Tool Company constructed several building additions in the late 1970's, which extended onto the eastern portion of the subject site. With the exception of the building additions, the eastern portion of the subject site has been used for unpaved parking. Various industrial activities, engine repair shops and automotive body shops were also historically identified at properties surrounding the subject site.

Based on the results of the updated Phase I ESA, DEC found no on-site recognized environmental conditions (RECs) in connection with the subject property, except for the following:

- In 2002, DEC conducted an environmental investigation at the subject site. The previous environmental investigation included a Phase I ESA, a Phase II ESA and a Contaminant Delineation Sampling and Chemical Analysis Report. In addition, impacted "hot spots" were excavated and disposed (approximately 60 cubic yards), Verification of Soil Remediation soil sampling was conducted, a local background survey was attempted for several metallic constituents, five monitor wells were installed and several groundwater sampling events were conducted. Impacted soil was primarily encountered on the eastern portion of the subject site. Impacted groundwater was encountered throughout the subject property. In summary, trichloroethene, chromium, iron, molybdenum, and nickel are currently present in the soil at concentrations exceeding the Generic Residential Cleanup Criteria (GRCC) outlined in the Administrative Rules for Part 201 Environmental Remediation of the Natural Resources and Environmental Protection Act 1994 PA 451, as amended, dated December 21, 2002 (Part 201). In addition, concentrations of trichloroethene and tetrachloroethene in the groundwater also currently exceed the GRCC. An overview of the previous environmental investigation and a summary of the analytical results are included in Section 2.3 of this report. The contaminated soil and groundwater at the subject site were identified as an on-site REC.

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Regarding off-site RECs in the surrounding area, DEC identified 20 sites of environmental contamination within the ASTM Approximate Minimum Search Distance (AMSD) criteria. The ASTM Phase I ESA requires that the environmental professional identify and review available government files regarding such sites located within specified radial distances of the subject property. DEC conducted the review at the MDEQ, Grand Rapids District office. The land use in the area was historically identified as heavy industrial. Due to the extensive hazardous substance use associated with the historical and current industrial activities in the area, the former land use in the surrounding area was identified as an off-site REC. Brief descriptions of the AMSD sites are included in Section 3.4 of the updated Phase I ESA report (Appendix B).

This BEA is intended to reasonably define the existing conditions and circumstances at the facility so that in the event of a subsequent release, there is a means of distinguishing any new release from the existing contamination. DEC completed the BEA utilizing methodology outlined in the "Instructions for Preparing and Disclosing Baseline Environmental Assessments and Section 7a Compliance Analysis to the Michigan Department of Environmental Quality" dated March 11, 1999 and the Part 201 Rules.

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3.0 PROPERTY DESCRIPTION & INTENDED HAZARDOUS SUBSTANCE USE

The subject site is located at 3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan. The subject site was identified in the Northeast ¼ of Section 24, Township 6 North, Range 12 West. Figures 1, 2 and 3 are included as a Project Location Map Boring Location/Monitor Well Location Diagram and Control Zone Diagram, respectively. A copy of the legal description, as provided by the Kent County Equalization Department, is included below and in Appendix F.

3890 Buchanan Avenue, SW

Lots 51, 52 & 53, also that part of vacated portion of Buchanan Avenue adjacent on the West, also Lots 78, 79 & 80, Roselawn Park No.1, Wyoming, Kent County, Michigan, according to the plat thereof.

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GRCC exceedances of chromium, iron, molybdenum, nickel and trichloroethene in the soil and trichloroethene and tetrachloroethene in the groundwater establish the subject site a "facility". DEC understands that hazardous substance use will take place in the future at the subject site, and that some of the metallic products and by-products may contain detectable concentrations of the same metallic hazardous substances encountered within the soil. However, Cut Above Tool Company, Inc. does not intend to use, store, handle or manage any significant quantities of trichloroethene or tetrachloroethene at the subject site. The source of the VOCs identified in the soil and groundwater appears to be potentially related to the historical operations at the subject site and/or the surrounding area. The hazardous substances proposed for use at the subject site are summarized in the following table.

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Table 1 - Proposed Hazardous Substance Use
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Product	Hazardous Ingredients (CAS #)
76 UNAX AW 32	Proprietary Mixture
WAY OIL HD 68	Proprietary Mixture
CITGO HYDRAULIC FLUID SUS-3, AW HYDRAULIC OIL NZ 4633-462	Mineral Oil, Petroleum Distillates, Solvent-Refined (Severe) Light Paraffinic (64741-89-5) Mineral Oil, Petroleum Distillates, Solvent-Dewaxed Heavy Paraffinic (64742-64-0) Mineral Oil, Petroleum Distillates, Hydrotreated (Severe) Heavy Paraffinic (64742-54-7) Refined Petroleum Oil (72623-87-1) Zinc Dialkylthiophosphates
#173 Synkool-M	Triethanolamine (102-71-6) 4-(2-Nitrobutyl) morpholine (2224-44-4) 4, 4-(2-Ethyl-2-Nitrotrimethylene)-dimorpholine (1854-23-5)
CITGO Hydraulic Oil A/W	Distillates, petroleum, solvent-refined heavy paraffinic (64741-88-4) Zinc alkylthiophosphate (68649-42-3)
TRIM® E206	Petroleum Oil (8002-05-9) Triethanolamine (102-71-6)
TRIM® SC200	Petroleum Oil (8002-05-9) Triethanolamine (102-71-6)
665513-00 Mobilmet Sigma	Alkyl Esters (68440-40-4)
600684-00 Mobil Velocite Oil No-10	Petroleum Hydrocarbons and additives (No reportable MSDS Ingredients)
600486-00 Mobil Vactra Oil No-1	Petroleum Hydrocarbons and additives (No reportable MSDS Ingredients)
602623-00 Mobil DTE 24	Petroleum Hydrocarbons and additives (No reportable MSDS Ingredients)
600494-00 Mobil Vactra Oil No-2	Petroleum Hydrocarbons and additives (No reportable MSDS Ingredients)

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Table 1 - Proposed Hazardous Substance Use, cont.
3890 Buchanan Avenue, SW, Wyoming, Michigan

Product	Hazardous Ingredients (CAS #)
CITGO A/W Hydraulic Oil 100	Distillates, Petroleum, Solvent-Refined Heavy Paraffinic (64741-88-4) Residual Oils, Petroleum, Solvent-Refined (64742-01-4) Zinc Alkyldithiophosphate (68649-42-3)
CITGO Ruot-O-Lene® 100	Distillates, Petroleum, Hydrotreated Light Naphthenic (64742-53-6) Distillates, Petroleum, Hydrotreated Heavy naphthenic (64742-52-5) Mineral Spirits (8052-41-3) Proprietary Ingredients
Mystic® Power Lubricants® Soluble Oil	Distillates, Petroleum, Hydrotreated Light Naphthenic (64742-53-6) Proprietary Ingredients
Ecocut Lco 8	Mineral Oil (proprietary)
Lightening 220™	Proprietary Mixture (No reportable MSDS Ingredients)
Rust and Scale Remover 139	Phosphoric Acid(7664-38-2) Isopropyl Alcohol (2-Propanol)(67-63-0)
600148-00 Mobil DTE Oil Light	Petroleum Hydrocarbons and additives (No reportable MSDS Ingredients)
Bio-Metal Cool HD	No known hazards (No reportable MSDS Ingredients)
Sandvik Hard Materials cemented tungsten carbide grades prefixed C, DC or CR	Tantalum Carbide (limits Tantalum dust) (12070-06-3) Cobalt (7440-48-4) Nickel (7440-02-0) Tungsten Carbide (12070-12-1) Chromium (limits for chromium (+3) compounds Cr) (7440-47-3) Molybdenum (7439-98-7)

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Table 1 - Proposed Hazardous Substance Use, cont.
3890 Buchanan Avenue, SW, Wyoming, Michigan

Product	Hazardous Ingredients (CAS #)
Carpenter Micro-Melt M4T2 HSS	Iron (1309-37-1) Tungsten (7440-33-7) Molybdenum (7439-98-7) Chromium (7440-47-3) Cobalt (7440-48-4) Manganese (7439-96-5) Copper (7440-50-8)
Seven Star Tool Steel (M7) ESR Standard Finish Annealed	Carbon (7440-44-0) Manganese (7439965) Silicon Phosphorus (7723140) Sulfur Chromium (18540299) Molybdenum (7439987) Tungsten Vanadium (7440622) Nickel/Copper
2.52 Rnd Bar TAT V-N (M-7N) Airmlt 10FT-15FT Mill Anld PP	Carbon (7440440) Manganese (7439965) Silicon Phosphorus (7723140) Sulfur Chromium (18540299) Molybdenum (7439987) Tungsten Vanadium (7440622) Nickel (7440020) Cobalt (7440484) Copper (7440508) Aluminum (7429905) Nitrogen Tin
H.R. & C.F. Carbon. Alloy & Tool Steel	Iron (7439896) Aluminum (7429905) Carbon (7440440) Chromium (18540299) Cobalt (7440484) Copper (7440508) Lead (7439921) Manganese (7439965)

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4.0 KNOWN CONTAMINATION

4.1 Previous Environmental Investigation

DEC conducted a previous environmental investigation at the subject site which consisted of a Phase I Environmental Site Assessment (ESA) dated January 29, 2002, a Phase II ESA dated February 14, 2002 and a Contaminant Delineation Sampling and Chemical Analysis Report dated April 10, 2002. In addition, "hot spot" areas of impacted soil were excavated and disposed of off-site (approximately 60 cubic yards). Verification of Soil Remediation sampling and chemical analysis was conducted at the excavation sites, a local background survey for several metallic constituents was attempted, five permanent monitor wells were installed and several groundwater sampling events were conducted. A summary of the previous environmental investigations is provided below.

Based on the Phase I ESA, the subject site was undeveloped and vacant until 1947. The subject site was developed in two portions. The western portion of the subject site was developed in 1947. The original building structure (central portion of the currently existing building) was constructed in 1947. In 1949, the first occupant of the subject site was identified as Commercial Grinding and Manufacturing Company. From 1957 through the present, Conical Tool Company was identified as the operator of the subject site. Conical Tool Company manufactures end mill bits for the tool and die industry. The eastern portion of the subject site appears to have been historically utilized as an unpaved parking lot/access driveway for the northern adjoining property. The historical operators identified at the northern adjoining property included an aluminum foundry (1940's), Boss Cushion and Spring Shop (1949), C & B Silo Company (1949 through 1966) and Cliff's Garage Truck Repair (1965 and 1966). The Conical Tool Company acquired the eastern portion of the subject site in the early 1970's. Conical Tool Company constructed several building additions in the late 1970's, which extended onto the eastern portion of the subject site. With the exception of the building additions, the eastern portion of the subject site has been used for unpaved parking. Various industrial

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activities, engine repair shops and automotive body shops were also historically identified at properties surrounding the subject site.

Based on the results of the January 2002 Phase I ESA, DEC found no on-site recognized environmental conditions (RECs) in connection with the subject property, except for the following:

- Based on the review of historical aerial photographs and features observed during the site walkover, two areas of possibly discolored soil were identified at the subject property. A historical area of possibly discolored soil was depicted on the 1970 and 1975 aerial photographs. The historical area of possibly discolored soil was located beneath what is currently the northeastern portion of the building structure. An area of discolored soil was also observed near the current northeastern corner of the subject building during the site walkover. DEC understands that an exterior storage area was formerly located on this portion of the subject site. A scrap steel bin and empty 55-gallon drums were stored on this portion of the subject site. The areas of discolored soil at the subject site were identified as an on-site REC.

The 2002 Phase II ESA was conducted to further investigate the on-site REC identified in the Phase I ESA. The Phase II ESA consisted of two soil borings. The soil borings were conducted at each of the areas of discolored soil. The analytical results from soil samples collected from the two soil borings are summarized in the following table. Detectable concentrations of volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PNAs) and metals were identified in the soil at the subject site. The concentrations of trimethylbenzene isomers, trichloroethene, chromium, iron, molybdenum and nickel exceeded the Generic Residential Cleanup Criteria (GRCC) as outlined in the Michigan Department of Environmental Quality (MDEQ), Environmental Response Division Operation Memorandum #18: Part 201 Generic Cleanup Criteria Tables dated December 21, 2002. The analytical results compared to the current cleanup criteria are summarized below in Table 2.

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Table 2 - Phase II ESA Soil Sample Analytical Results Summary
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	SB-1 (0.5-1') (µg/Kg)	SB-1 (4.5-5') (µg/Kg)	SB-2 (0.5-1') (µg/Kg)	SB-2 (3-3.5') (µg/Kg)	GRCC for Soil (µg/Kg)
1,2,4-trimethylbenzene	95636	2,000	BDL	BDL	BDL	2,100 ^a
1,3,5-trimethylbenzene	108678	2,400	BDL	BDL	BDL	1,800 ^a
trichloroethene	79016	BDL	BDL	790	BDL	100 ^a
total xylenes	1330207	130	BDL	BDL	BDL	5,600 ^a
Remaining VOCs	-	BDL	BDL	BDL	BDL	-
acenaphthene	83329	BDL	BDL	400	BDL	300,000 ^a
anthracene	120127	BDL	BDL	980	BDL	41,000 ^a
benzo(a)anthracene	56553	BDL	BDL	920	BDL	20,000 ^b
benzo(a)pyrene	50328	BDL	BDL	730	BDL	2,000 ^b
benzo(g,h,i)perylene	191242	BDL	BDL	2,900	BDL	2,500,000 ^b
benzo(k)fluoranthene	207089	BDL	BDL	460	BDL	200,000 ^b
chrysene	218019	BDL	BDL	1,000	BDL	2,000,000 ^b
dibenzo(a,h)anthracene	53703	BDL	BDL	520	BDL	2,000 ^b
fluoranthene	206440	9,700	4,800	31,000	BDL	730,000 ^a
fluorene	86737	BDL	BDL	440	BDL	390,000 ^a
indeno(1,2,3-cd)pyrene	193395	BDL	BDL	1,600	BDL	20,000 ^b
naphthalene	91203	BDL	BDL	360	BDL	35,000 ^a
phenanthrene	85018	890	BDL	3,800	BDL	56,000 ^a
pyrene	129000	6,300	3,400	19,000	BDL	480,000 ^a
Remaining PNAs	-	BDL	BDL	BDL	BDL	-

Notes:

- ^a Residential & Commercial I Drinking Water Protection Criteria.
- ^b Residential & Commercial I Direct Contact Criteria.
- ^c Infinite Source Volatile Soil Inhalation Criteria.
- ^d Statewide Default Background Level.
- BDL - Below the respective method detection limits.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on January 28, 2002 and February 6, 2002.

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Table 2 - Phase II ESA Soil Sample Analytical Results Summary, cont.
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	SB-1 (0.5-1') (µg/Kg)	SB-1 (4.5-5') (µg/Kg)	SB-2 (0.5-1') (µg/Kg)	SB-2 (3-3.5') (µg/Kg)	GRCC for Soil (µg/Kg)
aluminum	7429905	3,100,000	3,200,000	2,000,000	4,300,000	6,900,000 ^d
arsenic	7440382	1,700	1,500	6,200	5,000	7,600 ^b
cadmium	7440439	280	BDL	2,700	130	6,000 ^a
chromium, total	18540299	49,000	5,000	1,500,000	48,000	30,000 ^a
iron	7439896	5,000,000	4,700,000	46,000,000	17,000,000	12,000,000 ^d
lead	7439921	21,000	2,100	160,000	13,000	400,000 ^b
molybdenum	7439987	43,000	5,100	1,500,000	33,000	1,500 ^a
nickel	7440020	8,700	5,500	120,000	28,000	100,000 ^a
silver	7440224	BDL	550	BDL	690	4,500 ^a
zinc	7440666	44,000	9,300	150,000	39,000	2,400,000 ^a

Notes:

- ^a Residential & Commercial Drinking Water Protection Criteria.
- ^b Residential & Commercial Direct Contact Criteria.
- ^c Infinite Source Volatile Soil Inhalation Criteria.
- ^d Statewide Default Background Level.
- BDL - Below the respective method detection limits.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on January 28, 2002 and February 6, 2002.

Based on the presence of impacted soil, DEC conducted an investigation to further delineate the impacted media. The Contaminant Delineation Sampling and Chemical Analysis Report (Contaminant Delineation) summarized the additional sampling activities at the subject site. Based on the results of the Contaminant Delineation, three areas of impacted soil were identified at the subject site. The areas of impacted soil were located at the eastern end of the building, beneath the subject building and near a solid waste dumpster at the northern portion of the site. The analytical results of samples collected from the subject site also confirmed concentrations of trimethylbenzene isomers, dibenzo(a,h)anthracene and silver in the soil, which exceeded the GRCC. In addition, concentrations of trichloroethene were detected in the groundwater, which exceeded the GRCC. The analytical results from the Contaminant Delineation are summarized in the following tables.

Table 3 - Contaminant Delineation Soil Sample Analytical Results Summary
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	GP-1 (9-10') ($\mu\text{g/Kg}$)	GP-2 (1-3') ($\mu\text{g/Kg}$)	GP-3 (1-3') ($\mu\text{g/Kg}$)	GP-4 (1-3') ($\mu\text{g/Kg}$)	GP-5 (13-15') ($\mu\text{g/Kg}$)	GP-6 (1-1.5') ($\mu\text{g/Kg}$)	GP-7 (1-1.5') ($\mu\text{g/Kg}$)	GP-8 (1-1.5') ($\mu\text{g/Kg}$)	GP-10 (1') ($\mu\text{g/Kg}$)	GRCC for Soil ($\mu\text{g/Kg}$)
1,3,5-trimethylbenzene	108678	< 50	< 50	< 50	< 50	1,300	< 50	< 50	< 50	< 50	1,800 ^a
trichloroethene	79016	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	100 ^a
chromium, total	18540299	3,700	51,000	540,000	82,000	110,000	7,200	8,800	62,000	6,300	30,000 ^a
iron	7439896	9,200,000	26,000,000	21,000,000	11,000,000	7,900,000	3,400,000	5,200,000	6,900,000	5,100,000	12,000,000 ^b
molybdenum	7439987	< 500	38,000	580,000	83,000	230,000	5,400	4,500	53,000	950	1,500 ^a
nickel	7440020	9,400	37,000	59,000	17,000	15,000	4,200	8,100	14,000	6,300	100,000 ^a

Notes:

^a Residential & Commercial Drinking Water Protection Criteria.

^b Statewide Default Background Level.

BDL - Below the respective method detection limits.

Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.

Samples collected on March 26 and 27, 2002

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Table 3 - Contaminant Delineation Soil Sample Analytical Results Summary, cont.
3890 Buchanan Avenue, SW. Wyoming, Michigan

Constituent	CAS Number	GP-9 (0.5-1') ($\mu\text{g/Kg}$)	GP-9 (9-11') ($\mu\text{g/Kg}$)	GRCC for Soil ($\mu\text{g/Kg}$)
1,2,4-trimethylbenzene	95636	24,000	500	2,100 ^a
1,3,5-trimethylbenzene	108678	7,900	130	1,800 ^a
ethylbenzene	100414	560	< 50	1,500 ^a
total xylenes	1330207	4,800	< 150	5,600 ^a
toluene	108883	110	< 50	16,000 ^a
Remaining VOCs	-	BDL	BDL	-
acenaphthene	83329	< 330	< 330	300,000 ^a
acenaphthylene	208968	< 330	< 330	5,900 ^a
anthracene	120127	< 330	< 330	41,000 ^a
benzo(a)anthracene	56553	1,700	< 330	20,000 ^b
benzo(a)pyrene	50328	1,800	< 330	2,000 ^b
benzo(b)fluoranthene	205992	880	< 330	20,000 ^b
benzo(g,h,i)perylene	191242	8,200	< 330	2,500,000 ^b
benzo(k)fluoranthene	207089	750	< 330	200,000 ^b
chrysene	218019	2,100	< 330	2,000,000 ^b
dibenzo(a,h)anthracene	53703	4,400	< 330	2,000 ^b
fluoranthene	206440	19,000	< 330	730,000 ^a
fluorene	86737	< 330	< 330	390,000 ^a
indeno(1,2,3-cd)pyrene	193395	6,500	< 330	20,000 ^b
naphthalene	91203	1,200	< 330	35,000 ^a
phenanthrene	85018	1,100	< 330	56,000 ^a
pyrene	129000	13,000	< 330	480,000 ^a

Notes:

- ^a Residential & Commercial Drinking Water Protection Criteria
- ^b Direct Contact Criteria.
- ^c Statewide Default Background Level.
- BDL - Below the respective method detection limits
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on March 26 and 27, 2002.

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Table 3 - Contaminant Delineation Soil Sample Analytical Results Summary, cont.
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	GP-9 (0.5-1') (µg/Kg)	GP-9 (9-11') (µg/Kg)	GRCC for Soil (µg/Kg)
aluminum	7429905	4,400,000	2,400,000	6,900,000 ^c
arsenic	7440382	4,100	1,400	7,600 ^b
cadmium	7440439	330	< 50	6,000 ^a
chromium	18540299	38,000	9,100	30,000 ^a
iron	7439896	13,000,000	3,600,000	12,000,000 ^c
lead	7439921	50,000	2,000	400,000 ^b
molybdenum	7439987	25,000	8,700	1,500 ^a
nickel	7440020	140,000	6,000	100,000 ^a
silver	7440224	15,000	< 500	4,500 ^a
zinc	7440666	210,000	11,000	2,400,000 ^a

Notes:

- ^a Residential & Commercial Drinking Water Protection Criteria.
- ^b Direct Contact Criteria
- ^c Statewide Default Background Level
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18 Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002
- Samples collected on March 26 and 27, 2002

Table 4 - Groundwater Sample Analytical Results Summary
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	GP-1 (17.5-19') (µg/L)	GP-5 (17-19') (µg/L)	GP-9 (15-17') (µg/L)	GRCC for Groundwater (µg/L)*
1,3,5-trimethylbenzene	108678	< 1	< 1	< 1	72
trichloroethene	79016	14	100	< 1	5.0
Remaining VOCs	-	NS	NS	BDL	-
molybdenum	7439987	< 10	< 10	22	73
zinc	7440666	NS	NS	29	2,400
Remaining Metals	-	BDL	BDL	BDL	-

Notes:

- ^{*} Residential and Commercial Drinking Water Criteria.
- BDL - Below the respective method detection limits.
- NS - Not analyzed for respective parameter(s)
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18 Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002
- Samples were collected on March 26, 2002.

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The two areas of impacted soil (located outside the subject building) were excavated and removed from the subject site on July 9, 2002. Approximately 60 cubic yards of impacted soil were removed and disposed at Ottawa County Farms (Type II) Sanitary Landfill in Allendale, Michigan. Twelve Verification of Soil Remediation (VSR) soil samples were collected from the floor and sidewalls of the excavations. The analytical results of the VSR soil sampling identified that concentrations of chromium, iron and molybdenum still existed in excess of the GRCC in certain areas outside the limits of the subject building. Nickel and trichloroethene also exist in an area of soil under the subject building. A local background survey was attempted to determine whether the specific metal concentrations (chromium, iron, molybdenum and nickel) were representative of the naturally occurring conditions in the soil. The results of the background survey did not support that the metallic concentrations were representative of natural conditions. The analytical results of the VSR samples and the local background survey are summarized below.

Table 5 - VSR Sample Analytical Results Summary

Constituent	CAS Number	VSR-1 (2.5') ($\mu\text{g/Kg}$)	VSR-2 (2.5') ($\mu\text{g/Kg}$)	VSR-3 (3') ($\mu\text{g/Kg}$)	VSR-4 (1.5') ($\mu\text{g/Kg}$)	GRCC for Soil ($\mu\text{g/Kg}$)
dibenzo(a,h)anthracene	53703	< 330	< 330	< 330	1,100	2,000 ^a
trichloroethene	79016	< 50	< 50	< 50	< 50	100 ^b
chromium, total	18540299	2,400	69,000	4,900	21,000	30,000 ^b
iron	7439896	2,200,000	8,300,000	4,600,000	7,200,000	12,000,000 ^c
molybdenum	7439987	3,400	57,000	2,800	18,000	1,500 ^b
nickel	7440020	3,200	17,000	4,200	14,000	100,000 ^b
silver	7440224	< 50	< 500	< 500	< 500	4,500 ^b

Notes

- ^a Direct Contact Criteria.
- ^b Residential & Commercial / Drinking Water Protection Criteria.
- ^c Statewide Default Background Level.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on July 9, 2002.

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Table 5 - VSR Sample Analytical Results Summary, cont.

Constituent	CAS Number	VSR-5 (2') (µg/Kg)	VSR-6 (1') (µg/Kg)	VSR-7 (0.5') (µg/Kg)	VSR-8 (0.5') (µg/Kg)	GRCC for Soil (µg/Kg)
dibenzo(a,h)anthracene	53703	< 330	< 330	< 630	< 330	2,000 ^a
trichloroethene	79016	< 50	< 50	< 50	< 50	100 ^b
chromium, total	18540299	10,000	6,500	450,000*	110,000	30,000 ^b
iron	7439896	6,200,000	5,000,000	25,000,000	11,000,000	12,000,000 ^c
molybdenum	7439987	6,500	3,400	330,000	120,000	1,500 ^b
nickel	7440020	6,900	5,800	58,000	18,000	100,000 ^b
silver	7440224	< 500	< 500	< 500	< 500	4,500 ^b

Notes:

- ^a Direct Contact Criteria
- ^b Residential & Commercial I Drinking Water Protection Criteria.
- ^c Statewide Default Background Level.
- *VSR-7 - Analyzed for hexavalent chromium. Results indicate < 500 ug/Kg hexavalent chromium
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on July 9, 2002.

Table 5 - VSR Sample Analytical Results Summary, cont.

Constituent	CAS Number	VSR-9 (0.5') (µg/Kg)	VSR-10 (0.5') (µg/Kg)	VSR-11 (1.5') (µg/Kg)	VSR-12 (1.5') (µg/Kg)	GRCC for Soil (µg/Kg)
dibenzo(a,h)anthracene	53703	< 330	< 330	< 330	< 330	2,000 ^a
trichloroethene	79016	< 50	< 50	< 50	< 50	100 ^b
chromium, total	18540299	12,000	25,000	6,100	6,600	30,000 ^b
iron	7439896	6,400,000	5,900,000	5,300,000	5,400,000	12,000,000 ^c
molybdenum	7439987	27,000	24,000	4,500	8,900	1,500 ^b
nickel	7440020	7,800	6,500	4,800	4,900	100,000 ^b
silver	7440224	< 500	< 500	< 500	< 500	4,500 ^b

Notes:

- ^a Direct Contact Criteria.
- ^b Residential & Commercial I Drinking Water Protection Criteria.
- ^c Statewide Default Background Level.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on July 9, 2002.

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Table 6 - Background Sample Analytical Results Summary

Constituent	CAS Number	BG-1 (1-2') (µg/Kg)	BG-2 (1-2') (µg/Kg)	BG-3 (1.5-2') (µg/Kg)	BG-4 (1.5-2') (µg/Kg)	BG-5 (1-2') (µg/Kg)	GRCC for Soil (µg/Kg)
chromium	18540299	6.900	7.200	4,800	4,500	5,100	30,000 ^b
iron	7439896	5,100,000	6,100,000	4,500,000	4,600,000	4,800,000	12,000,000 ^c
molybdenum	7439987	18,000	520	1,100	325	325	1,500 ^b
nickel	7440020	4.900	5.400	3.800	4.400	4.900	100,000 ^b

Notes:

- ^a Direct Contact Criteria.
- ^b Residential & Commercial I Drinking Water Protection Criteria
- ^c Statewide Default Background Level.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on July 18, 2002.

4.2 Groundwater Monitoring/Sampling Events

On July 17 and 19, 2002, DEC installed five permanent monitor wells at the subject site. The location of the monitor wells are depicted on Figure 2. DEC collected groundwater samples from the wells on July 22, 2002, November 12, 2002, February 14, 2003 and March 26, 2004. Each of the sampling events identified concentrations of trichloroethene and tetrachloroethene in the groundwater exceeding the GRCC. The analytical results for the groundwater sampling are summarized in the following tables.

**Table 7 - July 2002 Groundwater Sample Analytical Results
3890 Buchanan Avenue, SW, Wyoming, Michigan**

Constituent	CAS Number	MW-1 (12') (µg/L)	MW-2 (12') (µg/L)	MW-3 (16') (µg/L)	MW-4 (14') (µg/L)	MW-5 (17.5') (µg/L)	GRCC for Groundwater
tetrachloroethene	127184	1	< 1	< 1	12	4.4	5.0
trichloroethene	79016	7.8	28	85	17	< 1	5.0
Remaining VOCs	-	BDL	BDL	BDL	BDL	BDL	-
molybdenum	7439987	< 10	< 10	< 10	36	< 10	73

Notes:

- ^a Residential & Commercial I Drinking Water Protection Criteria.
- BDL - Below the respective method detection limits.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on July 22, 2002.

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Table 8 - November 2002 Groundwater Sample Analytical Results
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	MW-1 (12') (µg/L)	MW-2 (12') (µg/L)	MW-3 (16') (µg/L)	MW-4 (14') (µg/L)	MW-5 (17.5') (µg/L)	GRCC for Groundwater (µg/L)*
1,1,1-trichloroethane	71556	< 1	< 1	1.7	1.4	< 1	200
tetrachloroethene	127184	1.2	< 1	< 1	6.6	2.6	5.0
trichloroethene	79016	4	23	19	6.2	< 1	5.0
Remaining VOCs	-	BDL	BDL	BDL	BDL	BDL	-
molybdenum	7439987	NS	NS	NS	NS	NS	73

Notes:

- * Residential & Commercial Drinking Water Protection Criteria
- BDL - Below the respective method detection limits.
- NS - Sample not analyzed for chemical parameter specified
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on November 12, 2002

Table 9 - February 2003 Groundwater Sample Analytical Results
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	MW-1 (12') (µg/L)	MW-2 (12') (µg/L)	MW-3 (16') (µg/L)	MW-4 (14') (µg/L)	MW-5 (17.5') (µg/L)	GRCC for Groundwater (µg/L)*
1,1,1-trichloroethane	71556	< 1	< 1	3.9	NS	< 1	200
tetrachloroethene	127184	1.8	1.3	1	NS	3	5.0
trichloroethene	79016	1.8	< 1	98	NS	< 1	5.0
Remaining VOCs	-	BDL	BDL	BDL	NS	BDL	-
molybdenum	7439987	< 10	< 10	< 10	NS	< 10	73

Notes:

- * Residential & Commercial Drinking Water Protection Criteria.
- BDL - Below the respective method detection limits.
- NS - Sample not analyzed for chemical parameter specified
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002
- Samples collected on February 14 and 17, 2003

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Table 10 - March 2004 Groundwater Sample Analytical Results
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	MW-1 (12') (µg/L)	MW-2 (12') (µg/L)	MW-3 (16') (µg/L)	MW-4 (14') (µg/L)	MW-5 (17.5') (µg/L)	GRCC for Groundwater (µg/L)*
chloroform	67663	2.0	< 1.0	< 1.0	NS	< 1.0	100
tetrachloroethene	127184	2.0	27	< 1.0	NS	2.0	5.0
trichloroethene	79016	2.1	19	38	NS	< 1	5.0
Remaining VOCs	-	BDL	BDL	BDL	NS	BDL	-
chromium, total	18540299	< 5	< 5	< 5	NS	< 5	100
iron	7439896	< 50	< 50	< 50	NS	< 50	300
molybdenum	7439987	< 10	< 10	< 10	NS	< 10	73

Notes:

- * Residential & Commercial Drinking Water Protection Criteria.
- BDL - Below the respective method detection limits
- NS - Sample not analyzed for chemical parameter specified, because well could not be located.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18 Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on March 26, 2004

Impacted soil and groundwater has been documented throughout the subject property. In summary, trichloroethene, chromium, iron, molybdenum, and nickel are present in the soil primarily on the eastern portion of the subject site at concentrations exceeding the GRCC. In addition, concentrations of trichloroethene and tetrachloroethene in certain groundwater samples also exceed the GRCC.

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5.0 LIKELIHOOD OF OTHER CONTAMINATION

Performance of this assessment is intended to reduce, but may not eliminate, uncertainty regarding the characterization of hazardous substances released or encountered at the subject property. The assessment also recognizes reasonable limits to time and costs. The most an environmental professional can do, is to prepare a logical assessment approach to characterize and evaluate the recognized environmental conditions encountered at the subject site. The potential exists, however, for hazardous substances to be present at the subject property in elevated concentrations at other locations not targeted in this assessment.

Regarding off-site RECs in the surrounding area, DEC identified 20 sites within the ASTM Approximate Minimum Search Distance (AMSD) criteria. The ASTM Phase I ESA requires that the environmental professional identify and review available government files as to such sites within specified radial distances of the subject property. DEC conducted the review at the MDEQ, Grand Rapids District office. The land use in the area was historically identified as heavy industrial. Due to the extensive hazardous substance use associated with the historical and current industrial activities in the area, the former land use in the surrounding area was identified as an off-site REC. Impacted groundwater migrating from the off-site REC onto the subject property is likely. Brief descriptions of the AMSD sites are included in Section 3.4 of the updated Phase I ESA in Appendix B.

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6.0 ALTERNATIVE APPROACHES

Conical Real Estate, LLC (prospective purchaser) and Cut Above Tool Company, Inc.(prospective operator) will rely on engineering controls and isolations zones as a means of distinguishing the pre-existing contamination from any new release after acquisition and commencement of operations at the subject site. Specifically, the subject site will be divided into two zones: Zone A (Proposed Isolation Zone) and Zone B (Proposed Concrete and Asphalt Engineering Control). Figure 3 depicts the location of Zone A and Zone B. Documentation relating to the installation, performance and maintenance of the isolation zones and engineering controls will be maintained by the Cut Above Tool Company, Inc.

6.1 Zone A - Proposed Isolation Zone

Zone A, identified in Figure 3, consists of the lawn area located along the western and southern portion of the subject property and the unimproved area along the central northern portion of the subject property.

An isolation zone will be created in Zone A using 4 to 6 inches of clean, screened topsoil over the unimproved ground. The topsoil will be seeded and/or covered with landscape mulch. The installation process will be documented and records will be maintained by the Cut Above Tool Company, LLC. Annual inspections of the isolation zone will be conducted by Cut Above Tool Company's members to document the condition of the topsoil and to repair any areas that appear eroded or thin. A minimum of 4 inches of topsoil will be verified during the annual inspection. Any needed modifications to the isolation zone will be made within 45 days of the noted deficiency and documented accordingly.

The future operator, Cut Above Tool Company, Inc., does not intend any significant hazardous substance use within Zone A of the subject site. However, clean topsoil material is proposed as surface material over Zone A. The clean topsoil material will provide a media that may be sampled in the future. The clean topsoil material will provide a verifiable means through visual inspections

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of assuring that any future release will be spatially separated from the existing contaminated media. In addition, if a release occurs on the surface of the clean topsoil material, it can be sampled and responded to in a timely manner to prevent commingling with the existing contamination. If a new release cannot be responded to in a timely manner and commingles with the existing contamination, the Petitioners will not use this BEA as an exemption to liability for the response activities necessary to address the new release.

