PHILIPS ECG, INC.
Seneca Falls, New York
GROUNDWATER MONITORING

IMPLEMENTATION OF ALTERNATE
GROUNDWATER MONITORING SYSTEM

AUGUST 11, 1986

Prepared By: S. G. McGuire

Reviewed By: R. W. Anderson

Approved By: W. Zabban

Project No.: 2887-05

The Chester Engineers

Engineers
Architects
Planners

P.O. Box 9356
Pittsburgh
Pennsylvania 15225-0356
412 269-5700
Telex 855450

PhilipsECG

Philips ECG, Inc.
50 Johnston Street
Seneca Falls NY 13148
(315) 568-5881

FEDERAL EXPRESS

August 14, 1986

Mr. William Smith
Solid Waste Branch
New York Permit Section
U. S. Environmental Protection Agency
Region II
26 Federal Plaza, Room 905
New York, New York 10278

Dear Mr. Smith:

Re: Philips ECG, Inc., Seneca Falls, New York - EPA I.D. #NYD002246015

Enclosed please find one (1) copy of the Alternate Groundwater System as prepared by our consultants, The Chester Engineers. This is an addendum to the Closure Plan submitted on July 30, 1986.

Very truly yours,

Edward E. Chase

Edward E. Chase, Manager
Facilities Engineering

/aep
Enc.

cc: Ms. Tracey Bell - EPA/New York
Mr. Timothy Henderson - EPA/New York
Ms. Susan Lin - EPA/New York
Mr. James Bologna - NYSDEC/Albany
Mr. Robert McNamee - NYSDEC/Albany
Mr. Vincent Dick - NYSDEC/Avon
Mr. Mahmoud Khalil - NYSDEC/Avon
Mr. Stephen McGuire - Chester Engineers
Mr. Walter Zabban - Chester Engineers
D. W. Fisher, Esq. - NAPC/New York
Mr. A. R. Covell
E. V. Egert, Esq.

BUREAU OF HAZARDOUS WASTE TECHNOLOGY

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DECLARATION

I certify that I am a qualified Geologist experienced in hydrogeological analyses associated with hazardous waste management. I have reviewed the report prepared by The Chester Engineers dated August 11, 1986 for the Implementation of an Alternate Groundwater Monitoring System. I hereby declare that the contents of that report comply with the stipulations of 6NYCRR 373-3.6(d)(4)(iii) relative to the requirements for the Philips ECG Surface Impoundments at the Seneca Falls New York facility.

Robert W. Anderson

Robert W. Anderson, C.P.G. 6120
Senior Project Geologist

PHILIPS ECG, INC.
SENECA FALLS, NEW YORK

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PHILIPS ECG, INC.
SENECA FALLS, NEW YORK

I. SUMMARY OF ALTERNATE SYSTEM

A. MONITORING HISTORY

At the initiation of the RCRA groundwater monitoring program Philips ECG requested a variance from the monitoring requirements due to the low permeability of the glacial till beneath the site. The variance request was denied and in March 1983 the installation of a conventional RCRA leak detection system began with six monitoring wells. Due to the low yield of the till aquifer additional wells were placed in both the till and bedrock units in an attempt to define a sampling network which would satisfy regulatory requirements for hydraulic configuration, ability to meet sampling protocols, and the capability to detect any leakage from the hazardous waste management area. By November 8, 1985 a total of 16 wells were present at the site. Due to the complex site hydrogeology and natural geochemistry it has proven to be impractical to implement a conventional RCRA monitoring system. This document outlines Philips implementation of an Alternate Groundwater Monitoring System.

B. GROUNDWATER QUALITY STATUS

The sixteen monitoring wells have been sampled to the greatest extent practical for the full RCRA Year One parameter list. The monitoring of the entire 16 well network has not provided evidence that the impoundment facilities are leaking. The complex range of geochemical environments displayed by the bedrock wells is due to the presence of salt and gypsum evaporite deposits. The bedrock aquifer does not meet the RCRA requirements for being an aquifer immediately capable of detecting contamination. Furthermore, groundwater in the till aquifer flowing on or in immediate proximity to the bedrock may acquire bedrock aquifer quality attributes.

C. REGULATORY BASIS

Groundwater monitoring requirements are defined by 6NYCRR 373-3.6. Section 373-3.6(a)(4) provides for the implementation of an alternate groundwater monitoring system when it is known that statistical differences in Indicator Parameters would require the submittal and implementation of a Groundwater Quality Assessment Plan. The alternate monitoring system is therefore being implemented by the Section 373-3.6(d)(1)(i) provision for confirmation of whether hazardous waste or hazardous waste constituents have entered the groundwater.

D. ALTERNATE SYSTEM

The glacial till aquifer is the unit requiring monitoring. Existing monitoring wells will be utilized. The upgradient wells will be MW-1 and MW-13. The downgradient wells will be MW-12, MW-16 and the triad MW-4/14/15. All wells MW-1 through MW-16 will be used for groundwater elevation determinations. The alternate system provides a contingency plan if MW-4/14/15 do not yield sufficient water. The contingency is for the installation of an additional monitoring well/ lysimeter beneath the settling lagoon after the closure removal of contaminated material. The alternate system provides for variances from normal sampling and analysis protocols to account for low well yields and small sample volumes.

E. APPENDICES OF BACKGROUND DOCUMENTS

This report contains headings for a great deal of background information on the Philips site. Much of the information has been discussed in detail in ongoing groundwater monitoring reports. The text of the alternate system documentation therefore contains only brief summaries of information with detailed documentation in a series of appendices. Where new issues are involved, the text contains the necessary information and supporting documentation.

II. SITE HYDROGEOLOGY

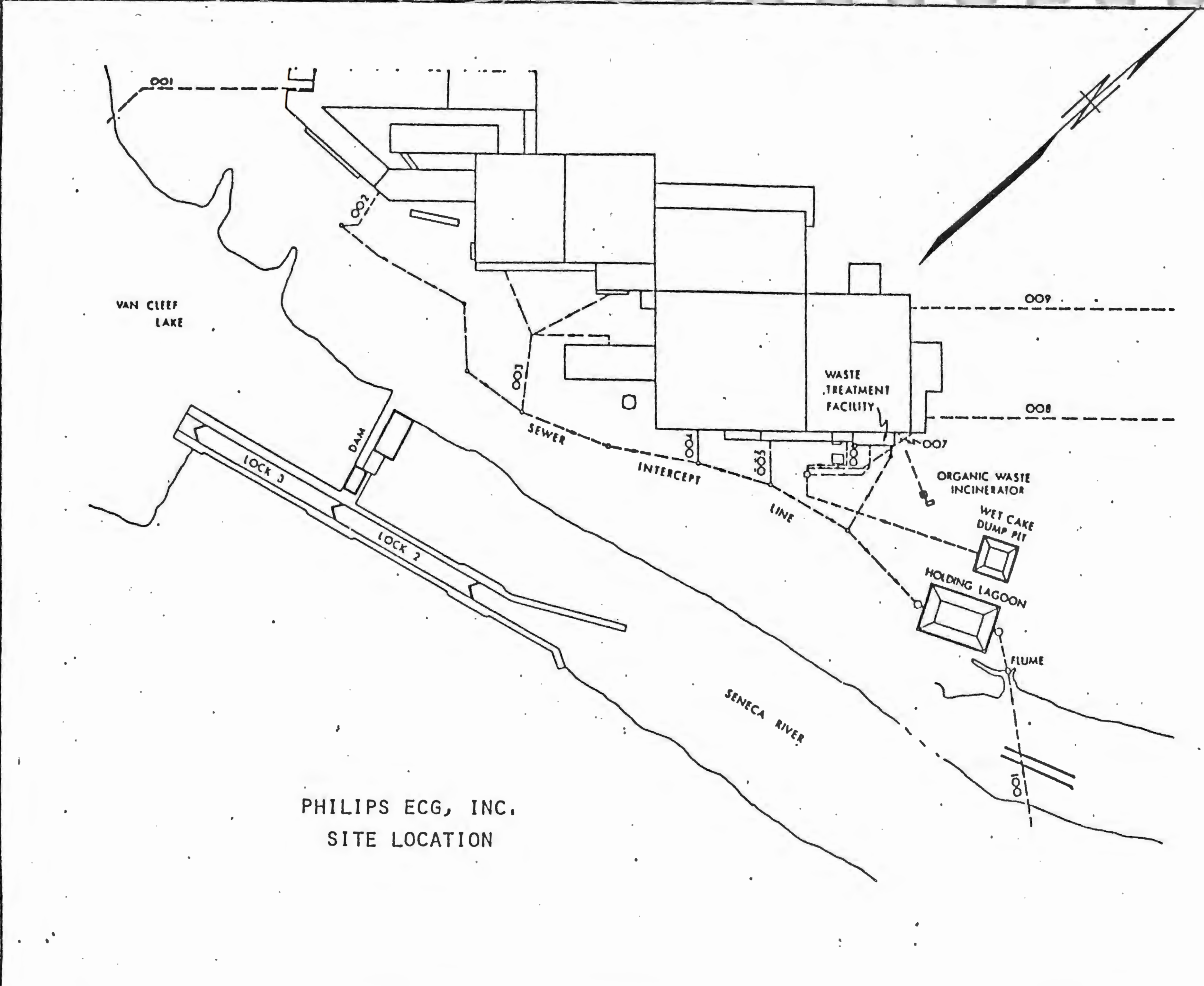
A. REGIONAL SETTING

Seneca Falls is located on a glacial till plain extending north to Lake Ontario. The Seneca River, Figure II-1, flows from west to east along the southern edge of the Philips property. The old falls on the Seneca River were located on the western Philips property boundary. The present dam causes a 50 foot difference in water elevations and provides for a marked hydrogeologic discontinuity along the escarpment which fronts the Philips property. The settling lagoon ranges from 40 to 70 feet from the edge of the escarpment and the 60 foot drop to the Seneca River.

The regional bedrock dip is 30-35 feet to the southwest. The uppermost bedrock units beneath the waste management area are the Bertie Limestone and Camillus shale of the Salina Formation. The most significant aspect of the bedrock is the extensive presence of both gypsum (calcium sulfate) and salt (sodium chloride). Regionally, groundwater from the Salina units may be highly mineralized with either chloride or sulfate or both. The bedrock beneath the impoundments is covered with 25-35 feet of dense glacial till.

B. MONITORING WELL INSTALLATION DETAILS

A total of 16 monitoring wells are present in the vicinity of the waste management area as indicated on Figure II-2. There are eleven wells in the upper glacial



PHILIPS ECG, INC.
SITE LOCATION

The Chester Engineers

DWN. BY:

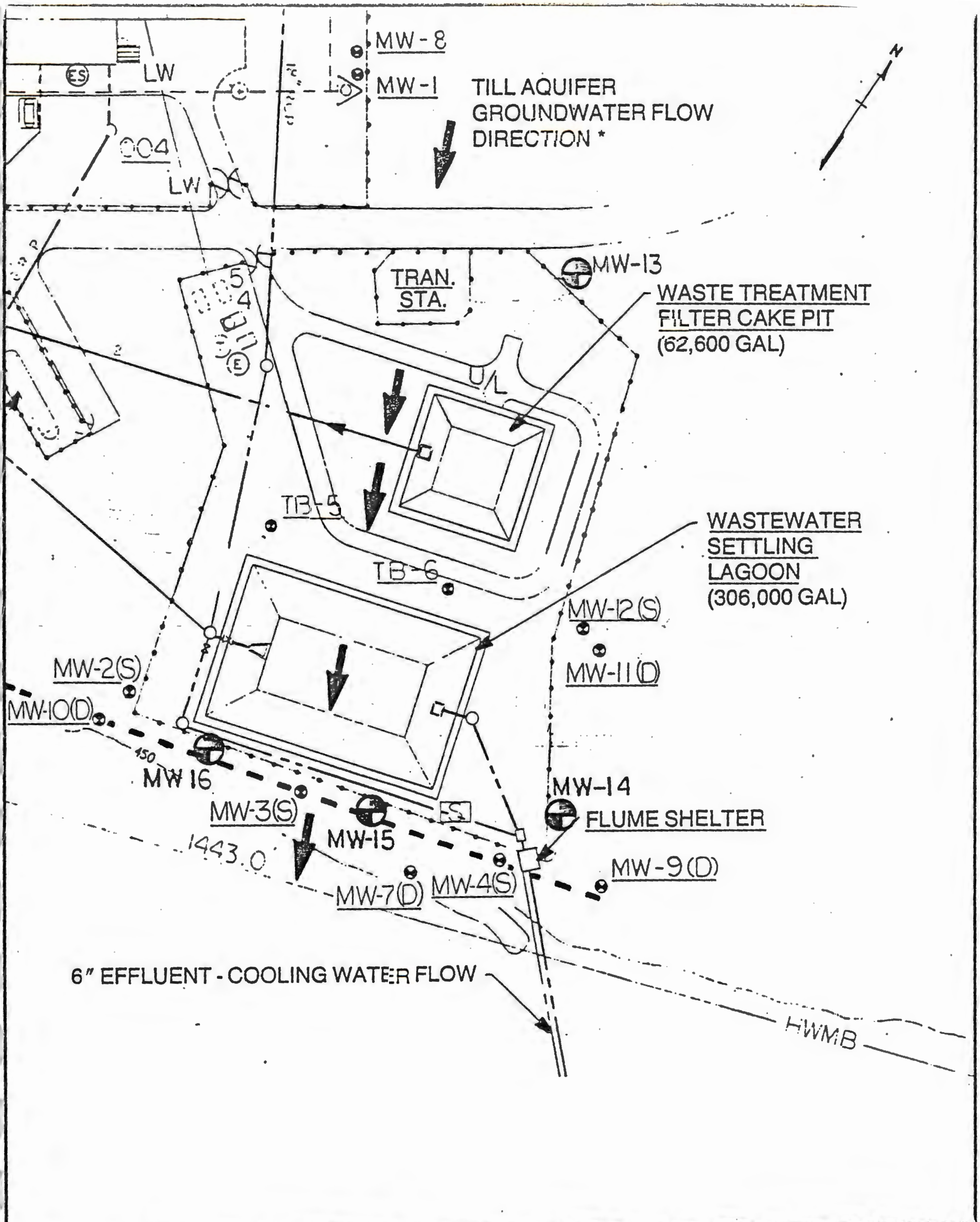
SCALE:

DATE

SHEET NO.

DWG. NO.
FIGURE
II-1

PHILIPS ECG, INC
SENECA FALLS, N.Y
SITE LOCATION



The Chester Engineers	SHEET NO.	PHILIPS ECG, INC. SENECA FALLS, NEW YORK
DWN.BY: SGM / SCALE: 1"=80' / DATE November 1985	DWG. NO. FIGURE II-2	GROUNDWATER MONITORING NETWORK
CHK'D.BY: / APPR.BY:		

till aquifer and five wells in the deeper bedrock aquifer. Table II-1 provides a summary of monitoring well physical data. Test boring records and well construction details are located in Appendices A and B.

C. PERMEABILITY OF TILL AQUIFER

The general permeability of the glacial till overburden is in the range of 10^{-5} to 10^{-6} cm/sec as determined by field slug tests and laboratory analysis. The low permeabilities mean that there is only a small potential supply of deep seepage through the till aquifer available for recharge to the deeper bedrock units. Sand stringers within the till are likely the main mechanism for water transport. The low permeabilities provide a limitation on the amount of water available for sampling and analysis purposes.

D. HYDROGEOLOGIC INTERPRETATIONS

The bedrock surface contours, Figure II-3, are clearly defined by the test boring records. The bedrock surface slopes in a southeasterly direction beneath the waste management area. The water level data in Table II-1 is amplified in Table II-2 and Figure II-4 for the wells in the alternate system network for the till aquifer. Figure II-5 is an east-west cross-section along the face of the escarpment showing the relationships between the bedrock surface, monitoring well construction, and static water levels.

As indicated on Figure II-2 groundwater in the till aquifer flows in a general southeast direction across

TABLE II-1

A.R.Covell
4/29/86

MONITOR WELL DATA - PHILIPS ECG, INC.

WELL NUMBER	DATE INSTALLED	USGS TOP OF CASE ELEV.(FT.)	USGS GROUND ELEV.(FT.)	USGS BEDROCK ELEV.(FT.)	USGS SCREEN TOP ELEV.(FT.)	USGS SCREEN BOTTOM ELEV.(FT.)	USGS 3/11/86 STATIC WATER ELEV.(FT.)	BORE LOG WELL DEPTH (FT.)	WELL CASE/ ANNULUS I.D. (INCHES
PHASE I									
MW-1	3/12/83	462.13	459.33	(429	439.39	429.39	455.85 Pump in place	30.0	4 / 9
MW-2	3/10/83	449.19	445.95	425	434.75	424.75	ND/Wet	22.0	4 / 9
MW-3	3/10/83	446.0	443.20	419	430.03	420.03	ND/Wet	24.5	4 / 9
MW-4	3/9/83	444.56	441.96	417	428.80	418.80	ND/Wet	26.0	4 / 9
TB-5	3/8/83	457.47	454.36	(424	434.90	424.90	ND/Wet	30.0	1.7 / 6
TB-6	3/12/83	457.22	454.39	422	431.65	421.65	ND/Wet	32.5	1.7 / 6
PHASE II									
MW-7	9/29/83	443.12	440.52	417	382.00	362.62	382.07 Pump in Place	80.0	4 / 6
PHASE III									
MW-8	2/29/84	461.91	459.67	425	(Open Bore hole) (421-309.67 Ft.)		380.16 Pump in Place	150.0	0 / 6 (uncased)
MW-9	3/1/84	443.86	441.89	415	380.00	360.89	382.84 Pump in Place	85.0	4 / 6
MW-10	3/3/84	448.81	446.31	417	383.00	363.31	383.06 Pump in Place	84.0	4 / 6
PHASE IV									
MW-11	7/12/84	455.94	453.42	413	373.00	354.92	358.32	98.0	4 / 6
MW-12	7/10/84	456.27	453.60	420	421.00	411.60	417.10	42.0	4 / 8.75
PHASE V									
MW-13	10/30/85	459.56	456.39	421.39	431.59	421.79	421.31 10 Ft. reservoir	47.0	1.7 / 8
MW-14	11/4/85	446.44	443.11	417.78	427.53	417.69	ND/Wet 10 Ft. reservoir	35.33	1.7 / 8
MW-15	11/7/85	445.32	442.84	419.34	427.84	417.84	ND/Wet 10 Ft. reservoir	33.5	1.7 / 8
MW-16	11/8/85	448.90	444.93	423.43	432.08	422.95	424.01 10 Ft. reservoir	32.0	1.7 / 8

Note: Bottom of Filter Cake Pie = 445.69
Bottom of Settling Lagoon = 437.69

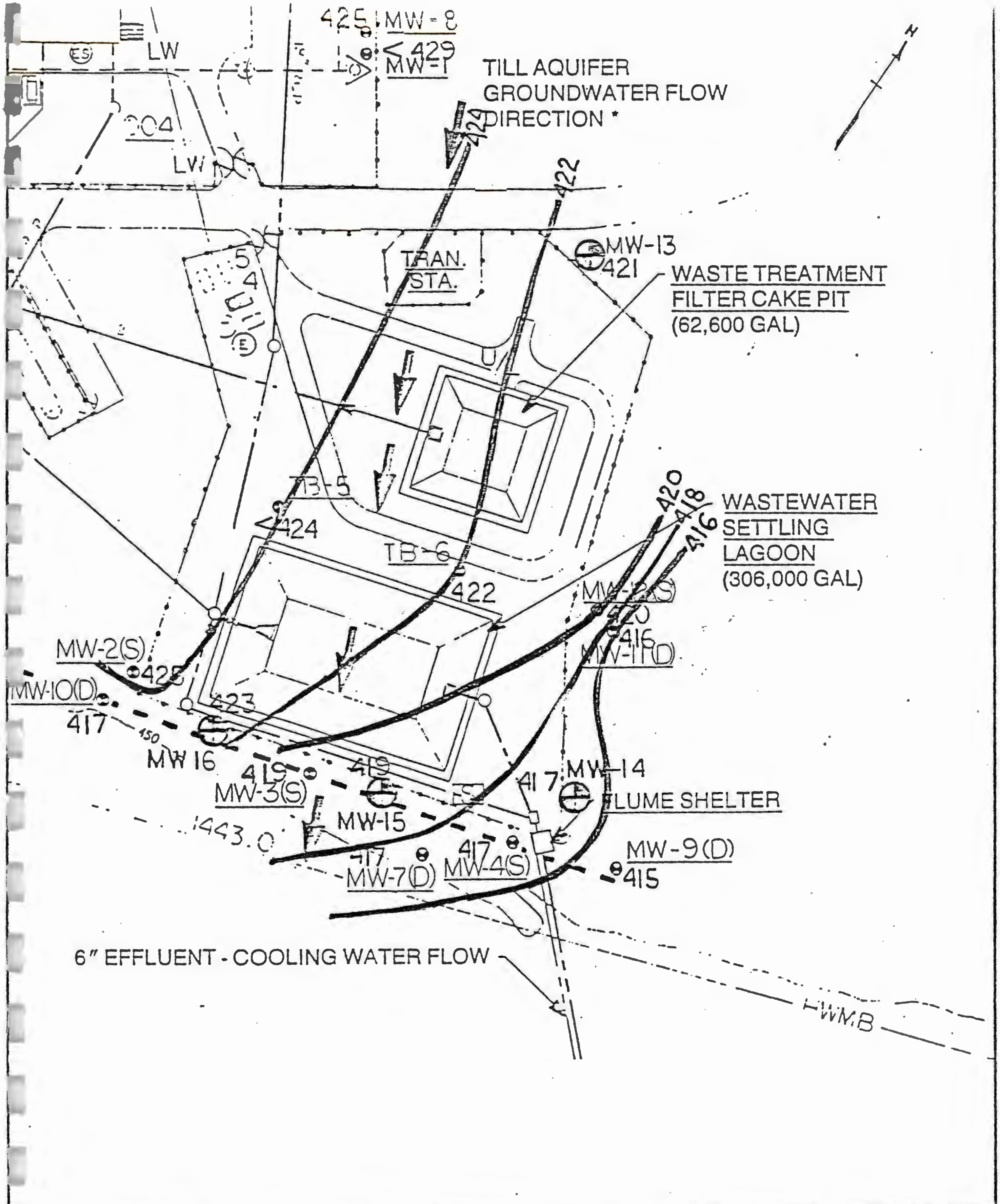
TABLE II-2

PROPOSED SHALLOW NETWORK

Well No.	Date Installed	USGS TOP OF WELL CASE (FT.)	USGS GROUND ELEVATION (FT.)	USGS BED-ROCK ELEVA-TION (FT.)	USGS SCREEN TOP ELE-VATION (FT.)	USGS SCREEN BOTTOM ELEVA-TION (FT.)	BORE LOG WELL DEPTH (FT.)	WELL CASE I.D./ BORE HOLE DIAM. (IN.)	USGS STATIC WATER LEVEL DATA BEFORE PURGING (FT.) 3/83 1st Qtr.	6/83 2nd Qtr.	9/83 3rd Qtr.	12/83 4th Qtr.	3/84 1st Qtr.	6/84 2nd Qtr.	9/84 3rd Qtr.	12/84 4th Qtr.	3/85 1st Qtr.	6/85 2nd Qtr.	9/85 3rd Qtr.	12/85 4th Qtr.	3/86 1st Qtr.	6/86 2nd Qtr.
13 (Upgrad-ient)	10/30/85	459.56	456.39	421.39	431.59	421.79	47.0	1.7/8	------------------ 10 Ft. Reservoir Below Well Screen ---------------------											421.74	421.31	421.41
12	7/10/84	456.27	453.60	420.0	421.00	411.60	42.0	4/8.75	--						416.65	416.50	417.44	417.06	416.27	416.88	417.10	416.91
16	11/8/85	448.90	444.93	423.43	432.08	422.95	32.0	1.7/8	-------------------10 Ft. Reservoir Below Well Screen----------------------											424.08	424.01	424.12
4	3/9/83	444.56	441.96	417.0	428.80	418.80	26.0	4/9	419.86	421.12 Slug Test Water	418.80 Dry	418.80 Dry	*	419.11	418.92	418.95	420.21	418.91	418.91	419.96	419.36	419.90
14	11/4/85	446.44	443.11	417.78	427.53	417.69	35.33	1.7/8	-------------------10 Ft. Reservoir Below Well Screen----------------------											408.87	408.55	408.55
15	11/7/85	445.32	442.84	419.34	427.84	417.84	33.5	1.7/8	-------------------10 Ft. Reservoir Below Well Screen----------------------											416.67 Slug Test Water ?	409.79	409.79

*Chester records/Start Semi-annual Monitoring

A.R. Covell
7/21/86
/md



The Chester Engineers

DWN.BY: SGM	SCALE: 1"=80'	DATE November 1985	SHEET NO.	PHILIPS ECG, INC. SENECA FALLS, NEW YORK
CK'D BY:	APPR.BY:		DWG. NO. FIGURE II-3	BEDROCK SURFACE CONTOURS

COMPARATIVE STATIC WATER LEVELS IN PROPOSED MONITOR WELL NETWORK (7/16/86)

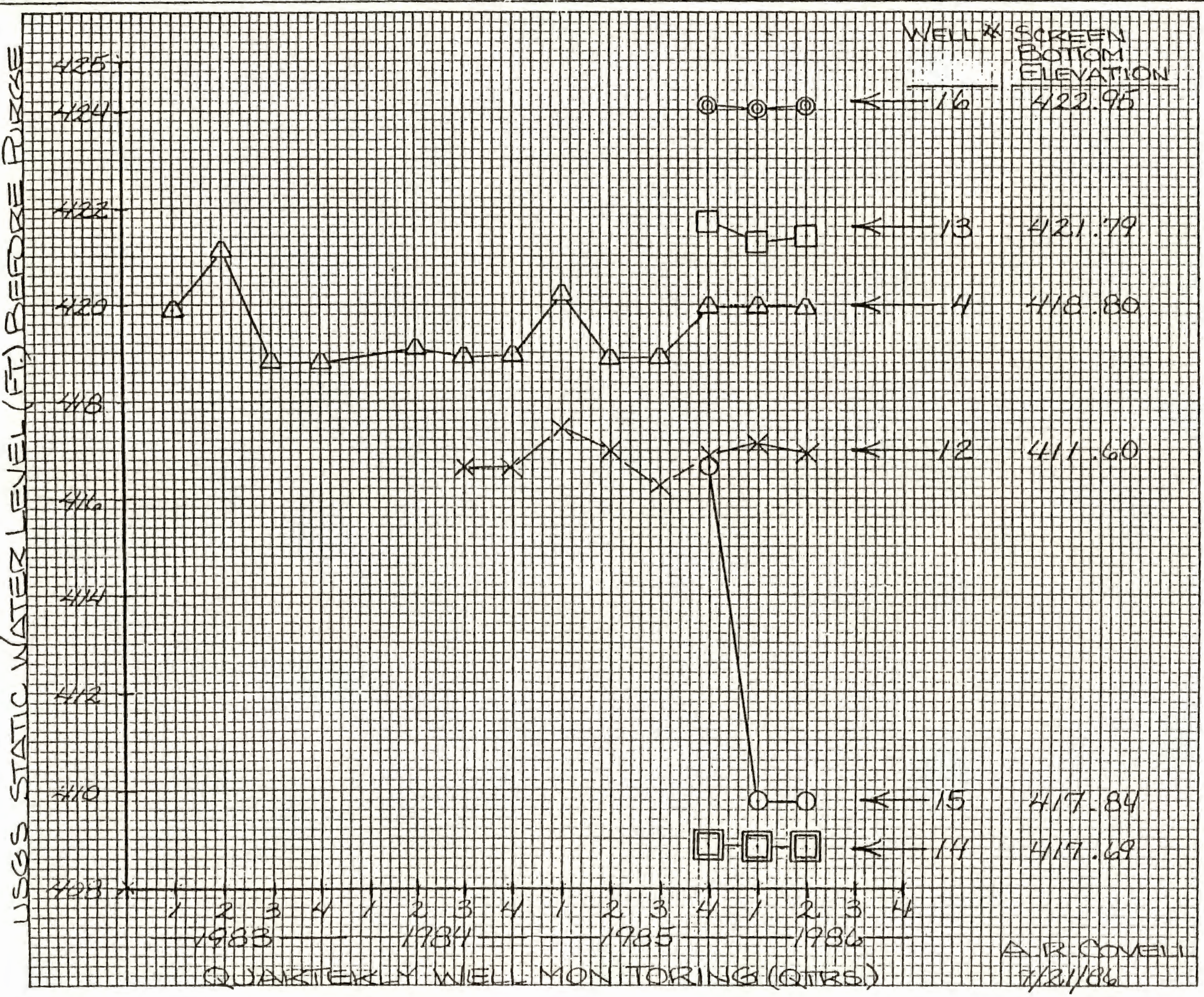
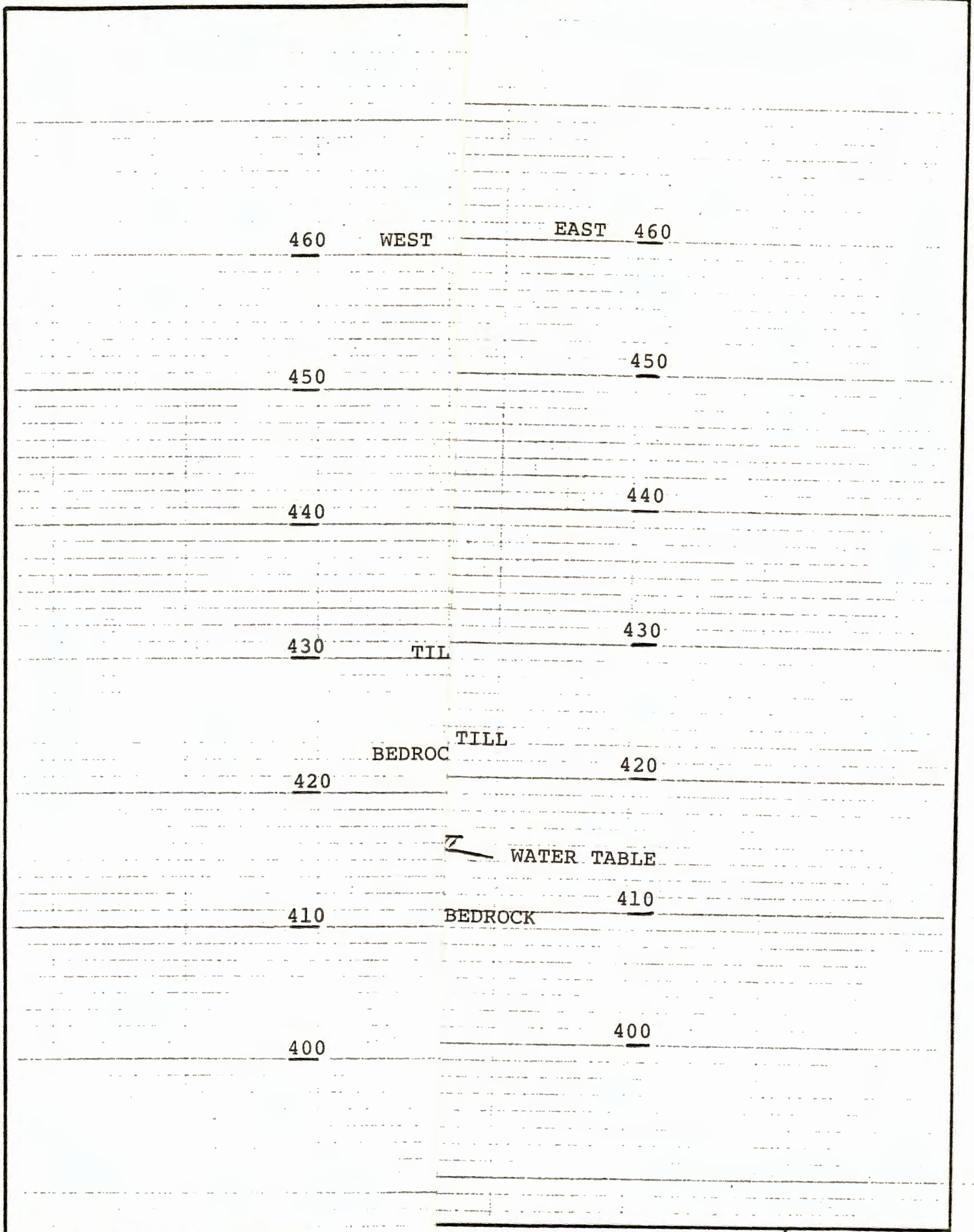


FIGURE II-4



Drawn By: SGM	Scale: H 1"=40' V 1"=10'	FALLS, NEW YORK IONSHIPS AT ERFACE	Dwg. No. FIGURE II-5
Checked By:	Date: AUGUST 1986		
Approved By:			

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UNING

the waste management area exiting in the face of the escarpment at the till/bedrock interface. Evaporation at the escarpment face is a controlling factor in limiting the physical presence of water at the contact. Beneath most of the site, the till aquifer is represented by a thin zone of water flowing across the surface of the bedrock. The nature of the till aquifer has caused great difficulty in the acquisition of reliable water level data.

