ENVIR. FILE

Results of

Phase III-B
Hydrogeological Investigation

for

General Motors Corporation
CPC Group
Grand Rapids, Michigan

July 1987

20676

EDI Engineering & Science
Environmental Engineering, Geology, Biology and Chemistry
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July 15, 1987

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Re: Phase III-B - Hydrogeological Investigation

In reply to your letter of June 15,1987, this plant is submitting the attached Phase III-B Report and Workplan.

We await your response to this plan.

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1.0 INTRODUCTION

The TCE groundwater contamination which originates in the area of column T-27 was found in Phase II to have reached the northern property line north of 36th Street. Concurrent with additional work done in the source area, investigation of the extent of the plume on-site and potential impact of the plume on Cole Drain was examined in this phase of work, Phase III-B. In addition, the report includes a work plan for off-site investigation of the plume. The work completed for the source area is included in the Phase III-A Hydrogeological Investigation Report.

2.0 PURPOSE AND SCOPE

The purposes of this work were to: 1) examine the potential impact of the TCE plume in the groundwater on the water quality of Cole Drain 2) determine the width of the plume in the northern portion of the property 3) obtain information about the aquifer characteristics in the northern portion of the plant property. To accomplish these goals, the following scope of work was completed.

1) Soil vapor samples were taken along the south side of 36th Street to aid in selection of the locations of two wells.

2) Two wells (87-8 and 87-9) were placed along the northern property line of the parking lot. They were located east and west of the location of well 86-3 to define the width of the plume at the property line. The aquifer was sampled at ten foot intervals with temporary wells and the permanent well set in the zone of greatest contamination.

3) Cole Drain was sampled in four locations to assess the possible impact of TCE contaminated groundwater on the surface water in the drain. One sample was taken just downstream of the CPC retention pond and above any likely contribution to the stream flow by contaminated groundwater from the plume or source area. Three samples were taken between 36th and 28th Streets to measure downstream changes in concentration of TCE.

4) The hydraulic conductivity of the aquifer in the two new wells was measured by the falling head method. Water levels were obtained in these two wells at the same time as the other wells on site were measured.

3.0 METHODS

3.1 Soil Vapor Study

Soil vapors were collected by driving a hollow metal rod into the soils to a depth of three feet. The soil vapors were extracted by a battery-operated air pump pulling 1000 cubic centimeters of soil vapor per minute. The soil vapors are drawn through the hollow rod and Teflon connecting tubing for at least five minutes of purging. The samples are extracted from the tubing ahead of the pump with a syringe. The metal rod is brushed to remove soils and heated with a propane torch to decontaminate it between samples. The samples were run on a gas chromatograph located on site. Duplicate samples were taken at four locations to assess the sampling variability.

3.2 Soil Borings

At the two locations where wells were installed, the soil borings were advanced using 3-1/4 ID hollow stem augers . Soil samples were obtained with a split spoon sampler at five foot intervals above the water table. A split spoon sample was obtained of the clay beneath the aquifer for lithology, and a portion of the sample was sent to the laboratory for chemical analysis of TCE. The soil borings and well logs are included in Appendix A.

3.3 Temporary Wells

In the soil borings, when groundwater was encountered, a temporary well was set. After development and sampling the augers were advanced 10 feet and a second temporary well was set. This pattern was continued through the thickness of the aquifer until clay or other non-permeable materials were encountered. The resulting chemical analyses were used to characterize the vertical variation within the aquifer. The temporary wells were constructed of 2-inch galvanized casing and 3-foot stainless steel screen. All of the well materials were thoroughly steam cleaned prior to installation in the augers. Each time a temporary well was set, the well was developed by a Brainard hand pump or by bailing. After development, the water samples were collected for chemical analysis with a stainless steel bailer.

3.4 Permanent Wells

The permanent wells were set through the augers to a depth indicated by the results from the temporary wells. The permanent wells, 87-8 and 87-9 are constructed of 2-inch galvanized casing and 3-foot stainless steel screen. The formation was allowed to collapse around the screen. The boring was backfilled with natural soils and bentonite to the surface. The wells were completed with flush-mount locking cap set to the level of the parking lot asphalt.

3.5 GROUNDWATER SAMPLING

Water samples were collected from the new wells and selected existing wells. Wells 85-7, 86-3, 87-8, and 87-9 were sampled on January 21, 1987. The wells were purged of at least three casing volumes with a ditch pump or bailer prior to sampling.

3.6 HYDROLOGY

The static water level in the wells was determined to the nearest 0.01 foot using the wetted tape method.

The permeability of the aquifer in the vicinity of the wells was measured by the falling head method using a pressure transducer and In-situ data logger. A vacuum is created which pulls water into the well. Once the level is stabilized, the vacuum is released and the rate of fall recorded. The mathematics, methods, and the raw data are presented in Appendix B.

3.7 CHEMICAL ANALYSIS

The chemical analyses were performed according to the following methods:

Chemical	Instrumentation	Method
Trichloroethylene	GC	EPA 604
Volatile Priority Pollutant	GC/MS	EPA 624
Acid Priority Pollutant	GC/MS	EPA 625
Base Neutral Priority Pollutant	GC/MS	EPA 625

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. Figure 1 plots the locations of soil borings from this study, previous groundwater sampling locations, and locations of previous work done for the placement of equipment within the facility. The traces of the geologic cross-sections are also indicated in Figure 1. Figures 2 through 4 are the geological cross-sections in the area of the plume. The wells and borings indicate a substantial slope of the clay (1 foot in 15 feet) beneath the sand and gravel surface aquifer to the west-northwest. Cross-section Z-Z' (Figure 2) displays the geology of the aquifer from east to west along the northern edge of the parking lot. The slope of the clay beneath the aquifer is evident. The sands and gravels above the clay do not show partings of clay which would influence

the direction and rate of contaminant movement with the groundwater. There is however a slope to the sand and gravel units to the west which may influence the flow direction and rate due to slight differences in the permeabilities of these different materials. In Cross-section C-C' (Figure 3), along the northern edge of the building, all of the wells are shallow and do not provide information on the slope of the clay. Cross-section B-B' (Figure 4), extends from the source north to the property line. The apparent slope of the clay in this direction is substantially less than in the east-west direction.

4.2 Soil Vapor Study

Samples of the soil vapor were collected and analyzed from the unpaved strip along the south side of 36th Street in front of the plant. An initial attempt was made to sample through the asphalt of the north parking lot to obtain soil vapor samples. At the time of year the study was conducted (December) the melting snow and ice of the parking lot seeped into the hole for the soil vapor probe and into the sampling apparatus. The series of locations along the south side of 36th Street were sampled as an alternative. The first sample was collected adjacent to well 85-7 to serve as a calibration point. The locations sampled and the concentration of TCE in milligrams per cubic meter of soil vapor are shown in Figure 5. Table 1 summarizes the soil vapor data which are included in Appendix C. All of the values obtained are very low compared to values found near the source. Several factors may contribute to this difference of values. The soil and air temperature may affect the values obtained from relatively shallow soils (six feet). Heavy rains early in the fall may have affected the levels of TCE in the soils. The plume appears to be moving downward as uncontaminated water recharges the top of the aquifer. The downward movement disconnects the plume from the soils above the water table.

The distribution of TCE in the soil vapor samples indicates the existence of the plume 400 feet east and 300 feet west of well 85-7. The concentrations of TCE found along 36th Street were used to select the locations of the two wells installed along the northern property line.

4.3 Cole Drain

Samples of Cole Drain were taken on January 7, 1987 at four locations along its course. The results of the analyses are summarized in Table 2, and the analytical report is included in Appendix C. Very similar values for TCE (2.7 to 4.8 ug/l) were found in all of the samples. Sample CD 1 was collected just below the retention pond outfall and upstream of any likely contribution to the drain by contaminated groundwater from the plume or source area. The uniformity of the TCE levels found along Cole Drain shows that no significant amount of TCE is entering the drain at this time.

TABLE 1

GM CPC METAL PLANT
SOIL VAPOR TCE SUMMARY
(Mg TCE/M^3 Soil Vapor)

Location	Depth (feet)	ppm	MG/M^3
30	6	0.52	2.8
31	6	0.23	1.2
32	6	0.15	0.80
	6D	2.3	12
33	6	0.33	0.41
	6D	1.8	2.2
34	6	0.2	1.1
	6D	0.16	0.85
35	6	0.89	4.7
	6D	0.23	1.2

D = Duplicate Sample
* = Non-detectable
NA = Method Alteration, Open Column 0-6 ft
R = Duplicate Analysis

TABLE 2

GM CPC METAL PLANT
COLE DRAIN SURFACE WATER SAMPLES
(ug/l)

Sample Date	Sample No.	Location	Trichloro-ethylene	Tetrachloro-ethylene	Bromodichloro-methane	Chloroform	1,1,1-Trichloro-ethane
1/7/87	1	West side of drain downstream of GM retention pond	4.4				
1/7/87	2	1,300 feet south of 32nd Street bridge	3.6				
1/7/87	3	20 feet north of 32nd Street bridge	4.8			*Not analyzed*	
1/7/87	4	1,450 feet north of 32nd Street bridge	2.7				
6/15/87	5	Retention pond inlet	2.0	ND	3.0	5.0	8.0
6/15/87	6	Retention pond outlet	2.0	ND	ND	3.0	4.0
6/15/87	7	Cole Drain adjacent to Clay Ave.	4.0	11.0	ND	ND	ND

Detection Limit - 1.0 ug/l
ND - No detection

Three additional locations were sampled on June 15, 1987 to assess the impact of the CPC Retention Pond on Cole Drain. The locations were the Retention Pond Inlet, Retention Pond Outfall, and Cole Drain adjacent to the Clay Avenue Outfalls. The samples were analysed for volatile organic compounds on the Priority Pollutant List. The analyses are included in Appendix C and the results are summarized in Table 2. The sample taken near the Clay Avenue Outfalls is to assess the water quality coming into Cole Drain other than from the CPC Retention Pond. The water entering Cole Drain from the Retention Pond causes an eddy to develop around the head end of the Drain where the Clay Avenue Outfalls enter. The sample taken at the Clay Avenue Outfalls may thus have been mixed with water from the CPC Retention Pond by the eddy. The results of the sampling show an approximately 50 percent drop in the levels of compounds across the pond from inlet to the outflow. The exception was that the concentration of TCE was low in the Inlet water (2 ppb) and remained at that level at the Outfall. The sample taken near the Clay Avenue Outfalls contained Tetrachloroethylene which was not found at either the Inlet or Outfall of the CPC Retention Pond. The other chemicals found in the Retention Pond do not appear in the Clay Avenue sample and the level of TCE in the Clay Avenue sample was higher than the level in the Retention Pond Outfall. The different distributions of chemicals found in the Retention Pond and the Clay Avenue Outfalls sample suggest that potential mixing in the drain did not affect the Clay Avenue sample. An off-site source is likely for the Tetrachloroethylene and also for TCE found in Cole Drain.