6.2 Zone B - Engineering Controls Area

Zone B, identified in Figure 3, is the area of the subject site that currently is occupied by concrete or asphalt surfaces or will be improved with asphalt paved surfaces. Zone B will consist of the concrete flooring within the single story building, and all exterior asphalt and concrete paved surfaces. The location of the existing and proposed engineering controls are depicted in Figure 3.

The future operator, Cut Above Tool Company, Inc., may use, store, handle, or manage hazardous substances within the existing building at the subject site. Cut Above Tool Company intends to operate metal grinding operations. The hazardous substances identified in Table 1 will be stored or handled in the eastern portion of the building. With the exception of the metallic shavings and empty drums, no hazardous substance use, storage or handling is proposed outside the limits of the subject building. The metallic shavings and empty drums will be stored in a covered bin on a concrete pad (with secondary containment) along the eastern exterior wall of the subject building.

Zone B will be occupied by asphalt and concrete pavement and building structures with concrete flooring. The asphalt and concrete pavement will be constructed and/or repaired to serve as an engineering control across Zone B.

No catch basins or strip drains are currently used or will be used for storm water collection on the subject site. The grade of the site will be "crowned" to direct storm water to the municipal storm water conveyance system in the adjoining public street.

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Any future release of hazardous substance in Zone B will be spatially separated from the pre-existing contamination by a physical barrier that will exist over nearly all of the subject site. Therefore, any contaminants identified beneath or beyond the physical barrier outside the engineering controls will be considered pre-existing contaminants, unless these contaminants are present as a result of a new release caused by the operator.

Visual inspections and maintenance of the engineering controls will be used to prevent or control future releases in Zone B. Quarterly visual inspections of the hazardous materials storage areas within the building will be conducted to evaluate the condition of the product containers within the storage area and to determine whether a leak or spill has occurred. In addition, the surfaces of the concrete and asphalt will be inspected for cracking and/or separation on a yearly basis. Cracks or separations greater than 1/4 inch will be repaired. The quarterly and annual inspections will be conducted by a member of Cut Above Tool Company, LLC and the results of the inspection will be recorded on an inspection log and maintained on-site. Any required repairs will be conducted within 45 days of the inspection date.

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7.0 CONCLUSIONS

The following environmental conditions were identified at the subject property:

- Detectable concentrations of metallic constituents, volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PNAs) were identified in the soil samples collected from the subject property. Specifically, the chemical analysis results identified **chromium, iron, molybdenum, nickel** and **trichloroethene** in soil samples at concentrations which exceeded the Generic Residential Cleanup Criteria (GRCC) as outlined in the Administrative Rules for Part 201.
- Detectable concentrations of VOCs were identified in the groundwater samples collected from the subject property. Specifically, the chemical analysis results identified **trichloroethene** and **tetrachloroethene** in groundwater samples at a concentration which exceeded the GRCC for groundwater as outlined in the Administrative Rules for Part 201.

Based on the results, the subject site is a "facility" under Part 201.

Cut Above Tool Company, Inc. intends to use some of the "same" hazardous substances that have impacted the subject site. It will rely on engineering controls and isolation zones to provide a verifiable means to distinguish the existing contamination from any new release. The details of the engineering controls and the isolation zones are included as Section 6.0.

No hazardous substance use, storage or handling is proposed for Zone A - the isolation zone area. The clean topsoil material proposed as surface material over Zone A will provide a media that may be sampled in the future. The clean topsoil material will provide a verifiable means through visual inspections of assuring that any future release will be spatially separated from the existing contaminated media. In addition, if a release occurs on the surface of the clean topsoil material, it can be sampled and responded to in a timely manner to prevent commingling with the existing contamination. If a new release cannot be responded to in a timely manner and commingles with the existing contamination, the Petitioners will not use this BEA as an exemption to liability for the response activities necessary to address the new release.

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Zone B will use engineering controls to prevent any future releases from commingling with the existing contamination. New or existing concrete and asphalt will provide a physical barrier that will prevent any future releases from commingling with the underlying and pre-existing contamination. The engineering control features can be visually inspected for integrity to verify the engineering controls are performing properly. The engineering controls provide a verifiable mean to spatially separate any future release from the existing contaminated media. If a release should occur in the future, the engineering controls will provide additional time to respond to the release without the immediate concern of commingling with the existing contamination. If a new release breaches an engineering control and commingles with the existing contamination, the Petitioners will not use this BEA as an exemption to liability for the response activities necessary to address the new release.

Based on DEC's investigations and the proposed future uses of the subject site, it is DEC's opinion that this BEA is sufficient to provide a reasonable basis to distinguish the existing contamination from a potential future hazardous substance release on the subject site.

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and the Rules promulgated thereunder**

8.0 REFERENCES

Michigan Department of Environmental Quality - Instructions for Preparing and Disclosing Baseline Environmental Assessments and Section 7a Compliance Analysis to the Michigan Department of Environmental Quality dated March 11, 1999.

Administrative Rules for Part 201 of the Natural Resources and Environmental Protection Act 1994 PA 451, as amended, December 21, 2002.

Phase I Environmental Site Assessment, Conical Tool Company, 3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan completed by Dixon Environmental Consulting, Inc. on January 29, 2002 and April 7, 2004.

Phase II Environmental Site Assessment, Conical Tool Company, 3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan completed by Dixon Environmental Consulting, Inc. on February 14, 2002.

Contaminant Delineation Sampling and Chemical Analysis Report, Conical Tool Company, 3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan completed by Dixon Environmental Consulting, Inc. on April 10, 2002.

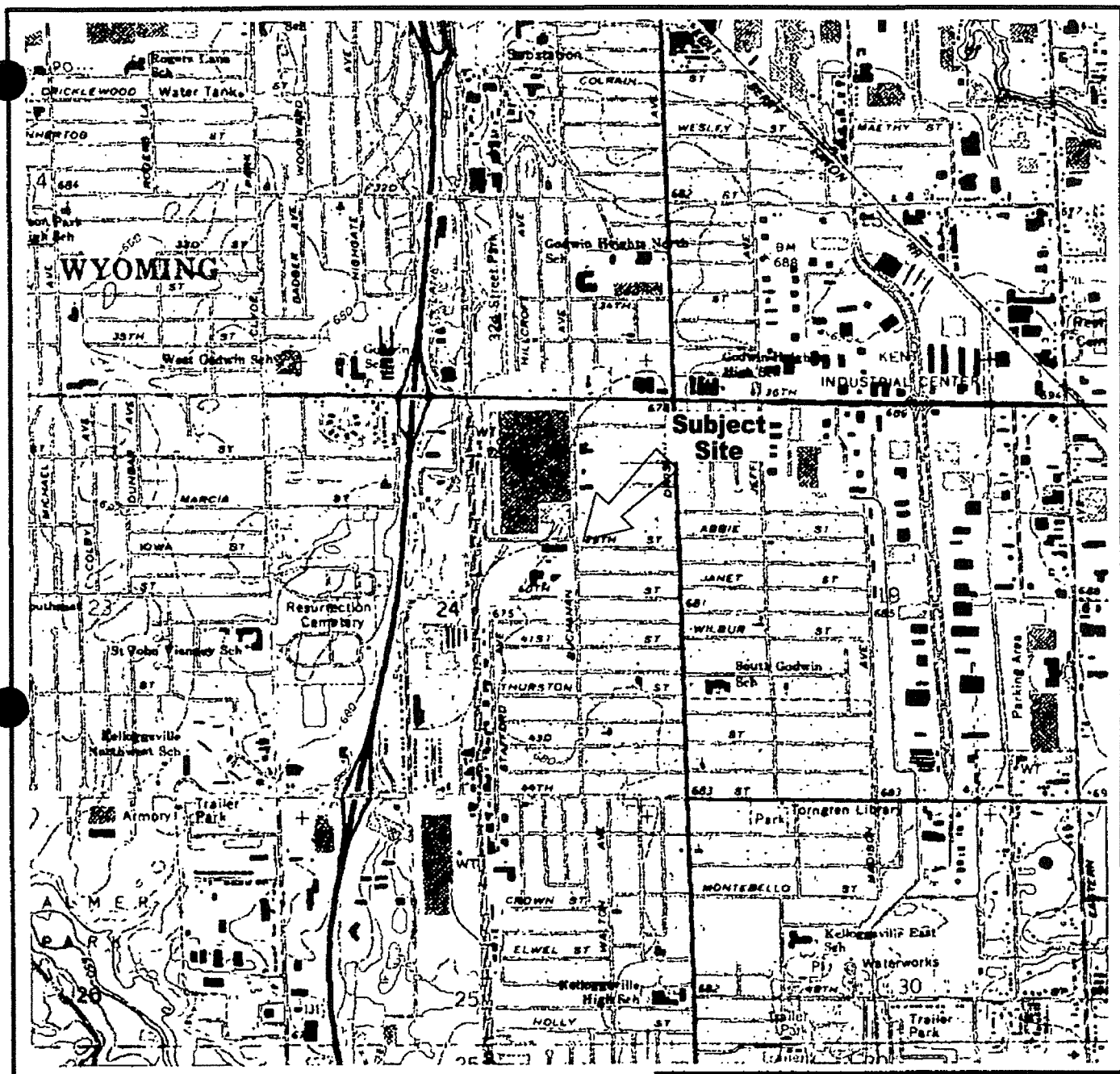
Verification of Soil Remediation Sample Location Diagram and Chemical Analysis Results, Conical Tool Company, 3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan completed by Dixon Environmental Consulting, Inc. in July 2002 (no formal report).

FIGURES

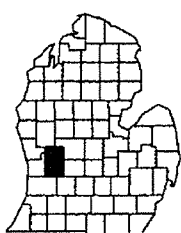
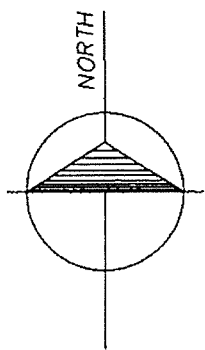
DIXON
ENVIRONMENTAL CONSULTING, INC.

FIGURES

**PROJECT LOCATION MAP
BORING LOCATION/MONITOR WELL LOCATION DIAGRAM
CONTROL ZONE DIAGRAM**

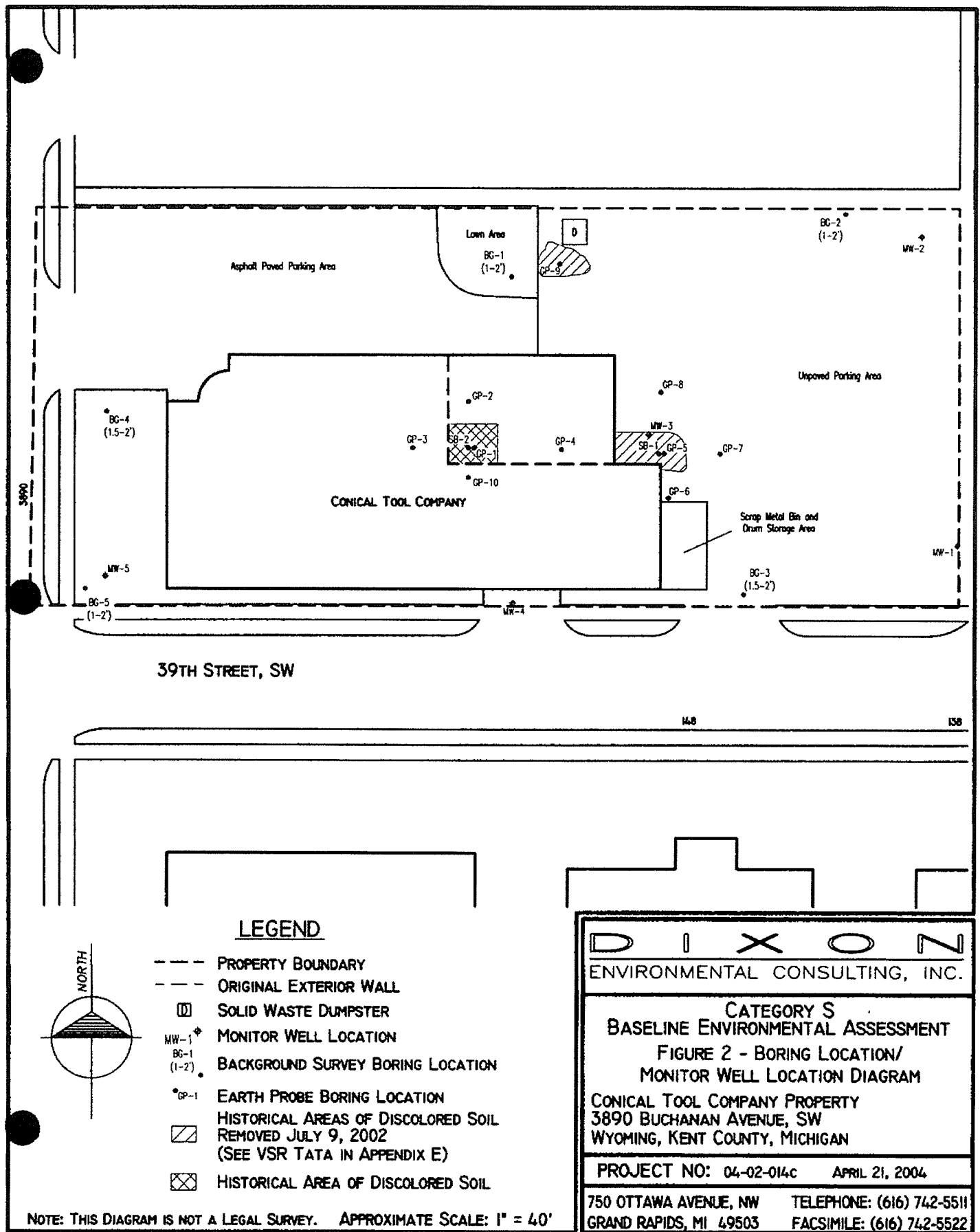


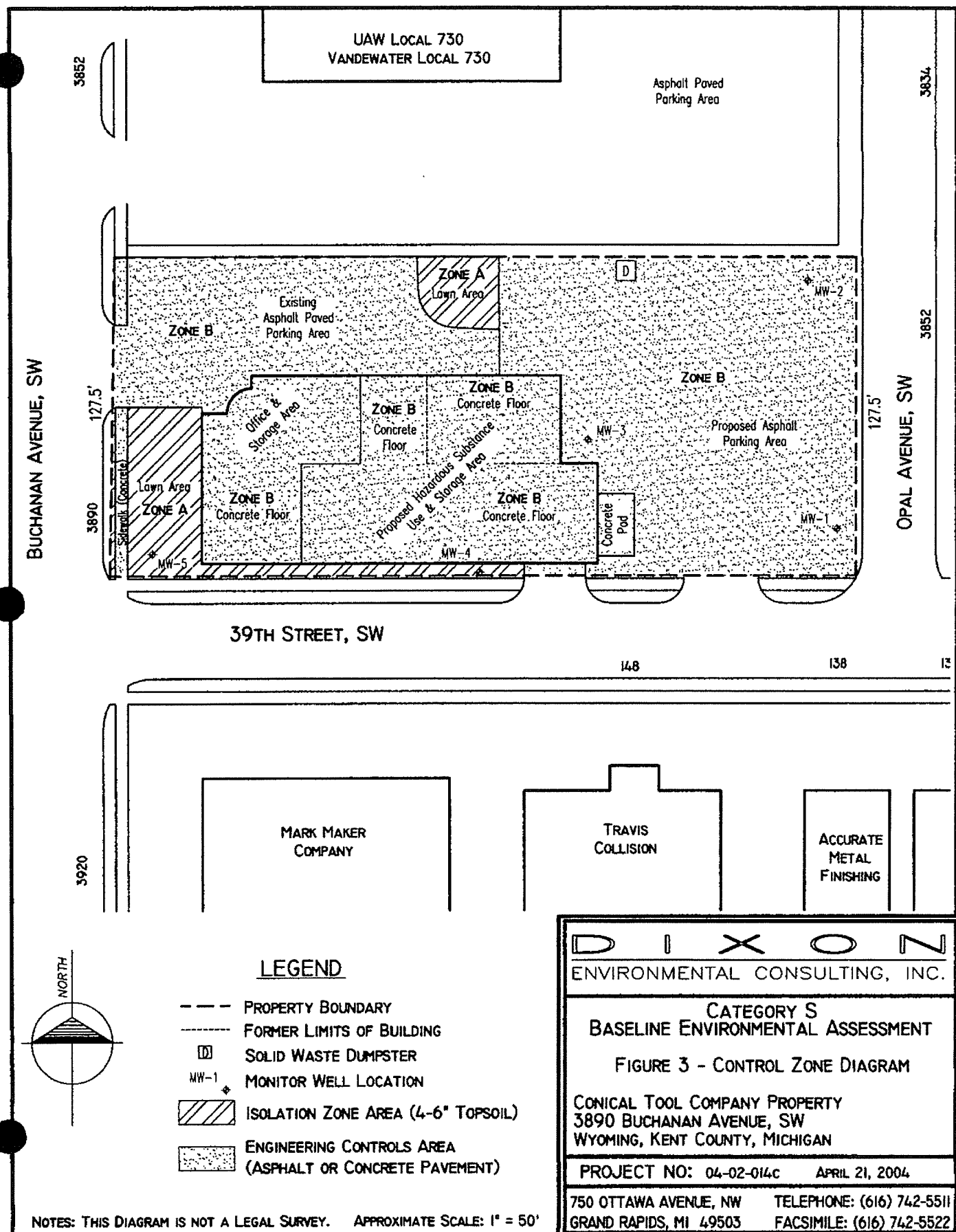
BASE MAP TAKEN FROM USGS 7.5 MINUTE QUADRANGLES:
CUTLERVILLE, MICHIGAN AND GRAND RAPIDS WEST, MICHIGAN



KENT COUNTY
APPROXIMATE SCALE: 1" = 2000'

D I X O N	
ENVIRONMENTAL CONSULTING, INC.	
CATEGORY S BASELINE ENVIRONMENTAL ASSESSMENT	
FIGURE I - PROJECT LOCATION MAP	
CONICAL TOOL COMPANY PROPERTY 3890 BUCHANAN AVENUE, SW WYOMING, KENT COUNTY, MICHIGAN	
PROJECT NO: 04-02-014C	APRIL 21, 2004
750 OTTAWA AVENUE, NW GRAND RAPIDS, MI 49503	TELEPHONE: (616) 742-5511 FACSIMILE: (616) 742-5522





A

DIXON
ENVIRONMENTAL CONSULTING, INC.

APPENDIX A

**QUALIFICATIONS OF
ENVIRONMENTAL PROFESSIONAL**

PROFESSIONAL RESUME Dixon Environmental Consulting, Inc.

James E. Dixon, P.E.

PRINCIPAL ENGINEER

EDUCATION

M.S. Candidate Earth Science Geology,
Western Michigan University,
Kalamazoo, MI

B.S. Civil Engineering, Michigan State
University, East Lansing, MI

Nation Water Well Association,
Groundwater Remediation Technology
Seminar, Long Beach, CA

ASFE Excavation Safety, Loss
Prevention Seminar, Detroit, MI

CERTIFICATION

Professional Engineer, States of
Michigan #40018, Kentucky #19270
Michigan Certified Underground
Storage Tank Professional #731
Stormwater Management Operator,
-industrial site #02706 A-1i
(expires July 1, 2006)
-construction site #01620 A1j
(expires July 1, 2006)

OSHA 1910.120 40-hour Hazardous
Waste Training and current
8-hour Refresher Training
expires April 2004

8-hour Supervisor's OSHA Training
EPA Lead Based Paint Inspector
Certification

RMD's LPA-1 Lead Paint Inspection
System Certification

Nuclear Density Gauge Testing
Certification

PROFESSIONAL ACTIVITIES

American Society of Civil Engineers
National Society of Professional
Engineers

Nation Water Well Association
Grand Rapids Chamber of Commerce,
Environmental Policy Committee
National Lead Abatement Council

EXPERIENCE

Mr. Dixon is a Principal Engineer for Dixon Environmental Consulting, Inc. (DEC) His primary responsibilities include the management of all facets of DEC. Mr. Dixon is also responsible for conducting environmental services provided by DEC. His experiences include project management relating to the design and performance of environmental subsurface exploration, waste characterization, design of both soil and groundwater remediation systems, conducting pollution prevention plans, performing environmental site assessments and Baseline Environmental Assessments. Mr. Dixon has also served as Construction Quality Assurance Engineer for several landfill projects and development of Quality Assurance/Quality Control (QA/QC) programs for building and remediation system construction. Areas of expertise include:

- Manager for numerous Phase I Environmental Site Assessment projects using ASTM Standard 1527-00.
- Project manager for Phase II and III Environmental Site Assessment projects.
- Conducting Baseline Environmental Site Assessments (BEA's) with concurring determination from MDEQ for Categories D, N and S.
- Associate and Senior Project Manager for Leaking Underground Storage Tank (LUST) projects, including removal and in-place closures, contaminant delineation, and remediation using Risk-Based Corrective Action (RBCA) procedures.
- Project Management for Underground Storage Tank Removal, Sampling and Closure Documentation according to the Michigan State Fire Marshal protocol.
- Preparation and review of hydrogeological/contaminant assessment reports.

- Managing Asbestos Abatement project including the survey, notification, air monitoring, coordination and abatement disposal.

- Development of QA/QC programs for installation of natural and synthetic liner systems, including dual-contained HDPE piping systems for landfills.

- Construction design and management for installation of large-scale soil and groundwater remediation systems.

- Conducting Stormwater Pollution Prevention Plans for construction and industry.

- Remedial investigations, feasibility studies and risk assessments.

- Interpretation of Ground Penetrating Radar (GPR) surveys.

- Design and installation of free product recovery systems at industrial sites.

- Design, permitting and construction management of underground and above ground storage tank systems.

- Design and construction management for earth retention systems.

- Waste Characterization for waste water, permitting with regulating governmental agency, verifying non-hazardous status of generator.

- Soil Density verification, permeability testing, physical testing of construction materials.

B

DIXON
ENVIRONMENTAL CONSULTING, INC.

APPENDIX B

**PHASE I ENVIRONMENTAL SITE ASSESSMENT
COMPLETED BY DIXON ENVIRONMENTAL CONSULTING, INC.
ON APRIL 7, 2004**

***PHASE I ENVIRONMENTAL SITE ASSESSMENT
CONICAL TOOL COMPANY PROPERTY
3890 BUCHANAN AVENUE, SW
WYOMING, MICHIGAN***

Prepared for:

*Mr. David W. Melinn
Conical Real Estate, LLC
3890 Buchanan Avenue, SW
Wyoming, Michigan 49548*

Prepared by:

*Dixon Environmental Consulting, Inc.
750 Ottawa Avenue, NW
Grand Rapids, Michigan 49503*

April 7, 2004

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EXECUTIVE SUMMARY

Dixon Environmental Consulting, Inc. (DEC) was retained to conduct a Phase I Environmental Site Assessment (ESA) of the Conical Tool Company Property located at 3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan. The Tax Parcel Identification Number for the 0.88-acre subject site is 41-17-24-276-014. The subject site consists of a commercial building structure, an asphalt paved parking area and an unpaved parking area. This Phase I ESA was conducted to identify the potential for Recognized Environmental Conditions (RECs) to exist at the subject site. DEC has completed the Phase I ESA utilizing methodology outlined in American Society for Testing and Materials (ASTM), Standard Practice E 1527-00.

Based on the Phase I ESA, the subject site was undeveloped and vacant until 1947. The subject site was acquired and developed in two portions. The western portion of the subject site was developed in 1947. The original building structure (central portion of the current subject building) was constructed in 1947. In 1949, the first occupant of the subject site was identified as Commercial Grinding and Manufacturing Company. From 1957 through the present, Conical Tool Company was identified as the operator of the subject site. Conical Tool Company manufactures end mill bits for the tool and die industry. The eastern portion of the subject site appears to have been historically utilized as an unpaved parking lot/access driveway for the northern adjoining property. The historical operators identified at the northern adjoining property included an aluminum foundry (1940's), Boss Cushion and Spring Shop (1949), C & B Silo Company (1949 through 1966) and Cliff's Garage Truck Repair (1965 and 1966). The Conical Tool Company acquired the eastern portion of the subject site in the early 1970's. Conical Tool Company constructed several building additions in the late 1970's, which extended onto the eastern portion of the subject site. With the exception of the building additions, the eastern portion of the subject site has been used for unpaved parking. Various industrial activities, engine repair shops and automotive body shops were also historically identified at properties surrounding the subject site.

Based on the results of the Phase I ESA, DEC found no on-site recognized environmental conditions (RECs) in connection with the subject property, except for the following:

- In 2002, DEC conducted several environmental investigations at the subject site. The previous environmental investigations included a Phase I ESA, a Phase II ESA and a Contaminant Delineation Sampling and Chemical Analysis Report. In addition, impacted "hot spots" were excavated and disposed (approximately 60 cubic yards), Verification of Soil Remediation soil sampling was conducted, a local background survey was attempted for several metallic constituents, five monitor wells were installed and several groundwater sampling events were conducted. Impacted soil was primarily encountered on the eastern portion of the subject site. Impacted groundwater was encountered throughout the subject property. In summary, trichloroethene, chromium, iron, molybdenum, and nickel are currently present in the soil at concentrations exceeding the Generic Residential Cleanup

Criteria (GRCC) outlined in the Administrative Rules for Part 201 Environmental Remediation of the Natural Resources and Environmental Protection Act 1994 PA 451, as amended, dated December 21, 2002. In addition, concentrations of trichloroethene and tetrachloroethene in the groundwater also currently exceed the GRCC. An overview of the previous environmental investigations and a summary of the analytical results are included in Section 2.3 of this report. The contaminated soil and groundwater at the subject site were identified as an on-site REC.

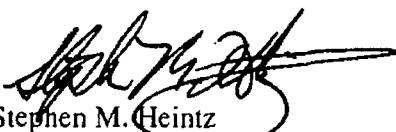
Regarding off-site RECs in the surrounding area, DEC identified 20 sites within the ASTM Approximate Minimum Search Distance (AMSD) criteria. The ASTM Phase I ESA requires that the environmental professional identify and review available government files within specified radial distances of the subject property. DEC conducted the review at the MDEQ, Grand Rapids District office. The land use in the area was historically identified as heavy industrial. Due to the extensive hazardous substance use associated with the historical and current industrial activities in the area, the former land use in the surrounding area was identified as an off-site REC. Brief descriptions of the AMSD sites are included in Section 3.4 of this report.

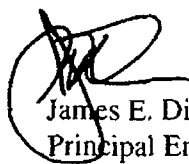
DEC has performed this Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Standard Practice E 1527-00. Any exemptions to, or deletions from, this practice are described in Section 1.2 of this report.

Within the limits of the ASTM Standard Practice E 1527-00 and in DEC's professional opinion, all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice has been provided through this assessment. The results of the Executive Summary are not intended to be mutually exclusive of the entire Phase I ESA Report.

REPORT PREPARED BY:

DIXON ENVIRONMENTAL CONSULTING, INC.


Stephen M. Heintz
Project Scientist


James E. Dixon, P.E.
Principal Engineer

1.0 INTRODUCTION

1.1 Scope of Work

Dixon Environmental Consulting, Inc. (DEC) was retained to conduct a Phase I Environmental Site Assessment (ESA) of the Conical Tool Company Property located at 3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan (hereafter referred to as the "subject site" or "subject property"). The Tax Parcel Identification Number of the 0.88-acre subject site is 41-17-24-276-014. The subject site consists of a commercial building structure, an asphalt paved parking area and an unpaved parking area.

The purpose of this Phase I ESA was to review the available information and determine whether the potential for recognized environmental conditions (RECs) exists at the subject site. An REC is defined as: "The presence or likely presence of any hazardous substances on a property under conditions that indicate an existing release, a past release, or material threat of a release into structures on the property, or into the ground, groundwater or surface water of the property." Figure 1 and Figure 2 are included as a Project Location Map and Site Vicinity Diagram, respectively. The legal description for the subject site is included as Appendix A.

As a part of this Phase I ESA, DEC conducted a historical investigation and reconnaissance walkover, concentrating primarily on the site conditions and activities performed at the subject site and adjoining properties. DEC's investigation also included a review of available regulatory records and environmental lists from local, state and federal agencies responsible for compliance and enforcement at the subject site and surrounding area. The Phase I ESA was performed utilizing methodology of the American Society for Testing and Materials (ASTM) Designation E 1527-00. The Phase I ESA did not include any ASTM non-scope considerations. Appendix B is included as documentation of the sources reviewed as part of the Phase I ESA scope of work.

1.2 Limitations

DEC has provided this assessment in accordance with the "scoped" provisions as provided by the ASTM E 1527-00 standard. Asbestos containing materials, lead-based paint, radon, lead in the drinking water, low-lying area, regulatory compliance, cultural and historic resources, industrial hygiene, health and safety, ecological resources, endangered species, indoor air quality, and high voltage power lines are beyond the scope of this assessment. The ASTM standard also specifies limitations to the assessment for the effort involved in gathering the information, the environmental professional's duties and their reliance on information gathered.

No environmental site assessment can wholly eliminate uncertainty regarding the potential for RECs in connection with the property. Therefore, DEC cannot warrant, guarantee, or certify that the property is free of environmental contamination. Performance of this assessment is intended to reduce, but may not eliminate, uncertainty regarding the potential for recognized environmental conditions with a property, and recognize reasonable limits to time and costs. The most an environmental professional can do, is to prepare a logical assessment approach and evaluate those conditions that are encountered.

Conical Real Estate, LLC and Cut Above Tool Co. (d.b.a. Conical Tool Company) may use and rely on the results and conclusions of the Phase I Site Assessment. No other parties may use or rely on the information without written permission from Conical Real Estate, LLC and Dixon Environmental Consulting, Inc.

2.0 SITE DESCRIPTION

2.1 Location and Legal Description

The subject site is located at 3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan. The subject property is located in the Northeast ¼ of Section 24, Township 6 North, Range 12 West. A Project Location Map and a Site Vicinity Diagram are included as Figure 1 and Figure 2, respectively. A copy of the legal description, as provided by the City of Wyoming Tax Assessor's Office, is included below and as Appendix A.

3890 Buchanan Street, SW

*Lots 51, 52 & 53, also that part of vacated portion of Buchanan Avenue adjacent on the West,
also Lots 78, 79 & 80, Roselawn Park No.1, Wyoming, Kent County, Michigan.*

Tax Parcel Identification Number: 41-17-14-276-014

2.2 Site Vicinity Characteristics

The subject site is located in the eastern portion of the City of Wyoming. The City of Wyoming composes the south-central portion of the Grand Rapids metropolitan area. Specifically, the subject site is located at the northeastern corner of Buchanan Avenue, SW and 39th Street, SW. The subject site is zoned "I-2", which is referenced as "General Industrial".

The regional topography of the area is relatively level with a slight downward slope to the west. The closest surficial body of water is a tributary of the Plaster Creek which is located approximately ½ mile northwest of the subject site (Cole Drain). A highway, U.S. Route-131, is located approximately ¾ mile to the west.

The UAW Local 730/Vandewater Local 730 Union Hall were located on the northern adjoining property (3852 Buchanan Avenue, SW). Pries Supply Company was located to the northeast of the subject site (3830-3834 Opal Avenue, SW). A quonset style building structure, several semi-truck trailers and several automobiles were located at the eastern adjoining property (3852 Opal Avenue, SW). DEC could not document the current occupant of the eastern adjoining property. George's Foreign Car Service was located on the southeastern adjoining property (130 39th Street, SW). Accurate Metal Finishing, Travis Collision and Mark Maker Company were located to the south of the subject site (138 39th Street, SW, 148 39th Street, SW and 3920 Buchanan Avenue, SW, respectively). The General Motors Corporation Grand Rapids Metal Plant was located to the west of the subject site (300 36th Street, SW).

The subject site is serviced by Consumers Energy (electricity), MichCon (natural gas), AT & T (telephone service) and the municipal water, sanitary sewer and storm water sewer systems.

2.3 Specialized Knowledge of the Subject Site

DEC conducted previous environmental investigations at the subject site. The previous environmental investigations consisted of a Phase I Environmental Site Assessment dated January 29, 2002, a Phase II ESA dated February 14, 2002, a Contaminant Delineation Sampling and Chemical Analysis Report dated April 10, 2002. In addition, "hot spot" areas of impacted soil were excavated and disposed (approximately 60 cubic yards), Verification of Soil Remediation sampling and chemical analysis was conducted at the excavation sites, a local background survey for several metallic constituents was attempted, five permanent monitor wells were installed and several groundwater sampling events were conducted. A summary of the previous environmental investigations is provided below.

Based on the Phase I ESA, the subject site was undeveloped and vacant until 1947. The subject site was acquired and developed in two portions. The western portion of the subject site was developed

in 1947. The original building structure (central portion of the current subject building) was constructed in 1947. In 1949, the first occupant of the subject site was identified as Commercial Grinding and Manufacturing Company. From 1957 through the present, Conical Tool Company was identified as the operator of the subject site. Conical Tool Company manufactures end mill bits for the tool and die industry. The eastern portion of the subject site appears to have been historically utilized as an unpaved parking lot/access driveway for the northern adjoining property. The historical operators identified at the northern adjoining property included an aluminum foundry (1940's), Boss Cushion and Spring Shop (1949), C & B Silo Company (1949 through 1966) and Cliff's Garage Truck Repair (1965 and 1966). The Conical Tool Company acquired the eastern portion of the subject site in the early 1970's. Conical Tool Company constructed several building additions in the late 1970's, which extended onto the eastern portion of the subject site. With the exception of the building additions, the eastern portion of the subject site has been used for unpaved parking. Various industrial activities, engine repair shops and automotive body shops were also historically identified at properties surrounding the subject site.

Based on the results of the January 2002 Phase I ESA, DEC found no on-site recognized environmental conditions (RECs) in connection with the subject property, except for the following:

- Based on the review of historical aerial photographs and features observed during the site walkover, two areas of possibly discolored soil were identified at the subject property. A historical area of possibly discolored soil was depicted on the 1970 and 1975 aerial photographs. The historical area of possibly discolored soil was located beneath what is currently the northeastern portion of the building structure. An area of discolored soil was also observed near the current northeastern corner of the subject building during the site walkover. DEC understands that an exterior storage area was formerly located on this portion of the subject site. A scrap steel bin and empty 55-gallon drums were stored on this portion of the subject site. The areas of discolored soil at the subject site were identified as an on-site REC.

The 2002 Phase II ESA was conducted to further investigate the on-site REC identified in the Phase I ESA. The Phase II ESA consisted of two soil borings. The soil borings were conducted at the each

of the areas of discolored soil. The soil boring locations are depicted on the Site Detail Diagram included as Figure 3. The analytical results from soil samples collected from the two soil borings are summarized in the following table. Detectable concentrations of volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PNAs) and metals were identified in the soil at the subject site. The concentrations of 1,3,5-trimethylbenzene, trichloroethene, chromium, iron, molybdenum and nickel exceeded the Generic Residential Cleanup Criteria (GRCC) as outlined in the Michigan Department of Environmental Quality (MDEQ), Environmental Response Division Operation Memorandum #18: Part 201 Generic Cleanup Criteria Tables dated December 21, 2002. The analytical results compared to the current cleanup criteria are summarized below in Table 1.

