Occidental Chemical Corporation

RESIDENTIAL COMMUNITY MONITORING WELLS

-Installation
-Development
-Initial Sampling

April 1987

Hyde Park Requisite Remedial Technology Program

April 1987
Ref. No. 1069

CONESTOGA-ROVERS & ASSOCIATES

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1.0 INTRODUCTION

Residential community monitoring well (CMW) pairs have been installed at eight locations in the Hyde Park Landfill area to serve as early warning monitoring stations for APL plume migration toward residential areas. Each well pair consists of one overburden and one shallow bedrock well. The general location of each well pair is presented in Figure 1. Appendix A presents the specific locations for each well installation.

Installation of the community monitoring wells began on December 15, 1986 and was completed February 18, 1987. Development of the bedrock wells was conducted concurrently with well installation while development of the overburden wells was carried out on February 18 and March 9 to March 12, 1987. The initial round of sample collection from the community monitoring wells was completed between March 30 and April 10, 1987.

This report details the installation and development of the eight community monitoring well pairs. This report also presents the initial sample round collection details.

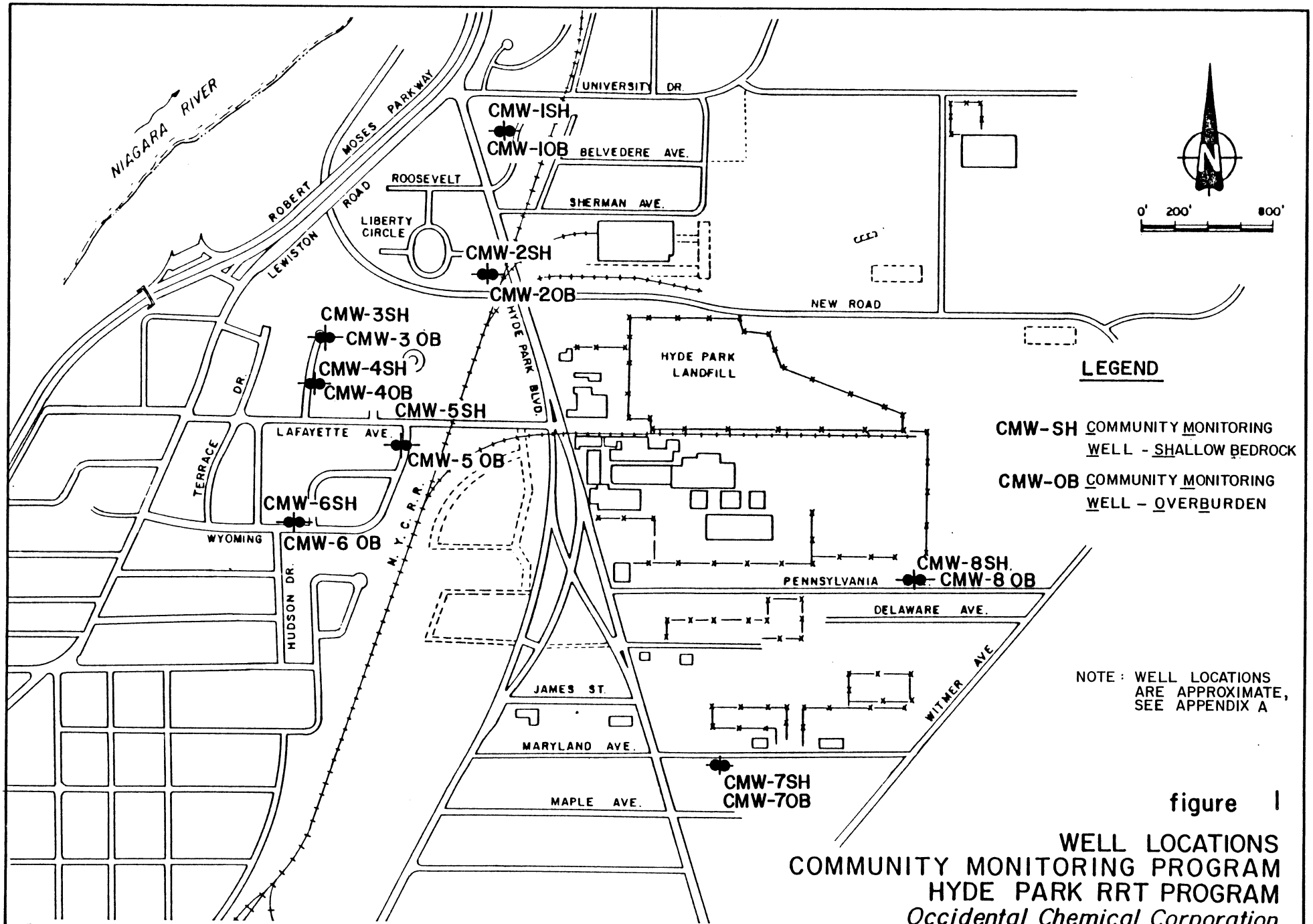

figure 1

WELL LOCATIONS
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HYDE PARK RRT PROGRAM

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2.0 INSTALLATION PROCEDURE

2.1 SHALLOW BEDROCK WELL

The initial phase of the CMW installation program consisted of the installation of the 4-inch diameter overburden casing at each bedrock well location. The boreholes used to facilitate the overburden casing installations were drilled using hollow stem augers mounted on a CME75 drill rig. Split spoon samples of the overburden soils were collected to the top of bedrock in advance of the augering operation. Appendix B presents the overburden stratigraphic logs.

Auger cuttings (soils) brought to the surface during the overburden penetration were contained in approved 55-gallon drums and stored adjacent to the Hyde Park Field Office. Each drum is marked with the generation date and location. Disposal of the waste soils will be based upon the results of the sampling program.

Following complete penetration through the overburden material, to the top of the bedrock regime, the augers were removed and a 4-inch diameter steel casing was lowered into the hole. At those locations where the bedrock depth was shallow and there was minimal water accumulation in

the bottom of the borehole, grout was poured into the entire annular space. The casing was then driven to refusal with the same hammer used to drive the split spoon samples to depth. For deeper casings and where water accumulation was notable, an inflatable packer was set in the 4-inch casing. Grout was pumped under pressure through the packer to fill the annular space between the borehole and the outside of the casing. The casing was then driven to refusal. Grout was allowed to set for 48 hours prior to commencing further drilling activities at each location.

Following installation of all of the overburden casings for the bedrock wells, the drilling contractor began a second phase of work. The second phase involved resetting the survey site at each well pair location and completing the coring of the bedrock well, the installation of the protective cover and the installation of the overburden well.

The bedrock was penetrated using an NX size (3-inch diameter) diamond drill bit and core barrel which provided a continuous geologic core sample of the entire formation penetrated. Appendix B presents the bedrock stratigraphic logs. During the coring procedure the amount of water lost into the formation was recorded. City water, direct from a local fire hydrant, was used to supply the drilling water. Return water was monitored for quality

(visual and odor) and was pumped into a licensed waste hauler. Return water was not recycled and all recovered groundwater/drilling water was properly disposed of into the Hyde Park Lagoon System.

Upon completion of each bedrock coring, a protective flush mount casing was installed. The casing consists of an 8-inch diameter manhole cover and frame having a water-tight cover which was cemented into place. Each protective cover was installed to match the surrounding grade. Figure 2 shows a typical bedrock well installation. Table 1 presents a summary of well installation details.

2.2 OVERBURDEN WELLS

Augering of the borehole for an overburden well required the use of 18-inch diameter augers. Only the first two feet of the 18-inch diameter augers were flyted. As a result, it was necessary to lift the auger from the borehole repeatedly and remove the cuttings manually until the borehole was completed to the required depth. The auger cuttings (soils) were contained in 55-gallon drums and stored adjacent to the Hyde Park Field Office.

Upon completion of the 18-inch diameter overburden borehole, a measured length of 12-inch diameter

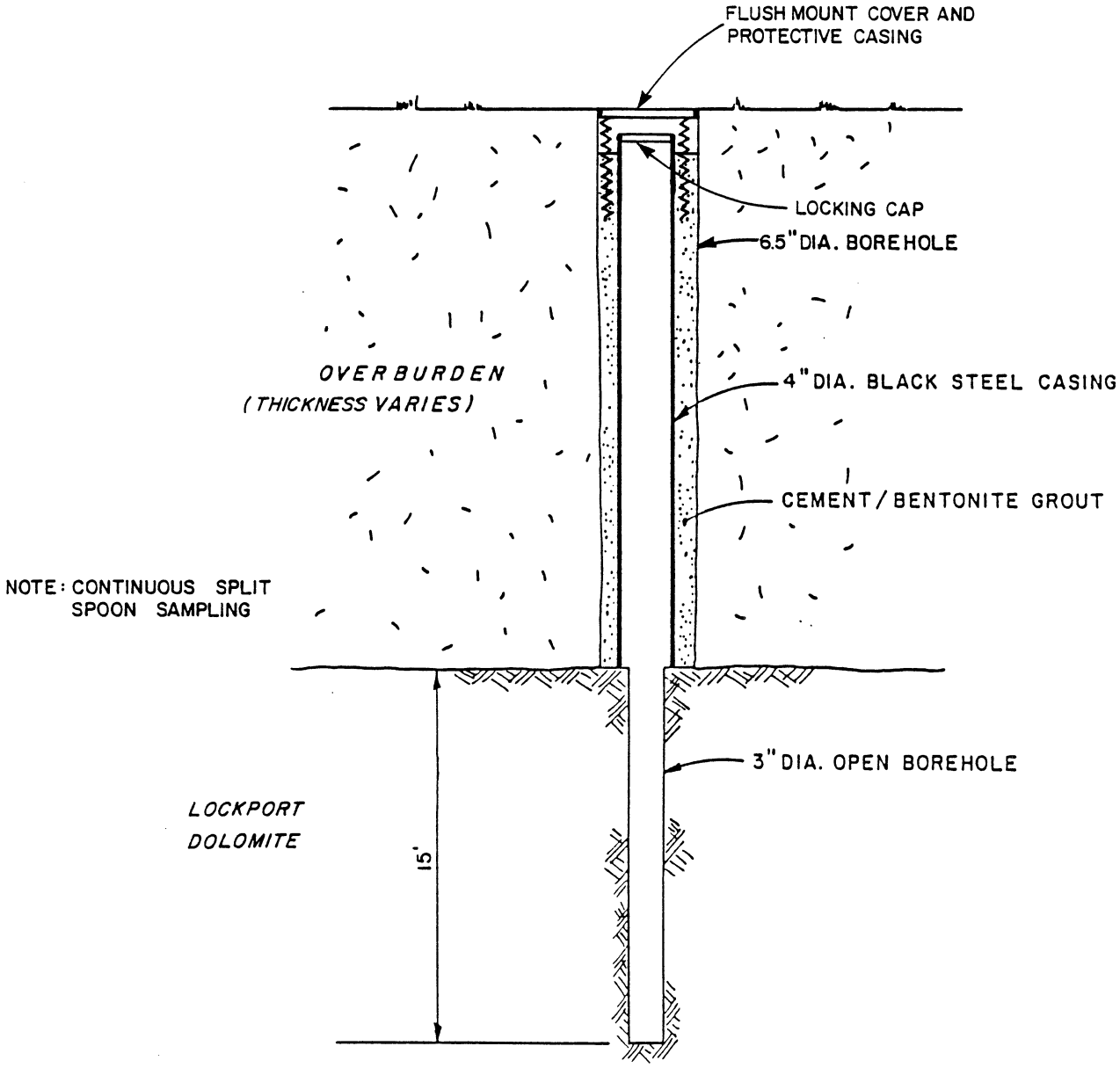

figure 2

SHALLOW BEDROCK
COMMUNITY MONITORING WELL
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TABLE 1

SUMMARY OF WELL INSTALLATION DETAILS

Overburden:

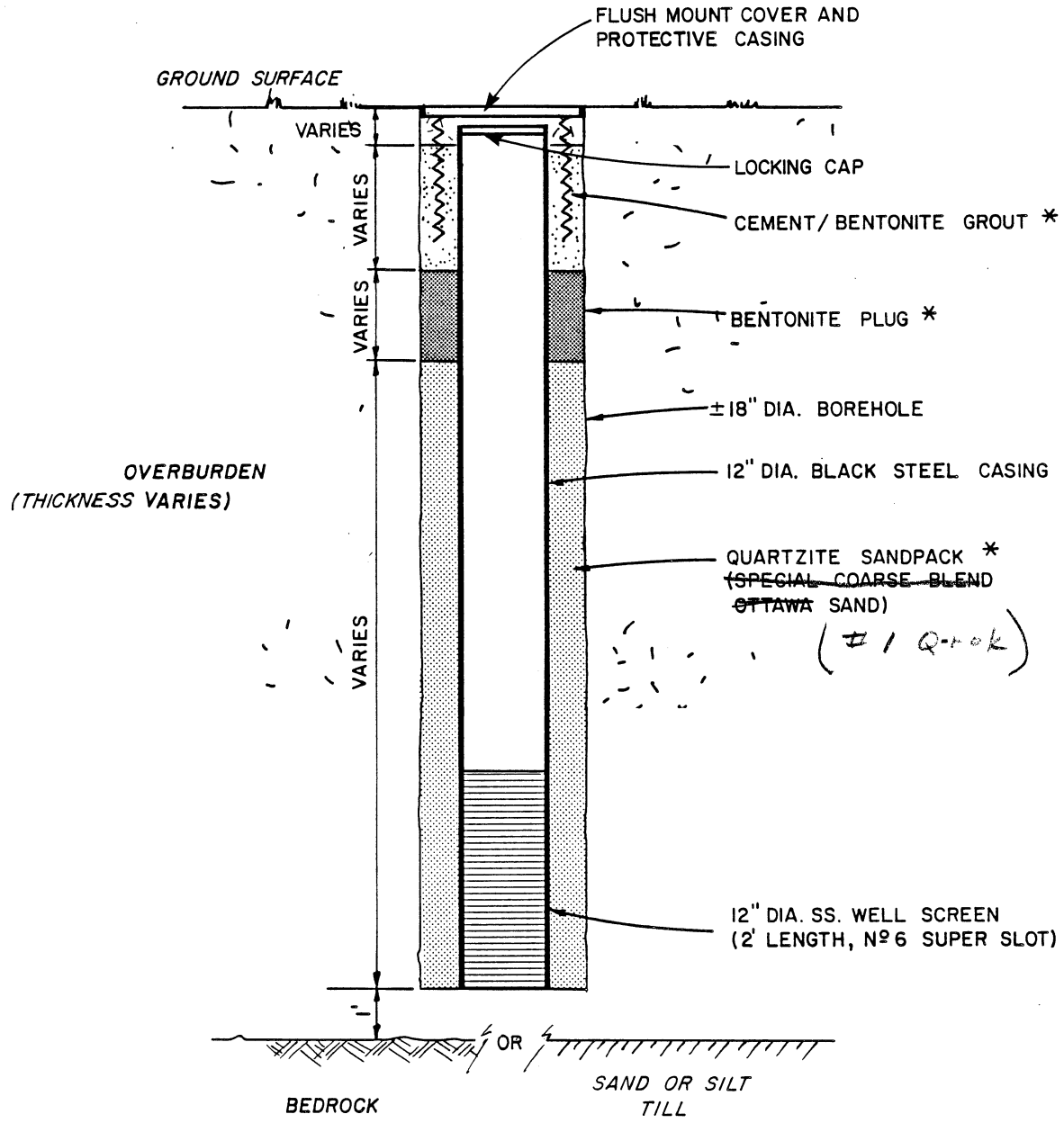
Well No.	Grade Elevation	Top of Casing Elevation	Sandpack Interval
CMW-10B	576.8	576.12	571.7 - 561.6
CMW-20B	591.5	590.05	585.5 - 570.5
CMW-30B	583.4	582.79	577.4 - 566.2
CMW-40B	575.7	574.85	570.2 - 567.2
CMW-50B	584.7	584.13	580.2 - 576.2
CMW-60B	573.4	572.55	571.1 - 568.9
CMW-70B	612.1	611.38	608.6 - 605.6
CMW-80B	617.3	616.78	615.5 - 613.0