4.4 HYDROLOGY

The groundwater levels have been measured twice during the completion of this study and were reported in the Phase III-A Investigation. Figure 6 shows the groundwater levels from February 24, 1987. They have been contoured at a 0.5 foot interval. The groundwater flow direction in the north parking lot is north-northwest. The hydraulic conductivity was measured on wells 87-8 and 87-9. The results of these tests are summarized in Table 3 along with the results of previous tests conducted on wells on site. The results for the two new wells are less than, but not greatly different from, the hydraulic conductivity measured in well 86-3 previously.

The flow rate can be calculated for the plume groundwater by using the gradient of the groundwater as measured in the wells and the average of the three hydraulic conductivity tests completed in the north parking lot. The flow rate or velocity can be calculated as:

$$V=Ki/P$$

where:

V is the velocity
K is the hydraulic conductivity
i is the hydraulic gradient
P is the porosity

TABLE 3

GM CPC METAL PLANT
HYDRAULIC CONDUCTIVITY

Well	Ft/Sec	Ft/Day
Measurements:		
87-8	1.15×10^{-3}	99.4
87-9	1.81×10^{-3}	156.4
Previous Measurements:		
85-1	1.98×10^{-4}	17.1
85-7	9.19×10^{-4}	79.4
86-2	3.53×10^{-4}	30.5
86-3	2.23×10^{-3}	192.6
Average		95.9
Average of 86-3,87-8 and 87-9		149

The average hydraulic conductivity is 149 ft/day. The hydraulic gradient is 7.2 ft/mile (1.37 X10-3). The porosity is estimated at 25 percent. The estimated velocity is 0.8 ft per day. The estimated velocity is less (0.5 ft/day) in the source area. If these differences in estimated flow velocity are significant, the result may be that the leading edge of the plume is being stretched.

4.5 Chemical Analyses

The groundwater samples collected from the temporary wells installed during the drilling of wells 87-8 and 87-9 were analyzed for TCE. The results of those analyses are presented in Table 4. Figures 7, 8, and 9 show the concentrations of TCE in the temporary and permanent wells overlain on the cross-sections of the aquifer. The results for well 87-8 show the highest concentration to be at the surface of the groundwater. In well 87-9, the largest concentration of TCE is at an intermediate depth (between 22 and 55 feet). This pattern is similar to what was found in well 86-3 in the previous investigation. The concentration levels are significantly lower in the two new wells by comparison with well 86-3. Well 87-8 approximates the edge of the plume. Well 87-9 is within the plume. The probable western edge of the plume is approximately 100 to 200 feet west of well 87-9.

The two new permanent wells and wells 85-7 and 86-3 were sampled and analyzed for the volatile, acid, and base neutral fractions of the priority pollutants. In addition, the samples were analyzed for hardness, pH, iron, and grease and oil. The positive results are summarized in Table 5.

In the volatile fraction, (trans)1,2-Dichloroethylene (DCE) appears in wells 85-7 and 86-3 in low concentrations. This compound is a common contaminant in TCE and also a degradation product of TCE. The plant has no history of use of DCE so the probable source in the groundwater plume is the TCE. 1,1,1-Trichloroethane (TCA) found in low concentration in well 86-3 is used on site. TCA was not found in other wells on site.
In the base neutral fraction, Bis-(2-ethyl hexyl)-phthalate appeared in well 85-7 and Butyl benzyl phthalate was found in well 86-3. These compounds are common plasticizers and are also products of combustion. Some of the wells in the source area contained these compounds in similar quantities.

No acid fraction compounds were present in the samples.

The pH averaged 7.82 with a range of 7.68 to 7.94. The hardness ranged from 350 to 410 mg/l. None of the samples showed a significant amount of oil and grease. The concentration of iron ranged from 2.8 to 150 mg/l.

TABLE 4

SUMMARY OF TEMPORARY WELL SAMPLE ANALYSES
CONCENTATION TCE
GM CPC METAL PLANT
Results Reported as ug/l

Well No.	Date	Depth (feet)	Concentration
87-8	1/13/87	18.7-19.7	17
		28.0-31.0	5.4
		38.0-41.0	<1.0
		48.0-51.0	<1.0
		58.0-61.0	5.2
87-9	1/14/87	16.0-17.5	14
		22.0-25.0	42
		32.0-35.0	27
		41.0-44.0	41
		52.0-55.0	63
		62.0-65.0	19
		72.0-75.0	2.9

Detection Limit - 1.0 ug/l

TABLE 5

ANALYTICAL SUMMARY OF GROUNDWATER FROM THE PERMANENT WELLS GM CPC METAL PLANT

Well ID	Grease & Oil (mg/l)	Total Iron (mg/l)	Hardness (mg/l)	pH+	TCE (ug/l)	Other Volatile Organics (ug/l)	Other Parameters (base neutral fraction) (ug/l)
85-7	1.2	44	350	7.68	150	(trans)1,2-Dichloroethylene - 4	Bis-2-Ethyl Hexyl Phthalate - 68
86-3	1.7	2.8	360	7.82	340	(trans)1,2-Dichlroeothylene - 4 1,1,1-Trichloroethane - 6	Butyl-Benzyl Phthalate - 26
87-8	1.0	150	410	7.82	9		
87-9	1.9	0.50	360	7.94	62		
Detection Limit	1.0	0.010	2.0	--	1.0		

+ Standard units.

5.0 CONCLUSIONS

The core of the plume of TCE with concentration over 100 ug/l is approximately 300 feet wide on the north property line. The plume has settled from the surface of the groundwater beneath the plant to the middle portion of the aquifer. The most likely cause of the downward movement of the plume is the recharge of the aquifer north of the plant.

The TCE plume at the north property line has traveled almost 1,200 feet from the source area. Because the date when the leakage in the source area and other factors are unknown, it is difficult to predict how far the tip of the plume is from the plant. One attempt to estimate the tip would be to consider the distance on-site over which the concentration decreases by a factor of 10. On-site that distance is about 1,000 feet. Extending the same regime off-site would indicate TCE to be present at approximately 30 ppb 1,000 feet north of the property line (in line with 34th Street). The apparent increase in velocity of groundwater toward the north may significantly influence the distance that the tip of the plume has covered.

Cole Drain samples do not indicate a detectable flux of TCE into the drain between 30th and 36th Streets. The level of TCE in Cole Drain was uniformly low.

6.0 WORK PLAN FOR PLUME DEFINITION

6.1 Purpose and Scope of Work

The work done on-site has indicated a plume of TCE contaminated groundwater is going off the property to the north-northwest. The purpose of this scope of work is to define the horizontal and vertical extent of the off-site plume, including the biodegradation products of TCE, determine the groundwater flow direction and velocity in the plume area, and determine the relationship of the groundwater and Cole Drain. To accomplish these goals, the following tasks will be completed:

6.1.1 Soil Gas Survey

To aid in the selection of drilling locations, a soil gas (vapor) survey will be conducted in the area bounded by 36th Street, Buchanan Avenue, US-131, and 32nd Street. The survey will be initiated by placing locations along an east-west line near the north boundary of the GM-CPC property. The survey will continue toward the north until the limits of contamination are found or until reaching 32nd Street.

Soil vapors will be collected by driving a hollow metal rod into the soil to a depth of three feet. The soil vapors will be extracted by a battery-operated air pump pulling 1,000 cubic centimeters of soil vapor per minute. The soil vapors will be pulled through the hollow rod and Teflon tubing for purging at least five minutes. The samples will be

extracted from the tubing ahead of the pump with a syringe. The metal rod will be brushed to remove soils and heated, with a propane torch to decontaminate it between samples.

The soil vapor samples will be analyzed with a portable gas chromotograph (GC) for TCE at a temporary laboratory set up at GM-CPC and operated by an EDI chemist. The results of the GC analysis of the soil vapor samples will guide the progress of the study until the area of soil impact is delineated. If the intial results along the northern edge of the parking lot do not indicate the cross section of the plume, the soil vapor program will be terminated at that time.

6.1.2 Soil Borings and Temporary Wells

Up to twelve (12) soil borings will be drilled within the area described in task (1) above, with the actual locations picked after reviewing the results of the soil gas survey and the information of the previous wells. The soil borings will be drilled until the bottom of the aquifer is penetrated (approximately 60 feet below the surface). Two of the wells will be drilled in the warehouse area east of US-131 and north of 36th Street for water levels and water sample analyses west of Cole Drain. These two wells will not be drilled to the bottom of the aquifer if an adjacent well on the east side of the drain shows no TCE.

All soil borings will be drilled using a 3 1/4" I.D. hollow-stem auger with split-spoon cores collected every five feet until reaching the water table which varies from approximately 5 to 20 feet below the surface. In addition, one split-spoon sample will be recovered in each boring from the clay at approximately 60 feet below the surface. At least 5 feet of clay will be penetrated in each boring to verify that the bottom of the aquifer has been reached.

As each split spoon is recovered at the surface, it will be opened and immediately scanned with an Hnu photoionization detector calibrated for TCE. The Hnu detector will be used to help in determining the presence of TCE-contaminated soil. If the Hnu indicates that there is a localized source(s) of soil contamination above the water table, the soil sample(s) will be collected from the split-spoon(s) and placed in standard vials with Teflon septa. Five soil samples have been budgeted for this purpose to allow for identification of sources that are **not related** to the TCE source at the GM-CPC plant.

Groundwater samples will be collected from each boring at approximately 10-foot intervals below the water table with a temporary 2-inch well point consisting of a stainless steel screen and galvanized steel casing. It is anticipated that five samples will be collected from each well for a total of 60 groundwater samples. The temporary wells will be developed with a rod pump, if possible, or a Teflon or stainless steel bailer. Bailers will also be used to collect groundwater samples in standard vials with Teflon septa.

The soil and groundwater samples will be analyzed with a gas chromotograph (GC) for vinyl chloride, TCE, and 1,2-DCE at EDI's laboratory in Grand Rapids. The GC analysis of the temporary groundwater samples will determine the vertical variation of the solvents within the aquifer.

The soil borings will be backfilled with bentonite within the clay and with a combination of bentonite and clean soils from the top of the clay to the surface.

6.1.3 Monitoring Wells

Up to twelve (12) monitoring wells will be constructed at locations directly offset to the soil borings described in task 2 described above. The wells will be completed with 2-inch diameter galvanized steel casing and a 5-foot long, 2-inch diameter stainless steel, wire-wrapped, slotted screen. The screens will be set within the interval determined to be the most contaminated from the analysis of the temporary groundwater samples.

The monitoring wells will be gravel packed opposite the screen and to two feet above the screen, bentonite seals above the gravel pack, and a combination of bentonite and clean soil up to near the surface. Flush-mount caps with internally locking caps will be placed at the surface with cement placed around the ground level portion of the caps.

6.1.4 Decontamination

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

6.1.5 Sampling and Analysis

Groundwater samples will be collected from the twelve new wells, the three monitoring wells in the GM parking lot near the north boundary of the property, and at four locations along Cole Drain (19 samples total). The groundwater samples will be analyzed for complete VOC scans at EDI's laboratory in Grand Rapids. The samples will be analyzed using GC/MS instrumentation.