The position of the water table at the time of sampling with respect to the bottom of the well screen is an important aspect in determining the validity of the data according to RCRA protocols. This is especially important for those wells (MW-13 through MW-16) which have blank reservoir pipes below the till/bedrock contact. RCRA protocols require that a static level within the well screen be present at the time of sampling. This is to prevent the sampling of stagnant water.

Figure II-4 shows the time history of water level elevations with respect to screen bottom elevations. It should be noted that screen bottom elevations are calculated from drilling records and may be in error by several tenths of a foot. Downgradient wells MW-12 and MW-16 definitely have free flow conditions through the screen. Well MW-4 has periodically exhibited flow through the screen. Upgradient well MW-13 periodically has flow through the well screen within measurement accuracy and has yielded adequate volumes of water for sampling. Downgradient wells MW-14 and MW-15 have only yielded small amounts of water in the reservoirs and have not yet exhibited flow through conditions.

III. GROUNDWATER QUALITY

A. IMPOUNDMENT QUALITY

The particulate matter in the filter cake dump pit consists primarily of calcium fluoride although there is some calcium sulfate present. With respect to sulfate, chloride is a minor constituent. Analysis of standing water in the dump pit showed fluoride at 6.1 mg/L, sulfate at 964 mg/L, and chloride at 41 mg/L. Lead is the most significant metal with minor levels of chromium and cadmium.

The settling lagoon has been routinely monitored for compliance with SPDES effluent limitations. Monitored waste constituents have included fluoride, lead and trichloroethylene.

The two waste impoundments have never been sampled for all parameters covered by the groundwater monitoring requirements. Phase I of the Groundwater Quality Assessment Plan outlined in Section IV of this document provides for additional sampling of the impoundments for the groundwater monitoring parameters.

B. TILL/BEDROCK LEACHATE CHARACTERISTICS

Field observations during drilling indicated the presence of evaporite deposits in the bedrock within a few inches of the till/bedrock interface. ASTM Method A water leachate tests were run on till and bedrock samples as outlined in Appendix C. Chloride was either absent or in trace quantities. Sulfates were 36 mg/L in the till leachate but ranged from 1133 mg/L to 1586 mg/L in the bedrock leachate. This indicates the presence of gypsum proximate to the till/bedrock interface. Groundwater quality interpretations may thus be complicated by the fact that groundwater flowing on or in immediate proximity to the bedrock may acquire bedrock quality attributes through the processes of dispersion and capillary transport.

C. OVERBURDEN TILL AQUIFER

The First Quarter 1986 Monitoring Report, Appendix D, provides an overview of till aquifer quality. The high sulfates and conductivities observed in MW-12 and MW-13 correspond to the previously documented bedrock leachate influences. The presence of chloride in MW-12 but not in the bedrock leachate indicates the variability of the bedrock influence. The wells between the settling lagoon and escarpment face in general exhibit better quality than the upgradient wells. Philips is of the opinion that the absence of any hazardous waste constituents or other leachate indicators such as fluoride demonstrate that there is no adverse environmental impact from the Philips surface impoundments on the till aquifer.

D. BEDROCK AQUIFER

The bedrock aquifer exhibits an extreme range of geochemical environments ranging from a brine in MW-11 to minimal chlorides and sulfates in MW-9. Minor violations of the drinking water limit for lead have been periodically observed. Lead mineralization in the carbonates and gypsum may account for the observed lead concentrations. The bedrock aquifer has been documented as being geochemically inappropriate for RCRA detection monitoring purposes.

E. MOBILITY/DEGRADATION OF POTENTIAL CONTAMINANTS

No site specific studies have been performed on the mobility/degradation characteristics of potential contaminants. In general there should be relatively little attenuation of the common ions such as fluoride or sulfate. Significant lead sorption would be expected in the immediate vicinity of the base of the impoundments. Some sorption of organics would be expected.

F. SUMMARY

A large groundwater quality database now exists for both the till and bedrock aquifers. Philips is of the opinion that there is no evidence in any monitoring well that the RCRA impoundment facilities are detectably impacting groundwater quality. The complex range of geochemical environments displayed by the bedrock wells is due to the presence of salt and gypsum evaporite deposits. The bedrock aquifer does not meet the RCRA requirements for being an aquifer capable of detecting contamination. A further complicating factor is that groundwater flowing on or in immediate proximity to the bedrock may acquire bedrock aquifer quality attributes through the processes of dispersion and capillary transport. This will be a confounding factor in the interpretation of waste constituent parameters.

IV. GROUNDWATER QUALITY ASSESSMENT PLAN

A. ASSESSMENT PLAN REQUIREMENTS

A Groundwater Quality Assessment Plan must be capable of determining:

1. Whether hazardous waste or hazardous waste constituents have entered the groundwater;

2. The rate and extent of migration of hazardous waste or hazardous waste constituents in the groundwater; and

3. The concentration of hazardous waste or hazardous waste constituents in the groundwater.

The alternate monitoring system will be implemented within the framework of a groundwater quality assessment plan even though no contamination from the RCRA impoundments has been observed or suspected. The assessment plan provides a sequential series of investigations to document impoundment source quality and confirmation sampling of the alternate monitoring network. The assessment program will consist of three phases as follows:

Phase I - Document Impoundment Quality

Phase II - Assessment/Confirmation of Site Specific Hazardous Waste Constituents and Indicators

Phase III - Determination of Extent of Contamination

Based on current site information only Phase I and II activities are detailed and proposed for implementation at this time. The results of Phase II will determine the need for the definition of any additional Phase III activities.

B. ASSESSMENT PLAN IMPLEMENTATION

I. Phase I - Document Impoundment Quality

Phase I will consist of a one time sampling of the two impoundments for the purpose of documenting potential leakage quality which will take place coincident with the initial sampling of the alternate detection system.

Standing water and sludge samples will be obtained from each impoundment. Potential leachate quality from the sludge will be determined by using the EP toxicity extraction procedure both with and without the addition of acid. The total metals content will also be determined for each sludge sample. Water samples will be analyzed for the site specific constituents defined by DEC/EPA as being applicable for the Seneca Falls facility. The analysis parameters are as follows:

<u>Indicator</u> - pH
Conductivity
Total Organic Carbon
Total Organic Halogen

<u>Inorganic</u> - Chloride
Sulfate
Fluoride

<u>Metals</u> - Cadmium
Total Chromium
Lead
Zinc
Calcium
Magnesium
Sodium

Phase I will result in a better understanding of how to interpret the groundwater quality database for evidence of any interactions with the Philips hazardous waste facilities.

II. Phase II - Assessment/Confirmation Sampling

The assessment/confirmation of whether any hazardous waste constituents have entered the groundwater is the primary component of the assessment plan. The required sampling will be implemented via the alternate system described in detail in Section V of this document.

The output of Phase II will be a determination of whether the Philips facility may continue in a routine detection monitoring mode or whether it will be necessary to implement a Phase III Determination of Extent of Contamination.

V. ALTERNATE MONITORING SYSTEM

A. MONITORING WELL NETWORK

Alternate System 1

This is the primary monitoring system which will be immediately implemented using existing monitoring wells. The wells in the system are as follows:

Upgradient: MW-1, MW-13
Downgradient: MW-12, MW-16, MW-4/14/15

Three wells MW-4/14/15 will constitute a single down-gradient monitoring point. The primary well of the triad is MW-4. If MW-4 yields adequate sampling volumes the other two wells will not be sampled. If MW-4 lacks adequate volume, water from MW-14 and MW-15 will be utilized as necessary to form a composite sample.

Alternate System 2

This is a contingency plan if the MW-4/14/15 triad does not yield sufficient water for RCRA protocol sampling. After removal of contaminated material from the settling lagoon, a backhoe will be used to excavate to water at the southeast corner of the lagoon. Depending on the observed nature of the groundwater system at the till/bedrock interface an additional monitoring well/lysimeter will be installed in the excavation. This location would then be used to replace the MW-4/14/15 triad.

Groundwater elevations will continue to be recorded for all monitoring wells, MW-1 through MW-16 and for the Seneca River.

B. SAMPLING PROTOCOL

The overall protocol for groundwater sampling, Appendix E, has been established since 1983 as documented in the original well installation report and should be followed. Full EPA protocol will be observed to the maximum practical extent. Additional special provisions are outlined in this section to account for low sample volume procedures.

1. All low sample volume procedures for any specific sampling period will be documented in the field logs and laboratory reports.

2. For the purposes of this protocol, stagnant water is defined as that which has been in a well for a period of greater than seven days since the last purging of the well.

3. The use of purged water for analytical purposes is not acceptable as part of RCRA protocols.

4. Water which has recharged into a well within a period of seven days since the last purging is not considered to be stagnant water and is deemed to be acceptable for analytical purposes as part of these RCRA protocols. The recharge period will be kept to the minimum necessary to obtain sufficient sample volume. but not to exceed 7 days.

complete sampling within 14 days of purging first well, max of 7 days/well

5. All sampling for any monitoring period shall be accomplished within 14 days of the time that the initial purging takes place. If sufficient water for analysis has not been accumulated within this time period, it should be so noted in the field logs.

Sampling will progress in the following sequence based on water availability:

1. Measure water levels and determine whether the static water level is within the screened section for flow through conditions.

2. Purge each individual well according to the normal EPA protocols.

3. Purged water may be retained for non-RCRA protocol evaluations but any such evaluations are not acceptable in lieu of RCRA protocol samples.

4. Wells MW-1, MW-13, MW-12, and MW-16 will be sampled individually.

5. Well MW-4 will be sampled individually if adequate water is available. If there is insufficient water from MW-4, samples will be obtained from MW-14/15 as necessary and the resultant sample should be noted as representing a composite sample. When sampling MW-14/15 if either well MW-14 or MW-15 has adequate water for a complete sample, then that well should be sampled. If both wells

have adequate water, the well with the fastest recharge rate should be sampled.

6. If samples for any well are collected over a several day period for compositing purposes, field pH and conductivity measurements should be obtained on each day's sample volume provided that sufficient water is available.

7. Where sample volume is limiting sample bottles should be filled in the following order: metals, inorganics, total organic halogen, total organic carbon.

8. Care should be taken to ensure that sample holding times are not exceeded. Shipment of partial samples sets to the laboratory may be necessary.

C. ANALYSIS PARAMETERS

Groundwater samples will be analyzed for the site specific constituents defined by DEC/EPA as being applicable for the Seneca Falls facility. The analysis parameters are as follows:

<u>Indicator</u> - pH
Conductivity
Total Organic Carbon
Total Organic Halogen

<u>Inorganic</u> - Chloride
Sulfate
Fluoride

Metals - Cadmium
Total Chromium
Lead
~~Zinc~~
Calcium
~~Magnesium~~
Sodium

add Nickel

D. ANALYSIS PROTOCOLS

Laboratory procedures will follow SW-846 protocols wherever possible. Table V-1 outlines EPA reference procedures and required sample volumes. Where sample volume is limited, small aliquot methods will be used and documented as necessary to achieve the required parameter coverage. Table V-1 presents alternate procedures and sample volumes.

E. EVALUATION PROCEDURES

Groundwater elevations will be reviewed after each sampling event to determine the hydraulic relationships for each well and for the well network as a whole to ensure that monitoring protocol requirements are still being met.

TABLE V-1

GROUND WATER MONITORING - WATER SAMPLE ANALYSES

Parameter	EPA Procedure Sample Volume	EPA Procedure Reference	Alternate Procedure Sample Volume	Alternate Procedure Reference
Lead	50-100 ml.	*Sect.302D, 303 or 304	20 ml.	With digestion EPA 200.7
Zinc	"	" " "	"	" "
Cadmium	"	" " "	"	" "
Silver	"	" " "	"	" "
Chrome (Total)	"	" " "	"	" "
Copper	"	" " "	"	" "
Calcium	"	" " "	"	" "
Sodium	"	" " "	"	" "
Magnesium	"	" " "	"	" "
Sulfate	100 ml.	* Sect. 426C	5 "	Absorbence Cell (CUVET)
Chloride	100 ml.	* Sect. 407A	5 "	Ion Selective Electrode
Fluoride	300 ml.	* Sect. 413A & B	20 "	No Digestion 413B
pH	10 ml.	* Sect. 423	1 "	Microelectrode
Conductivity	75 ml.	* Sect. 205	50 "	With (1) rinse of cell.
TOC	100 ml.	** Sect. SW846-9060		No Available Alternate
TOX	500 ml.	** Sect. SW846-9020		No Available Alternate
TTO	3785 ml.	** Sect. SW846 - Var. Sections		No Available Alternate

* - Reference - Standard Methods For Determination of Water and Wastewater, 16th Ed., 1985

** - SW846 Refer to Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, July 1982

Note: The 20 ml. sample will be digested for total metals determination using an Inductivity Coupled Plasma Spectrometer following EPA method 200.7 published in FR Vol. 49 No. 209, October 26, 1984. All metals will be determined using the single 20 ml. aliquot.

E. E. Chase
7/21/86

VI. SCHEDULE OF IMPLEMENTATION

A. SAMPLING

The Assessment Plan Monitoring will be initiated during the 3rd Quarter (July-September) 1986. This is the next scheduled sampling period under the current groundwater evaluation program. Four additional quarters of assessment monitoring will be collected for the well network for the Indicator, Inorganic and Metals parameter lists. Thereafter, sampling will occur semi-annually for indicators and annually for other parameters if no hazardous waste constituents are detected.

B. STATISTICAL EVALUATIONS

Indicator parameter statistical evaluations are not required as part of an assessment monitoring program. However, if hazardous waste constituents are observed at concentrations greater than drinking water limits, statistical confirmation may be required.

C. REPORTING

Quarterly sampling reports will be submitted during the first year of the Assessment Program. If changes in indicator parameters occur which cannot be reconciled with the known site geochemistry modifications to the sampling schedule may be required.

The Initial Determination of Findings report on the Groundwater Quality Assessment Program will be issued in the 3rd Quarter 1987 either with the fourth quarter monitoring report or as soon as technically feasible. If it is concluded that no hazardous waste constituents have been detected, then Philips will terminate the Groundwater Quality Assessment program and implement the semi-annual detection monitoring program.

APPENDIX A

Status Review of RCRA
Groundwater Monitoring Program
September 25, 1985

PHILIPS ECG, INC.
Seneca Falls, NY

Report on
STATUS REVIEW OF RCRA
GROUNDWATER MONITORING PROGRAM

JUNE 1985
REVISED SEPTEMBER 25, 1985

Prepared by: S. G. McGuire

Approved by: W. Zabban, P.E. Walter Zabban

Project No.: 2887-07

TheChesterEngineers

Engineers
Architects
Planners

P.O. Box 9356
Pittsburgh
Pennsylvania 15225
412 269-5700
Telex 812423

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PHILIPS ECG, INC.
SENECA FALLS, NEW YORK

SUMMARY
STATUS REVIEW OF RCRA GROUNDWATER MONITORING PROGRAM

This report which is a revision of the June 1985 report contains additions made as a result of a meeting between representatives of the New York State Department of Environmental Conservation, the United States Environmental Protection Agency, Philips ECG, Inc., and The Chester Engineers in Seneca Falls, NY, on July 27, 1985.

The report discusses the hydrogeologic and geochemical processes operational at the Philips Seneca Falls facility.

It is Chester's opinion that the existing monitoring well system (12 wells) greatly exceeds to the RCRA saturated zone monitoring requirement for this site and that present DEC/EPA objections are unreasonable. The present well network monitors several aquifers and geochemical environments. The till aquifer flowing south toward the Seneca River is the uppermost water table unit and the unit requiring leak detection monitoring. This and only this aquifer should be monitored. All reasonable attempts have been made to achieve saturated zone monitoring in the till aquifer at the downgradient edge of the hazardous waste management zone near the escarpment. There is often insufficient water to obtain adequate sample volume. A variance from the monitoring regulations is needed to provide for sampling when groundwater is unavailable in sufficient volume to follow normal sampling and analysis protocols.

Chester believes that the hydraulic evidence indicates that the well network of MW-1, 2, 3, 4, and 12 provides the earliest possible and best leak detection system that is within the framework of the hydrogeologic system and the intent of RCRA groundwater monitoring.

In summary, monitoring of the entire monitoring well network has not provided evidence that the Philips hazardous waste impoundment facilities are leaking. The groundwater quality data base does not show any evidence of environmental hazards in the groundwater system above background conditions.

PHILIPS ECG, INC.
SENECA FALLS, NEW YORK

I. INTRODUCTION

RCRA Interim Status groundwater monitoring was initiated at the Philips Seneca Falls, New York facility in March 1983 with the installation of four monitoring wells. Due to uncertainty on the part of the regulatory agencies, twelve monitoring wells have been installed in an attempt to satisfy the regulatory agency concerns.

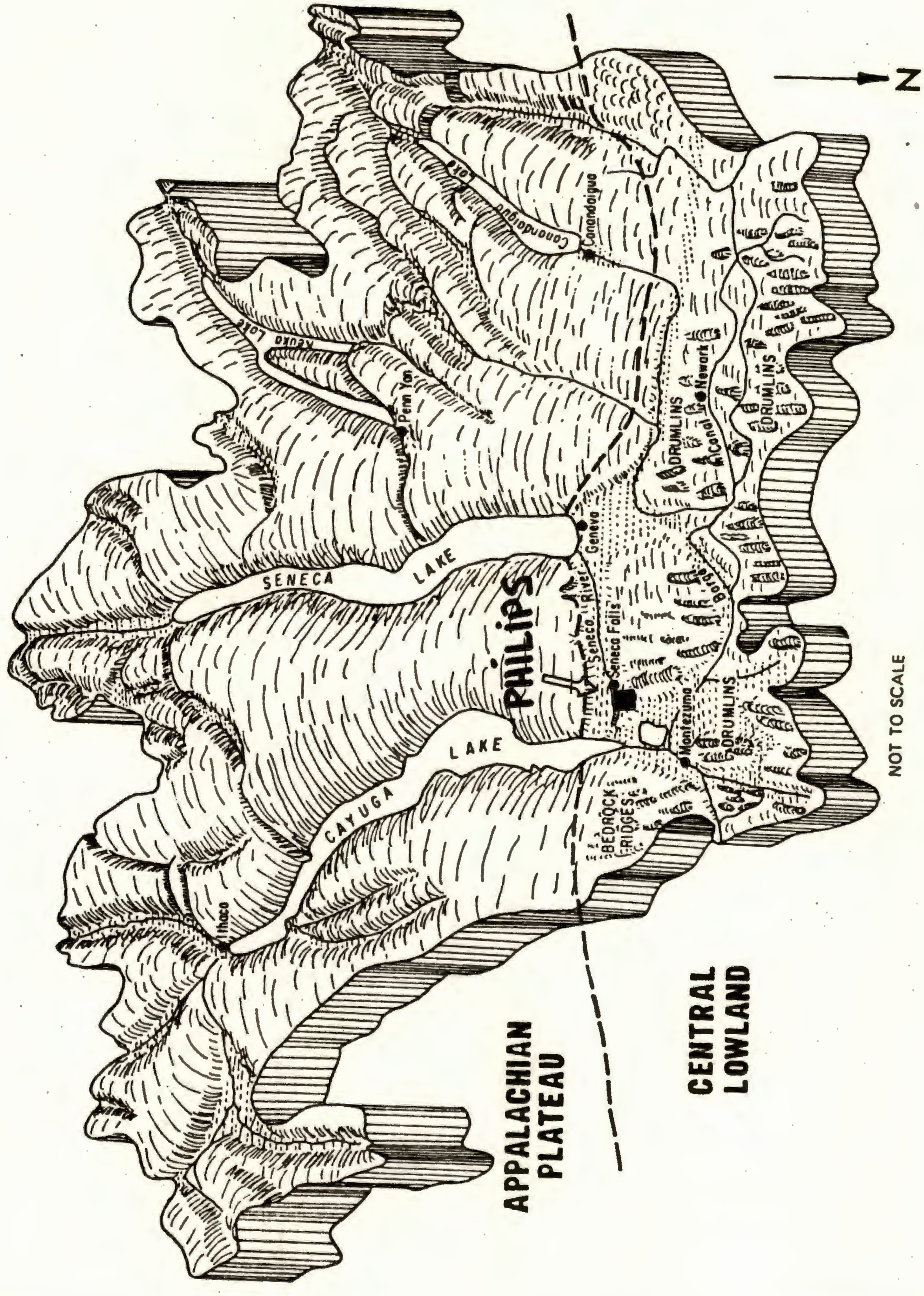
By letter dated February 15, 1985 Philips was notified by EPA of deficiencies in the RCRA Part B permit application. One of the requested items was a discussion of the present status of the monitoring program. This is in addition to specific line item requests for additional information. The present report has been prepared in response to the EPA request. Chapters II, III and IV present summary discussions on the site hydrogeology, groundwater quality, and conclusions as to the present state of the monitoring program. Chapter V presents responses to the various NOD items.

II. SITE HYDROGEOLOGY

A. REGIONAL SETTING

Seneca Falls is located in the Central Lowland province of the Western Oswego River Basin (Figure II-1). This area is largely a glacial till plain extending northward to Lake Ontario. The Seneca River provides outlet drainage from Seneca Lake to Cayuga Lake and thence to the Oswego River and New York State Barge Canal. The old falls on the Seneca River were located on the western Philips property boundary. The location of the present dam which has caused the falls to be submerged is shown on Figure II-2. The normal minimum operating level on Van Cleef Lake is 428.24 feet. The minimal seasonal navigation level downstream on the Seneca River is 378.94 feet. The fifty foot difference in water elevations provides a marked hydrogeologic discontinuity along the Philips river front property. The previous eroding action of the falls left a sharp escarpment which fronts the Philips property. This escarpment has a height of about 60 feet in the vicinity of the Philips settling lagoon. The lagoon ranges from about 40 to 70 feet from the edge of the escarpment.

The escarpment provides an excellent exposure of the bedrock beneath the Philips facility. Two bedrock units are exposed; the Bertie Limestone and the Camillus Shale. Figure II-3 is a portion of the 1909



TheChesterEngineers			SHEET NO.	PHILIPS ECG, INC SENECA FALLS N.Y GEOMORPHIC PROVINCES II-2
DWN.BY:	SCALE:	DATE	DWG. NO. FIG.II-1	
CHK'D.BY:	APPR.BY:			

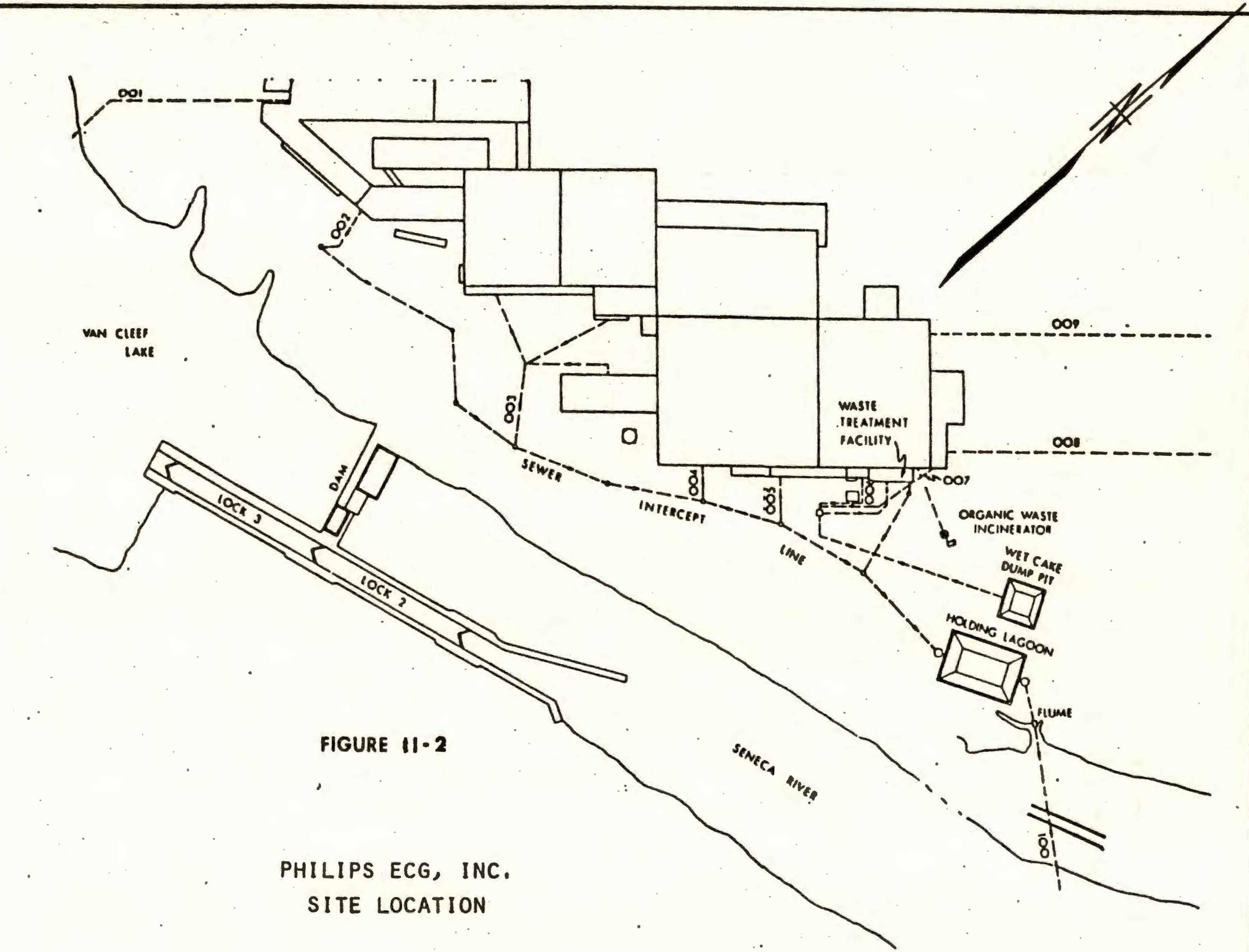


FIGURE II-2

PHILIPS ECG, INC.
SITE LOCATION

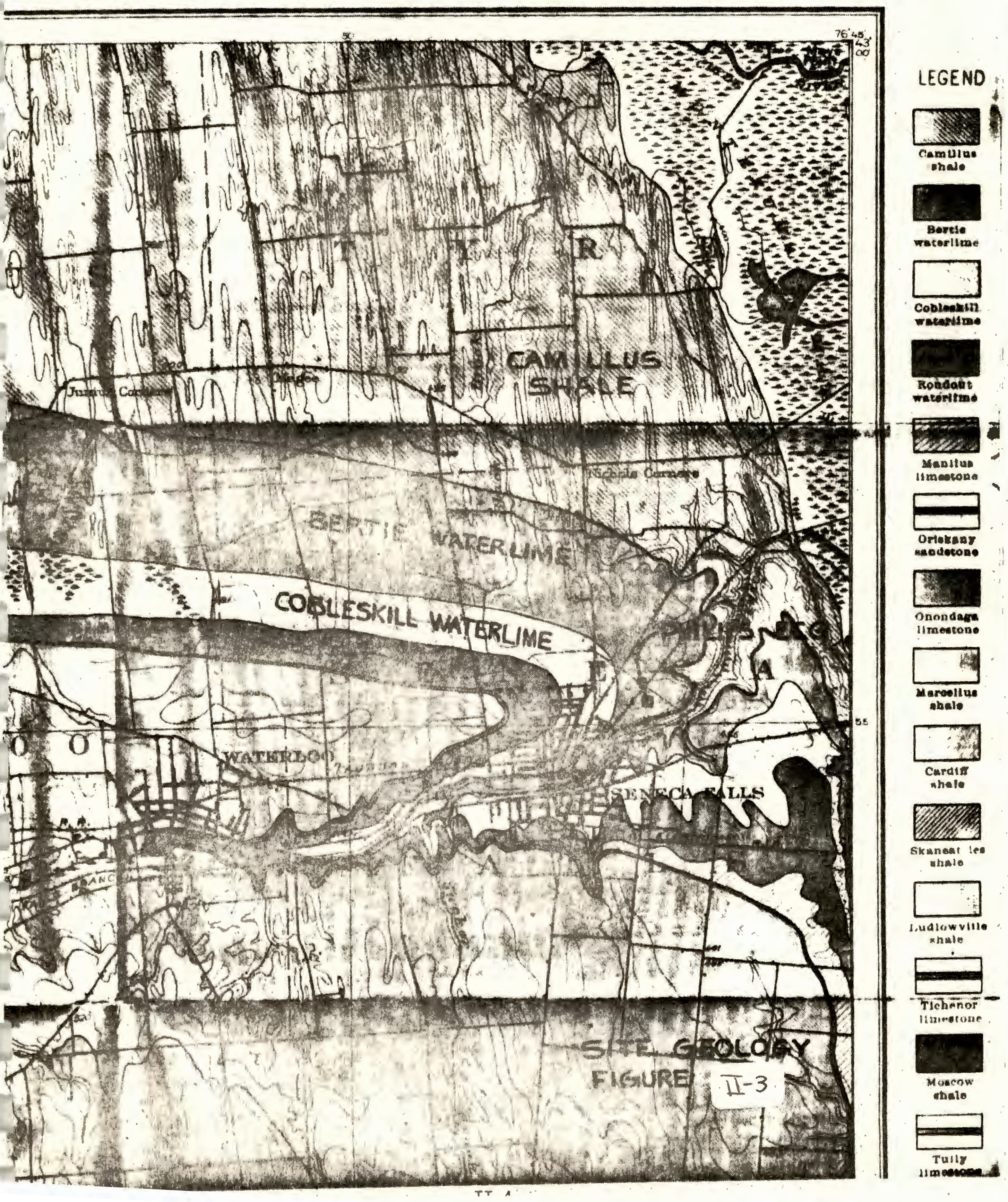
TheChesterEngineers

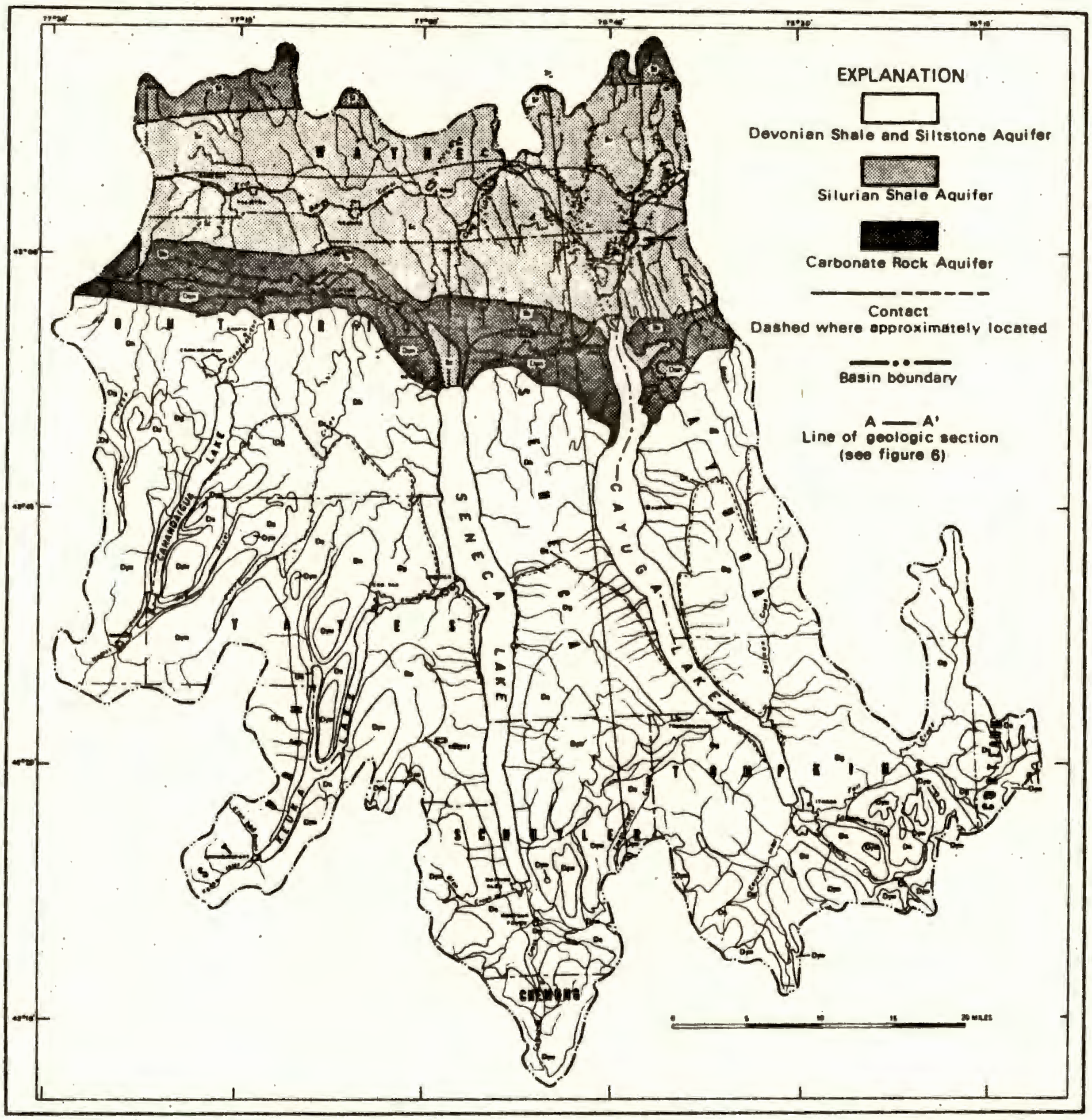
DWN.BY: | SCALE: | DATE
CHK'D.BY: | APPR.BY:

SHEET NO.