Bedrock:

Well No.	Grade Elevation	Top of Casing Elevation	Top of Bedrock Elevation	Bottom of Corehole Elevation
CMW-1SH	577.3	576.68	559.6	544.6
CMW-2SH	591.2	589.73	563.2	548.2
CMW-3SH	583.5	582.74	561.2	546.2
CMW-4SH	575.6	524.97	564.4	549.4
CMW-5SH	584.7	584.13	569.4	554.4
CMW-6SH	573.3	572.68	567.9	552.9
CMW-7SH	612.1	611.16	600.3	585.3
CMW-8SH	617.3	617.01	611.4	596.4

steel casing was connected to a 12-inch diameter stainless steel well screen and lowered into the borehole. The screened interval of each of the well screens had #6 superslot size openings and was approximately two-feet long with the exception of CMW-60B which was one-foot long. The annular space between the borehole and the casing/well screen was then backfilled with a sandpack of ~~coarse-blend Ottawa~~ #1 Q-Rok Sand, a bentonite seal and cement/bentonite grout. The grout backfill contained approximately three percent bentonite to reduce shrinkage.

The installation depth of each overburden well was determined based upon the soil stratigraphy observed during split spoon sampling of the immediately adjacent shallow bedrock well. The overburden well depth was designed to be a distance above the silty clay till zone as it is apparent that the silty clay till has a direct hydraulic contact with the underlying bedrock zone. At the request of the New York State Department of Environmental Conservation (NYSDEC) the overburden well depth also considers the depth of basements in the surrounding area. Table 1 presents a summary of the installation details for the eight overburden wells. Figure 3 illustrates the construction of a typical overburden well.



* NOTE: THICKNESS TO BE FIELD DETERMINED.

figure 3

OVERBURDEN COMMUNITY MONITORING WELL
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2.3 EQUIPMENT CLEANING

Prior to commencing the installation program and after each occasion of overburden drilling or bedrock coring at each site, the drilling equipment was cleaned. The cleaning procedure utilized was as follows:

- Steam clean equipment; soils not removed by steam cleaning were scraped off and resteamed,
- Rinse with acetone,
- Rinse with hexane,
- Rinse with acetone, and
- Rinse with distilled water

Soiled equipment was wrapped in plastic prior to and during transport from each survey site to the Hyde Park facility. The pad at the Hyde Park lagoons was used for decontamination. The spent fluids were discharged directly into the Hyde Park lagoons.

Well materials (i.e. riser pipe, well screen) were also cleaned prior to installation to remove any foreign material, dirt, grease, etc.

2.4 HEALTH AND SAFETY PROGRAM

During the CMW program, the environmental health and safety protocols stipulated in the report entitled "Environmental Health and Safety Plan for Survey Activities" were followed. To isolate each survey site during drilling activities, a plastic ground sheet was placed on the ground within the survey site and this was in turn overlaid with sheets of plywood to protect the plastic. The survey site was also surrounded with a 'snow fence' to restrict access to the survey site. Personnel entering the survey site after drilling operations at that site had commenced, were required to wear safety apparel including hard hat, safety glasses with side shields, splash resistant Tyvek suit having elasticized cuffs, rubber gloves and rubber boots. A respirator for each of the survey site personnel as well as first aid kit, emergency escape air pack, portable eyewash unit, fire extinguisher and a bag of absorbent material, were required to be close at hand to the survey site.

All project personnel (i.e. drilling personnel, site representatives, etc.) were given baseline medical examinations before beginning work on the Hyde Park program. These examinations were administered by the Niagara Falls Memorial Medical Center. No personnel were permitted within the fenced-in survey site without having first undergone their medical examinations.

3.0 OVERBURDEN WELL DEVELOPMENT

From March 9 to March 12, 1987, well development and recovery tests were performed on the overburden wells recently installed for the Hyde Park CMW Program. CMW-80B was dry and no development was performed. CMW-20B had been initially developed by the drillers and, therefore, only a recovery test was planned. However, due to the heavy amount of sediment being drawn up from the bottom of CMW-20B, additional pumping was performed in order to clear the sediment from the well. The water cleared after 35 gallons had been removed.

In developing each overburden well (12-inch diameter), the water in the well initially had to be surged out into the sandpack and drawn back into the screen, in order to clean out clay and silt fines from the sandpack. The wells developed on the first day, CMW-50B and CMW-40B, were surged using a 3'x 1" diameter stainless steel bailer. Due to the insufficient surging action of the bailer a 4-inch diameter galvanized steel plate was attached to the end of the bailer, which was used for the remaining wells except CMW-60B. Due to the small amount of water in CMW-60B surging of the well was determined to be unnecessary.

After the initial surging, the wells were pumped for one hour or until dry, whichever occurred first. All wells, except CMW-10B and CMW-30B were pumped dry.

Due to the greater volume of water in wells CMW-10B and CMW-30B and the low capacity of the peristaltic pumps (1 GPM) being used, the pumping duration was extended for these wells to comply with the DEC's request that at least one volume be purged from the well. Surging continued throughout the pumping process to eliminate as much sediment as possible.

For the wells that were pumped dry, distilled water was poured into the well to bring the water level to the top of the screen, or to the initial static water level if that level was below the top of screen. This water was again surged and the well pumped dry to provide additional cleaning of the sandpack. This additional work was performed at the request of the DEC field representative.
Upon completion of the second purging, the well was then monitored for recovery.

3.1 OVERBURDEN HYDRAULIC CONDUCTIVITY

In conjunction with the development of the overburden monitoring wells, the recovery of the wells following purging was monitored in order to estimate the hydraulic conductivity of the overburden regime. Immediately prior to well development, the water level of the individual

well was recorded. Upon completion of purging the drawdown and time was recorded. During recovery of the water level within the well, further drawdown measurements and associated times were recorded. Appendix C presents the recovery data.

As indicated by the recovery data of the overburden wells, these wells return to equilibrium at a very slow rate. Such slow rates of recovery indicate that the clayey overburden soils have a very low permeability or poor hydraulic conductivity. The permeability values listed in Table 2 are calculated based on a slug test calculation. In actuality, the pumping rate and subsequent drawdown rate of these recovery tests was very low and, therefore, the tests do deviate somewhat from actual slug test conditions. However, the indicated permeability values give an indication of the order of magnitude of the permeability of area overburden soils.

3.2 BEDROCK WELL DEVELOPMENT

In order to develop each of the bedrock wells, a quantity of water equivalent to 1.5 times the volume of water lost during the coring operation was pumped out of the bedrock well. In the event that the full quantity of water to be pumped from the well was not recoverable, then the well was pumped dry on three occasions with full recovery

TABLE 2

CALCULATED OVERBURDEN PERMEABILITY VALUES

Well Number	Calculated Permeability
CMW-10B	1.3×10^{-5} cm/sec
CMW-20B	1.3×10^{-4} cm/sec
CMW-30B	5.9×10^{-5} cm/sec
CMW-40B	4.9×10^{-5} cm/sec
CMW-50B	3.0×10^{-5} cm/sec
CMW-60B	insufficient volume of water
CMW-70B	dry
CMW-80B	dry

Note: Equation used: $$K = \frac{r^2}{2L} \ln \frac{L}{R} \frac{[\ln H_1/H_2]}{[\, t_2 - t_1 \,]}$$

K = permeability
r = radius of well casing
R = radius of borehole
L = length of screen
H_1 = drawdown at time t_1
H_2 = drawdown at time t_2

being allowed after each pumping event. Table 3 presents a summary of water lost during coring and water pumped from the well for development purposes.

TABLE 3

WATER VOLUMES REMOVED FOR DEVELOPMENT

Well No.	Water Loss During Coring (Gal.)	Groundwater Removed (Gal.)	Distilled Water Added & Removed (Gal.)
CMW-10B	---	80	0
CMW-1SH	448	672	0
CMW-20B	---	225	0
CMW-2SH	134	201	0
CMW-30B	---	40	9
CMW-3SH	87	15*	0
CMW-40B	---	10	10
CMW-4SH	606	873	0
CMW-50B	---	35	13
CMW-5SH	131	199	0
CMW-60B	---	2	0
CMW-6SH	201	25*	0
CMW-70B	---	1	12
CMW-7SH	782	85*	0
CMW-80B	---	Dry	0
CMW-8SH	1550	2470	0

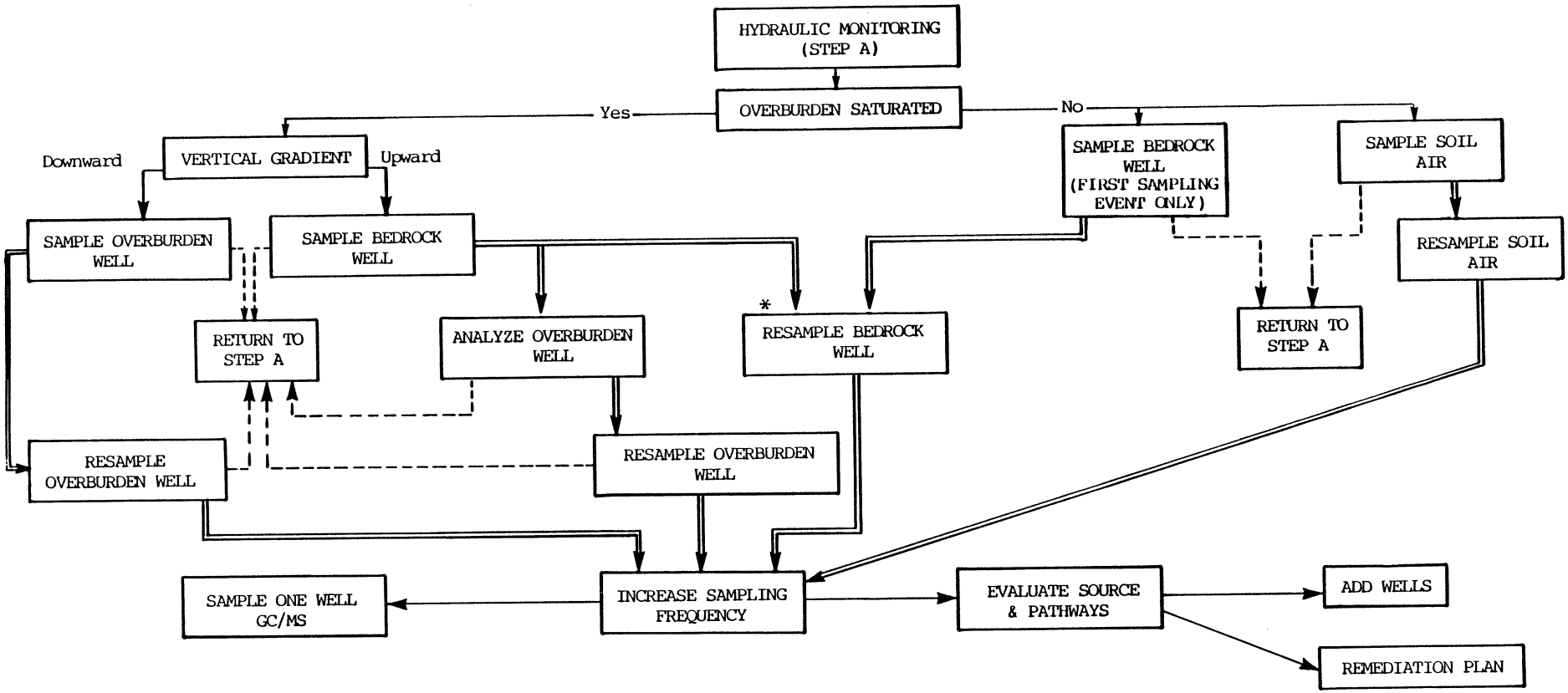
*Purged to dryness on three consecutive days.

4.0 SAMPLE COLLECTION

The requirements for sample collection are presented in the document entitled, "Stipulation on Requisite Remedial Technology Program, May 13, 1986". The requirements of the stipulation indicate that water level measurements must be made at each well and subsequently it is to be determined whether the gradient between the bedrock and overburden is upwards or downwards and whether the overburden is saturated or unsaturated (a dry overburden well indicates an unsaturated overburden condition). In general, if the gradient is downwards and the overburden is saturated, then the overburden well will be sampled. In those cases where the gradient is upwards or the overburden is unsaturated, then the bedrock well will be sampled. In addition to the collection of a groundwater sample from the bedrock well in the event that the overburden is unsaturated, an air sample will be collected from the ~~bedrock~~ overburden well. See the Monitoring Logic Diagram presented in Figure 4.

4.1 WATER LEVELS

Following the completion of each monitoring well installation, the water levels were periodically monitored and recorded. Prior to each water level measurement, the measurement device is cleaned using a series



LEGEND

═══	Detected
-------	Not detected
*	Detected & above floor elevation

figure 4

MONITORING LOGIC DIAGRAM
COMMUNITY MONITORING PROGRAM
HYDE PARK RRT PROGRAM
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of acetone, hexane, acetone and distilled water rinses. Table 4 presents the water level data collected.