6.1.6 In-Situ Permeability Measurements

In-situ permeability tests will be performed on the twelve new monitoring wells, using a vacuum pump and Hermit data logger. The tests will be performed according to EDI's standard operating procedure, and the data will be analyzed according to the Bouwer-Rice method. The permeability measurements will be combined with other data to

determine the velocity of groundwater flow.

6.1.7 Elevation Survey

The U.S.G.S. elevations of the top-of-casing for the twelve monitoring wells will be determined. From these data, the elevation of the groundwater will be calculated, and the direction of groundwater flow will be determined.

6.2 Report

The report will contain and/or address the following sections:

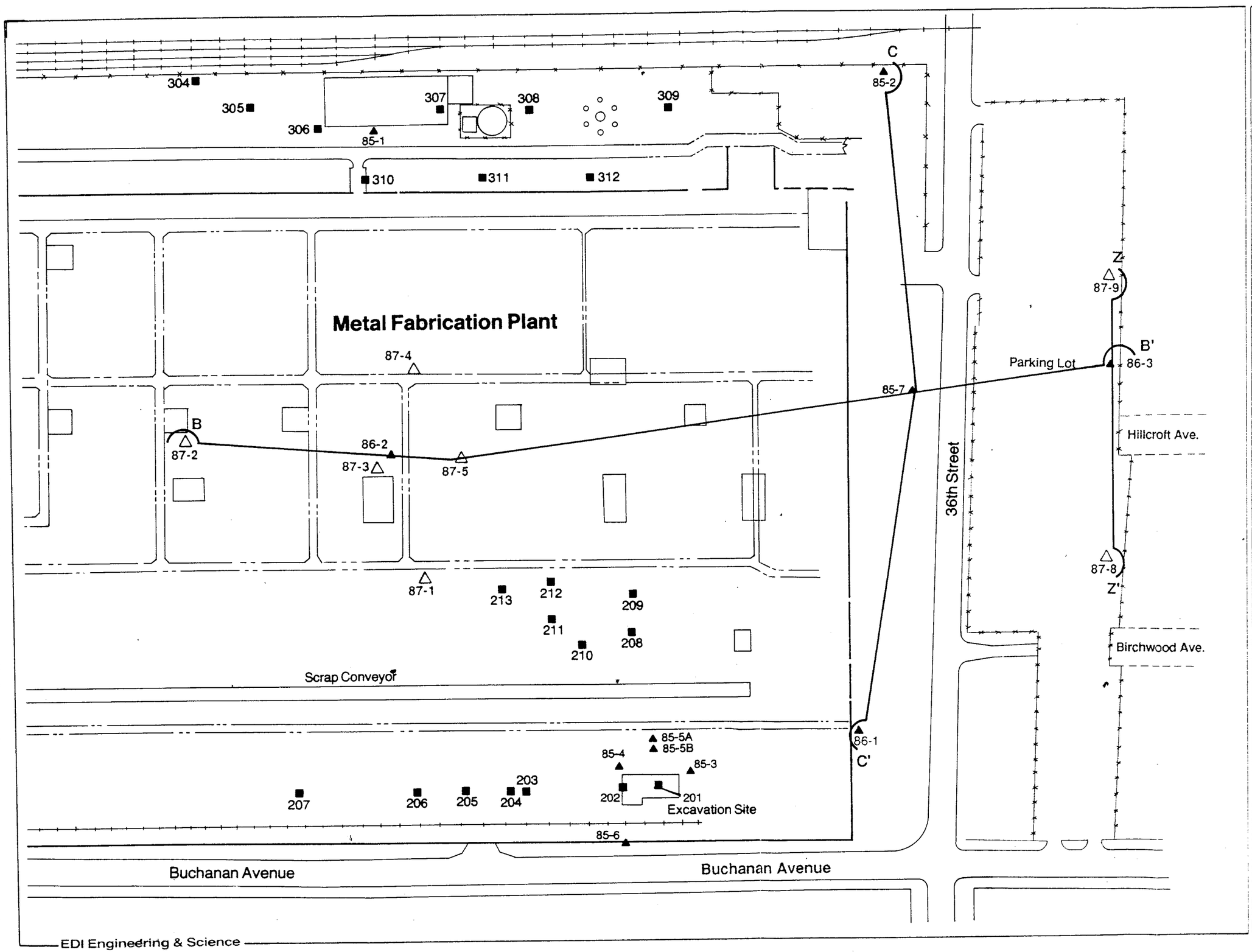
A. Lithology of the aquifer
B. Methods used for drilling, decontamination, sampling and analysis
C. Direction and rate of flow of groundwater
D. Estimate of extent of the plume
E. Discussion of relationship between Cole Drain and groundwater
F. Conclusions including projected movement of the plume
G. Well construction logs
H. Analytical laboratory reports

6.3 Schedule for Off-Site Work Plan

The off-site plume investigation will be conducted on the following schedule, Table 6, beginning with authorization to proceed. Since landowner permissions will be required to conduct most of this work, the schedule may be delayed by the time necessary to obtain these permissions.

TABLE 6
PHASE IV-C PLUME INVESTIGATION
GM CPC
GRAND RAPIDS METAL PLANT

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Approval	X																				
2. Scheduling	X	X	X																		
3. Soil Vapor Study				X																	
4. Temporary Wells (TW)					X	X	X														
5. Permanent Wells (PW)							X	X													
6. Sampling, Water Levels									X												
7. Survey									X												
8. In-situ Permeability										X											
9. Chemical Analyses (TW)						X	X	X	X												
10. Chemical Analyses (PW)										X	X	X									
11. Data Interpretation											X	X	X	X	X						
12. Report Preparation															X	X	X	X			
13. CPC Review																			X		
14. Final Draft																				X	
15. Submit to MDNR																					X



Legend

- ▲ Existing Monitoring Wells
- △ New Monitoring Wells
- ■ Soil Boring Drilled By Soils and Materials Engineers March, 1985
- Geologic Cross-Section Trace

N

0 100 150 200 300

Scale in Feet

Figure 1

Well & Boring Locations Traces of Cross-Sections

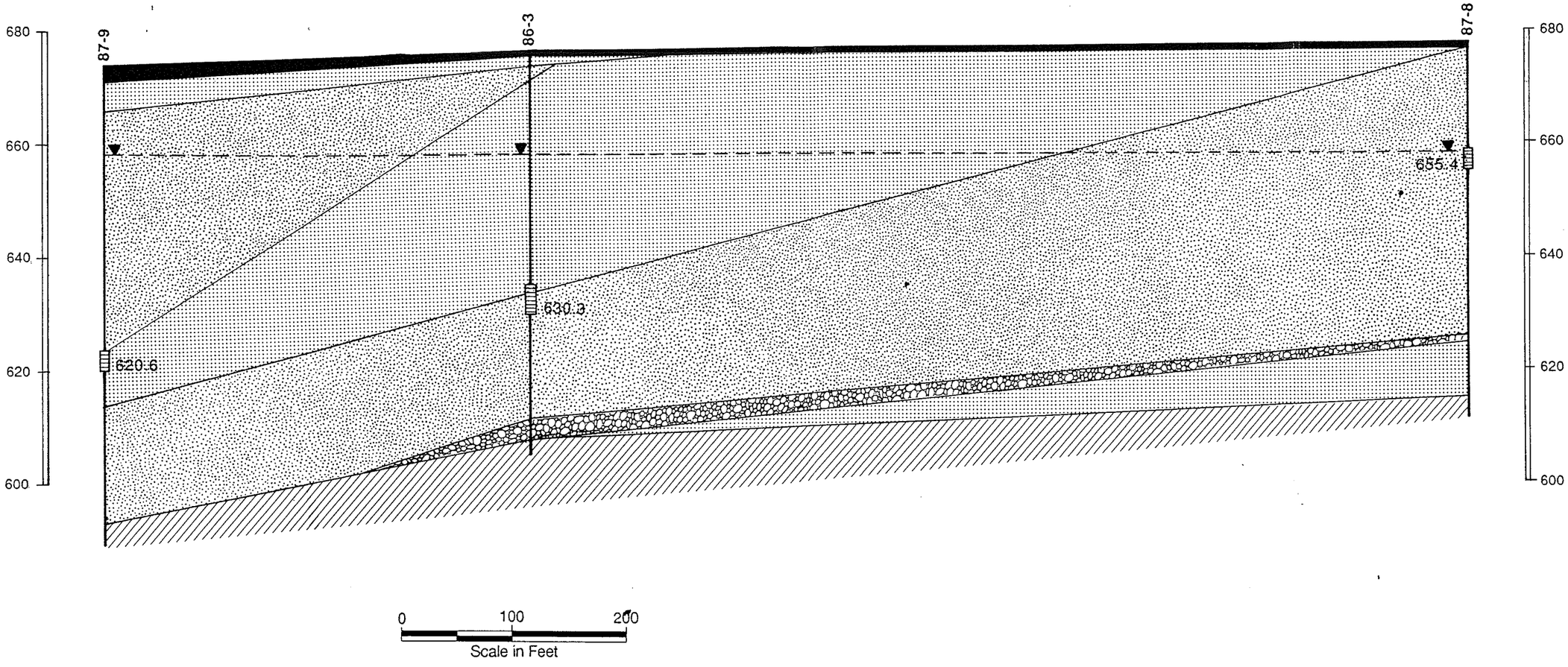
General Motors Corp./CPC Group
Grand Rapids, Michigan

June, 1987 20676

EDI Engineering & Science

West

East



LEGEND

- Concrete
- Fine Sand
- Sand
- Sand & Gravel
- Gravel
- Silt
- Clay
- Water Level
- Well Screen (620.6) Elevation

Horizontal Scale 1" = 40"
Vertical Scale 1" = 20'

Elevations NGVD

Figure 2

Geological Cross-Section Z-Z'