Table 1 - Phase II ESA Soil Sample Analytical Results Summary
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	SB-1 (0.5-1') (µg/Kg)	SB-1 (4.5-5') (µg/Kg)	SB-2 (0.5-1') (µg/Kg)	SB-2 (3-3.5') (µg/Kg)	GRCC for Soil (µg/Kg)
1,2,4-trimethylbenzene	95636	2,000	BDL	BDL	BDL	2,100 ^a
1,3,5-trimethylbenzene	108678	2,400	BDL	BDL	BDL	1,800 ^a
trichloroethene	79016	BDL	BDL	790	BDL	100 ^a
total xylenes	1330207	130	BDL	BDL	BDL	5,600 ^a
Remaining VOCs	-	BDL	BDL	BDL	BDL	-
acenaphthene	83329	BDL	BDL	400	BDL	300,000 ^a
anthracene	120127	BDL	BDL	980	BDL	41,000 ^a
benzo(a)anthracene	56553	BDL	BDL	920	BDL	20,000 ^b
benzo(a)pyrene	50328	BDL	BDL	730	BDL	2,000 ^b
benzo(g,h,i)perylene	191242	BDL	BDL	2,900	BDL	2,500,000 ^b
benzo(k)fluoranthene	207089	BDL	BDL	460	BDL	200,000 ^b
chrysene	218019	BDL	BDL	1,000	BDL	2,000,000 ^b
dibenzo(a,h)anthracene	53703	BDL	BDL	520	BDL	2,000 ^b
fluoranthene	206440	9,700	4,800	31,000	BDL	730,000 ^a
fluorene	86737	BDL	BDL	440	BDL	390,000 ^a
indeno(1,2,3-cd)pyrene	193395	BDL	BDL	1,600	BDL	20,000 ^b
naphthalene	91203	BDL	BDL	360	BDL	35,000 ^a
phenanthrene	85018	890	BDL	3,800	BDL	56,000 ^a
pyrene	129000	6,300	3,400	19,000	BDL	480,000 ^a
Remaining PNAs	-	BDL	BDL	BDL	BDL	-

Notes:

- ^a Residential & Commercial I Drinking Water Protection Criteria.
- ^b Residential & Commercial I Direct Contact Criteria.
- ^c Infinite Source Volatile Soil Inhalation Criteria.
- ^d Statewide Default Background Level.
- BDL - Below the respective method detection limits.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on January 28, 2002 and February 6, 2002.

Table 1 - Phase II ESA Soil Sample Analytical Results Summary, cont.
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	SB-1 (0.5-1') ($\mu\text{g/Kg}$)	SB-1 (4.5-5') ($\mu\text{g/Kg}$)	SB-2 (0.5-1') ($\mu\text{g/Kg}$)	SB-2 (3-3.5') ($\mu\text{g/Kg}$)	GRCC for Soil ($\mu\text{g/Kg}$)
aluminum	7429905	3,100,000	3,200,000	2,000,000	4,300,000	6,900,000 ^d
arsenic	7440382	1,700	1,500	6,200	5,000	7,600 ^b
cadmium	7440439	280	BDL	2,700	130	6,000 ^a
chromium, total	18540299	49,000	5,000	1,500,000	48,000	30,000 ^a
iron	7439896	5,000,000	4,700,000	46,000,000	17,000,000	12,000,000 ^d
lead	7439921	21,000	2,100	160,000	13,000	400,000 ^b
molybdenum	7439987	43,000	5,100	1,500,000	33,000	1,500 ^a
nickel	7440020	8,700	5,500	120,000	28,000	100,000 ^a
silver	7440224	BDL	550	BDL	690	4,500 ^a
zinc	7440666	44,000	9,300	150,000	39,000	2,400,000 ^a

Notes:

- ^a Residential & Commercial I Drinking Water Protection Criteria.
- ^b Residential & Commercial I Direct Contact Criteria.
- ^c Infinite Source Volatile Soil Inhalation Criteria.
- ^d Statewide Default Background Level.
- BDL - Below the respective method detection limits.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on January 28, 2002 and February 6, 2002.

Based on the presence of impacted soil, DEC conducted an investigation to further delineate the impacted media. The Contaminant Delineation Sampling and Chemical Analysis Report (Contaminant Delineation) summarized the additional sampling activities at the subject site. Based on the results of the Contaminant Delineation, three areas of impacted soil were identified at the subject site. The areas of impacted soil were located at the eastern end of the building, beneath the subject building and near a solid waste dumpster at the northern portion of the site. The analytical results of samples collected from the subject site also confirmed elevated concentrations of trimethylbenzene isomers, dibenzo(a,h)anthracene and silver in the soil. In addition, elevated concentrations of trichloroethene were detected in the groundwater. The analytical results from the Contaminant Delineation are summarized in the following tables.

Table 2 - Contaminant Delineation Soil Sample Analytical Results Summary
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	GP-1 (9-10') (µg/Kg)	GP-2 (1-3') (µg/Kg)	GP-3 (1-3') (µg/Kg)	GP-4 (1-3') (µg/Kg)	GP-5 (13-15') (µg/Kg)	GP-6 (1-1.5') (µg/Kg)	GP-7 (1-1.5') (µg/Kg)	GP-8 (1-1.5') (µg/Kg)	GP-10 (1') (µg/Kg)	GRCC for Soil (µg/Kg)
1,3,5-trimethylbenzene	108678	< 50	< 50	< 50	< 50	1,300	< 50	< 50	< 50	< 50	1,800 ^a
trichloroethene	79016	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	100 ^a
chromium, total	18540299	3,700	51,000	540,000	82,000	110,000	7,200	8,800	62,000	6,300	30,000 ^a
iron	7439896	9,200,000	26,000,000	21,000,000	11,000,000	7,900,000	3,400,000	5,200,000	6,900,000	5,100,000	12,000,000 ^b
molybdenum	7439987	< 500	38,000	580,000	83,000	230,000	5,400	4,500	53,000	950	1,500 ^a
nickel	7440020	9,400	37,000	59,000	17,000	15,000	4,200	8,100	14,000	6,300	100,000 ^a

Notes:

- ^a Residential & Commercial I Drinking Water Protection Criteria.
- ^b Statewide Default Background Level.
- BDL - Below the respective method detection limits.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on March 26 and 27, 2002

Table 2 - Contaminant Delineation Soil Sample Analytical Results Summary, cont.
 3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	GP-9 (0.5-1') (µg/Kg)	GP-9 (9-11') (µg/Kg)	GRCC for Soil (µg/Kg)
1,2,4-trimethylbenzene	95636	24,000	500	2,100 ^a
1,3,5-trimethylbenzene	108678	7,900	130	1,800 ^a
ethylbenzene	100414	560	< 50	1,500 ^a
total xylenes	1330207	4,800	< 150	5,600 ^a
toluene	108883	110	< 50	16,000 ^a
Remaining VOCs	-	BDL	BDL	-
acenaphthene	83329	< 330	< 330	300,000 ^a
acenaphthylene	208968	< 330	< 330	5,900 ^a
anthracene	120127	< 330	< 330	41,000 ^a
benzo(a)anthracene	56553	1,700	< 330	20,000 ^b
benzo(a)pyrene	50328	1,800	< 330	2,000 ^b
benzo(b)fluoranthene	205992	880	< 330	20,000 ^b
benzo(g,h,i)perylene	191242	8,200	< 330	2,500,000 ^b
benzo(k)fluoranthene	207089	750	< 330	200,000 ^b
chrysene	218019	2,100	< 330	2,000,000 ^b
dibenzo(a,h)anthracene	53703	4,400	< 330	2,000 ^b
fluoranthene	206440	19,000	< 330	730,000 ^a
fluorene	86737	< 330	< 330	390,000 ^a
indeno(1,2,3-cd)pyrene	193395	6,500	< 330	20,000 ^b
naphthalene	91203	1,200	< 330	35,000 ^a
phenanthrene	85018	1,100	< 330	56,000 ^a
pyrene	129000	13,000	< 330	480,000 ^a

Notes:

- ^a Residential & Commercial I Drinking Water Protection Criteria.
- ^b Direct Contact Criteria.
- ^c Statewide Default Background Level.
- BDL - Below the respective method detection limits.
- Results in bold exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on March 26 and 27, 2002

Table 2 - Contaminant Delineation Soil Sample Analytical Results Summary, cont.
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	GP-9 (0.5-1') (µg/Kg)	GP-9 (9-11') (µg/Kg)	GRCC for Soil (µg/Kg)
aluminum	7429905	4,400,000	2,400,000	6,900,000 ^c
arsenic	7440382	4,100	1,400	7,600 ^b
cadmium	7440439	330	< 50	6,000 ^a
chromium, total	18540299	38,000	9,100	30,000 ^a
iron	7439896	13,000,000	3,600,000	12,000,000 ^c
lead	7439921	50,000	2,000	400,000 ^b
molybdenum	7439987	25,000	8,700	1,500 ^a
nickel	7440020	140,000	6,000	100,000 ^a
silver	7440224	15,000	< 500	4,500 ^a
zinc	7440666	210,000	11,000	2,400,000 ^a

Notes:

- ^a Residential & Commercial I Drinking Water Protection Criteria.
- ^b Direct Contact Criteria.
- ^c Statewide Default Background Level.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on March 26 and 27, 2002

Table 3 - Groundwater Sample Analytical Results Summary
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	GP-1 (17.5-19') (µg/L)	GP-5 (17-19') (µg/L)	GP-9 (15-17') (µg/L)	GRCC for Groundwater (µg/L)*
1,3,5-trimethylbenzene	108678	< 1	< 1	< 1	72
trichloroethene	79016	14	100	< 1	5.0
Remaining VOCs	-	NS	NS	BDL	-
molybdenum	7439987	< 10	< 10	22	73
zinc	7440666	NS	NS	29	2,400
Remaining Metals	-	BDL	BDL	BDL	-

Notes:

- * Residential and Commercial I Drinking Water Criteria.
- BDL - Below the respective method detection limits.
- NS - Not analyzed for respective parameter(s).
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples were collected on March 26, 2002.

The two areas of impacted soil (located outside the subject building) were excavated and disposed from the subject site on July 9, 2002. Approximately 60 cubic yards of impacted soil were removed and disposed at Ottawa County Farms (Type II) Sanitary Landfill in Allendale, Michigan. Twelve Verification of Soil Remediation (VSR) soil samples were collected from the floor and sidewalls of the excavations. The analytical results of the VSR soil sampling identified that concentrations of chromium, iron and molybdenum still existed in excess of the GRCC in certain areas outside the limits of the subject building. Nickel and trichloroethene also exist in an area of soil under the subject building. A local background survey was attempted to determine whether the specific metal concentrations (chromium, iron, molybdenum and nickel) were representative of the naturally occurring conditions in the soil. The results of the background survey did not support that the metallic concentrations were representative of natural conditions. The analytical results of the VSR samples and the local background survey are summarized below.

Table 4 - VSR Sample Analytical Results Summary

Constituent	CAS Number	VSR-1 (2.5') (µg/Kg)	VSR-2 (2.5') (µg/Kg)	VSR-3 (3') (µg/Kg)	VSR-4 (1.5') (µg/Kg)	GRCC for Soil (µg/Kg)
dibenzo(a,h)anthracene	53703	< 330	< 330	< 330	1,100	2,000 ^a
trichloroethene	79016	< 50	< 50	< 50	< 50	100 ^b
chromium, total	18540299	2,400	69,000	4,900	21,000	30,000 ^b
iron	7439896	2,200,000	8,300,000	4,600,000	7,200,000	12,000,000 ^c
molybdenum	7439987	3,400	57,000	2,800	18,000	1,500 ^b
nickel	7440020	3,200	17,000	4,200	14,000	100,000 ^b
silver	7440224	< 50	< 500	< 500	< 500	4,500 ^b

Notes:

- ^a Direct Contact Criteria.
- ^b Residential & Commercial I Drinking Water Protection Criteria.
- ^c Statewide Default Background Level.
- ^d VSR-7 - Analyzed for hexavalent chromium. Results indicate < 500 ug/Kg hexavalent chromium.
- BDL - Below the respective method detection limits.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on July 9, 2002.

Table 4 - VSR Sample Analytical Results Summary, cont.

Constituent	CAS Number	VSR-5 (2') (µg/Kg)	VSR-6 (1') (µg/Kg)	VSR-7 (0.5') (µg/Kg)	VSR-8 (0.5') (µg/Kg)	GRCC for Soil (µg/Kg)
dibenzo(a,h)anthracene	53703	< 330	< 330	< 630	< 330	2,000 ^a
trichloroethene	79016	< 50	< 50	< 50	< 50	100 ^b
chromium, total	18540299	10,000	6,500	450,000*	110,000	30,000 ^b
iron	7439896	6,200,000	5,000,000	25,000,000	11,000,000	12,000,000 ^c
molybdenum	7439987	6,500	3,400	330,000	120,000	1,500 ^b
nickel	7440020	6,900	5,800	58,000	18,000	100,000 ^b
silver	7440224	< 500	< 500	< 500	< 500	4,500 ^b

Notes:

- ^a Direct Contact Criteria.
- ^b Residential & Commercial I Drinking Water Protection Criteria.
- ^c Statewide Default Background Level.
- *VSR-7 - Analyzed for hexavalent chromium. Results indicate < 500 µg/Kg hexavalent chromium.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on July 9, 2002.

Table 4 - VSR Sample Analytical Results Summary, cont.

Constituent	CAS Number	VSR-9 (0.5') (µg/Kg)	VSR-10 (0.5') (µg/Kg)	VSR-11 (1.5') (µg/Kg)	VSR-12 (1.5') (µg/Kg)	GRCC for Soil (µg/Kg)
dibenzo(a,h)anthracene	53703	< 330	< 330	< 330	< 330	2,000 ^a
trichloroethene	79016	< 50	< 50	< 50	< 50	100 ^b
chromium, total	18540299	12,000	25,000	6,100	6,600	30,000 ^b
iron	7439896	6,400,000	5,900,000	5,300,000	5,400,000	12,000,000 ^c
molybdenum	7439987	27,000	24,000	4,500	8,900	1,500 ^b
nickel	7440020	7,800	6,500	4,800	4,900	100,000 ^b
silver	7440224	< 500	< 500	< 500	< 500	4,500 ^b

Notes:

- ^a Direct Contact Criteria.
- ^b Residential & Commercial I Drinking Water Protection Criteria.
- ^c Statewide Default Background Level.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on July 9, 2002.

Table 5 - Background Sample Analytical Results Summary

Constituent	CAS Number	BG-1 (1-2') (µg/Kg)	BG-2 (1-2') (µg/Kg)	BG-3 (1.5-2') (µg/Kg)	BG-4 (1.5-2') (µg/Kg)	BG-5 (1-2') (µg/Kg)	GRCC for Soil (µg/Kg)
chromium, total	18540299	6,900	7,200	4,800	4,500	5,100	30,000 ^b
iron	7439896	5,100,000	6,100,000	4,500,000	4,600,000	4,800,000	12,000,000 ^c
molybdenum	7439987	18,000	520	1,100	325	325	1,500 ^b
nickel	7440020	4,900	5,400	3,800	4,400	4,900	100,000 ^b

Notes:

- ^a Direct Contact Criteria.
- ^b Residential & Commercial I Drinking Water Protection Criteria.
- ^c Statewide Default Background Level.
- BDL - Below the respective method detection limits.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on July 18, 2002.

On July 17 and 19, 2002, DEC installed five permanent monitor wells at the subject site. The location of the monitor wells are depicted on Figure 2. DEC collected groundwater samples from the wells on July 22, 2002, November 12, 2002, February 14, 2003 and March 26, 2004. Each of the sampling events identified concentrations of trichloroethene and tetrachloroethene in the groundwater exceeding the GRCC. The analytical results for the groundwater sampling are summarized in the following tables.

Table 6 - July 2002 Groundwater Sample Analytical Results
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	MW-1 (12') (µg/L)	MW-2 (12') (µg/L)	MW-3 (16') (µg/L)	MW-4 (14') (µg/L)	MW-5 (17.5') (µg/L)	GRCC for Groundwater
tetrachloroethene	127184	1	< 1	< 1	12	4.4	5.0
trichloroethene	79016	7.8	28	85	17	< 1	5.0
Remaining VOCs	-	BDL	BDL	BDL	BDL	BDL	-
molybdenum	7439987	< 10	< 10	< 10	36	< 10	73

Notes:

- ^a Residential & Commercial I Drinking Water Protection Criteria.
- BDL - Below the respective method detection limits.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on July 22, 2002.

Table 7 - November 2002 Groundwater Sample Analytical Results
3890 Buchanan Avenue, SW, Wyoming, Michigan

Phase I Environmental Site Assessment
Conical Tool Company Property
3890 Buchanan Avenue, SW, Wyoming, Michigan
DEC Project No. 04-02-014
April 7, 2004

Constituent	CAS Number	MW-1 (12') (µg/L)	MW-2 (12') (µg/L)	MW-3 (16') (µg/L)	MW-4 (14') (µg/L)	MW-5 (17.5') (µg/L)	GRCC for Groundwater (µg/L)*
1,1,1-trichloroethane	71556	< 1	< 1	1.7	1.4	< 1	200
tetrachloroethene	127184	1.2	< 1	< 1	6.6	2.6	5.0
trichloroethene	79016	4	23	19	6.2	< 1	5.0
Remaining VOCs	-	BDL	BDL	BDL	BDL	BDL	-
molybdenum	7439987	NS	NS	NS	NS	NS	73

Notes:

- * Residential & Commercial I Drinking Water Protection Criteria.
- BDL - Below the respective method detection limits.
- NS - Sample not analyzed for chemical parameter specified.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on November 12, 2002.

Table 8 - February 2003 Groundwater Sample Analytical Results
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	MW-1 (12') (µg/L)	MW-2 (12') (µg/L)	MW-3 (16') (µg/L)	MW-4 (14') (µg/L)	MW-5 (17.5') (µg/L)	GRCC for Groundwater (µg/L)*
1,1,1-trichloroethane	71556	< 1	< 1	3.9	NS	< 1	200
tetrachloroethene	127184	1.8	1.3	1	NS	3	5.0
trichloroethene	79016	1.8	< 1	98	NS	< 1	5.0
Remaining VOCs	-	BDL	BDL	BDL	NS	BDL	-
molybdenum	7439987	< 10	< 10	< 10	NS	< 10	73

Notes:

- * Residential & Commercial I Drinking Water Protection Criteria.
- BDL - Below the respective method detection limits.
- NS - Sample not analyzed for chemical parameter specified.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on February 14 and 17, 2003.

Table 9 - March 2004 Groundwater Sample Analytical Results
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	MW-1 (12') (µg/L)	MW-2 (12') (µg/L)	MW-3 (16') (µg/L)	MW-4 (14') (µg/L)	MW-5 (17.5') (µg/L)	GRCC for Groundwater (µg/L)*
chloroform	67663	2.0	< 1.0	< 1.0	NS	< 1.0	100
tetrachloroethene	127184	2.0	27	< 1.0	NS	2.0	5.0
trichloroethene	79016	2.1	19	38	NS	< 1	5.0
Remaining VOCs	-	BDL	BDL	BDL	NS	BDL	-
chromium	18540299	< 5	< 5	< 5	NS	< 5	100
iron	7439896	< 50	< 50	< 50	NS	< 50	300
molybdenum	7439987	< 10	< 10	< 10	NS	< 10	73

Notes:

- * Residential & Commercial I Drinking Water Protection Criteria.
- BDL - Below the respective method detection limits.
- NS - Sample not analyzed for chemical parameter specified, because well could not be located due to snow.
- Results in **bold** exceed the Generic Residential Cleanup Criteria as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, dated December 21, 2002.
- Samples collected on March 26, 2004.

Impacted soil and groundwater has been documented throughout the subject property. In summary, trichloroethene, chromium, iron, molybdenum, and nickel are present in the soil primarily on the eastern portion of the subject site at concentrations exceeding the GRCC. In addition, concentrations of trichloroethene and tetrachloroethene in certain groundwater samples also exceed the GRCC. The locations of the borings, approximate remedial excavation limits and VSR Sampling Locations are depicted on Figures 3 and 4.

2.4 History and Uses at the Subject Site and Adjoining Properties

DEC reviewed historical R.L. Polk telephone directories, Kent County aerial photographs, Sanborn Fire Insurance Maps and title information from Kent County Register of Deeds office. In addition, DEC utilized information provided by individuals that were familiar with the subject site. Using the above cited references, a summary of the developments at and near the subject site is included below.

Based on the Phase I ESA, the subject site was undeveloped and vacant until 1947. The subject site was acquired and developed in two portions. The western portion of the subject site was developed in 1947. The original building structure (central portion of the current subject building) was constructed in 1947. In 1949, the first occupant of the subject site was identified as Commercial Grinding and Manufacturing Company. From 1957 through the present, Conical Tool Company was identified as the operator of the subject site. Conical Tool Company manufactures end mill bits for the tool and die industry. The eastern portion of the subject site appears to have been historically utilized as an unpaved parking lot/access driveway for the northern adjoining property. The historical operators identified at the northern adjoining property included an aluminum foundry (1940's), Boss Cushion and Spring Shop (1949), C & B Silo Company (1949 through 1966) and Cliff's Garage Truck Repair (1965 and 1966). The Conical Tool Company acquired the eastern portion of the subject site in the early 1970's. Conical Tool Company constructed several building additions in the late 1970's, which extended onto the eastern portion of the subject site. With the exception of the building additions, the eastern portion of the subject site has been used for unpaved parking.

From the late 1940's through the late 1950's, two businesses were identified at the northern adjoining property. Boss Cushion and Spring Shop and C & B Silo Company were identified at the northern adjoining property in 1949. C & B Silo Company was identified on the eastern portion of the northern adjoining property until 1966. Cliff's Truck Repair also operated on the eastern portion of the northern adjoining property in 1965 and 1966. From the late 1950's through the present, a union hall was identified on the western portion of the northern adjoining property. In the mid-1970's, the union hall expanded onto the eastern portion of the northern adjoining property. Listings at the western portion of the northern adjoining property included United Automobile Worker Local 730 (1957), United Auto Workers (1958 through 1996-1997), Agricultural Implement Workers Local 730 (1958 through 1996-1997), Vandewater Hall - UAW Local 730 (1981 through 1991), International Union (2001 and 2003), United Auto (2001 and 2003) and Aerospace and Agriculture (2001 and 2003).

Since the late 1940's, several businesses were identified at the northeastern adjoining property. The historical occupants of the northeastern adjoining property included Alexis Manufacturing Company (1949 through 1962), D & W Woodcarving Company (1954 and 1957), Robertson's Auto Service (1966), Sheer Metal Repair Service (1966 through 1981), Mercury Building Maintenance (1971 through 1986), VanFongeren Furniture Refinishing (1981 and 1986) and PCS Distributing Company (1986 through present).

A truck repair facility and a trucking company were listed at the eastern adjoining property from the late 1940's through the early 1980's. The businesses were identified as Film Truck Service (1949 through 1958) and Pep Lines Trucking Company (1962 through 1981). Apex Wholesale was identified at the eastern adjoining property in 1986 and 1991. The current occupant of the eastern adjoining property was unable to be identified.

The southeastern adjoining property was historically utilized for industrial purposes. Businesses listed at this adjoining property include Apex Polishing Company (1958 through 1991), George's Simonizing (1962), Accurate Metal Finishing (1996), George's Foreign Car Service (1996 and 2001) and GJ Fabrication (2001 and 2003).

The southern adjoining property consisted of a residential property, a vacant area and an industrial property from the early 1950's through the mid-1960's. In the mid-1960's, the residential house was replaced with a commercial building structure. An additional commercial building structure was constructed to the south of the subject site in the mid-1970's. Businesses listed at the southern adjoining property included Servelux Manufacturing Company (1949), Ventaire Awnings (1954), Bishop's Auto Reconditioning (1957), Tiffany Building Contractors (1958), Tiffany Millwright (1958), Wyoming Manufacturing Products (1958), Ken'l Pave Improvement Company (1962), Haas Body Shop (1966 and 1971), Bosma Brothers Plumbing (1966 and 1971), Apex Wholesale (1976), John Damman Company (1976), Apex Storage (1981 and 1986), Auto Boutique (1981 through 1991), Toering Electric Company (1981), Litho Photo Supply - Graphic Art Dealership (1986

through 1996-1997), VPZ Power Sports (1991), Travis Truck Collision (1991), Collision Repair Shop (1996), Mark Maker Company (2001), Accurate Metal Finishing (2001 and 2003) and Travis Truck and Auto Collision (2001 and 2003).

A steel fabrication plant for the General Motors Corporation was historically identified to the west of the subject site. The different divisions of the General Motors were identified as Fischer Body (1949 through 1986), Chevrolet Pontiac Canada Group (1991), Cadillac Luxury Car (1996-1997) and Metal Fabrication Division (2001).

3.0 RECORDS REVIEW

3.1 USGS 7.5 Minute Quadrangle Map Review

DEC reviewed the United States Geological Survey (USGS), 7.5 Minute Quadrangle Maps for Grand Rapids West, Michigan and Cutlerville, Michigan. A copy of the 7.5 Minute Quadrangle Maps depicting the subject area is included as the base map for Figure 1.

The regional topography of the area is relatively level with a slight downward slope to the west. The closest surficial body of water is a tributary of the Plaster Creek which is located approximately ½ mile northwest of the subject site. A highway, U.S. Route-131, is located approximately ⅔ mile to the west.

3.2 Michigan Department of Environmental Quality, Waste and Hazardous Materials Division

On March 30, 2004, DEC contacted the Michigan Department of Environmental Quality, Waste and Hazardous Materials Division (MDEQ, WHMD) in Lansing, Michigan. The MDEQ, WHMD was given the address of the subject site to determine if any information pertaining to registered underground storage tanks (USTs) was available.

Based on the MDEQ, WHMD response, there are no registered USTs located at the subject site (3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan). In addition, no indications of USTs were observed during the walkover of the subject site.

3.3 Environmental Data Resources, Inc. Site Assessment Report Summary

Appendix C includes the Environmental Data Resources, Inc.(EDR) Radius Map Report. This report details facilities found in state and federal environmental databases that are located within a specified distance (i.e., Approximate Minimum Search Distance [AMSD]) from the subject site. The specified distances are established per the ASTM Standard Practice E 1527-00. Information was also utilized from DEC's database of contaminated sites. The following table lists the number of AMSD sites identified within specific government files (some sites may be identified on more than one database).

Table 10 - EDR Radius Map Report Summary

GOVERNMENT RECORD	APPROXIMATE MINIMUM SEARCH DISTANCE (AMSD)	NUMBER FOUND
US EPA National Priority List (NPL)	1.0 mile	0
US EPA Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) List	0.5 mile	0
CERCLIS No Further Remedial Action Planned (NFRAP) Site	Subject Site & Adjoining	0
Michigan State Hazardous Waste Site (SHWS)	1.0 mile	0
Solid Waste Facility (SWF) List	0.5 mile	0
US EPA Resource Conservation and Recovery Act (RCRA), Corrective Action (CORRACTS) Site	1.0 mile	0
US EPA RCRA non-CORRACTS TSD Facility List	0.5 mile	1
US EPA Resource Conservation and Recovery Information System (RCRIS) Notifiers List	Subject Site & Adjoining	0
Michigan Registered Underground Storage Tank (RUST) sites	Subject Site & Adjoining	3
Michigan Registered Aboveground Storage Tank (RAST) sites	Subject Site & Adjoining	1
Michigan Leaking Underground Storage Tank (LUST) sites	0.5 mile	0
Federal Emergency Response Notification System (ERNS) List	Subject site	14
Baseline Environmental Assessment (BEA)	1.0 mile	0

3.4 Michigan Department of Environmental Quality, Regulatory Divisions

On March 30, 2004, DEC faxed Freedom of Information Act (FOIA) requests to the Michigan Department of Environmental Quality (MDEQ), Grand Rapids District Office. DEC requested any information relating to the subject site and AMSD sites. The FOIA request was made to the Surface Water Quality, Environmental Response, Storage Tank, and/or Waste Management Divisions. A comprehensive review of available information was conducted by DEC. Information was also utilized from DEC's database of contaminated sites. Brief summaries of each AMSD site are included below.

RCRIS

Conical Tool Company - 3890 Buchanan Avenue, SW - The facility at the subject site was identified as a Resource Conservation & Recovery Information System (RCRIS) small quantity generator of regulated materials. An April 5, 1994 Notification of Regulated Waste Activity indicated Conical Tool Company was a small quantity generator of ignitable waste (D001). A February 29, 1996 Conditionally Exempt Small Quantity Generator Inspection Form indicated parts washer solvent was utilized at the subject site. Safety Kleen was responsible for servicing the parts washer. An April 16, 1996 MDEQ Report of Complaint indicated oils, coolants, cutting fluids and mineral spirits were being dumped outside at this facility. An April 22, 1996 MDEQ letter indicated an inspection of the facility was conducted on April 18, 1996. Based on the inspection, industrial waste materials consisting of barrels and scrap metals in a dumpster were stored outside at the subject site. A Certificate of Coverage under the Storm Water General Permit was issued for the subject site on May 28, 1996. An April 21, 1998 Conical Tool Company letter indicated a roof was constructed to provide cover for the metal chips. The Certificate of Coverage under the Storm Water General Permit was terminated in December 16, 1998 MDEQ letter. The MDEQ file also contained the February 14, 2002 Phase II ESA and the September 3, 2002 Preliminary Soil and Groundwater Data Letter prepared by DEC. The previous environmental investigations are summarized in Section 2.3.

Auto Boutique, Inc. - 148 39th Street, SW - The facility at the southern adjoining property was identified as a RCRIS small quantity generator of hazardous materials. An April 10, 1990 Notification of Hazardous Waste Activity indicated this facility was a small quantity generator of spent nonhalogenated solvents (F003 and F005), ignitable waste (D001) and toxic waste (D000). A November 16, 1992 Resource Conservation and Recovery Act Inspection Report indicated a body shop was operated at this site. No violations were identified. Based on the historical operations using hazardous substances, this site may present an environmental concern to the subject site.

GMC Metal Fabrication Plant - 300 36th Street, SW - The facility at the western adjoining property was identified as a RCRIS small quantity generator of hazardous materials and a State Hazardous Waste Site (SHWS). The MDEQ file contained numerous records pertaining to the regulated waste operations at this site. An August 7, 1980 Notification of Hazardous Waste Activity indicated this facility was a generator and treatment, storage, disposal facility of toxic (D000), paint residues or sludge (F017) and cyanide containing quenching bath residues (F010). A January 26, 1986 Notification of Hazardous Waste Activity indicated used oil was disposed of utilizing an oil burner at this facility. An April 25, 1994 MDNR letter cited two violations at this site. The violations pertained to hazardous waste labeling and closing hazardous waste containers during storage. A June 30, 1994 MDNR letter indicated the facility was in compliance. No additional violations pertaining to hazardous waste operations were identified in the MDEQ records. A January 6, 2000 Notification of Regulated Waste identified the following waste streams at the western adjoining property: lead (D008), mercury (D009), spent halogenated solvents (F001 and F002) and spent nonhalogenated solvents (F003, F004 and F005).

A March 1989 TCE Remediation Monitoring Program Report, prepared by EDI Engineering and Science, indicated the trichloroethylene contamination at this site resulted from a leaking parts cleaner. An April 1993 Off-site Groundwater Purge Evaluation, prepared by WW Engineering and Science, indicated a soil vapor extraction system and two purge wells were installed at this site in 1989. The groundwater was determined to flow northwesterly to the Cole Drain. The contaminated groundwater was delineated on the northern portion of this site and extending to the northwest. A December 6, 2001 Quarterly Monitoring Report stated 4,983,270 gallons of impacted groundwater were remediated at this site. Based on the contaminant delineation and the groundwater flow direction (away from the subject site), this site does not appear to present an environmental concern to the subject site. A February 6, 2004 Quarterly Groundwater Monitoring Report, prepared by Conestoga-Rovers and Associates, depicted the impacted groundwater on the northern portion of this site. The groundwater was confirmed to flow in a northwesterly direction. Based on the groundwater flow direction, this site does not appear to present an environmental concern to the subject site.

RUST

Mercury Caulking, Inc. - 3838 Opal Street, SW - The northeastern adjoining property was identified as a Registered Underground Storage Tank (RUST) site. Based on the MDEQ, Storage Tank Division records, a 1,000-gallon capacity gasoline UST was removed from this site. No information pertaining to the removal of the UST was available. Based on the anticipated groundwater flow direction (west-northwesterly), this site does not appear to present an environmental concern to the subject site.

LUST

Dwar Oil Company - 3910 South Division Avenue - This site was identified as a Leaking Underground Storage Tank (LUST) site and is located approximately ¼ mile east of the subject site. Based on the MDEQ file, a confirmed release was reported at this site on July 8, 1998. A July 30, 1999 LUST Initial Assessment Report, prepared by Rose & Westra, Inc., indicated eight USTs were removed from this site. The soil and groundwater were impacted with benzene, toluene ethylbenzene and xylene (BTEX compounds) and polynuclear aromatic hydrocarbons (PNAs). The contaminated groundwater was partially delineated on the northwestern portion of this site. A June 25, 2002 Final Assessment Report, prepared by Superior Environmental Corp. (SEC), indicated that the groundwater flows in a northwesterly direction. A January 13, 2004 Quarterly Groundwater and Free Product Status Report indicated that 150 cubic yards of soil and 910 gallons of groundwater were remediated at this site. Based on the groundwater flow direction to the northwest, this site does not appear to present an environmental concern to the subject site.

Godwin Plumbing, Inc. - 3703 South Division Avenue - This site was identified as a LUST site and is located approximately ¼ mile northeast of the subject site. Based on the MDEQ file, a confirmed release was reported at this site on April 15, 1998. An April 19, 1999 LUST Closure Report, prepared by Prein & Newhof, indicated the UST and 150 cubic yards of contaminated soil were removed from this site. No contamination was identified during the subsequent environmental investigation at this site. A June 8, 1999 MDEQ Audit of Corrective Action stated the corrective action at this site had resulted in the unrestricted residential use closure of this site. Based on the "closed" status of the LUST investigation at this site (confirmed by the MDEQ), this site does not appear to present an environmental concern to the subject site.

Godwin Heights (Former B&R Auto) - 3712 South Division Avenue - This site was identified as a LUST site and is located ½ mile northeast of the subject site. Based on the MDEQ file, a confirmed release was reported at this site on June 14, 1989. A May 15, 1997 LUST Final Assessment Report, prepared by Lakeshore Environmental, Inc., stated 150 tons of contaminated soil were removed. The groundwater was determined to flow in a northwesterly direction. The contamination was delineated at this site and extending to the northwest. Based on the groundwater flow direction, this site does not appear to present an environmental concern to the subject site.