Water levels measured during and prior to the initial CMW sample collection program indicated only two locations where the overburden was unsaturated, CMW-70B and CMW-80B. At the other six locations, there was some accumulation of water in the overburden well and the gradient was downwards (see Table 5). At these six locations, groundwater samples were taken from the overburden wells while the bedrock wells were sampled at the other two locations.

It is to be noted that, on occasion, the annular space between the well casing and the protective casing above the cement grout backfill of some CMW wells was observed to contain water due to leakage of surface water into this space. In the event that the water in the annular space was above the level of the top of well casing, and therefore leakage into the well casing was possible, no water level measurement was recorded until the well was allowed to equilibrate. Care was taken to remove this accumulation prior to opening the well cap. Repairs will be made to the following wells once the dry weather season arrives.

- CMW1SH
- CMW20B
- CMW40B
- CMW60B
- CMW7SH
- CMW70B

TABLE 4

HYDE PARK COMMUNITY MONITORING WELL GROUNDWATER LEVELS

Well Number	Ground Elevation	Top/Casing Elevation	Date Measured	Groundwater Elevation	
CMW1 SH	577.3	576.68	02/25/87	564.99	
			03/05/87	565.63	
		BR @ 559.6	04/06/87	566.16	
			04/14/87	565.57	
					6'
CMW1 OB	576.8	576.12	02/25/87	571.14	
			03/05/87	571.86	
			04/06/87	571.99	
			04/14/87	571.27	
CMW2 SH	591.2	587.73	02/17/87	569.78	
			02/25/87	567.56	
		BR @ 563.2	03/05/87	568.20	
			04/14/87	569.47	
					19'
CMW2 OB	591.5	590.05	02/17/87	588.56	
			02/25/87	588.29	
			03/05/87	588.99	
			04/14/87	589.56	
CMW3 SH	583.5	582.74	02/02/87	551.03	
			02/06/87	551.60	
			02/12/87	551.96	
			02/18/87	551.30	
		BR @ 561.2	02/26/87	551.40	
			03/05/87	553.42	
			03/31/87	555.66	
			04/14/87	556.96	
					15'
CMW3 OB	583.4	582.79	02/06/87	566.47	
			02/12/87	567.47	
			02/18/87	568.53	
			02/26/87	569.59	
			03/13/87	570.85	
			04/14/87	571.41	
CMW4 SH	575.6	574.97	01/30/87	565.96	
			02/02/87	565.70	
			02/06/87	565.84	
			02/13/87	566.10	confined, artesian
			02/18/87	566.02	
		BR @ [illegible]	02/26/87	565.72	
			03/05/87	566.72	
			03/31/87	566.46	
			04/14/87	567.24	

NOTE: All Bedrock (BR) wells are NX open hole with 4" surface casing.

continued...

TABLE 4

HYDE PARK COMMUNITY MONITORING WELL GROUNDWATER LEVELS

Well Number	Ground Elevation	Top/Casing Elevation	Date Measured	Groundwater Elevation
CMW4 OB	575.7	574.85	01/30/87	dry
			02/13/87	567.74
			02/18/87	567.79
			02/26/87	568.52
			03/05/87	568.60
			05/31/87	567.94
			04/14/87	567.69
CMW5 SH	584.7	584.13	1/29/87	577.88
			2/02/87	577.92
			2/06/87	578.04
			2/13/87	577.98
			2/18/87	577.79
			2/27/87	577.65
			3/05/87	578.98
			4/01/87	579.00
			4/14/87	579.41
CMW5 OB	584.7	584.13	1/29/87	580.14
			2/06/87	579.73
			2/13/87	--
			2/18/87	579.48
			2/26/87	--
			2/27/87	579.11
			3/05/87	580.90
			4/01/87	580.34
			4/14/87	581.27
CMW6 SH	573.3	572.68	2/13/87	562.67
			2/17/87	561.01
			2/18/87	560.83
			2/26/87	560.74
			3/05/87	562.14
			3/30/87	562.94
			4/14/87	563.23

continued...

TABLE 4

HYDE PARK COMMUNITY MONITORING WELL GROUNDWATER LEVELS

Well Number	Ground Elevation	Top/Casing Elevation	Date Measured	Groundwater Elevation
CMW6 OB	573.4	572.55	2/13/87	Dry
			2/17/87	Dry
			2/18/87	Dry
			2/26/87	Dry
			3/05/87	569.40
			3/09/87	569.62
			3/30/87	569.39
			4/14/87	569.53
CMW7 SH	612.1	611.16	1/28/87	599.78
			1/30/87	599.77
			2/02/87	599.74
			2/13/87	599.56
			2/16/87	599.56
		Top of B- 600.5	2/26/87	599.33
			3/05/87	600.24
			4/08/87	604.79
			4/14/87	602.78
CMW7 OB	612.1	611.38	2/06/87	606.17
			2/13/87	606.18
			2/26/87	606.17
			3/05/87	606.18
			4/08/87	dry
			4/14/87	dry
CMW8 SH	617.3	617.01	1/30/87	609.03
			2/02/87	608.55
			2/13/87	608.27
		BR @ 611.4	2/16/87	608.09
			2/25/87	607.44
			3/05/87	610.47
			4/02/87	610.49
			4/14/87	612.67
CMW8 OB	617.3	616.78	2/25/87	Dry
			3/05/87	Dry
			4/02/87	Dry
			4/14/87	Dry

Note: All elevations are based on USGS Datum.

TABLE 5

VERTICAL HYDRAULIC GRADIENT VALUES

WELL NEST NO.	VERTICAL HYDRAULIC GRADIENT	DATE MEASURED
CMW-1	-2.9	04/06/87
CMW-2	-2.8	04/14/87
CMW-3	-3.0	03/31/87
CMW-4	-0.5	03/31/87
CMW-5	-0.2	04/01/87
CMW-6	-4.5	03/30/87
CMW-7	N/A*	04/08/87
CMW-8	N/A*	04/02/87

* Overburden wells CMW-70B and CMW-80B were dry on the dates indicated and therefore no gradient calculation was made.

4.2 INITIAL SAMPLE ROUND

The initial round of groundwater sample collection from the community monitoring wells was completed between March 30 and April 10, 1987. During this period, groundwater samples were collected from six overburden and two shallow bedrock wells. Table 6 presents a list of wells and sample numbers included in the initial sample round. The air sampling required to be conducted as a part of this program is presently awaiting finalization of the air sample collection protocols.

The sampling protocols require that each well will be purged of a quantity of groundwater equivalent to the lesser of five well volumes or until dry on three consecutive days. In all cases, the overburden well was pumped dry on three occasions while the full five well volumes were purged in a single effort from both of the bedrock wells. Table 7 presents the volumes purged from each of the wells sampled.

Purging of the wells was completed by pumping of the water to the surface via teflon suction tubing using either a peristaltic pump or a small centrifugal pump. The peristaltic pump extracted groundwater at a rate between 0.5 and 1.0 GPM while the centrifugal pump was capable of 2 to 4 GPM. A new pump was procured for CMW-10B and CMW-20B and has been dedicated to each respective well, thereby

TABLE 6

SAMPLE IDENTIFICATION

Sample Number	Well No.	Volume Collected		Sample Collection Date/Time	Laboratory
1	CMW-8SH	1A	1 liter	4/2/87 - 14:15	AES
		1B	1 liter	4/2/87 - 14:15	OCC Grand Island
		1C	2 liter	4/2/87 - 14:15	OCC Works Lab
2	CMW-60B	2A	1 liter	4/7/87 - 9:00	AES
		2B	1 liter	4/7/87 - 15:15	OCC Grand Island
		2C	1 liter	4/7/87 - 15:5	OCC Works Lab
3	CMW-50B	3A	1 liter	4/3/87 - 12:30	AES
		3B	1 liter	4/3/87 - 12:30	OCC Grand Island
		3C	2 liter	4/3/87 - 12:30	OCC Works Lab
4	CMW-30B	4A	1 liter	4/3/87 - 13:00	AES
		4B	1 liter	4/3/87 - 13:00	OCC Grand Island
		4C	2 liter	4/3/87 - 13:00	OCC Works Lab
5	CMW-7SH	5A	1 liter	4/8/87 - 13:35	AES
		5B	1 liter	4/8/87 - 13:35	OCC Grand Island
		5C	2 liter	4/8/87 - 13:35	OCC Works Lab
6	CMW-10B	6A	1 liter	4/8/87 - 14:15	AES
		6B	1 liter	4/8/87 - 14:15	OCC Grand Island
		6C	2 liter	4/8/87 - 14:15	OCC Works Lab
7	CMW-10B	7A	1 liter	4/8/87 - 14:30	AES
	(Duplicate)	7B	1 liter	4/8/87 - 14:30	OCC Grand Island
		7C	2 liter	4/8/87 - 14:30	OCC Works Lab
8	CMW-40B	8A	1 liter	4/8/87 - 15:15	AES
		8B	1 liter	4/9/87 - 11:00	OCC Grand Island
		8C	2 liter	4/8/87 - 15:15	OCC Works Lab
9	Field Blank	9A	1 liter	4/9/87 - 9:15	AES
		9B	1 liter	4/9/87 - 9:15	OCC Grand Island
		9C	2 liter	4/9/87 - 9:15	OCC Works Lab
10	CMW-20B	10A	1 liter	4/9/87 - 14:00	AES
		10B	1 liter	4/9/87 - 14:00	OCC Grand Island
		10C	2 liter	4/9/87 - 14:00	OCC Works Lab

continued...

TABLE 6

SAMPLE IDENTIFICATION

Sample Number	Well No.	Volume Collected		Sample Collection Date/Time	Laboratory
11	Distilled Water	11A	1 liter	4/9/87 - 10:00	AES
		11B	1 liter	4/9/87 - 10:00	OCC Grand Island
	Control	11C	2 liter	4/9/87 - 10:00	OCC Works Lab

Note:

- sample bottles - 1 liter amber, teflon lined cap
- no preservatives were added to any sample in the field
- no filtering was conducted in the field
- samples were stored on ice and shipped to the respective laboratory on the sampling date
- AES = Advanced Environmental Services (Niagara Falls)

TABLE 7

OVERBURDEN WELL PURGE VOLUMES - INITIAL SAMPLE ROUND

Well No.	Initial Purge Volume (Gal.)	Second Purge Volume (Gal.)	Third Purge Volume (Gal.)	Type of Pump	Date Sampled
CMW-10B	70	33	20	1	4/08/87
CMW-20B	200	200	145	1	4/09/87
CMW-30B	40	2-1/2	3	2	4/03/87
CMW-40B	2	1/4	1/10	2	4/08 & 4/09/87
CMW-50B	30	23	18	2	4/03/87
CMW-60B	1-1/4	1/2	1/4	2	4/07/87
CMW-7SH	43	5 Well Volumes		2	4/08/87
CMW-8SH	30	5 Well Volumes		2	4/02/87

1 = Centrifugal Pump
2 = Peristaltic Pump

effectively preventing cross-contamination due to backflushing of water through a pump used previously at another well.

The groundwater samples collected from the 12-inch diameter overburden wells were obtained using 8-inch diameter by 8-inch high stainless steel bailers, having a bottom teflon flapper valve. Woven stainless steel aircraft cable was used as the bailing rope. The bedrock groundwater samples were collected using a 2-foot teflon bailer and stainless steel cable. The bailers and cable were cleaned in accordance with the following protocols:

- soapy water wash
- acetone rinse
- hexane rinse
- acetone rinse
- air dry
- three rinses with distilled water

Individual dedicated bailers have been purchased for each of the overburden wells. In each case following collection of the groundwater samples for a particular well, the bailer dedicated to that well was placed suspended on a hook above the water table in the well for storage.

Collected groundwater samples were poured directly from the bailer into a small mouth 1-liter amber bottle having a teflon lined cap. In each case the head space volume was kept to a minimum. The samples were then placed in a cooler on ice. Where possible six 1-liter bottles were filled according to the following requirements:

- 1 liter shipped to AES for TOH analysis
- 1 liter shipped to Grand Island for HPLC analysis
- 2 liters shipped to Works Lab for organics analysis
- 2 liters were given to the DEC representative, Tom Christofell

At two wells, CMW-40B and CMW-60B, the volume of water in the wells was insufficient to provide all of the sample volume requested. In both cases, water was removed from the wells in two stages in order to attempt to collect the required volume. CMW-40B yielded all of the sample volume except one liter for the State and CMW-60B yielded all of the sample volume except one liter for organics analysis by the Works Lab. Chain of Custody record forms were completed by CRA sampling personnel for those samples delivered to AES, Grand Island and the Works Lab (see Appendix D). Samples released to the DEC were done so under DEC Chain of Custody forms.

Groundwater samples collected during the initial sampling round were analyzed for the following set of community early warning parameters:

- TOH
- chlorendic acid
- benzoic acid
- monochlorobenzoic acids
- monochlorobenzene
- monochlorotoluenes
- monochlorobenzotrifluorides

The groundwater samples were analyzed according to the requirements of the document entitled "Hyde Park Quality Assurance Plan and Analytical Protocols for High Priority Programs". The analytical results from the initial sampling round in conjunction with the requirements of the Stipulation on Requisite Remedial Technology Program will determine future sampling and analysis requirements. See Figure 4. The analytical results of the initial round groundwater samples, and further information regarding the Community Monitoring Program will be reported as the information becomes available.

All of which is respectfully submitted,

CONESTOGA-ROVERS & ASSOCIATES

David E. Black, P. Eng.