General Motors Corp./CPC Group
Grand Rapids, Michigan

June, 1987

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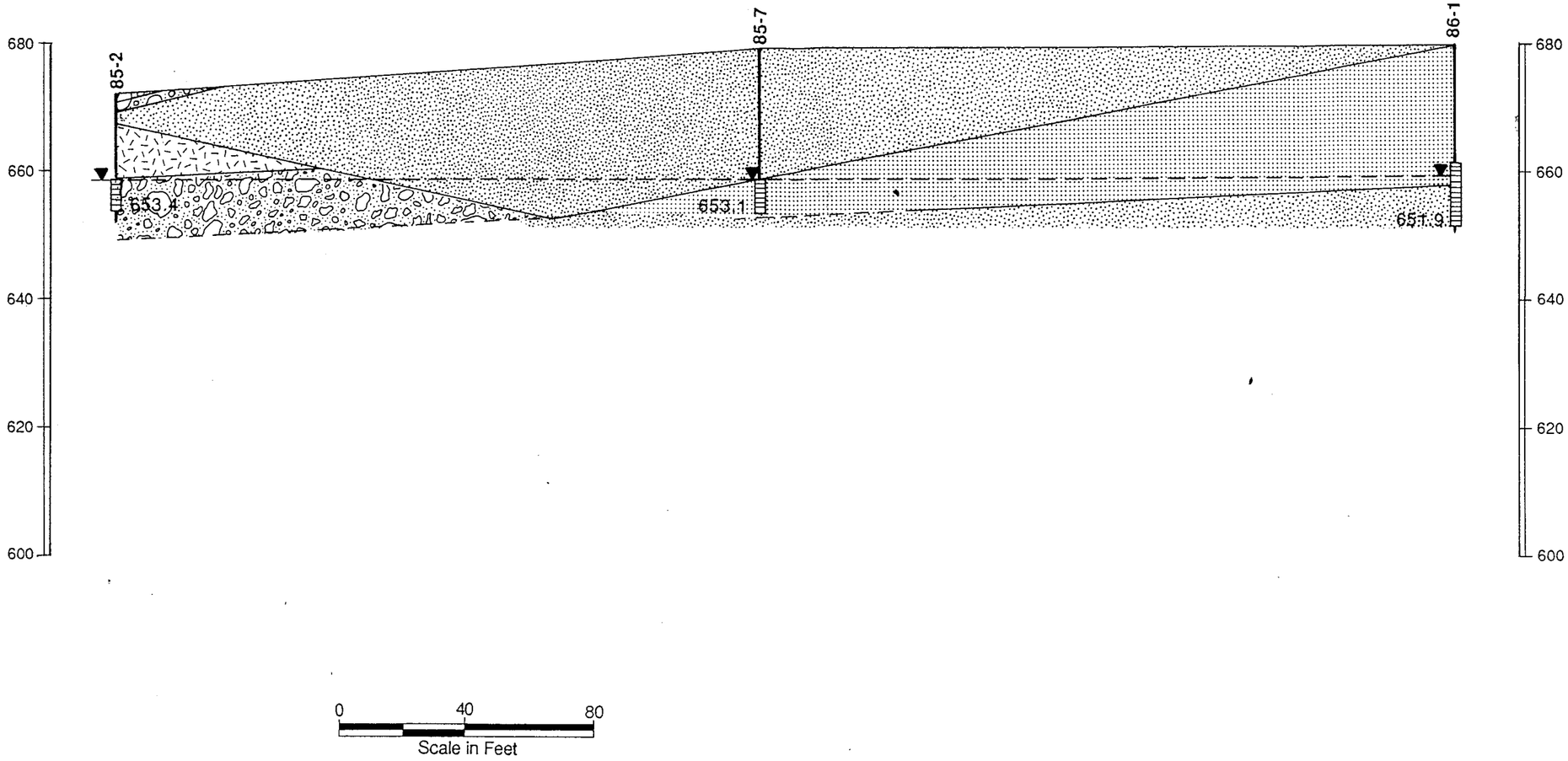
West

East



0 40 80

Scale in Feet

LEGEND

- Concrete
- Fine Sand
- Sand
- Sand & Gravel
- Gravel
- Silt
- Clay
- Water Level
- Well Screen (620.6) Elevation

Horizontal Scale 1" = 100'
Vertical Scale 1" = 20'

Elevations NGVD

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Figure 3

Geological Cross-Section C-C'

General Motors Corp./CPC Group
Grand Rapids, Michigan

June, 1987

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South

North

North Edge of Building

87-2

86-2

87-5

85-7

86-3

642.9

648.9

630.5

653.1

630.3

680

660

640

620

600

0 100 200

Scale in Feet

LEGEND

- Concrete
- Fine Sand
- Sand
- Sand & Gravel
- Gravel
- Silt
- Clay
- Water Level
- Well Screen (630.5) Elevation

Horizontal Scale 1" = 100'
Vertical Scale 1" = 20'

Elevations NGVD

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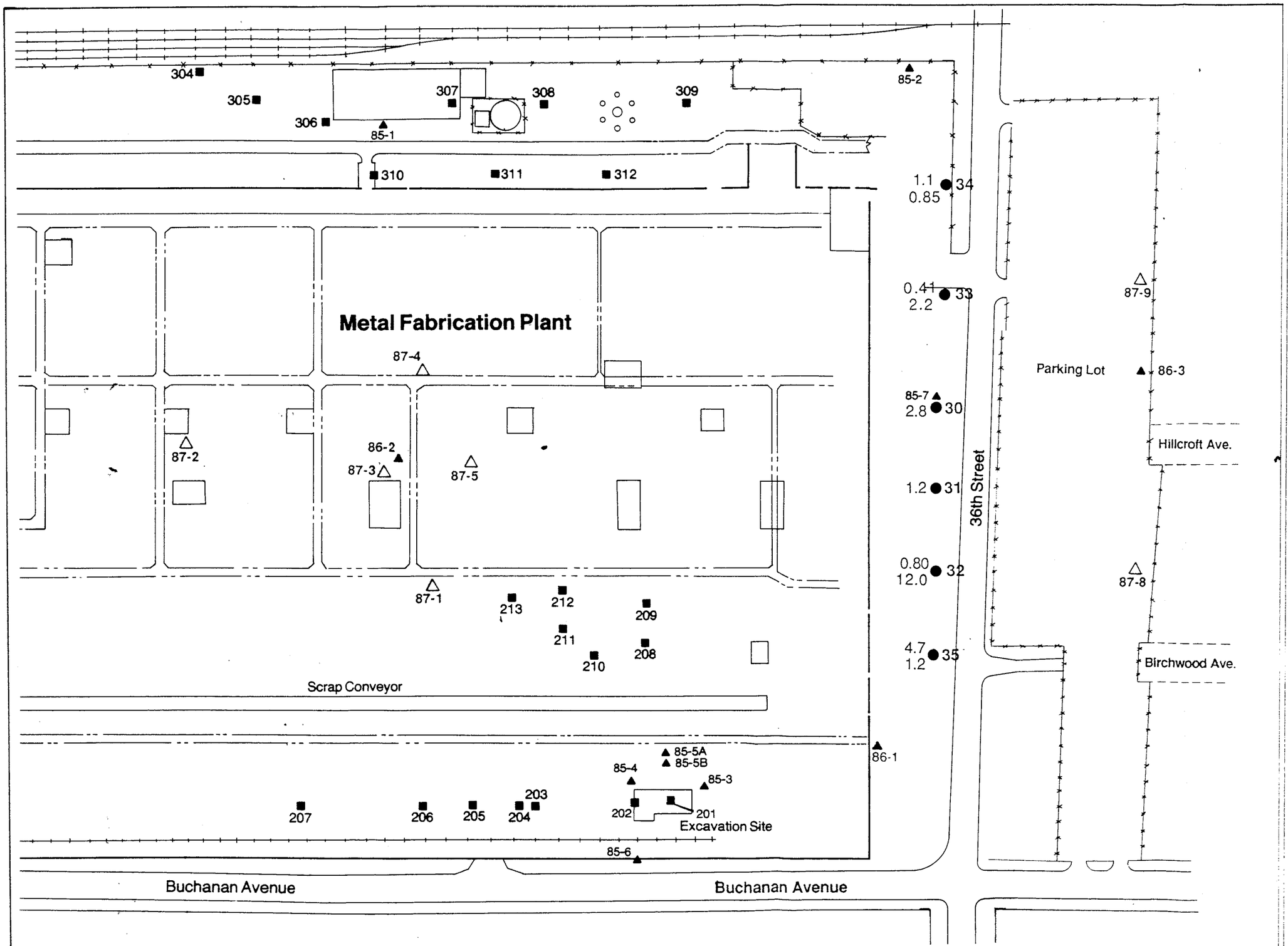
Figure 4

Geological Cross-Section B-B'

General Motors Corp./CPC Group
Grand Rapids, Michigan



Legend

- ▲ Existing Monitoring Wells
- △ New Monitoring Wells
- ■ Soil Boring Drilled By Soils and Materials Engineers March, 1985
- ● Soil Vapor Sample Location
- 0.52 TCE Concentration mg/m^3 Sample Depth 6 ft.