DWG. NO. FIG II-2

PHILIPS ECG, INC
SENECA FALLS, N.Y
SITE LOCATION


LEGEND
Camillus shale
Bertie waterlime
Cobleskill waterlime
Rondout waterlime
Manlius limestone
Oriskany sandstone
Onondaga limestone
Marcellus shale
Cardiff shale
Skaneateles shale
Ludlowville shale
Tichenor limestone
Moscow shale
Tully limestone
CAMILLUS SHALE
BERTIE WATERLIME
COBLESKILL WATERLIME
WATERLOO
SENECA FALLS
SITE GEOLOGY
FIGURE II-3
76°45'
55



EXPLANATON

DEVONIAN
- Djw — Java and West Falls Formation
- Ds — Sonyea Formation
- Dg — Genesee Formation
- Dt — Tully Limestone
- Dh — Hamilton Group
- Don — Onondaga Limestone (including Helderberg Group and Oriskany Sandstone)

SILURIAN
- Sb — Silurian Carbonate Rock (including Cobleskill Limestone, Bertie Limestone, and Arkon Dolomite)
- Sc — Camillus Shale
- Sv — Vernon Shale
- Sl — Lockport Dolomite

-Bedrock geology of the Western Oswego River basin.

TheChesterEngineers			SHEET NO.	PHILIPS ECG, INC
			DWG. NO.	SENECA FALLS NY
DWN.BY:	SCALE:	DATE	FIG II-4	REGIONAL BEDROCK GEOLOGY
CHK'D.BY:	APPR.BY:			

The Chester Engineers

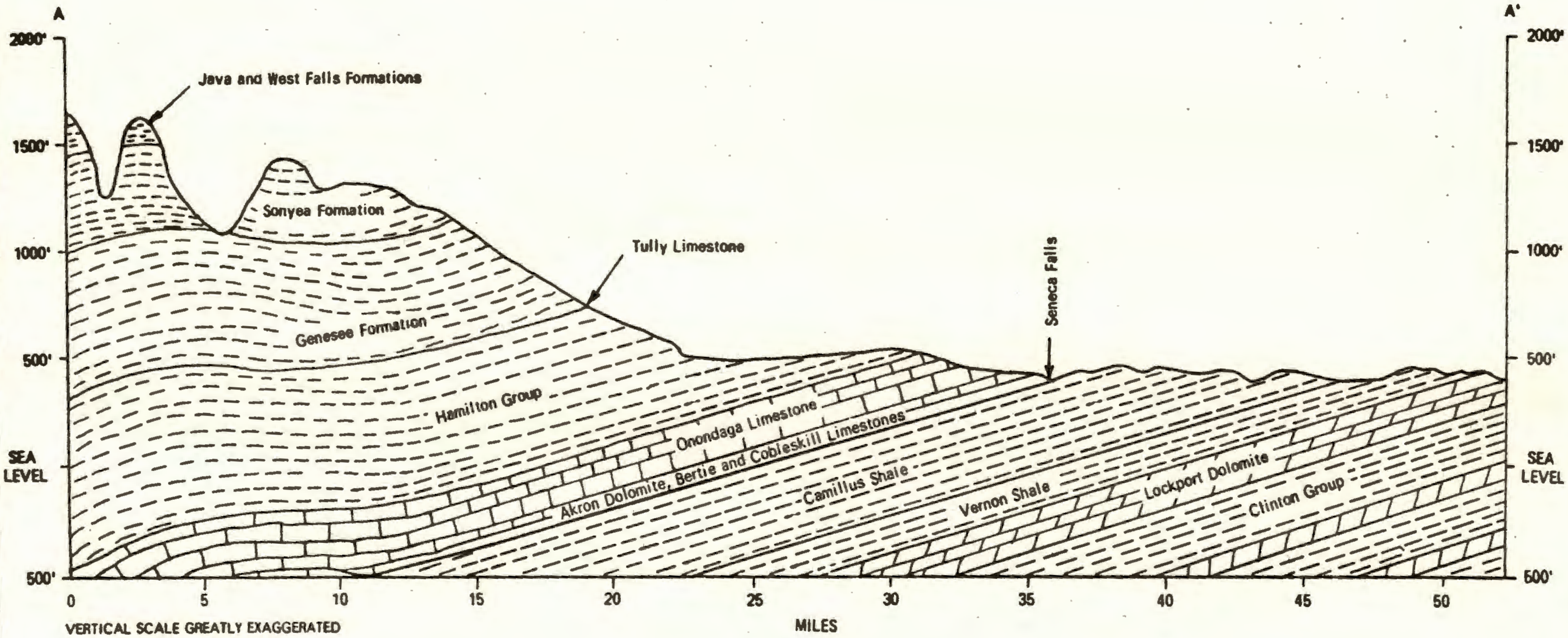
DWN. BY: | SCALE: | DATE

CHK'D. BY: | APPR. BY:

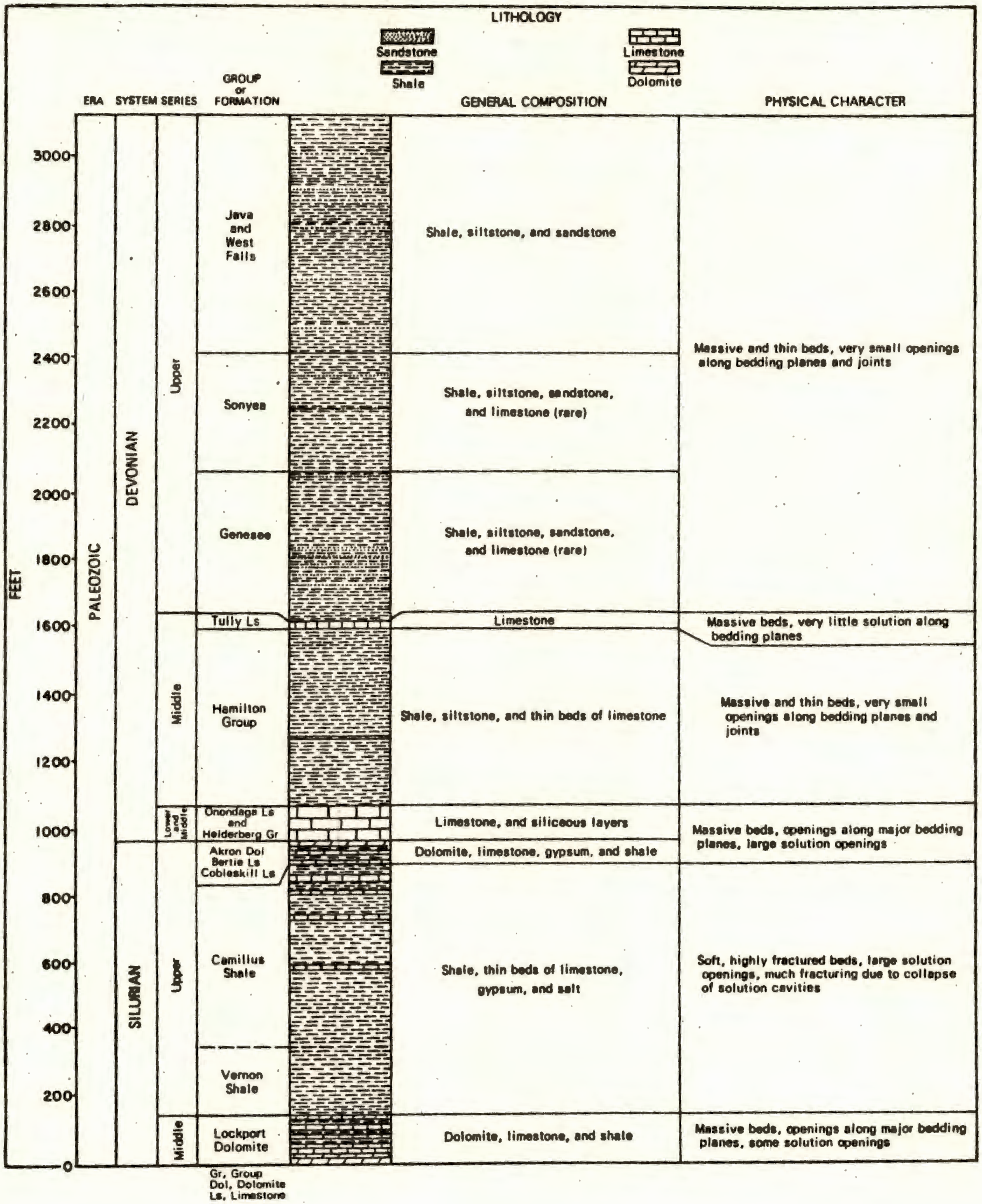
SHEET NO.

DWG. NO. FIG II-5

PHILIPS ECG. INC
SENECA FALLS N.Y.
REGIONAL GEOLOGIC
CROSS-SECTION



--Geologic section; line of section shown in figure II-4



.--Generalized stratigraphic column of bedrock in the Western Oswego River basin.

The Chester Engineers			SHEET NO.	PHILIPS ECG. INC
DWN.BY:	SCALE:	DATE	DWG. NO. FIG II-6	SENECA FALLS NY
CHK'D.BY:	APPR.BY:			STRATAGRAPHIC COLUMN

Geologic Map of the Geneva and Ovid Quadrangles and shows the position of these two units. Figure II-4 is a more general bedrock geologic map. Cross-section AA' cuts through Seneca Falls and is presented as Figure II-5. Figure II-6 is a generalized stratigraphic column of the bedrock units. The regional bedrock dip is 30-35 feet per mile to the southwest.

The Bertie Limestone and Camillus Shale are the uppermost member of the Salina Formation which is best characterized by the presence of gypsum and salt. The commercial production of salt occurs in older deeper units of the Salina Formation in areas north of Seneca Falls.

The Bertie Limestone or water lime is approximately 25 feet thick. It is a magnesian limestone with beds 3-10 inches thick. Carbonaceous partings weather into a hard slaty shale. The Bertie Limestone has been used for the production of cement. The Camillus shale contains thin dolomitic limestones. The most significant factor, however, is the extensive presence of both gypsum (calcium sulfate) and salt (sodium chloride). The uppermost portion of the Camillus is characterized in the 1909 geologic report as being a bed of gypseous shale 35 feet thick which in places is suitable for use as plaster. This unit would be within the hydrogeologic zone of interest beneath the Philips site.

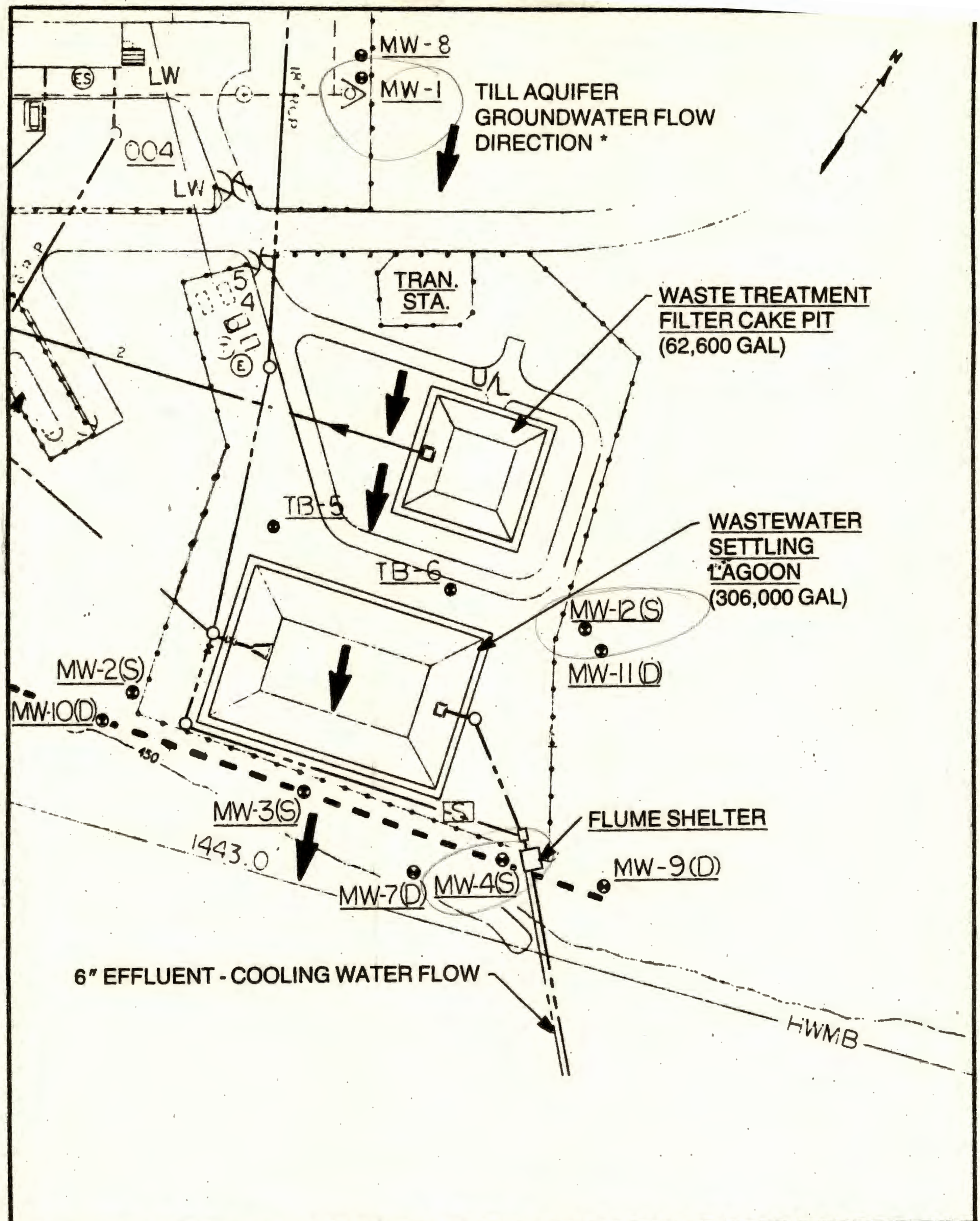
Both salt and gypsum are soluble minerals with salt being much more soluble (35.8 g/L) than gypsum (0.193 g/L). Regionally it appears that most of the salt has been dissolved out in the outcrop areas but that some gypsum remains. Removal of the soluble minerals leaves large solution voids in the shales. This creates a very open hydraulic system such as exists in limestone systems. The development of secondary porosity by solutioning in both the Camillus shale and the Bertie limestone would be further exacerbated by the proximity to the escarpment face which would impose adding mechanical stresses to the natural joints and fractures.

Regionally, groundwater from the Salina units may be highly mineralized with either chloride or sulfate or both. Gypsum flakes can occur in well water samples. The 1951 Groundwater Resources of Seneca County (Bulletin GW-26) cited a well in the nearby Montezuma Migratory Bird Refuge which had salt water in two horizons in the glacial drift and five horizons in the bedrock. The upward transport of brine from deeper bedrock units into the overlaying glacial material is indicated as being a common occurrence.

B. MONITORING WELL INSTALLATION HISTORY

All monitoring well locations are shown on Figure II-7.

A series of test borings were conducted in 1968 to obtain design information for the construction of the filter cake storage pit and the holding lagoon. No water was observed in any of the borings upon completion but a 24 hour static water level did develop. This indicated the presence of an upper aquifer zone within the glacial till. In March 1983 Chester laid out the initial four well RCRA monitoring well network. Based on the RCRA requirement for monitoring the uppermost aquifer and the historic test borings, the



TheChesterEngineers			SHEET NO.	PHILIPS ECG, INC. SENECA FALLS, NEW YORK
DWN.BY: SGM	SCALE:	DATE 8/9/85	DWG. NO. FIG. II-7	GROUNDWATER MONITORING SYSTEM
CHK'D.BY:	APPR.BY:			

till aquifer was identified as the unit requiring monitoring for leak detection purposes. The upgradient well (MW-1) made a considerable amount of water; more than was expected. Recent discussions with long time employees indicate that MW-1 is located in an area once quite marshy but now filled in. Possibly this old marshy area is a source of water for the shallow aquifer. This may be why MW-1 yields more water than the other till aquifer wells. Two of the downgradient wells (MW-3 and MW-4) contained a small amount of water at the till/bedrock interface. The third downgradient well MW-2 did not yield sufficient water for monitoring purposes. It is likely that flow in this upper aquifer is controlled by the ancestral erosion surface on top of the bedrock/till contact.

Since the initial wells were installed at the end of a dry winter and before any spring rains, Chester recommended that the existing wells be observed until the next quarterly sampling period to define seasonal recharge characteristics. Instead of having the expected seasonal spring recharge, the downgradient wells gradually lost water and did not yield usable volumes of water for routine sampling purposes. Groundwater may have bled off to dry fractures or the introduction of water to heretofore dry zones caused changes in the hydraulic conductivity of the zones.

By the end of the summer of 1983 due to the low productivity of the shallow wells, it was decided that a downgradient bedrock monitoring well might assist in defining site conditions. At the beginning of September a drilling date of September 26, 1983 was scheduled. On September 23, 1983 Philips received a letter from EPA Region III dated September 20, 1983 advising of a requirement for the installation of an additional monitoring well to supplement MW-2, a shallow downgradient well. Philips efforts to better understand the hydrogeology therefore predated any agency directive. Since 1983 Philips has made every effort to comply with both the letter and intent of the RCRA regulations.

The drilling of the new well MW-7 did not detect groundwater in the upper aquifer. The open drill hole extended 5 feet into bedrock did not yield any water. Moisture was noted during drilling but the soils were apparently too tight to yield free water into the open borehole. A highly fractured shale zone at 50 to 58 feet (and approximately at the level of the Seneca River) did not appear to yield a large enough volume of water for sampling purposes. Significant water volume was not encountered until a depth of 80 feet which is 20 feet below the level of the Seneca River. The sand pack for the monitoring well was extended up through the fractured zone. The static water level in MW-7 was in the fractured zone at an elevation slightly higher than the Seneca River. This seemed to confirm the expected pattern of a regional bedrock aquifer discharging into the Seneca River as the local base drainage. The bedrock fractures, however, can distort the apparent hydraulic relationships between aquifer zones. As a result, water levels can be very difficult to interpret.

On January 9, 1984 Philips ECG was informed by the EPA of the need to install three additional bedrock monitoring wells (MW-8, 9, and 10) to bring the monitoring well system into RCRA compliance. On February 27, 1984 the installation of one upgradient and two downgradient monitoring wells began. All wells were targeted to be completed at the same bedrock elevation (360 ±feet) as MW-7 so that the same aquifer would be monitored. The minor southwesterly dip was not considered important in setting the target elevations. Downgradient wells MW-9 and MW-10 were completed as planned with no evidence of groundwater in the upper 20 feet of the bedrock. The most significant drilling observation was a void in MW-9 at the same Seneca River elevation as the fractured shale observed in MW-7. This void required 20 bags of sand to fill during the well installation process. The void was likely created by the dissolution of evaporite deposits in the shale.

The upgradient bedrock well MW-8 was placed in the vicinity of MW-1. The upper till aquifer was isolated by grouting a steel casing into the bedrock. Drilling indicated a medium hard limestone with several soft gypsum seams interbedded. No water was encountered at the 360 foot elevation target. The hole was advanced another 50 feet to a maximum depth of 150 feet or an elevation of 310 feet. Since this was 70 feet below the level of the Seneca River, Chester believed any further drilling to encounter water would not yield chemically representative samples of the aquifer strata intersected by Wells MW-7, 9 and 10. MW-8 was left as an open bedrock bore hole for observational purposes. Water level observation records indicate that a static water level of 342.03 feet had developed during the spring recharge season. Since that time a water table has continued to be present with a maximum elevation of 356.19 feet. The Philips baildown/recovery data on water levels indicates that MW-8 recovers very slowly over a matter of weeks. The static water levels which have been reported with the RCRA monitoring results are sample time elevations and do not reflect a completely recovered static water level prior to the presample well evacuations. Since no fractures were observed which could account for the subsequent static water levels, the source of the water is unknown and the well does not meet RCRA documentation requirements.

On June 12, 1984 Philips and Chester attended a meeting at EPA Region II headquarters to discuss the ground-water monitoring program at the Seneca Falls facility. By letter dated June 22, 1984 EPA requested that additional overburden and bedrock wells be placed in an intermediate downgradient position southeast of the filter cake storage pit. The deep well, MW-11, and the shallow well, MW-12, were drilled the week of July 9th. Chester submitted well completion information to EPA II by letter dated July 13, 1984. On July 19, 1984 Chester presented our hydrogeologic evaluation of site conditions at a Seneca Falls inspection trip made by representatives of EPA Region II, EPA Washington Headquarters, and New York DEC. The hydrogeologic interpretations presented in the following section of this report are substantially the same as presented to the Agency representatives on July 19, 1984. Table II-1 contains a summary of monitoring well construction details.

This summary of the field investigation history has been presented to reaffirm the efforts by Philips ECG to comply with both the general regulatory language and specific technical requirements imposed by EPA Region II. Philips has immediately responded to all EPA well

TABLE II-1

MONITORING WELL CONSTRUCTION DETAILS

WELL	TOP OF CASING	GROUND SURFACE	BEDROCK CONTACT	TOP OF BENTONITE	TOP OF SAND PACK	TOP OF SCREEN	BOTTOM OF SCREEN	STATIC WATER LEVEL 7/1/85
1	462.13	459.33	<429	457	454	439.39	429.39	453.70
2	449.19	445.95	425	443	440	434.75	424.75	424.83
3	446.00	443.20	419	441	438	430.03	420.03	420.16
4	444.56	441.96	417	440	437	428.80	418.80	418.91
5	457.47	454.36	<424	452	449	434.90	424.90	425.00
6	457.22	454.39	422	452	449	431.65	421.65	421.65
7	443.12	440.52	417	412.5	413	382	362.62	383.91
8	461.91	459.67	425	(Open Borehole 421-309.67)				351.36
9	443.86	441.89	415	384.5	385	380	360.89	383.96
10	448.81	446.31	417	384.5	385	383	363.31	384.99
11	455.94	453.42	413	401	398	373	354.92	357.36
12	456.27	453.60	420	435	432	421	411.6	415.92

installation directives in order to provide a monitoring well network which will satisfy EPA requirements. Philips and Chester have proceeded in theassumption that the EPA directives represented EPA's technical assessment of those measures necessary to satisfy EPA's interpretation of the EPA requirements.

C. HYDROGEOLOGIC INTERPRETATIONS

The twelve monitoring wells provide the basis for defining the basic site geology and most of the significant hydrogeologic processes necessary for aquifer identification and groundwater flow directions. Table II-2 is a summary of the groundwater elevation information.

The test boring records indicate a well defined glacial till/bedrock interface. The upper portion of the bedrock is limestone and appears to be extensively weathered for the first several feet. This weathered zone represents a probable zone of enhanced permeability and water transmission. The surface of the bedrock is well defined as indicated in Figure II-8 and slopes in a southeasterly direction.

Geologic cross-sections start to reveal the complex nature of the Philips site. Figure II-9 is a west-east section through the borings along the face of the Seneca River escarpment. The most significant features are as follows:

1. Water occurs in very small amounts at the till/ bedrock interface. This water is only seasonally present.
2. The shale zone near the level of the Seneca River is continuous but with variable thickness. This

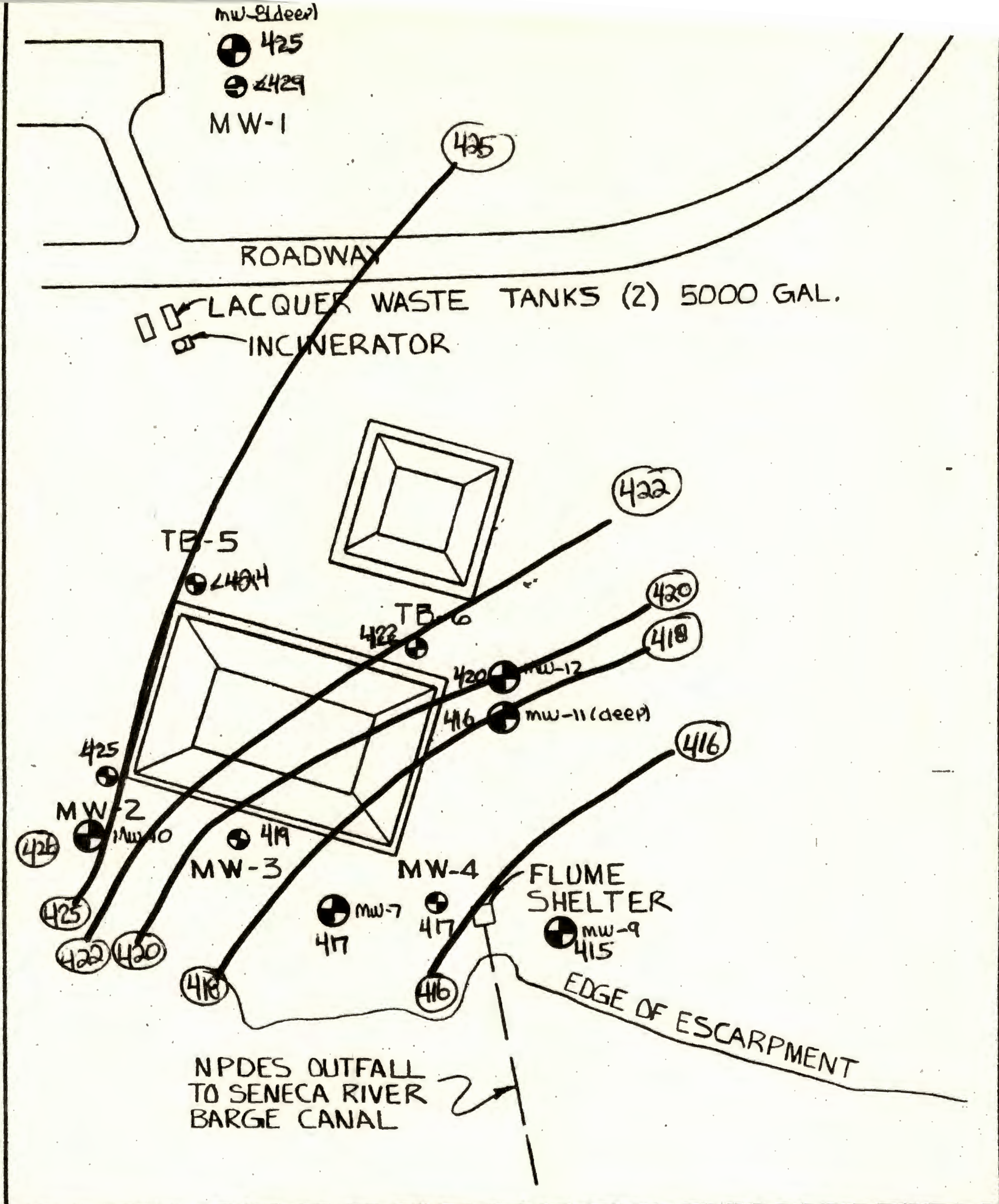
TABLE II-2

GROUNDWATER ELEVATIONS

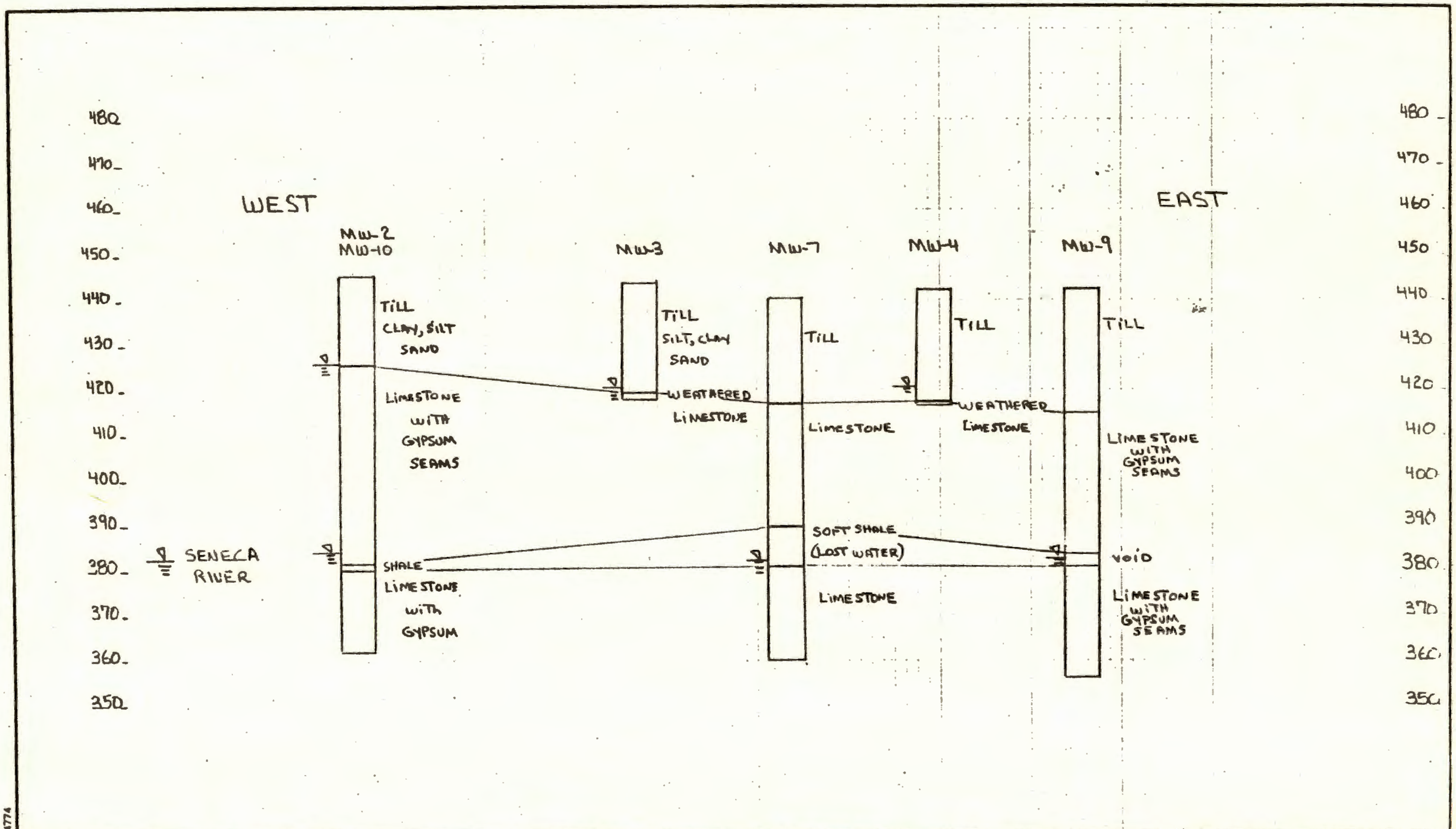
MONITORING WELLS

DATE	1	2	3	4	5	6	7	8	9	10	11	12
3/28/83	455.63	Dry	420.70	419.86	Dry	423.02	--	--	--	--	--	--
6/16/83	454.13	424.90	420.34	418.83	Dry	Dry	--	--	--	--	--	--
9/15/83	451.97	424.76	420.03	418.80	424.90	421.65	385.00	--	--	--	--	--
12/14/83	456.89	424.93	420.12	418.89	424.89	421.63	382.37	--	--	--	--	--
3/4/84	452.33	--	--	--	--	--	380.52	Dry	379.96	384.21	--	--
5/30/84	--	--	--	--	--	--	--	342.03	--	--	--	--
6/11/84	454.75	424.76	420.12	Dry	424.87	421.62	384.38	329.01	385.10	385.21	--	--
8/27/84	--	--	--	--	--	--	--	356.19	--	--	--	--
9/12/84	455.46	425.89	420.10	418.92	424.97	421.70	383.15	318.59	383.23	384.18	356.47	415.60
11/28/84	--	--	--	--	--	--	--	347.01	--	--	--	--
12/17/84	454.03	425.00	420.21	418.95	419.95?	422.44	381.05	318.28	381.61	382.11	356.74	417.07
2/25/85	--	--	--	--	--	--	--	345.06	--	--	--	--
3/11/85	457.03	425.19	420.50	420.21	425.32	422.42	382.22	318.24	382.56	383.31	357.74	417.30
7/1/85	453.70	424.83	420.16	418.91	425.00	421.65	383.91	351.36	383.96	384.99	357.36	415.92

*River elevation on 6/11/84 was 382.38.