APPENDIX A

SPECIFIC LOCATIONS

RESIDENTIAL COMMUNITY MONITORING WELLS

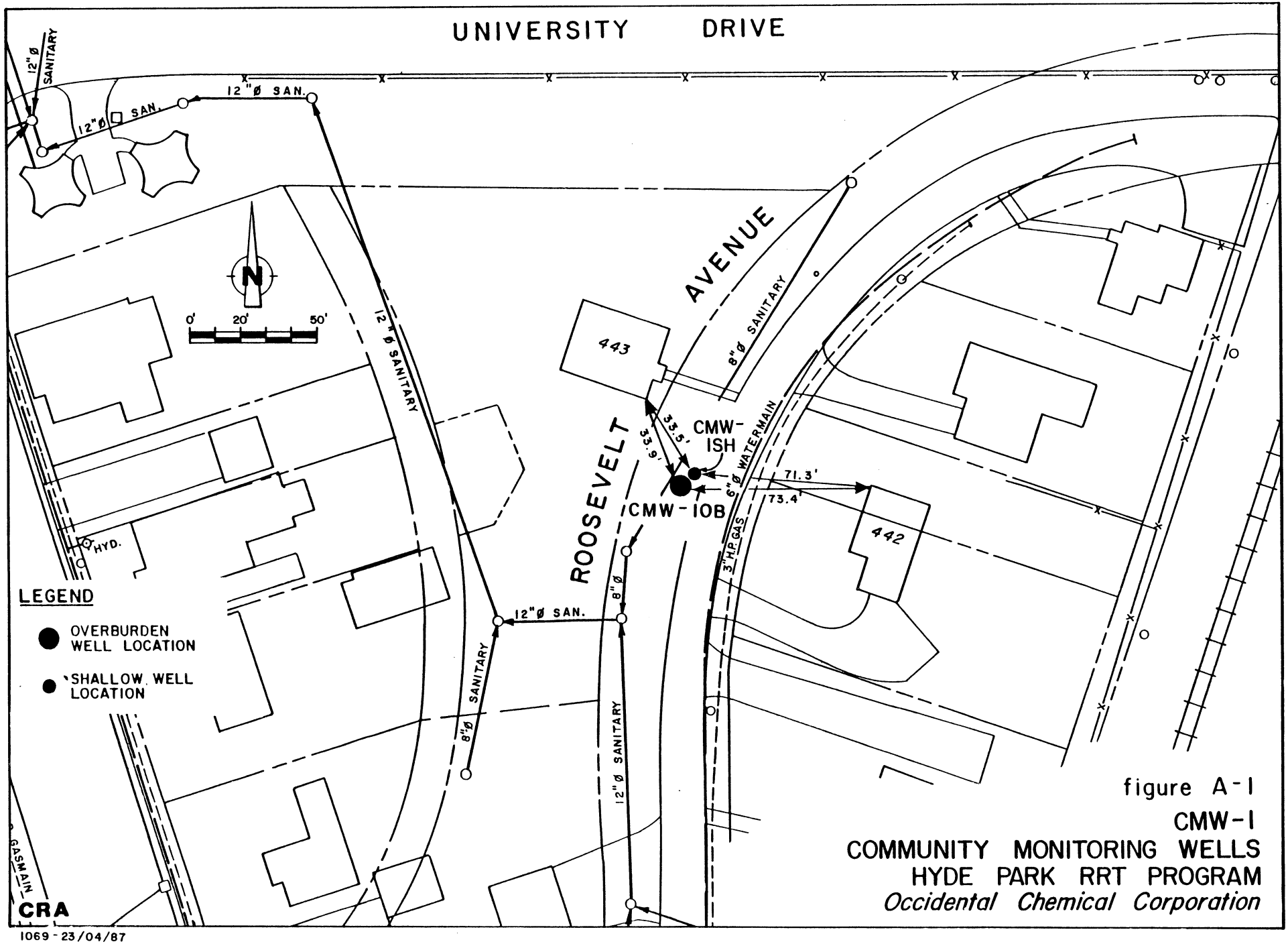


figure A-1

CMW-1

COMMUNITY MONITORING WELLS

HYDE PARK RRT PROGRAM

Occidental Chemical Corporation

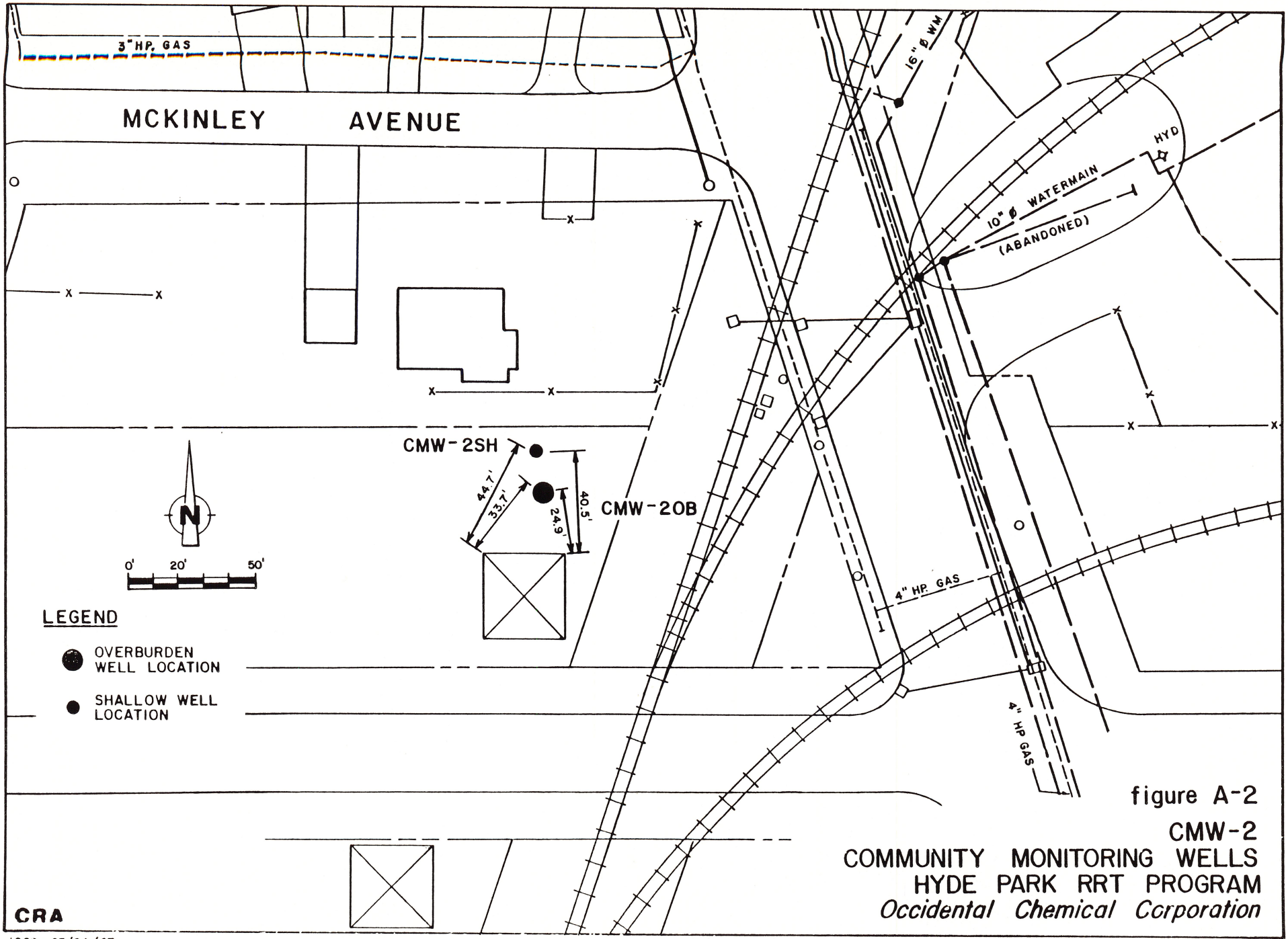


figure A-2

CMW-2

COMMUNITY MONITORING WELLS

HYDE PARK RRT PROGRAM

Occidental Chemical Corporation

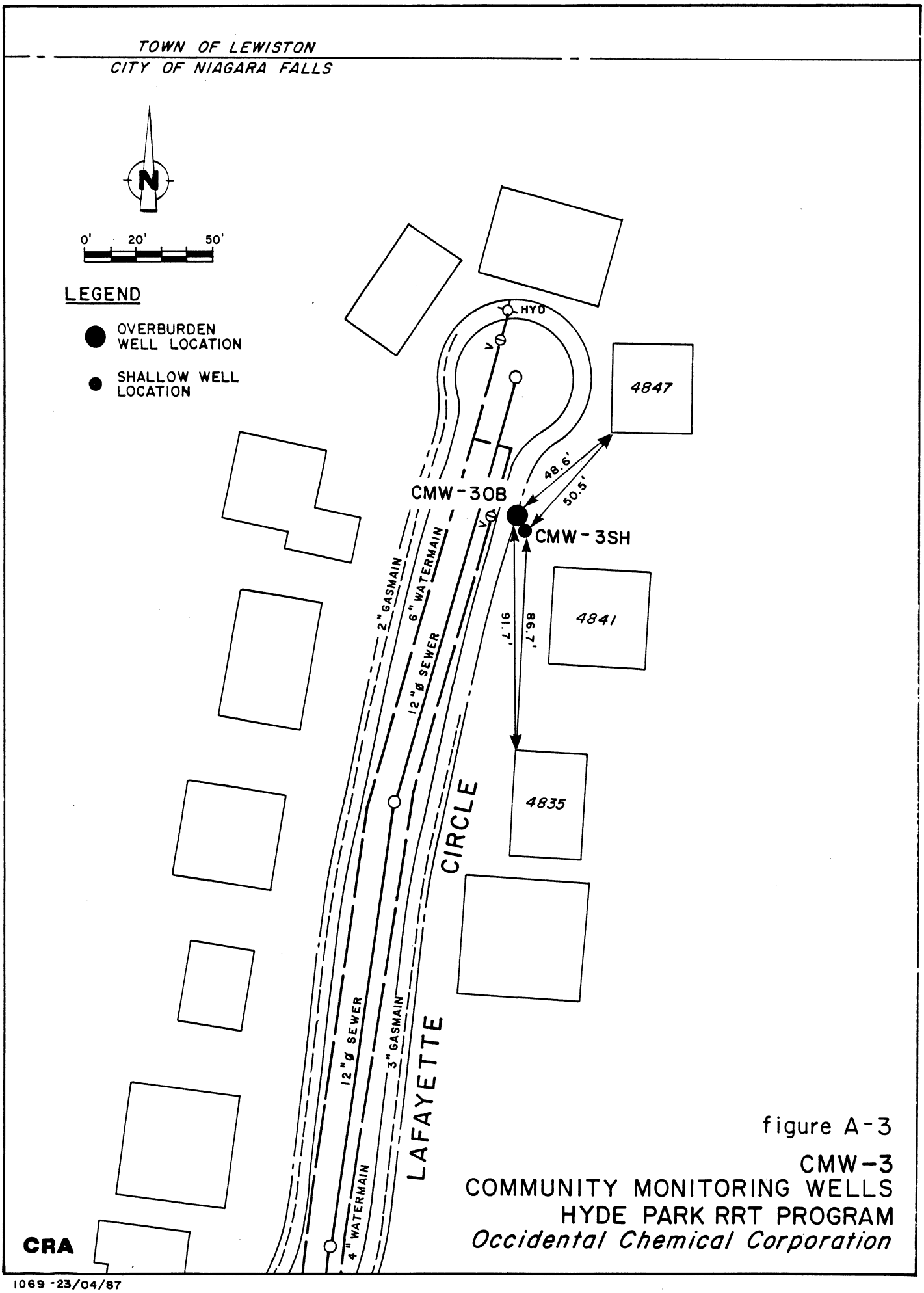


figure A-3

CMW-3
COMMUNITY MONITORING WELLS
HYDE PARK RRT PROGRAM
Occidental Chemical Corporation

1069-23/04/87

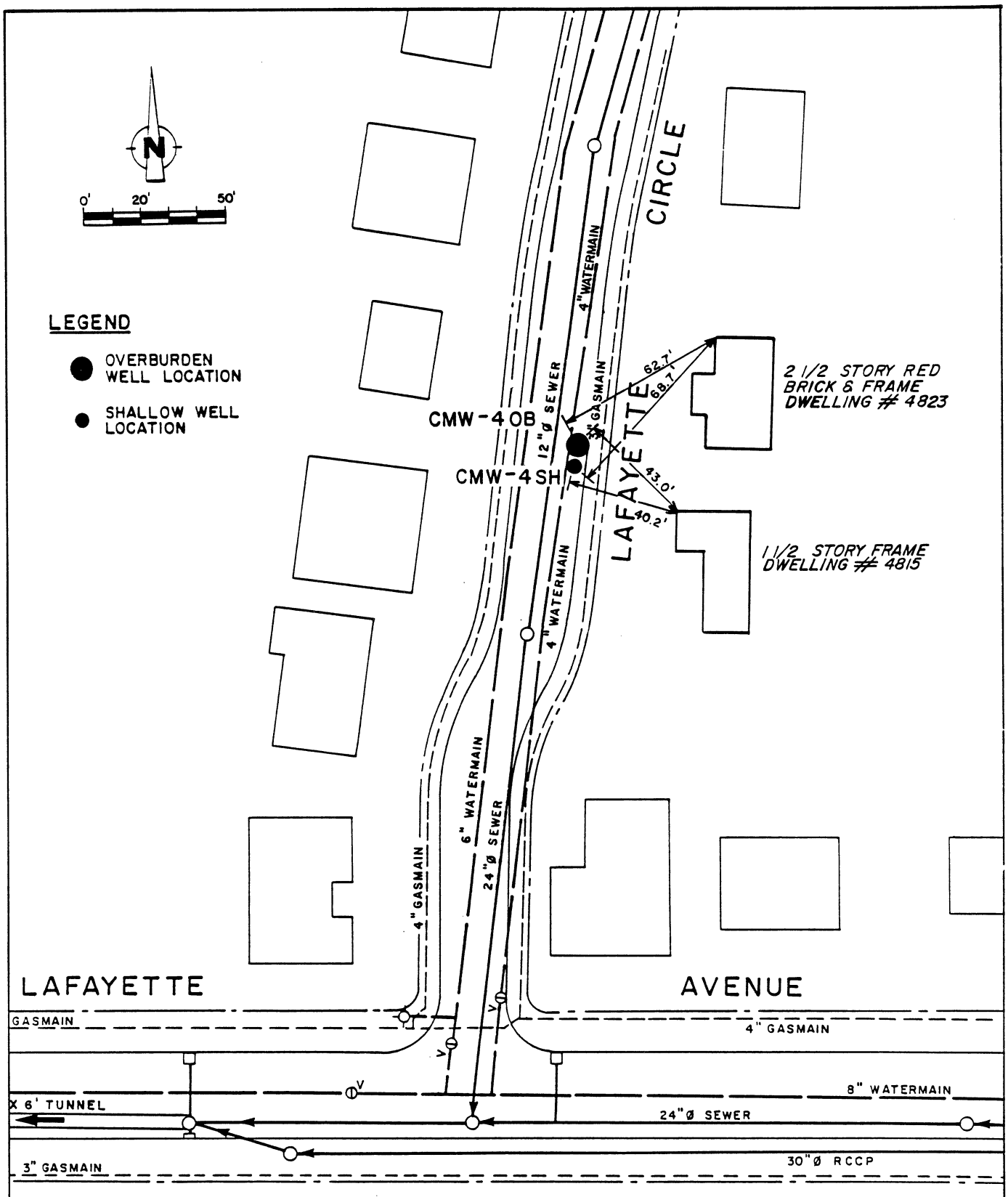


figure A-4

CMW-4
COMMUNITY MONITORING WELLS
HYDE PARK RRT PROGRAM
Occidental Chemical Corporation