N

0 100 150 200 300

Scale in Feet

Figure 5

Soil Vapor Concentrations of TCE along 36th Street

General Motors Corp./CPC Group
Grand Rapids, Michigan

June, 1987 20676

EDI Engineering & Science

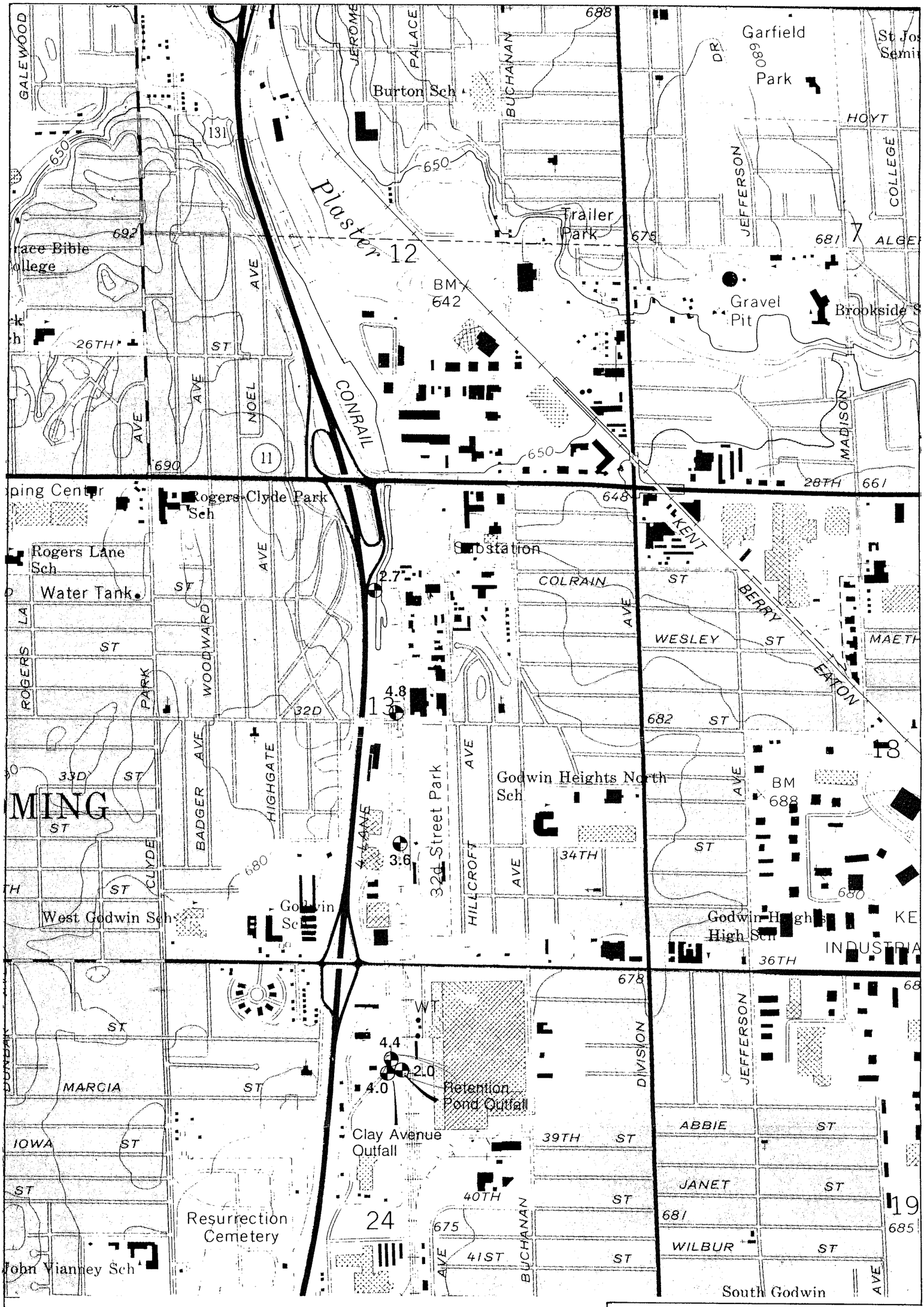


Figure 6

Cole Drain Sample Locations & TCE Concentrations

General Motor Corp./CPC Group
Grand Rapids, Michigan

June, 1987 20676

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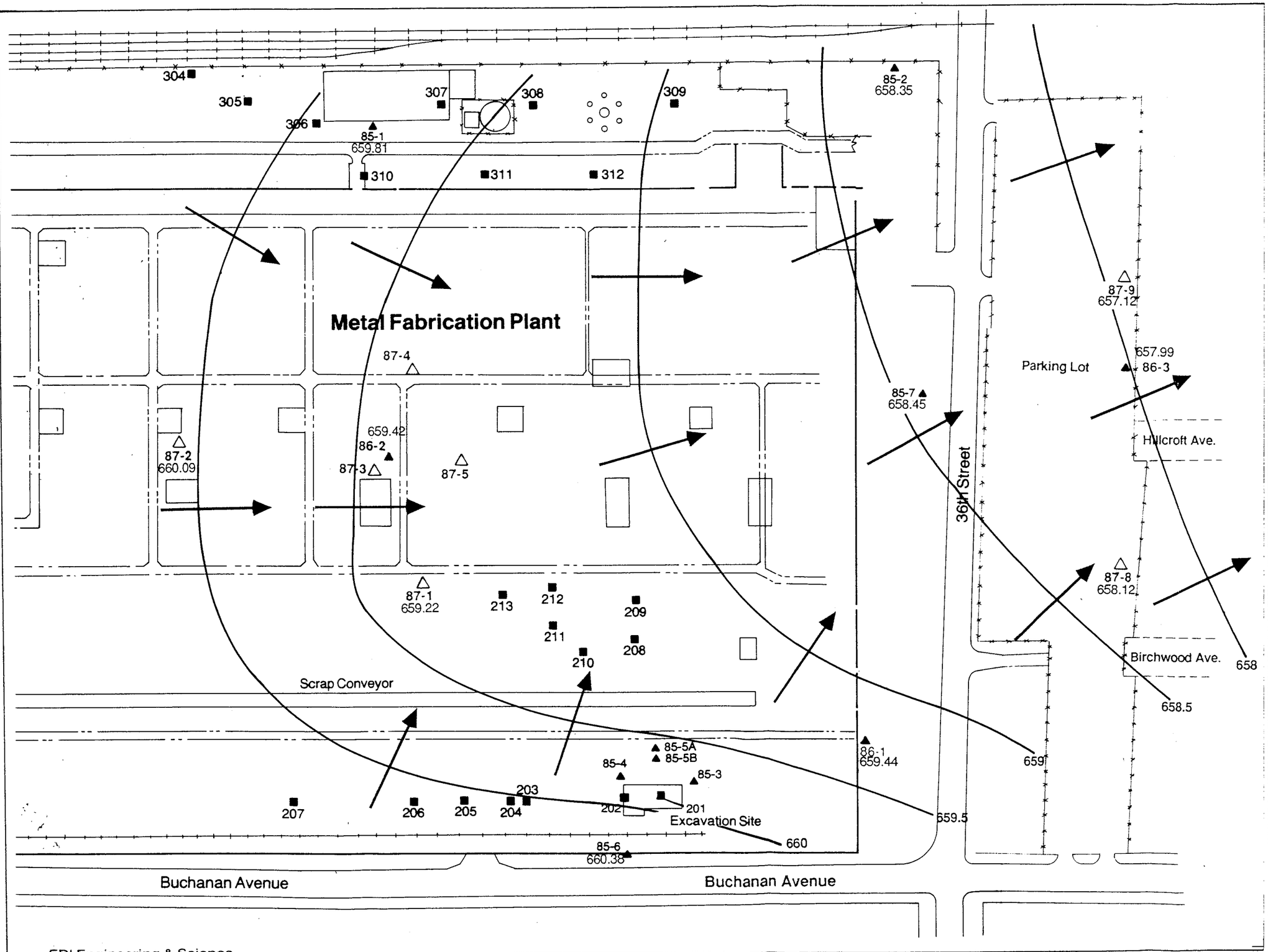


Legend

- ▲ Existing Monitoring Wells
- △ New Monitoring Wells
- ■ Soil Boring Drilled By Soils and Materials Engineers March, 1985
- Direction of Groundwater Flow

N

0 100 150 200 300

Scale in Feet

Figure 7

Water Table Elevation and Direction of Groundwater Flow (data collected 2/24/87)

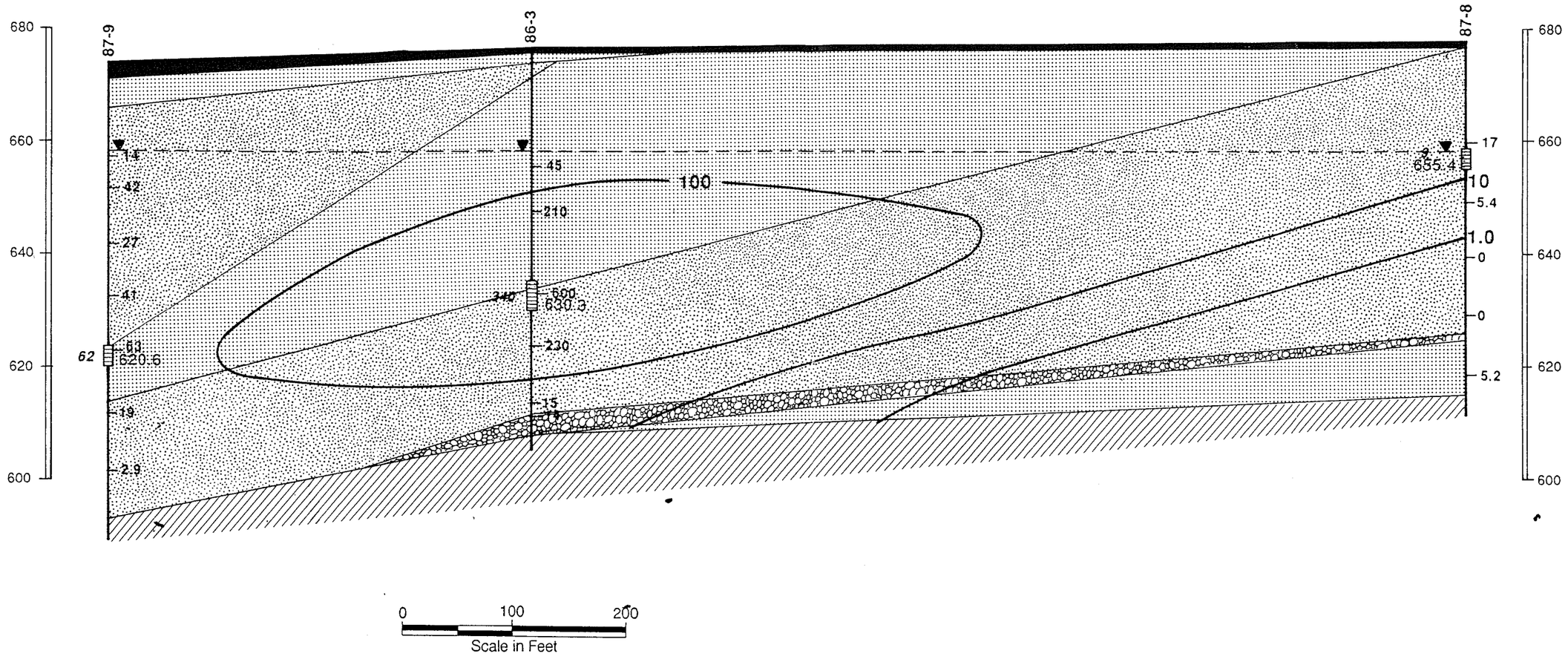
General Motors Corp./CPC Group
Grand Rapids, Michigan

June, 1987 20676

EDI Engineering & Science

West

East



LEGEND

- Concrete
- Fine Sand
- Sand
- Sand & Gravel
- Gravel
- Silt
- Clay
- Water Level
- Well Screen
- 65 TCE in Permanent Well Concentration ug/l
- —6.6 TCE in Temp. Well Concentration ug/l
- — 6.6 TCE in Soil Concentration ug/kg
- 12 / 220 Soil Vapor Location Number / TCE in Soil Vapor Concentration mg/m^3
- —100— TCE Concentration in Groundwater ug/l

Horizontal Scale 1" = 40'
Vertical Scale 1" = 20'