The Chester Engineers			SHEET NO.	PHILIPS ECG BEDROCK SURFACE CONTOURS
DWN.BY: FJC	SCALE: NONE	DATE APRIL 1983	FIGURE II-8	
CHK'D.BY: SGM	APPR.BY:			



Drawn By: SGM	Scale: H 1" = 40' V 1" = 20'	The Chester Engineers	PHILIPS ECG, INC SENECA FALLS, NY. WEST - EAST HYDROGEOLOGIC CROSS-SECTION MARCH 1985	Dwg. No. FIGURE II-9
Checked By: SGM	Date: 5/17/85			
Approved By: SGM				

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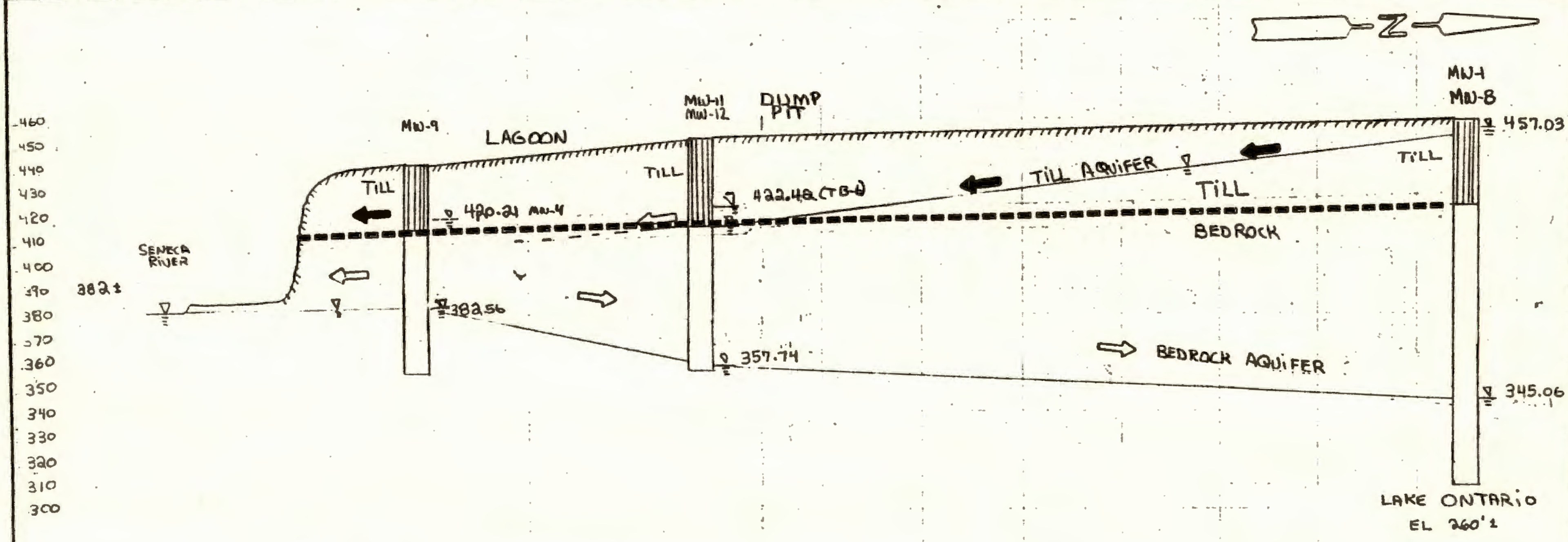
BRUNING



1. THE UPPER TILL AQUIFER FLOWS TO THE SOUTH TOWARD THE SENECA RIVER.
2. NEAR THE ESCARPMENT THE UPPER WATER TABLE IS DIFFICULT TO MONITOR
3. THERE IS A SMALL GROUNDWATER MOUND NEAR THE ESCARPMENT IN THE BEDROCK AQUIFER
4. THE BEDROCK AQUIFER NEAR THE ESCARPMENT HAS A HYDRAULIC GRADIENT TOWARD THE SENECA RIVER
5. THE APPARENT BEDROCK AQUIFER FLOW IS TO THE NORTH WITH THE SENECA RIVER ACTING AS A RECHARGE SOURCE

Drawn By: SGM Checked By: Approved By:	Scale: 1"= 40' Horiz. 1"= 40' VERT. Date: 9/25/85	The Chester Engineers	PHILIPS ECG. INC. SENECA FALLS N.Y. HYDROGEOLOGIC CROSS-SECTION MARCH 1985	Dwg. No. FIGURE II-10

may represent the gypseous shale typically present at the top of the Camillus formation.

3. The void present in MW-9 represents the dissolution of the gypseous shale. The fracture systems supplying this void may have a higher hydraulic conductivity and water circulation rate than the fractures that supply water to the shale zones in MW-7 and MW-10. Water level measurements in MW-9 must be viewed with caution due to the open circulation system.

4. On June 6, 1984, the static water levels in the deep wells near the escarpment were higher than the Seneca River. While this seems to indicate a hydraulic gradient and flow toward the Seneca River, the presence of the fractures may confound the hydraulic relationships.

The complexity of the site is further revealed in the south to north cross-section, Figure II-10. The major features are as follow:

1. The upper till aquifer flows to the south toward the Seneca River.

2. There are no obvious seepage zones at the till/bedrock contact. However, the contact area is vegetated and access to the escarpment face prohibits any definitive inspection for seepage zones. Some shale partings at the escarpment are wet but not seeping. Groundwater evaporation at the escarpment face appears to be a controlling factor in the apparent lack of active seepage zones.

3. The bedrock monitoring wells appear to show a groundwater high at a level above the Seneca River in the bedrock aquifer near the escarpment.

4. While the bedrock aquifer near the escarpment appears to have a hydraulic gradient toward the Seneca River, the actual hydraulic relationships are uncertain.

5. There appears to be a deep bedrock flow system to the north.

The apparent deeper bedrock flow system represents one of the most intriguing characteristics of the Philips site. The deep wells MW-8 and MW-11 make only small amounts of water indicating a very restricted hydraulic circulation system. The fact that MW-8 is an open borehole from 30 feet to 150 feet and still yields very little water provides an indication of the lack of water in the bedrock system. The regional characteristics of the apparent bedrock aquifer flow pattern to the north are not known.

The general permeability of the glacial till overburden is in the range of 10^{-5} to 10^{-6} cm/sec as determined by field slug tests and laboratory analysis. The low permeabilities mean that there is only a small potential supply of deep seepage from the till aquifer available for recharge to the deeper bedrock units. Sand stringers within the till are likely the main mechanism for water transport. Flow velocities within sand stringers would be faster than the 3.65 feet/year rate calculated on the basis of till permeability.

The central question presently posed by DEC/EPA is the definition of the aquifer unit which must be monitored to satisfy RCRA requirements. There are clearly two zones of saturation present beneath the Philips site. The upper till aquifer flows in a southerly direction toward the Seneca River and is the aquifer unit which should be monitored for leak detection purposes. Chester has continually presented the argument that the RCRA monitoring philosophy is to identify the impact of a waste unit on the uppermost continuous unit of water bearing material as it flows beneath the waste management area. At Philips the parcel of water originates to the north near MW-1, flows beneath the waste units at the till/bedrock interface. It can be continuously observed in MW-12 and periodically observable at the shallow downgradient wells MW-2, 3, and 4. These four wells define the uppermost groundwater flow path for any parcel of water as it flows beneath the waste units.

The physical characteristics of the subsurface materials beneath the waste site have made it difficult to establish a conventional groundwater monitoring system in a downgradient direction at the till/bedrock interface because of the low yield of the till aquifer. It is very obvious that the shallow till aquifer is the zone which must be monitored for leakage. RCRA monitoring and permitting of the till aquifer will require a variance from the RCRA regulations because sampling may not be possible on a quarterly basis. Any further monitoring in the deeper bedrock aquifer would be a waste of time and resources.

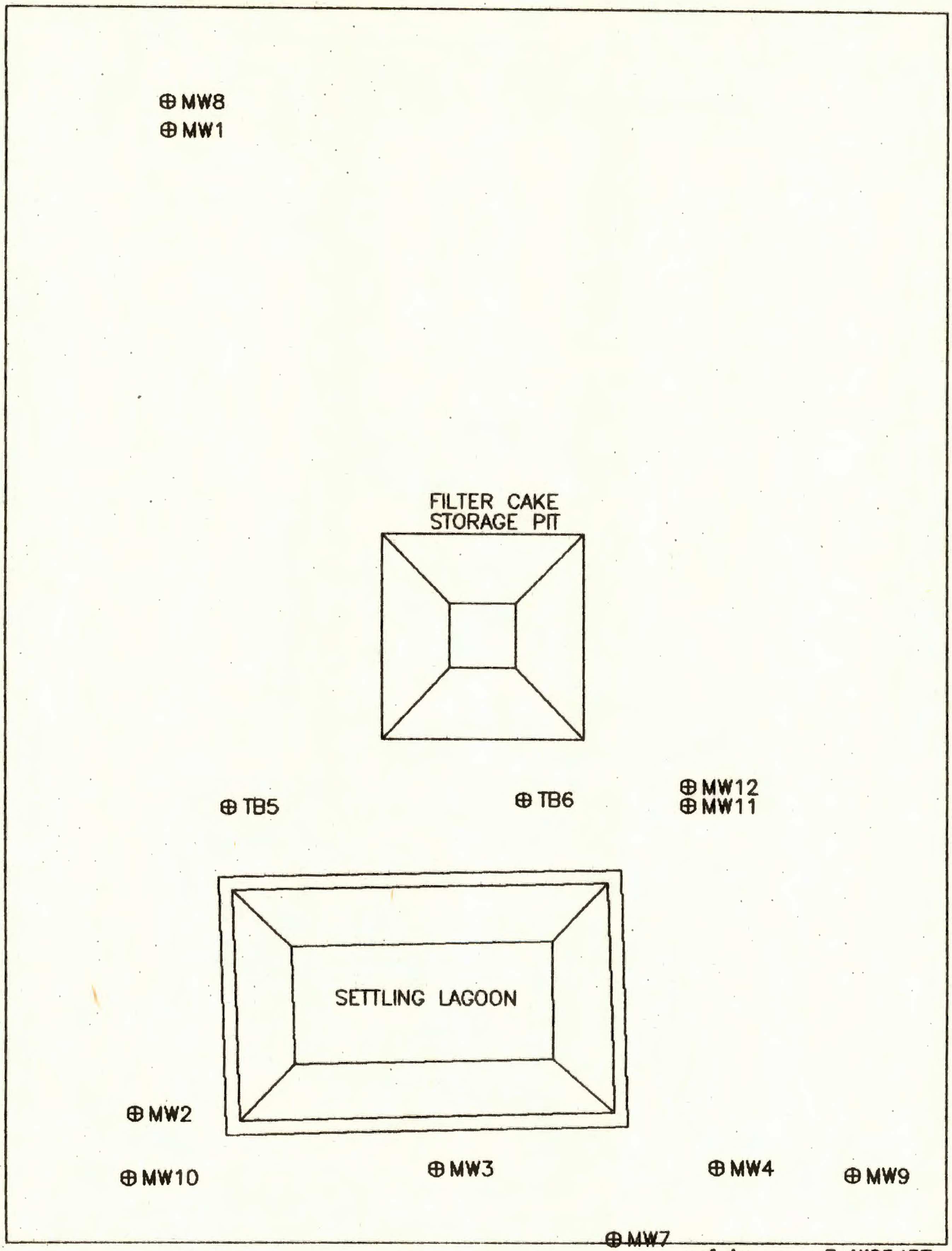
Groundwater flow rates may be estimated from the seepage velocity form of the Darcy equation:

$$V_s = PI/N_e \text{ where } V_s = \text{seepage velocity, ft/day}; \quad P = \text{permeability, ft/ft}; \quad I = \text{hydraulic gradient, ft/ft}; \quad N_e = \text{effective porosity}$$

The Hvorslev slug test permeability for MW-6 was 1.1×10^{-5} cm/sec or 0.0312 ft/day. The hydraulic gradient from TB-6 to MW-4 is 0.025 ft/ft. The effective porosity is not known but is assumed at 0.08 to provide a low safe estimate. Substitution of the previous values yields an estimated seepage velocity of 0.01 ft/day or 3.65 ft/year. This would correspond to a travel time of 44 years between MW-6 and MW-4 in the till aquifer. The exceedingly low permeability of the till material governs both the capacity to transmit water and groundwater velocities.

In summary, Chester believes that the hydraulic evidence indicates that the well network of MW-1, 2, 3, 4, and 12 provides the earliest possible leak detection system that is within the framework of the hydrogeologic system and the intent of RCRA groundwater monitoring. Also, this monitoring well system provides the only leak detection program available given the hydrogeologic conditions beneath the hazardous waste management area.

PHILIPS ECG - BASE MAP



ref.dwg no. F-W25457

III. GROUNDWATER QUALITY

The previous section of this report discussed the hydraulic characteristics of the Philips site. This section provides an overview of groundwater quality conditions. All monitoring wells have been routinely sampled to the maximum possible extent since they were installed. If wells were totally dry or sample volume insufficient for analysis, no sample was collected. RCRA sample time has been advanced on a quarterly basis whenever there was sufficient sample for analysis. The RCRA time may, therefore, be less than the actual calendar time since well installation. For the latest reported sample period in March 1985, RCRA time ranges from the Year 3, 1st semiannual sample (MW-1) down to the Year 1, 4th quarter.

The filter cake dump pit and the holding lagoon would represent the most likely concentrated wastewater source which could possibly enter the groundwater system. A sample of the standing water in the pit in which the filter cake from the fluoride waste treatment plant was partially submerged was collected in March 1985 to ascertain potential leachate tracer parameters. Table III-1 presents the results of that analysis. The particular matter in the filter cake consists primarily of calcium fluoride, although there is some calcium sulfate present. One of the analyses of the filter cake yielded this information in percentages by weight:

Iron	1.13	Calcium	31.30
Barium	0.12	Fluoride	23.5

Chester Laboratories
A Division Of
The **Chester** Engineers
P.O. Box 9356
Pittsburgh
Pennsylvania 15225
Phone: (412) 269-5700

TABLE III-1

Laboratory Analysis Report For

Philips ECG, Inc.
Seneca Falls, New York

Samples Received: 3/13/85
Report Date: 4/04/85

Analyses

Source	Water in Filter Cake Dump
Log No. 85-	1768
Date Collected	3/12/85 @ 10:30 AM
pH	7.2
Calcium Hardness, mg/L $CaCO_3$*	580
Total Suspended Solids, mg/L	56
Total Solids, mg/L	1,332
Sulfate, mg/L SO_4	964
Fluoride, mg/L F	6.1
Chloride, mg/L Cl	41
Cadmium, mg/L Cd	0.02
Lead, mg/L Pb	0.16
Total Organic Carbon, mg/L C	9
Total Organic Halogens, mg/L Cl	0.16

* Calculated Calcium Concentration = 232 mg/L

- Unless otherwise noted, analyses are in accordance with the methods and procedures outlined and approved by the Environmental Protection Agency and conform to quality assurance protocol.
- "Less-than" (<) values are indicative of the detection limit.

Chromium	0.29	Sulfate	3.2
Lead	1.30	Chloride	0.34
Magnesium	0.19	Carbonate	2.3

One sludge analysis in the holding lagoon yielded the following percentage by weight composition:

Water	78.4%
Chloride	0.21%
Sulfate	20.1%
Lead	0.5%
Fluoride	1.2%
Calcium	15%

The standing water has only a moderate sulfate concentration of 964 mg/L, which is less than that present in a saturated solution of calcium sulfate. The low chloride of 41 mg/L indicates that chloride is not a suitable indicator of leachate. The fluoride of 6.1 mg/L is three times drinking water limits and lower than would be present in saturated solution of calcium fluoride. This could be due to the presence of an excess of calcium or to the fact that the rate of dissolution of calcium fluoride present in the filter cake is slow. Lead is another significant filter cake parameter but the standing water value of 0.16 mg/L is a relatively small source concentration. Cadmium at 0.02 mg/L is not indicated as being a significant parameter. The total organic halogen (TOX) concentration of 0.16 mg/L is above background and should be taken into consideration.

Tables III-2 through III-10 represent tabular summaries of the groundwater quality database for parameters which are important in describing the geochemical characteristics of the groundwater system. These tables contain the results of

Chester's routine RCRA analytical reports and the New York DEC sampling which took place June 6, 1984. For comparison purposes sample results from a private domestic water well several miles north of the Philips site are also presented. Each parameter will be briefly discussed.

pH - With the exception of deep well MW-11, pH values appear to be within the expected range in a carbonate environment. The high pH in MW-11 may reflect the presence of grout transport through the fracture system in the bedrock. The most recent sample from MW-11 shows an improving trend. The pH in MW-11 is not thought to be related to the waste facilities. Statistical increases in pH in MW-7, 9 and 10 reflect only minor pH differences and do not appear to be important.

Specific Conductance - All wells have significantly higher conductivities when compared to the shallow upgradient well MW-1. The two shallow wells closest to the dump pit (MW-6 and 12) do appear to have higher than expected values. The two deepest wells (MW-8 and 11) have the highest values which would correspond to increased mineralization with depth. Any leachate plume would tend to have lower values with depth due to the process of dilution.

Total Organic Halogen - The TOX values do not seem to follow any consistent pattern. The high value of 940 ug/L for MW-8 was not confirmed on a resample. The March 1985 sampling did indicate statistical increases for MW-7 and MW-8.

Chloride - Background chlorides in the till aquifer are quite low. The increase in chloride content in the bedrock represents natural sources rather than the Philips waste units. The low chlorides in MW-9 reflect the good circulation pattern which apparently exists in the fracture system intersected by this well. It should be noted that the bedrock aquifer is saline. The 6NYCRR Part 703 groundwater quality standards define saline water as that water having a chloride concentration of more than 250 mg/L. Lesser concentrations are deemed fresh water of Class GA whose best usage is as a source of potable water supply. It is also worth noting that Class GSB waters are those saline waters which have a chloride content in excess of 1000 mg/L and that the best usage of Class GSB waters is as a receiving water for disposal of wastes. The deep bedrock is clearly not a fresh water and a usable aquifer by regulatory definition.

Sulfate - While sulfate should be a key tracer parameter, the extensive natural presence of gypsum (calcium sulfate) clearly renders interpretations much more difficult. The till aquifer appears to be generally low in sulfate as evidenced by Wells 1 through 4. The shallow till well nearest the pit (MW-6) does have an increased sulfate concentration. The other overburden well (MW-12) near the pit exhibits much higher sulfates. MW-12 however does extend 8 feet into the upper weathered bedrock surface to ensure capture of any water at the till/bedrock interface. The presence of shaley seams in the limestone could provide a substantially different geochemical influence. The high sulfate in MW-12 can thus not be reliably used as an indicator of leachate presence. Overall, sulfate concentrations increase with bedrock depth and the restriction of the hydraulic circulation system. The sulfate of 1340 mg/L in the private well shows that the groundwater is used for domestic supply purposes out of necessity, and not from the desirability of a good quality groundwater.

Fluoride - The EPA Primary Drinking Water Standard is 1.4-2.4 mg/L. The New York Part 703 limit for GA water is 1.5 mg/L or natural. Part 703.7 also sets a 3.0 mg/L effluent discharge limitation to Class GA groundwater. The till aquifer appears to have low fluoride levels. The bedrock wells nearest the escarpment have slightly higher but generally comparable concentrations. Bedrock wells MW-8 and MW-11 and shallow well MW-12 consistently have somewhat higher values. The maximum concentration recorded in the monitoring well network is 2.6 mg/L, the same as observed in the private well. Fluoride concentrations do not appear to be an environmental concern. Any influence of Philips waste sources is minimal and not resolvable within the natural geochemical setting.

Lead - Lead is a possible waste source parameter from the filter cake pit. Lead concentrations in the groundwater system are variable and inconsistent. The upgradient well MW-1 has been generally near detection limits at levels below the 0.05 mg/L EPA Standard and GA Limit of 0.025 mg/L. For the two wells nearest the pit, MW-6 has been less than detection limits and MW-12 has a maximum value of 0.11 mg/L. The highest concentration, 0.20 mg/L, has been in MW-8. This well, however, has been shown to be in such a different geochemical environment that no reliable interpretations are possible. The lead concentrations in the carbonate bedrock are generally higher than in the till. Lead mineralization in carbonates, however, is a common occurrence. In reducing environments, the lead sulfide mineral galena may be present. Lead will also substitute isomorphically for calcium in the carbonate mineral aragonite to form the lead carbonate cerussite. Soils of high pH may release fixed lead when becoming acidic. The lead sulfate, anglesite, is often associated with gypsum. The low levels of lead observed may be a natural geochemical factor.

Cadmium - The standing water in the sludge pit had a cadmium concentration of 0.02 mg/L. The highest value in the well field reported by Chester is 0.02 mg/L with most values being less than detection limits. The DEC analysis had a detection limit of 0.10 mg/L with a high value of 0.10 mg/L. Since the DEC concentrations are right at their detection limit and Chester has systematically reported much lower concentrations at detection limits ranging from 0.005 to 0.01 mg/L, it does not appear that cadmium is present at unacceptable concentrations in the monitoring well network. Only two of Chester's analyses have minimally exceeded the Class GA Limit of 0.01 mg/L. MW-9 has a single value of 0.018 mg/L and MW-11 has a single transcendence (0.02 mg/L) of the acceptable limit.

Nickel - Nickel has not been a routine analytical parameter. The DEC sampling in June 1984 indicated nickel concentrations up to 3.40 mg/L. In response, Chester analyzed for nickel in the March 1985 samples. The highest concentration was 0.05 mg/L. The DEC findings are not confirmed.

In summary, there is no parameter which provides evidence that the Philips hazardous waste facilities are leaking. The groundwater quality data base does not show any evidence of environmental hazards in the groundwater system.

TABLE III-2

GROUNDWATER MONITORING
PARAMETER pH

MONITORING WELLS

DATE	1	2	3	4	5	6	7	8	9	10	11	12
3/28/83	7.7	--	8.0	8.0	--	8.0	--	--	--	--	--	--
6/16/83	7.1	--	--	--	--	--	--	--	--	--	--	--
9/15/83	7.3	--	--	--	--	--	7.5	--	--	--	--	--
12/14/83	7.5	--	--	--	--	--	7.8	--	--	--	--	--
3/4/84	7.6	--	--	--	--	--	7.8	--	7.8	7.9	--	--
6/6/84	6.7	--	--	--	--	--	6.8	7.0	7.1	6.7	--	--
6/11/84	7.2	--	--	--	--	--	7.4	7.4	7.3	7.5	11.3	7.7
9/12/84	7.5	--	--	--	--	--	7.8	7.4	7.7	7.4	11.2	7.4
12/17/84	N.S.	--	--	--	--	--	N.S.	7.8	7.8	7.9	N.S.	7.6
3/11/85	7.5	8.2	8.48	7.84	--	7.75	7.6	7.6	7.7	7.8	9.8	7.4
7/1/85	7.38	--	--	--	--	--	7.53	7.3	7.3	7.7	8.9	7.2

*Private Well pH on 9/12/84 was 7.4.

TABLE III-3

GROUNDWATER MONITORING
PARAMETER SPECIFIC CONDUCTANCE (umhos/cm)

MONITORING WELLS

DATE	1	2	3	4	5	6	7	8	9	10	11	12
3/28/83	990	--	840	750	--	2600	--	--	--	--	--	--
6/16/83	1000	--	--	--	--	--	--	--	--	--	--	--
9/15/83	965	--	--	--	--	--	1850	--	--	--	--	--
12/14/83	1225	--	--	--	--	--	2050	--	--	--	--	--
3/4/84	975	--	--	--	--	--	1990	--	1010	1750	--	--
6/6/84	1250	--	--	--	--	--	2100	7500	850	1650	--	--
6/11/84	1040	--	--	--	--	--	2000	8400	900	1750	3900	1900
9/12/84	1200	--	--	--	--	--	2100	11000	1380	2050	12000	6200
12/17/84	--	--	--	--	--	--	--	5400	1350	2100	--	2800
3/11/85	1080	--	--	--	--	1340	1750	5350	1060	1775	--	5775
7/1/85	957	--	--	--	--	--	2112	4975	870	1625	85250	6200

*Private Well Specific Conductance on 9/12/84 was 1840.

TABLE III-4

GROUNDWATER MONITORING
PARAMETER TOX (ug/L)

MONITORING WELLS

DATE	1	2	3	4	5	6	7	8	9	10	11	12
3/28/83	56	--	51	39	--	97	--	--	--	--	--	--
6/16/83	41	--	--	--	--	--	--	--	--	--	--	--
9/15/83	41	--	--	--	--	--	76	--	--	--	--	--
12/14/83	38	--	--	--	--	--	90	--	--	--	--	--
3/4/84	43	--	--	--	--	--	54	--	37	43	--	--
6/6/84	<100	--	--	--	--	--	<100	<100	<100	<100	--	--
6/11/84	83	--	--	--	--	--	202	940	80	106	99	100
9/12/84	40	--	--	--	--	--	49	41	32	42	--	36
12/17/84	--	--	--	--	--	--	--	56	55	77	--	37
3/11/85	36	--	--	--	--	14	79	114	32	58	--	70
7/1/85	73	--	--	--	--	--	23	28	10	48	80	29

*Private Well TOX on 9/12/84 was 25.

TABLE III-5

GROUNDWATER MONITORING
PARAMETER CHLORIDE (mg/L)

MONITORING WELLS

DATE	1	2	3	4	5	6	7	8	9	10	11	12
3/28/83	10	--	13	24	--	30	--	--	--	--	--	--
6/16/83	--	--	--	--	--	--	--	--	--	--	--	--
9/15/83	15	--	--	--	--	--	136	--	--	--	--	--
12/14/83	15	--	--	--	--	--	154	--	--	--	--	--
3/4/84	--	--	--	--	--	--	124	--	14	148	--	--
6/6/84	--	--	--	--	--	--	--	--	--	--	--	--
6/11/84	11	--	--	--	--	--	82	1590	2	129	278	102
9/12/84	28	--	--	--	--	--	129	2020	54	39	2310	635
12/17/84	--	--	--	--	--	--	--	895	9	147	--	650
3/11/85	16	40	40	34	--	9.9	120	795	2	147	13450	550

*Private Well Chloride on 9/12/84 was 9.

TABLE III-6

GROUNDWATER MONITORING
PARAMETER SULFATE (mg/L)

MONITORING WELLS

DATE	1	2	3	4	5	6	7	8	9	10	11	12
3/28/83	91	--	115	56	--	1064	--	--	--	--	--	--
6/16/83	--	--	--	--	--	--	--	--	--	--	--	--
9/15/83	103	--	--	--	--	--	1292	--	--	--	--	--
12/14/83	83	--	--	--	--	--	1213	--	--	--	--	--
3/4/84	--	--	--	--	--	--	1107	--	377	882	--	--
6/11/84	74	--	--	--	--	--	1140	2545	223	775	2177	1172
9/12/84	97	--	--	--	--	--	1431	954	735	1242	2782	2941
12/17/84	--	--	--	--	--	--	--	2624	545	1431	--	3022
3/11/85	167	147	159	111	--	565	1240	2380	487	1014	2525	2500

*Private Well Sulfate on 9/12/84 was 1350.

TABLE III-7

GROUNDWATER MONITORING
PARAMETER FLUORIDE (mg/L)

DATE	MONITORING WELLS 1	2	3	4	5	6	7	8	9	10	11	12
3/28/83	0.25	--	0.29	0.30	--	1.3	--	--	--	--	--	--
6/16/83	0.31	--	2.56	--	--	--	--	--	--	--	--	--
9/15/83	0.81	--	--	--	--	--	1.4	--	--	--	--	--
12/14/83	0.23	--	--	--	--	--	0.33	--	--	--	--	--
3/4/84	--	--	--	--	--	--	0.31	--	1.7	0.36	--	--
6/11/84	--	--	--	--	--	--	0.85	2.1	0.61	0.66	2.6	1.5
9/12/84	0.34	--	--	--	--	--	0.81	0.84	0.53	0.62	1.3	2.5
12/17/84	--	--	--	--	--	--	--	1.7	1.4	0.44	--	1.2
3/11/85	0.23	<0.02	<0.02	0.12	--	0.62	0.34	1.8	0.27	0.28	1.67	0.83

*Private Well Fluoride on 9/12/84 was 2.6.

TABLE III-8

GROUNDWATER MONITORING
PARAMETER LEAD (mg/L)

MONITORING WELLS

DATE	1	2	3	4	5	6	7	8	9	10	11	12
3/28/83	<.005	--	<.005	<.005	--	<.005	--	--	--	--	--	--
6/16/83	<.005	--	0.11	--	--	--	--	--	--	--	--	--
9/15/83	<.002	--	--	--	--	--	.026	--	--	--	--	--
12/14/83	.017	--	--	--	--	--	.070	--	--	--	--	--
3/4/84	--	--	--	--	--	--	0.10	--	0.11	.08	--	--
6/6/84	<.100	--	--	--	--	--	<.100	.20	<.10	<.10	--	--
6/11/84	--	--	--	--	--	--	<.005	<.005	<.005	<.005	.02	.02
9/12/84	--	--	--	--	--	--	--	.01	.02	.01	.02	.02
12/17/84	--	--	--	--	--	--	--	.16	.07	.07	--	.11
3/11/85	.02	<.04	<.04	<.01	--	<.01	.06	.10	.04	.05	<.02	.10

TABLE III-9

GROUNDWATER MONITORING
PARAMETER CADMIUM (mg/L)

MONITORING WELLS

DATE	1	2	3	4	5	6	7	8	9	10	11	12
3/28/83	<.005	--	<.005	<.005	--	<.005	--	--	--	--	--	--
6/16/83	<.005	--	.006	--	--	--	--	--	--	--	--	--
9/15/83	<.005	--	--	--	--	--	<.005	--	--	--	--	--
12/14/83	.003	--	--	--	--	--	.010	--	--	--	--	--
3/4/84	--	--	--	--	--	--	.008	--	.018	<.005	--	--
6/6/84	<.100	--	--	--	--	--	.100	.10	.10	.10	--	--
6/11/84	--	--	--	--	--	--	<.005	<.005	<.005	<.005	.02	.008
9/12/84	--	--	--	--	--	--	--	<.003	.01	<.003	<.003	.005
12/17/84	--	--	--	--	--	--	--	.01	.01	<.01	--	.01
3/11/85	<.005	<.005	<.005	<.005	--	<.005	<.005	.005	<.005	<.005	<.005	<.005

TABLE III-10

GROUNDWATER MONITORING
PARAMETER NICKEL (mg/L)

MONITORING WELLS

DATE	1	2	3	4	5	6	7	8	9	10	11	12
3/28/83	--	--	--	--	--	--	--	--	--	--	--	--
6/16/83	--	--	--	--	--	--	--	--	--	--	--	--
9/15/83	--	--	--	--	--	--	--	--	--	--	--	--
12/14/83	--	--	--	--	--	--	--	--	--	--	--	--
3/4/84	--	--	--	--	--	--	--	--	--	--	--	--
6/6/84	2.0	--	--	--	--	--	3.40	0.60	1.50	<.10	--	--
6/11/84	--	--	--	--	--	--	--	--	--	--	--	--
9/12/84	--	--	--	--	--	--	--	--	--	--	--	--
12/17/84	--	--	--	--	--	--	--	--	--	--	--	--
3/11/85	.005	<.02	<.02	<.005	--	<.005	.02	.05	.007	.01	<.01	.04

IV. GROUNDWATER MONITORING CONCLUSIONS

The previous sections of this report have discussed the complex hydrogeologic and geochemical processes operational at the Philips Seneca Falls facility. Chester believes that the application of the RCRA groundwater monitoring regulations must be sensitive to the special physical characteristics of this site.

It is Chester's opinion that the existing monitoring well system is a satisfactory response to the RCRA saturated zone monitoring requirement for this site and that present EPA objections are unreasonable. The present well network monitors all aquifers and geochemical environments. The till aquifer is the uppermost water table unit and the unit requiring leak detection monitoring. Upgradient well MW-1 and downgradient wells MW-2, 3, 4, and 12 satisfy the RCRA requirements. All reasonable attempts have been made to achieve saturated zone monitoring in the till aquifer at the downgradient edge of the hazardous waste management zone near the escarpment. There is often insufficient water to obtain adequate sample volumes. No seeps that could be sampled have been observed at the escarpment. Evaporation may control the wetness present in some shale partings below the till/bedrock contact.

The bedrock wells MW-7, 9, 10 and 11 monitor the deep or bedrock aquifer. Even though these four wells are finished at approximately the same elevation, the chloride and sulfate data indicate substantial differences in the natural geochemical environment of their sampling spaces which would confound RCRA interpretations.