Cummins Michigan, Inc. - 3715 Clay Avenue, SW - This site was identified as a LUST site and is located approximately ¼ mile west of the subject site. Based on the MDEQ file, confirmed releases were reported at this site on August 2, 1989, August 21, 1989 and October 4, 1989. No information pertaining to the corrective action at this site was available. Based on the groundwater at the subject site (northwesterly to the Cole Drain), this site does not appear to present an environmental concern to the subject site.

Floyds Electric - 3781 Clay Avenue, SW - This site was identified as a LUST site and is located approximately ¼ mile west of the subject site. Based on the MDEQ file, a confirmed release was reported at this site on August 20, 1991. An April 25, 1997 LUST Closure Report, prepared by SEC, indicated the UST and 122 cubic yards of contaminated soil were removed from this site. The report also delineated an area of impacted groundwater located near the southeastern corner of the building structure at this site. A July 15, 1997 MDEQ Audit of Corrective Action concurred that the corrective action at this site had resulted in the restricted use of the property. The restriction prohibited the potable or non-potable use of the groundwater at this site. Based on the contaminant delineation, this site does not appear to present an environmental concern to the subject site.

Overland Transportation System - 3773 Clay Avenue, SW - This site was identified as a LUST site and is located approximately ¼ mile west of the subject site. Based on the MDEQ file, a confirmed release was reported at this site on August 16, 1990. A June 22, 1995 Release Closure Report, prepared by Aares, Ltd., indicated a 10,000-gallon capacity UST and 1,167 cubic yards of contaminated soil were removed from this site. Subsequent soil and groundwater sampling revealed contaminant concentrations below the cleanup criteria. A July 19, 1995 MDEQ Audit of Corrective Action concurred that the appropriate cleanup levels had been achieved for all areas of soil and groundwater impacted by the release. Based on the "closed" status of the LUST investigation at this site (confirmed by the MDEQ), this site does not appear to present an environmental concern to the subject site.

Rite Aid #1823 - 3617 South Division - This site was identified as a LUST site and is located approximately ⅓ mile northeast of the subject site. Based on the MDEQ file, a confirmed release was reported at this site on May 13, 1996. A May 15, 1996 MDEQ letter informed Rite Aid of their responsibilities. No additional information pertaining to the corrective action at this site was available in the MDEQ file. Based on the anticipated groundwater flow direction at this site (west-northwesterly to the Cole Drain), this site does not appear to present an environmental concern to the subject site.

Timmers Service Center - 3600 South Division - This site was identified as a LUST site and is located approximately ⅓ mile northeast of the subject site. A July 5, 1990 Report of UST Closure and Initial Abatement Measures Report, prepared by Superior Environmental Corp., stated the USTs were removed from this site. The report also stated that contaminated soil and groundwater exist at this site. No contaminant delineation was conducted. Based on the anticipated groundwater flow direction at this (west-northwest to the Cole Drain), this site does not appear to present an environmental concern to the subject site.

Hobart Sales Service - 4064 South Division - This site was identified as a LUST site and is located approximately ⅓ mile southeast of the subject site. Based on the MDEQ file, a confirmed release

was reported at this site on October 26, 1992. An April 27, 2001 LUST Closure Report, prepared by BLDI Environmental, indicated 109 cubic yards of contaminated soil were removed from this site. In addition, 600 gallons of impacted groundwater were remediated. Subsequent sampling revealed contaminant concentrations below the cleanup criteria. An October 18, 2001 MDEQ Audit of Corrective Action concurred that the corrective action had resulted in the unrestricted residential use closure of this site. Based on the "closed" status of the LUST investigation at this site (confirmed by the MDEQ), this site does not appear to present an environmental concern to the subject site.

Pony Express Courier Corporation - 4130 South Division - This site was identified as a LUST site and is located approximately $\frac{1}{3}$ mile southeast of the subject site. Based on the MDEQ file, a confirmed release was reported at this site on November 2, 1998. A November 10, 1999 LUST Final Assessment Report, prepared by Envirologic Technologies, Inc., indicated gasoline constituents had impacted the soil at the former dispenser located on site and that the perched groundwater had migrated into the backfilled area of the former UST excavation. No groundwater was identified at the site other than the former excavation. The Corrective Action Plan for this site was to extract the impacted groundwater from the former UST excavation, install a deep monitor well to determine whether the underlying aquifer has been impacted and remove the impacted soil from the former dispenser location. Based on the limited nature of the impacted media, this site does not appear to present an environmental concern to the subject site.

Ryder Truck Rental - 3663 Clay Avenue, SW - This site was identified as a LUST site and is located approximately $\frac{1}{3}$ mile northwest of the subject site. Based on the MDEQ file, confirmed releases were reported at this site on May 3, 1994 and July 14, 1994. A July 19, 2000 LUST Closure Report, prepared by EnviroSolutions, Inc., indicated approximately 2,100 cubic yards of contaminated soil were removed from this site. Quarterly sampling of the groundwater at this site eventually revealed contaminant concentrations below the cleanup criteria. An August 30, 2000 MDEQ letter indicated that the closure report was received and that it may be audited. Based on the information reviewed, this site does not appear to present an environmental concern to the subject site.

Wyoming Warehouse, Inc. - 425 - 36th Street, SW - This site was identified as a LUST site and is located approximately $\frac{3}{8}$ mile northwest of the subject site. Based on the MDEQ file, a confirmed release was reported at this site on December 22, 1989. A December 4, 1992 Hydrogeological & Soil Investigation, prepared by Westshore Engineering & Surveying (WES), indicated 142 cubic yards of impacted soil were removed from this site. Additional soil and groundwater sampling revealed contaminant concentrations close to the former Type B Cleanup Criteria. Quarterly groundwater monitoring was recommended as the next stage of corrective action. An October 18, 1993 WES letter report indicated the second consecutive sampling event with contaminant levels below the Type B Cleanup Criteria was achieved. A November 17, 1993 Michigan Department of Natural Resources, or MDNR (currently known as the MDEQ), letter concurred that the interim response activities at this site had reduced contaminant concentrations to concentrations acceptable

of a Type B closure. Based on the "closed" status of this site (confirmed by the MDNR), this site does not appear to present an environmental concern to the subject site.

Consumers Energy Company - 4000 Clay Avenue, SW - This site was identified as a LUST site and is located approximately $\frac{3}{8}$ mile west of the subject site. Based on the MDEQ file, confirmed releases were reported at this site on the following dates: June 11, 1990; August 24, 1992; and, June 9, 1994. The corrective action at this site involved the removal of approximately 500 cubic yards of contaminated soil. Subsequent soil sampling resulted in the closure of the three incidents. No impacted groundwater was identified in the MDEQ file. Based on the information reviewed, this site does not appear to present an environmental concern to the subject site.

Clark Store #476 - 3470 South Division - This site was identified as a LUST site and is located approximately $\frac{1}{2}$ mile northeast of the subject site. Based on the MDEQ file, a confirmed release was reported at this site November 24, 1997. A December 3, 1999 LUST Final Assessment Report prepared by ATC Associates, Inc. (ATC), indicated 748 cubic yards of contaminated soil were removed from this site. The groundwater was determined to flow in a west-northwesterly direction (away from the subject site). A February 3, 2000 letter from the MDEQ indicated that the Final Assessment Report did not contain the horizontal extent of groundwater contamination. A May 23, 2001 ATC Free Product Recovery Status Report partially delineated the impacted groundwater at the site and extending to the northwest. An additional monitoring well was proposed to further delineate the contaminated groundwater. Based on the groundwater flow direction, this site does not appear to present an environmental concern to the subject site.

SHWS

George Belfer Drum & Barrel Company - 4336 Hansen, SW - This site was identified as a SHWS and is located approximately $\frac{1}{2}$ mile southwest of the subject site. Based on a November 17, 1998 Notification of Self-Implementing Cleanup & Disposal of PCB Remediation Waste, prepared by George Belfer Drum and Barrel Company, the soil at this site is impacted with polychlorinated biphenyls (PCBs). The contaminated soil was delineated on this property. The target level for this site was to remediate the PCB contaminated soil to concentrations of less than 100 parts per billion (ppb). The report also stated the exposure to the remaining contaminated soil (less than 100 ppb) would be restricted by the concrete floor. Based on the information reviewed, this site does not appear to be an environmental concern to the subject site.

Grantex Inc. - 3560 Jefferson Avenue, SE - This site was identified as a SHWS and is located approximately $\frac{1}{2}$ mile northeast of the subject site. A July 6, 1998 American Hydrogeology Corporation (AHC) Work Plan indicated the tetrachloroethene was released from a dry-cleaning machine at this site. A July 15, 1998 AHC letter report summarized the plume delineation activities. The contamination was partially delineated extending to the north-northeast. A March 30, 2000

AHC Status Report of Monitoring and Remedial Activities also partially delineated the contaminated groundwater. The western and northern limits of contamination were not fully delineated. Based on the partial contaminant delineation, this site does not appear to present an environmental concern to the subject site.

RCRA-CORRACTS

Benteler Industries - 3721 Hagen Drive, SE - This site was identified as a RCRA CORRACTS site and is located approximately one mile east northeast of the subject site. A June 13, 1983 EPA letter indicated the permit for the treatment, storage and disposal activities at this site was withdrawn. A July 11, 1986 EPA letter listed several violations at this site. The violations were identified as a lack of record keeping pertaining to the disposition of PCB containing items and the lack of secondary containment in areas containing PCB items. In addition, PCB dielectric fluid was observed leaking onto the floor of the facility. No information pertaining to the correction of the violations was available in the MDEQ file. An August 5, 1997 MDEQ letter stated this facility was in compliance. A Certificate of Coverage under the Storm Water General Permit was issued for this site on April 9, 2001. An October 4, 2001 Spill Report Form indicated an estimated 250 gallons of water and coolant mix was allowed to run out of the facility into the soil and stormwater catch basin. A total of six cubic yards of stained soil and 100 gallons of water and coolant mix was pumped out of the stormwater catch basin. Based on the information reviewed and the distance to the subject site, this site does not appear to present an environmental concern to the subject site.

3.5 Kent County Equalization Department

DEC visited the Kent County Equalization Department on January 24, 2002 to review aerial photographs for the subject site and the surrounding area. Aerial photographs from 1970, 1975, 1980, 1986, 1991, 1996, 1998, and 1999 were available for review. A brief description of the aerial photographs is provided below.

The 1970 aerial photograph depicted the southwestern and north-central portions of the subject building. An unpaved parking area extended along the northern and eastern sides of the subject building. An area of discolored soil was depicted at the northeastern corner of the subject building. The eastern portion of the subject site consisted of a vacant lot. The eastern portion of the subject site appeared to have been utilized for parking and as access to the building. The western portion

of the northern adjoining property consisted of a small square shaped building and a paved parking area. An irregular shaped building with a quonset style building and unpaved areas were depicted to the northeast of the subject site. The eastern adjoining property consisted of a quonset style building structure and an unpaved parking area. A rectangular shaped building was depicted on the southeastern adjoining property. The area to the south of the subject site consisted of a quonset style building structure, a vacant lot, a residential house and a small rectangular shaped commercial building structure. A large industrial building structure with railroad tracks and an exterior storage area were depicted to the west of the subject site.

The 1975 aerial photograph depicted the western portion of the subject site consistent with the previous aerial photograph. In addition, several 55-gallon drums were depicted near the northeastern corner of the subject building. An addition was also constructed to the west of the north-central portion of the building. An asphalt paved parking area was depicted on the northwestern portion of the property. The eastern portion of the subject site consisted of a graded parking area. An apparent railcar was depicted on the northeastern portion of the property. The graded area appeared to be a portion of the parking area located on the eastern portion of the northern adjoining property (former industrial property). The remaining adjoining property features were consistent with the previous aerial photograph. In addition, a square shaped building was depicted to the south of the subject site.

The 1980 aerial photograph depicted two additions along the eastern side of the building structure. The northern addition covered the former exterior storage area located at the northeastern corner of the subject building. The remaining features of the subject site and adjoining properties appeared consistent with the previous aerial photograph. Additions were also constructed along the eastern side of the small commercial building structure located to the south of the subject site and along the southern side of the large industrial building located to the west. An exterior storage area was also depicted immediately to the west of the subject site. Numerous 55-gallon drums were depicted in the exterior storage area located on the western adjoining property.

The 1986 aerial photograph depicted the subject site consistent with the current site features. An area of possibly discolored soil was depicted at the northeastern corner of the subject building. The area of possibly discolored soil was consistent with features currently observed at the property. The eastern portion of the subject site appeared to be utilized by the occupants of the western portion of the subject site. The adjoining property features were consistent with the previous aerial photograph. A building addition and asphalt paved parking were also depicted on the eastern portion of the northern adjoining property. Miscellaneous debris was depicted along the southern side of the square shaped building located to the south.

The 1991 and 1996 aerial photographs depicted the subject site consistent with the previous photographs. In addition, several 55-gallon drums and a steel bin were depicted at the area of possibly discolored soil. The adjoining properties were also consistent with the previous. A large addition was also depicted along the southern side of the building structure on the western adjoining property.

The 1998 and 1999 aerial photographs depicted an addition along the eastern side of subject building. The 55-gallon drums and bin were no longer present at the northeastern corner of the subject building, however, the area of possibly discolored soil was still present. An asphalt paved parking area was located on the northwestern portion of the subject site and the eastern portion consisted of an unpaved parking area. The features of the adjoining properties were consistent with the previous aerial photograph.

3.6 Kent County Health Department

On March 30, 2004, DEC contacted the County Health Department (KCHD), Environmental Health Division (EHD) in Grand Rapids, Michigan. The KCHD, EHD was given the address of the subject site in order to determine whether any county records were available.

Based on the response from KCHD, EHD, records pertaining to the subject site (3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan) were not available.

3.7 Kent County Register of Deeds

On January 24, 2002, DEC visited the Kent County Register of Deeds office in Grand Rapids, Michigan. The purpose of this visit was to obtain ownership and usage documentation pertaining to the subject site. Title information was reviewed at the Register of Deeds through 1948. Title information prior to 1948 was not reasonably ascertainable. A summary of the title information is provided in the following table.

Table 11 - Title Information

PROPERTY DESCRIPTION	GRANTOR	GRANTEE	DATE	DEED DESCRIPTION
Entire Parcel	Harriet J. Stanaback, Cyril F. Moore and David Stanaback, Co-Trustees of Kenneth P. Stanaback Trust	Harriet J. Stanaback, Cyril F. Moore & David Stanaback	January 20, 1992	Quit-Claim Deed
Lots 51, 52 & 53	Kathryn W. Stanaback	Kenneth P. Stanaback	June 4, 1965	Quit-Claim Deed
Lots 51, 52 & 53	Charles C. Sabo & Mildred V. Sabo	Kenneth P. Stanaback & Kathryn W. Stanaback	August 26, 1957	Warranty Deed
Lots 51, 52 & 53	Charles C. Russell & Frances P. Russell	Charles C. Sabo & Mildred V. Sabo	August 26, 1957	Warranty Deed

DEC did not identify any records that indicated that an environmental lien, encumbrance or restriction was associated with the subject property.

3.8 Wyoming Tax Assessor

The Wyoming Tax Assessor's Office provided DEC with a copy of the tax assessment information pertaining to the subject site. The address of the subject site was identified as 3890 Buchanan Avenue, SW. A copy of the tax assessor's records is included as Appendix D.

Based on the assessor's records, the main portion of the one-story building structure was constructed in 1947. Additions to the subject building were constructed in 1965, 1967, 1972, 1980 and 1994. The construction materials of the building were identified as a poured concrete foundation, carpeted floor coverings, concrete block walls and wood-on-wood/steel-on-steel roof structures with tar and gravel. The heating system was identified as suspended units - hot water. Improvements to the subject site were identified as asphalt pavement, curbing, gutters, storm sewer, sidewalks, sanitary sewer, city water, natural gas and electricity.

3.9 Grand Rapids Public Library

DEC visited the Grand Rapids Public Library on January 15 and 17, 2002 and March 30, 2004. The purpose of these visits was to evaluate historical records which would assist in resolving previous ownership, users, and/or developments at the subject and adjoining properties. A summary of the library information is provided below.

DEC reviewed Kent County Plat Maps from the following years: 1855, 1863, 1876, 1894, 1907, 1919, 1939, 1955, 1961, 1969, 1971, 1981, 1983, 1990, 1992 and 1996. Data failure occurred for plat map information prior to 1855. The following table summarizes the historical information obtained from the plat maps.

Table 12 - Historical Plat Map Information

Plat Map Year(s)	Plat Map Information	Parcel Size (Acres)
1990 through 1996	Rose Lawn Park	-
1969 through 1983	Subdivision	-
1961	Small Tracts	-
1939 through 1955	Plats	-
1919	H. Veling	19.1
1907	N.A. Smith	25
1876 through 1894	J. Hughes	40
1863	(Illegible)	-
1855	Whitney	40

DEC reviewed the R.L. Polk Grand Rapids City and Suburban Directories containing coverage of the subject area. The city telephone directories were reviewed from the following years: 1949, 1954 and 2001. The suburban telephone directories were reviewed from the following years: 1957, 1958, 1962, 1966, 1971, 1976, 1981, 1986, 1991, 1996 and 2003. Data failure occurred for directory information prior to 1949. The following table summarizes the historical directory information.

Table 13 - Historical Directory Information

Address	Year(s)	Occupant(s)
3890 Buchanan Avenue, SW (Subject Site)	1958 through 2003	Conical Tool Company
	1957	Vacant
	1954	No Listing
	1949	Commercial Grinding and Manufacturing Company

Table 13 - Historical Directory Information, cont.

Address	Year(s)	Occupant(s)
141 39 th Street, SW (Subject Site)	1971 through 2003	No Listing
	1968	Vacant
	1965 and 1966	C & B Silo Company and Cliff's Garage Truck Repair
	1957 and 1962	C & B Silo Company
	1949	No Listing
3846 through 3882 Buchanan Avenue, SW (Northern Adjoining Property)	2001 and 2003	International Union United Auto and Aerospace and Agriculture
	1996-1997	United Auto Workers and Agricultural Implement Workers Local 730
	1981 through 1991	United Auto Workers, Agricultural Implement Workers Local 730 and Vandewater Hall (UAW Local 730)
	1976	United Auto Workers, Agricultural Implement Workers Local 730 and GR Commercial Heat Treating Company - storage
	1971	United Auto Workers, Agricultural Implement Workers Local 730 and Antevlink EJ Company
	1966	United Auto Workers, Agricultural Implement Workers Local 730 and Acme Welding Service
	1958	United Auto Workers, Agricultural Implement Workers Local 730 and GR Herald - garage
	1957	United Auto Workers Local 730 and GR Herald - garage
	1954	No Listing
	1949	Boss Cushion & Spring Shop and Buchanan Avenue Garage and Body Shop
3814 through 3841 Opal Avenue, SW (Historic Northern Adjoining Property)	1958 through 2003	No Listing
	1949 through 1957	C & B Silo Company

Table 13 - Historical Directory Information, cont.

Address	Year(s)	Occupant(s)
3834 & 3838 Opal Avenue, SW (Northeastern Adjoining Property)	2001 and 2003	No Listing
	1991 through 1996-1997	PSC Distributing Company
	1986	PSC Distributing Company, Mercury Building Maintenance and VanFongeren Furniture Refinishing
	1981	Sheer Metal Repair Service, Mercury Building Maintenance and VanFongeren Furniture Refinishing
3834 & 3838 Opal Avenue, SW (Northeastern Adjoining Property)	1971 and 1976	Sheer Metal Repair Service and Mercury Building Maintenance
	1966	Sheer Metal Repair Service and Robertson's Auto Service (Auto Repair)
	1962	Alexis Manufacturing Company (furniture)
	1954 and 1957	Alexis Manufacturing Company and D & W Woodcarving Company
	1949	Alexis Manufacturing Company
3852 Opal Avenue, SW (Eastern Adjoining Property)	2001 and 2003	No Listing
	1996	Vacant
	1986 and 1991	Apex Wholesale
	1962 through 1981	Pep Lines Trucking Company
	1949 through 1958	Film Truck Service
120 39 th Street, SW (Southeastern Adjoining Property)	2001 and 2003	GJ Fabrication
	1996	No Listing
	1958 through 1991	Apex Polishing Company
	1949 through 1957	No Listing
	1945	No Coverage

Table 13 - Historical Directory Information, cont.

Address	Year(s)	Occupant(s)
130 39 th Street, SW (Southeastern Adjoining Property)	2001 and 2003	George's Foreign Car Service
	1996	Accurate Metal Finishing George's Foreign Car Service
	1966 through 1991	No Listing
	1962	George's Simonizing
	1949 through 1958	No Listing
	1945	No Coverage
138 39 th Street, SW (Southern Adjoining Property)	2001 and 2003	Accurate Metal Finishing
	1996	Vacant
	1991	VPZ Power Sports
	1981 and 1986	Apex Stage
	1976	Apex Wholesale
	1966 and 1971	Haas Body Shop
	1962	Ken'l Pave Improvement Company
	1958	Tiffany Building Contractors, Tiffany Millwright and Wyoming Manufacturing Products
	1957	Bishop's Auto Reconditioning
	1954	Ventaire Awnings
	1949	Servelux Manufacturing Company
148 39 th Street, SW (Southern Adjoining Property)	2001 and 2003	Travis Truck and Auto Collision
	1996	Collision Repair Shop
	1991	Auto Boutique, Inc. and Travis Truck Collision
	1981 and 1986	Auto Boutique, Inc.
	1949 through 1976	No Listing

Table 13 - Historical Directory Information, cont.

Address	Year(s)	Occupant(s)
3920 & 3926 Buchanan Avenue, SW (Southern Adjoining Property)	2003	No Listing
	2001	Mark Maker Company
	1986 through 1996-1997	Litho Photo Supply (Graphic Art Dealership)
	1981	Toering Electric Company
	1976	John Damman Company
	1966 and 1971	Bosma Brothers Plumbing
	1949 through 1962	Various Individuals
300 36 th Street, SW (Western Adjoining Property)	2001 and 2003	General Motors Metal Fabricating Division United Auto and Aerospace & Agricultural
	1996-1997	Cadillac Luxury Car Division
	1991	Chevrolet Pontiac Canada Group
	1959 through 1986	Fischer Body Division General Motors Corporation
	1954	No Listing
	1949	Fischer Body (A Division of GM Corporation)

3.10 Sanborn Fire Insurance Maps

Sanborn Fire Insurance Maps provide details pertaining to site features and building construction materials. Fire insurance maps were produced by the Sanborn Company at various times from the late 1800's to the mid-1980's. DEC retained Environmental Data Resources (EDR), Inc. to provide the available Sanborn Fire Insurance Maps for the subject site. Fire insurance maps were available from 1950, 1953, 1966 and 1985. Details pertaining to the western adjoining property were not

depicted on the 1953 through 1985 fire insurance maps.

The 1950 fire insurance maps depicted a machine shop on the southwestern corner of the subject property. The remaining five lots of the subject site were vacant. A woodworking building, an auto repair shop, and an aluminum foundry were depicted on the northern adjoining property. A baked goods distributing center was identified on the northeastern adjoining property. The building structure located to the east of the subject site was identified as a private garage. A woodworking building, four vacant lots and a residential dwelling were depicted to the south of the subject site. A large factory identified as the Grand Rapids Stamping Division of the General Motors Corporation was identified to the west and northwest of the subject site. Several railroad spurs provided access to the western adjoining property.

The 1953 fire insurance map also depicted a machine shop on the southwestern portion of the subject site. The remaining portion of the subject property was vacant. A spring factory, an automobile repair facility and a concrete silo factory were depicted to the north of the subject site. The remaining adjoining properties were consistent with the previous fire insurance map.

The 1966 and 1985 fire insurance maps depicted the machine shop building on the southwestern portion of the subject site. A building addition was depicted along the northern side of the structure. The remaining portion of the subject site was vacant. A union hall, an automobile repair facility and a concrete silo factory were depicted to the north of the subject site. The northeastern adjoining property consisted of a sheet metal facility and an automobile repair facility. The private garage was depicted to the east of the subject site. A building identified as boat storage and polishing/buffing works was located on the southeastern adjoining property. A paving contractor's warehouse, the vacant lots, a vacant building and a plumbing company were depicted to the south of the subject site.

4.0 SITE RECONNAISSANCE AND INTERVIEWS

4.1 Site Reconnaissance

The on-site walkover reconnaissance of the subject site was conducted on March 23, 2004, by Stephen M. Heintz, Project Scientist, of DEC. The qualifications of the environmental professionals responsible for completing the Phase I ESA are included in Appendix E.

DEC conducted a walkover of the subject property and the interior of the subject building. The walkover of the subject property consisted of a visual evaluation of exterior conditions and site features. The walkover of the interior of the subject building included a review of hazardous substance use, its location and potential conveyance pathways. A photographic log of the walkover is included in Appendix F.

4.1.1 Walkover of the Subject Property

The subject site is located in an industrial area in the eastern portion of the City of Wyoming. The subject property is located at the northeastern quadrant of the intersection of Buchanan Avenue, SW and 39th Street, SW. The address was identified as 3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan. The subject site consisted of a multiple section commercial building, an asphalt paved parking area and an unpaved parking area.

The subject building was located on the southwestern portion of the subject site. A small landscaped area was located along the western side of the subject building. The asphalt paved parking area was located to the northwest and north of the subject building. The eastern portion of the property was unpaved gravel parking lot.

DEC observed a solid waste dumpster in the unpaved parking area located to the north of the subject building. The solid waste dumpster was utilized for the disposal of miscellaneous refuse. No indications of leakage or surficial soil staining were observed in the vicinity of the solid waste dumpster.

A shed roof structure with a concrete floor was located along the eastern side of the subject building. DEC observed a scrap steel bin and several empty 55-gallon drums in the structure. Oil staining and metal shavings were observed on the concrete floor of the lean-to structure (near the scrap steel bin). The concrete was in good condition and the oil staining appeared limited to the concrete surface.

DEC did not observe any evidence of USTs, aboveground storage tanks (ASTs), pits, ponds, lagoons, drinking water wells, on-site septic systems or potential polychlorinated biphenyl (PCB) containing equipment during the walkover of the subject site.

The UAW Local 730/Vandewater Local 730 Union Hall were located on the northern adjoining property (3852 Buchanan Avenue, SW). Pries Supply Company was located to the northeast of the subject site (3830-3834 Opal Avenue, SW). A quonset style building structure, several semi-truck trailers and several automobiles were located on the eastern adjoining property (3852 Opal Avenue, SW). DEC could not identify the occupant of the eastern adjoining property. George's Foreign Car Service was located on the southeastern adjoining property (130 39th Street, SW). Accurate Metal Finishing, Travis Collision and Mark Maker Company were located to the south of the subject site (138 and 148 39th Street, SW and 3920 Buchanan Avenue, SW, respectively). The General Motors Corporation Grand Rapids Metal Plant was located to the west of the subject site (300 36th Street, SW).

4.1.2 Walkover of the Subject Building

The building structure at the subject site was occupied by Conical Tool Company. Conical Tool company manufactures tapered end mill bits for the tool and die industry. The subject building consisted of an office area, a shipping area, a storage area and a machine shop.

The office area was located in the western portion of the subject building. DEC observed a cubical area, a conference room, an office supply storage room/work area, an office and a bathroom. The shipping area was located along the western side of the office area. This portion of the subject building consisted of a storage rack for the end mill bits, a small office area and a bathroom. A shadow graph was also located in the shipping area. The shadow graph was utilized for verifying that an end mill bit has been manufactured properly.

The storage room was located to the north of the shipping area. Items observed in this portion of the subject building included cardboard boxes, boxes of padding, boxes of paperwork, computer boxes and a ceiling mounted natural gas fired heating unit. A wall-mounted electrical transformer was also observed in this portion of the subject building. The wall-mounted electrical transformer appeared to be an air-cooled transformer, therefore, no dielectric insulating/cooling oil was utilized. In addition, no indications of dielectric oil leakage or staining were observed.

The machine shop was located in the eastern portion of the subject building. Several ceiling mounted heating units were observed in this portion of the subject building. Historical heating units formerly utilized steam and were not functional. The current ceiling heating units utilized natural gas.

DEC observed numerous grinding units, lathes and miscellaneous manufacturing equipment located in the machine shop. DEC also observed miscellaneous tools and supplies in the eastern portion of

the building. The grinding machines varied in size and function. The grinding units utilized an aboveground cutting oil/coolant reservoir.

Numerous 55-gallon drums and five-gallon containers of cutting oils and coolants were observed in the subject building. The drums and containers were in good condition. Several areas of oil staining were observed in various locations throughout the machine shop. The concrete floor of the machine shop was in good condition and the oil stained areas appeared limited to the concrete surface. No floor drains were located in the machine shop. A table summarizing the miscellaneous products is included below.

A partial basement was located beneath the southeastern portion of the subject building. DEC observed a storage room, a boiler room and a compressor area in the basement of the subject building. Miscellaneous supplies were observed in the storage and boiler rooms. The natural gas fired boiler was not operational.

The air compressor was located in the northernmost portion of the basement. An oil stained area surrounded the air compressor. The oil stained area appeared limited to the concrete surface. Two 55-gallon drums of scrap steel, several damaged paint containers, and two five-gallon containers of rust/scale remover were also observed in the basement. No significant indications of leakage or staining were observed near the containers. A covered sump was located in the northwestern corner of the air compressor room. No indications of hazardous substance staining or odors were associated with the sump in the basement of the subject building.

An additional air compressor was located near the drum storage area in the northeastern portion of the subject building. An air drying unit was located adjacent to the air compressor. No indications of oil staining were observed near the air compressor in the northeastern portion of the subject building.

A wall-mounted electrical transformer was observed in the south-central portion of the subject building. The wall-mounted electrical transformer also appeared to be an air-cooled transformer, therefore, no dielectric insulating/cooling oil was utilized. In addition, no indications of dielectric oil leakage or staining were observed.

4.2 Interviews

DEC conducted telephone interviews with specific individuals at government regulatory agencies to determine whether any information pertaining to the subject site was available. DEC also contacted representatives of the current owners and/or users of the subject site. The current owners of the subject site were identified as Harriet Stanaback, David Stanaback and Cyril Moore. Interviews conducted as part of the previous Phase I ESA are included below.

On January 23, 2002 and April 6, 2004, DEC contacted the Wyoming Zoning Variances and Inquires Department in order to determine the zoning of the subject site. DEC understands the subject site (Tax Parcel Identification Number 41-17-24-276-014) is zoned I-2, which is referenced as "General Industrial."

On January 11, 2002, Ms. Harriet Stanaback completed a Phase I ESA Questionnaire for the subject site. Based on the questionnaire, the subject site has historically been utilized for manufacturing. Industrial operations are also conducted at the subject site. Stained soil was also currently and historically located at the subject site (former exterior storage area). The utility providers at the subject site were identified as AT & T (telephone service), Consumers Energy (electricity), MichCon (natural gas) and the municipal water, sanitary sewer and storm water sewer systems.

On January 28, 2002, DEC attempted to contact the previous owners of the subject site. The previous owners were unable to be located for an interview.

*Phase I Environmental Site Assessment
Conical Tool Company Property
3890 Buchanan Avenue, SW, Wyoming, Michigan
DEC Project No. 04-02-014
April 7, 2004*

On March 23, 2004, DEC interviewed Mr. Dennis Avery, a manager for Conical Tool Company. Mr. Avery indicated the operations at the subject site were consistent with the previous Phase I ESA. Mr. Avery also indicated impacted soil was removed from the eastern end of the subject building.

5.0 SUMMARY AND CONCLUSIONS

This Phase I ESA was conducted to identify the potential for environmental impairment to exist on the subject site. DEC has completed the Phase I ESA utilizing methodology outlined in American Society for Testing and Materials (ASTM), Standard Practice E 1527-00.

Based on the Phase I ESA, the subject site was undeveloped and vacant until 1947. The subject site was acquired and developed in two portions. The western portion of the subject site was developed in 1947. The original building structure (central portion of the current subject building) was constructed in 1947. In 1949, the first occupant of the subject site was identified as Commercial Grinding and Manufacturing Company. From 1957 through the present, Conical Tool Company was identified as the operator of the subject site. Conical Tool Company manufactures end mill bits for the tool and die industry. The eastern portion of the subject site appears to have been historically utilized as an unpaved parking lot/access driveway for the northern adjoining property. The historical operators identified at the northern adjoining property included an aluminum foundry (1940's), Boss Cushion and Spring Shop (1949), C & B Silo Company (1949 through 1966) and Cliff's Garage Truck Repair (1965 and 1966). The Conical Tool Company acquired the eastern portion of the subject site in the early 1970's. Conical Tool Company constructed several building additions in the late 1970's, which extended onto the eastern portion of the subject site. With the exception of the building additions, the eastern portion of the subject site has been used for unpaved parking. Various industrial activities, engine repair shops and automotive body shops were also historically identified at properties surrounding the subject site.

Based on the results of the Phase I ESA, DEC found no on-site recognized environmental conditions (RECs) in connection with the subject property, except for the following:

- In 2002, DEC conducted several environmental investigations at the subject site. The previous environmental investigations included a Phase I ESA, a Phase II ESA and a Contaminant Delineation Sampling and Chemical Analysis Report. In addition, impacted "hot spots" were excavated and disposed (approximately 60 cubic yards), Verification of Soil Remediation soil sampling was conducted, a local background survey was attempted for several metallic constituents, five monitor wells were installed and several groundwater sampling events were conducted. Impacted soil was primarily encountered on the eastern

portion of the subject site. Impacted groundwater was encountered throughout the subject property. In summary, trichloroethene, chromium, iron, molybdenum, and nickel are currently present in the soil at concentrations exceeding the Generic Residential Cleanup Criteria (GRCC) outlined in the Administrative Rules for Part 201 Environmental Remediation of the Natural Resources and Environmental Protection Act 1994 PA 451, as amended, dated December 21, 2002. In addition, concentrations of trichloroethene and tetrachloroethene in the groundwater also currently exceed the GRCC. An overview of the previous environmental investigations and a summary of the analytical results are included in Section 2.3 of this report. The contaminated soil and groundwater at the subject site were identified as an on-site REC.

Regarding off-site RECs in the surrounding area, DEC identified 20 sites within the ASTM Approximate Minimum Search Distance (AMSD) criteria. The ASTM Phase I ESA requires that the environmental professional identify and review available government files within specified radial distances of the subject property. DEC conducted the review at the MDEQ, Grand Rapids District office. The land use in the area was historically identified as heavy industrial. Due to the extensive hazardous substance use associated with the historical and current industrial activities in the area, the former land use in the surrounding area was identified as an off-site REC. Brief descriptions of the AMSD sites are included in Section 3.4 of this report.

DEC has performed this Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Standard Practice E 1527-00. Any exemptions to, or deletions from, this practice are described in Section 1.2 of this report.

Within the limits of the ASTM Standard Practice E 1527-00 and in DEC's professional opinion, all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice has been provided through this assessment.