CRA

1069-23/04/87

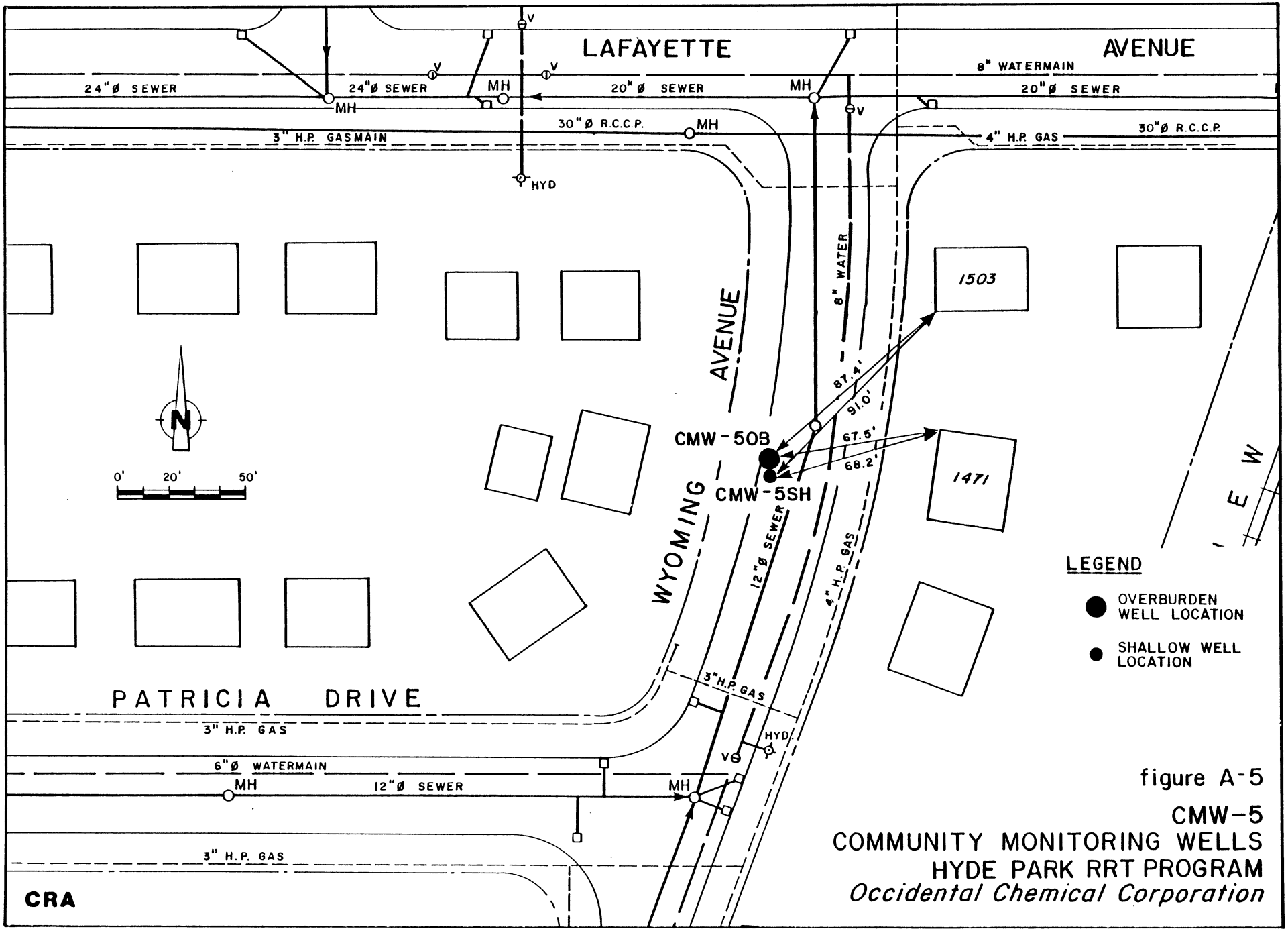


figure A-5

CMW-5
COMMUNITY MONITORING WELLS
HYDE PARK RRT PROGRAM
Occidental Chemical Corporation

1069 - 23/04/87

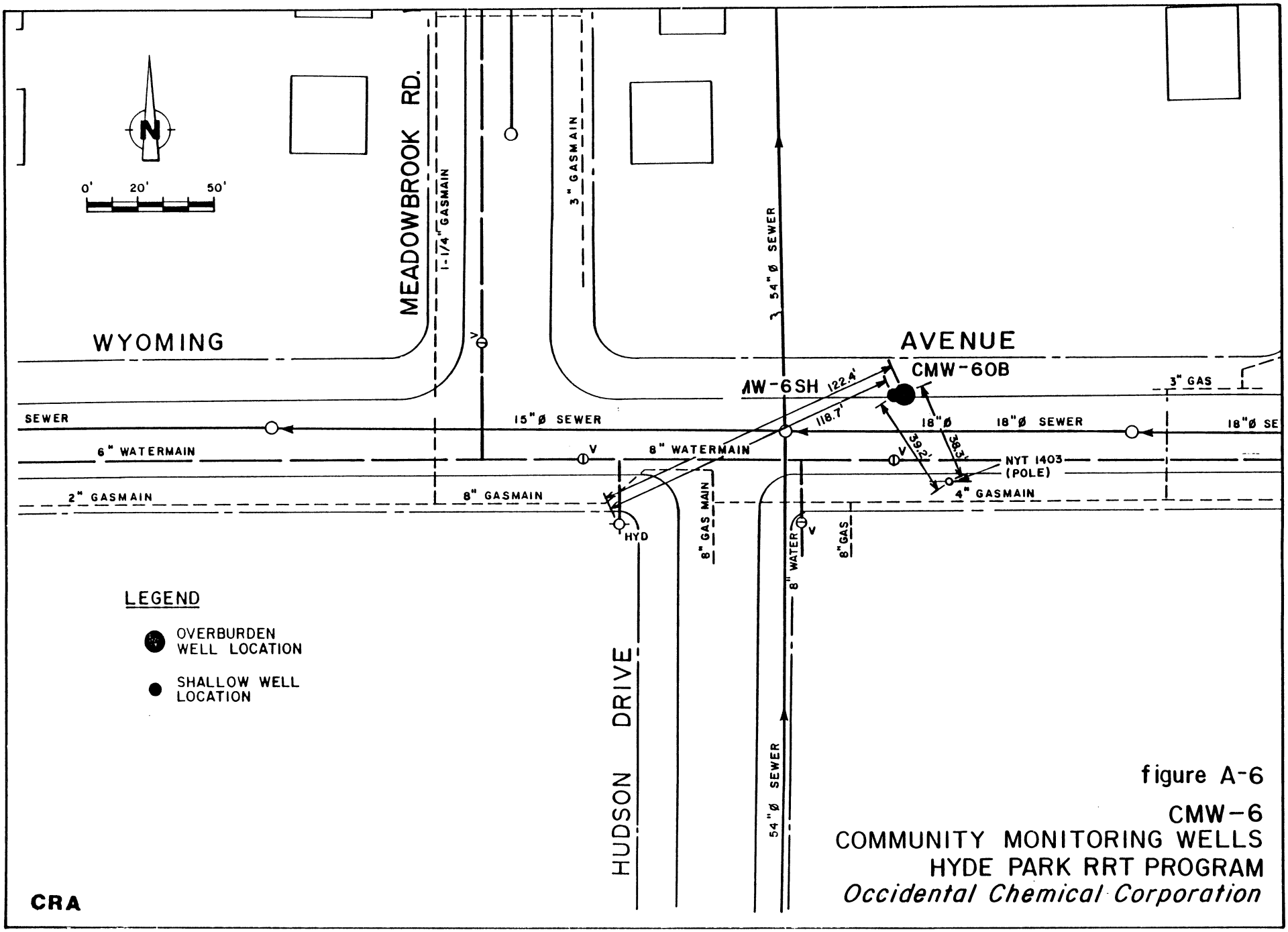


figure A-6

CMW-6
COMMUNITY MONITORING WELLS
HYDE PARK RRT PROGRAM
Occidental Chemical Corporation

1069 - 23/04/87

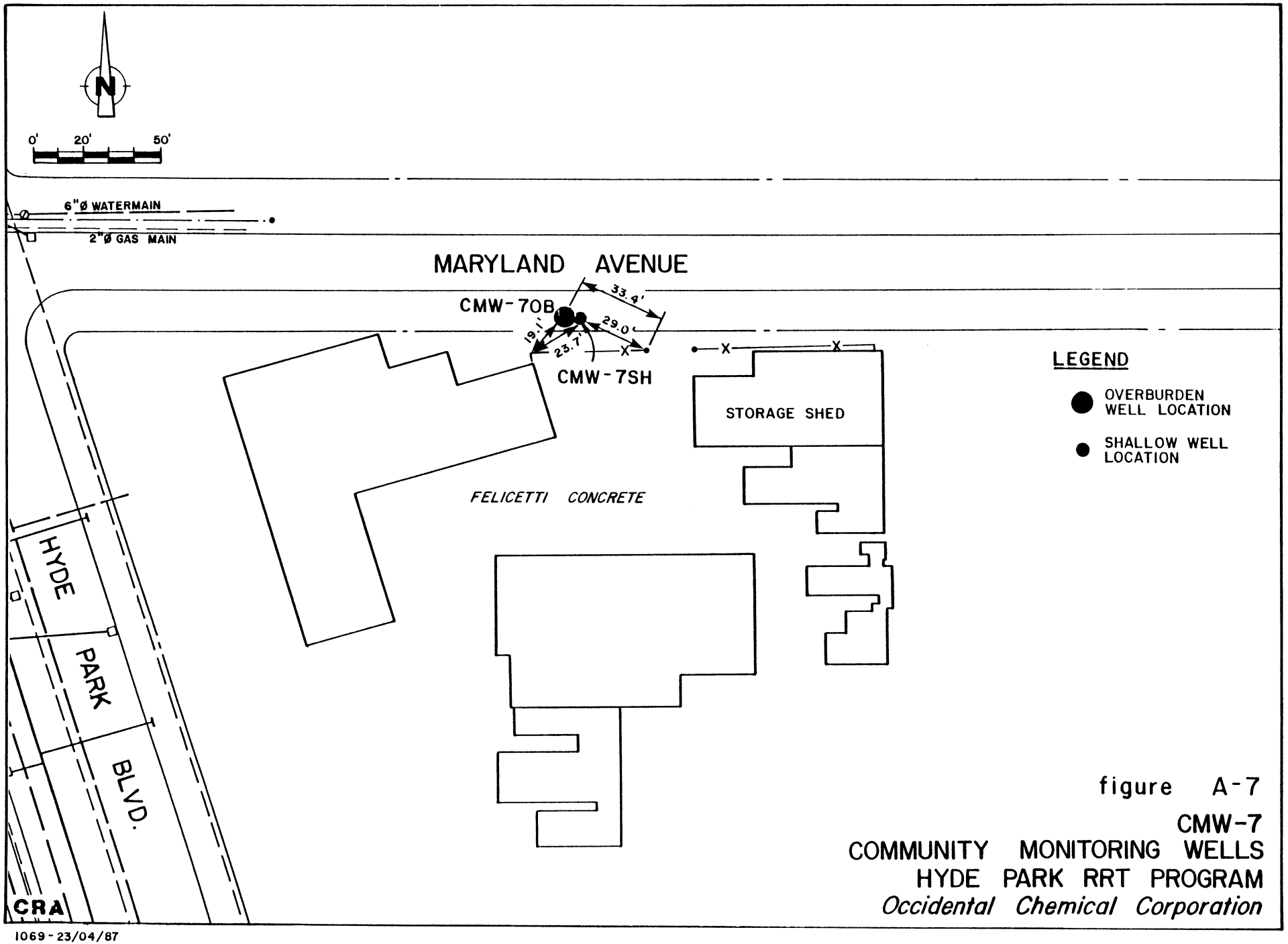


figure A-7

CMW-7
COMMUNITY MONITORING WELLS
HYDE PARK RRT PROGRAM
Occidental Chemical Corporation