The use of MW-8 presents several problems as formal RCRA monitoring point. It is not the first aquifer, it is not a usable fresh water aquifer, and it is in a different geochemical environment than wells MW-7, 8, 9 and 10 which appear to be upgradient to MW-8. As an uncased well MW-8 is suitable only for general investigative purposes.

The dilemma in the groundwater monitoring program is that the review of regulatory requirements by DEC/EPA has not made allowance for the conditions present at the Seneca Falls site. Chester urges that EPA and DEC consider the entire environmental data base which has not shown any evidence of adverse groundwater quality conditions traceable to the Philips facility. A further point is that the 1984 RCRA amendments will require the modification or closure of the two impoundments to satisfy the double liner requirement.

Throughout the monitoring program Philips and Chester have immediately responded to technical guidance from EPA to those measures which EPA believed necessary to satisfy EPA requirements. At the July 19, 1984 meeting, EPA indicated that it would provide further guidance on what measures it might deem necessary to meet EPA monitoring guidelines. No such guidance has been received to date or is provided in the Notice of Deficiencies.

At a review meeting held August 22, 1985 at Seneca Falls, DEC/EPA requested the installation of three additional bedrock wells north and east of the waste units. Based on the information presented in this report, Chester does not believe that such additional wells would satisfy RCRA upper aquifer monitoring requirements.

7. The Philips facility logs already contain the requested information.

8. The Seneca River/Barge Canal elevations will be added to the sampling event information.

9. Water levels are measured using an electrical contact water level indicator.

10. The Teflon bailer is lowered using a plastic coated surveyors tape. The tape and bailer are thoroughly rinsed with distilled water between wells.

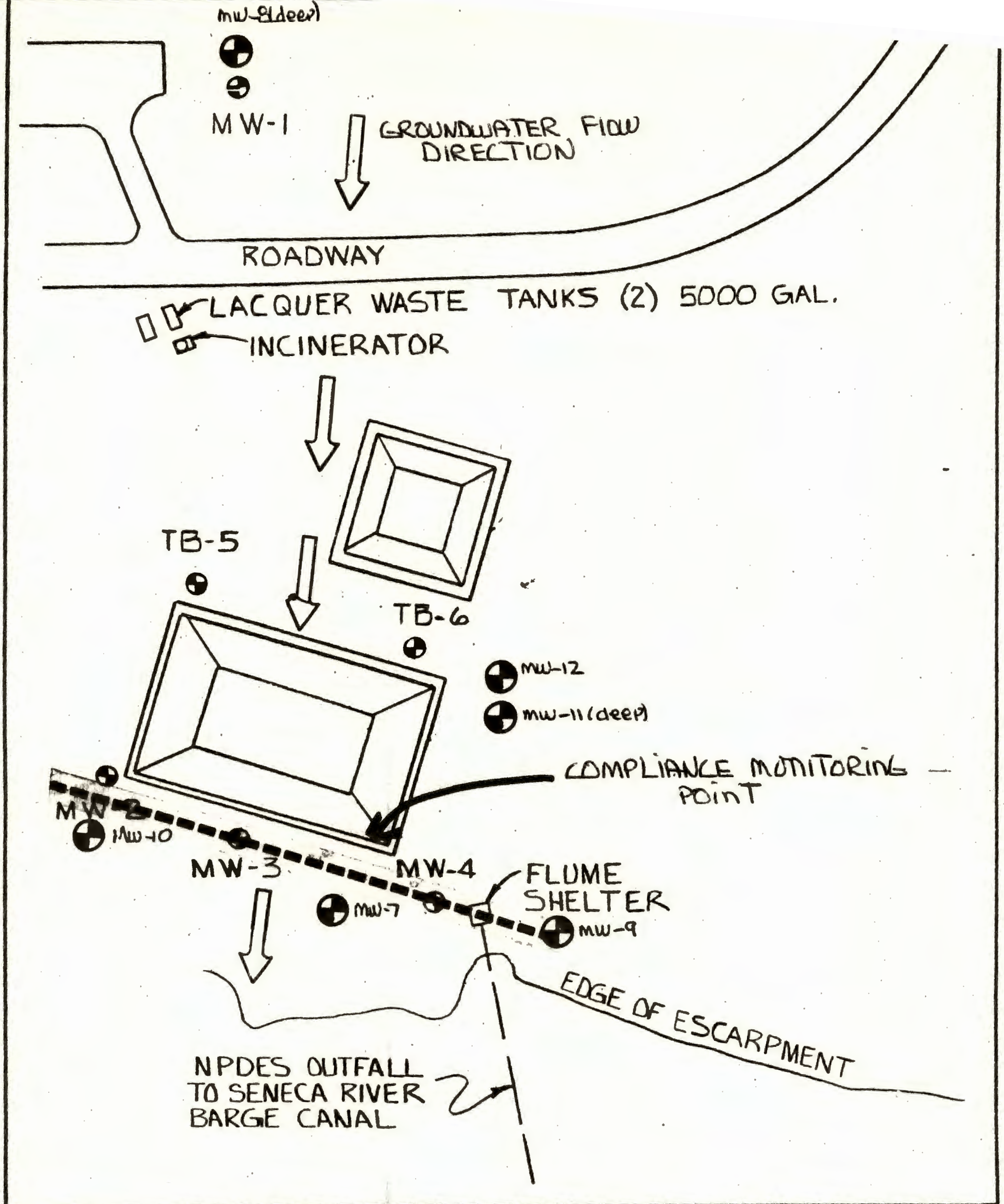
11. The diameter of the well annulus to be used for well volume calculations is as follows for each well.

Well	Annulus Inches	Well	Annulus Inches
MW-1	9	MW-7	6
MW-2	9	MW-8	6
MW-3	9	MW-9	6
MW-4	9	MW-10	6
MW-5	6	MW-11	6
MW-6	6	MW-12	8.75

Wells 1, 7, 8, 9 and 10 are fitted with QED System air bladder pumps for well evacuation purposes. To date, these pumps have not been used for sampling. The pump installations are suitable for RCRA sampling purposes.

12. Groundwater temperature will be recorded for each well.

13. Chester Engineers Laboratory in Pittsburgh, Pennsylvania has performed all routine groundwater sample analyses through March 1985. Any change of laboratories will be so noted by Philips in their monitoring



The Chester Engineers			SHEET NO.	PHILIPS ECG GROUNDWATER MONITORING COMPLIANCE POINT
DWN.BY: FJC	SCALE: NONE	DATE APRIL 1983	FIGURE V-1	
CHK'D.BY: SGM	APPR.BY:			

Item E-4. Contaminant Plume Description

1. Chester does not agree that the well network is insufficient. The groundwater quality data base in both spatial and temporal dimensions shows no significant evidence of contamination from the waste facilities that is not completely resolvable within the natural geochemical variations.

Item E-5. Groundwater Monitoring Program

1. The bedrock flow system is discussed in Section III of this report.

2. The physical characteristics of the site make it difficult to operate the downgradient overburden wells using saturated zone monitoring techniques.

3. Philips will identify the wells as requested.

4. See Drilling Logs in Appendix A.

5. Chester considers the point of compliance to be the fence line between the settling lagoon and the escarpment. Wells 2, 3, 4, and 12 should be used for point of compliance determinations. This point of compliance is indicated on Figure V-1.

6. The Site Geology Map, Figure II-3 in this report, is the best available copy from the 1909 source document obtainable in the library.

result submittals. Radiological samples have been analyzed by the Westinghouse Advanced Reactor Division, New Stanton, Pennsylvania.

14. Up to the present time there has been no identified need for special organic sampling techniques. If necessary, low density immiscible organics which may be floating on the surface will be collected using a bottom valve bailer which has been gently lowered several inches into the water. Where further density separations are obvious, additional isolation of layers can be accomplished in the laboratory in the placement of the tip of the syringe during sample withdrawal from the GC/MS vial. Any sampling for high density organics would utilize a double valve bailer for sampling at the bottom of the wells. Laboratory sample preparation procedures may also be used to further isolate obvious layers.

<u>Item E-6</u>. Detection Monitoring Program

1(a) Waste analysis information is presented as part of the NOD response package.

1(b) There have been no laboratory investigations to date of degradation, sorption/desorption, precipitation, or other physical/chemical interactions that any suspected leachate would have with the till aquifer materials. The parameters of interest at this facility are generally guite mobil and stable and not subject to degradation. The sorption of metals on both the bentonite liner and till material is probably an active process.

1(c) The detectability limits of the RCRA parameters considered to date are outlined in Table V-1.

2. Chapters II, III and IV of this report provide the requested information.

3. All analytical data is presented in Appendix B. The March 1985 statistical results which are presented in Appendix C contain background parameter values. No Part 261 Appendix VIII analyses have been performed to date.

4. Chester Laboratories analytical techniques conform to SW-846 methods.

5. Groundwater flow rate and direction in the upper till aquifer are discussed in this report.

6. Statistical analyses are generally available six weeks after the samples are collected. Actual laboratory turnaround time depends on the number of samples and the required analytical schedule.

Item E-7. Compliance Monitoring Program

This report responds to this item.

Item E-8. Corrective Action Plan

No corrective actions are planned beyond the possible closure of the two impoundments in response to the 1984 RCRA Amendment requirement for double liner systems. The lagoon closure plan is addressed elsewhere in the NOD response summary.

V. NOTICE OF DEFICIENCY ITEMS

The previous sections of this report have attempted to respond in an orderly comprehensive manner to the major groundwater monitoring issues presented in the Notice of Deficiencies. This section presents line item responses. Reference is made to the report text as appropriate.

Item E-1. Exemption from Groundwater Protection Requirements

1. The waver denial letter is included as part of the NOD response package.

Item E-2. Interim Status Period Groundwater Monitoring Data

1(a) Chester disagrees. This report presents our technical analysis and rationale for our position.

1(b) Appendix A contains revised test boring records which show well completion information. See also Table II-1.

1(c) Philips will submit a corrected drawing.

2(a) Analytical results are contained in Appendix B.

Item E-3. Aquifer Identification

All items are addressed in detail in this report.

APPENDIX A

MONITORING WELL BORING RECORDS

APPENDIX A

MONITORING WELL BORING RECORDS

BORING NO. MW-1

THE CHESTER ENGINEERS
CORAOPOLIS, PENNSYLVANIA
TEST BORING RECORD

SHEET 1 of 1

PROJECT Philips ECG LOCATION Senaca Falls, New York GROUND ELEVATION 459.33
Top of Casing 462.13
FEATURE Upgradient Well
DATE STARTED 3/11/83 TYPE OF SAMPLER Split Spoon DIAMETER OF AUGER 9 inch GROUND WATER 0 HRS 17.0' 24 HRS 6.3'
DATE COMPLETED 3/12/83 SAMP. SIZE 2 inch O.D. WEIGHT OF HAMMER 140 lb. FALL 36 inch
WEATHER Cloudy, Cold CASING SIZE 4 inch I.D. WEIGHT OF HAMMER FALL

DEPTH OF STRATUM	DESCRIPTION OF STRATUM	COLOR	MOISTURE CONDITION	DENSITY CONSISTENCY, HONESS	BLOW CNT OR RECVY*	% REC.	SMPL. OR RUN NO.	SMPL. OR RUN INTVL	RQD LENGTH	% RQD	CAS. BLOWS
0.0-14.0 445	Silt and clay, some sand, trace gravel (till)	reddish brown	damp	very stiff to hard	9-12-12 19-24-26		S-1 S-2	5.0-6.5 10.0-11.5			
14.0-20.0 439	Silt, some clay, some sand, little gravel (till)	brown	damp	very stiff	9-8-9		S-3	15.0-16.5			
20.0-30.0 429	Silt and clay, some sand, little gravel (till)	grayish brown	moist	hard to stiff	9-12-17 16-16-25 5-5-4-6		S-4 S-5 S-6	20.0-21.5 25.0-26.5 30.0-32.0			
	Bottom of Hole 30.0' Well Completion Data Cement 2.0 - Surface Bentonite 5.0-2.0' Sand Pack 30.0-5.0' Screen 30.0-20.0'										

*NOTE: Blow Count indicates number of blows required to drive sampler 6 inches using 140 pound hammer falling 30 inches.

DRILLING COMPANY Catoh Environmental Co. DRILLER Arthur Utter INSPECTOR Frank Jones

BORING NO. MW-2

THE CHESTER ENGINEERS
CORAOPOLIS, PENNSYLVANIA
TEST BORING RECORD

SHEET 1 of 1

PROJECT Philips ECG LOCATION Senaca Falls, New York GROUND ELEVATION 445.95
FEATURE Downgradient Well to Right of Lagoon Top of Casing 449.19
DATE STARTED 3/10/83 TYPE OF SAMPLER Split Spoon DIAMETER OF AUGER 9 inch GROUND WATER 0 HRS Dry 24 HRS 21.7'
DATE COMPLETED 3/10/83 SAMP. SIZE 2 inch O.D. WEIGHT OF HAMMER 140 lb. FALL 36 inch
WEATHER Cloudy, Cold CASING SIZE 4 inch I.D. WEIGHT OF HAMMER FALL

DEPTH OF STRATUM	DESCRIPTION OF STRATUM	COLOR	MOISTURE CONDITION	DENSITY CONSISTENCY, HDNESS	BLOW CNT OR RECVY*	% REC.	SMPL. OR RUN NO.	SMPL. OR RUN INTVL	RQD LENGTH	% RQD	CAS. BLOWS
0.0-14.0 432	Silt and clay, some sand, little rounded gravel (till)	reddish brown	damp	hard	12-15-28 22-24-34		S-1 S-2	5.0-6.5 10.0-11.0			
14.0-21.0 425	Clay, some silt, little sand, trace rounded gravel (till)	gray	wet	stiff	6-6-6 5-3-14		S-3 S-4	15.0-16.5 20.0-21.5			
21.0-22.0 424	Weathered shaley limestone Auger refusal at 22.0'	gray	damp	hard							
	Bottom of Hole 22.0' Well Completion Data Cement 2.0'-surface Bentonite 5.0-2.0' Sand Pack 22.0-5.0' Screen 22.0-12.0'										

*NOTE: Blow Count indicates number of blows required to drive sampler 6 inches using 140 pound hammer falling 30 inches.

DRILLING COMPANY Catoh Environmental Co. DRILLER Arthur Utter INSPECTOR Frank Jones

BORING NO. MW-3

THE CHESTER ENGINEERS
CORAOPOLIS, PENNSYLVANIA
TEST BORING RECORD

SHEET 1 of 1

PROJECT Philips ECG LOCATION Senaca Falls, New York GROUND ELEVATION 443.20
FEATURE Downgradient Center Well Top of Casing 446.00
DATE STARTED 3/9/83 TYPE OF SAMPLER Split Spoon DIAMETER OF AUGER 9 inch GROUND WATER O HRS Dry 24 HRS Dry
DATE COMPLETED 3/10/83 SAMP. SIZE 2 inch O.D. WEIGHT OF HAMMER 140 lb. FALL 36 inch
WEATHER Rain, Cold CASING SIZE 4 inch I.D. WEIGHT OF HAMMER FALL

DEPTH OF STRATUM	DESCRIPTION OF STRATUM	COLOR	MOISTURE CONDITION	DENSITY CONSISTENCY, HDNESS	BLOW CNT OR RECVY*	% REC.	SMPL. OR RUN NO.	SMPL. OR RUN INTVL	RQD LENGTH	% RQD	CAS. BLOWS
0.0-24.0 419	Silt, some clay, some sand, little rounded gravel (till)	reddish brown	damp to very moist at 17.0'	hard	11-18-24-41 17-23-18 8-6-6 12-14-41		S-1 S-2 S-3 S-4	5.0-7.0 10.0-11.5 15.0-16.5 20.0-21.5			
24.0-24.5 418	Weathered limestone Auger refusal at 24.5'	gray		hard	50/.3		S-5	24.0-24.3			
	Bottom of Hole 24.5' Well Completion Data Cement 2.0'-Surface Bentonite 5.0-2.0' Sand Pack 24.5-5.0' Screen 24.5-14.5'										

*NOTE: Blow Count indicates number of blows required to drive sampler 6 inches using 140 pound hammer falling 30 inches.

DRILLING COMPANY Catoh Environmental Co. DRILLER Arthur Utter INSPECTOR Frank Jones

BORING NO. MW-4

THE CHESTER ENGINEERS
CORAOPOLIS, PENNSYLVANIA
TEST BORING RECORD

SHEET 1 of 1

PROJECT Philips ECG LOCATION Senaca Falls, New York GROUND ELEVATION 441.96
FEATURE Downgradient Well Top of Casing 444.56
DATE STARTED 3/8/83 TYPE OF SAMPLER Split Spoon DIAMETER OF AUGER 9 inch GROUND WATER 0 HRS Dry 24 HRS Dry
DATE COMPLETED 3/9/83 SAMP. SIZE 2 inch O.D. WEIGHT OF HAMMER 140 lb. FALL 36 inch
WEATHER Cold, Rain CASING SIZE 4 inch I.D. WEIGHT OF HAMMER FALL

DEPTH OF STRATUM	DESCRIPTION OF STRATUM	COLOR	MOISTURE CONDITION	DENSITY CONSISTENCY, HDNESS	BLOW CNT OR RECVY*	% REC.	SMPL. OR RUN NO.	SMPL. OR RUN INTVL	RQD LENGTH	% RQD	CAS. BLOWS
0.0-12.0 430	Some sand, some silt, some clay, little small to medium gravel (till)	reddish brown	damp	hard	17-22-26 13-22-26		S-1 S-2	5.0-6.5 10.0-11.5			
12.0-25.5 417	Silt and clay, some sand, little small to medium gravel (till)	brownish gray	moist to wet at 17.0'	very stiff	9-12-8 2-10-20		S-3 S-4	15.0-16.5 20.0-21.5			
25.5-26.0 417	Weathered limestone Auger refusal at 26.0'	gray	dry	hard	50/.5		S-5	25.0-25.5			
	Bottom of Hole 26.0' Well Completion Data Cement 2.0'- Surface Bentonite 5.0-2.0' Sand Pack 26.0-5.0' Screen 26.0-16.0'										

*NOTE: Blow Count indicates number of blows required to drive sampler 6 inches using 140 pound hammer falling 30 inches.

DRILLING COMPANY Catoh Environmental Co. DRILLER Arthur Utter INSPECTOR Frank Jones

BORING NO. TB-5

THE CHESTER ENGINEERS
CORAOPOLIS, PENNSYLVANIA
TEST BORING RECORD

SHEET 1 of 1

PROJECT Philips ECG LOCATION Senaca Falls, New York GROUND ELEVATION 454.36

FEATURE Detection Well Located between Lagoons Top of Casing 457.47

DATE STARTED 3/8/83 TYPE OF SAMPLER Split Spoon DIAMETER OF AUGER 6 inch GROUND WATER 0 HRS Dry 24 HRS Dry

DATE COMPLETED 3/8/83 SAMP. SIZE 2 inch O.D. WEIGHT OF HAMMER 140 lb. FALL 36 inch

WEATHER Cold, Rain CASING SIZE 2 inch I.D. WEIGHT OF HAMMER FALL

DEPTH OF STRATUM	DESCRIPTION OF STRATUM	COLOR	MOISTURE CONDITION	DENSITY CONSISTENCY, HDNESS	BLOW CNT OR RECVY*	% REC.	SMPL. OR RUN NO.	SMPL. OR RUN INTVL	RQD LENGTH	% RQD	CAS. BLOWS
0.0-9.0 445	Sand, little silt, little small rounded gravel (till)	reddish brown	moist	hard	9-14-20		S-1	5.0-6.5			
9.0-25.0 429	Silt and clay, some fine sand, little small to medium rounded gravel (till)	reddish brown becoming reddish gray at 16.0'	moist to wet at 20.0'	very stiff to hard	10-10-17 4-6-10 10-15-20		S-2 S-3 S-4	10.0-11.5 15.0-16.5 20.0-21.5			
25.0-30.0 424	Some sand, some silt, some clay, trace small to medium gravel (till)	brown	wet	hard	10-50		S-5	25.0-26.0			
	Bottom of Hole 30.0' Well Completion Data Cement 2.0'-Surface Bentonite 5.0-2.0' Sand Pack 30.0-5.0' Screen 30.0-20.0'										

*NOTE: Blow Count indicates number of blows required to drive sampler 6 inches using 140 pound hammer falling 30 inches.

DRILLING COMPANY Catoh Environmental Co. DRILLER Arthur Utter INSPECTOR Frank Jones

BORING NO. TB-6

THE CHESTER ENGINEERS
CORAOPOLIS, PENNSYLVANIA
TEST BORING RECORD

SHEET 1 of 1

PROJECT Philips ECG LOCATION Senaca Falls, New York GROUND ELEVATION 454.39
FEATURE Detection Well Located Between Lagoons Top of Casing 457.22
DATE STARTED 3/12/83 TYPE OF SAMPLER Split Spoon DIAMETER OF AUGER 6 inch GROUND WATER 0 HRS Dry 24 HRS 31.7
DATE COMPLETED 3/12/83 SAMP. SIZE 2 inch O.D. WEIGHT OF HAMMER 140 lb. FALL 36 inch
WEATHER Rain, Cold CASING SIZE 2 inch I.D. WEIGHT OF HAMMER FALL

DEPTH OF STRATUM	DESCRIPTION OF STRATUM	COLOR	MOISTURE CONDITION	DENSITY CONSISTENCY, HDNESS	BLOW CNT OR RECVY*	% REC.	SMPL. OR RUN NO.	SMPL. OR RUN INTVL	RQD LENGTH	% RQD	CAS. BLOWS
0.0-19.0 435	Some sand, some silt, some clay, little gravel (till)	reddish brown	moist	very stiff to hard	9-12-14 12-18-36 22-26-25		S-1 S-2 S-3	5.0-6.5 10.0-11.5 15.0-16.5			
19.0-27.0 427	Silt and clay, some sand, little gravel	gray	moist	very stiff to hard	11-11-13 3-10-41		S-4 S-5	20.0-21.5 25.0-26.5			
27.0-32.0	Silt, some clay, some sand	gray	moist	hard	11-18-30		S-6	30.0-31.5			
32.0-32.5	Weathered shaley limestone Auger refusal at 32.5'										
	Bottom of Hole 32.5' Well Completion Data Cement 2.0-Surface Bentonite 5.0-2.0' Sand Pack 32.5-5.0' Screen 32.5-22.5'										

*NOTE: Blow Count indicates number of blows required to drive sampler 6 inches using 140 pound hammer falling 30 inches.

DRILLING COMPANY Catoh Environmental Co. DRILLER Arthur Utter INSPECTOR Frank Jones

BORING NO. MW-7

THE CHESTER ENGINEERS
CORAOPOLIS, PENNSYLVANIA
TEST BORING RECORD

SHEET 1 of 1

PROJECT PHILIPS ECG LOCATION Seneca Falls, New York

Top of Casing 443.12
GROUND ELEVATION 440.52

FEATURE Deep Monitoring Well between MW-3 and MW-4

DATE STARTED 9/26/83 TYPE OF SAMPLER ____ DIAMETER OF AUGER 9-inch GROUND WATER 0 HRS 58.0 24 HRS 58.0

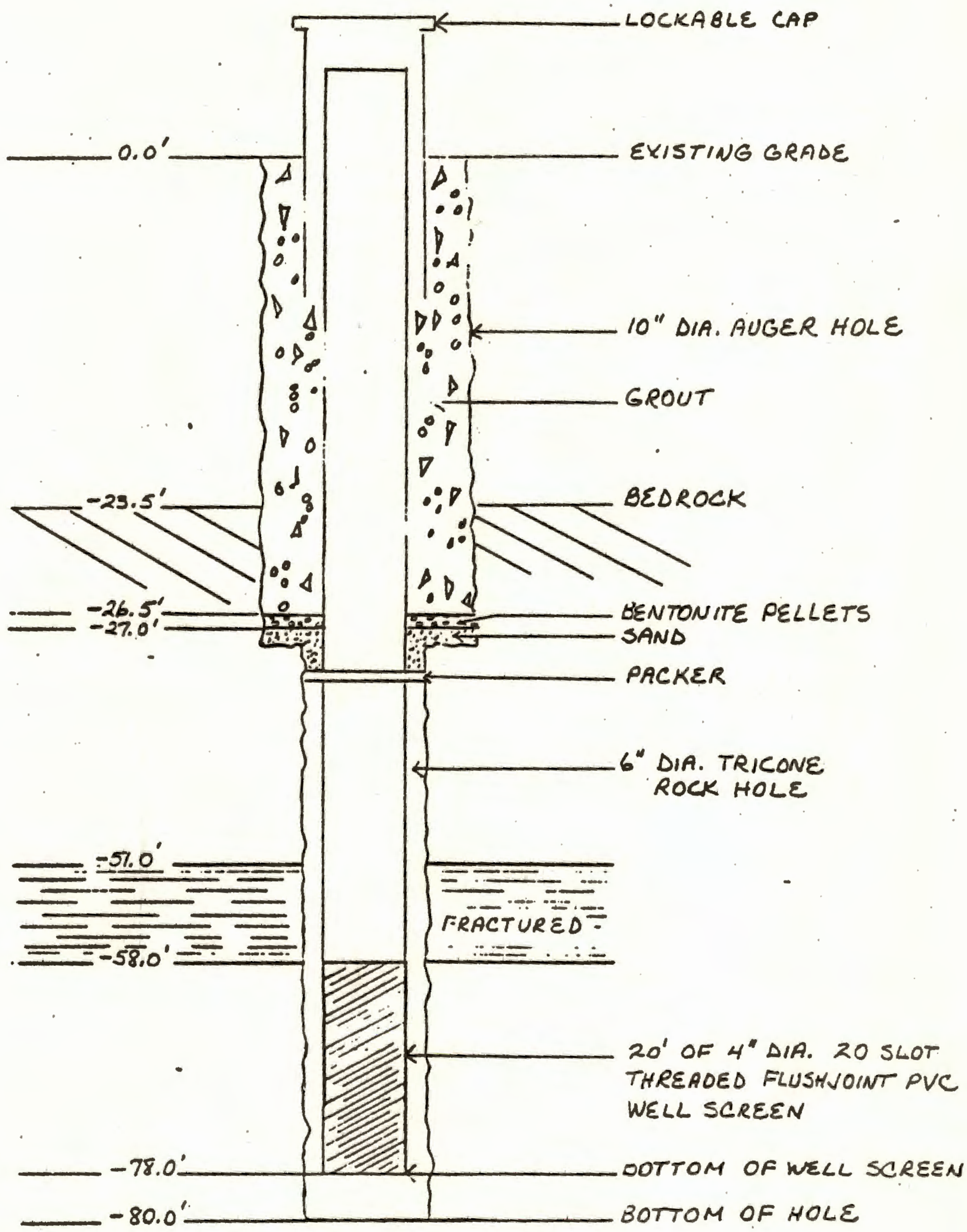
DATE COMPLETED 9/29/83 SAMP. SIZE No Samples WEIGHT OF HAMMER No Samples FALL ____

WEATHER Cloudy, Cool CASING SIZE ____ WEIGHT OF HAMMER ____ FALL ____

DEPTH OF STRATUM	DESCRIPTION OF STRATUM	COLOR	MOISTURE CONDITION	DENSITY CON-SISTENCY, HDNESS	BLOW CNT OR RECVY*	% REC.	SMPL. OR RUN NO.	SMPL. OR RUN INTVL	RQD LENGTH	% RQD	CAS. BLOWS
0.0-21.0 419	Silt, some clay, little sand, little gravel (till)	Brown	Moist	Hard							
21.0-23.5 417	Silt and clay, little sand, little gravel (till)	Gray	Moist	Hard							
23.5-45.0 395	Limestone, very soft and weathered first 4 feet, then hard	Bluish Gray									
45.0-48.0 392	Limestone, hard	Brownish Gray									
48.0-51.0 389	Limestone, hard	Bluish Gray									
51.0-58.0 382	Soft shaley seam, lost water at 51.0 feet	Brown									
58.8-80.0 360	Limestone, hard	Gray									
	Bottom of Hole 80.0' Well Completion Data SEE ATTACHED PAGE										

*NOTE: Blow Count indicates number of blows required to drive sampler 6 inches using 140 pound hammer falling 30 inches.

DRILLING COMPANY Catoh Environmental Co. DRILLER Arthur Utter INSPECTOR Frank Jones



CATOH ENVIRONMENTAL COS. INC.
PHILIPS ECG, SENECA FALLS, NY
INSTALLATION OF MONITOR WELL
CATOH DRWG. # C201-1

NOT TO SCALE

BORING NO. MW-8

THE CHESTER ENGINEERS
CORAOPOLIS, PENNSYLVANIA
TEST BORING RECORD

PROJECT PHILIPS ECG LOCATION Senaca Falls, New York GROUND ELEVATION 459.67
FEATURE Near MW-1 Upgradient Well Top of Casing 461.91
DATE STARTED 2/27/84 TYPE OF SAMPLER None DIAMETER OF AUGER Air Hammer GROUND WATER 0 HRS Dry 24 HRS Dry
DATE COMPLETED 2/29/84 SAMP. SIZE N/A WEIGHT OF HAMMER N/A FALL
WEATHER Snow, cold CASING SIZE 8 inch WEIGHT OF HAMMER FALL

DEPTH OF STRATUM	DESCRIPTION OF STRATUM	COLOR	MOISTURE CONDITION	DENSITY CON-SISTENCY, HDNESS	BLOW CNT OR RECVY*	% REC.	SMPL. OR RUN NO.	SMPL. OR RUN INTVL	RQD LENGTH	% RQD	CAS. BLOWS
0.0-7.0 453	Silt, some clay, some sand, little gravel	Brown	Moist	Hard							
7.0-35.0 425	Clay, some silt, little sand, little gravel	Gray	Wet	Hard							
35.0-150.0 310	Limestone with gypsum seams	Gray	Dry	Medium Hard							
	Bottom of hole 150.0' Well Completion Data Steel Casing with Grouted Annulus 38.0-Surface Open Borehole 150.0-38.0'										

*NOTE: Blow Count indicates number of blows required to drive sampler 6 inches using 140 pound hammer falling 30 inches.

DRILLING COMPANY Catoh Environmental Co. DRILLER INSPECTOR Frank Jones

BORING NO. MW-9

THE CHESTER ENGINEERS
CORAOPOLIS, PENNSYLVANIA
TEST BORING RECORD

SHEET 1 of 1

PROJECT PHILIPS ECG LOCATION Senaca Falls, New York GROUND ELEVATION 441.89
FEATURE Downgradient near flume shelter Top of Casing 443.86
DATE STARTED 2/29/84 TYPE OF SAMPLER None DIAMETER OF AUGER Air Hammer GROUND WATER 0 HRS 64.1 24 HRS 63.9
DATE COMPLETED 3/1/84 SAMP. SIZE N/A WEIGHT OF HAMMER N/A FALL
WEATHER Snow, Cold CASING SIZE 8 inch WEIGHT OF HAMMER FALL

DEPTH OF STRATUM	DESCRIPTION OF STRATUM	COLOR	MOISTURE CONDITION	DENSITY CON-SISTENCY, HDNESS	BLOW CNT OR RECVY*	% REC.	SMPL. OR RUN NO.	SMPL. OR RUN INTVL	RQD LENGTH	% RQD	CAS. BLOWS
0.0-27.0 415	Clay, some silt, little sand, little gravel	Gray	Moist	Hard							
27.0-59.0 383	Limestone with soft gypsum seams	Gray	Dry	Medium Hard							
59.0-61.0 381	Void - Took 20 bags of sand to fill										
61.0-85.0 357	Limestone with soft gypsum seams	Gray	Dry	Medium Hard							
	Bottom of hole 85.0' Well Completion Data Grout 384.5-Surface Bentonite 385.0-384.5' Sand Pack 360.0-385.0' Screen 360.0-380.0'										

*NOTE: Blow Count indicates number of blows required to drive sampler 6 inches using 140 pound hammer falling 30 inches.

DRILLING COMPANY Catoh Environmental Co. DRILLER INSPECTOR Frank Jones

BORING NO. MW-10

THE CHESTER ENGINEERS
CORAOPOLIS, PENNSYLVANIA
TEST BORING RECORD

SHEET 1 of 1

PROJECT PHILIPS ECG LOCATION Senaca Falls, New York GROUND ELEVATION 446.31

FEATURE Downgradient near MW-2 Top of Casing 448.81

DATE STARTED 3/2/84 TYPE OF SAMPLER None DIAMETER OF AUGER Air Hammer GROUND WATER 0 HRS 64.9 24 HRS 64.6

DATE COMPLETED 3/3/84 SAMP. SIZE N/A WEIGHT OF HAMMER N/A FALL

WEATHER Snow, cold CASING SIZE 8 inch WEIGHT OF HAMMER FALL

DEPTH OF STRATUM	DESCRIPTION OF STRATUM	COLOR	MOISTURE CONDITION	DENSITY CON-SISTENCY, HDNESS	BLOW CNT OR RECVY*	% REC.	SMPL. OR RUN NO.	SMPL. OR RUN INTVL	RQD LENGTH	% RQD	CAS. BLOWS
0.0-20.5 426	Clay, some silt, little sand, little gravel	Gray	Moist	Hard							
20.5-64.5 382	Limestone with sold gypsum seams	Gray	Dry	Medium Hard							
64.5-66.0 380	Soft shaley seam	Brown	Wet	Soft							
66.0-84.0 362	Limestone with soft gypsum seams	Gray	Dry	Medium Hard							
	Bottom of hole 84.0' Well Completion Data Grout 384.5-Surface Bentonite 385.0-384.5' Sand Pack 363.0-385.0' Screen 363.0-383.0'										

*NOTE: Blow Count indicates number of blows required to drive sampler 6 inches using 140 pound hammer falling 30 inches.