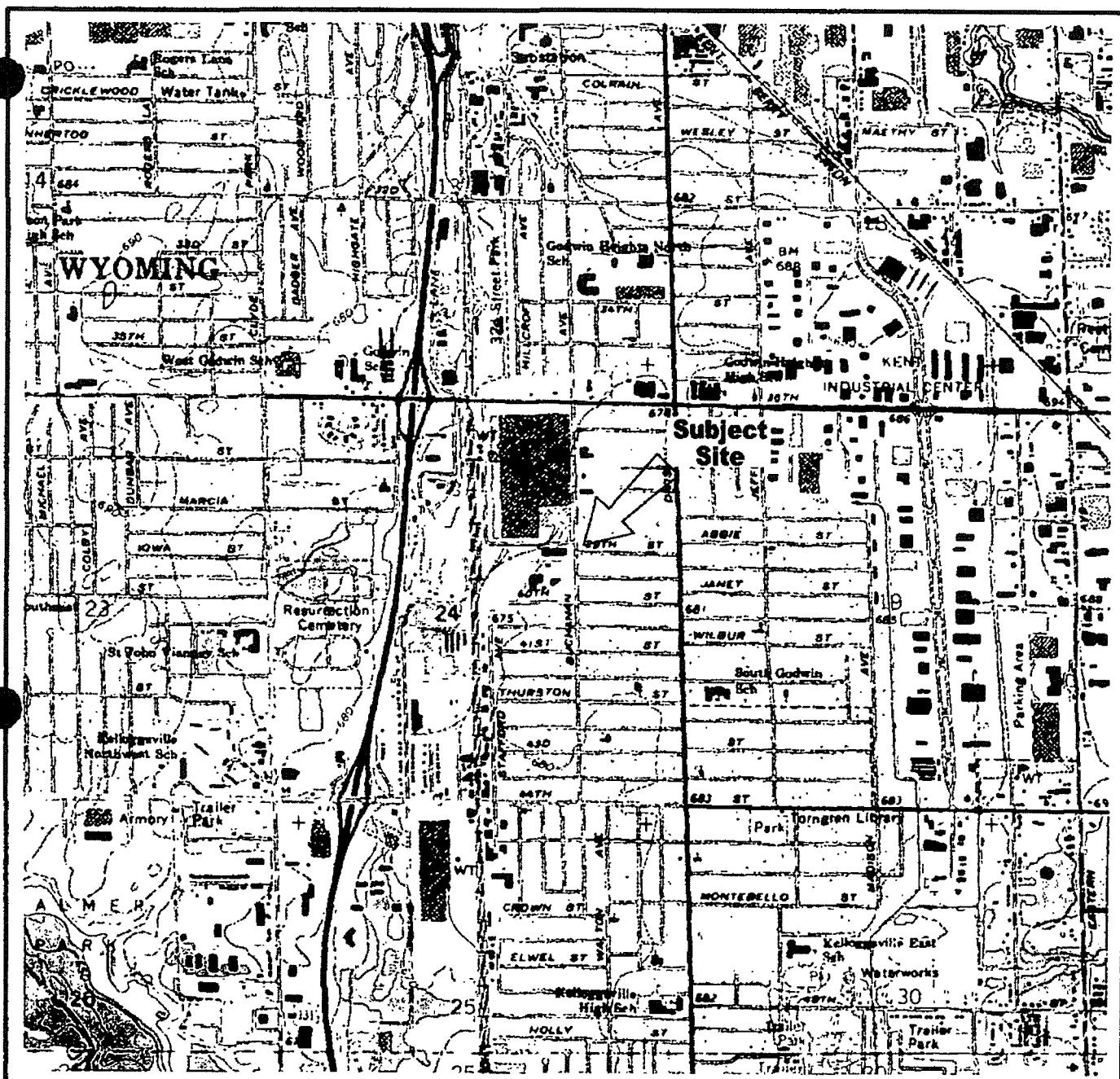
FIGURES

PROJECT LOCATION MAP

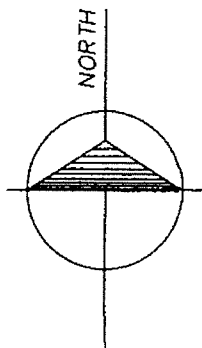
SITE VICINITY DIAGRAM

SITE DETAIL DIAGRAM

**REMEDIAL EXCAVATION AND VSR SAMPLE LOCATION
DIAGRAM**



BASE MAP TAKEN FROM USGS 7.5 MINUTE QUADRANGLES:
CUTLERVILLE, MICHIGAN AND GRAND RAPIDS WEST, MICHIGAN



KENT COUNTY

APPROXIMATE SCALE: 1" = 2000'

D I X O N
ENVIRONMENTAL CONSULTING, INC.

PHASE I ENVIRONMENTAL SITE ASSESSMENT

FIGURE I - PROJECT LOCATION MAP

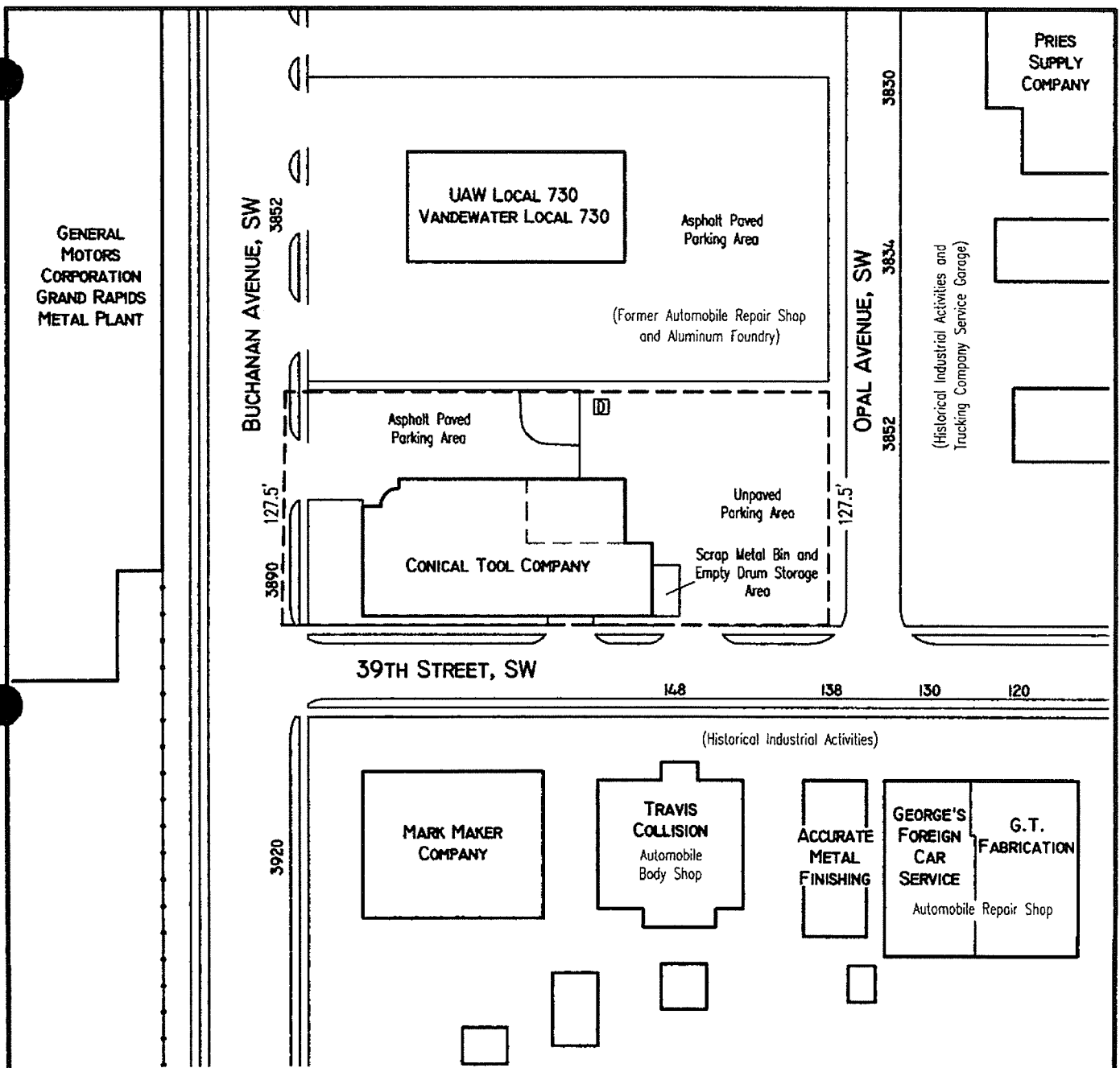
CONICAL TOOL COMPANY PROPERTY
3890 BUCHANAN AVENUE, SW
WYOMING, KENT COUNTY, MICHIGAN

PROJECT NO: 04-02-014

APRIL 7, 2004

750 OTTAWA AVENUE, NW
GRAND RAPIDS, MI 49503

TELEPHONE: (616) 742-5511
FACSIMILE: (616) 742-5522



D I X O N
ENVIRONMENTAL CONSULTING, INC.

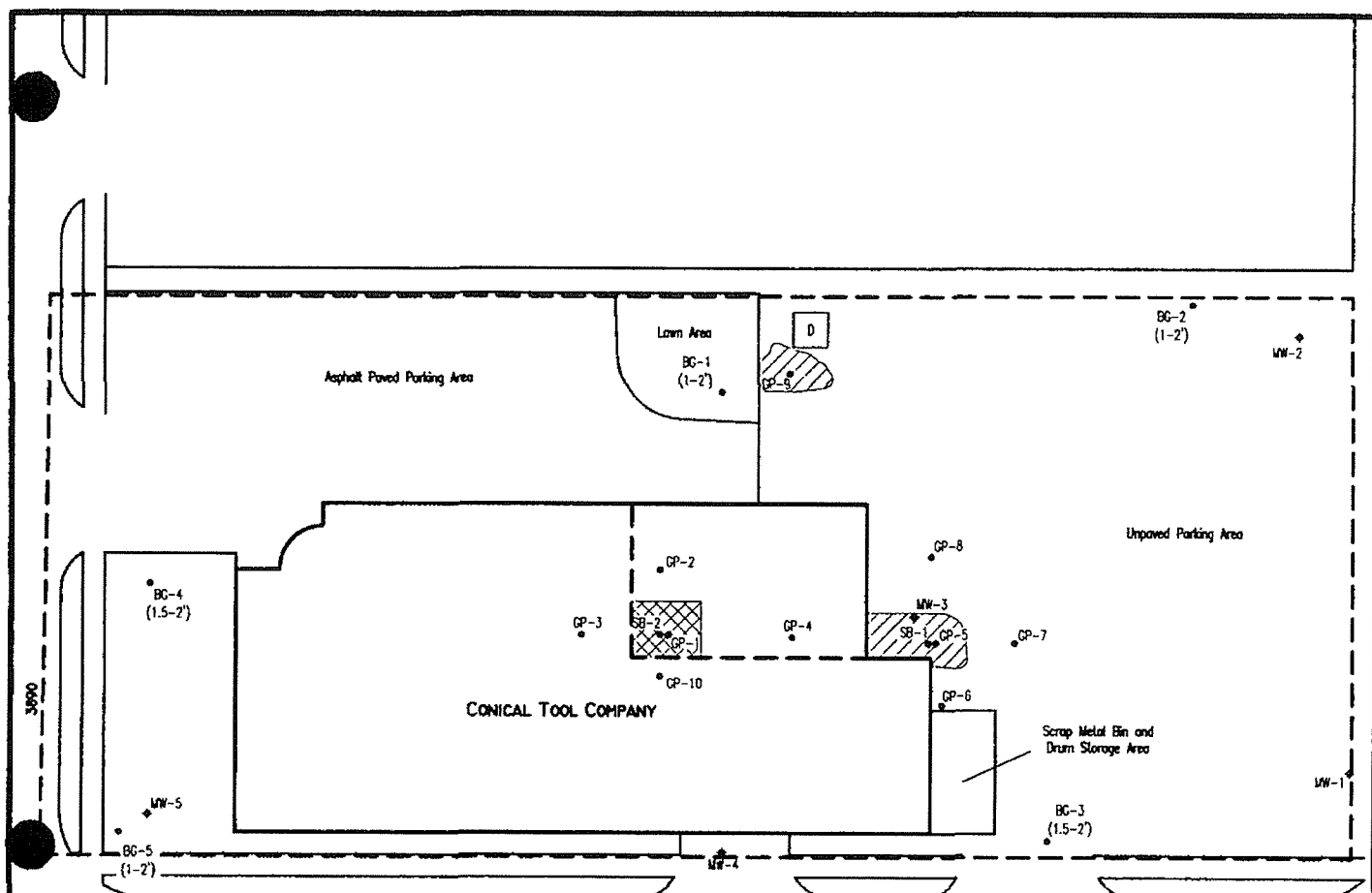
PHASE I ENVIRONMENTAL SITE ASSESSMENT

FIGURE 2 - SITE VICINITY DIAGRAM

CONICAL TOOL COMPANY PROPERTY
3890 BUCHANAN AVENUE, SW
WYOMING, KENT COUNTY, MICHIGAN

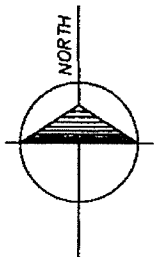
PROJECT NO: 04-02-014 **APRIL 7, 2004**

750 OTTAWA AVENUE, NW **TELEPHONE: (616) 742-5511**
GRAND RAPIDS, MI 49503 **FACSIMILE: (616) 742-5522**



39TH STREET, SW

LEGEND



- PROPERTY BOUNDARY
- .-.- FORMER LIMITS OF BUILDING
- [Hatched Box] SOLID WASTE DUMPSTER
- [Star Symbol] MONITOR WELL LOCATION
- [Star Symbol] BACKGROUND SURVEY BORING LOCATION
- [Star Symbol] EARTH PROBE BORING LOCATION
- [Hatched Box] HISTORICAL AREAS OF DISCOLORED SOIL REMOVED JULY 9, 2002
- [Cross-hatched Box] HISTORICAL AREA OF DISCOLORED SOIL

NOTE: THIS DIAGRAM IS NOT A LEGAL SURVEY. APPROXIMATE SCALE: 1" = 40'

D I X O N
ENVIRONMENTAL CONSULTING, INC.

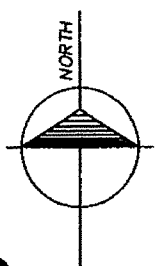
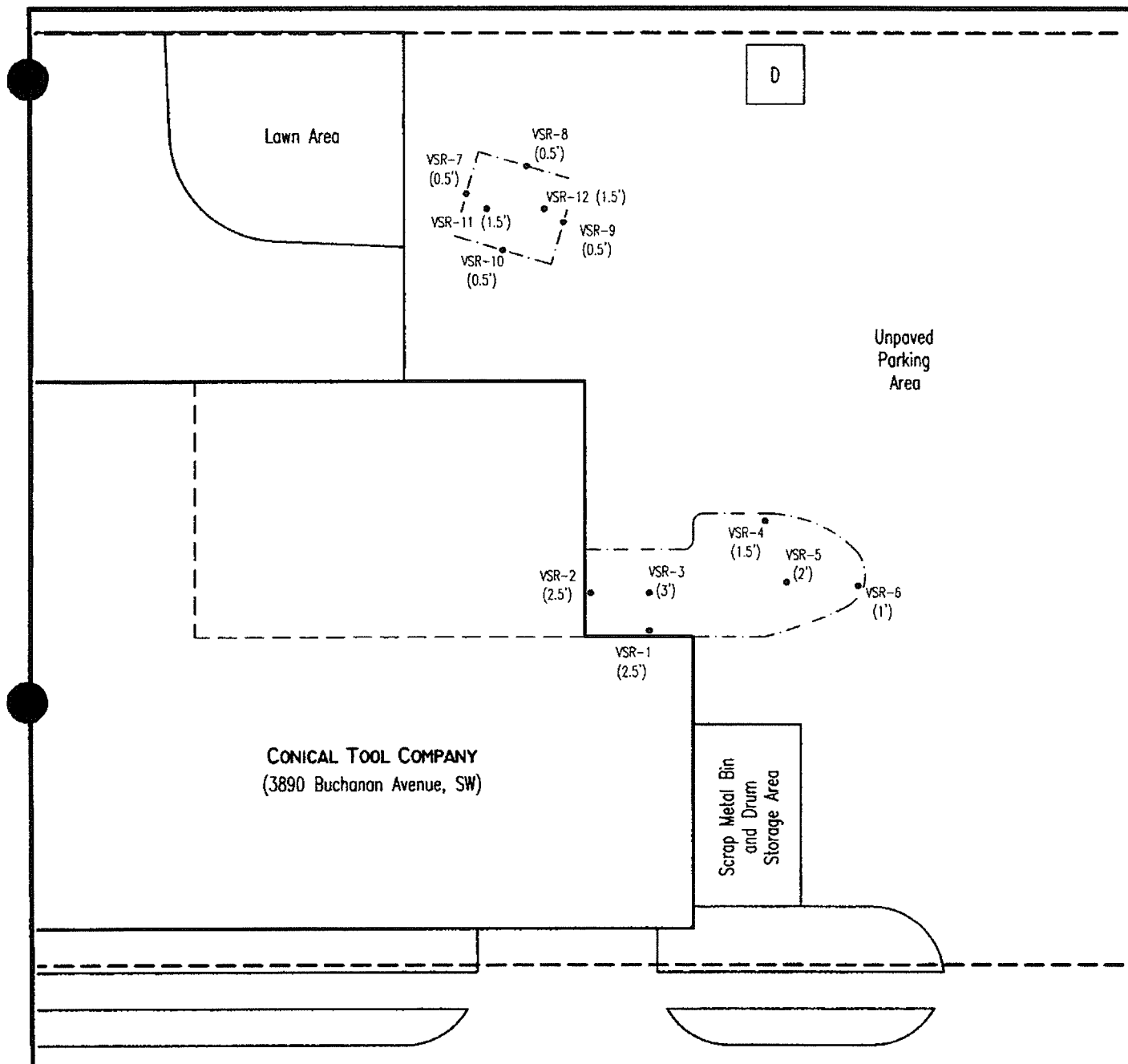
PHASE I ENVIRONMENTAL SITE ASSESSMENT

FIGURE 3 - SITE DETAIL DIAGRAM

CONICAL TOOL COMPANY PROPERTY
3890 BUCHANAN AVENUE, SW
WYOMING, KENT COUNTY, MICHIGAN

PROJECT NO: 04-02-014 APRIL 7, 2004

750 OTTAWA AVENUE, NW TELEPHONE: (616) 742-5511
GRAND RAPIDS, MI 49503 FACSIMILE: (616) 742-5522



LEGEND

- PROPERTY BOUNDARY
- FORMER LIMITS OF BUILDING
- ☐ SOLID WASTE DUMPSTER
- APPROXIMATE EXCAVATION LIMITS
- VSR SOIL SAMPLE LOCATION

D I X O N
ENVIRONMENTAL CONSULTING, INC.

PHASE I ENVIRONMENTAL SITE ASSESSMENT

FIGURE 4 - REMEDIAL EXCAVATION AND VSR SAMPLE LOCATION DIAGRAM

CONICAL TOOL COMPANY PROPERTY
3890 BUCHANAN AVENUE, SW
WYOMING, KENT COUNTY, MICHIGAN

PROJECT NO: 04-02-014

APRIL 7, 2004

750 OTTAWA AVENUE, NW
GRAND RAPIDS, MI 49503

TELEPHONE: (616) 742-5511
FACSIMILE: (616) 742-5522

NOTE: THIS DIAGRAM IS NOT A LEGAL SURVEY. APPROXIMATE SCALE: 1" = 20'

APPENDIX A

PROPERTY LEGAL DESCRIPTION

PROPERTY LEGAL DESCRIPTION

3890 Buchanan Avenue, SW

Lots 51, 52 & 53, also that part of vacated portion of Buchanan Avenue adjacent on the West,
also Lots 78, 79 & 80, Roselawn Park No.1, Wyoming, Kent County, Michigan.

Tax Parcel Identification Number: 41-17-24-276-014

APPENDIX B

**DOCUMENTATION OF SOURCES REVIEWED
AND PERTINENT INFORMATION**

DOCUMENTATION OF SOURCES REVIEWED

The information contained in this report was obtained from the following sources:

- American Society for Testing and Materials (ASTM) Designation: E 1527-00, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process approved May 10, 2000;
- On-site reconnaissance walkovers of the subject site conducted by DEC personnel Stephen M. Heintz on January 18, 2002 and March 23, 2004;
- Interviews (or attempts to interview through visits, written or verbal correspondence) with; Current and Former Owners and Occupants; Kent County Equalization Department; Kent County Health Department, Environmental Health Division; Kent County Register of Deeds; Grand Rapids Public Library, Grand Rapids, Michigan; Wyoming Tax Assessor; Michigan Department of Environmental Quality (MDEQ), Storage Tank Division (STD), Lansing, Michigan; MDEQ, Environmental Response, Storage Tank, Surface Water Quality, and Waste Management Divisions, Grand Rapids, Michigan;
- Site photographs taken at the time of the on-site walkover (March 23, 2004) from the subject site;
- Research and review of reasonably available and practically reviewable R.L. Polk Grand Rapids City Directories;
- Research and review of reasonably available and practically reviewable Sanborn Fire Insurance Maps;
- Review of available Kent County aerial photographs;
- Review of title deed information available at the Kent County Register of Deeds office, Grand Rapids, Michigan;
- Review of United States Geological Survey (USGS), 7.5 minute quadrangle map for Grand Rapids, West, Michigan and Cutlerville, Michigan (attained from DeLorme 3-D TopoQuads™ Copyright © 1999); and,
- Review of federal and state regulatory records as part of the ASTM Standard Environmental Records Search. EDR, Inc., of , provided Site Assessment Report for AMSD sites. The records were cross referenced through use of government databases provided by the MDEQ, Grand Rapids District Office, Grand Rapids, Michigan, and UST information available through FOIAs with MDEQ, STD, Lansing, Michigan.

att.

Jim Dixon

Phase I ESA Questionnaire

Owner/Operator's Name: Conical Tool Co.

Property Address: 3890 Buchanan Ave S.W.

City: Wyoming State: Mi Zip: 49548

Question	Owner/Operator	Comments	DEC Comments
1a. Is the property used for an industrial use?	Yes ☒ No ☐ Unk ☐		
1b. Is any adjoining property used for an industrial use?	Yes ☐ No ☒ Unk ☐		
2a. Did you observe evidence or do you have any prior knowledge that the property has been used for an industrial use in the past?	Yes ☐ No ☒ Unk ☐		
2b. Did you observe evidence or do you have any prior knowledge that any adjoining property has been used for an industrial use in the past?	Yes ☐ No ☒ Unk ☐		
3a. Is the property used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes ☐ No ☒ Unk ☐		
3b. Is any adjoining property used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes ☐ No ☒ Unk ☐		

Question	Owner/Operator	Comments	DEC Comments
4a. Did you observe evidence or do you have any prior knowledge that the property has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard, landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes ☒ No ☐ Unk		
4b. Did you observe evidence or do you have any prior knowledge that any adjoining properties have been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard, landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes ☒ No ☐ Unk		
5a. Are there currently any damaged or discarded automotive or industrial batteries, or pesticides, paints or other chemicals in individual containers of greater than 5 gallons in volume or 50 gallons in aggregate, stored on or used at the property or at the facility?	Yes ☒ No ☐ Unk		
5b. Did you observe evidence or do you have any prior knowledge that there have been previously any damaged or discarded automotive or industrial batteries, or pesticides, paints or other chemicals in individual containers of greater than 5 gallons in volume or 50 gallons in aggregate, stored on or used at the property or at the facility?	Yes ☒ No ☐ Unk		
6a. Are there currently any industrial drums (typically 55 gallon) or sacks of chemicals located on the property or at the facility?	Yes ☒ No ☐ Unk		
6b. Did you observe evidence or do you have any prior knowledge that there have been previously any industrial drums (typically 55 gallon) or sacks of chemicals located on the property or at the facility?	Yes ☒ No ☐ Unk		

Question	Owner/Operator	Comments	DEC Comments
7a. Did you observe evidence or do you have any prior knowledge that fill dirt has been brought onto the property that originated from a contaminated site?	Yes ☒ No ☐ Unk ☐		
7b. Did you observe evidence or do you have any prior knowledge that fill dirt has been brought onto the property that is of an unknown origin?	Yes ☒ No ☐ Unk ☐		
8a. Are there currently any pits, ponds, or lagoons located on the property in connection with waste treatment or waste disposal?	Yes ☒ No ☐ Unk ☐		
8b. Did you observe evidence or do you have any prior knowledge that there have been previously any pits, ponds, or lagoons located on the property in connection with waste treatment or waste disposal?	Yes ☒ No ☐ Unk ☐		
9a. Is there currently any stained soil on the property?	Yes ☒ No ☐ Unk ☐		Old RV - moved under shelter
9b. Did you observe evidence or do you have any prior knowledge that there have been previously any stained soil on the property?	Yes ☒ No ☐ Unk ☐		
10a. Are there currently any registered or unregistered storage tanks (above or underground) located on the property?	Yes ☒ No ☐ Unk ☐		
10b. Did you observe evidence or do you have any prior knowledge that there have been previously any registered or unregistered storage tanks (above or underground) located on the property?	Yes ☒ No ☐ Unk ☐		
11a. Are there currently any vent pipes, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?	Yes ☒ No ☐ Unk ☐		

Question	Owner/Operator	Comments	DEC Comments
11b. Did you observe evidence or do you have any prior knowledge that there have been previously, any vent pipes, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?	Yes ☒ No ☐ Unk ☐		
12a. Are there currently any flooring, drains, or walls located within the facility that are stained by substances other than water or are emitting foul odors?	Yes ☒ No ☐ Unk ☐		
12b. Did you observe evidence or do you have any prior knowledge that there have been previously any flooring, drains, or walls located within the facility that were stained by substances other than water or were emitting foul odors?	Yes ☒ No ☐ Unk ☐		
13a. If the property is served by a private well or non-public water system, is there evidence or do you have any prior knowledge that contaminants have been identified in the well or system that exceed guidelines applicable to the water system?	Yes ☒ No ☐ Unk ☐		
13b. If the property is served by a private well or non-public water system, is there evidence or do you have any prior knowledge that the well has been designated as contaminated by any government environmental/health agency?	Yes ☒ No ☐ Unk ☐		
14. Does the owner or occupant of the property have any knowledge of environmental liens or governmental notification relating to past or recurrent violations of environmental laws with respect to the property or any facility located on the property?	Yes ☒ No ☐ Unk ☐		
15a. Has the owner or occupant of the property been informed of the past existence of hazardous substances or petroleum products with respect to the property or any facility located on the property?	Yes ☒ No ☐ Unk ☐		

Question	Owner/Operator	Comments	DEC Comments
15b. Has the owner or occupant of the property been informed of the current existence of hazardous substances or petroleum products with respect to the property or any facility located on the property?	Yes ☒ No ☐ Unk ☐		
15c. Has the owner or occupant of the property been informed of the past existence of environmental violations with respect to the property or any facility located on the property?	Yes ☒ No ☐ Unk ☐		
15d. Has the owner or occupant of the property been informed of the current existence of environmental violations with respect to the property or any facility located on the property?	Yes ☒ No ☐ Unk ☐		
16. Does the owner or occupant of the property have any knowledge of any environmental site assessment of the property or facility?	Yes ☒ No ☐ Unk ☐		
17. Does the owner or occupant of the property know of any past threatened, or pending lawsuits or administrative proceedings concerning a release or threatened release of any hazardous substance or petroleum products involving the property by any owner or occupant of the property?	Yes ☒ No ☐ Unk ☐		
18a. Does the property discharge waste water, on or adjacent to the property, other than storm water, into a storm water sewer system?	Yes ☒ No ☐ Unk ☐		
18b. Does the property discharge waste water, on or adjacent to the property, other than storm water, into a sanitary sewer system?	Yes ☒ No ☐ Unk ☐		
19. Did you observe evidence or do you have any prior knowledge that any hazardous substances or petroleum products, unidentified waste materials, tires, automotive or industrial batteries, or any other waste materials have been dumped above grade, buried and/or burned on the property?	Yes ☒ No ☐ Unk ☐		

Question	Owner/Operator	Comments	DEC Comments
20. Is there a transformer, capacitor, or any hydraulic equipment for which there are any records indicating the presence of PCBs?	Yes No <u>Unk</u>	<u> </u>	<u> </u>
		<u> </u>	<u> </u>
		<u> </u>	<u> </u>
		<u> </u>	<u> </u>
		<u> </u>	<u> </u>

Additional Information

Purchase date and parties involved: 1960 Conical Tool v. ?

Use of site during ownership/occupancy: Manufacturing

Specialized knowledge of the subject property:

Utility Providers

Telephone Company: AT&T

Electric Company: Consumers Energy

Gas Company: Michcon

Water Service: City of Wyoming

Sanitary Sewer Service: City of Wyoming

Storm Water Sewer Service: City of Wyoming

Signature: Harriet Stanback Date: 1/11/02

* Questionnaire based on ASTM Environmental Site Assessment Transaction Screen Questionnaire (ASTM Designation E 1528-00).

APPENDIX C
EDR RADIUS MAP REPORT



EDR Environmental
Data Resources Inc

The EDR Radius Map™ Report

**Conical Tool Company
3890 Buchanan Avenue, SE
Grand Rapids, MI 49548**

Inquiry Number: 01159128.1r

March 26, 2004

The Standard in Environmental Risk Management Information

**440 Wheelers Farms Road
Milford, Connecticut 06460**

Nationwide Customer Service

**Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com**

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Map Findings.....	6
Orphan Summary.....	33
Government Records Searched/Data Currency Tracking.....	GR-1

GEOCHECK ADDENDUM

GeoCheck - Not Requested

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

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc. (EDR). The report meets the government records search requirements of ASTM Standard Practice for Environmental Site Assessments, E 1527-00. Search distances are per ASTM standard or custom distances requested by the user.

TARGET PROPERTY INFORMATION

ADDRESS

3890 BUCHANAN AVENUE, SE
GRAND RAPIDS, MI 49548

COORDINATES

Latitude (North): 42.893400 - 42° 53' 36.2"
Longitude (West): 85.669900 - 85° 40' 11.6"
Universal Transverse Mercator: Zone 16
UTM X (Meters): 608605.2
UTM Y (Meters): 4749620.5
Elevation: 679 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property: 42085-H6 GRAND RAPIDS WEST, MI
Source: USGS 7.5 min quad index

TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following government records. For more information on this property see page 6 of the attached EDR Radius Map report:

<u>Site</u>	<u>Database(s)</u>	<u>EPA ID</u>
CONICAL TOLL CO 3890 BUCHANAN AVE SW GRAND RAPIDS, MI 49548	RCRIS-SQG FINDS	MI0000264929

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the ASTM E 1527-00 search radius around the target property for the following databases:

FEDERAL ASTM STANDARD

NPL..... National Priority List
Proposed NPL..... Proposed National Priority List Sites
CERCLIS..... Comprehensive Environmental Response, Compensation, and Liability Information System
CERC-NFRAP..... CERCLIS No Further Remedial Action Planned

EXECUTIVE SUMMARY

RCRIS-TSD..... Resource Conservation and Recovery Information System
RCRIS-LQG..... Resource Conservation and Recovery Information System
ERNS..... Emergency Response Notification System

STATE ASTM STANDARD

SWF/LF..... Solid Waste Facilities Database
HIST LF..... Inactive Solid Waste Facilities
INDIAN UST..... Underground Storage Tanks on Indian Land

FEDERAL ASTM SUPPLEMENTAL

CONSENT..... Superfund (CERCLA) Consent Decrees
ROD..... Records Of Decision
Delisted NPL..... National Priority List Deletions
HMIRS..... Hazardous Materials Information Reporting System
MLTS..... Material Licensing Tracking System
MINES..... Mines Master Index File
NPL Liens..... Federal Superfund Liens
PADS..... PCB Activity Database System
US BROWNFIELDS..... A Listing of Brownfields Sites
DOD..... Department of Defense Sites
RAATS..... RCRA Administrative Action Tracking System
TRIS..... Toxic Chemical Release Inventory System
TSCA..... Toxic Substances Control Act
SSTS..... Section 7 Tracking Systems
FTTS INSP..... FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

STATE OR LOCAL ASTM SUPPLEMENTAL

AST..... Aboveground Tanks
DEL SHWS..... Delisted List of Contaminated Sites
PEAS..... Pollution Emergency Alerting System

EDR PROPRIETARY HISTORICAL DATABASES

Coal Gas..... Former Manufactured Gas (Coal Gas) Sites

BROWNFIELDS DATABASES

US BROWNFIELDS..... A Listing of Brownfields Sites

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.

Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in *bold italics* are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

FEDERAL ASTM STANDARD

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity.

A review of the CORRACTS list, as provided by EDR, and dated 12/18/2003 has revealed that there is 1 CORRACTS site within approximately 1 mile of the target property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
BENTELER INDUSTRIES	3721 HAGEN DRIVE SOUTHE	1/2 - 1 ENE	30	31

RCRIS: Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs): generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month. Small quantity generators (SQGs): generate between 100 kg and 1,000 kg of hazardous waste per month. Large quantity generators (LQGs): generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste from the generator off-site to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

A review of the RCRIS-SQG list, as provided by EDR, and dated 01/12/2004 has revealed that there are 8 RCRIS-SQG sites within approximately 0.25 miles of the target property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
TRAVIS TRUCK & AUTO COLLISION	148 39TH ST SW	0 - 1/8 SSE	A2	6
WYOMING BODY SHOP	100 39TH ST	0 - 1/8 SE	3	6
FED EX FREIGHT	3740 BUCHANAN AVE SW	1/8 - 1/4N	C7	9
BUCHANAN AUTO AND TRUCK RPR	3720 BUCHANAN SW	1/8 - 1/4N	C8	10
TOTAL TRANSPORTATION SVC INC	3720 BUCHANAN SW	1/8 - 1/4N	C9	10
TOERING ELECTRIC	3714 BUCHANAN AVE SW	1/8 - 1/4N	D10	11
<u>Lower Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
MR EASY CLEANERS	3887 S DIVISION AVE	1/8 - 1/4E	E13	15
JIM WILLIAMS MOTEL	3821 S DIVISION	1/8 - 1/4ENE	14	15

STATE ASTM STANDARD

SHWS: The State Hazardous Waste Sites records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. The data come from the Department of Environmental Quality's Contaminated Sites List on Diskette With Address.

A review of the SHWS list, as provided by EDR, has revealed that there are 3 SHWS sites within

EXECUTIVE SUMMARY

approximately 1 mile of the target property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
GRANTEX INC.	3560 JEFFERSON AVE S.E.	1/2 - 1 NE	28	31
<u>Lower Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
GENERAL MOTORS - CPC METALS	300 36TH ST. SW	1/4 - 1/2 NNW	22	22
BELFER DRUM AND BARREL	4336 HANSEN AVENUE	1/2 - 1 SSW	29	31

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Environmental Quality's Leaking Underground Storage Tank (LUST) Database.