1069-23/04/87

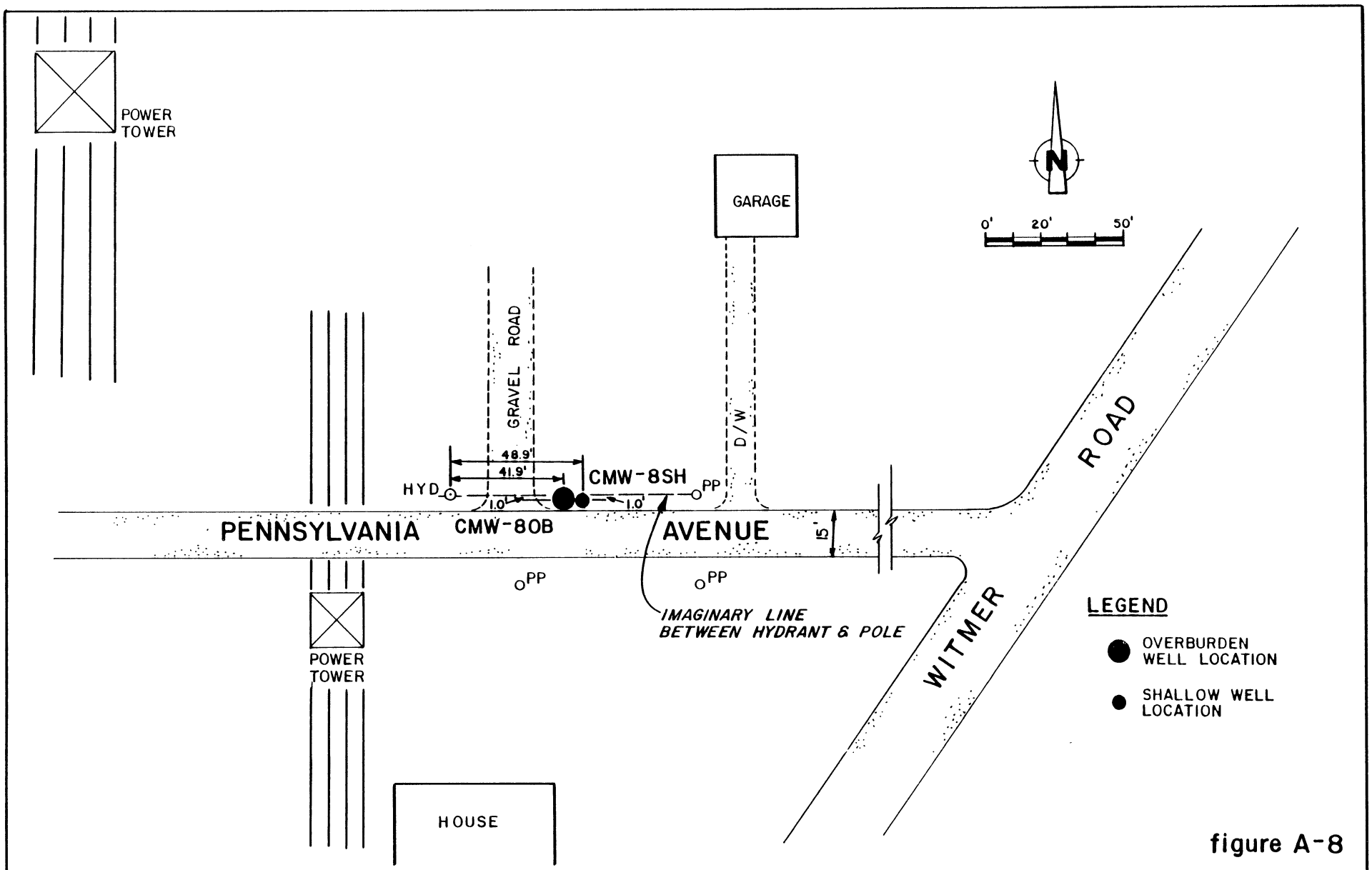


figure A-8

CMW-8
COMMUNITY MONITORING WELLS
HYDE PARK RRT PROGRAM
Occidental Chemical Corporation

CRA

1069-23/04/87

APPENDIX B

STRATIGRAPHIC LOGS

STRATIGRAPHIC AND INSTRUMENTATION LOG

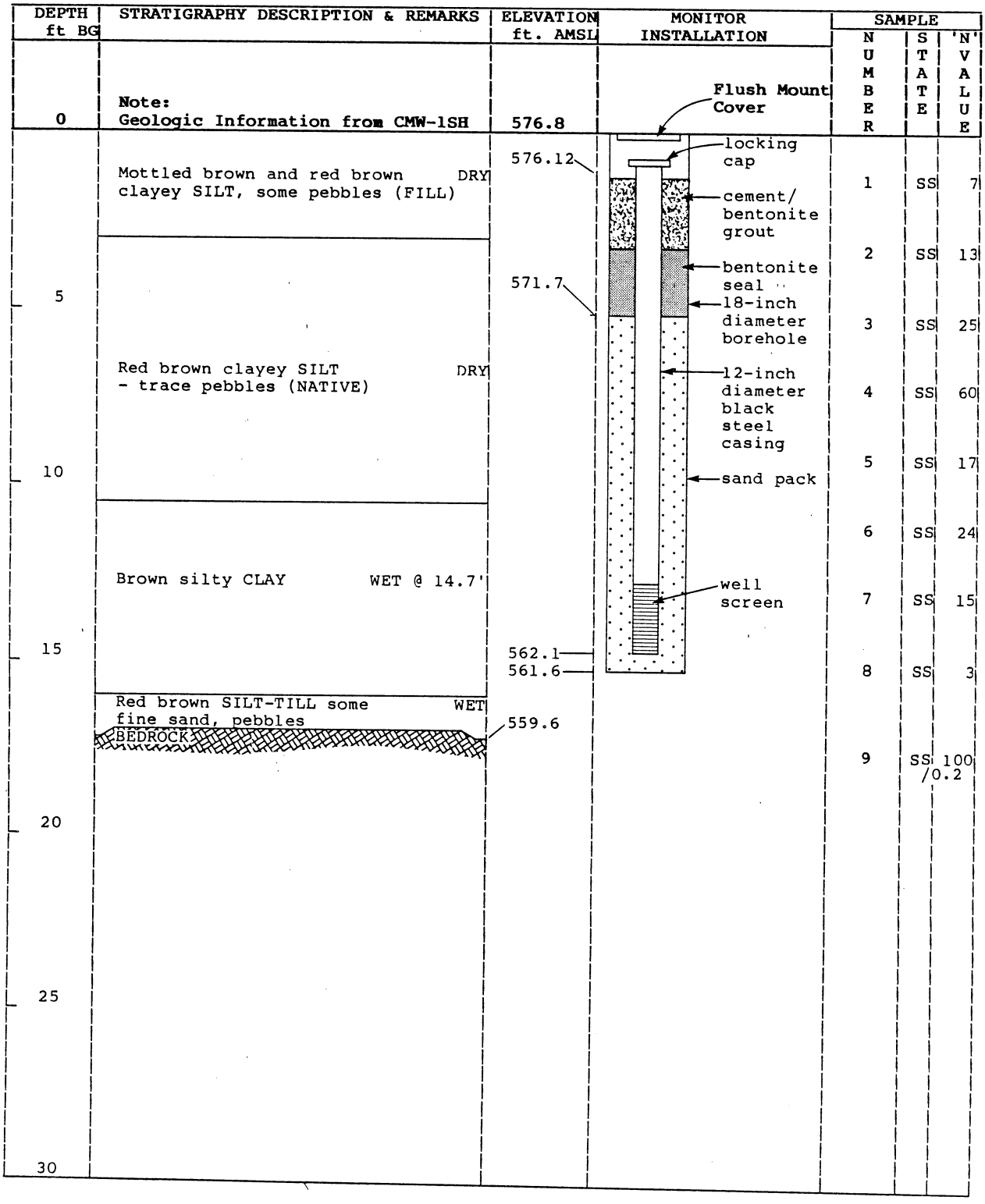
(OVERBURDEN)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-10B

PROJECT NO.: 1069
DATE COMPLETED: FEBRUARY 18, 1987

CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: 18" DIA. AUGER

LOCATION: Roosevelt Avenue
CRA SUPERVISOR: B. KLETTKE



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL
RISER PIPE: 12-INCH DIAMETER BLACK STEEL
WELL SCREEN: 12-INCH DIAMETER STAINLESS STEEL, #6 SLOT, 24-INCHES LONG

STRATIGRAPHIC AND INSTRUMENTATION LOG

(OVERBURDEN)

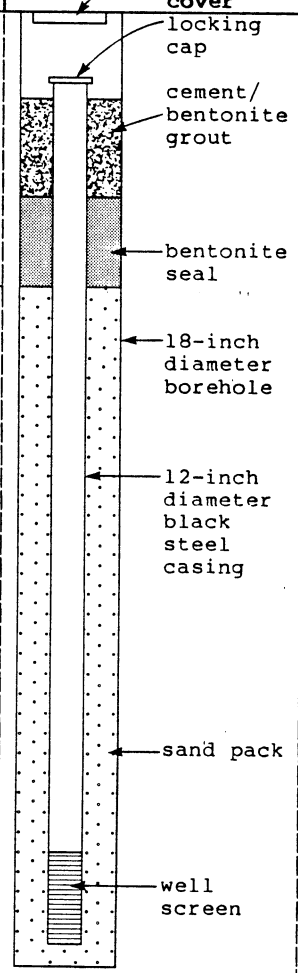
PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-20B

PROJECT NO.: 1069
DATE COMPLETED: FEBRUARY 9, 1987

CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: 18" DIA. AUGER

LOCATION: PASNY Property
CRA SUPERVISOR: B. KLETTKE

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS		ELEVATION ft. AMSL	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0	**Note:** **Geologic Information from CMW-2SH**		591.5			
	Brown clayey SILT - some rock fragments (FILL)	MOIST	590.05	1	SS	18
				2	SS	18
5	Mottled red brown with brown and gray clayey SILT (NATIVE)	MOIST	585.5	3	SS	11
	Red brown fine silty SAND - trace clay	MOIST		4	SS	36
10				5	SS	15
				6	SS	33
	Red brown clayey SILT - some gravel	MOIST		7	SS	22
15				8	SS	9
				9	SS	11
20				10	SS	4
	Red gray silty CLAY - occasional silty sand layer, trace pebbles	WET	571.0 570.5	11	SS	5
				12	SS	6
25				13	SS	26
	Red brown SILT - till, some pebbles	WET		14	SS	126 /0.55'
	BEDROCK		563.2			
30						



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL
RISER PIPE: 12-INCH DIAMETER BLACK STEEL
WELL SCREEN: 12-INCH DIAMETER STAINLESS STEEL, #6 SLOT, 24-INCHES LONG

STRATIGRAPHIC AND INSTRUMENTATION LOG

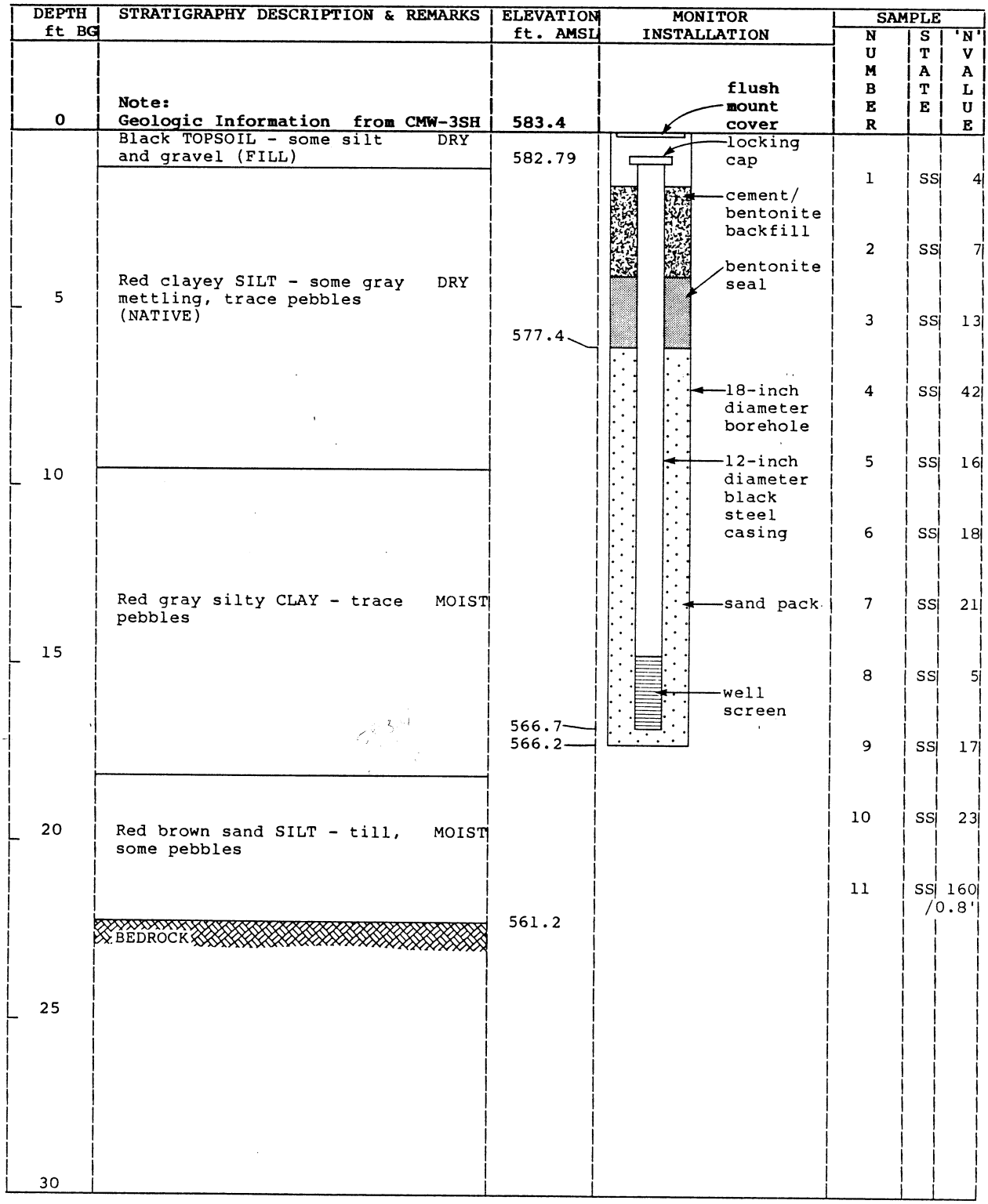
(OVERBURDEN)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-30B

PROJECT NO.: 1069
DATE COMPLETED: FEBRUARY 2, 1987

CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: 18" DIA. AUGER

LOCATION: North End - Lafayette Circle
CRA SUPERVISOR: B. KLETTKE



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL
RISER PIPE: 12-INCH DIAMETER BLACK STEEL
WELL SCREEN: 12-INCH DIAMETER STAINLESS STEEL, #6 SLOT, 24-INCHES LONG

STRATIGRAPHIC AND INSTRUMENTATION LOG

(OVERBURDEN)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-40B

PROJECT NO.: 1069
DATE COMPLETED: JANUARY 19, 1987

CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: 18" DIA. AUGER

LOCATION: Midway - Lafayette Circle
CRA SUPERVISOR: B. KLETTKE

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0	Note: Geologic Information from CMW-4SH	575.7	flush mount cover			
	ASPHALT (FILL) DRY	574.85	locking cap			
	GRAVEL (FILL) DRY			1	SS	21
	Red clayey SILT - occasional silt occlusion, trace pebbles (NATIVE) DRY		cement/ bentonite grout	2	SS	32
5	Red brown clayey SILT DRY		bentonite seal	3	SS	24
	Red gravelly SILT MOIST		sand pack	4	SS	34
		567.7	well screen			
		567.2	18-inch diameter borehole			
10	Red brown SILT and SAND - till, some gravel WET			5	SS	39
		564.4				
	BEDROCK					
15						
20						
25						
30						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL
RISER PIPE: 12-INCH DIAMETER BLACK STEEL
WELL SCREEN: 12-INCH DIAMETER STAINLESS STEEL, #6 SLOT, 24-INCHES LONG