DRILLING COMPANY Catoh Environmental Co. DRILLER INSPECTOR Frank Jones

BORING NO. MW-11

THE CHESTER ENGINEERS
CORAOPOLIS, PENNSYLVANIA
TEST BORING RECORD

SHEET 1 of 1

Top of Casing 455.94

PROJECT PHILIPS ECG LOCATION Seneca Falls, New York GROUND ELEVATION 453.42

FEATURE Deep Well Southeast of Filter Cake Pond

DATE STARTED 7/10/84 TYPE OF SAMPLER None DIAMETER OF AUGER 8-3/4 inch GROUND WATER 0 HRS 88.5 24 HRS 88.5

DATE COMPLETED 7/12/84 SAMP. SIZE None WEIGHT OF HAMMER N/A FALL N/A

WEATHER Sunny, Warm CASING SIZE 6 Inch WEIGHT OF HAMMER FALL

DEPTH OF STRATUM	DESCRIPTION OF STRATUM	COLOR	MOISTURE CONDITION	DENSITY CON-SISTENCY, HDNESS	BLOW CNT OR RECVY*	% REC.	SMPL.OR RUN NO.	SMPL. OR RUN INTVL	RQD LENGTH	% RQD	CAS. BLOWS
0.0-17.0 436	Silt, some clay, some sand, some gravel	Brown	Damp	Very Stiff							
17.0-29.0 424	Silt and clay, some sand, some gravel (till)	Gray	Moist	Hard							
29.0-37.0 416	Silt, some medium gravel, some sand, little clay	Gray	Very Moist	Medium							
37.0-40.0 413	Weathered shale	Gray		Medium							
40.0-98.0 355	Limestone with shaley seams and some soft clay seams	Gray		Medium Hard							
	Bottom of Hole 98.0' Well Completion Data Grout 52.0-Surface Bentonite 55.0-52.0' Sand Pack 98.0-55.0' Screen 98.0-80.0'										

*NOTE: Blow Count indicates number of blows required to drive sampler 6 inches using 140 pound hammer falling 30 inches.

DRILLING COMPANY Catoh Environmental Co. DRILLER Tim Lowell INSPECTOR Frank Jones

BORING NO. MW-12

THE CHESTER ENGINEERS
CORAOPOLIS, PENNSYLVANIA
TEST BORING RECORD

SHEET 1 of 1

PROJECT PHILIPS ECG LOCATION Seneca Falls, New York

Top of Casing 456.27
GROUND ELEVATION 453.60

FEATURE Shallow Well Southeast of Filter Cake Pond

DATE STARTED 7/9/84 TYPE OF SAMPLER None DIAMETER OF AUGER 8-3/4 GROUND WATER 0 HRS 12.2 24 HRS 39.3

DATE COMPLETED 7/10/84 SAMP. SIZE None WEIGHT OF HAMMER N/A FALL N/A

WEATHER Cloudy, Cool CASING SIZE WEIGHT OF HAMMER FALL

DEPTH OF STRATUM	DESCRIPTION OF STRATUM	COLOR	MOISTURE CONDITION	DENSITY CON-SISTENCY, HDNESS	BLOW CNT OR RECVY*	% REC.	SMPL. OR RUN NO.	SMPL. OR RUN INTVL	RQD LENGTH	% RQD	CAS. BLOWS
0.0-14.0 440	Silt, some clay, some sand, some gravel	Brown	Moist	Stiff							
14.0-25.0 429	Silt and clay, some sand, some gravel (till)	Gray	Moist	Hard							
25.0-30.5 423	Silt, some gravel, some sand, little clay	Brown	Moist	Medium							
30.5-34.0 420	Silt and clay, some small gravel, little sand (till)	Gray	Moist	Hard							
34.0-36.0 418	Weathered shaley limestone	Gray		Medium							
36.0-42.0 412	Limestone, with shaley seams	Gray		Medium Hard							
	Bottom of Hole 42.0' Well Completion Data Grout 18.0-Surface Bentonite 21.0-18.0' Sand Pack 42.0-21.0' Screen 42.0-32.0'										

*NOTE: Blow Count indicates number of blows required to drive sampler 6 inches using 140 pound hammer falling 30 inches.

DRILLING COMPANY Catoh Environmental Co. DRILLER Tim Lowel INSPECTOR Frank Jones

APPENDIX B

CHESTER LABORATORIES
ANALYTICAL RESULTS
FOR
GROUNDWATER MONITORING

ChesterLaboratories

A Division Of

The**Chester**Engineers

845 Fourth Avenue
Coraopolis
Pennsylvania 15108
Phone (412) 262-1035

4r1 - 15T0/R

Laboratory Analysis Report For

Philips ECG, Inc.
Seneca Falls, New York

Monitoring Well Analyses

Samples Received: 3/29/83
Report Date: 4/15/83

Source	MW-1	MW-3	MW-4	MW-6
Log No. 83-	1471	1472	1473	1474
Date Collected	3/28/83 @ 10:05 AM	3/28/83 @ Noon	3/28/83 @ 1:00 PM	3/28/83 @ 2:00 PM
pH	7.7	8.0	8.0	8.0
Specific Conductance, μmhos/cm	990	840	750	2,600
Total Organic Halogens, μg/L Cl	56	51	39	97
Total Organic Carbon, mg/L C	30	17	16	19
Calcium Hardness, mg/L $CaCO_3$	--	--	--	1,340
Arsenic, mg/L As	<0.001	<0.001	0.0014	<0.001
Barium, mg/L Ba	0.3	0.2	0.6	1.0
Cadmium, mg/L Cd	<0.005	<0.005	<0.005	<0.005
Chromium, mg/L Cr	0.012	0.012	0.015	0.012
Lead, mg/L Pb	<0.005	<0.005	<0.005	<0.005
Mercury, mg/L Hg	<0.001	<0.001	<0.001	<0.001
Selenium, mg/L Se	<0.001	<0.001	<0.001	<0.001
Silver, mg/L Ag	<0.01	<0.01	<0.01	0.01
Zinc, mg/L Zn	0.019	0.005	0.055	0.042
Total Fluoride, mg/L F	0.25	0.29	0.30	1.3
Nitrates and Nitrites, mg/L N	0.124	0.076	0.049	0.056
Nitrites, mg/L N	0.012	0.011	0.016	0.020
Nitrates, mg/L N	0.112	0.065	0.033	0.036
Total Coliform, No./100 mL	<1	--	<1	<1
Chlorides, mg/L Cl	10	13	24	30
Sodium, mg/L Na	19	12	15	48
Phenols, mg/L PhOH	0.005	0.005	0.009	0.022
Manganese, mg/L Mn	0.27	<0.01	0.95	1.8
Iron, mg/L Fe	0.24	0.02	3.9	3.2
Sulfates, mg/L SO_4	91	115	56	1,064

2887-95

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845 Fourth Avenue
Coraopolis
Pennsylvania 15108
Phone: (412) 262-1035

Laboratory Analysis Report
For

Philips ECG, Inc.
Seneca Falls, New York

Samples Received: 3/29/83
Report Date: 4/15/83

Replicate Analyses
Monitoring Well MW-1

Source	Replicate #2	Replicate #3	Replicate #4
Log No. 83-	1471	1471	1471
pH	7.6	7.6	7.7
Specific Conductance, µmhos/cm	995	985	990
Total Organic Halogens, µg/L Cl	59	59	56
Total Organic Carbon, mg/L C	31	32	29

2887-95

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Laboratory Analysis Report
For

Philips ECG, Inc.
Seneca Falls, New York

Samples Received: 6/17 and 6/22/83
Report Date: 7/21/83

Source	MW-1	MW-3
Log No. 83-	2998	2999
pH	7.1	--
Specific Conductance, μmhos/cm	1,000	--
Total Organic Halogens, μg/L Cl	41	--
Total Organic Carbon, mg/L C	44	--
Arsenic, mg/L As	<0.0005	0.0018
Barium, mg/L Ba	0.2	0.6
Cadmium, mg/L Cd	<0.005	0.006
Chromium, mg/L Cr	<0.005	0.046
Lead, mg/L Pb	<0.005	0.11
Mercury, mg/L Hg	<0.001	<0.001
Selenium, mg/L Se	0.0030	<0.001
Silver, mg/L Ag	<0.01	0.02
Total Fluoride, mg/L F	0.31	2.56
Nitrates and Nitrites, mg/L N	0.18	--
Nitrites, mg/L N	<0.004	--
Nitrates, mg/L N	0.18	--
Total Coliform, No./100 mL	<1	<1
Chlorides, mg/L Cl	67	--
Sodium, mg/L Na	32	14
Phenols, mg/L PhOH	<0.004	--
Manganese, mg/L Mn	0.15	2.5
Iron, mg/L Fe	0.22	13.6
Sulfates, mg/L SO_4	109	--
Zinc, mg/L Zn	0.024	0.24
Gross Alpha, pCi/L	1.0	--
Gross Beta, pCi/L	0	--
Radium 226, pCi/L	0.1	--

2887-05

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Laboratory Analysis Report
For

Philips ECG, Inc.
Seneca Falls, New York

Samples Received: 6/17 and 6/22
Report Date: 7/21/83

Replicate Analyses
MW-1

Source	Replicate #2	Replicate #3	Replicate #4
Log No. 83-	2998	2998	2998
pH	7.0	7.0	7.1
Specific Conductance, μmhos/cm	1,000	1,010	1,020
Total Organic Halogens, μg/L Cl	43	35	39
Total Organic Carbon, mg/L C	46	42	44

2887-05

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Laboratory Analysis Report For

Phillips ECG, Inc.
Seneca Falls, New York

Monitoring Well Analyses

Samples Received: 9/15/83
Report Date: 10/25/83

Source	MW #1
Log No. 83-	4677
Date Collected	9/14/83 @ 0900
Arsenic, mg/L As	<0.001
Barium, mg/L Ba	0.14
Cadmium, mg/L Cd	<0.005
Chromium, mg/L Cr	<0.005
Lead, mg/L Pb	<0.002
Mercury, mg/L Hg	<0.0005
Selenium, mg/L Se	<0.001
Silver, mg/L Ag	<0.01
Total Fluoride, mg/L F	0.81
Nitrates and Nitrites, mg/L N	0.028
Nitrites, mg/L N	0.010
Nitrates, mg/L N	0.018
Radium 226, pCi/L	0.08
Gross Alpha, pCi/L	2.1
Gross Beta, pCi/L	0.
Turbidity, NTU	10
Total Coliform, No./100 mL	<1
Endrin, µg/L	<0.01
Lindane, µg/L	<0.01
Methoxychlor, µg/L	<0.1
Toxaphene, µg/L	<0.5
2,4-D, µg/L	<1
2,4,5-TP Silvex, µg/L	<1
Chlorides, mg/L Cl	15
Sodium, mg/L Na	20
Phenols, mg/L PhOH	<0.004

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LABORATORY ANALYSIS REPORT
FOR

Phillips ECG, Inc.
Seneca Falls, New York

Monitoring Well Analyses

Source	MW #1
Log No. 83-	4677
Date Collected	9/15/83 @ 0900
Iron, mg/L Fe	0.57
Manganese, mg/L Mn	0.34
Sulfates, mg/L SO_4	103

2887-05

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Laboratory Analysis Report
For

Phillips ECG, Inc.
Seneca Falls, New York

Replicate Analyses
MW #1

Samples Received: 9/15/83
Report Date: 10/25/83

Source	Replicate #1	Replicate #2	Replicate #3	Replicate #4
Log No. 83-	4677	4677	4677	4677
pH	7.3	7.2	7.3	7.3
Specific Conductance, µmhos/cm	965	970	955	965
Total Organic Halogens, µg/L Cl	41	45	48	43
Total Organic Carbon, mg/L C	65	63	58	56

2887-05

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Laboratory Analysis Report
For

Phillips ECG, Inc.
Seneca Falls, New York

Monitoring Well Analyses

Samples Received: 9/30/83
Report Date: 10/25/83

Source	MW #7
Log No. 83-	5042
Date Collected	9/29/83
Arsenic, mg/L As	<0.001
Barium, mg/L Ba	0.12
Cadmium, mg/L Cd	<0.005
Chromium, mg/L Cr	0.010
Lead, mg/L Pb	0.026
Mercury, mg/L Hg	<0.001
Selenium, mg/L Se	0.002
Silver, mg/L Ag	<0.01
Total Fluoride, mg/L F	1.4
Nitrates and Nitrites, mg/L N	0.042
Nitrites, mg/L N	0.005
Nitrates, mg/L N	0.037
Turbidity, NTU	40
Total Coliform, No./100 mL	10
Chlorides, mg/L Cl	136
Sodium, mg/L Na	90
Phenols, mg/L PhOH	<0.004
Iron, mg/L Fe	0.44
Manganese, mg/L Mn	0.040
Sulfates, mg/L SO_4	1,292
pH	7.5
Specific Conductance, μmhos/cm	1,850
Total Organic Halogens, μg/L Cl	76
Total Organic Carbon, mg/L C	5
Total Hardness, mg/L $CaCO_3$	1,110

2887-05

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Laboratory Analysis Report
For

Phillips ECG, Inc.
Seneca Falls, New York

Monitoring Well Analyses

Samples Received: 9/30/83
Report Date: 11/17/83

Source	MW #7
Log No. 83-	5042
Date Collected	9/29/83
Radium 226, pCi/L	0.5
Gross Alpha, pCi/L	0
Gross Beta, pCi/L	0
Endrin, µg/L	<0.01
Lindane, µg/L	<0.01
Methoxychlor, µg/L	<0.1
Toxaphene, µg/L	<0.5
2,4-D, µg/L	<1
2,4,5-TP Silvex, µg/L	<1

.2887-05

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Laboratory Analysis Report
For

Philips ECG, Inc.
Seneca Falls, New York

Monitoring Well Analyses

Samples Received: 12/16/83
Report Date: 1/31/84

Source	MW-1	MW-7
Log No. 83-	6731	6732
Date Collected	12/14/83	12/14/83
Arsenic, mg/L As	<0.0005	<0.0007
Barium, mg/L Ba	0.10	0.03
Cadmium, mg/L Cd	0.003	0.010
Total Chromium, mg/L Cr	<0.005	0.007
Lead, mg/L Pb	0.017	0.070
Mercury, mg/L Hg	0.0012	<0.0005
Selenium, mg/L Se	<0.0005	<0.0005
Silver, mg/L Ag	0.003	0.017
Total Fluoride, mg/L F	0.23	0.33
Nitrates and Nitrites, mg/L N	0.169	0.140
Nitrites, mg/L N	0.012	0.011
Nitrates, mg/L N	0.157	0.129
Radium 226, pCi/L	0.3	0.3
Gross Alpha, pCi/L	3.1	<1
Gross Beta, pCi/L	1	5
Turbidity, NTU	0.25	0.20
Total Coliform, No./100 mL	<1	<1
Endrin, μg/L	<0.01	<0.01
Lindane, μg/L	<0.01	<0.01
Methoxychlor, μg/L	<0.1	<0.1
Toxaphene, μg/L	<0.5	<0.5
2,4-D, μg/L	<1	<1
2,4,5-TP Silvex, μg/L	<1	<1
Chlorides, mg/L Cl	15	154
Sodium, mg/L Na	18	91
Phenols, mg/L PhOH	<0.004	<0.004

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LABORATORY ANALYSIS REPORT
FOR

Philips ECG, Inc.
Seneca Falls, New York

Monitoring Well Analyses
(Continued)

Source	MW-1	MW-7
Log No. 83-	6731	6732
Date Collected	12/14/83	12/14/83
Manganese, mg/L Mn	0.16	0.07
Iron, mg/L Fe	0.19	0.11
Sulfates, mg/L SO_4	83	1,213
pH	7.5	7.8
Specific Conductance, µmhos/cm	1,225	2,050
Total Organic Halogens, µg/L Cl	38	90
Total Organic Carbon, mg/L C	26	1

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Laboratory Analysis Report For

Philips ECG
Seneca Falls, New York

Monitoring Well Analyses

Samples Received: 3/5/84
Report Date: 3/25/84

Source	MW-7	MW-9	MW-10
Log No. 84-	1315	1316	1317
Date Collected	3/4/84 @ 10:30 AM	3/4/84 @ 12:15 PM	3/4/84 @ 2:00 PM
Arsenic, mg/L As	<0.001	<0.001	<0.001
Barium, mg/L Ba	<0.05	<0.05	<0.05
Cadmium, mg/L Cd	0.008	0.018	<0.005
Chromium, mg/L Cr	0.008	0.005	0.007
Lead, mg/L Pb	0.10	0.11	0.08
Mercury, mg/L Hg	<0.001	<0.001	<0.001
Selenium, mg/L Se	<0.001	<0.001	<0.001
Silver, mg/L Ag	<0.005	<0.005	<0.005
Total Fluorides, mg/L F	0.31	1.7	0.36
Nitrates, mg/L N	0.47	0.92	0.34
Radium, pCi/L	0.2	3.2	0.2
Gross Alpha, pCi/L	2.5	7.6	0.9
Gross Beta, pCi/L	16	14	11
Turbidity, NTU	5.4	60	4.5
Total Coliform, No./100 mL	<1	<1	<1
Endrin, µg/L	<0.01	<0.01	<0.01
Lindane, µg/L	<0.01	<0.01	<0.01
Methoxychlor, µg/L	<0.1	<0.1	<0.1
Toxaphene, µg/L	<0.5	<0.5	<0.5
2,4-D, µg/L	<1	<1	<1
2,4,5-TP Silvex, µg/L	<1	<1	<1
Chlorides, mg/L Cl	124	14	148
Sodium, mg/L Na	74	28	79
Phenols, mg/L PhOH	0.004	<0.004	0.006
Iron, mg/L Fe	0.70	3.9	0.39
Manganese, mg/L Mn	0.08	0.18	0.02
Sulfates, mg/L SO_4	1,107	377	882
pH	7.8	7.8	7.9
Specific Conductance, µmhos/cm	1,990	1,010	1,750
Total Organic Halogens, µg/L Cl	54	37	43
Total Organic Carbon, mg/L C	2	11	1

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845 Fourth Avenue
Coraopolis
Pennsylvania 15108
Phone: (412) 262-1035

Laboratory Analysis Report For

Philips ECG
Seneca Falls, New York

Samples Received: 3/5/84
Report Date: 3/25/84

Replicate Analyses
MW-1

Source	Replicate #1	Replicate #2	Replicate #3	Replicate #4
Log No. 84-	1314	1314	1314	1314
pH	7.6	7.7	7.7	7.7
Specific Conductance, µmhos/cm	975	975	970	975
Total Organic Halogens, µg/L Cl	43	46	43	41
Total Organic Carbon, mg/L C	33	31	34	29

2887-95

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KEC'D 3/14/85
ARC

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-0001

Henry G. Williams
Commissioner

MAR 1 1 1985

Mr. Alan R. Covell
Environmental Engineer
Philips ECG, Inc.
50 Johnston Street
Seneca Falls, New York 13148

Dear Mr. Covell:

Re: Groundwater Monitoring

Enclosed are the analytical results of the Department's June 6, 1984 sampling of Philips' groundwater monitoring network. The data indicate levels of several metals in excess of 6NYCRR Part 703 groundwater quality standards: cadmium was detected in wells 7, 8, 9, 10; nickel was detected in wells 1, 7; and lead was detected in well 8. Lesser amounts of nickel were also found in wells 8 and 9.

As of December 27, 1983, the New York State Department of Environmental Conservation has had Phase I Interim Authorization under the Resource Conservation and Recovery Act (RCRA). As a result, RCRA facilities which have been granted interim status in New York State are subject to Article 27, Title 9 of the Environmental Conservation Law and 6NYCRR Part 360 rather than 40CFR Part 265 Subpart F. Facilities must also meet the groundwater quality standards set forth in 6NYCRR Part 703.

Considering the possible contamination by the abovementioned metals, Philips must sample its groundwater monitoring network within 30 days of receipt of this letter. Groundwater samples are to be analyzed for the metals listed above as well as the Part 360 parameters specified in Clause 360.8(c)(5)(iii)(b): primary drinking parameters, groundwater quality parameters, and indicator parameters. The analytical method used for total organic halogens must be capable of detecting volatile organic compounds.

Please be advised that this letter in no way precludes future enforcement actions for any violations of the Environmental Conservation Law or the regulations promulgated thereunder.

If you have any questions, please contact Mr. Robert McNamee of my staff at (518) 457-9255.

Sincerely,

Paul R. Counterman

Paul R. Counterman, P.E.
Chief
Bureau of Hazardous Waste Technology
Division of Solid and Hazardous Waste

Enclosures

cc: w/encs. - S. Siegel, EPA Region II

cc: w/o encs. - F. Shattuck, Region 8

N.Y.S. DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SOLID AND HAZARDOUS WASTE

SAMPLE I.D. NUMBER:68415501 Well #1
SITE NAME:PHILIPSECS

PARAMETER	UNITS	CONCENTRATION	COMMENTS
TOTAL ORGANIC CARBON	UG/L	<500	-
TOTAL ORGANIC HALOGEN	UG/L	<100	-
VOLATILE ORGANICS	UG/L	NA	NS
CD	UG/L	<100	-
CR	UG/L	<100	-
CU	UG/L	200	-
NI	UG/L	2000	-
PB	UG/L	<100	-
ZN	UG/L	<100	-
CONDUCTIVITY	UMHO	1250	-
PH	SU	6.70	-

N.Y.S. DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SOLID AND HAZARDOUS WASTE

SAMPLE I.D. NUMBER:88415204 Well #7
SITE NAME:PHILIPSEC6

PARAMETER	UNITS	CONCENTRATION	COMMENTS
TOTAL ORGANIC CARBON	UG/L	<500	-
TOTAL ORGANIC HALOGEN	UG/L	<100	-
VOLATILE ORGANICS	UG/L	NA	NS
CD	UG/L	100	-
CR	UG/L	<100	-
CU	UG/L	<100	-
NI	UG/L	3400	-
PB	UG/L	<100	-
ZN	UG/L	<100	-
CONDUCTIVITY	UMHO	2100	-
PH	SU	6.80	-

N.Y.S. DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SOLID AND HAZARDOUS WASTE

SAMPLE I.D. NUMBER:88415802 Well #8
SITE NAME:PHILIPSEC6

PARAMETER	UNITS	CONCENTRATION	COMMENTS
TOTAL ORGANIC CARBON	UG/L	<500	-
TOTAL ORGANIC HALOGEN	UG/L	<100	-
VOLATILE ORGANICS	UG/L	NA	NS
CD	UG/L	100	-
CR	UG/L	<100	-
CU	UG/L	<100	-
NI	UG/L	600	-
PB	UG/L	200	-
ZN	UG/L	<100	-
CONDUCTIVITY	UMHO	7500	-
PH	SU	7.0	-

N.Y.S. DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SOLID AND HAZARDOUS WASTE

SAMPLE I.D. NUMBER:88415803 Well #9
SITE NAME:PHILIPSECS

PARAMETER	UNITS	CONCENTRATION	COMMENTS
TOTAL ORGANIC CARBON	UG/L	<500	-
TOTAL ORGANIC HALOGEN	UG/L	<100	-
VOLATILE ORGANICS	UG/L	NA	NS
CD	UG/L	100	-
CR	UG/L	<100	-
CU	UG/L	<100	-
NI	UG/L	1500	-
PB	UG/L	<100	-
ZN	UG/L	<100	-
CONDUCTIVITY	UMHO	850	-
PH	SU	7.10	-

N.Y.S. DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SOLID AND HAZARDOUS WASTE

SAMPLE I.D. NUMBER:88415805 Well #10
SITE NAME:PHILIPSECG

PARAMETER	UNITS	CONCENTRATION	COMMENTS
TOTAL ORGANIC CARBON	UG/L	<500	-
TOTAL ORGANIC HALOGEN	UG/L	<100	-
VOLATILE ORGANICS	UG/L	NA	NS
CD	UG/L	100	-
CR	UG/L	<100	-
CU	UG/L	<100	-
NI	UG/L	<100	-
PB	UG/L	<100	-
ZN	UG/L	<100	-
CONDUCTIVITY	UMHO	1650	-
PH	SU	6.70	-

Chester Laboratories
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P.O. Box 9356
Pittsburgh
Pennsylvania 15225
Phone (412) 269-5700

Laboratory Analysis Report
For

Philips ECG, Inc.
Seneca Falls, New York

Monitoring Well Analyses

Samples Received: 6/12/84
Report Date: 6/29/84

Source	MW-1
Log No. 84-	3969
Date Collected	6/8/84 @ 3:00 PM
pH	7.2
Specific Conductance, µmhos/cm	1,040
Total Organic Halogens, µg/L Cl	83
Total Organic Carbon, mg/L C	3
Chloride, mg/L Cl	11
Sulfate, mg/L SO_4	74
Phenol, mg/L PhOH	<0.004
Iron, mg/L Fe	0.46
Manganese, mg/L Mn	0.04
Sodium, mg/L Na	24

2887—95

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Pennsylvania 15225
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Laboratory Analysis Report For

Philips ECG, Inc.
Seneca Falls, New York

Samples Received: 6/12/84
Report Date: 6/29/84

Replicate Analyses

Source	MW-8 Replicate #2	MW-8 Replicate #3	MW-8 Replicate #4
Log No. 84-	3970	3970	3970
Date Collected	6/8/84 @ 2 PM	6/8/84 @ 2 PM	6/8/84 @ 2 PM
pH	7.4	7.4	7.4
Specific Conductance, μmhos/cm	8,400	8,200	8,200
Total Organic Halogens, μg/L Cl	893	905	905
Total Organic Carbon, mg/L C	8	7	7

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Laboratory Analysis Report
For

Philips ECG, Inc.
Seneca Falls, New York

Monitoring Well Analyses

Samples Received: 6/12/84
Report Date: 6/29/84

Source	MW-8	MW-9	MW-7	MW-10
Log No. 84-	3970	3971	3990	3991
Date Collected	6/8/84 @ 2 PM	6/11/84 @ 8 AM	6/11/84 @ 2:10 PM	6/11/84 @ 2:55 PM
pH	7.4	7.3	7.4	7.5
Specific Conductance, µmhos/cm	8,400	900	2,000	1,750
Total Organic Halogens, µg/L Cl	940	80	202	106
Total Organic Carbon, mg/L C	7	17	11	1
Arsenic, mg/L As	<0.001	<0.001	<0.001	<0.001
Barium, mg/L Ba	0.25	0.08	0.18	0.18
Cadmium, mg/L Cd	<0.005	<0.005	<0.005	<0.005
Chromium, mg/L Cr	0.02	0.009	0.01	0.01
Lead, mg/L Pb	<0.005	<0.005	<0.005	<0.005
Mercury, mg/L Hg	<0.001	<0.001	<0.001	<0.001
Selenium, mg/L Se	<0.001	<0.001	<0.001	<0.001
Silver, mg/L Ag	0.03	<0.01	0.01	0.01
Iron, mg/L Fe	0.28	0.32	0.08	0.04
Manganese, mg/L Mn	0.02	0.01	0.05	0.02
Sodium, mg/L Na	1,500	4	60	81
Fluoride, mg/L F	2.1	0.61	0.85	0.66
Nitrate, mg/L N	0.49	0.46	0.18	0.16
Chloride, mg/L Cl	1,590	2	82	129
Sulfate, mg/L SO_4	2,545	223	1,140	775
Total Coliform, No./100 mL	<1	<1	<1	<1
Phenolics, mg/L PhOH	<0.004	<0.004	<0.004	<0.004
Endrin, µg/L	<0.01	<0.01	*<0.01	*<0.01
Lindane, µg/L	<0.01	<0.01	*<0.01	*<0.01
Methoxychlor, µg/L	<0.1	<0.1	* <0.1	* <0.1
Toxaphene, µg/L	<0.5	<0.5	* <0.5	* <0.5
2,4-D, µg/L	<1	<1	* <1	* <1
2,4,5-TP Silvex, µg/L	<1	<1	* <1	* <1
Radium 226, pCi/L	0.7	0.3	0.2	0.1
Gross Alpha, pCi/L	2.0	0	0	0
Gross Beta, pCi/L	19	2	3	2

*Note: For MW-7 Analyses of Log No. 84-4140 collected 6/18/84 @ 8:10 AM
For MW-10 Analyses of Log No. 84-4141 collected 6/18/84 @ 8:25 AM

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Pittsburgh
Pennsylvania 15225
Phone (412) 269-5700

Laboratory Analysis Report
For

Philips ECG
Seneca Falls, New York

VF 2 1ST Qtr

Samples Received: 7/13/84
Report Date: 8/7/84

Analyses

Source	MW-11 (Deep)	MW-12 (Shallower)
Log No. 84-	4798	4799
Date Collected	7/12/84	7/12/84
pH	11.3	7.7
Specific Conductance, µmhos/cm	3900	1900
Total Organic Carbon, mg/L C	13	8
Total Organic Halogens, µg/L Cl	99	100
Chlorides, mg/L Cl	278	102
Iron, Fe	6.4	1.7
Manganese, mg/L Mn	0.26	0.15
Phenols, mg/L PhOH	0.24	0.018
Sodium, mg/L Na	240	115
Sulfate, mg/L SO_4	2177	1172
Arsenic, mg/L As	0.002	<0.001
Barium, mg/L Ba	0.20	0.15
Cadmium, mg/L Cd	0.02	0.008
Chromium, mg/L Cr	0.09	0.04
Lead, mg/L Pb	0.02	0.02
Mercury, mg/L Hg	<0.001	<0.001
Selenium, mg/L Se	<0.005	<0.005
Silver, mg/L Ag	0.02	<0.01
Fluoride, mg/L F	2.6	1.5
Nitrates and Nitrites, mg/L N	0.57	0.62
Nitrites, mg/L N	0.02	0.01
Nitrates, mg/L N	0.55	0.61
Endrin, µg/L	<0.01	<0.01
Lindane, µg/L	<0.01	<0.01
Methoxychlor, µg/L	<0.1	<0.1
Toxaphene, µg/L	<0.5	<0.5
2, 4-D, µg/L	<1	<1
2, 4, 5-TP Silver, µg/L	<1	<1
Radium 226, pCi/L	0	5.4
Gross Alpha, pCi/L	4.1	9.8
Gross Beta, pCi/L	224	35
Turbidity, NTU	850	450
Total Coliform No./100 mL	<1	165
Calcium, mg/L Ca	1400	700

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Pittsburgh
Pennsylvania 15225
Phone (412) 269-5700

Laboratory Analysis Report
For

Philips ECG, Inc.
Seneca Falls, New York

Monitoring Wells
Replicate Analyses

Report Date: 10/23/84

Source	MW-1 Replicate #2	MW-1 Replicate #3	MW-1 Replicate #4
Log No. 84-	6265	6265	6265
Date Collected	9/12/84	9/12/84	9/12/84
Date Received	9/14/84	9/14/84	9/14/84
pH	7.5	7.5	7.5
Specific Conductance, μmhos/cm	1,250	1,180	1,200
Total Organic Halogens, μg/L Cl	34	36	32
Total Organic Carbon, mg/L C	18	22	22

Source	MW-7 Replicate #2	MW-7 Replicate #3	MW-7 Replicate #4
Log No. 84-	6130	6130	6130
Date Collected	9/6/84	9/6/84	9/6/84
Date Received	9/7/84	9/7/84	9/7/84
pH	7.8	7.8	7.8
Specific Conductance, μmhos/cm	2,100	2,100	2,100
Total Organic Halogens, μg/L Cl	45	50	44
Total Organic Carbon, mg/L C	11	10	10

Source	MW-8 Replicate #2	MW-8 Replicate #3	MW-8 Replicat[e] #4
Log No. 84-	6266	6266	626
Date Collected	9/12/84	9/12/84	9/12/8
Date Received	9/14/84	9/14/84	9/14/8
pH	7.3	7.3	7.
Specific Conductance, μmhos/cm	12,000	12,000	11,00
Total Organic Halogens, μg/L Cl	37	45	4
Total Organic Carbon, mg/L C	9	6	

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Pennsylvania 15225
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Laboratory Analysis Report For