A review of the LUST list, as provided by EDR, and dated 12/08/2003 has revealed that there are 13 LUST sites within approximately 0.5 miles of the target property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
GODWIN HEIGHTS	3712 S DIVISION	1/4 - 1/2 NE	F15	16
GODWIN PLUMBING INC	3703 DIVISION AVE S	1/4 - 1/2 NE	F16	16
RITE AID #1823	3617 DIVISION AVE S	1/4 - 1/2 NE	21	21
GRAND RAPIDS SERVICE CENTER	4000 CLAY AVE	1/4 - 1/2 WSW	25	24
TIMMERS SERVICE CENTER	3600 DIVISION AVE S	1/4 - 1/2 NNE	26	29
<u>Lower Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
DWAR OIL CO	3910 DIVISION AVE S	1/8 - 1/4 E	E12	11
HOBART SALES & SERVICE	4064 DIVISION AVE S	1/4 - 1/2 SE	17	17
FLOYDS ELECTRIC	3781 CLAY SW	1/4 - 1/2 WNW	18	18
VITRAN EXPRESS	3773 CLAY AVE SW	1/4 - 1/2 WNW	19	19
CUMMINS MICHIGAN INC	3715 CLAY SW	1/4 - 1/2 NW	20	20
PONY EXPRESS COURIER CORP	4130 S DIVISION	1/4 - 1/2 SE	23	22
RYDER TRANSPORTATION SERV #262	3663 CLAY AVE SW	1/4 - 1/2 NW	24	23
WYOMING WHSE INC	425-36TH ST SW	1/4 - 1/2 NW	27	30

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environmental Quality's Michigan UST database.

A review of the UST list, as provided by EDR, and dated 12/08/2003 has revealed that there are 5 UST sites within approximately 0.25 miles of the target property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
COMMERCIAL HEAT TREATING CO	3840 BUCHANAN SW	0 - 1/8 NNW	B4	7
GRAND RAPIDS COMMERCIAL HEAT	3832 BUCHANAN AVE SW	0 - 1/8 NNW	B5	7
FED EX FREIGHT	3740 BUCHANAN AVE SW	1/8 - 1/4 N	C7	9
HARTWICK WELDING SUPPLY	3700 BUCHANAN AVE SW	1/8 - 1/4 N	D11	11
<u>Lower Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
DWAR OIL CO	3910 DIVISION AVE S	1/8 - 1/4 E	E12	11

EXECUTIVE SUMMARY

BEA: Baseline Environmental Assessment.

A review of the BEA list, as provided by EDR, and dated 12/07/2003 has revealed that there is 1 BEA site within approximately 0.5 miles of the target property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
3832 BUCHANAN AVE.	3832 BUCHANAN AVE.	0 - 1/8	NNW B6	8

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

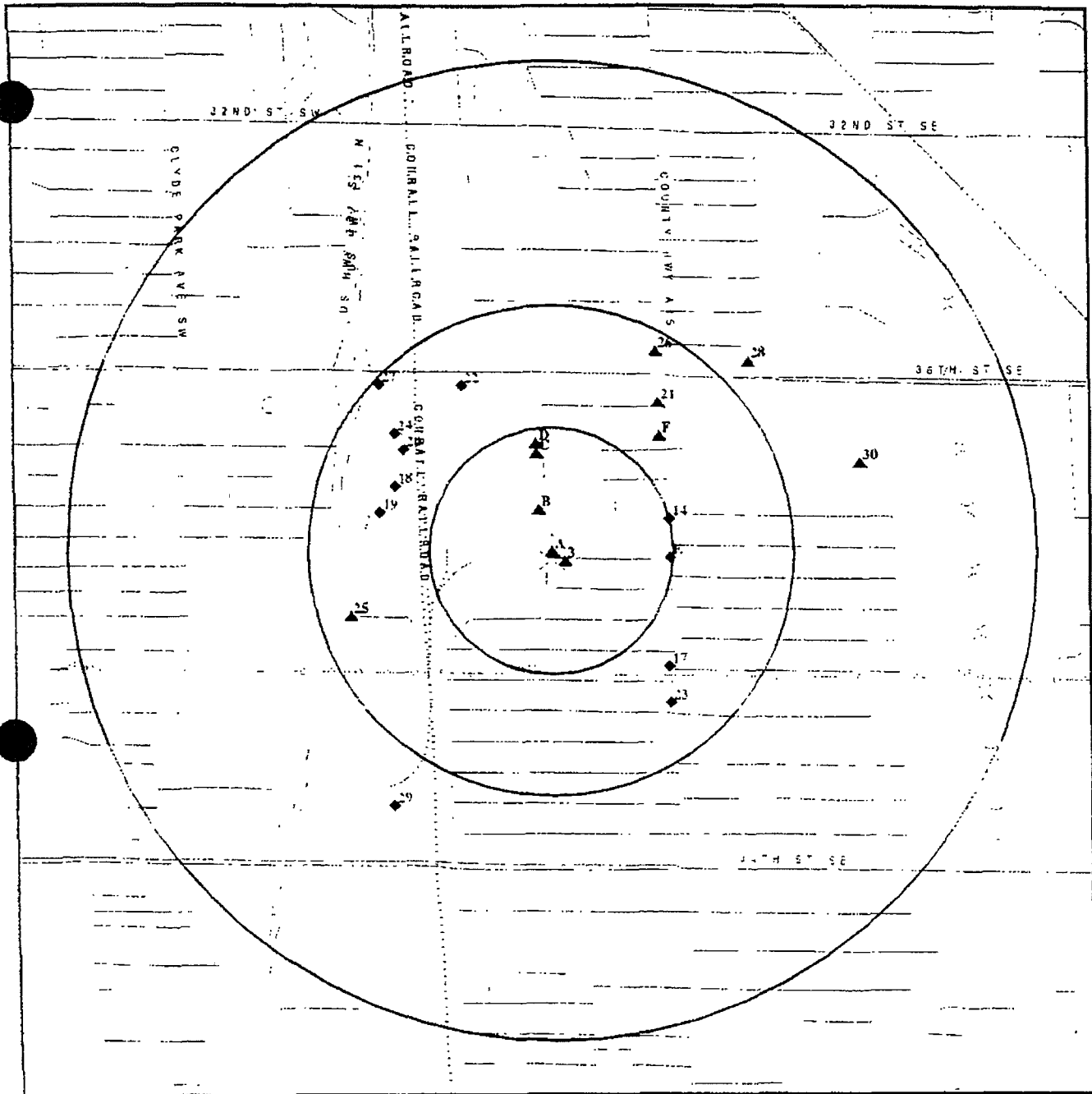
Site Name

68TH. ST. & DIVISION AREA
GENEVA TOWNSHIP LANDFILL
APPROVED INDUSTRIAL REMOVAL
J&J MOVING & DELIVERY SERVICE IN
16 28TH ST. S. E. & 2806 SOUTH DIVISION
BELTLINE BAR/BUNNY CLEANERS
BOSMA BROTHERS PLUMBING

Database(s)

SHWS
SHWS
SHWS
UST
BEA
BEA
BEA

OVERVIEW MAP - 01159128.1r - Dixon Environmental



- Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Coal Gasification Sites
- National Priority List Sites
- Landfill Sites
- Dept. Defense Sites

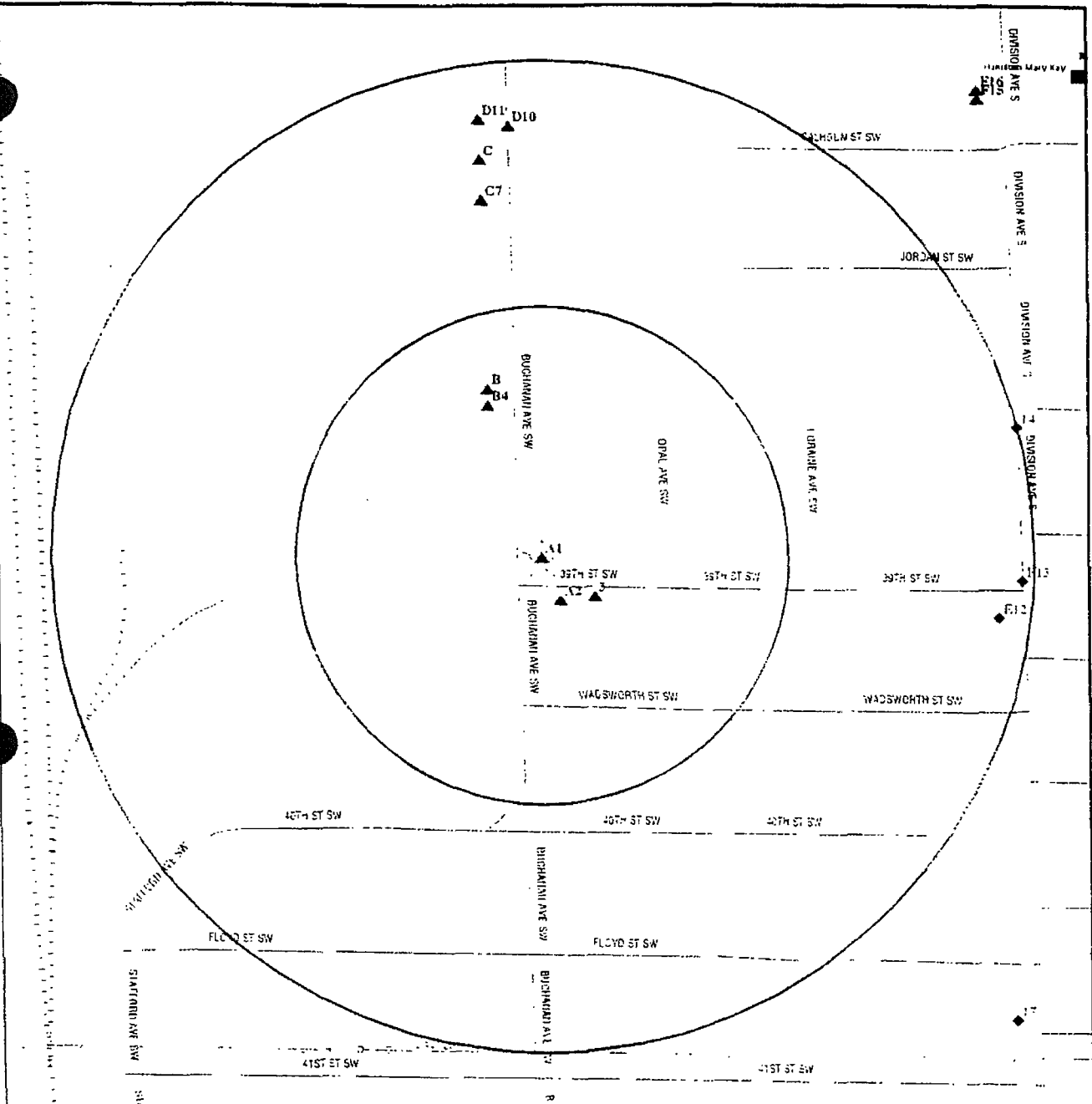
- Power transmission lines
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone

TARGET PROPERTY: Conical Tool Company
 ADDRESS: 3890 Buchanan Avenue, SE
 CITY/STATE/ZIP: Grand Rapids MI 49548
 LAT/LONG: 42.8934 / 85.6699

CUSTOMER: Dixon Environmental
 CONTACT: Kimberly A. DeVries
 INQUIRY #: 01159128.1r
 DATE: March 26, 2004 2:17 pm

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DETAIL MAP - 01159128.1r - Dixon Environmental



- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- ▲ Coal Gasification Sites
- Sensitive Receptors
-  National Priority List Sites
-  Landfill Sites
-  Dept. Defense Sites

Power transmission lines

Oil & Gas pipelines

100-year flood zone

500-year flood zone

TARGET PROPERTY:	Conical Tool Company
ADDRESS:	3890 Buchanan Avenue, SE
CITY/STATE/ZIP:	Grand Rapids MI 49548
LAT/LONG:	42.8934 / 85.6699

CUSTOMER: Dixon Environmental
CONTACT: Kimberly A. DeVries
INQUIRY #: 01159128.1r
DATE: March 26, 2004 2:18 pm

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
<u>FEDERAL ASTM STANDARD</u>								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
CERCLIS		0.500	0	0	0	NR	NR	0
CERC-NFRAP		0.250	0	0	NR	NR	NR	0
CORRACTS		1.000	0	0	0	1	NR	1
RCRIS-TSD		0.500	0	0	0	NR	NR	0
RCRIS Lg. Quan. Gen.		0.250	0	0	NR	NR	NR	0
RCRIS Sm. Quan. Gen.	X	0.250	2	6	NR	NR	NR	8
ERNS		TP	NR	NR	NR	NR	NR	0
<u>STATE ASTM STANDARD</u>								
State Haz. Waste		1.000	0	0	1	2	NR	3
State Landfill		0.500	0	0	0	NR	NR	0
LUST		0.500	0	1	12	NR	NR	13
UST		0.250	2	3	NR	NR	NR	5
BEA		0.500	1	0	0	NR	NR	1
HIST LF		0.500	0	0	0	NR	NR	0
INDIAN UST		0.250	0	0	NR	NR	NR	0
<u>FEDERAL ASTM SUPPLEMENTAL</u>								
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
Delisted NPL		1.000	0	0	0	0	NR	0
FINDS	X	TP	NR	NR	NR	NR	NR	0
HMIRS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
MINES		0.250	0	0	NR	NR	NR	0
NPL Liens		TP	NR	NR	NR	NR	NR	0
PADS		TP	NR	NR	NR	NR	NR	0
US BROWNFIELDS		0.500	0	0	0	NR	NR	0
DOD		1.000	0	0	0	0	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
SSTS		TP	NR	NR	NR	NR	NR	0
FTTS		TP	NR	NR	NR	NR	NR	0
<u>STATE OR LOCAL ASTM SUPPLEMENTAL</u>								
AST		TP	NR	NR	NR	NR	NR	0
DEL SHWS		1.000	0	0	0	0	NR	0
PEAS		TP	NR	NR	NR	NR	NR	0
<u>EDR PROPRIETARY HISTORICAL DATABASES</u>								
Coal Gas		1.000	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

<u>Database</u>	<u>Target Property</u>	<u>Search Distance (Miles)</u>	<u>< 1/8</u>	<u>1/8 - 1/4</u>	<u>1/4 - 1/2</u>	<u>1/2 - 1</u>	<u>> 1</u>	<u>Total Plotted</u>
<u>BROWNFIELDS DATABASES</u>								
US BROWNFIELDS		0.500	0	0	0	NR	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number
EPA ID Number

Coal Gas Site Search: No site was found in a search of Real Property Scan's ENVIROHAZ database.

A1
Target
Property

CONICAL TOLL CO
3890 BUCHANAN AVE SW
GRAND RAPIDS, MI 49548

RCRIS-SQG 1004722281
FINDS MI0000264929

Site 1 of 2 in cluster A

Actual:
679 ft.

RCRIS:

Owner: STANBACK HARRIET
EPA ID: MI0000264929
Contact: HARRIET STANABACK
(616) 531-8500

Classification: Conditionally Exempt Small Quantity Generator
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site:
Resource Conservation and Recovery Act Information system (RCRAINFO)

A2
SSE
< 1/8
122 ft.

TRAVIS TRUCK & AUTO COLLISION INC.
148 39TH ST SW
WYOMING, MI 49548

RCRIS-SQG 1000324433
FINDS MID985577857

Site 2 of 2 in cluster A

Relative:
Equal

RCRIS:

Owner: SCOTT C TRAVIS
EPA ID: MID985577857
Contact: SCOTT TRAVIS
(616) 532-2286

Classification: Small Quantity Generator
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site:
Resource Conservation and Recovery Act Information system (RCRAINFO)

3
SE
< 1/8
173 ft.

WYOMING BODY SHOP
100 39TH ST
WYOMING, MI 49509

RCRIS-SQG 1000299946
FINDS MID982625139

Relative:
Equal

Actual:
679 ft.

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

WYOMING BODY SHOP (Continued)

EDR ID Number
EPA ID Number

Database(s)

1000299946

RCRIS:

Owner: NAME NOT REPORTED
EPA ID: MID982625139
Contact: MARVIN BOLSER
(616) 532-6329

Classification: Small Quantity Generator
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site:
Resource Conservation and Recovery Act Information system (RCRAINFO)

B4
NNW
< 1/8
425 ft.

COMMERCIAL HEAT TREATING CO
3840 BUCHANAN SW
WYOMING, MI 49548

UST U003790707
N/A

Site 1 of 3 in cluster B

Relative:
Equal

UST:

Actual:
679 ft.

Facility ID: 00040617
Tank ID: 1
Owner: Grand Rapids Commercial Heat
Owner Country: USA
Owner Contact: Not reported
Owner Address: 2199 15 MILE RD SE
SPARTA, MI 49548
Owner Phone: (616) 698-3209
Product: Gasoline
Capacity: 1000
Tank Status: Removed from Ground
Remove Date: Feb 7 2001
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Bare Steel
Piping Type: Suction Valve at Tank
Contact: MR JOHN HICKEY
Contact Phone: (616) 696-3209
Impressed Device: No
Install Date: Not reported
Release Detection:
Tank: Not reported
Pipe: Not reported

B5
NNW
< 1/8
467 ft.

GRAND RAPIDS COMMERCIAL HEAT
3832 BUCHANAN AVE SW
GRAND RAPIDS, MI 49548

UST U003329134
N/A

Site 2 of 3 in cluster B

Relative:
Equal

UST:

Actual:
679 ft.

Facility ID: 00032880
Tank ID: 1
Owner: Grand Rapids Commercial Heat
Owner Country: USA
Owner Contact: Not reported
Owner Address: 2199 15 MILE RD SE

Map ID
Direction
Distance
Distance (ft.)
Elevation Site

MAP FINDINGS

Database(s) EDR ID Number
EPA ID Number

GRAND RAPIDS COMMERCIAL HEAT (Continued)

U003329134

SPARTA, MI 49548
Owner Phone: (616) 698-3209
Product: QUENCH OIL
Capacity: 8000
Tank Status: Currently in Use
Remove Date: Not reported
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Not reported
Contact: MR JOHN HICKEY
Contact Phone: (616) 696-3209
Impressed Device: No
Install Date: Jun 23 1980
Release Detection:
Tank: Not reported
Pipe: Not reported

Facility ID: 00032880
Tank ID: 2
Owner: Grand Rapids Commercial Heat
Owner Country: USA
Owner Contact: Not reported
Owner Address: 2199 15 MILE RD SE
SPARTA, MI 49548
Owner Phone: (616) 698-3209
Product: Gasoline
Capacity: 100
Tank Status: Removed from Ground
Remove Date: Feb 7 2001
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Bare Steel
Piping Type: Suction: Valve at Tank
Contact: MR JOHN HICKEY
Contact Phone: (616) 696-3209
Impressed Device: No
Install Date: Not reported
Release Detection:
Tank: Not reported
Pipe: Not reported

B6 3832 BUCHANAN AVE.
NNW 3832 BUCHANAN AVE.
< 1/8 WYOMING, MI 49548
467 ft.

BEA S105094880
N/A

Relative:
Equal

Actual:
679 ft.

Site 3 of 3 in cluster B

BEA:
Petition Disclosure: 0
BEA Number: 938
District: Grand Rapids
Date Received: 08/31/2001
Submitter Name: 3832 Buchanan Properties, LLC
Petition Determination: No Request
Category: No Hazardous Substance(s)
Determination 20107A: No Request
Reviewer: obnert1
Division Assigned: Environmental Response Division
Secondary Address: Not reported

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

3832 BUCHANAN AVE. (Continued)

EDR ID Number
EPA ID Number

Database(s)

S105094880

C7
North
1/8-1/4
956 ft.

FED EX FREIGHT
3740 BUCHANAN AVE SW
GRAND RAPIDS, MI 49548

RCRIS-SQG 1000465296
FINDS MID985599281
UST

Site 1 of 3 in cluster C

Relative:
Equal

RCRIS:

Owner: FED EX FREIGHT EAST
EPA ID: MID985599281
Contact: KIM BANOTCHEN
(616) 475-9985

Actual:
679 ft.

Classification: Conditionally Exempt Small Quantity Generator
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site:
Resource Conservation and Recovery Act Information system (RCRAINFO)

UST:

Facility ID: 00000465
Tank ID: 1
Owner: David L Toering
Owner Country: USA
Owner Contact: Not reported
Owner Address: 3714 Buchanan Ave SW
Grand Rapids, MI 49548
Owner Phone: (616) 245-0271
Product: Diesel
Capacity: 12000
Tank Status: Removed from Ground
Remove Date: Sep 27 1990
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Unknown
Piping Type: Not reported
Contact: DAVID L. TOERING
Contact Phone: (616) 245-0271
Impressed Device: No
Install Date: Mar 17 1966
Release Detection:
Tank: Not reported
Pipe: Not reported

Facility ID: 00000465
Tank ID: 2
Owner: David L Toering
Owner Country: USA
Owner Contact: Not reported
Owner Address: 3714 Buchanan Ave SW
Grand Rapids, MI 49548
Owner Phone: (616) 245-0271
Product: Gasoline
Capacity: 15000
Tank Status: Removed from Ground
Remove Date: Sep 27 1990
Constr Material: Asphalt Coated or Bare Steel

Map ID
Direction
Distance
Distance (ft.)
Elevation Site

MAP FINDINGS

Database(s) EDR ID Number
EPA ID Number

FED EX FREIGHT (Continued)

1000465298

Piping Material: Unknown
Piping Type: Not reported
Contact: DAVID L. TOERING
Contact Phone: (616) 245-0271
Impressed Device: No
Install Date: Mar 17 1966
Release Detection:
Tank: Not reported
Pipe: Not reported

C8
North
1/8-1/4
1063 ft.
BUCHANAN AUTO AND TRUCK RPR
3720 BUCHANAN SW
GRAND RAPIDS, MI 49548

RCRIS-SQG 1000828104
FINDS MID985651603

Site 2 of 3 in cluster C

Relative:
Equal

RCRIS:

Owner: PITSCH DENNIS
EPA ID: MID985651603
Contact: DENNIS PITSCH
(616) 245-4100

Actual:
679 ft.

Classification: Conditionally Exempt Small Quantity Generator
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site:
Resource Conservation and Recovery Act Information system (RCRAINFO)

C9
North
1/8-1/4
1063 ft.
TOTAL TRANSPORTATION SVC INC
3720 BUCHANAN SW
GRAND RAPIDS, MI 49548

RCRIS-SQG 1000529748
FINDS MID985622190

Site 3 of 3 in cluster C

Relative:
Equal

RCRIS:

Owner: KAREL HERM
EPA ID: MID985622190
Contact: RICK MAYWALT
(616) 245-6633

Actual:
679 ft.

Classification: Small Quantity Generator
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site:
Resource Conservation and Recovery Act Information system (RCRAINFO)

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

Database(s) EDR ID Number
EPA ID Number

D10 TOERING ELECTRIC
North 3714 BUCHANAN AVE SW
1/8-1/4 GRAND RAPIDS, MI 49548
1146 ft.

RCRIS-SQG 1007098059
MIK454591223

Site 1 of 2 in cluster D

Relative:
Equal

RCRIS:

Owner: DAVID L TOERING
EPA ID: MIK454591223
Contact: SHANE TOERING
(616) 245-0271

Actual:
679 ft.

Classification: Conditionally Exempt Small Quantity Generator
TSDF Activities: Not reported
Violation Status: No violations found

D11 HARTWICK WELDING SUPPLY
North 3700 BUCHANAN AVE SW
1/8-1/4 GRAND RAPIDS, MI 49548
1172 ft.

UST U003867557
N/A

Site 2 of 2 in cluster D

Relative:
Equal

UST:

Facility ID: 00017563
Tank ID: 1
Owner: Hartwick Welding Supply
Owner Country: USA
Owner Contact: Not reported
Owner Address: 3700 Buchanan Ave SW
Grand Rapids, MI 49548
Owner Phone: (616) 245-2227
Product: Gasoline
Capacity: 1000
Tank Status: Removed from Ground
Remove Date: Jan 1 1982
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Unknown
Piping Type: Not reported
Contact: Not reported
Contact Phone: () -
Impressed Device: No
Install Date: Apr 28 1966
Release Detection:
Tank: Not reported
Pipe: Not reported

Actual:
679 ft.

E12 DWAR OIL CO
East 3910 DIVISION AVE S
1/8-1/4 GRAND RAPIDS, MI 49548
1235 ft.

LUST U003328541
UST N/A

Site 1 of 2 in cluster E

Relative:
Lower

LUST:

Facility ID: 00013770
Release Number: Open
Release Date: Jul 8 1998
District: Grand Rapids District Office
Closed Date: Not reported
Owner Contact: Not reported

Actual:
678 ft.

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

DWAR OIL CO (Continued)

EDR ID Number
EPA ID Number

Database(s)

U003328541

Owner Name : Dwar Oil Co
Owner Address : PO Box 146
Martin, MI 49070
Country : USA
Owner Phone : (616) 458-8243
Contact : MR RON VANDENBERG
Facility Phone : (616) 458-8243
Leak Number: C-0596-98

UST:

Facility ID: 00013770
Tank ID: 1
Owner: Dwar Oil Co
Owner Country: USA
Owner Contact: Not reported
Owner Address: PO Box 146
Martin, MI 49070
Owner Phone: (616) 458-8243
Product: Gasoline
Capacity: 10000
Tank Status: Removed from Ground
Remove Date: Oct 14 1999
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Pressure
Contact: MR RON VANDENBERG
Contact Phone: (616) 458-8243
Impressed Device: No
Install Date: May 7 1971
Release Detection:
Tank: Not reported
Pipe: Not reported

Facility ID: 00013770
Tank ID: 2
Owner: Dwar Oil Co
Owner Country: USA
Owner Contact: Not reported
Owner Address: PO Box 146
Martin, MI 49070
Owner Phone: (616) 458-8243
Product: Gasoline
Capacity: 10000
Tank Status: Removed from Ground
Remove Date: Oct 14 1999
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Pressure
Contact: MR RON VANDENBERG
Contact Phone: (616) 458-8243
Impressed Device: No
Install Date: May 7 1971
Release Detection:
Tank: Not reported
Pipe: Not reported

Facility ID: 00013770
Tank ID: 3

Map ID
Direction
Distance
Distance (ft.)
Elevation Site

MAP FINDINGS

Database(s) EDR ID Number
EPA ID Number

DWAR OIL CO (Continued)

U003328541

Owner: Dwar Oil Co
Owner Country: USA
Owner Contact: Not reported
Owner Address: PO Box 146
Martin, MI 49070
Owner Phone: (616) 458-8243
Product: Gasoline
Capacity: 4000
Tank Status: Removed from Ground
Remove Date: Oct 14 1999
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Suction: Valve at Tank
Contact: MR RON VANDENBERG
Contact Phone: (616) 458-8243
Impressed Device: No
Install Date: May 7 1971
Release Detection:
Tank: Not reported
Pipe: Not reported

Facility ID: 00013770
Tank ID: 4
Owner: Dwar Oil Co
Owner Country: USA
Owner Contact: Not reported
Owner Address: PO Box 146
Martin, MI 49070
Owner Phone: (616) 458-8243
Product: Kerosene
Capacity: 4000
Tank Status: Removed from Ground
Remove Date: Oct 14 1999
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Suction: Valve at Tank
Contact: MR RON VANDENBERG
Contact Phone: (616) 458-8243
Impressed Device: No
Install Date: May 7 1971
Release Detection:
Tank: Not reported
Pipe: Not reported

Facility ID: 00013770
Tank ID: 5
Owner: Dwar Oil Co
Owner Country: USA
Owner Contact: Not reported
Owner Address: PO Box 146
Martin, MI 49070
Owner Phone: (616) 458-8243
Product: Diesel
Capacity: 4000
Tank Status: Removed from Ground
Remove Date: Oct 14 1999
Constr Material: Asphalt Coated or Bare Steel

Map ID
Direction
Distance
Distance (ft.)
Elevation Site

MAP FINDINGS

Database(s) EDR ID Number
EPA ID Number

DWAR OIL CO (Continued)

U003328541

Piping Material: Galvanized Steel
Piping Type: Suction: Valve at Tank
Contact: MR RON VANDENBERG
Contact Phone: (616) 458-8243
Impressed Device: No
Install Date: May 7 1971
Release Detection:
Tank: Not reported
Pipe: Not reported

Facility ID: 00013770
Tank ID: 6
Owner: Dwar Oil Co
Owner Country: USA
Owner Contact: Not reported
Owner Address: PO Box 146
Martin, MI 49070
Owner Phone: (616) 458-8243
Product: Diesel
Capacity: 4000
Tank Status: Removed from Ground
Remove Date: Oct 14 1999
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Suction: Valve at Tank
Contact: MR RON VANDENBERG
Contact Phone: (616) 458-8243
Impressed Device: No
Install Date: May 7 1971
Release Detection:
Tank: Not reported
Pipe: Not reported

Facility ID: 00013770
Tank ID: 7
Owner: Dwar Oil Co
Owner Country: USA
Owner Contact: Not reported
Owner Address: PO Box 146
Martin, MI 49070
Owner Phone: (616) 458-8243
Product: Diesel
Capacity: 2000
Tank Status: Removed from Ground
Remove Date: Oct 14 1999
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Suction: Valve at Tank
Contact: MR RON VANDENBERG
Contact Phone: (616) 458-8243
Impressed Device: No
Install Date: May 7 1971
Release Detection:
Tank: Not reported
Pipe: Not reported

Facility ID: 00013770

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

DWAR OIL CO (Continued)

EDR ID Number
EPA ID Number

Database(s)

Tank ID: 8
Owner: Dwar Oil Co
Owner Country: USA
Owner Contact: Not reported
Owner Address: PO Box 146
Martin, MI 49070
Owner Phone: (616) 458-8243
Product: Used Oil
Capacity: 1000
Tank Status: Removed from Ground
Remove Date: Oct 14 1999
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Gravity Fed?
Contact: MR RON VANDENBERG
Contact Phone: (616) 458-8243
Impressed Device: No
Install Date: May 7 1971
Release Detection:
Tank: Not reported
Pipe: Not reported

U003328541

E13
East
1/8-1/4
1288 ft.

MR EASY CLEANERS
3887 S DIVISION AVE
WYOMING, MI 49509

RCRIS-SQG 1000200269
FINDS MID049246374

Site 2 of 2 in cluster E

Relative:
Lower

RCRIS:
Owner: NAME NOT REPORTED
EPA ID: MID049246374
Contact: DONNA KIMBLE
(616) 534-3110

Actual:
678 ft.

Classification: Conditionally Exempt Small Quantity Generator
TSDF Activities: Not reported
Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site:
Resource Conservation and Recovery Act Information system (RCRAINFO)

14
ENE
1/8-1/4
1320 ft.

JIM WILLIAMS MOTEL
3821 S DIVISION
GRAND RAPIDS, MI 49548

RCRIS-SQG 1007100533
MIK845298397

Relative:
Lower

Actual:
678 ft.

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

JIM WILLIAMS MOTEL (Continued)

EDR ID Number
EPA ID Number

Database(s)

1007100533

RCRIS:

Contact: RAJ PATEL
(616) 241-5461

Classification: Small Quantity Generator
TSDF Activities: Not reported

Violation Status: No violations found

F15
NE
1/4-1/2
1690 ft.

GODWIN HEIGHTS
3712 S DIVISION
WYOMING, MI 99999

LUST U000257377
N/A

Site 1 of 2 in cluster F

Relative:
Higher

LUST:

Actual:
680 ft.

Facility ID: 00014553
Release Number: Open
Release Date: Jun 14 1989
District: Grand Rapids District Office
Closed Date: Not reported
Owner Contact: Not reported
Owner Name: UNKNOWN
Owner Address: Not Recorded
Not Recorded, mi 99999
Country: USA
Owner Phone: () -
Contact: JACK J BARRIX
Facility Phone: (616) 459-0717
Leak Number: C-0262-89

F16
NE
1/4-1/2
1706 ft.

GODWIN PLUMBING INC
3703 DIVISION AVE S
GRAND RAPIDS, MI 49548

LUST U003866750
UST N/A

Site 2 of 2 in cluster F

Relative:
Higher

LUST:

Actual:
680 ft.

Facility ID: 00007787
Release Number: Closed
Release Date: Apr 15 1998
District: Grand Rapids District Office
Closed Date: Jun 8 1999
Owner Contact: Not reported
Owner Name: Godwin Plumbing Inc
Owner Address: 3703 Division Ave S
Grand Rapids, MI 49548
Country: USA
Owner Phone: (616) 243-3131
Contact: WALT DEVRIES
Facility Phone: (616) 243-3131
Leak Number: C-0274-98

UST:

Facility ID: 00007787
Tank ID: 1
Owner: Godwin Plumbing Inc
Owner Country: USA

Map ID
Direction
Distance
Distance (ft.)
Elevation Site

MAP FINDINGS

Database(s) EDR ID Number
EPA ID Number

GODWIN PLUMBING INC (Continued)

U003866750

Owner Contact: Not reported
Owner Address: 3703 Division Ave S
Grand Rapids, MI 49548
Owner Phone: (616) 243-3131
Product: Gasoline
Capacity: 12000
Tank Status: Removed from Ground
Remove Date: Apr 14 1998
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Suction; No Valve At Tank
Contact: WALT DEVRIES
Contact Phone: (616) 243-3131
Impressed Device: Yes
Install Date: Mar 27 1974
Release Detection:
Tank: Tank Tightness Testing
Pipe: Not reported

17 HOBART SALES & SERVICE
SE 4064 DIVISION AVE S
1/4-1/2 GRAND RAPIDS, MI 49548
1768 ft.

LUST U000257440
UST N/A

Relative:
Lower

LUST:
Facility ID: 00008170
Release Number: Closed
Release Date: Oct 26 1992
District: Grand Rapids District Office
Closed Date: Oct 18 2001
Owner Contact: Not reported
Owner Name: Hobart Sales & Serv
Owner Address: 4064 Division Ave S
Grand Rapids, MI 49548
Country: USA
Owner Phone: (616) 538-1470
Contact: ED VERBURG
Facility Phone: (616) 538-1470
Leak Number: C-1897-92

Actual:
677 ft.

UST:
Facility ID: 00008170
Tank ID: 1
Owner: Hobart Sales & Serv
Owner Country: USA
Owner Contact: Not reported
Owner Address: 4064 Division Ave S
Grand Rapids, MI 49548
Owner Phone: (616) 538-1470
Product: Gasoline
Capacity: 550
Tank Status: Removed from Ground
Remove Date: Oct 26 1992
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Bare Steel, Galvanized Steel
Piping Type: Not reported
Contact: ED VERBURG
Contact Phone: (616) 538-1470
Impressed Device: No

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

HOBART SALES & SERVICE (Continued)

EDR ID Number
EPA ID Number

Database(s)

U000257440

Install Date: Mar 31 1969
Release Detection:
Tank: Not reported
Pipe: Not reported

18
WNW
1/4-1/2
1815 ft.

FLOYDS ELECTRIC
3781 CLAY SW
WYOMING, MI 49548

LUST U003328235
UST N/A

Relative:
Lower

LUST:

Facility ID: 00009332
Release Number: Closed
Release Date: Aug 20 1991
District: Grand Rapids District Office
Closed Date: Jul 15 1997
Owner Contact: Not reported
Owner Name: Floyds Electric
Owner Address: 3781 CLAY SW
WYOMING, MI 49548
Country: USA
Owner Phone: (616) 534-8691
Contact: JOHN KIMBLE
Facility Phone: (616) 534-8691
Leak Number: C-1708-91

Actual:
662 ft.