S T R A T I G R A P H I C A N D I N S T R U M E N T A T I O N L O G

(O V E R B U R D E N)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-50B

PROJECT NO.: 1069
DATE COMPLETED: JANUARY 18, 1987

CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: 18" DIA. AUGER

LOCATION: Wyoming Avenue near Lafayette
CRA SUPERVISOR: B. KLETTKE

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS		ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0	Note: Geologic Information from CMW-5SH		584.7	flush mount cover			
	Black ASPHALT - (FILL)	DRY		locking cap			
	GRAVEL - (FILL)	DRY	584.13				
	CONCRETE - (FILL)	DRY			1	SS	13
	Mottled gray brown clayey SILT - (FILL)	DRY		cement/ bentonite grout			
					2	SS	18
	Dark brown clayey SILT - (NATIVE)	MOIST		bentonite seal			
5							
				sand pack	3	SS	14
			578.7				
	Mottled orange gray, brown clayey SILT - trace pebbles	MOIST					
				well screen	4	SS	16
			576.7				
	Brown medium SAND	WET	576.2				
	Red brown clayey SILT - some pebbles	WET					
10	Weathered ROCK	WET		18-inch diameter borehole	5	SS	38
					6	SS	42
	Red SILT - till, some pebbles	WET					
					7	SS	122
15	Weathered Rock	WET					
	BEDROCK		569.4				
20							
25							
30			554.4	30.3			

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

RISER PIPE: 12-INCH DIAMETER BLACK STEEL

WELL SCREEN: 12-INCH DIAMETER STAINLESS STEEL, #6 SLOT, 24-INCHES LONG

STRATIGRAPHIC AND INSTRUMENTATION LOG

(OVERBURDEN)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-60B

PROJECT NO.: 1069
DATE COMPLETED: FEBRUARY 12, 1987

CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: 18" DIA. AUGER

LOCATION: Wyoming Avenue near Hudson
CRA SUPERVISOR: B. KLETTKE

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0	Note: Geologic Information from CMW-6SH	573.4	flush mount cover			
	Silty GRAVEL (FILL) DRY	572.55	locking cap			
		571.6	cement/ bentonite	1	SS	12
	Red brown clayey SILT - occasional lens of fine silty sand or gravel (NATIVE) DRY	571.1	bentonite pellets			
			well screen	2	SS	36
		568.9				
5	Weathered ROCK DRY	567.9	18-inch diameter borehole	3	SS	100 /.4'
	BEDROCK					
10						
15						
20						
25						
30						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL
RISER PIPE: 12-INCH DIAMETER BLACK STEEL
WELL SCREEN: 12-INCH DIAMETER, STAINLESS STEEL, #6 SLOT, 12-INCHES LONG

STRATIGRAPHIC AND INSTRUMENTATION LOG

(OVERBURDEN)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-70B

PROJECT NO.: 1069
DATE COMPLETED: JANUARY 22, 1987

CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: 18" DIA. AUGER

LOCATION: Maryland Avenue at Felicetti's
CRA SUPERVISOR: B. KLETTKE

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0	Note: Geologic Information from CMW-7SH	612.1	flush mount cover			
	GRAVEL - some black cinders (FILL) DRY	611.38	locking cap			
	Red brown clayey SILT - (NATIVE) DRY		bentonite seal	1	SS	16
	Red clayey SILT - till, some pebbles DRY		sand pack	2	SS	50
	Gray brown, fine, clayey SAND - some rock fragments	608.1	well screen	3	SS	100 /0.5'
5	NO RECOVERY - 5.5 to 11.8 feet below grade	606.1				
		605.6	18-inch diameter borehole	4	SS	100 /0.2'
10				5	SS	6
	BEDROCK	600.3		6	SS	150 /0.8'
15						
20						
25						
30						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL
RISER PIPE: 12-INCH DIAMETER, BLACK STEEL
WELL SCREEN: 12-INCH DIAMETER, STAINLESS STEEL, #6 SLOT, 24-INCHES LONG

STRATIGRAPHIC AND INSTRUMENTATION LOG

(OVERBURDEN)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-80B

PROJECT NO.: 1069
DATE COMPLETED: JANUARY 8, 1987

CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: 18" DIA. AUGER

LOCATION: Pennsylvania Avenue
CRA SUPERVISOR: B. KLETTKE

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0	Note: Geologic Information from CMW-8SH	617.3	flush mount cover			
	Gray sandy GRAVEL - some silt (FILL) DRY	616.78	cement/ bentonite grout	1	SS	12
		615.5	bentonite pellets			
	Red brown clayey SILT - (NATIVE) DRY		sand pack	2	SS	25
		613.3	18-inch diameter borehole			
5	Red brown clayey SILT - till, some pebbles MOIST	613.0		3	SS	100 /.4'
		611.4				
	BEDROCK					
10						
15						
20						
25						
30						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL
RISER PIPE: 12-INCH DIAMETER BLACK STEEL
WELL SCREEN: 12-INCH DIAMETER STAINLESS STEEL, #6 SLOT, 24-INCHES LONG

STRATIGRAPHIC AND INSTRUMENTATION LOG

(SHALLOW BEDROCK)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-1SH
(Page 1 of 2)
PROJECT NO.: 1069
DATE COMPLETED: FEBRUARY 17, 1987
CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: H.S.A./NX CORE
LOCATION: Roosevelt Avenue
CRA SUPERVISOR: D. BLACK

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0		577.3	Flush Mount Cover			
	Mottled brown and red brown clayey SILT, some pebbles (FILL) DRY	576.68	locking cap	1	SS	7
			cement/ bentonite grout	2	SS	13
5				3	SS	25
	Red brown clayey SILT - trace pebbles (NATIVE) DRY		9-inch diameter borehole	4	SS	60
10				5	SS	17
	Brown silty CLAY WET @ 14.7'		4-inch diameter black steel casing	6	SS	24
				7	SS	15
15				8	SS	3
	Red brown SILT-TILL some fine sand, pebbles WET	559.6	17.7 top of bedrock	9	SS	100 /0.2
20						
	DOLOMITE - bituminous brown-gray, fine to medium grained, many fractures					
25			3-inch diameter corehole			
30						

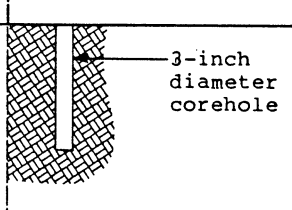
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

(SHALLOW BEDROCK)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-1SH
(Page 2 of 2)
PROJECT NO.: 1069
DATE COMPLETED: FEBRUARY 17, 1987
CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: H.S.A./NX CORE
LOCATION: Roosevelt Avenue
CRA SUPERVISOR: D. BLACK

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
30						
	Bedrock					
		544.6				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

(SHALLOW BEDROCK)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
PROJECT NO.: 1069
CLIENT: OCCIDENTAL CHEMICAL CORP.
LOCATION: PASNY Property

HOLE DESIGNATION: CMW-2SH

DATE COMPLETED: FEBRUARY 4, 1987
DRILLING METHOD: H.S.A./NX CORE
CRA SUPERVISOR: D. BLACK

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0		591.2	flush mount cover			
	Brown clayey SILT - some rock fragments (FILL) MOIST	589.73	locking cap	1	SS	18
				2	SS	18
5	Mottled red brown with brown and gray clayey SILT (NATIVE) MOIST			3	SS	11
	Red brown fine silty SAND - trace clay MOIST			4	SS	36
10			cement/ bentonite grout	5	SS	15
				6	SS	33
	Red brown clayey SILT - some gravel MOIST		4-inch diameter black steel casing	7	SS	22
15				8	SS	9
				9	SS	11
20				10	SS	4
	Red gray silty CLAY - occasional silty sand layer, trace pebbles WET		9-inch diameter borehole	11	SS	5
				12	SS	6
25				13	SS	26
	Red brown SILT - till, some pebbles WET			14	SS	126 /0.55'
		563.2	28.0 top of bedrock			
	Bedrock					
30						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

(SHALLOW BEDROCK)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
PROJECT NO.: 1069
CLIENT: OCCIDENTAL CHEMICAL CORP.
LOCATION: PASNY Property

HOLE DESIGNATION: CMW-2SH

DATE COMPLETED: FEBRUARY 4, 1987
DRILLING METHOD: H.S.A./NX CORE
CRA SUPERVISOR: D. BLACK

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
30						
35	DOLOMITE - bituminous olive green-gray, fine to medium grained, few fractures	548.2	3-inch diameter corehole			
40						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

(SHALLOW BEDROCK)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-3SH

PROJECT NO.: 1069
DATE COMPLETED: JANUARY 29, 1987
CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: H.S.A./NX CORE
LOCATION: North End - Lafayette Circle
CRA SUPERVISOR: D. BLACK

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0		583.5	flush mount cover			
	Black TOPSOIL - some silt and gravel (FILL) DRY	582.74	locking cap	1	SS	4
				2	SS	7
5	Red clayey SILT - some gray mettling, trace pebbles (NATIVE) DRY		cement/ bentonite backfill	3	SS	13
				4	SS	42
				5	SS	16
10			9-inch diameter borehole			
				6	SS	18
	Red gray silty CLAY - trace pebbles MOIST			7	SS	21
15						
				8	SS	5
			4-inch diameter black steel casing	9	SS	17
20	Red brown sand SILT - till, some pebbles MOIST			10	SS	23
				11	SS	160 /0.8'
		561.2	22.3 top of bedrock			
25						
	DOLOMITE - bituminous, brown-gray, fine to medium grained, many fractures		3-inch diameter borehole			
30						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

S T R A T I G R A P H I C A N D I N S T R U M E N T A T I O N L O G

(S H A L L O W B E D R O C K)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-3SH

PROJECT NO.: 1069
DATE COMPLETED: JANUARY 29, 1987
CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: H.S.A./NX CORE
LOCATION: North End - Lafayette Circle
CRA SUPERVISOR: D. BLACK

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
30						
35	DOLOMITE - bituminous brown-gray, fine to medium grained, many fractures	546.2	3-inch diameter corehole			
40						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

(SHALLOW BEDROCK)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-4SH

PROJECT NO.: 1069
DATE COMPLETED: JANUARY 15, 1987

CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: H.S.A./NX CORE

LOCATION: Midway - Lafayette Circle
CRA SUPERVISOR: D. BLACK

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS		ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0			575.6	flush mount cover			
	ASPHALT (FILL)	DRY					
			524.97	locking cap	1	SS	21
	GRAVEL (FILL)	DRY					
	Red clayey SILT - occasional silt occlusion, trace pebbles (NATIVE)	DRY		cement/ bentonite grout	2	SS	32
5	Red brown clayey SILT	DRY		9-inch diameter borehole	3	SS	24
	Red gravelly SILT	MOIST		4-inch diameter black steel casing	4	SS	34
10	Red brown SILT and SAND - till, some gravel	WET			5	SS	39
			564.4	11.2' top of bedrock			
15							
	DOLOMITE - bituminous, medium gray, fine to medium grained, few fractures						
20							
25			549.4				
30							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

(SHALLOW BEDROCK)

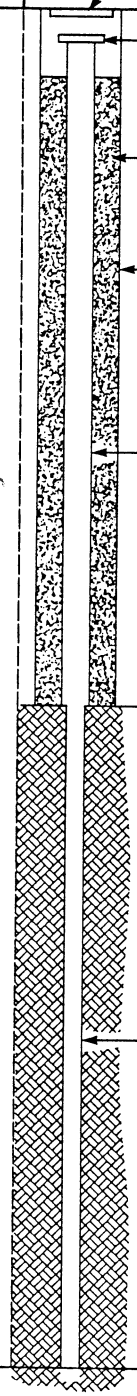
PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-5SH

PROJECT NO.: 1069
DATE COMPLETED: JANUARY 12, 1987

CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: H.S.A./NX CORE

LOCATION: Wyoming Avenue near Lafayette
CRA SUPERVISOR: D. BLACK

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS		ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0			584.7	flush mount cover			
	Black ASPHALT - (FILL)	DRY					
	GRAVEL - (FILL)	DRY	584.13	locking cap	1	SS	13
	CONCRETE - (FILL)	DRY					
	Mottled gray brown clayey SILT - (FILL)	DRY		cement/ bentonite grout	2	SS	18
5	Dark brown clayey SILT - (NATIVE)	MOIST			3	SS	14
	Mottled orange gray, brown clayey SILT - trace pebbles	MOIST		9-inch diameter borehole	4	SS	16
	Brown medium SAND	WET					
	Red brown clayey SILT - some pebbles	WET			5	SS	38
10	Weathered ROCK	WET		4-inch diameter black steel casing	6	SS	42
	Red SILT - till, some pebbles	WET			7	SS	122
15	Weathered Rock	WET	569.4	15.3' top of bedrock			
20	DOLOMITE - bituminous, brown-gray, coarse to medium grained, few fractures, no weathering						
				3-inch diameter corehole			
25							
	DOLOMITE - bituminous, gray, slightly brownish, fine grained, few fractures, little weathering						
30			554.4	30.3			



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

(SHALLOW BEDROCK)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-6SH

PROJECT NO.: 1069
DATE COMPLETED: FEBRUARY 11, 1987

CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: H.S.A./NX CORE

LOCATION: Wyoming Avenue near Hudson
CRA SUPERVISOR: D. BLACK

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0		573.3	flush mount cover			
	Silty GRAVEL (FILL) DRY	572.68	locking cap	1	SS	12
	Red brown clayey SILT - occasional lens of fine silty sand or gravel (NATIVE) DRY		cement/ bentonite grout	2	SS	36
5			9-inch diameter borehole			
	Weathered ROCK DRY	567.9	4-inch diameter black steel casing	3	SS	100 /.4'
			5.4' top of bedrock			
10			3-inch diameter corehole			
	DOLOMITE - bituminous, gray, slightly brownish, fine grained, few fractures, little weathering					
15						
20			20.4'			
25						
30						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

S T R A T I G R A P H I C A N D I N S T R U M E N T A T I O N L O G

(S H A L L O W B E D R O C K)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-7SH
PROJECT NO.: 1069
DATE COMPLETED: JANUARY 26, 1987
CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: H.S.A./NX CORE
LOCATION: Maryland Avenue at Felicetti's
CRA SUPERVISOR: D. BLACK

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0		612.1	flush mount cover			
	GRAVEL - some black cinders (FILL) DRY	611.16	locking cap	1	SS	16
	Red brown clayey SILT - (NATIVE) DRY					
	Red clayey SILT - till, some pebbles DRY		cement/ bentonite grout	2	SS	50
5	Gray brown, fine, clayey SAND - some rock fragments		9-inch diameter borehole	3	SS	100 /0.5'
	NO RECOVERY - 5.5 to 11.8 feet below grade		4-inch diameter black steel casing	4	SS	100 /0.2'
10				5	SS	6
		600.3	11.8' top of bedrock	6	SS	150 /0.8'
15						
	DOLOMITE - bituminous, brown-gray, fine to medium grained, many weathered fractures		3-inch diameter corehole			
20						
25						
		585.3				
30						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