Elevations NGVD

EDI Engineering & Science

Figure 8

Geological Cross-Section Z-Z'
TCE Concentrations in Groundwater

General Motor Corp./CPC Group
Grand Rapids, Michigan

June, 1987

20676

West

East

34 — 1.1 / 0.8

33 — 1.8 / 2.2

30 — 2.8

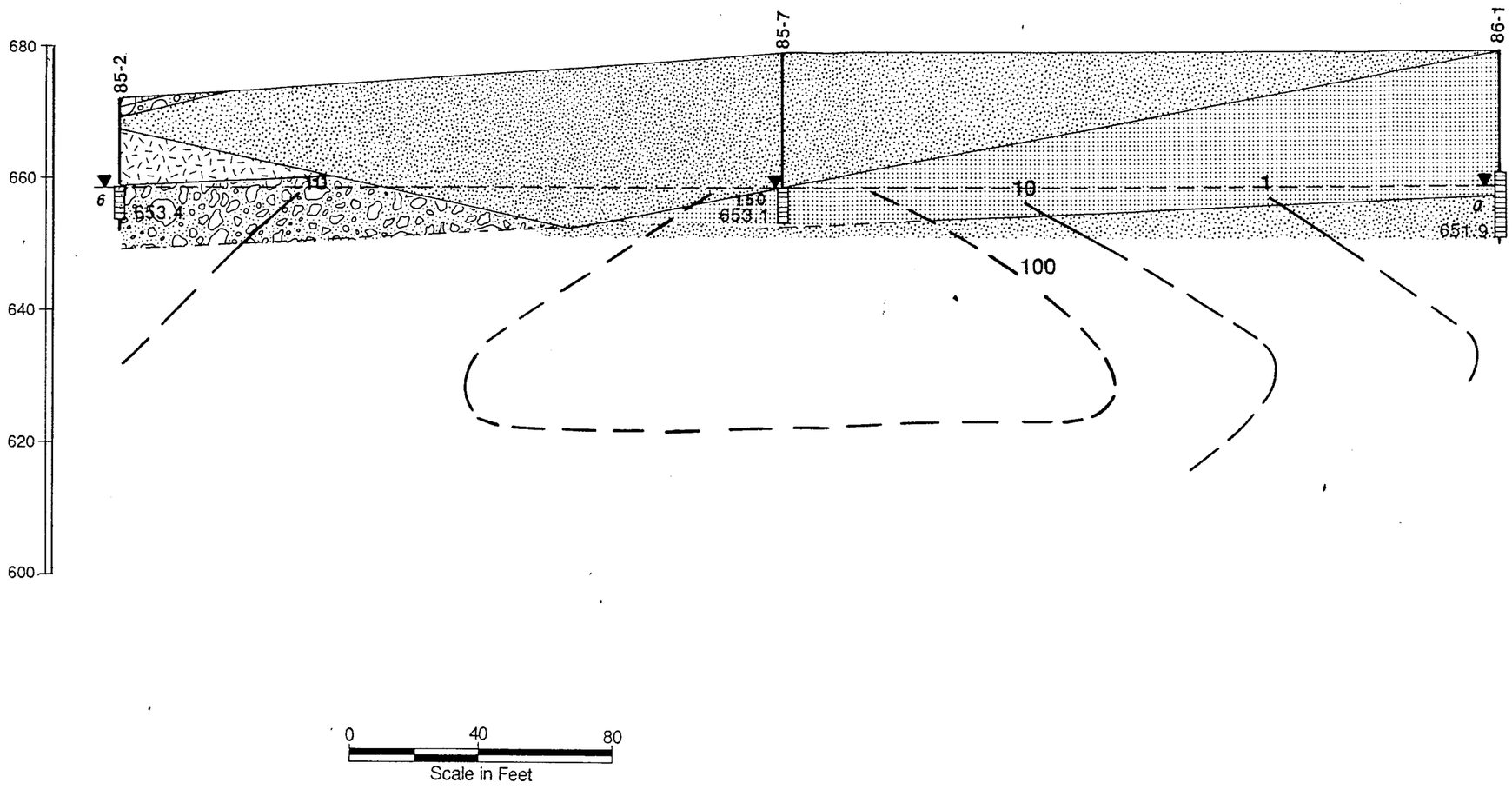
31 — 1.2

32 — 12 / 0.8

35 — 4.7 / 1.2

Soil Vapor Location Number

TCE in Soil Vapor mg/m^3



0 40 80

Scale in Feet

LEGEND

- Concrete
- Fine Sand
- Sand
- Sand & Gravel
- Gravel
- Silt
- Clay
- Water Level
- Well Screen
- 65 TCE in Permanent Well Concentration ug/l
- –6.6 TCE in Temp. Well Concentration ug/l
- —6.6 TCE in Soil Concentration ug/kg
- 12 / 220 Soil Vapor Location Number / TCE in Soil Vapor Concentration mg/m^3
- —100— TCE Concentration in Groundwater ug/l

Horizontal Scale 1" = 100'
Vertical Scale 1" = 20'

Elevations NGVD

Figure 9

Geological Cross-Section C-C'
TCE Concentration in Soil Vapor, Bulk Soil and Groundwater

General Motors Corp./CPC Group
Grand Rapids, Michigan

June, 1987

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South

North

North Edge of Building

30 Soil Vapor Location

2.8 TCE in Soil Vapor mg/m3

	8	9	10	11	18	13	14	22	21	43	42	49
	26	960	1750	3350	2900	2550	440	210	130	0.59	1.6	7.4

87-2 86-2 87-5 85-7 86-3

680 660 45 210 600 230 620 15 14 600

0 100 200

Scale in Feet

LEGEND

- Concrete
- Fine Sand
- Sand
- Sand & Gravel
- Gravel
- Silt
- Clay
- Water Level
- Well Screen
- 65 TCE in Permanent Well Concentration ug/l
- 6.6 TCE in Temp. Well Concentration ug/l
- 6.6 TCE in Soil Concentration ug/kg
- 12 / 220 Soil Vapor Location Number / TCE in Soil Vapor Concentration mg/m3
- 100 TCE Concentration in Groundwater ug/l

Horizontal Scale 1" = 100'
Vertical Scale 1" = 20'

Elevations NGVD

EDI Engineering & Science

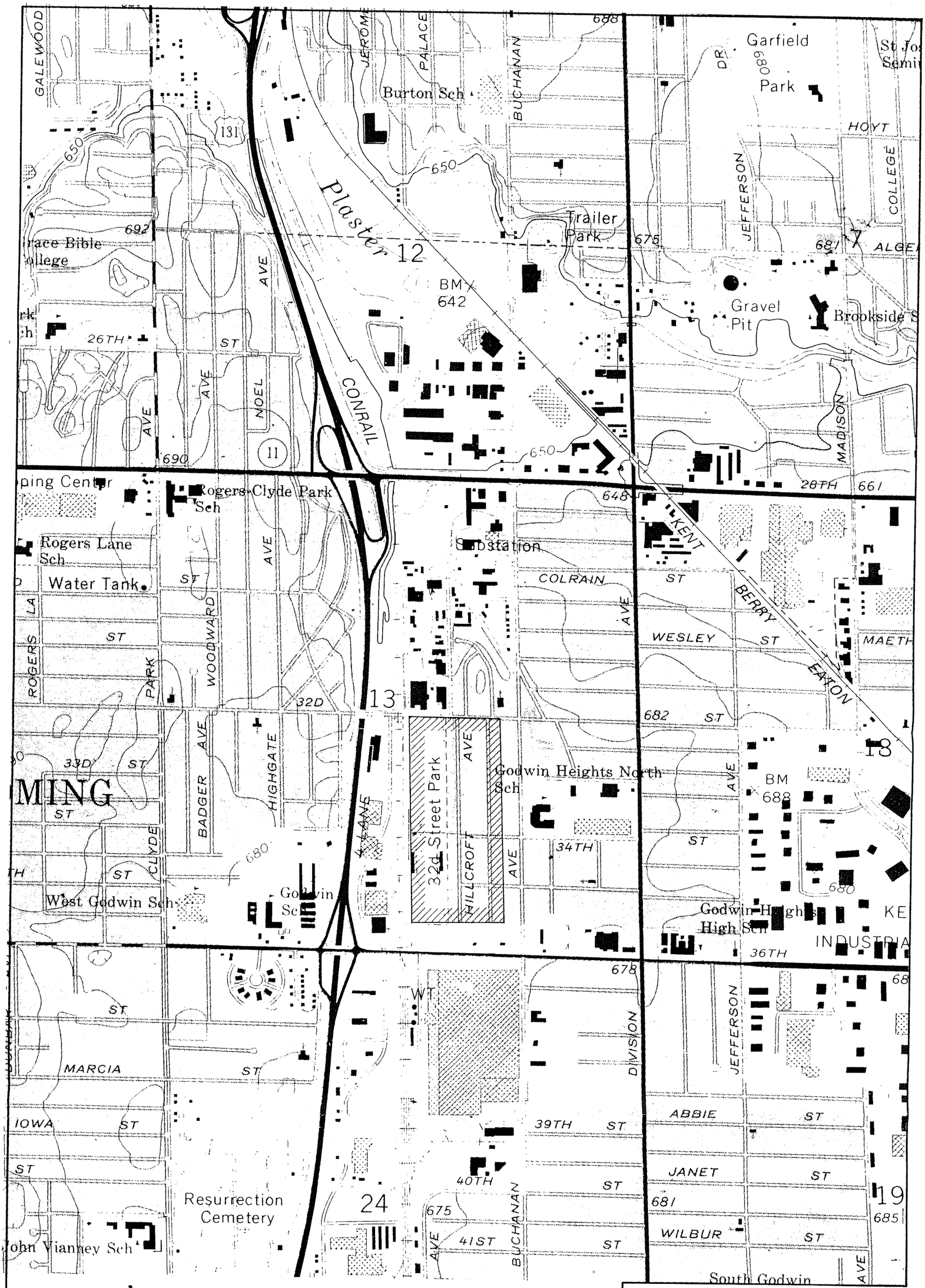
Figure 10

Geological Cross-Section B-B'
TCE Concentrations
in Soil Vapor, Bulk Soil, Groundwater

General Motors Corp./CPC Group
Grand Rapids, Michigan

June, 1987

20676



Legend

Soil Vapor Study Area

Figure 11

Proposed Study Area
Phase IV-C

General Motor Corp./CPC Grand Rapids

June, 1987

20676

APPENDIX A

WELL LOGS

EDI Engineering & Science
Environmental Engineering
Geology, Biology and Chemistry
611 Cascade West Pkwy, SE; Grand Rapids, MI 49506-2179; (616) 942-8600
A subsidiary of WW Engineering & Science

028

Well/Boring No.: 87-8
Client: GM CPC
Project No.: 20676
Permit No.:
Date Started 1/13 Finished 1/14/87

Well / Boring Log Sheet

County	Township	Fraction	Section	T	R
KENT	CITY OF WYOMING	¼ NE¼ NW ¼	18	6N	12W

Contractor: Stearns Drilling
Address: Dutton, MI

Equipment: Acker AD II
8" HSA
Supervisor: E. Culver

Drilling Method(s) / **Depth**
8" HSA — 65'

Grouting/Seal

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:

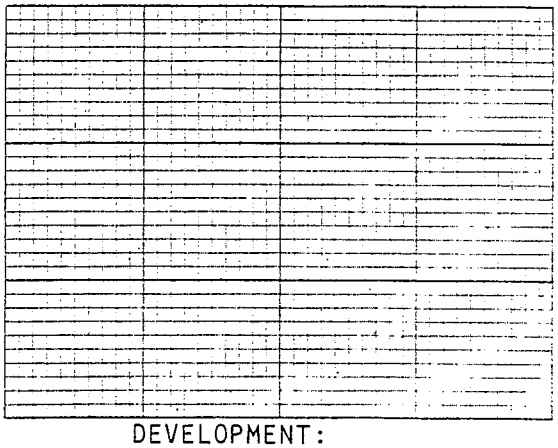
Screen:
Manufacturer: Johnson
Material: stainless steel
Model: 936
Slot/Gauze: 7 slot Dia.: 2"
Length: 3'
Depth Set: 19.7' To: 22.7'

Casing

Dia.	Type	Depth Set
2"	Galv.	0.3 To 19.7
		To

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

Location Sketch : SEE LOCATION MAP



Remarks (include here, other data available)
Temporary Wells @ 18.7 - 19.7'

DEVELOPMENT:

28.0 - 31.0'	Rod Pump	45 gal
38.0 - 41.0'	Rod Pump	45 gal
48.0 - 51.0'	Rod Pump	75 gal
58.0 - 61.0'	Rod Pump	30 gal

Bailed

Samples Taken w/Teflon Bailer

S = Soil / W = Water

(feet) Thickness	(feet) Depth To Base	Description	*Sample Type: / Sample Depth (ft)			Remarks
0.3	0.3	ASPHALT	3½	5		S/REP
0.7	1.0	GRAVEL	8½	10		S/REP
5.0	6.0	SAND - fine to medium, brown	13½	15		S/REP
7.0	13.0	SAND - coarse to medium, brown	18½	20		S/REP
5.5	18.5	SAND - medium, brown	18.7	19.7		W/OVA
33.5	52.0	SAND - medium, brown, wet	28	31		W/OVA
1.0	53.0	GRAVEL - wet	38	41		W/OVA
10.0	63.0	SAND - fine to very fine, wet, layers of brown and	48	51		W/OVA
		gray clay	58	61		W/OVA
3.5	66.5	CLAY - gray, sandy, firm	65	66½		S/OVA
		NOTE: Well caps have been stamped with ID# and				
		locked with #506 padlock.				