UST:

Facility ID: 00009332
Tank ID: 1
Owner: Floyds Electric
Owner Country: USA
Owner Contact: Not reported
Owner Address: 3781 CLAY SW
WYOMING, MI 49548
Owner Phone: (616) 534-8691
Product: Gasoline
Capacity: 1000
Tank Status: Removed from Ground
Remove Date: Sep 6 1991
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Not reported
Contact: JOHN KIMBLE
Contact Phone: (616) 534-8691
Impressed Device: No
Install Date: Apr 17 1967
Release Detection:
Tank: Not reported
Pipe: Not reported

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

Site

Database(s)

EDR ID Number
EPA ID Number

19
WNW
1/4-1/2
1898 ft.

VITRAN EXPRESS
3773 CLAY AVE SW
WYOMING, MI 49548

RCRIS-SQG 1001077825
FINDS MIR000007930
LUST
UST

Relative:
Lower

RCRIS:

Owner: VITRAN EXPRESS
EPA ID: MIR000007930

Actual:
667 ft.

Contact: STEVE AMAN
(317) 803-4060

Classification: Conditionally Exempt Small Quantity Generator
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:

Other Pertinent Environmental Activity Identified at Site:
Resource Conservation and Recovery Act Information system (RCRAINFO)

LUST:

Facility ID: 00016761
Release Number: Closed
Release Date: Aug 16 1990
District: Grand Rapids District Office
Closed Date: Jul 19 1995
Owner Contact: Not reported
Owner Name: Overland Trans
Owner Address: 3773 CLAY S W
GRAND RAPIDS, MI 49548
Country: USA
Owner Phone: (616) 249-9060
Contact: JOHN DEPIETRO
Facility Phone: (616) 249-9060
Leak Number: C-1543-90

UST:

Facility ID: 00016761
Tank ID: 1
Owner: Overland Trans
Owner Country: USA
Owner Contact: Not reported
Owner Address: 3773 CLAY S W
GRAND RAPIDS, MI 49548
Owner Phone: (616) 249-9060
Product: Diesel
Capacity: 10000
Tank Status: Removed from Ground
Remove Date: Aug 17 1990
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Not reported
Contact: JOHN DEPIETRO
Contact Phone: (616) 249-9060
Impressed Device: No
Install Date: Apr 18 1972
Release Detection:
Tank: Not reported
Pipe: Not reported

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

Database(s)
EDR ID Number
EPA ID Number

VITRAN EXPRESS (Continued)

1001077825

20
NW
1/4-1/2
1924 ft.

CUMMINS MICHIGAN INC
3715 CLAY SW
GRAND RAPIDS, MI 48120

LUST
UST
U003327604
N/A

Relative:
Lower

LUST:

Facility ID: 00001523
Release Number: Open
Release Date: Oct 4 1989
District: Grand Rapids District Office
Closed Date: Not reported
Owner Contact: Not reported
Owner Name: Cummins Michigan Inc
Owner Address: 3760 WYOMING AVE
GRAND RAPIDS, MI 48120
Country: USA
Owner Phone: (616) 538-2250
Contact: KEITH SCHALTZ
Facility Phone: (616) 538-2250
Leak Number: C-0627-89

Facility ID: 00001523
Release Number: Open
Release Date: Aug 21 1989
District: Grand Rapids District Office
Closed Date: Not reported
Owner Contact: Not reported
Owner Name: Cummins Michigan Inc
Owner Address: 3760 WYOMING AVE
GRAND RAPIDS, MI 48120
Country: USA
Owner Phone: (616) 538-2250
Contact: KEITH SCHALTZ
Facility Phone: (616) 538-2250
Leak Number: C-0446-89

Facility ID: 00001523
Release Number: Open
Release Date: Aug 2 1989
District: Grand Rapids District Office
Closed Date: Not reported
Owner Contact: Not reported
Owner Name: Cummins Michigan Inc
Owner Address: 3760 WYOMING AVE
GRAND RAPIDS, MI 48120
Country: USA
Owner Phone: (616) 538-2250
Contact: KEITH SCHALTZ
Facility Phone: (616) 538-2250
Leak Number: C-0377-89

UST:

Facility ID: 00001523
Tank ID: 1
Owner: Cummins Michigan Inc
Owner Country: USA
Owner Contact: Not reported
Owner Address: 3760 WYOMING AVE

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

CUMMINS MICHIGAN INC (Continued)

EDR ID Number
EPA ID Number

Database(s)

U003327604

Owner Phone: GRAND RAPIDS, MI 48120
(616) 538-2250
Product: NEW OIL
Capacity: 6000
Tank Status: Removed from Ground
Remove Date: Sep 1 1989
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Not reported
Contact: KEITH SCHALTZ
Contact Phone: (616) 538-2250
Impressed Device: No
Install Date: Mar 19 1971
Release Detection:
Tank: Not reported
Pipe: Not reported

Facility ID: 00001523
Tank ID: 2
Owner: Cummins Michigan Inc
Owner Country: USA
Owner Contact: Not reported
Owner Address: 3760 WYOMING AVE
GRAND RAPIDS, MI 48120
Owner Phone: (616) 538-2250
Product: Used Oil,
Capacity: 1000
Tank Status: Removed from Ground
Remove Date: Jul 31 1992
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Bare Steel, Galvanized Steel
Piping Type: Gravity Fed?
Contact: KEITH SCHALTZ
Contact Phone: (616) 538-2250
Impressed Device: No
Install Date: Mar 19 1971
Release Detection:
Tank: Not reported
Pipe: Not reported

21 RITE AID #1823
NE 3617 DIVISION AVE S
1/4-1/2 GRAND RAPIDS, MI 49548
1981 ft.

LUST U003329613
UST N/A

Relative:
Higher

Actual:
680 ft.

LUST:

Facility ID: 00039023
Release Number: Open
Release Date: May 13 1996
District: Grand Rapids District Office
Closed Date: Not reported
Owner Contact: Not reported
Owner Name: Rite Aid Of Michigan
Owner Address: PO Box 3165
Harrisburg, PA 17105
Country: USA
Owner Phone: (419) 578-2757
Contact: KAREN SMITH
Facility Phone: (717) 731-4700

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

RITE AID #1823 (Continued)

EDR ID Number
EPA ID Number

Database(s)

U003329613

Leak Number: C-0302-96

UST:

Facility ID: 00039023
Tank ID: 1
Owner: Rite Aid Of Michigan
Owner Country: USA
Owner Contact: Not reported
Owner Address: PO Box 3165
Harrisburg, PA 17105
Owner Phone: (419) 578-2757
Product: Gasoline
Capacity: 10000
Tank Status: Removed from Ground
Remove Date: May 2 1996
Constr Material: Asphalt Coated or Bare Steel,Unknown
Piping Material: Bare Steel,Unknown
Piping Type: Not reported
Contact: KAREN SMITH
Contact Phone: (717) 731-4700
Impressed Device: No
Install Date: Not reported
Release Detection:
Tank: Not reported
Pipe: Not reported

22
NNW
1/4-1/2
2025 ft.

GENERAL MOTORS - CPC METALS
300 36TH ST. SW
WYOMING, MI 49509

SHWS S105144229
N/A

Relative:
Lower

SHWS:

Facility ID: 41000115
Facility Status: Interim Response in progress
Source: Automotive Stamping
Pollutant(s): TCE; Oil
SAM Score: 29
SAM Score Date: 06/11/91
Township: 06N
Range: 12W
Section: 24
Quarter: NE
Quarter/Quarter: NW

Actual:
672 ft.

23
SE
1/4-1/2
2072 ft.

PONY EXPRESS COURIER CORP
4130 S DIVISION
WYOMING, MI 48216

LUST U003328761
UST N/A

Relative:
Lower

LUST:

Facility ID: 00016455
Release Number: Open
Release Date: Nov 2 1998
District: Grand Rapids District Office
Closed Date: Not reported
Owner Contact: Not reported
Owner Name: Pony Express Courier Corp
Owner Address: 2950 Rosa Parks Blvd
Detroit, MI 48216

Actual:
677 ft.

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

Database(s)
EDR ID Number
EPA ID Number

PONY EXPRESS COURIER CORP (Continued)

U003328761

Country : USA
Owner Phone : (313) 965-7420
Contact : GEORGE HUNTER
Facility Phone : (616) 531-2910
Leak Number: C-1088-98

UST:

Facility ID: 00016455
Tank ID: 1
Owner: Pony Express Courier Corp
Owner Country: USA
Owner Contact: Not reported
Owner Address: 2950 Rosa Parks Blvd
Detroit, MI 48216
Owner Phone: (313) 965-7420
Product: Gasoline
Capacity: 4000
Tank Status: Removed from Ground
Remove Date: Nov 2 1998
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Not reported
Contact: GEORGE HUNTER
Contact Phone: (616) 531-2910
Impressed Device: No
Install Date: Apr 13 1966
Release Detection:
Tank: Not reported
Pipe: Not reported

24
NW
1/4-1/2
2105 ft.

RYDER TRANSPORTATION SERV #2623
3663 CLAY AVE SW
GRAND RAPIDS, MI 49548

LUST S105551250
N/A

Relative:
Lower

LUST:

Actual:
663 ft.

Facility ID: 00020040
Release Number: Closed
Release Date: Jul 19 1994
District: Grand Rapids District Office
Closed Date: Aug 30 2000
Owner Contact: Amy White
Owner Name: Ryder Truck Rental
Owner Address: C/O Vertex Services P. O. Box 70737
Houston, TX 77270
Country: USA
Owner Phone: 713-426-4800
Contact: JOE WIERZBECKI
Facility Phone: (616) 538-2800
Leak Number: C-0735-94

Facility ID: 00020040
Release Number: Closed
Release Date: May 3 1994
District: Grand Rapids District Office
Closed Date: Aug 30 2000
Owner Contact: Amy White
Owner Name: Ryder Truck Rental
Owner Address: C/O Vertex Services P. O. Box 70737

Map ID
Direction
Distance
Distance (ft.)
Elevation Site

MAP FINDINGS

Database(s) EDR ID Number
EPA ID Number

RYDER TRANSPORTATION SERV #2623 (Continued)

S105551250

Houston, TX 77270
Country : USA
Owner Phone : 713-426-4800
Contact : JOE WIERZBECKI
Facility Phone : (616) 538-2800
Leak Number: C-0400-94

Facility ID: 00020040
Release Number: Open
Release Date: Oct 1 1987
District: Grand Rapids District Office
Closed Date: Not reported
Owner Contact : Amy White
Owner Name : Ryder Truck Rental
Owner Address : C/O Vertex Services P. O. Box 70737
Houston, TX 77270
Country : USA
Owner Phone : 713-426-4800
Contact : JOE WIERZBECKI
Facility Phone : (616) 538-2800
Leak Number: C-4022-85

25
WSW
1/4-1/2
2282 ft.

GRAND RAPIDS SERVICE CENTER
4000 CLAY AVE
WYOMING, MI 49201

LUST U000257428
UST N/A

Relative:
Higher

LUST:

Actual:
689 ft.

Facility ID: 00017429
Release Number: Closed
Release Date: Dec 18 1990
District: Grand Rapids District Office
Closed Date: Dec 20 1991
Owner Contact : Not reported
Owner Name : Consumers Energy
Owner Address : One Energy Plaza
Jackson, MI 49201
Country : USA
Owner Phone : (517) 788-0620
Contact : ROBERT G NEUMANN
Facility Phone : 517-788-0350
Leak Number: C-2735-90

Facility ID: 00017429
Release Number: Closed
Release Date: Aug 24 1992
District: Grand Rapids District Office
Closed Date: Dec 4 1992
Owner Contact : Not reported
Owner Name : Consumers Energy
Owner Address : One Energy Plaza
Jackson, MI 49201
Country : USA
Owner Phone : (517) 788-0620
Contact : ROBERT G NEUMANN
Facility Phone : 517-788-0350
Leak Number: C-1423-92

Map ID
Direction
Distance
Distance (ft.)
Elevation Site

MAP FINDINGS

Database(s) EDR ID Number
EPA ID Number

GRAND RAPIDS SERVICE CENTER (Continued)

U000257428

Facility ID: 00017429
Release Number: Closed
Release Date: Jun 11 1990
District: Grand Rapids District Office
Closed Date: Jun 15 1993
Owner Contact: Not reported
Owner Name: Consumers Energy
Owner Address: One Energy Plaza
Jackson, MI 49201
Country: USA
Owner Phone: (517) 788-0620
Contact: ROBERT G NEUMANN
Facility Phone: 517-788-0350
Leak Number: C-1037-90

Facility ID: 00017429
Release Number: Closed
Release Date: Nov 2 2001
District: Grand Rapids District Office
Closed Date: Feb 7 2002
Owner Contact: Not reported
Owner Name: Consumers Energy
Owner Address: One Energy Plaza
Jackson, MI 49201
Country: USA
Owner Phone: (517) 788-0620
Contact: ROBERT G NEUMANN
Facility Phone: 517-788-0350
Leak Number: C-1363-01

Facility ID: 00017429
Release Number: Closed
Release Date: Jun 9 1994
District: Grand Rapids District Office
Closed Date: Jan 20 1995
Owner Contact: Not reported
Owner Name: Consumers Energy
Owner Address: One Energy Plaza
Jackson, MI 49201
Country: USA
Owner Phone: (517) 788-0620
Contact: ROBERT G NEUMANN
Facility Phone: 517-788-0350
Leak Number: C-0577-94

UST:

Facility ID: 00017429
Tank ID: 1
Owner: Consumers Energy
Owner Country: USA
Owner Contact: Not reported
Owner Address: One Energy Plaza
Jackson, MI 49201
Owner Phone: (517) 788-0620
Product: Gasoline
Capacity: 15000
Tank Status: Removed from Ground

Map ID
Direction
Distance
Distance (ft.)
Elevation Site

MAP FINDINGS

Database(s) EDR ID Number
EPA ID Number

GRAND RAPIDS SERVICE CENTER (Continued)

U000257428

Remove Date: Oct 18 2001
Constr Material: Asphalt Coated or Bare Steel,Lined Interior
Piping Material: Double Walled,Fiberglass reinforced plastic
Piping Type: Pressure
Contact: ROBERT G NEUMANN
Contact Phone: 517-788-0350
Impressed Device:No
Install Date: Apr 24 1967
Release Detection:
 Tank: Automatic Tank Gauging,Tank Tightness Testing
 Pipe: Automatic Line Leak Detectors,Interstitial Monitoring Double Walled Piping,Line Tightness Testing

Facility ID: 00017429
Tank ID: 2
Owner: Consumers Energy
Owner Country: USA
Owner Contact: Not reported
Owner Address: One Energy Plaza
 Jackson, MI 49201
Owner Phone: (517) 788-0620
Product: Used Oil
Capacity: 500
Tank Status: Removed from Ground
Remove Date: Aug 19 1991
Constr Material: Asphalt Coated or Bare Steel,Cathodically Protected Steel
Piping Material: Bare Steel,Cathodically Protected
Piping Type: Not reported
Contact: ROBERT G NEUMANN
Contact Phone: 517-788-0350
Impressed Device:No
Install Date: Apr 24 1967
Release Detection:
 Tank: Not reported
 Pipe: Not reported

Facility ID: 00017429
Tank ID: 3
Owner: Consumers Energy
Owner Country: USA
Owner Contact: Not reported
Owner Address: One Energy Plaza
 Jackson, MI 49201
Owner Phone: (517) 788-0620
Product: Used Oil
Capacity: 500
Tank Status: Removed from Ground
Remove Date: Aug 19 1991
Constr Material: Asphalt Coated or Bare Steel,Cathodically Protected Steel
Piping Material: Bare Steel,Cathodically Protected
Piping Type: Not reported
Contact: ROBERT G NEUMANN
Contact Phone: 517-788-0350
Impressed Device:No
Install Date: Apr 24 1967
Release Detection:
 Tank: Not reported

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

Database(s)
EDR ID Number
EPA ID Number

GRAND RAPIDS SERVICE CENTER (Continued)

U000257428

Pipe: Not reported

Facility ID: 00017429
Tank ID: 4
Owner: Consumers Energy
Owner Country: USA
Owner Contact: Not reported
Owner Address: One Energy Plaza
Jackson, MI 49201
Owner Phone: (517) 788-0620
Product: Diesel
Capacity: 10000
Tank Status: Removed from Ground
Remove Date: Oct 18 2001
Constr Material: Cathodically Protected Steel
Piping Material: Double Walled, Fiberglass reinforced plastic, Secondary Containment
Piping Type: Pressure
Contact: ROBERT G NEUMANN
Contact Phone: 517-788-0350
Impressed Device: No
Install Date: Apr 23 1980
Release Detection:
Tank: Automatic Tank Gauging, Tank Tightness Testing
Pipe: Automatic Line Leak Detectors, Interstitial Monitoring Double Walled Piping, Line Tightness Testing

Facility ID: 00017429
Tank ID: 5
Owner: Consumers Energy
Owner Country: USA
Owner Contact: Not reported
Owner Address: One Energy Plaza
Jackson, MI 49201
Owner Phone: (517) 788-0620
Product: USED TRANS OIL
Capacity: 10000
Tank Status: Removed from Ground
Remove Date: Aug 17 1992
Constr Material: Asphalt Coated or Bare Steel, Cathodically Protected Steel
Piping Material: Bare Steel, Cathodically Protected
Piping Type: Gravity Fed?
Contact: ROBERT G NEUMANN
Contact Phone: 517-788-0350
Impressed Device: No
Install Date: Apr 23 1976
Release Detection:
Tank: Not reported
Pipe: Not reported

Facility ID: 00017429
Tank ID: 6
Owner: Consumers Energy
Owner Country: USA
Owner Contact: Not reported
Owner Address: One Energy Plaza
Jackson, MI 49201
Owner Phone: (517) 788-0620

Map ID
Direction
Distance
Distance (ft.)
Elevation Site

MAP FINDINGS

Database(s) EDR ID Number
EPA ID Number

GRAND RAPIDS SERVICE CENTER (Continued)

U000257428

Product: Diesel
Capacity: 1200
Tank Status: Removed from Ground
Remove Date: Oct 25 1990
Constr Material: Asphalt Coated or Bare Steel,Cathodically Protected Steel
Piping Material: Bare Steel,Cathodically Protected
Piping Type: Not reported
Contact: ROBERT G NEUMANN
Contact Phone: 517-788-0350
Impressed DeviceNo
Install Date: Apr 24 1967
Release Detection:
Tank: Not reported
Pipe: Not reported

Facility ID: 00017429
Tank ID: 7
Owner: Consumers Energy
Owner Country: USA
Owner Contact: Not reported
Owner Address: One Energy Plaza
Jackson, MI 49201
Owner Phone: (517) 788-0620
Product: TRANS OIL
Capacity: 10000
Tank Status: Removed from Ground
Remove Date: Oct 12 1994
Constr Material: Asphalt Coated or Bare Steel,Cathodically Protected Steel
Piping Material: Double Walled,Fiberglass reinforced plastic,Secondary Containment
Piping Type: Gravity Fed?,Pressure
Contact: ROBERT G NEUMANN
Contact Phone: 517-788-0350
Impressed DeviceNo
Install Date: Apr 23 1980
Release Detection:
Tank: Automatic Tank Gauging,Tank Tightness Testing
Pipe: Automatic Line Leak Detectors,Interstitial Monitoring Double Walled Piping,Line Tightness Testing

Facility ID: 00017429
Tank ID: 8
Owner: Consumers Energy
Owner Country: USA
Owner Contact: Not reported
Owner Address: One Energy Plaza
Jackson, MI 49201
Owner Phone: (517) 788-0620
Product: TRANS OIL
Capacity: 10000
Tank Status: Removed from Ground
Remove Date: Oct 13 1994
Constr Material: Asphalt Coated or Bare Steel,Cathodically Protected Steel
Piping Material: Double Walled,Fiberglass reinforced plastic,Secondary Containment
Piping Type: Pressure
Contact: ROBERT G NEUMANN
Contact Phone: 517-788-0350
Impressed DeviceNo

Map ID
Direction
Distance
Distance (ft.)
Elevation Site

MAP FINDINGS

Database(s) EDR ID Number
EPA ID Number

GRAND RAPIDS SERVICE CENTER (Continued)

U000257428

Install Date: Apr 23 1980
Release Detection:
Tank: Automatic Tank Gauging,Tank Tightness Testing
Pipe: Automatic Line Leak Detectors,Interstitial Monitoring Double Walled Piping,Line Tightness Testing

Facility ID: 00017429
Tank ID: 9
Owner: Consumers Energy
Owner Country: USA
Owner Contact: Not reported
Owner Address: One Energy Plaza
Jackson, MI 49201
Owner Phone: (517) 788-0620
Product: Kerosene
Capacity: 500
Tank Status: Removed from Ground
Remove Date: Sep 30 1990
Constr Material: Asphalt Coated or Bare Steel,Cathodically Protected Steel
Piping Material: Bare Steel,Cathodically Protected
Piping Type: Not reported
Contact: ROBERT G NEUMANN
Contact Phone: 517-788-0350
Impressed Device:No
Install Date: Apr 24 1967
Release Detection:
Tank: Not reported
Pipe: Not reported

26
NNE
1/4-1/2
2441 ft.
TIMMERS SERVICE CENTER
3600 DIVISION AVE S
GRAND RAPIDS, MI 49548

LUST U003867943
UST N/A

Relative:
Equal

Actual:
679 ft.

LUST:
Facility ID: 00034055
Release Number: Open
Release Date: Jun 20 1990
District: Grand Rapids District Office
Closed Date: Not reported
Owner Contact: Not reported
Owner Name: Charles C. Saur
Owner Address: 1415 Forrester St SE
Grand Rapids, MI 49508
Country: USA
Owner Phone: (616) 245-7552
Contact: GERALD B. TIMMER
Facility Phone: (616) 245-3688
Leak Number: C-1128-90

UST:
Facility ID: 00034055
Tank ID: 1
Owner: Charles C. Saur
Owner Country: USA
Owner Contact: Not reported
Owner Address: 1415 Forrester St SE
Grand Rapids, MI 49508
Owner Phone: (616) 245-7552

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

Database(s)
EDR ID Number
EPA ID Number

TIMMERS SERVICE CENTER (Continued)

U003867943

Product: Gasoline
Capacity: 10000
Tank Status: Removed from Ground
Remove Date: Jun 19 1990
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Galvanized Steel
Piping Type: Not reported
Contact: GERALD B. TIMMER
Contact Phone: (616) 245-3688
Impressed Device: No
Install Date: Not reported
Release Detection:
Tank: Not reported
Pipe: Not reported

27
NW
1/4-1/2
2579 ft.
WYOMING WHSE INC
425-36TH ST SW
WYOMING, MI 49418

LUST U003328658
UST N/A

Relative:
Lower

LUST:

Facility ID: 00015070
Release Number: Closed
Release Date: Nov 15 1989
District: Grand Rapids District Office
Closed Date: Nov 17 1993
Owner Contact: Not reported
Owner Name: Wyoming Whse Inc
Owner Address: 4520 Spartan Industrial Dr SW
Grandville, MI 49418
Country: USA
Owner Phone: (616) 538-6770
Contact: ORRIN G SUNDE
Facility Phone: (616) 538-6770
Leak Number: C-1215-89

Actual:
678 ft.

UST:

Facility ID: 00015070
Tank ID: 1
Owner: Wyoming Whse Inc
Owner Country: USA
Owner Contact: Not reported
Owner Address: 4520 Spartan Industrial Dr SW
Grandville, MI 49418
Owner Phone: (616) 538-6770
Product: Diesel
Capacity: 1000
Tank Status: Removed from Ground
Remove Date: Nov 6 1989
Constr Material: Asphalt Coated or Bare Steel
Piping Material: Bare Steel
Piping Type: Not reported
Contact: ORRIN G SUNDE
Contact Phone: (616) 538-6770
Impressed Device: No
Install Date: Apr 3 1981
Release Detection:
Tank: Not reported
Pipe: Not reported

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

WYOMING WHSE INC (Continued)

EDR ID Number
EPA ID Number

Database(s)

U003328658

28
NE
1/2-1
2979 ft.

GRANTEX INC.
3560 JEFFERSON AVE S.E.
WYOMING, MI 49548

SHWS S105144247
N/A

Relative:
Equal

SHWS:

Facility ID: 41000862
Facility Status: Interim Response in progress
Source: null
Pollutant(s): null
SAM Score: 36
SAM Score Date: 11/13/98
Township: 41
Range: 6N
Section: 11
Quarter: null
Quarter/Quarter: null

Actual:
679 ft.

29
SSW
1/2-1
3235 ft.

BELFER DRUM AND BARREL
4336 HANSEN AVENUE
WYOMING, MI 49509

SHWS S105144206
N/A

Relative:
Lower

SHWS:

Facility ID: 41000006
Facility Status: Interim Response in progress
Source: null
Pollutant(s): PCB's
SAM Score: 27
SAM Score Date: 06/21/91
Township: 06N
Range: 12W
Section: 24
Quarter: SW
Quarter/Quarter: SE

Actual:
676 ft.

30
ENE
1/2-1
3494 ft.

BENTELER INDUSTRIES
3721 HAGEN DRIVE SOUTHEAST
WYOMING, MI 49548

RCRIS-SQG 1000400112
FINDS MID000776104
CORRACTS
CERC-NFRAP

Relative:
Higher

CERCLIS-NFRAP Classification Data:

Site Incident Category: Not reported
Non NPL Code: DR

Federal Facility: Not a Federal Facility

Actual:
680 ft.

Ownership Status: Unknown

NPL Status: Not on the NPL

CERCLIS-NFRAP Assessment History:

Assessment: DISCOVERY
Assessment: PRELIMINARY ASSESSMENT
Assessment: ARCHIVE SITE

Completed: 01/28/1992
Completed: 09/11/1992
Completed: 12/18/1995

CORRACTS Data:

EPA Id: MID000776104
Region: 5
Area Name: ENTIRE FACILITY
Actual Date: 05/29/1992
Corrective Action: CA050 - RFA Completed

Map ID
Direction
Distance
Distance (ft.)
Elevation

MAP FINDINGS

BENTELER INDUSTRIES (Continued)

EDR ID Number
EPA ID Number

Database(s)

1000400112

2002 NAICS Title: General Automotive Repair
EPA Id: MID000776104
Region: 5
Area Name: ENTIRE FACILITY
Actual Date: 03/31/1992
Corrective Action: CA075LO - CA Prioritization, Facility or area was assigned a low corrective action priority
2002 NAICS Title: General Automotive Repair

RCRIS Corrective Action Summary:

Event: RFA Completed
Event Date: 05/29/1992
Event: CA Prioritization, Facility or area was assigned a low corrective action priority.
Event Date: 03/31/1992

RCRIS:

Owner: BENTELER CORP
EPA ID: MID000776104
Contact: WILLIAM HALL
(616) 246-5470

Classification: Small Quantity Generator
TSDF Activities: Not reported

Violation Status: No violations found

NY MANIFEST

Additional detail is available in NY MANIFEST. Please contact your EDR Account Executive for more information.

FINDS:

Other Pertinent Environmental Activity Identified at Site:
AIRS/AIRS Facility Subsystem (AIRS/AFS)
Integrated Compliance Information System (ICIS)
National Emissions Inventory (NEI)
National Emissions Trends (NET)
National Toxics Inventory (NTI)
Resource Conservation and Recovery Act Information system (RCRAINFO)
Toxic Chemical Release Inventory System (TRIS)

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
GRAND RAPIDS	S105254521	16 28TH ST. S. E. & 2806 SOUTH DIVISION	16 28TH ST. S. E. / 2806 SOUTH DIVISION	BEA	BEA
GRAND RAPIDS	S105094854	BELTLINE BAR/BUNNY CLEANERS	16 28TH STREET SE / 2806 S DIVISION AVE.	BEA	BEA
GRAND RAPIDS	S103085176	68TH. ST. & DIVISION AREA	68TH STREET AND DIVISION AREA	49548	SHWS
KENTWOOD	U003866203	J&J MOVING & DELIVERY SERVICE IN	5622 DIVISION AVE S	49548	UST
NULL	S105144739	GENEVA TOWNSHIP LANDFILL	67TH ST AND KIBBIE CORNERS	49548	SHWS
WYOMING	S103084951	APPROVED INDUSTRIAL REMOVAL	3755 LINDEN / 750 HIMES	49509	SHWS
WYOMING	S104909489	BOSMA BROTHERS PLUMBING	3042 STAFFORD	49548	BEA

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Elapsed ASTM days: Provides confirmation that this EDR report meets or exceeds the 90-day updating requirement of the ASTM standard.

FEDERAL ASTM STANDARD RECORDS

NPL: National Priority List

Source: EPA

Telephone: N/A

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 01/29/04

Date Made Active at EDR: 02/27/04

Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 02/06/04

Elapsed ASTM days: 21

Date of Last EDR Contact: 02/06/04

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 6
Telephone: 214-655-6659

EPA Region 8
Telephone: 303-312-6774

Proposed NPL: Proposed National Priority List Sites

Source: EPA

Telephone: N/A

Date of Government Version: 01/07/04

Date Made Active at EDR: 02/27/04

Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 02/06/04

Elapsed ASTM days: 21

Date of Last EDR Contact: 02/06/04

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

Source: EPA

Telephone: 703-413-0223

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 11/17/03

Date Made Active at EDR: 02/02/04

Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 12/22/03

Elapsed ASTM days: 42

Date of Last EDR Contact: 03/22/04

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Source: EPA

Telephone: 703-413-0223

As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 11/17/03
Date Made Active at EDR: 02/02/04
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 12/22/03
Elapsed ASTM days: 42
Date of Last EDR Contact: 03/22/04

CORRACTS: Corrective Action Report

Source: EPA
Telephone: 800-424-9346

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 12/18/03
Date Made Active at EDR: 02/02/04
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 12/26/03
Elapsed ASTM days: 38
Date of Last EDR Contact: 03/08/04

RCRIS: Resource Conservation and Recovery Information System

Source: EPA
Telephone: 800-424-9346

Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs): generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month. Small quantity generators (SQGs): generate between 100 kg and 1,000 kg of hazardous waste per month. Large quantity generators (LQGs): generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month. Transporters are individuals or entities that move hazardous waste from the generator off-site to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 01/12/04
Date Made Active at EDR: 02/10/04
Database Release Frequency: Varies

Date of Data Arrival at EDR: 01/19/04
Elapsed ASTM days: 22
Date of Last EDR Contact: 01/19/04

ERNS: Emergency Response Notification System

Source: National Response Center, United States Coast Guard
Telephone: 202-260-2342

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/03
Date Made Active at EDR: 03/12/04
Database Release Frequency: Annually

Date of Data Arrival at EDR: 01/26/04
Elapsed ASTM days: 46
Date of Last EDR Contact: 01/26/04

FEDERAL ASTM SUPPLEMENTAL RECORDS

BRS: Biennial Reporting System

Source: EPA/NTIS
Telephone: 800-424-9346

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/01/01
Database Release Frequency: Biennially

Date of Last EDR Contact: 03/16/04
Date of Next Scheduled EDR Contact: 06/14/04

CONSENT: Superfund (CERCLA) Consent Decrees

Source: EPA Regional Offices
Telephone: Varies

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: N/A
Database Release Frequency: Varies

Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ROD: Records Of Decision

Source: EPA

Telephone: 703-416-0223

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 01/09/04

Database Release Frequency: Annually

Date of Last EDR Contact: 01/06/04

Date of Next Scheduled EDR Contact: 04/05/04

DELISTED NPL: National Priority List Deletions

Source: EPA

Telephone: N/A

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 01/29/04

Database Release Frequency: Quarterly

Date of Last EDR Contact: 02/06/04

Date of Next Scheduled EDR Contact: 05/01/04

FINDS: Facility Index System/Facility Identification Initiative Program Summary Report

Source: EPA

Telephone: N/A

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 02/09/04

Database Release Frequency: Quarterly

Date of Last EDR Contact: 01/06/04

Date of Next Scheduled EDR Contact: 04/05/04

HMIRS: Hazardous Materials Information Reporting System

Source: U.S. Department of Transportation

Telephone: 202-366-4555

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/18/03

Database Release Frequency: Annually

Date of Last EDR Contact: 01/19/04

Date of Next Scheduled EDR Contact: 04/19/04

MLTS: Material Licensing Tracking System

Source: Nuclear Regulatory Commission

Telephone: 301-415-7169

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 01/15/04

Database Release Frequency: Quarterly

Date of Last EDR Contact: 01/06/04

Date of Next Scheduled EDR Contact: 04/05/04

MINES: Mines Master Index File

Source: Department of Labor, Mine Safety and Health Administration

Telephone: 303-231-5959

Date of Government Version: 11/25/03

Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 12/29/03

Date of Next Scheduled EDR Contact: 03/29/04

NPL LIENS: Federal Superfund Liens

Source: EPA

Telephone: 202-564-4267

Federal Superfund Liens. Under the authority granted the USEPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 10/15/91
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 03/12/04
Date of Next Scheduled EDR Contact: 05/24/04

PADS: PCB Activity Database System

Source: EPA
Telephone: 202-564-3887

PCB Activity Database. PADS identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 12/30/03
Database Release Frequency: Annually

Date of Last EDR Contact: 02/09/04
Date of Next Scheduled EDR Contact: 05/10/04

DOD: Department of Defense Sites

Source: USGS
Telephone: 703-648-5423

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 10/01/03
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 02/02/04
Date of Next Scheduled EDR Contact: 05/10/04

STORMWATER: Storm Water General Permits

Source: Environmental Protection Agency
Telephone: 202 564-0746

A listing of all facilities with Storm Water General Permits.