(SHALLOW BEDROCK)

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS
HOLE DESIGNATION: CMW-8SH

PROJECT NO.: 1069
DATE COMPLETED: JANUARY 7, 1987

CLIENT: OCCIDENTAL CHEMICAL CORP.
DRILLING METHOD: H.S.A./NX CORE

LOCATION: Pennsylvania Avenue
CRA SUPERVISOR: D. BLACK

DEPTH ft BG	STRATIGRAPHY DESCRIPTION & REMARKS	ELEVATION ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
0		617.3	flush mount cover			
	Gray sandy GRAVEL - some silt (FILL) DRY	617.01	locking cap	1	SS	12
	Red brown clayey SILT - (NATIVE) DRY		cement/ bentonite grout			
			9-inch diameter borehole	2	SS	25
5	Red brown clayey SILT - till, some pebbles MOIST	611.4	4-inch diameter black steel casing	3	SS	100 /.4'
	DOLOMITE - argillaceous, brown-gray, fine to medium grained, highly fractured with occasional joint		5.9' top of bedrock			
10						
			3-inch diameter corehole			
15	DOLOMITE - bituminous, brown-gray, fine to medium grained, some fractures with occasional joint					
20		596.4	20.9			
25						
30						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS WATER FOUND STATIC WATER LEVEL

APPENDIX C

RECOVERY DATA

APPENDIX C

RECOVERY DATA

WELL #	DATE	TIME	DRAWDOWN (ft.)
CMW-10B	03/11/87	13:57:00	9.60
		13:59:00	9.51
		14:01:00	9.46
		14:07:00	9.24
		14:17:00	9.10
		14:27:00	8.96
		17:17:00	8.19
	03/12/87	11:41:00	5.40
CMW-20B	03/12/87	09:53:00	4.37
		09:53:30	4.36
		09:54:00	4.35
		09:55:00	4.33
		09:56:00	4.31
		09:57:00	4.29
		09:58:00	4.27
		10:03:00	4.16
		10:13:00	4.00
		10:23:00	3.83
		13:09:00	1.93
CMW-30B	03/11/87	16:33:30	5.19
		16:34:30	5.15
		16:35:30	5.14
		16:38:30	5.12
		16:46:30	5.10
		16:53:00	5.06
		17:03:00	5.06
	03/12/87	13:38:00	4.75
CMW-40B	03/09/87	15:32:30	0.99
		15:33:30	0.99
		15:34:30	0.99
		15:37:30	0.98
		15:47:30	0.96
		16:04:00	0.94
	03/10/87	10:16:00	0.85
		15:25:00	0.85
	03/12/87	13:57:00	0.81
CMW-50B	03/09/87	12:16:00	dry
		12:18:30	4.67
		12:21:00	4.62
		12:27:00	4.56

continued...

APPENDIX C

RECOVERY DATA

WELL #	DATE	TIME	DRAWDOWN (ft.)
CMW-50B (cont'd)		12:36:00	4.45
		12:56:00	4.31
		14:23:00	3.95
		16:28:00	3.55
	03/10/87	10:02:00	1.74
		15:35:00	1.44
	03/12/87	14:15:00	0.42
	03/09/87	08:51:00	dry
CMW-60B	03/10/87	15:47:00	0.19
	03/12/87	14:35:00	0.16
CMW-70B	03/10/87	14:09:30	0.05
		14:13:00	0.03
		14:15:30	0.00
		14:19:30	0.00
		14:26:00	0.00
	03/12/87	11:28:00	0.00
CMW-80B	--	--	dry

APPENDIX D

COPIES OF CHAIN OF CUSTODY FORMS

CRA Consulting Engineers
CONESTOGA-ROVERS & ASSOCIATES LIMITED
651 Colby Drive, Waterloo, Ontario Canada N2V 1C2
Telephone (519) 884-0510

SHIPPED TO (Laboratory name):
AES
GRAND ISLAND
WEEKS LAB

CHAIN OF CUSTODY RECORD

PROJECT Nº. 1069

PROJECT NAME: CMW Sampling Program

SAMPLER'S SIGNATURE _____ (SIGN)

SEQ. Nº.	SAMPLE Nº.	DATE	TIME	SAMPLE LOCATION	SAMPLE TYPE	Nº. OF CONTAINERS	REMARKS
1	Sample 1A	4/2/87	14:15	S-1	WATER	1	TOH
2	Sample 1B	4/2/87	14:15	S-1	WATER	1	HPLC
3	Sample 1C	4/2/87	14:15	S-1	WATER	1	Chlorobenzene &
4	Sample 1D	4/2/87	14:15	S-1	WATER	1	MCT & MCAA
				TOTAL Nº. OF CONTAINERS		4	

RELINQUISHED BY: (1) Bart Klootwijk (SIGN)	DATE/TIME 4/2/87 14:27 P	RECEIVED BY: (2) _____ (SIGN)	Sample 1C only
RELINQUISHED BY: (2) Bart Klootwijk (SIGN)	DATE/TIME _____	RECEIVED BY: (3) _____ (SIGN)	Sample 1B only
RELINQUISHED BY: (3) Bart Klootwijk (SIGN)	DATE/TIME 4/2/87 14:49 P	RECEIVED BY: (4) _____ (SIGN)	Sample 1A only
RELINQUISHED BY: (4) _____ (SIGN)	DATE/TIME _____	RECEIVED BY: (5) _____ (SIGN)	

METHOD OF SHIPMENT: AIR FREIGHT	SHIPPED BY: [illegible]	RECEIVED FOR LABORATORY BY: (SIGN) _____	DATE/TIME _____
CONDITION OF SEAL UPON RECEIPT: GENERAL CONDITION OF COOLER:		COOLER OPENED BY: (SIGN) _____	DATE/TIME _____

WHITE – ~~RECEIVING LABORATORY COPY~~ WEEKS LAB
YELLOW – ~~SHIPPER'S COPY~~ GRAND ISLAND
PINK – ~~CRA LABORATORY COPY~~ AES
GOLDEN ROD – CRA OFFICE COPY

001890

CRA Consulting Engineers
CONESTOGA-ROVERS & ASSOCIATES LIMITED
651 Colby Drive, Waterloo, Ontario Canada N2V 1C2
Telephone (519) 884-0510

SHIPPED TO (Laboratory name):
WCAP ONE
CAMBRIDGE
AES

CHAIN OF CUSTODY RECORD

PROJECT Nº.

PROJECT NAME :

SAMPLER'S SIGNATURE _____ (SIGN)

SEQ. Nº.	SAMPLE Nº.	DATE	TIME	SAMPLE LOCATION	SAMPLE TYPE	Nº. OF CONTAINERS	REMARKS
1	2				WATER	1	TCL
2	2		1615	2		1	TCL
3	2		1615	2	1	1	
				TOTAL Nº. OF CONTAINERS		3	

RELINQUISHED BY: 1 (SIGN)	DATE/TIME	RECEIVED BY: 2 (SIGN)	
RELINQUISHED BY: 2 (SIGN)	DATE / TIME	RECEIVED BY: 3 (SIGN)	
RELINQUISHED BY: 3 (SIGN)	DATE / TIME 1/7/87 1650	RECEIVED BY: 4 (SIGN)	
RELINQUISHED BY: 4 (SIGN)	DATE/TIME	RECEIVED BY: 5 (SIGN)	

METHOD OF SHIPMENT:	SHIPPED BY:	RECEIVED FOR LABORATORY BY: (SIGN)	DATE / TIME
CONDITION OF SEAL UPON RECEIPT: GENERAL CONDITION OF COOLER:		COOLER OPENED BY: (SIGN)	DATE / TIME

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CONESTOGA-ROVERS & ASSOCIATES LIMITED
651 Colby Drive, Waterloo, Ontario Canada N2V 1C2
Telephone (519) 884-0510

SHIPPED TO (Laboratory name): AES [illegible] [illegible] LAB

CHAIN OF CUSTODY RECORD

PROJECT Nº. 1069

PROJECT NAME: CALW Sampling [illegible]

SAMPLER'S SIGNATURE [signature] (SIGN)

SEQ. Nº.	SAMPLE Nº.	DATE	TIME	SAMPLE LOCATION	SAMPLE TYPE	Nº. OF CONTAINERS	REMARKS
1	Sample 3A	4/3/87	12:30	S-3	WATER	1	TOH
2	Sample 3B	4/3/87	12:30	S-3	WATER	1	HPLC
3	Sample 3C	4/3/87	12:30	S-3	WATER	2	MCB ACT, MCBTF
4	Sample 4A	4/3/87	12:00	S-4	WATER	1	TOH
5	Sample 4B	4/3/87	12:00	S-4	WATER	1	HPLC
6	Sample 4C	4/3/87	12:00	S-4	WATER	2	MCB ACT MCBTF
				TOTAL Nº. OF CONTAINERS		8	

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:
1 Bart Kloska (SIGN)	4/3/87, 2:55P Samples 3C & 4C	2 [signature] (SIGN)
2 Bart Kloska (SIGN)	4/3/87, 3:3?P Samples 3B & 4B	3 Jim [signature] (SIGN)
3 Bart Kloska (SIGN)	4/3/87, 4:05P Samples 3A & 4A	4 [signature] (SIGN)
4 (SIGN)		5 (SIGN)

METHOD OF SHIPMENT:	SHIPPED BY:	RECEIVED FOR LABORATORY BY: (SIGN)	DATE / TIME
CONDITION OF SEAL UPON RECEIPT: GENERAL CONDITION OF COOLER:		COOLER OPENED BY: (SIGN)	DATE / TIME

WHITE – ~~RECEIVING LABORATORY COPY~~ WORK [illegible] LAB
YELLOW – ~~SHIPPER'S COPY~~ GRAND ISLAND
PINK – ~~CRA LABORATORY COPY~~ AES
GOLDEN ROD – CRA OFFICE COPY

001379

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CONESTOGA-ROVERS & ASSOCIATES LIMITED
651 Colby Drive, Waterloo, Ontario Canada N2V 1C2
Telephone (519) 884-0510

SHIPPED TO (Laboratory name): WORKS LAB GRAND ISLAND AES

CHAIN OF CUSTODY RECORD

PROJECT №. 1169

PROJECT NAME: COMMUNITY MONITORING WELLS

SAMPLER'S SIGNATURE [signature] (SIGN)

SEQ. №.	SAMPLE №.	DATE	TIME	SAMPLE LOCATION	SAMPLE TYPE	№. OF CONTAINERS	REMARKS
1	5A	Apr 8/87	13:35	5	WATER	1	TCH
2	5B		13:35	5		1	HPLC
3	5C		13:35	5		2	MCR MCT [illegible]
4	6A		14:15	6		1	TCH
5	6B		14:15	6		1	HPLC
6	6C		14:15	6		2	MCR MCT [illegible]
7	7A		14:30	7		1	TCH
8	7B		14:30	7		1	HPLC
9	7C		14:30	7		2	MCR MCT [illegible]
10	8A		15:15	8		1	TCH
11	8C		15:15	8		2	1 x [illegible] MCR MCT [illegible]
				TOTAL №. OF CONTAINERS		15	

RELINQUISHED BY	DATE / TIME	RECEIVED BY
1 [signature] (SIGN)	4/8/87 4:37P [illegible]	2 (SIGN)
2 [signature] (SIGN)	4/8/87	3 [signature] (SIGN) [illegible] 5:70
3 [signature] (SIGN)	4/9/87 4:58P AC FAKATAEA	4 [signature] (SIGN)
4 (SIGN)		5 (SIGN)

METHOD OF SHIPMENT:	SHIPPED BY:	RECEIVED FOR LABORATORY BY: (SIGN)	DATE / TIME
CONDITION OF SEAL UPON RECEIPT: GENERAL CONDITION OF COOLER:		COOLER OPENED BY: (SIGN)	DATE / TIME

WHITE - ~~RECEIVING LABORATORY~~ COPY WORKS LAB
YELLOW - SHIPPER'S COPY GRAND ISLAND
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CRA Consulting Engineers
CONESTOGA-ROVERS & ASSOCIATES LIMITED
651 Colby Drive, Waterloo, Ontario Canada N2V 1C2
Telephone (519) 884-0510

SHIPPED TO (Laboratory name): WORKS LAB GRAND ISLAND AES

CHAIN OF CUSTODY RECORD

PROJECT Nº. 1069

PROJECT NAME: HYDE PARK COMMUNITY MONITORING WELLS

SAMPLER'S SIGNATURE [signature] (SIGN)

SEQ. Nº.	SAMPLE Nº.	DATE	TIME	SAMPLE LOCATION	SAMPLE TYPE	Nº. OF CONTAINERS	REMARKS
1	9A	4/9/87	09:15	9	WATER	1	TOH
2	9B	4/9/87	09:15	9		1	HPLC
3	9C	4/9/87	09:15	9		2	MCB MCT MCB-F
4	11A	4/9/87	10:00	11		1	TOH
5	11B	4/9/87	10:00	11		1	HPLC
6	11C	4/9/87	10:00	11		2	MCB MCT [illegible]
7	[illegible]B	4/9/87	[illegible]	[illegible]		1	[illegible]
[illegible]	[illegible]A	[illegible]	[illegible]			[illegible]	[illegible]
[illegible]	[illegible]	4/9/87	[illegible]	[illegible]		1	[illegible]
10	10C	4/9/87	14:00	10		2	MCB MCT [illegible]
11	TRIP BLANK	—	—	—		1	WORKS LAB [illegible]
			TOTAL Nº. OF CONTAINERS		17	

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:
1 [signature] (SIGN)	4/9/87, 3:50 P	[illegible] TRIP BLANK 2 (SIGN)
2 [signature] (SIGN)	4/9/87, 4:16 P	[illegible] 3 [signature] (SIGN)
3 [signature] (SIGN)	4/9/87, 4:34 P	[illegible] 4 [signature] (SIGN)
4 (SIGN)		5 (SIGN)

METHOD OF SHIPMENT:	SHIPPED BY:	RECEIVED FOR LABORATORY BY: (SIGN)	DATE/TIME

CONDITION OF SEAL UPON RECEIPT: GENERAL CONDITION OF COOLER:	COOLER OPENED BY: (SIGN)	DATE/TIME

WHITE - RECEIVING LABORATORY COPY
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