EDI Engineering & Science
Environmental Engineering
Geology, Biology and Chemistry
611 Cascade West Pkwy, SE; Grand Rapids, MI 49506-2178; (616) 942-9600

Well/Boring No.: 87-9
Client: GM CPC
Project No.: 20676
Permit No.:
Date Started 1/14 Finished 1/15/87

Well / Boring Log Sheet

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

Contractor: Stearns Drilling
Address: Dutton, MI

Equipment: Acker AD II
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

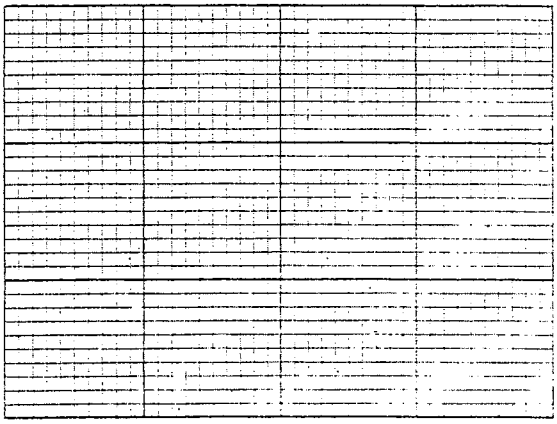
Screen:
Manufacturer: Johnson
Material: stainless steel
Model: 936
Slot/Gauze: 7 slot Dia.: 2"
Length: 3'
Depth Set: 50.5' To: 53.5'

Casing

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

Elevation
Casing: 673.87'
Ground: 674.1'
Ref. Pt.: NGVD

Location Sketch : SEE LOCATION MAP



Remarks (include here, other data available)
Temporary Wells @ 16 - 17.5'
22 - 25.0'
32 - 35.0'
41 - 44.0'
Samples Taken w/Teflon Bailer
T.D. = 53.49' T.O.C.

Development:
Bailed 10 gals
Centrifugal Pump 30 gals
Rod Pump 75 gals
Rod Pump 75 gals

*S = Soil / W = Water

(FEET) Thick-ness	(FEET) Depth To Base	Description	Remarks: *Sample Type: / Sample Depth (ft)		
0.25	0.25	ASPHALT	3½	5	S/REP
2.75	3.0	RUBBLE - black, metal, concrete	8½	10	S/REP
2.0	5.0	SAND - fine, black, rubble	13½	15	S/REP
3.0	8.0	SAND - fine, brown	16	17½	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/OVA
			83½	85	W/OVA
		NOTE: Well caps have been stamped with ID # and locked with #506 padlock.			

APPENDIX B

HYDRAULIC CONDUCTIVITY

Methods
Raw 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 $\pm$ 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:

$$K = [r_w^2 \ln(R_e/r_w) \ln (Y_o/Y_t]/[2 lt]$$

and (for partially penetrating wells):

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

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 (arithmatic scale). These values plus the values for well construction and aquifer thickness are substituted into the above equations to determine horizontal hydraulic conductivity.

IN SITU PERMEABILITY CALCULATIONS

BOUWER-RICE METHOD

GMC/CPC/MFP

20676

UNITS OF LENGTH: FEET UNITS OF TIME: SEC

WELL	K (LENGTH/TIME)	K (GPD/FT^2)	DEPTH
87-8	0.115E-02	745.98	22.70
87-9	0.181E-02	1167.14	53.50

Calculation Sheet

Computed by STD
Checked by _____

Subject Bouwer-Rice Input Parameters
Client GMC/CPC

Sheet ___ of ___
Job No. ___
Date ___

Note: Program assumes units are feet and seconds
D = Aquifer Thickness H: bottom of screen to water Table

Well ID	Depth	D	H	L (screen length)	R_c	R_w	T_o, Y_o	T_f, Y_f	A	B	C
87-8	22.7	43.5	3.2	3'	.1083	.1094	0.6 2.01	7.8 .06	2.3	.35	
87-9	53.5	65.0	37.5	3	.1083	.1094	1.2 2.18	8.2 .05	2.3	.35	

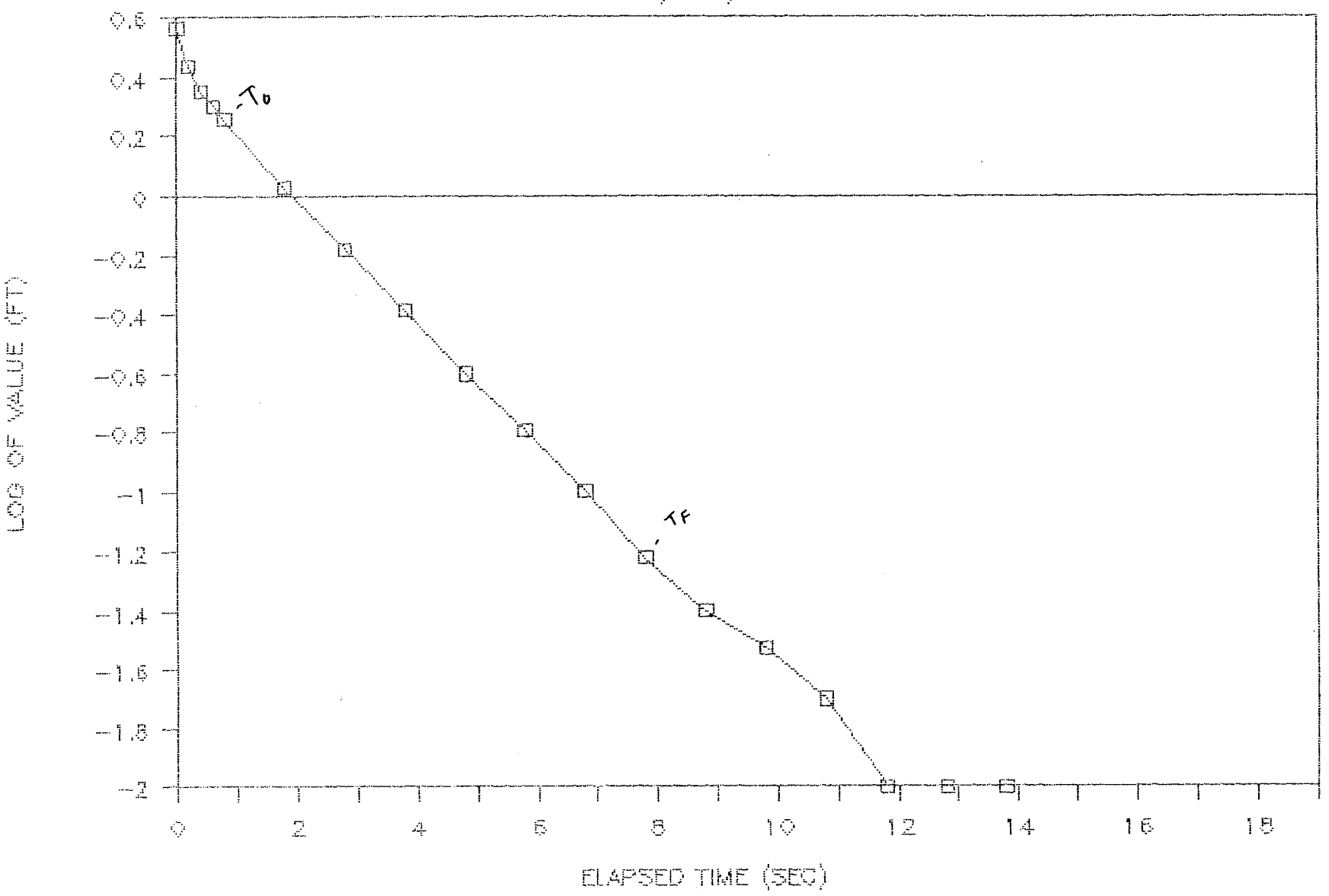
WELL 87-8
IN-SITU PERMEABILITY TEST

TIME (MIN)	VALUE (FT)	CORRECT TIME (SEC)	LOG OF VALUE (FT)	H/Ho	LOG OF H/Ho
0	0				
0.0033	0				
0.0066	0				
0.0099	0				
0.0133	-0.19				
0.0166	-2.77				
0.02	-3.68	0	0.565847	1	0
0.0233	-2.73	0.198	0.436162	0.741847	-0.12968
0.0266	-2.24	0.396	0.350248	0.608695	-0.21559
0.03	-2.01	0.6	0.303196	0.546195	-0.26265
0.0333	-1.81	0.798	0.257678	0.491847	-0.30816
0.05	-1.07	1.8	0.029383	0.290760	-0.53646
0.0666	-0.66	2.796	-0.18045	0.179347	-0.74630
0.0833	-0.41	3.798	-0.38721	0.111413	-0.95306
0.1	-0.25	4.8	-0.60205	0.067934	-1.16790
0.1166	-0.16	5.796	-0.79588	0.043478	-1.36172
0.1333	-0.1	6.798	-1	0.027173	-1.56584
0.15	-0.06	7.8	-1.22184	0.016304	-1.78769
0.1666	-0.04	8.796	-1.39794	0.010869	-1.96378
0.1833	-0.03	9.798	-1.52287	0.008152	-2.08872
0.2	-0.02	10.8	-1.69897	0.005434	-2.26481
0.2166	-0.01	11.796	-2	0.002717	-2.56584
0.2333	-0.01	12.798	-2	0.002717	-2.56584
0.25	-0.01	13.8	-2	0.002717	-2.56584
0.2666	0	14.796	ERR	0	ERR
0.2833	0	15.798	ERR	0	ERR
0.3	0	16.8	ERR	0	ERR
0.3166	0	17.796	ERR	0	ERR
0.3333	0	18.798	ERR	0	ERR
0.4167	0	23.802	ERR	0	ERR
0.5	0	28.8	ERR	0	ERR
0.5833	0	33.798	ERR	0	ERR
0.6667	0	38.802	ERR	0	ERR
0.75	0	43.8	ERR	0	ERR
0.8333	0	48.798	ERR	0	ERR
0.9167	0	53.802	ERR	0	ERR
1	0	58.8	ERR	0	ERR
1.0833	0	63.798	ERR	0	ERR
1.1667	0	68.802	ERR	0	ERR
1.25	0	73.8	ERR	0	ERR
1.3333	0	78.798	ERR	0	ERR
1.4166	0	83.796	ERR	0	ERR