Philips ECG, Inc.
Seneca Falls, New York

Samples Received: 9/14/84
Report Date: 10/23/84

Monitoring Well Analyses

Source	MW-8	Household Well	MW-11	MW-12	MW-1
Log No.	6266	6267	6268	6269	6265
Date Collected	9/12/84	9/12/84	9/12/84	9/12/84	9/12/84
pH	7.4	7.4	11.2	7.4	7.5
Specific Conductance, μmhos/cm	11,000	1,840	12,000	6,200	1,200
Total Organic Halogens, μg/L Cl	41	25	—	36	40
Total Organic Carbon, mg/L C	9	12	—	9	23
Total Dissolved Solids, mg/L	7,600	1,544	—	—	—
Total Hardness, mg/L $CaCO_3$	—	1,088	—	—	—
Alkalinity to M.O., mg/L $CaCO_3$	—	218	—	—	—
Calcium, mg/L Ca	1,450	—	—	1,310	—
Arsenic, mg/L As	<0.001	—	—	<0.001	—
Barium, mg/L Ba	0.10	—	—	0.12	—
Cadmium, mg/L Cd	<0.003	—	<0.003	0.005	—
Chromium, mg/L Cr	0.02	—	0.13	0.02	—
Lead, mg/L Pb	0.01	—	0.02	0.02	—
Mercury, mg/L Hg	<0.001	—	—	—	—
Selenium, mg/L Se	<0.001	—	—	<0.001	—
Silver, mg/L Ag	0.02	—	—	0.01	—
Iron, mg/L Fe	3.9	0.44	0.06	1.6	0.49
Manganese, mg/L Mn	0.19	<0.01	<0.005	0.09	0.04
Sodium, mg/L Na	1,660	4	1,428	575	16
Fluoride, mg/L F	0.84	2.6	1.3	2.5	0.34
Chloride, mg/L Cl	2,020	9	2,310	635	28
Sulfate, mg/L SO_4	954	1,350	2,782	2,941	97
Nitrate, mg/L N	2.2	0.52	—	3.6	—
Phenolics, mg/L PhOH	0.006	0.003	—	—	0.008
Total Coliform, No./100 mL	650	<5	—	—	240
Turbidity, NTU	30	1.5	1,250	75	—
Endrin, μg/L	<0.01	—	—	—	—
Lindane, μg/L	<0.01	—	—	—	—
Methoxychlor, μg/L	<0.1	—	—	—	—
Toxaphene, μg/L	<0.5	—	—	—	—
2,4-D, μg/L	<1	—	—	—	—
2,4,5-TP Silvex, μg/L	<1	—	—	—	—

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LABORATORY ANALYSIS REPORT
FOR

Philips ECG, Inc.
Seneca Falls, New York

Monitoring Well Analyses
(Continued)

Source	MW-8	Household Well	MW-11	MW-12	MW-1
Log No. 84-	6266	6267	6268	6269	6265
Date Collected	9/12/84	9/12/84	9/12/84	9/12/84	9/12/84
Radium 226, pCi/L	1.4	--	--	--	--
Gross Alpha, pCi/L	11.9	--	--	--	--
Gross Beta, pCi/L	19	--	--	--	--

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Pittsburgh
Pennsylvania 15225
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Laboratory Analysis Report
For

Philips ECG, Inc.
Seneca Falls, New York

Monitoring Well Analyses

Samples Received: 9/07/84
Report Date: 10/23/84

Source	MW-7	MW-9	MW-10
Log No. 84-	6130	6131	6132
Date Collected	9/6/84	9/5/84	9/6/84
pH	7.8	7.7	7.4
Specific Conductance, μmhos/cm	2,100	1,380	2,050
Total Organic Halogens, μg/L Cl	49	32	42
Total Organic Carbon, mg/L C	10	26	8
Turbidity, NTU	—	38	4
Arsenic, mg/L As	--	<0.001	<0.001
Barium, mg/L Ba	—	0.06	0.10
Cadmium, mg/L Cd	—	0.01	<0.003
Chromium, mg/L Cr	—	0.01	0.01
Lead, mg/L Pb	--	0.02	0.01
Calcium, mg/L Ca	900	—	--
Selenium, mg/L Se	—	<0.001	<0.001
Silver, mg/L Ag	—	<0.01	0.01
Iron, mg/L Fe	0.46	1.6	0.12
Manganese, mg/L Mn	0.05	0.05	0.03
Sodium, mg/L Na	78	22	90
Fluoride, mg/L F	0.81	0.53	0.62
Chloride, mg/L Cl	129	54	39
Sulfate, mg/L SO_4	1,431	735	1,242
Nitrate, mg/L N	0.13	0.32	0.07
Total Coliform, No./100 mL	<1	<1	<1
Phenolics, mg/L PhOH	0.005	<0.004	<0.004
Endrin, μg/L	—	<0.01	<0.01
Lindane, μg/L	—	<0.01	<0.01
Methoxychlor, μg/L	—	<0.1	<0.1
Toxaphene, μg/L	—	<0.5	<0.5
2,4-D, μg/L	—	<1	<1
2,4,5-TP Silvex, μg/L	—	<1	<1
Radium 226, pCi/L	—	0.5	0
Gross Alpha, pCi/L	—	0	0
Gross Beta, pCi/L	--	0	0

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Pittsburgh
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Phone: (412) 269-5700

Laboratory Analysis Report For

Philips ECG, Inc.
Seneca Falls, New York

Samples Received: 12/18/84
Report Date: 1/28/85

Monitoring Well Analyses

Source	MW-8 Year 1, 3rd Quarter	MW-12 Year 1, 3rd Quarter	MW-9 Year 1, 4th Quarter	MW-10 Year 1, 4th Quarter
Log No. 85-	9095	9096	9171	9172
Date Collected	12/17/84	12/17/84	12/17/84	12/17/85
Arsenic, mg/L As	0.004	<0.001	<0.001	<0.001
Barium, mg/L Ba	<0.03	<0.03	0.03	0.03
Cadmium, mg/L Cd	0.01	0.01	0.01	<0.01
Total Chromium, mg/L Cr	0.02	0.01	0.01	<0.01
Lead, mg/L Pb	0.16	0.11	0.07	0.07
Mercury, mg/L Hg	<0.001	<0.001	<0.001	<0.001
Selenium, mg/L Se	0.006	<0.002	<0.002	0.006
Silver, mg/L Ag	0.02	0.01	<0.01	<0.01
Iron, mg/L Fe	26	0.76	5.4	0.18
Manganese, mg/L Mn	0.41	0.09	0.19	0.05
Sodium, mg/L Na	630	620	6	89
Fluoride, mg/L F	1.7	1.2	1.4	0.44
Chloride, mg/L Cl	895	650	9	147
Sulfate, mg/L SO_4	2,624	3,022	545	1,431
Nitrate, mg/L N	2.1	3.0	0.85	1.5
Phenolics, mg/L PhOH	0.014	0.016	0.018	0.007
Total Coliform, No./100 mL	<1	<1	<1	<1
Turbidity, NTU	150	210	140	1.5
Endrin, µg/L	<0.01	<0.01	<0.01	<0.01
Lindane, µg/L	<0.01	<0.01	<0.01	<0.01
Methoxychlor, µg/L	<0.1	<0.1	<0.1	<0.1
Toxaphene, µg/L	<0.5	<0.5	<0.5	<0.5
2,4-D, µg/L	<1	<1	<1	<1
2,4,5-TP Silvex, µg/L	<1	<1	<1	<1
Radium 226, pCi/L	3.2	1.0	0.6	0.3
Gross Alpha, pCi/L	2.8	0.3	1.2	0.2
Gross Beta, pCi/L	25	53	8	45

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Pittsburgh
Pennsylvania 15225
Phone (412) 269-5700

Laboratory Analysis Report For

Philips ECG, Inc.
Seneca Falls, New York

Analyses

Samples Received: 12/18/84
Report Date: 1/28/85

Source	MW-8 Year 1, 3rd Quarter	MW-12 Year 1, 3rd Quarter	MW-9 Year 1, 4th Quarter	MW-10 Year 1, 4th Quarter
Log No. 85-	9095	9096	9171	9172
Date Collected	12/17/85	12/17/85	12/17/85	12/17/85
pH	7.8	7.6	7.8	7.9
Specific Conductance, μmhos/cm	5,400	2,800	1,350	2,100
Total Organic Halogens, μg/L Cl	56	37	55	77
Total Organic Carbon, mg/L C	26	24	23	14
Total Dissolved Solids, mg/L	5,096	4,788	1,048	1,772

Source	MW-8 Upgradient Year 1, 3rd Quarter Replicate #2	MW-8 Upgradient Year 1, 3rd Quarter Replicate #3	MW-8 Upgradient Year 1, 3rd Quarter Replicate #4
Log No. 85-	9095	9095	9095
Date Collected	12/17/85	12/17/85	12/17/85
pH	7.8	7.8	7.8
Specific Conductance, μmhos/cm	5,350	5,400	5,420
Total Organic Halogens, μg/L Cl	62	68	55
Total Organic Carbon, mg/L C	27	26	26

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Pittsburgh
Pennsylvania 15225
Phone (412) 269-5700

Laboratory Analysis Report
For

Philips ECG, Inc.
Seneca Falls, New York

Monitoring Well Analyses

Report Date: 4/18/85

Source	MW-1	MW-10	MW-8	MW-12	MW-7
Log No. 85-	1825	1826	1889	1890	1769
Date Collected	3/12/85	3/11/85	3/13/85	3/13/85	3/11/85
Date Received	3/14/85	3/14/85	3/15/85	3/15/85	3/13/85
Chloride, mg/L Cl	16	147	795	550	120
Fluoride, mg/L F	0.23	0.28	1.8	0.83	0.34
Phenolics, mg/L PhOH	0.007	0.006	0.011	0.007	0.010
Sodium, mg/L Na	12	87	550	730	85
Sulfate, mg/L SO_4	167	1,014	2,380	2,500	1,240
Nitrate, mg/L N	0.62	0.46	2.9	4.4	0.63
Turbidity, NTU	1.5	0.18	20	15	0.32
Total Coliform, No./100 mL	<1	<1	40	<20	<1
Arsenic, mg/L As	<0.001	<0.001	<0.001	<0.001	<0.001
Barium, mg/L Ba	0.20	<0.02	<0.02	<0.02	<0.02
Cadmium, mg/L Cd	<0.005	<0.005	0.005	<0.005	<0.005
Chromium, mg/L Cr	<0.002	0.002	0.01	0.02	0.002
Total Iron, mg/L Fe	0.12	0.14	2.1	1.7	0.48
Lead, mg/L Pb	0.02	0.05	0.10	0.10	0.06
Manganese, mg/L Mn	0.14	0.06	0.11	0.09	0.43
Nickel, mg/L Ni	0.005	0.01	0.05	0.04	0.02
Mercury, mg/L Hg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Selenium, mg/L Se	<0.001	<0.001	<0.001	<0.001	<0.001
Silver, mg/L Ag	<0.005	<0.005	0.008	0.005	<0.005
Gross Alpha, pCi/L	--	--	2.6	2.8	--
Gross Beta, pCi/L	--	--	25	231	--
Radium 226, pCi/L	--	--	0.9	1.0	--
Endrin, ug/L	--	--	<0.01	<0.01	--
Lindane, ug/L	--	--	<0.01	<0.01	--
Methoxychlor, ug/L	--	--	<0.1	<0.1	--
Toxaphene, ug/L	--	--	<0.5	<0.5	--
2,4-D, ug/L	--	--	<1	<1	--
2,4,5-TP Silvex, ug/L	--	--	<1	<1	--

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The Chester Engineers
P O Box 9356
Pittsburgh
Pennsylvania 15225
Phone: (412) 269-5700

Laboratory Analysis Report For

Philips ECG, Inc.
Seneca Falls, New York

Samples Received: 3/13/85
Report Date: 4/18/85

Monitoring Well Analyses

Source	MW-9
Log No. 85-	1770
Date Collected	3/11/85
Chloride, mg/L Cl	2
Fluoride, mg/L F	0.27
Phenolics, mg/L PhOH	0.008
Sodium, mg/L Na	5.6
Sulfate, mg/L SO_4	487
Nitrate, mg/L N	0.21
Turbidity, NTU	2.1
Total Coliform, No./100 mL	<1
Arsenic, mg/L As	<0.001
Barium, mg/L Ba	<0.02
Cadmium, mg/L Cd	<0.005
Chromium, mg/L Cr	<0.002
Total Iron, mg/L Fe	0.51
Lead, mg/L Pb	0.04
Manganese, mg/L Mn	0.30
Mercury, mg/L Hg	<0.0005
Selenium, mg/L Se	<0.001
Silver, mg/L Ag	<0.005
Nickel, mg/L Ni	0.007

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P O Box 9356
Pittsburgh
Pennsylvania 15225
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Laboratory Analysis Report For

Philips ECG, Inc.
Seneca Falls, New York

Replicate Analyses

Report Date: 4/18/85

Source	MW-7 Replicate #1	MW-7 Replicate #2	MW-7 Replicate #3	MW-7 Replicate #4
Log No. 85-	1769	1769	1769	1769
Date Collected	3/11/85	3/11/85	3/11/85	3/11/85
Date Received	3/13/85	3/13/85	3/13/85	3/13/85
pH	7.6	7.7	7.6	7.6
Specific Conductance, µmhos/cm	1,750	1,775	1,750	1,750
Total Organic Carbon, mg/L C	<1	<1	<1	<1
Total Organic Halogens, mg/L Cl	0.090	0.081	0.070	0.075

Source	MW-12 Replicate #1	MW-12 Replicate #2	MW-12 Replicate #3	MW-12 Replicate #4
Log No. 85-	1890	1890	1890	1890
Date Collected	3/13/85	3/13/85	3/13/85	3/13/85
Date Received	3/15/85	3/15/85	3/15/85	3/15/85
pH	7.4	7.4	7.4	7.4
Specific Conductance, µmhos/cm	5,775	5,800	5,800	5,800
Total Organic Carbon, mg/L C	1	2	2	2
Total Organic Halogens, mg/L Cl	0.100	0.075	0.051	0.054

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Laboratory Analysis Report For

Philips ECG, Inc.
Seneca Falls, New York

Replicate Analyses

Report Date: 4/18/85

Source	MW-9 Replicate #1	MW-9 Replicate #2	MW-9 Replicate #3	MW-9 Replicate #4
Log No. 85-	1770	1770	1770	1770
Date Collected	3/11/85	3/11/85	3/11/85	3/11/85
Date Received	3/13/85	3/13/85	3/13/85	3/13/85
pH	7.7	7.6	7.6	7.7
Specific Conductance, μmhos/cm	1,060	1,060	1,070	1,070
Total Organic Carbon, mg/L C	44	42	42	43
Total Organic Halogens, mg/L Cl	0.027	0.031	0.030	0.041

Source	MW-1 Replicate #1	MW-1 Replicate #2	MW-1 Replicate #3	MW-1 Replicate #4
Log No. 85-	1825	1825	1825	1825
Date Collected	3/12/85	3/12/85	3/12/85	3/12/85
Date Received	3/14/85	3/14/85	3/14/85	3/14/85
pH	7.5	7.5	7.5	7.5
Specific Conductance, μmhos/cm	1,080	1,090	1,090	1,090
Total Organic Carbon, mg/L C	4	4	4	4
Total Organic Halogens, mg/L Cl	0.038	0.021	0.040	0.045

2887-95

- Unless otherwise noted, analyses are in accordance with the methods and procedures outlined and approved by the Environmental Protection Agency and conform to quality assurance protocol.
- "Less-than" (<) values are indicative of the detection limit.

Chester Laboratories
A Division Of
The **Chester** Engineers
P O Box 9356
Pittsburgh
Pennsylvania 15225
Phone (412) 269-5700

Laboratory Analysis Report For

Philips ECG, Inc.
Seneca Falls, New York

Replicate Analyses

Report Date: 4/18/85

Source	MW-10 Replicate #1	MW-10 Replicate #2	MW-10 Replicate #3	MW-10 Replicate #4
Log No. 85-	1826	1826	1826	1826
Date Collected	3/11/85	3/11/85	3/11/85	3/11/85
Date Received	3/14/85	3/14/85	3/14/85	3/14/85
pH	7.8	7.8	7.8	7.8
Specific Conductance, μmhos/cm	1,775	1,780	1,780	1,780
Total Organic Carbon, mg/L C	5	4	5	4
Total Organic Halogens, mg/L Cl	0.039	0.075	0.082	0.037

Source	MW-8 Replicate #1	MW-8 Replicate #2	MW-8 Replicate #3	MW-8 Replicate #4
Log No. 85-	1889	1889	1889	1889
Date Collected	3/13/85	3/13/85	3/13/85	3/13/85
Date Received	3/15/85	3/15/85	3/15/85	3/15/85
pH	7.6	7.6	7.6	7.5
Specific Conductance, μmhos/cm	5,350	5,380	5,350	5,400
Total Organic Carbon, mg/L C	1	1	1	1
Total Organic Halogens, mg/L Cl	0.110	0.109	0.114	0.125

2887-95

- Unless otherwise noted, analyses are in accordance with the methods and procedures outlined and approved by the Environmental Protection Agency and conform to quality assurance protocol.
- "Less-than" (<) values are indicative of the detection limit.

APPENDIX C

MARCH 1985 STATISTICAL ANALYSIS

Statistical analysis of hazardous waste site data using Cochran's Approximation to the Behrens-Fisher Students' t-test at the 0.01 level of significance.

Samples were collected on 03/11-13/85 for:

YEAR 3
PERIOD 1

Prepared for:
Philips ECG, Inc.
Seneca Falls, New York

Prepared by:

The Chester Engineers
P.O.Box 9356
Pittsburgh, Pennsylvania 15225
412 269-5700

PARAMETER	ANALYTICAL RESULTS	MONITORING WELL AVERAGE	MONITORING WELL VARIANCE	BACKGROUND AVERAGE	BACKGROUND VARIANCE
pH	7.500				
	7.500				
	7.500				
	7.500	7.500	0.000	7.338	0.065
SPECIFIC COND.	1080.000				
umhos/cm	1090.000				
	1090.000				
	1090.000	1087.500	25.000	1005.384	4714.423
TOX	38.000				
ug/L Cl	21.000				
	40.000				
	45.000	36.000	108.666	46.384	70.256
TOC	4.000				
mg/L C	4.000				
	4.000				
	4.000	4.000	0.000	43.538	183.769

PARAMETER	ANALYTICAL RESULTS	MONITORING WELL AVERAGE	MONITORING WELL VARIANCE	BACKGROUND AVERAGE	BACKGROUND VARIANCE
pH	7.600				
	7.700				
	7.600				
	7.600	7.625	0.002	7.338	0.065
SPECIFIC COND.	1750.000				
umhos/cm	1775.000				
	1750.000				
	1750.000	1756.250	156.250	1005.384	4714.423
TOX	90.000				
ug/L Cl	81.000				
	70.000				
	75.000	79.000	74.000	46.384	70.256
TOC	1.000				
mg/L C	1.000				
	1.000				
	1.000	1.000	0.000	43.538	183.769

PARAMETER	ANALYTICAL RESULTS	MONITORING WELL AVERAGE	MONITORING WELL VARIANCE	BACKGROUND AVERAGE	BACKGROUND VARIANCE
pH	7.600				
	7.600				
	7.600				
	7.500	7.575	0.002	7.338	0.065
SPECIFIC COND.	5350.000				
umhos/cm	5380.000				
	5350.000				
	5400.000	5370.000	600.000	1005.384	4714.423
TOX	110.000				
ug/L Cl	109.000				
	114.000				
	125.000	114.500	53.666	46.384	70.256
TOC	1.000				
mg/L C	1.000				
	1.000				
	1.000	1.000	0.000	43.538	183.769

PARAMETER	ANALYTICAL RESULTS	MONITORING WELL AVERAGE	MONITORING WELL VARIANCE	BACKGROUND AVERAGE	BACKGROUND VARIANCE
pH	7.700				
	7.600				
	7.600				
	7.700	7.650	0.003	7.338	0.065
SPECIFIC COND.	1060.000				
umhos/cm	1060.000				
	1070.000				
	1070.000	1065.000	33.333	1005.384	4714.423
TOX	27.000				
ug/L Cl	31.000				
	30.000				
	41.000	32.250	36.916	46.384	70.256
TOC	44.000				
mg/L C	42.000				
	42.000				
	43.000	42.750	0.916	43.538	183.769

PARAMETER	ANALYTICAL RESULTS	MONITORING WELL AVERAGE	MONITORING WELL VARIANCE	BACKGROUND AVERAGE	BACKGROUND VARIANCE
pH	7.800				
	7.800				
	7.800				
	7.800	7.800	0.000	7.338	0.065
SPECIFIC COND.	1775.000				
umhos/cm	1780.000				
	1780.000				
	1780.000	1778.750	6.250	1005.384	4714.423
TOX	39.000				
ug/L Cl	75.000				
	82.000				
	37.000	58.250	555.583	46.384	70.256
TOC	5.000				
mg/L C	4.000				
	5.000				
	4.000	4.500	0.333	43.538	183.769

PARAMETER	ANALYTICAL RESULTS	MONITORING WELL AVERAGE	MONITORING WELL VARIANCE	BACKGROUND AVERAGE	BACKGROUND VARIANCE
pH	7.400				
	7.400				
	7.400				
	7.400	7.400	0.000	7.338	0.065
SPECIFIC COND.	5775.000				
umhos/cm	5800.000				
	5800.000				
	5800.000	5793.750	156.250	1005.384	4714.423
TOX	100.000				
ug/L Cl	75.000				
	51.000				
	54.000	70.000	514.000	46.384	70.256
TOC	1.000				
mg/L C	2.000				
	2.000				
	2.000	1.750	0.250	43.538	183.769

STATISTICAL RESULTS

PARAMETER	WELL	t*	tc	t-TEST RESULT
pH	MW-1	2.2690	3.0550	OK
	MW-7	3.7974	3.3608	SIGNIFICANTLY HIGHER
	MW-8	3.1348	3.3608	OK
	MW-9	4.0552	3.4483	SIGNIFICANTLY HIGHER
	MW-10	6.4829	3.0550	SIGNIFICANTLY HIGHER
	MW-12	0.8644	3.0550	OK
SPECIFIC COND.	MW-1	4.2753	2.7125	SIGNIFICANTLY HIGHER
	MW-7	37.4632	2.8618	SIGNIFICANTLY HIGHER
	MW-8	192.7686	3.2252	SIGNIFICANTLY HIGHER
	MW-9	3.0951	2.7227	SIGNIFICANTLY HIGHER
	MW-10	40.5236	2.6889	SIGNIFICANTLY HIGHER
	MW-12	238.9080	2.8618	SIGNIFICANTLY HIGHER
TOX	MW-1	-1.8195	4.2323	OK
	MW-7	6.6708	4.1204	SIGNIFICANTLY HIGHER
	MW-8	15.7008	4.0069	SIGNIFICANTLY HIGHER
	MW-9	-3.6949	3.8540	OK
	MW-10	0.9877	4.4713	OK
	MW-12	2.0407	4.4659	OK
TOC	MW-1	-10.5161	2.6809	OK
	MW-7	-11.3140	2.6809	OK
	MW-8	-11.3140	2.6809	OK
	MW-9	-.2080	2.7106	OK
	MW-10	-10.3526	2.6919	OK
	MW-12	-11.0900	2.6891	OK

PARAMETER	ANALYTICAL RESULTS 03/28/83	06/16/83	09/14/83	12/14/83
pH	7.700	7.100	7.300	7.500
	7.600	7.000	7.200	0.000
	7.600	7.000	7.300	0.000
	7.700	7.100	7.300	0.000
	average=	7.33846	variance=	0.06589
SPECIFIC COND.	990.000	1000.000	965.000	1225.000
	995.000	1000.000	970.000	0.000
	985.000	1010.000	955.000	0.000
	990.000	1020.000	965.000	0.000
	average=	1005.38461	variance=	4714.42307
TOX	56.000	41.000	41.000	38.000
	59.000	43.000	45.000	0.000
	59.000	35.000	48.000	0.000
	56.000	39.000	43.000	0.000
	average=	46.38461	variance=	70.25641
TOC	30.000	44.000	65.000	26.000
	31.000	46.000	63.000	0.000
	32.000	42.000	58.000	0.000
	29.000	44.000	56.000	0.000
	average=	43.53846	variance=	183.76923

APPENDIX B

Installation of Additional Wells
RCRA Groundwater Monitoring
November 18, 1986

PHILIPS ECG, INC.
Seneca Falls, New York

Report On
INSTALLATION OF ADDITIONAL WELLS
RCRA GROUNDWATER MONITORING

November 18, 1985

Prepared By: Gloria A. DePaolis

Reviewed By: Steve G. McGuire

Approved By: Walter Zabban, P.E.

Project No.: 2887-05

TheChesterEngineers

Engineers
Architects
Planners

P.O. Box 9356
Pittsburgh
Pennsylvania 15225-0356
412 269-5700
Telex 855450

PHILIPS ECG, INC.
SENECA FALLS, NEW YORK

INSTALLATION OF ADDITIONAL WELLS
RCRA GROUNDWATER MONITORING

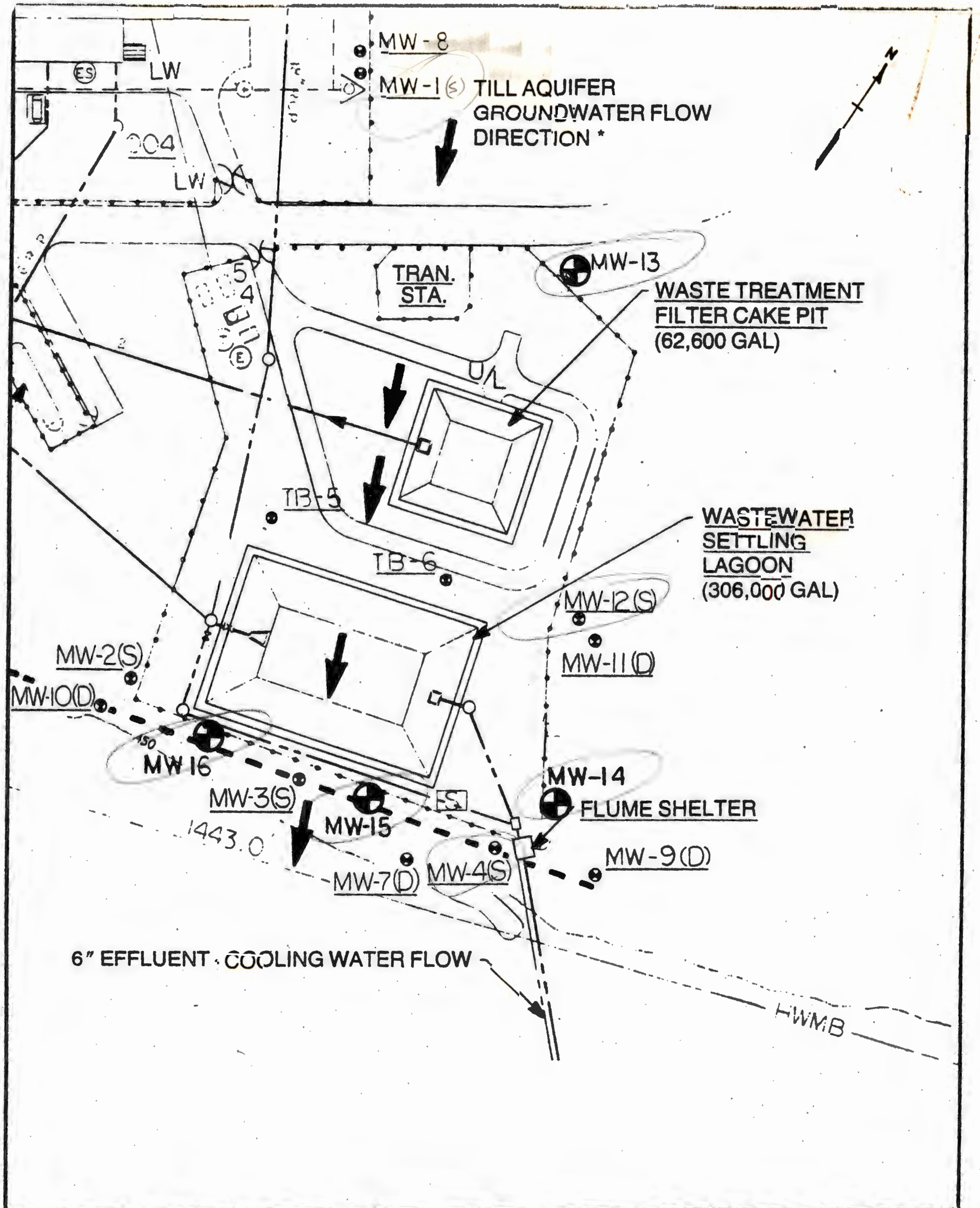
A. INTRODUCTION

RCRA Interim Status groundwater monitoring was initiated at the Philips' Seneca Falls, New York facility in March 1983 with the installation of four monitoring wells. In an effort to continue the evaluation of site characteristics, Philips installed eight additional wells between March 1983 and July 1984. A report entitled "Status Review of RCRA Groundwater Monitoring Program" was prepared in June 1985 and submitted as part of Philips' response to RCRA Part B Notice of Deficiency Items.

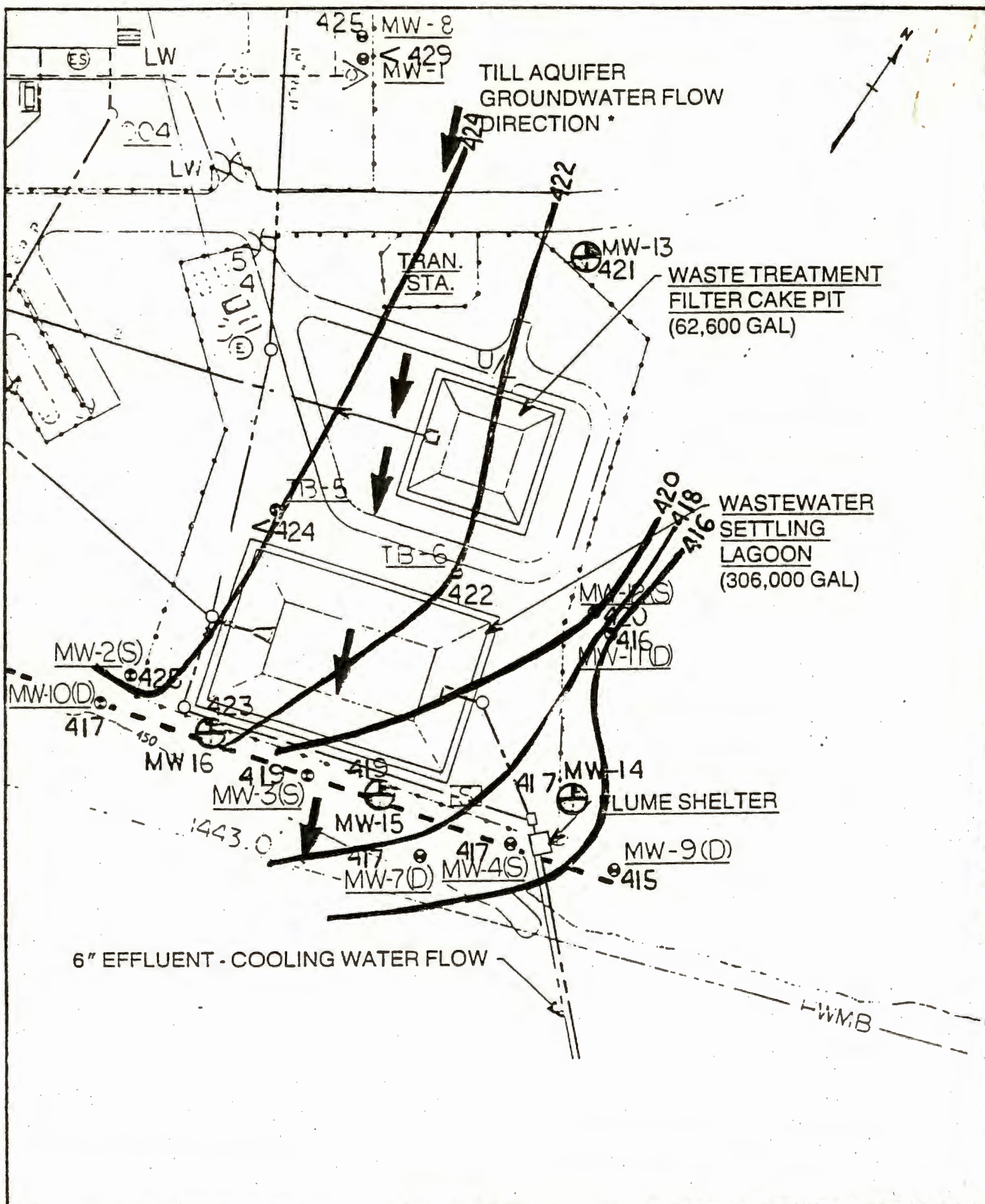
In light of the required November 8, 1985 certification for compliance with Interim Status Regulations, Philips and Chester reevaluated the June 1985 report information. It was concluded that the upper till aquifer was the stratigraphic unit which required monitoring for RCRA purposes.