Date of Government Version: N/A
Database Release Frequency: Quarterly

Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

US BROWNFIELDS: A Listing of Brownfields Sites

Source: Environmental Protection Agency
Telephone: 202-566-2777

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become BCRLF cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 07/15/03
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 03/15/04
Date of Next Scheduled EDR Contact: 06/14/04

RMP: Risk Management Plans

Source: Environmental Protection Agency
Telephone: 202-564-8600

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: N/A
Database Release Frequency: N/A

Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

RAATS: RCRA Administrative Action Tracking System

Source: EPA
Telephone: 202-564-4104

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/95
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 03/08/04
Date of Next Scheduled EDR Contact: 06/07/04

TRIS: Toxic Chemical Release Inventory System

Source: EPA
Telephone: 202-566-0250

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/01
Database Release Frequency: Annually

Date of Last EDR Contact: 03/23/04
Date of Next Scheduled EDR Contact: 06/21/04

TSCA: Toxic Substances Control Act

Source: EPA
Telephone: 202-260-5521

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/02
Database Release Frequency: Every 4 Years

Date of Last EDR Contact: 03/05/04
Date of Next Scheduled EDR Contact: 06/07/04

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

Source: EPA
Telephone: 202-564-2501

Date of Government Version: 01/21/04
Database Release Frequency: Quarterly

Date of Last EDR Contact: 03/22/04
Date of Next Scheduled EDR Contact: 06/21/04

SSTS: Section 7 Tracking Systems

Source: EPA
Telephone: 202-564-5008

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/01
Database Release Frequency: Annually

Date of Last EDR Contact: 01/19/04
Date of Next Scheduled EDR Contact: 04/19/04

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-564-2501

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 01/30/04
Database Release Frequency: Quarterly

Date of Last EDR Contact: 03/22/04
Date of Next Scheduled EDR Contact: 06/21/04

STATE OF MICHIGAN ASTM STANDARD RECORDS

SHWS: Contaminated Sites

Source: Department of Environmental Quality
Telephone: 517-373-9541

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: 02/16/04
Date Made Active at EDR: 03/09/04
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 02/23/04
Elapsed ASTM days: 15
Date of Last EDR Contact: 02/23/04

SWF/LF: Solid Waste Facilities Database

Source: Department of Environmental Quality
Telephone: 517-335-4035

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 09/16/03
Date Made Active at EDR: 10/16/03
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 09/23/03
Elapsed ASTM days: 23
Date of Last EDR Contact: 01/26/04

LUST: Leaking Underground Storage Tank Sites

Source: Department of Environmental Quality
Telephone: 517-373-8168

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 12/08/03
Date Made Active at EDR: 01/23/04
Database Release Frequency: Annually

Date of Data Arrival at EDR: 12/16/03
Elapsed ASTM days: 38
Date of Last EDR Contact: 03/16/04

UST: Underground Storage Tank Facility List

Source: Department of Environmental Quality
Telephone: 517-373-8168

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 12/08/03
Date Made Active at EDR: 01/13/04
Database Release Frequency: Annually

Date of Data Arrival at EDR: 12/16/03
Elapsed ASTM days: 28
Date of Last EDR Contact: 03/16/04

BEA: BASELINE ENVIRONMENTAL ASSESSMENT DATABASE

Source: DEPT. OF ENVIRONMENTAL QUALITY
Telephone: 517-373-9541

Date of Government Version: 12/07/03
Date Made Active at EDR: 01/13/04
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 12/17/03
Elapsed ASTM days: 27
Date of Last EDR Contact: 03/15/04

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN UST: Underground Storage Tanks on Indian Land

Source: EPA Region 5

Telephone: 312-886-6136

Date of Government Version: 11/01/02

Date Made Active at EDR: 12/04/02

Database Release Frequency: Varies

Date of Data Arrival at EDR: 11/12/02

Elapsed ASTM days: 22

Date of Last EDR Contact: 03/08/04

HIST LF: Inactive Solid Waste Facilities

Source: Department of Environmental Quality

Telephone: 517-335-4034

The database contains historical information and is no longer updated.

Date of Government Version: 03/01/97

Date Made Active at EDR: 03/06/03

Database Release Frequency: No Update Planned

Date of Data Arrival at EDR: 02/28/03

Elapsed ASTM days: 6

Date of Last EDR Contact: 02/28/03

INDIAN UST: Underground Storage Tanks on Indian Land

Source: EPA Region 8

Telephone: 303-312-6137

Date of Government Version: 03/17/03

Date Made Active at EDR: 04/17/03

Database Release Frequency: Varies

Date of Data Arrival at EDR: 03/31/03

Elapsed ASTM days: 17

Date of Last EDR Contact: 02/23/04

STATE OF MICHIGAN ASTM SUPPLEMENTAL RECORDS

AST: Aboveground Tanks

Source: Department of Environmental Quality

Telephone: 517-373-8168

Registered Aboveground Storage Tanks.

Date of Government Version: 01/05/04

Database Release Frequency: No Update Planned

Date of Last EDR Contact: 03/15/04

Date of Next Scheduled EDR Contact: 06/14/04

DEL SHWS: Delisted List of Contaminated Sites

Source: Department of Environmental Quality

Telephone: 517-373-9541

Sites that have been delisted or deleted from the List of Contaminated Sites. The available documentation for the site does not support its listing or the site no longer meets criteria specified in rules.

Date of Government Version: 02/24/04

Database Release Frequency: Varies

Date of Last EDR Contact: 02/23/04

Date of Next Scheduled EDR Contact: 05/24/04

PEAS: Pollution Emergency Alerting System

Source: Department of Environmental Quality

Telephone: 517-373-8427

Environmental pollution emergencies reported to the Department of Environmental Quality such as tanker accidents, pipeline breaks, and release of reportable quantities of hazardous substances.

Date of Government Version: 01/06/04

Database Release Frequency: Quarterly

Date of Last EDR Contact: 01/06/04

Date of Next Scheduled EDR Contact: 04/05/04

EDR PROPRIETARY HISTORICAL DATABASES

Former Manufactured Gas (Coal Gas) Sites: The existence and location of Coal Gas sites is provided exclusively to EDR by Real Property Scan, Inc. ©Copyright 1993 Real Property Scan, Inc. For a technical description of the types of hazards which may be found at such sites, contact your EDR customer service representative.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Disclaimer Provided by Real Property Scan, Inc.

The information contained in this report has predominantly been obtained from publicly available sources produced by entities other than Real Property Scan. While reasonable steps have been taken to insure the accuracy of this report, Real Property Scan does not guarantee the accuracy of this report. Any liability on the part of Real Property Scan is strictly limited to a refund of the amount paid. No claim is made for the actual existence of toxins at any site. This report does not constitute a legal opinion.

BROWNFIELDS DATABASES

US BROWNFIELDS: A Listing of Brownfields Sites

Source: Environmental Protection Agency

Telephone: 202-566-2777

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become BCRLF cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: N/A

Database Release Frequency: Semi-Annually

Date of Last EDR Contact: N/A

Date of Next Scheduled EDR Contact: N/A

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data

Source: PennWell Corporation

Telephone: (800) 823-6277

This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:

Source: American Hospital Association, Inc.

Telephone: 312-280-5991

The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing

Source: Centers for Medicare & Medicaid Services

Telephone: 410-786-3000

A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Nursing Homes

Source: National Institutes of Health

Telephone: 301-594-6248

Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools

Source: National Center for Education Statistics

Telephone: 202-502-7300

The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools

Source: National Center for Education Statistics

Telephone: 202-502-7300

The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Day Care Centers, Group & Family Homes

Source: Bureau of REgulatory Services

Telephone: 517-373-8300

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

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

STREET AND ADDRESS INFORMATION

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EDR® Environmental
Data Resources Inc

"Linking Technology with Tradition"

Sanborn® Map Report

Ship To: Kimberly A. DeVries
Dixon Environmental
750 Ottawa Avenue NW
Grand Rapids, MI 49503

Order Date: 3/24/2004 **Completion Date:** 3/25/2004

Inquiry #: 1157615.2s

P.O. #: NA

Site Name: Commercial Property

Address: 40 Grandville Avenue SW

City/State: Grand Rapids, MI 49503

Cross Streets:

Customer Project: 04-03-010
1012428DPM 616-742-5511

Based on client-supplied information, fire insurance maps for the following years were identified

1888 - 2 Maps
1895 - 1 Map
1912 - 1 Map
1950 - 1 Map
1953 - 1 Map
1967 - 1 Map
1984 - 1 Map

Limited Permission to Photocopy

Total Maps: 8

Dixon Environmental (the client) is permitted to make up to THREE photocopies of this Sanborn Map transmittal and each fire insurance map accompanying this report solely for the limited use of its customer. No one other than the client is authorized to make copies. Upon request made directly to an EDR Account Executive, the client may be permitted to make a limited number of additional photocopies. This permission is conditioned upon compliance by the client, its customer and their agents with EDR's copyright policy, a copy of which is available upon request.

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APPENDIX D
TAX ASSESSOR'S INFORMATION

INDUSTRIAL

SKETCH OF ISLAND, LOCATION:

41 17 24 276 014
LOTS 51 52 & 53 ALSO THAI PART
OF VAC PORTION OF BUCHANAN AVE
ADJ* ON THE W ALSO LOTS 78 79 &
80 ROSELAWN PARK NO. 1

2018301

FR 5/3/01

THEY ARE THE ONLY TWO IN THE WORLD WHO CAN AFFORD TO LIVE IN A HOUSE OF THIS SIZE.

0000421611 12/79 124.000

11-1300	£ 1800	£ 97500
		17500
		17500

[illegible]

1977

Conical Tool Co.

3890 Bucklewood SW

410-961-41

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July 1941

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APPENDIX E

**QUALIFICATIONS OF
ENVIRONMENTAL PROFESSIONALS**

PROFESSIONAL RESUME Dixon Environmental Consulting, Inc.

James E. Dixon, P.E.

PRINCIPAL ENGINEER

EDUCATION

M.S. Candidate Earth Science Geology,
Western Michigan University,
Kalamazoo, MI

B.S. Civil Engineering. Michigan State
University, East Lansing, MI

Nation Water Well Association,
Groundwater Remediation Technology
Seminar, Long Beach, CA

ASFE Excavation Safety, Loss
Prevention Seminar, Detroit, MI

CERTIFICATION

Professional Engineer, States of
Michigan #40018, Kentucky #19270
Michigan Certified Underground
Storage Tank Professional #731
Stormwater Management Operator,
-industrial site #02706 A-1i
(expires July 1, 2006)
-construction site #01620 A1j
(expires July 1, 2006)

OSHA 1910.120 40-hour Hazardous
Waste Training and current
8-hour Refresher Training
expires April 2004

8-hour Supervisor's OSHA Training
EPA Lead Based Paint Inspector
Certification

RMD's LPA-1 Lead Paint Inspection
System Certification

Nuclear Density Gauge Testing
Certification

PROFESSIONAL ACTIVITIES

American Society of Civil Engineers
National Society of Professional
Engineers

Nation Water Well Association
Grand Rapids Chamber of Commerce,
Environmental Policy Committee
National Lead Abatement Council

EXPERIENCE

Mr. Dixon is a Principal Engineer for Dixon Environmental Consulting, Inc. (DEC) His primary responsibilities include the management of all facets of DEC. Mr. Dixon is also responsible for conducting environmental services provided by DEC. His experiences include project management relating to the design and performance of environmental subsurface exploration, waste characterization, design of both soil and groundwater remediation systems, conducting pollution prevention plans, performing environmental site assessments and Baseline Environmental Assessments. Mr. Dixon has also served as Construction Quality Assurance Engineer for several landfill projects and development of Quality Assurance/Quality Control (QA/QC) programs for building and remediation system construction. Areas of expertise include:

- Manager for numerous Phase I Environmental Site Assessment projects using ASTM Standard 1527-00.
- Project manager for Phase II and III Environmental Site Assessment projects.
- Conducting Baseline Environmental Site Assessments (BEA's) with concurring determination from MDEQ for Categories D, N and S.
- Associate and Senior Project Manager for Leaking Underground Storage Tank (LUST) projects, including removal and in-place closures, contaminant delineation, and remediation using Risk-Based Corrective Action (RBCA) procedures.
- Project Management for Underground Storage Tank Removal, Sampling and Closure Documentation according to the Michigan State Fire Marshal protocol.
- Preparation and review of hydrogeological/contaminant assessment reports.

- Managing Asbestos Abatement project including the survey, notification, air monitoring, coordination and abatement disposal.

- Development of QA/QC programs for installation of natural and synthetic liner systems, including dual-contained HDPE piping systems for landfills.

- Construction design and management for installation of large-scale soil and groundwater remediation systems.

- Conducting Stormwater Pollution Prevention Plans for construction and industry.

- Remedial investigations, feasibility studies and risk assessments.

- Interpretation of Ground Penetrating Radar (GPR) surveys.

- Design and installation of free product recovery systems at industrial sites.

- Design, permitting and construction management of underground and above ground storage tank systems.

- Design and construction management for earth retention systems.

- Waste Characterization for waste water, permitting with regulating governmental agency, verifying non-hazardous status of generator.

- Soil Density verification, permeability testing, physical testing of construction materials.

PROFESSIONAL RESUME Dixon Environmental Consulting, Inc.

Stephen M. Heintz

PROJECT SCIENTIST/ENGINEER

EDUCATION

B.S. Natural Resource Management, Grand Valley State University, Allendale, MI

Associates Degree - Liberal Arts, Grand Rapids Community College, Grand Rapids, MI

Handling Asbestos: Your Rights & Responsibilities Workshop (MDEQ & MDCIS Environmental Workshop)

CERTIFICATION

OSHA 1910.120 40-hour Hazardous Waste Training and current 8-hour Refresher Training expires January 2003.

24-Hour Asbestos Building Inspector Training (Training was conducted in accordance with the requirements of 40 CFR 763 [AHERA] Appendix C, as amended, and Michigan Act 440, PA 1988). Asbestos Building Inspector Refresher Course expires May 2004.

Michigan Department of Consumer & Industry Services Accredited Asbestos Inspector (# 17880) expires March 18, 2004.

Michigan Department of Environmental Quality Storm Water Management - Industrial Site Certification (# 04227) expires July 1, 2003.

RMD's LPA-1 Lead Paint Inspection System Certification.

EXPERIENCE

Mr. Heintz is a Project Scientist/Engineer for Dixon Environmental Consulting, Inc. (DEC) Mr. Heintz is responsible for assisting the Principal Engineer with the environmental services offered by DEC. Since June 1996, Mr. Heintz has performed the following tasks at DEC:

- Construction Quality Assurance technician for a composite liner system for waste water storage lagoon.
- Construction Quality Assurance technician for a composite liner system for waste water anaerobic treatment lagoon.
- Oversight on geosynthetic clay liner deployment.
- Oversight on high density polyethylene (HDPE) liner deployment.
- Liner seam air testing oversight and monitoring.
- SDR-17 HDPE pipe fusion welding oversight and testing.
- Coordinating locational survey for lagoon construction as-built diagrams.
- CQA Certification Report preparation.
- Conducting Phase I Environmental Site Assessments for commercial properties using ASTM Designation: E 1527-00.
- Conducting Transaction Screens for commercial properties using ASTM Designation: E 1528-00.
- Conducting Phase II Environmental Site Assessments.
- Preparation of Category D, N and S Baseline Environmental Assessments (BEAs) with concurrence from MDEQ.
- Environmental soil & groundwater sampling, and review of chemical analysis.
- Performing Metal Surveys, Background Studies, and Statistical Analysis.
- Performing Asbestos Building Inspections and preparation of reports in accordance with Michigan Act 440, P.A. of 1988, as amended.
- Assisting project management for Underground Storage Tank Removal, Sampling and Closure Documentation according to the Michigan State Fire Marshal protocol.

PROFESSIONAL ACTIVITIES

Michigan Association of Environmental Professionals

APPENDIX F
PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

Plate	Description
1	Subject site facing southeast with Buchanan Avenue, SW in the foreground.
2	Subject site facing northeast with intersection of Buchanan Avenue, SW and 39 th Street, SW in the foreground.
3	Subject site facing northwest with the intersection of 39 th Street, SW and Opal Avenue, SW in the foreground.
4	Unpaved parking area and subject building facing southwest.
5	Scrap metal bin and drum storage area located along the eastern side of the subject building.
6	Solid waste dumpster located along the northern property boundary of the subject site.
7	Office area located in the western portion of the subject building.
8	Shipping area located along the eastern side of the office.
9	Storage room located along the northern side of the shipping area.
10	Northwestern portion of the manufacturing area.
11	Northeastern portion of the manufacturing area.
12	Southeastern portion of the manufacturing area.
13	Steel rod storage area located in the southeastern portion of the manufacturing area.
14	Southwestern portion of the manufacturing area.
15	Northern adjoining property.
16	Northeastern and eastern adjoining properties.
17	Southern and southeastern adjoining properties.
18	Southern adjoining property.
19	Southern adjoining property.
20	Western adjoining property.

* Photographs taken by Mr. Stephen M. Heintz, Project Scientist of Dixon Environmental Consulting, Inc. on March 23, 2004.

C

DIXON
ENVIRONMENTAL CONSULTING, INC.

APPENDIX C

PHASE II ENVIRONMENTAL SITE ASSESSMENT
COMPLETED BY DIXON ENVIRONMENTAL CONSULTING, INC.
ON FEBRUARY 14, 2002

***PHASE II ENVIRONMENTAL SITE ASSESSMENT
CONICAL TOOL COMPANY
3890 BUCHANAN AVENUE, SW
WYOMING, MICHIGAN***

Prepared for:

*Ms. Harriet Stanaback
Conical Tool Company
3890 Buchanan Avenue, SW
Wyoming, Michigan 49548*

Prepared by:

*Dixon Environmental Consulting, Inc.
750 Ottawa Avenue, NW
Grand Rapids, Michigan 49503*

February 14, 2002

February 14, 2002

Ms. Harriet Stanaback
Conical Tool Company
3890 Buchanan Avenue, SW
Wyoming, Michigan 49548

**RE: Phase II Environmental Site Assessment
Conical Tool Company Property
3890 Buchanan Avenue, SW
Wyoming, Kent County, Michigan
Tax Parcel Identification Number: 41-17-24-276-014
DEC Project No: 02-01-011**

Dear Ms. Stanaback:

Dixon Environmental Consulting, Inc. (DEC) has completed a Phase II Environmental Site Assessment (ESA) at the above referenced property. A Project Location Map is attached as Figure 1. The scope of work for the Phase II ESA was derived from the results of the Phase I ESA completed by DEC on January 29, 2002. This Phase II ESA was conducted to determine whether the subject site is a "facility" as defined under the Natural Resources and Environmental Protection Act, P.A. 451, Part 201 of 1994, as amended (Part 201).

Based on the results of the Phase I ESA, the following on-site RECs were identified at the subject property:

- Based on the review of historical aerial photographs and features observed during the site walkover, two areas of possibly discolored soil were identified at the subject property. A historical area of possibly discolored soil was depicted on the 1970 and 1975 aerial photographs. The historical area of possibly discolored soil was located beneath what is currently the northeastern portion of the building structure. An area of discolored soil was also observed near the current northeastern corner of the subject building during the site walkover. DEC understands that an exterior storage area was formerly located on this portion of the subject site. A scrap steel bin and empty 55-gallon drums were stored in the

exterior storage area. The areas of discolored soil at the subject site were identified as an on-site REC.

Phase II ESA Investigation

On January 28, 2002, DEC mobilized to the subject site to conduct a soil boring, SB-1, at the exterior area of discolored soil located near the northeastern corner of the subject building. In addition, a soil boring, SB-2, was conducted on February 6, 2002 at the historical area of discolored soil. A hand auger was utilized to conduct both soil borings at the subject site. A hammer drill was utilized to penetrate the concrete floor prior to conducting the soil boring within the building. The specific location of the soil boring and soil boring logs are included as Figure 2 and Appendix A, respectively. The soil borings conducted at the site were backfilled utilizing the soil boring cuttings and/or bentonite chips. The concrete surface was also restored at the boring location within the building structure.

Soil boring **SB-1** was conducted within the area of currently discolored soil near the northeastern corner of the subject building. A dark, discolored sand gravel with trace cobbles was encountered from the ground surface to a depth of approximately 2.5 feet below grade limit (bgl). A soil sample, **SB-1 (0.5-1')**, was collected from 0.5 to 1 foot bgl. A tan, fine sand was identified from 2.5 to 5 feet bgl. Another soil sample, **SB-1 (4.5-5')**, was collected from 4.5 to 5 feet bgl. The soil boring was terminated at 5 feet bgl.

Soil boring **SB-2** was conducted within the historical area of possibly discolored soil. Beneath the concrete surface, DEC encountered two inches of a brown, fine to medium sand. From 0.5 foot to 3.5 feet bgl, a dark brown, fine to medium sand with some coarse gravel and cobbles was encountered. Two soil samples, **SB-1 (0.5-1')** and **SB-2 (3-3.5')**, were collected from 0.5 to 1 foot bgl and 3 to 3.5 feet bgl, respectively. The soil boring was terminated at 3.5 feet bgl.

New, powderless latex or nitrile gloves were utilized when each individual sample was collected. The soil samples were collected using Encore® sampling containers and four ounce glass jars with Teflon™ septa seals. The soil samples for VOC analysis were collected via U.S. EPA Method 5035 using the Encore® samplers. The "contact" areas of the sampling equipment were decontaminated using a soapy rinse and a distilled water rinse between borings.

The samples were placed in a chilled cooler and transported to Bio-Chem Laboratories, Inc. (Bio-Chem) of Grand Rapids, Michigan for chemical analysis under standard chain-of-custody procedures. The soil samples were analyzed for the presence of volatile organic compounds (VOCs) via U.S. EPA 8260, polynuclear aromatic hydrocarbons (PNAs) via U.S. EPA 8270 and aluminum, arsenic, cadmium, chromium, iron, lead, nickel, molybdenum, silver and zinc via EPA approved "total analysis" methods.

Analytical Results Summary

DEC received the copies of the analytical results on February 4, 2002 and February 13, 2002. Detectable concentrations of VOCs, PNAs, and metals were identified in the soil at the subject site. The laboratory data sheets are included as an attachment.

Based on the analytical results, the concentrations of 1,2,4-trimethylbenzene, trichloroethene, chromium, iron, molybdenum and nickel in the soil exceeded the State of Michigan Generic Residential Cleanup Criteria (GRCC). The following table was created to compare the soil sample analytical results to the GRCC outlined in Environmental Response Division Operation Memorandum #18: Part 201 Generic Cleanup Tables, June 7, 2000 (Op Memo 18).

Table 1 - Soil Sample Analytical Results Summary
3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	SB-1 (0.5-1') (µg/Kg)	SB-1 (4.5-5') (µg/Kg)	SB-2 (0.5-1') (µg/Kg)	SB-2 (3-3.5') (µg/Kg)	GRCC for Soil (µg/Kg)
1,2,4-trimethylbenzene	95636	2,000	BDL	BDL	BDL	2,100 ^a
1,3,5-trimethylbenzene	108678	2,400	BDL	BDL	BDL	1,800 ^a
trichloroethene	79016	BDL	BDL	790	BDL	100 ^a
total xylenes	1330207	130	BDL	BDL	BDL	5,600 ^a
Remaining VOCs	-	BDL	BDL	BDL	BDL	-
acenaphthene	83329	BDL	BDL	400	BDL	300,000 ^a
anthracene	120127	BDL	BDL	980	BDL	41,000 ^a
benzo(a)anthracene	56553	BDL	BDL	920	BDL	20,000 ^b
benzo(a)pyrene	50328	BDL	BDL	730	BDL	2,000 ^b
benzo(g,h,i)perylene	191242	BDL	BDL	2,900	BDL	2,500,000 ^b
benzo(k)fluoranthene	207089	BDL	BDL	460	BDL	200,000 ^b
chrysene	218019	BDL	BDL	1,000	BDL	2,000,000 ^b
dibenzo(a,h)anthracene	53703	BDL	BDL	520	BDL	2,000 ^b
fluoranthene	206440	9,700	4,800	31,000	BDL	730,000 ^a
fluorene	86737	BDL	BDL	440	BDL	390,000 ^a
indeno(1,2,3-cd)pyrene	193395	BDL	BDL	1,600	BDL	20,000 ^b
naphthalene	91203	BDL	BDL	360	BDL	35,000 ^a
phenanthrene	85018	890	BDL	3,800	BDL	9,300 ^c
pyrene	129000	6,300	3,400	19,000	BDL	480,000 ^a
Remaining PNAs	-	BDL	BDL	BDL	BDL	-

Notes:

- ^a Residential & Commercial I Drinking Water Protection Criteria.
- ^b Residential & Commercial I Direct Contact Criteria.
- ^c Infinite Source Volatile Soil Inhalation Criteria.
- ^d Statewide Default Background Level.
- BDL - Below the respective method detection limits.
- Results in **bold** exceed the GRCC as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, Revision 1, June 7, 2000.
- Samples collected on January 28, 2002 and February 6, 2002.

Table 1 - Soil Sample Analytical Results Summary, cont.
 3890 Buchanan Avenue, SW, Wyoming, Michigan

Constituent	CAS Number	SB-1 (0.5-1') (µg/Kg)	SB-1 (4.5-5') (µg/Kg)	SB-2 (0.5-1') (µg/Kg)	SB-2 (3-3.5') (µg/Kg)	GRCC for Soil (µg/Kg)
aluminum	7429905	3,100,000	3,200,000	2,000,000	4,300,000	6,900,000 ^d
arsenic	7440382	1,700	1,500	6,200	5,000	7,600 ^b
cadmium	7440439	280	BDL	2,700	130	6,000 ^a
chromium	18540299	49,000	5,000	1,500,000	48,000	30,000 ^a
iron	7439896	5,000,000	4,700,000	46,000,000	17,000,000	12,000,000 ^d
lead	7439921	21,000	2,100	160,000	13,000	400,000 ^b
molybdenum	7439987	43,000	5,100	1,500,000	33,000	740 ^a
nickel	7440020	8,700	5,500	120,000	28,000	100,000 ^a
silver	7440224	BDL	550	BDL	690	4,500 ^a
zinc	7440666	44,000	9,300	150,000	39,000	2,400,000 ^a

Notes:

- ^a Residential & Commercial I Drinking Water Protection Criteria.
- ^b Residential & Commercial I Direct Contact Criteria.
- ^c Infinite Source Volatile Soil Inhalation Criteria.
- ^d Statewide Default Background Level.
- BDL - Below the respective method detection limits.
- Results in **bold** exceed the GRCC as outlined in the Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, Revision 1, June 7, 2000.
- Samples collected on January 28, 2002 and February 6, 2002.

Conclusions

DEC was retained to provide the environmental services relating to a Phase II ESA for the Conical Tool Company property located at 3890 Buchanan Avenue, SW, Wyoming, Kent County, Michigan. The purpose of the Phase II ESA was to investigate the on-site RECs and determine whether the site is a "facility" as defined in the Natural Resources and Environmental Protection Act, P.A. 451, Part 201 of 1994, as amended (Part 201).

Based on the results of the Phase II ESA, the following environmental conditions were identified at the subject property:

- Detectable concentrations of volatile organic hydrocarbons (VOCs), polynuclear aromatic hydrocarbons (PNAs) and metals were identified in the soil at the subject property. Specifically, the chemical analysis results identified **1,2,4-trimethylbenzene, trichloroethene, chromium, iron, molybdenum** and **nickel** in the soil at concentrations which exceeded the Generic Residential Cleanup Criteria (GRCC) as outlined in Environmental Response Division Operational Memorandum #18: Part 201 Generic Cleanup Criteria Tables, June 7, 2000 (Op Memo 18). The remaining detectable concentrations were reported below the GRCC.

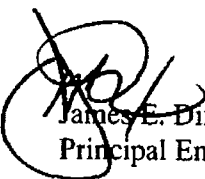
Based on the results of this Phase II ESA, DEC has encountered regulated compounds in the soil that qualify the subject site as a "facility", as defined under Part 201 of P.A. 451 of 1994, as amended.

If you have any questions or comments, please contact us at 742-5511.

Sincerely,

DIXON ENVIRONMENTAL CONSULTING, INC.

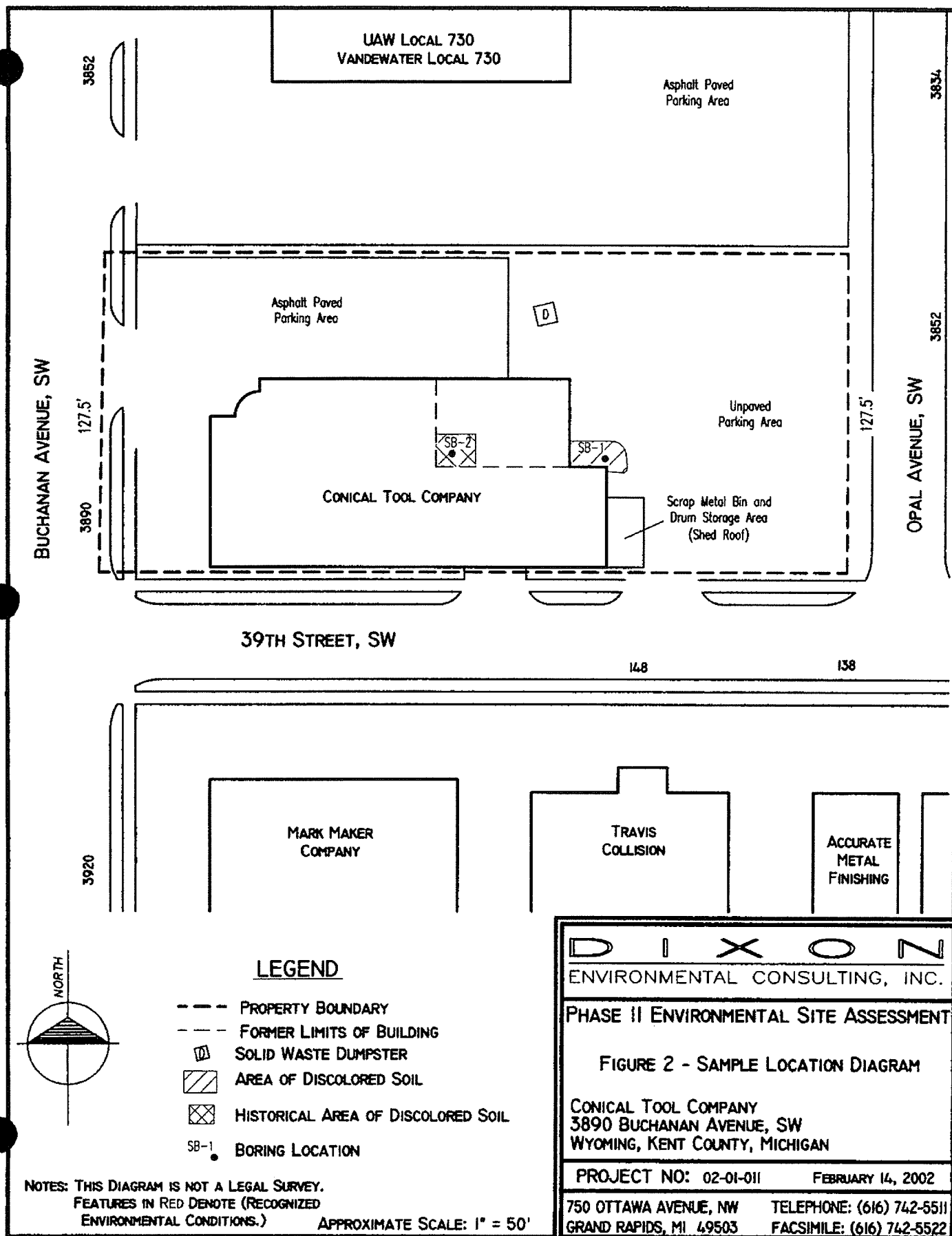

Stephen M. Heintz
Project Scientist


James E. Dixon, P.E.
Principal Engineer

Attachments (figures, boring logs and analytical results)

FIGURES

PROJECT LOCATION MAP
BORING LOCATION DIAGRAM



ATTACHMENT A

BORING LOGS

ATTACHMENT B
ANALYTICAL RESULTS



1049 - 28th Street SE
Grand Rapids, MI 49508
Ph: 616/248-4900
Toll Free: 800/362-LABS
Fax: 616/248-4904

February 04, 2002

Jim Dixon
Dixon Environmental
750 Ottawa Ave. NW
Grand Rapids, MI 49503
TEL: (616) 742-5511
FAX: (616) 742-5522

RE: 3890 Buchanan S.W.

Order No.: 0201378

Dear Jim Dixon,

BIO-CHEM Laboratories, Inc. completely received 2 samples on 01/28/2002 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative.

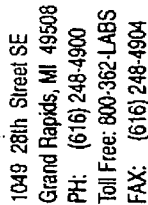
If you have any questions regarding these tests results, please feel free to call.

Please note that unless otherwise instructed, residual samples will be held for sixty (60) days from the original report date. At that time, all non-hazardous samples will be disposed of in accordance with federal, state and local regulations and ordinances, and hazardous samples shall be returned to you. Please contact the laboratory within thirty (30) days if other arrangements for sample retention need to be made.

Sincerely,

A handwritten signature in cursive script, reading "Julie Stallard".

Julie Stallard
Administrative Assistant



0201378

ANALYTICAL LABORATORIES Toll Free: 800-362-LABS FAX: (616) 248-4904		Firm Name DXN ENVIRONMENTAL		Turn around time 57-60 DAYS		Project Name 3870 BULLOCK RD		Project Number 02-01-011	
Firm Address 750 OTTAWA AVENUE NW		State Samples Taken From MI		Number of Containers 3		Date 1/28/2002		Date Due 1/28/2002	
City, State, Zip OSht		Contact Person Jim Dixon		Sample Description (sample type: water, soil, other) Soil		Analysis Desired (One per line) ALAS (Asbestos) FE Pb Ni Ag Zn *Molybdenum		Remarks *ALUMINUM, ARSENIC CHROMIUM, CADMIUM IRON, Lead, Nickel Silver, Molybdenum ZINC TOTAL ANALYSIS	
Lab I.D.	Client Sample Number	Date Taken	Time Taken	Sample Description	Number of Containers	Analysis Desired	Remarks		
1	58-1151	1/28	3:45	Soil	3	1			
2	58-1151	1/28	4:00	Soil	3	1			
3									
4									
5									
6									
7									
8									
9									
10									

Released by 	Received by Shirley Chappell	Date 1-28-02	Time 4:15 PM	Laboratory use only ☐ Blue Ice ° ☐ Regular Ice ☐ No Coolant Freezer

BIO-CHEM Laboratories, Inc.

Date: 02/04/2002

CLIENT: Dixon Environmental

Project: 3890 Buchanan S.W.

Lab Order: 0201378

Completely Received: 01/28/2002

Work Order Sample Summary

Date Reported: 02/04/2002

Lab Sample ID	Client Sample ID	Matrix	Date Collected	Date Received
0201378-01A	SB-1 (0.5')	Soil	01/28/2002	01/28/2002
0201378-02A	SB-1 (5')	Soil	01/28/2002	01/28/2002

BIO-CHEM Laboratories, Inc.

Date: 02/04/2002

CLIENT: Dixon Environmental

Project: 3890 Buchanan S.W.

Lab Order: 0201378

CASE NARRATIVE

Samples are routinely analyzed using methods outlined in the following references:

(SW) Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Ed.

(E) Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020.

(A) Standard Methods for the Examination of Water and Wastewater, APHA, 18th Ed.

(D) Annual Book of ASTM Standards.

Specific methods utilized for this project are provided in the analytical report and are identified by the reference document abbreviation () followed by the method number.

All QA/QC and sample analyses met method, laboratory and/or regulatory data quality objectives unless otherwise specified below.

Comments for PNAs by 8270

Samples 0201378-01A and 0201378-02A

The reporting limits (PQLs) for this sample analysis are elevated due to sample matrix. The extracted sample could not be concentrated to the routine final volume of 1 mL.