T = 1.3 sec

WELL 87-8

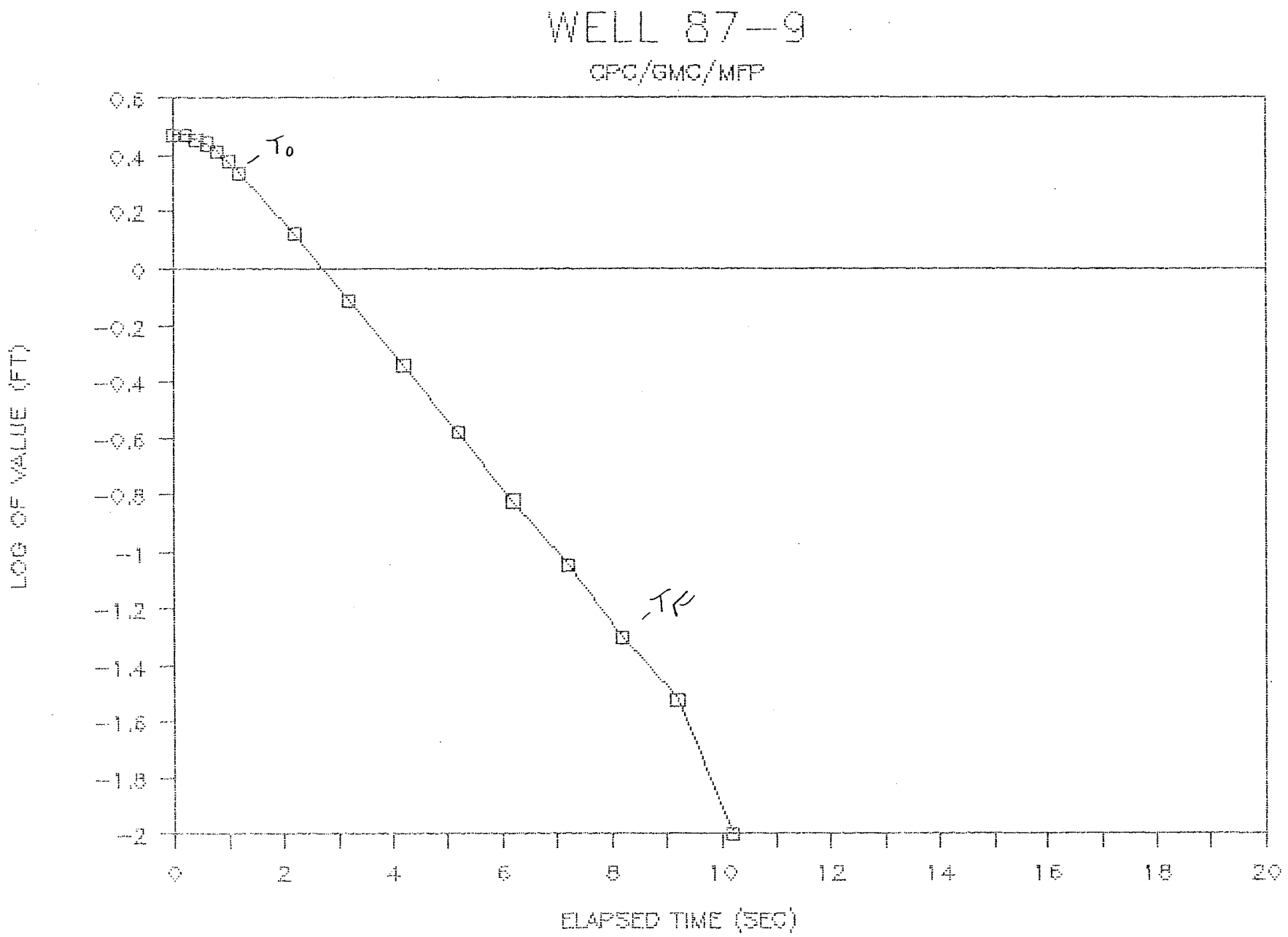
CPG/GMC/MFP



WELL 87-9
IN-SITU PERMEABILITY TEST

TIME (MIN)	VALUE (FT)	CORRECT TIME (SEC)	LOG OF VALUE (FT)	H/Ho	LOG OF H/Ho
0	0				
0.0033	0.01				
0.0066	-2.88				
0.0099	-2.82				
0.0133	-2.98	0	0.474216	1	0
0.0166	-2.98	0.198	0.474216	1	0
0.02	-2.87	0.402	0.457881	0.963087	-0.01633
0.0233	-2.77	0.6	0.442479	0.929530	-0.03173
0.0266	-2.59	0.798	0.413299	0.869127	-0.06091
0.03	-2.39	1.002	0.378397	0.802013	-0.09581
0.0333	-2.18	1.2	0.338456	0.731543	-0.13575
0.05	-1.32	2.202	0.120573	0.442953	-0.35364
0.0666	-0.77	3.198	-0.11350	0.258389	-0.58772
0.0833	-0.45	4.2	-0.34678	0.151006	-0.82100
0.1	-0.26	5.202	-0.58502	0.087248	-1.05924
0.1166	-0.15	6.198	-0.82390	0.050335	-1.29812
0.1333	-0.09	7.2	-1.04575	0.030201	-1.51997
0.15	-0.05	8.202	-1.30102	0.016778	-1.77524
0.1666	-0.03	9.198	-1.52287	0.010067	-1.99709
0.1833	-0.01	10.2	-2	0.003355	-2.47421
0.2	0	11.202	ERR	0	ERR
0.2166	0	12.198	ERR	0	ERR
0.2333	0	13.2	ERR	0	ERR
0.25	0	14.202	ERR	0	ERR
0.2666	0	15.198	ERR	0	ERR
0.2833	0	16.2	ERR	0	ERR
0.3	0	17.202	ERR	0	ERR
0.3166	0	18.198	ERR	0	ERR
0.3333	0	19.2	ERR	0	ERR
0.4167	0	24.204	ERR	0	ERR
0.5	0	29.202	ERR	0	ERR
0.5833	0	34.2	ERR	0	ERR
0.6667	0	39.204	ERR	0	ERR
0.75	0	44.202	ERR	0	ERR
0.8333	0.01	49.2	ERR	-0.00335	ERR
0.9167	0	54.204	ERR	0	ERR
1	0.01	59.202	ERR	-0.00335	ERR
1.0833	0.01	64.2	ERR	-0.00335	ERR
1.1667	0	69.204	ERR	0	ERR
1.25	0.01	74.202	ERR	-0.00335	ERR
1.3333	0.01	79.2	ERR	-0.00335	ERR
1.4166	0	84.198	ERR	0	ERR
1.5	0.01	89.202	ERR	-0.00335	ERR
1.5833	0	94.2	ERR	0	ERR
1.6667	0	99.204	ERR	0	ERR
1.75	0.01	104.202	ERR	-0.00335	ERR
1.8333	0	109.2	ERR	0	ERR
1.9167	0.01	114.204	ERR	-0.00335	ERR
2	0.01	119.202	ERR	-0.00335	ERR

T = 2.5 sec


WELL 87--9
CPC/GMC/MFP
LOG OF VALUE (FT)
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
-2
0
2
4
6
8
10
12
14
16
18
20
ELAPSED TIME (SEC)
T_0
T_R

APPENDIX C

COLE DRAIN TCE

TEMPORARY WELL TCE

PERMANENT WELL ANALYSES

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.

EDI Engineering & Science
Environmental Engineering, Geology, Biology & Chemistry
611 Cascade W Pkwy, SE; Grand Rapids, MI 49506-2179; (616) 942-9600

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: COLE DRAIN UPSTREAM

DATE SAMPLED: 06-15-1987 TIME: 09:15 AM
DATE RECEIVED: 06-15-1987 TIME: 11:40 AM
TEST DATE: 06-16-1987
SAMPLE NO. 76552

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	< 0.001
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	0.011
Toluene	< 0.001
1,1,1-Trichloroethane	< 0.002
1,1,2-Trichloroethane	< 0.003
Trichloroethylene	0.004
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.

TEMPORARY WELL TCE

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: 011387
SCHEDULED COMPLETION: 01/27/87
ANALYST: PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 22

					DETECTION LIMIT	UNITS
	87-8 18.7-19.7'	87-8 28-31'	87-8 38-41'	87-8 48-51'		
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: 011387
SCHEDULED COMPLETION: 01/27/87
ANALYST: PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 23

		DETECTION LIMIT	UNITS
	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: 01/14/87 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

					DETECTION LIMIT	UNITS
	87-9 16-17.5'	87-9 22-25'	87-9 32-35'	87-9 41-44'		
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 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 LIMIT	UNITS
	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 II HYDROGEO

DATE SAMPLED: 01/15/87 TIME: 12:00
DATE RECEIVED: 01/16/87 TIME: 7:00 AM
DATE COMPLETED: 011987
SCHEDULED COMPLETION: 01/30/87
ANALYST: PT
QUALITY CONTROL REVIEW BY: JE
WORKSHEET NO: 28

		DETECTION LIMIT	UNITS
	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.

PERMANENT WELL ANALYSES

Volatile Fraction
Base Neutral Fraction
Acid Fraction
Iron, Hardness, pH

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE 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: 012687

SAMPLE NO. 70821

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-CHLOROETHYLVINYL 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	0.15	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: 85-7

DATE SAMPLED: 01/21/87 TIME: 6:00 PM
DATE RECEIVED: 01/26/87 TIME: 11:00 AM
DATE COMPLETED: 012687

SAMPLE NO. 70821

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

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-CHLOROETHYLVINYL 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: 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-CHLOROETHYLVINYL 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

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-CHLOROETHYLVINYL 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*

SAMPLE NO. *70830*

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

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 2
BASE-NEUTRAL 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.
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	0.068	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-CHLORONAPTHALENE	*	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: 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	*	0.002	HEXACHLOROETHANE	*	0.007
4-BROMOPHENYL PHENYL ETHER	*	0.007	HEXACHLOROCYCLOPENTADIENE	*	0.005
BUTYL BENZYL PHTHALATE	0.026	0.003	INDENO (1,2,3-CD) PYRENE	*	0.010
2-CHLORONAPTHALENE	*	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
*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-CHLORONAPTHALENE	*	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-CHLORONAPTHALENE	*	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 (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: 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.