Since the inception of the groundwater monitoring program, the major regulatory concern on the part of New York Department of Environmental Conservation and EPA Region II has been the difficulty of obtaining sufficient water from the three downgradient wells (MW-2, 3 and 4) for sampling purposes.

Those three existing wells had been installed such that the bottom of the machine slotted screen was at the bedrock interface. Subsequent site investigations have indicated



The Chester Engineers			SHEET NO.	PHILIPS ECG, INC. SENECA FALLS, NEW YORK
DWN.BY: SGM	SCALE: 1"=80'	DATE November 1985	DWG. NO. FIGURE 1	GROUNDWATER MONITORING NETWORK
CHK'D.BY:	APPR.BY:			



The Chester Engineers			SHEET NO.	PHILIPS ECG, INC. SENECA FALLS, NEW YORK
DWN.BY: SGM	SCALE: 1"=80'	DATE November 1985	DWG. NO.	BEDROCK SURFACE CONTOURS
CHK'D.BY:	APPR.BY:		FIGURE 2	

APPENDIX C

Laboratory Analysis of Soil Extract
Chester Interoffice Memorandum
December 17, 1985

TheChesterEngineers **Interoffice**

To: ALAN COVELL **Date:** 12/17/85

From: G. A. DePaolis **Ref. No.** 2887-05

Subject: Laboratory Analysis of Soil Extract
Philips ECG - Seneca Falls

cc: S. G. McGuire
R. W. Anderson
W. Zabban
E. Chase

Enclosed are the laboratory results of water extract from four soil samples taken at wells MW-13, 15, and 16.

The purpose of this analysis was to confirm the low sulfate levels in the overburden above the gypsum-rich limestone bedrock and the role of gypsum in elevating the sulfate level and specific conductance in groundwater near the limestone contact.

The sample from MW-13 contained limestone with gypsum veinlets (please refer to the drilling logs in our last report). MW-15 contained weathered bedrock and has a slightly lower sulfate level.

Two samples from MW-16 were analyzed. The soil from 19.5 ft to 21.5 ft, above the limestone contact at 22.5 ft. contains little sulfate and has a low specific conductance. Surprisingly, this sample contained crystals of pyrite, an iron sulfide mineral.

Another sample, from the same well, but taken just above the limestone and containing shaly limestone, shows a much higher sulfate level and specific conductance although other parameters remain fairly constant. This sample contained no visible gypsum, however, the underlying limestone does.

Clearly, it is the gypsum, present in all samples but S-1 from MW-16, that raises the sulfate levels in the groundwater. The results of these analyses show that the gypsum can potentially raise the level of sulfates in groundwater just above the glacial till/bedrock interface by means of dispersion.

GAD:mlb

Enclosures

Chester Laboratories
A Division Of
The Chester Engineers
P.O. Box 8356
Pittsburgh
Pennsylvania 15225
Phone (412) 386-5700

Laboratory Analysis Report For

Philips, ECG Incorporated
Seneca Falls, New York

Samples Received:
Report Date: 12/12/85 12/12/85

Analyses

Source	MW-15 S-5 (23.5-25')	MW-16 S-1 (19.5-21.5')	MW-16 S-2 (21.5-22.5)	MW-13 S-7 (35.0-36.25')
Log No. 85-	9946	9947	9948	9949
Date Received	11/12/85	11/12/85	11/12/85	11/13/85
Water Extract (ASTM Method A):				
pH	7.6	7.9	7.5	8.1
Specific Conductance, µmhos/cm	1,600	80	1,420	2,050
Chloride, mg/L Cl	6	<1	<1	8
Fluoride, mg/L F	0.59	1.8	0.74	1.2
Sulfates, mg/L SO_4	1,213	36	1,133	1,586
Lead, mg/L Pb	<0.02	<0.02	<0.02	<0.02

2887-85

- Unless otherwise noted, analyses are in accordance with the methods and procedures outlined and approved by the Environmental Protection Agency, and conform to quality assurance protocol.
- "Less-than" (<) values are indicative of the detection limit.

APPENDIX D

First Quarter 1986 Groundwater Monitoring
April 29, 1986

PHILIPS ECG, INC.
Seneca Falls, New York

FIRST QUARTER 1986
GROUNDWATER MONITORING

Prepared by: Steve McGuire

Approved by: Walter Zabban

Project No.: 2887-05

The**Chester**Engineers

Engineers
Architects
Planners

P.O. Box 9356
Pittsburgh
Pennsylvania 15225-0356
412 269-5700
Telex 855450

Engineers
Architects
Planners

P.O. Box 9356
Pittsburgh
Pennsylvania 15225
412 269-5700
Telex 855450

TheChesterEngineers

Ref. No. 2887-05

April 29, 1986

Mr. Edward E. Chase
Division Facilities Engineering
Philips ECG, Inc.
50 Johnston Street
Seneca Falls, New York 13148

Dear Mr. Chase:

First Quarter 1986 Groundwater Monitoring
Seneca Falls, New York

The Chester Engineers is pleased to transmit the analytical and statistical results for the First Quarter 1986 RCRA groundwater monitoring at your Seneca Falls facility. Based upon the definition of the upper till aquifer unit as being the aquifer unit appropriate for RCRA sampling, the intent of the First Quarter sample period was to sample all the till aquifer wells.

Samples were collected by Philips ECG and shipped to Chester's water quality laboratory in Pittsburgh, Pennsylvania. Sample handling and analytical procedures were in accordance with the RCRA protocols established for your facility. Water was obtained from all till aquifer wells with the exception of MW-5 which is an intermediate well and not on the Point of Compliance. There was sufficient water for complete Year 1 RCRA parameters for MW-1, MW-13 and MW-16. Complete sets of indicator parameter replicates were run on MW-1, 12, 13, and 16. There were no analyses for radionuclides or pesticides/herbicides since the historic database indicates these parameters are not a factor at the Seneca Falls site. The present sampling period represents the second quarterly dataset for MW-13, 14, 15 and 16 which are the newest wells.

Groundwater Flow Pattern

Static water elevations have been determined for the premonitoring period on March 11, 1986 and at the time of well sampling March 21-25, 1986 as indicated in Table 1.

The groundwater elevations in Table 1 are plotted on Figure 1. The bottom of screen elevations are plotted for MW-5, 13, 14 and 15 where the static water level was below the bottom of the screen. The elevation information continues to show a southeast flow direction in the upper till aquifer toward the Seneca River escarpment. This is consistent with all previous information for the till aquifer. Based upon the hydraulic gradient from MW-1 to MW-4 the apparent seepage velocity in the till aquifer is 10 ft/year. The presence of water in MW-4 and MW-16 above the bottom of the well screens demonstrate the continuity of the aquifer for detection monitoring purposes.

Groundwater Quality

There continues to be no evidence of hazardous waste constituents in the groundwater system. For display purposes Figures 2 through 7 show the distribution of pH, specific conductance, calcium, sodium, sulfate and chloride. The following observations are significant.

1. pH increases in the downgradient direction. This is consistent with previous information. It should be noted, however, that the lower pH values occur in the wells which yield the greater quantities of water.

2. Conductivity decreases in a downgradient direction. It should be noted that the screen in MW-12 partially penetrates the bedrock.

3. Calcium decreases in a downgradient direction.

4. Sodium in MW-1 is about the same in the downgradient wells. The low chloride in MW-13 indicates that the elevated sodium in MW-13 is not from road salt run off.

5. The high sulfates in MW-12 and MW-13 correspond to documented bedrock leachate influences.

The natural geochemical influences continue to be the overriding quality factors in the evaluation of the indicator parameters at the Philips site. The absence of any hazardous waste constituents or other leachate indicators such as fluoride demonstrate the absence of any adverse environmental impacts from the Philips surface impoundments.

Statistical Evaluations

The statistical comparisons for the current sampling period are also attached. The significantly higher occurences of pH and conductivity correspond to previous quarterly sampling periods.

The increases in total organic carbon and total organic halogens (TOX) represent new observations. The TOX in MW-1 particularly bears watching since it is in an upgradient position.

As with previous sampling periods the occurrence of statistically significant increases in downgradient wells indicates that a Groundwater Quality Assessment Plan may be required for your facility. The regulatory option for confirmation sampling is not recommended given the historic database. The EPA Regional Administrator should be advised of the present findings for inclusion in the ongoing regulatory review of the definition of an acceptable groundwater monitoring network.

Please feel free to call me if you have any questions concerning this information.

Sincerely,

Steve McGuire

Steve McGuire
Manager, Geotechnical Section

SGM/lv

cc: Alan Covell - Philips
Richard Zipp - Philips
Walter Zabban - Chester

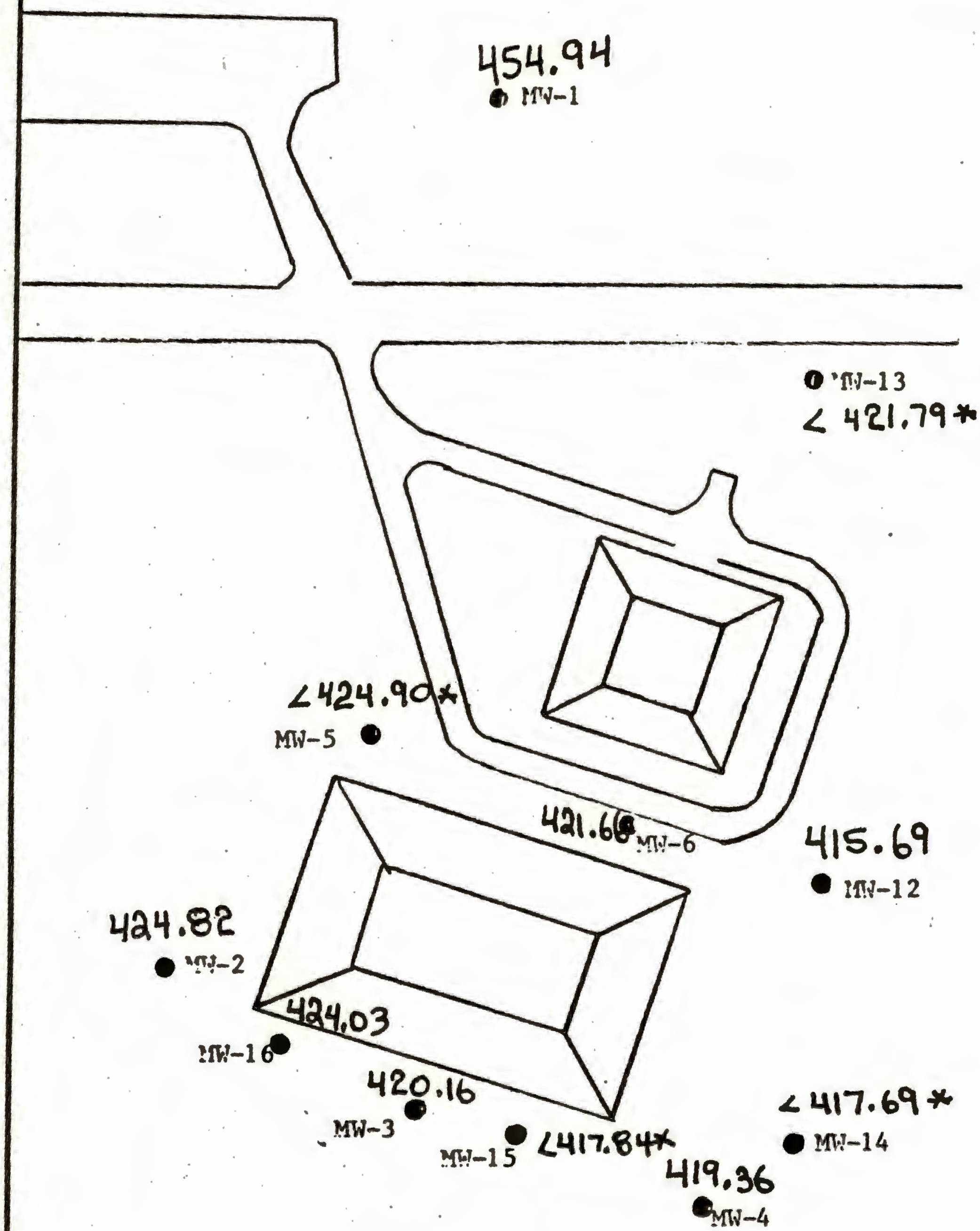
PHILIPS ECG, INC.
SENECA FALLS, NEW YORK

TABLE 1

GROUNDWATER ELEVATION DATA

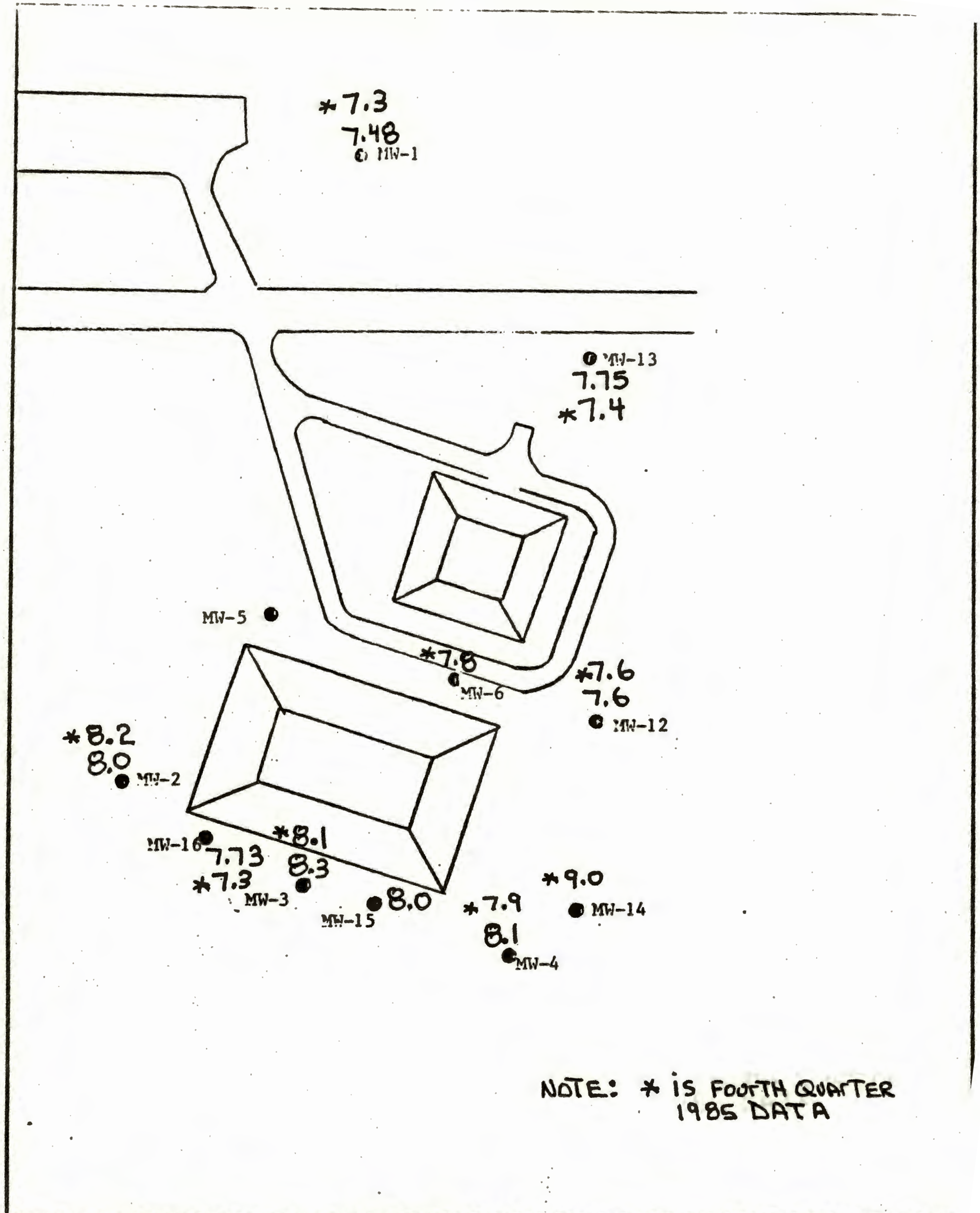
WELL	MARCH 11, 1986	MARCH 21-25, 1986
MW-1	455.85	454.94
MW-2	424.82	424.82
MW-3	420.16	420.16
MW-4	418.90	419.36
MW-5	<424.90 (dry)	<424.90 (dry)
MW-6	421.64	421.66
MW-7	382.07	--
MW-8	380.16	--
MW-9	382.24	--
MW-10	383.06	--
MW-11	358.32	--
MW-12	--	415.69
MW-13	421.31*	421.34*
MW-14	408.55*	408.55*
MW-15	409.79*	409.79*
MW-16	424.01	424.03

*Not a true static water elevation - is the elevation of water in storage reservoir below base of screen.



* BOTTOM OF SCREEN
STATIC LEVEL BELOW SCREEN

TheChesterEngineers			SHEET NO.	PHILIPS ECG, SENECA FALLS, NY TILL AQUIFER STATIC WATER ELEVATIONS 3/21/85
DWN.BY: SGM	SCALE:	DATE	DWG. NO.	
CHK'D.BY:	APPR.BY:	4/29/86	FIGURE 1	



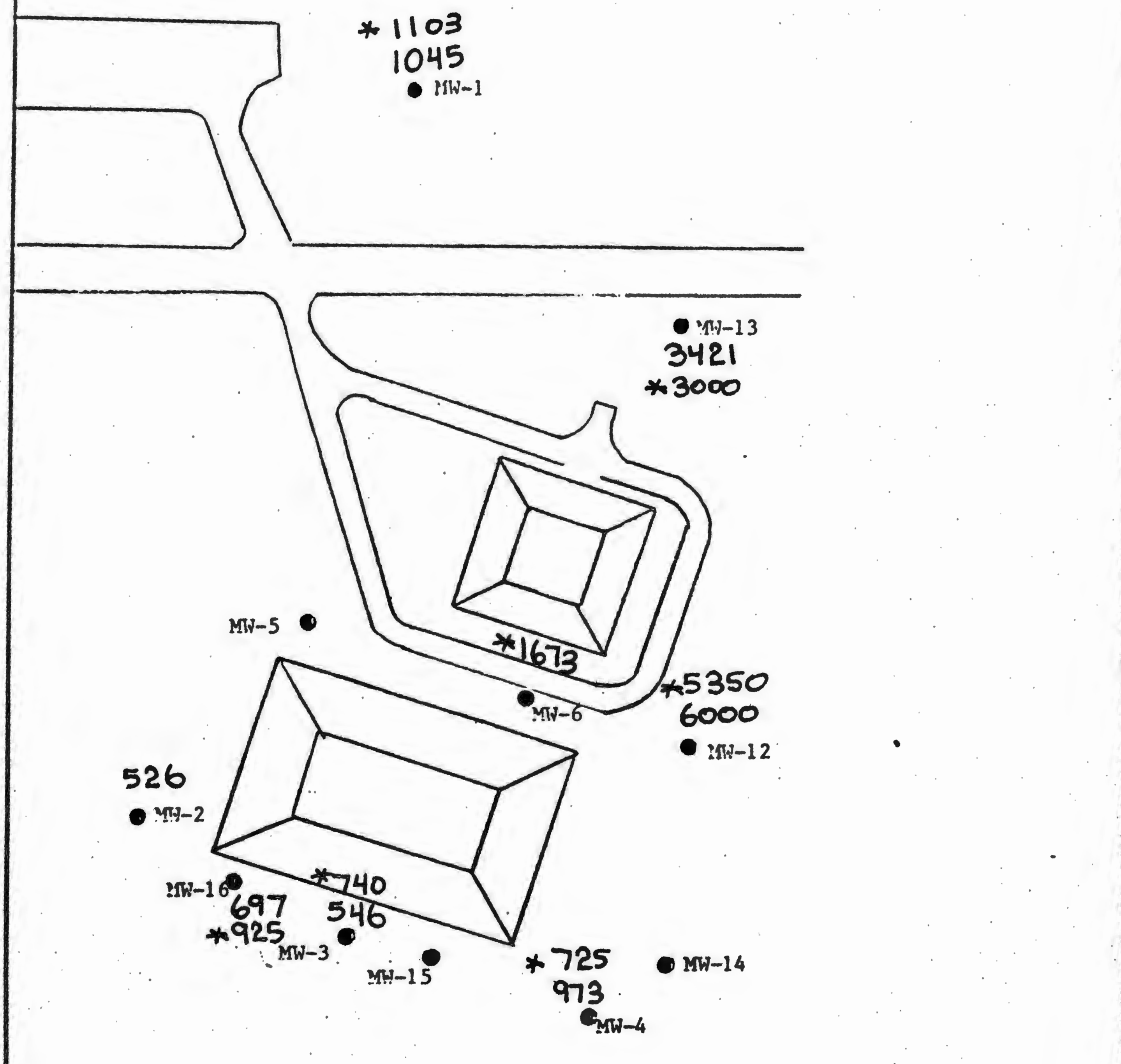
The Chester Engineers

DWN.BY: SGM | SCALE: | APPR.BY: | DATE 4/29/86

SHEET NO.

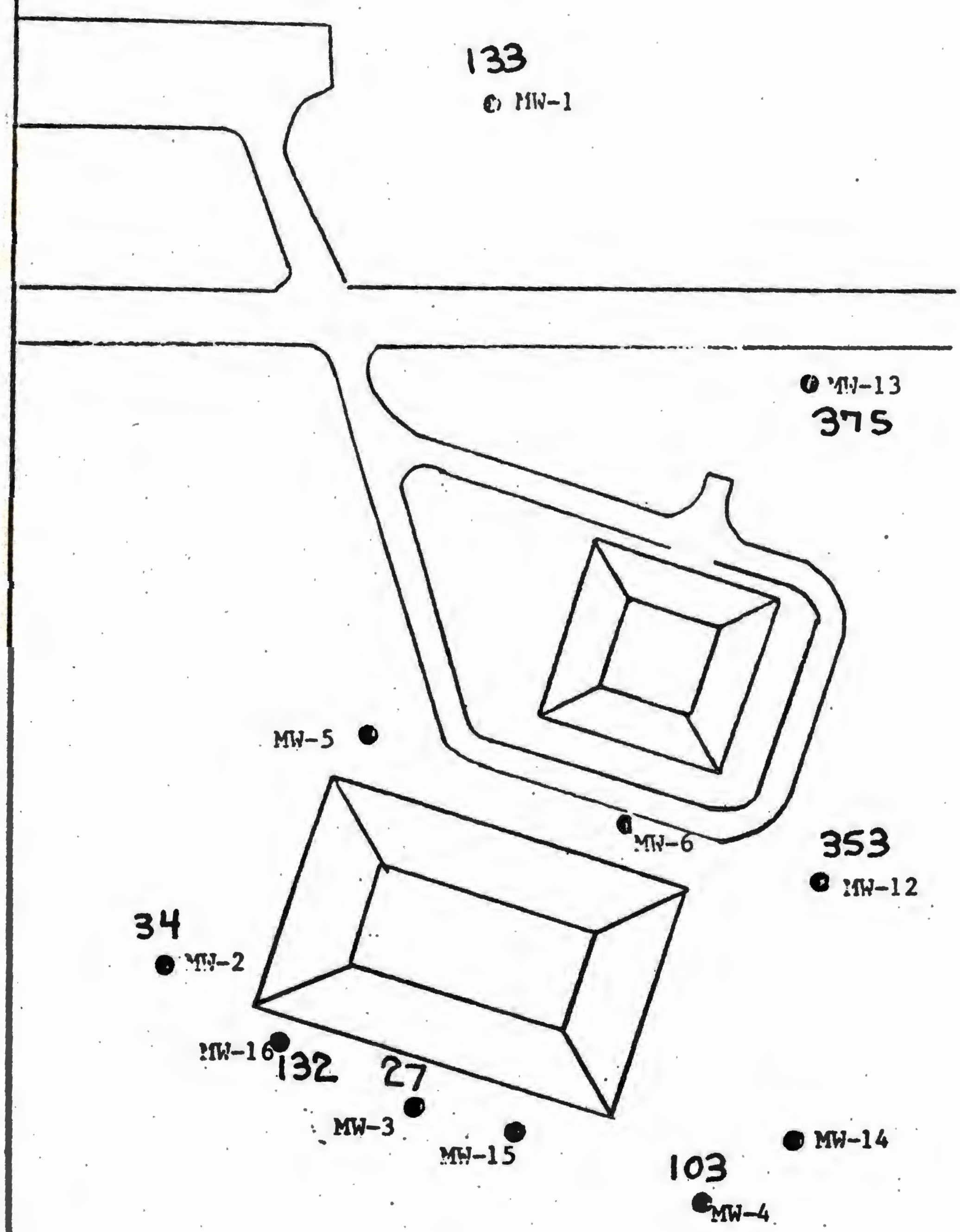
DWG. NO. FIGURE 2

PHILIPS ECG, SENECA FALLS, NY
TILL AQUIFER
pH
3/21/85

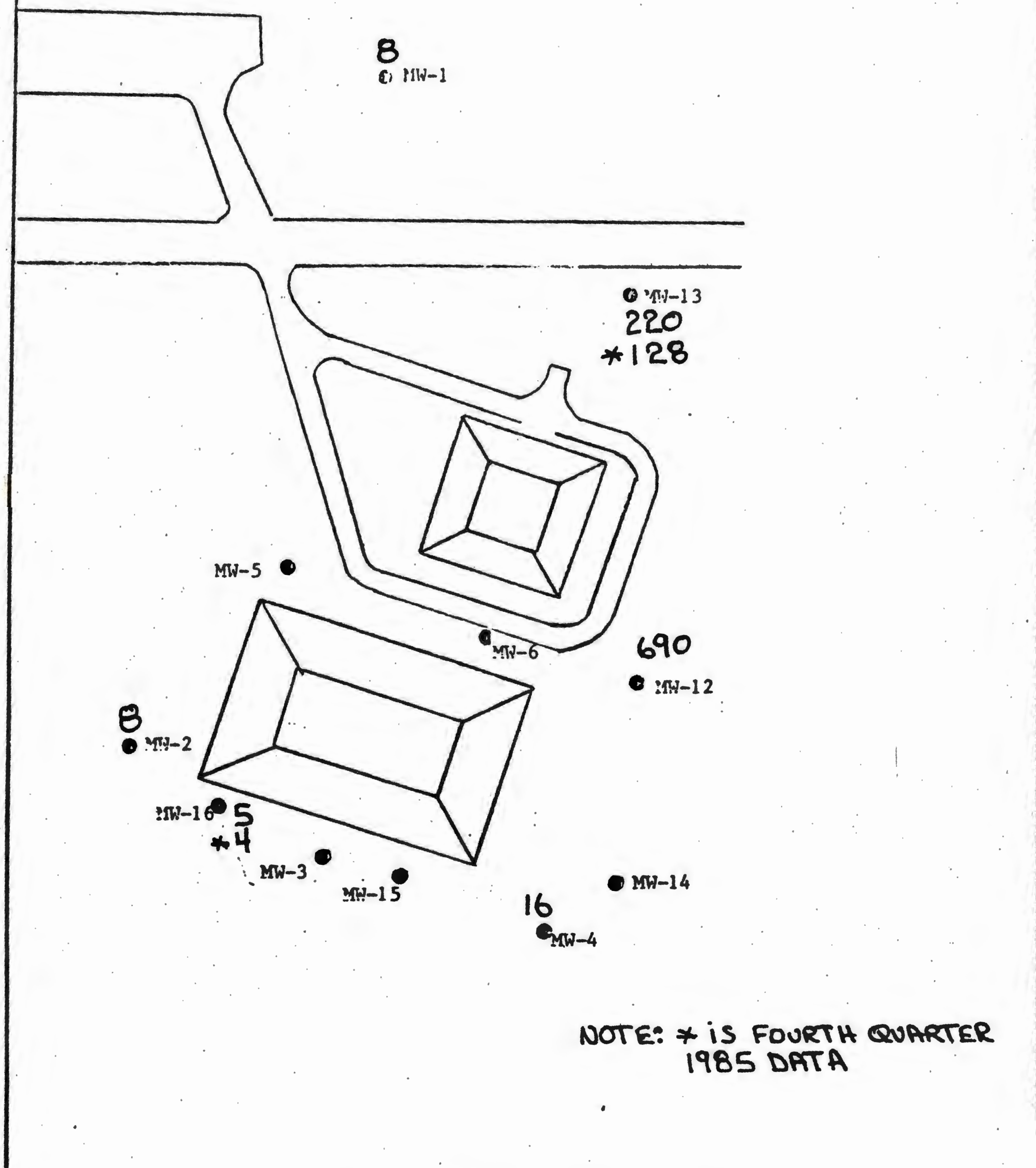


NOTE: * IS FOURTH QUARTER 1985 DATA

The Chester Engineers		SHEET NO.	PHILIPS ECG, SENECA FALLS, NY TILL AQUIFER CONDUCTIVITY, UMHOS/cm 3/21/85
DWN.BY: SGM	SCALE: / APPR.BY:	DATE 4/29/86	DWG. NO. FIGURE 3



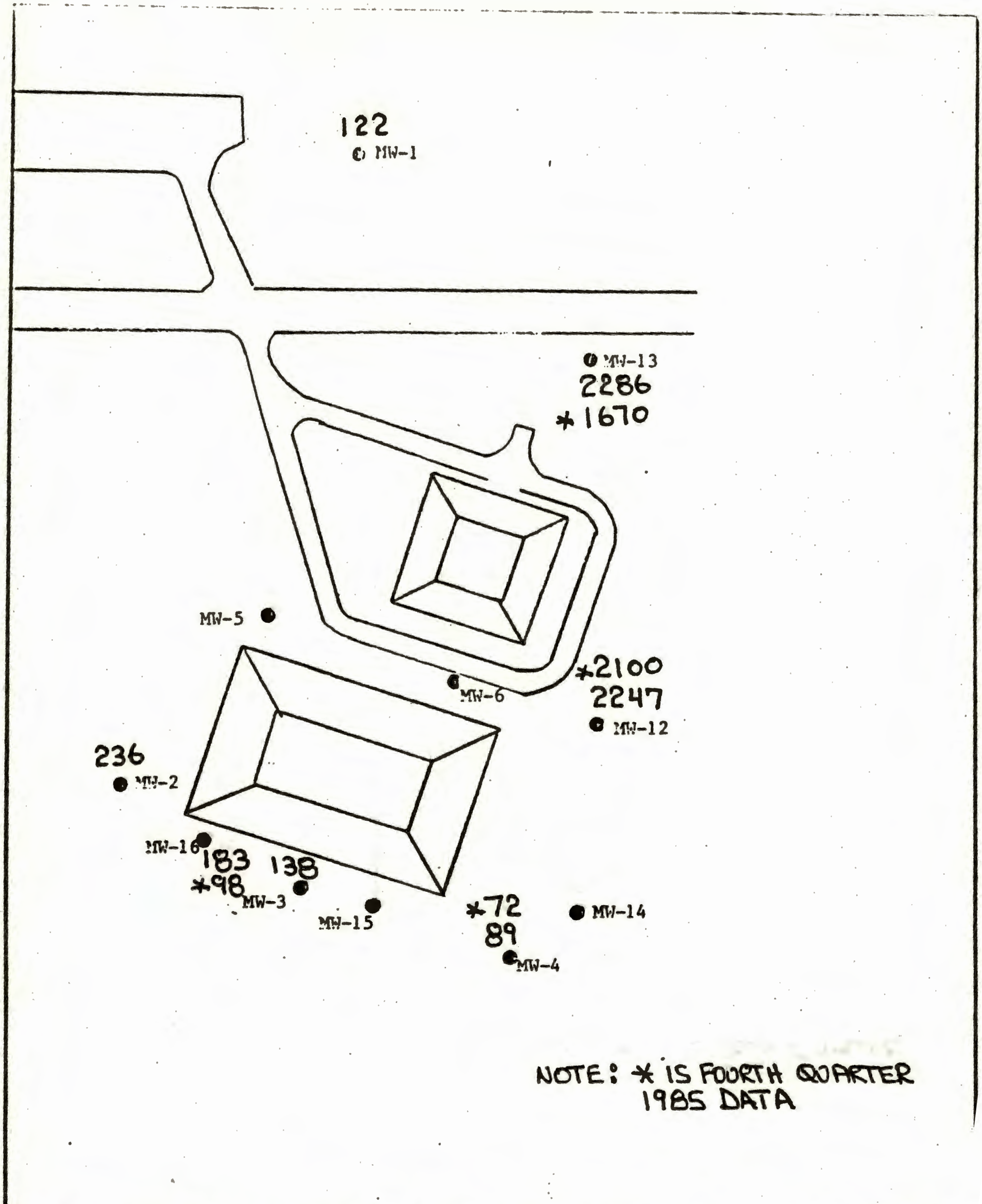
The Chester Engineers			SHEET NO.	PHILIPS ECG, SENECA FALLS, NY TILL AQUIFER CALCIUM, mg/L 3/21/85
DWN.BY: SGM	SCALE:	DATE 4/29/86	DWG. NO. FIGURE 4	
CHK'D.BY:	APPR.BY:			



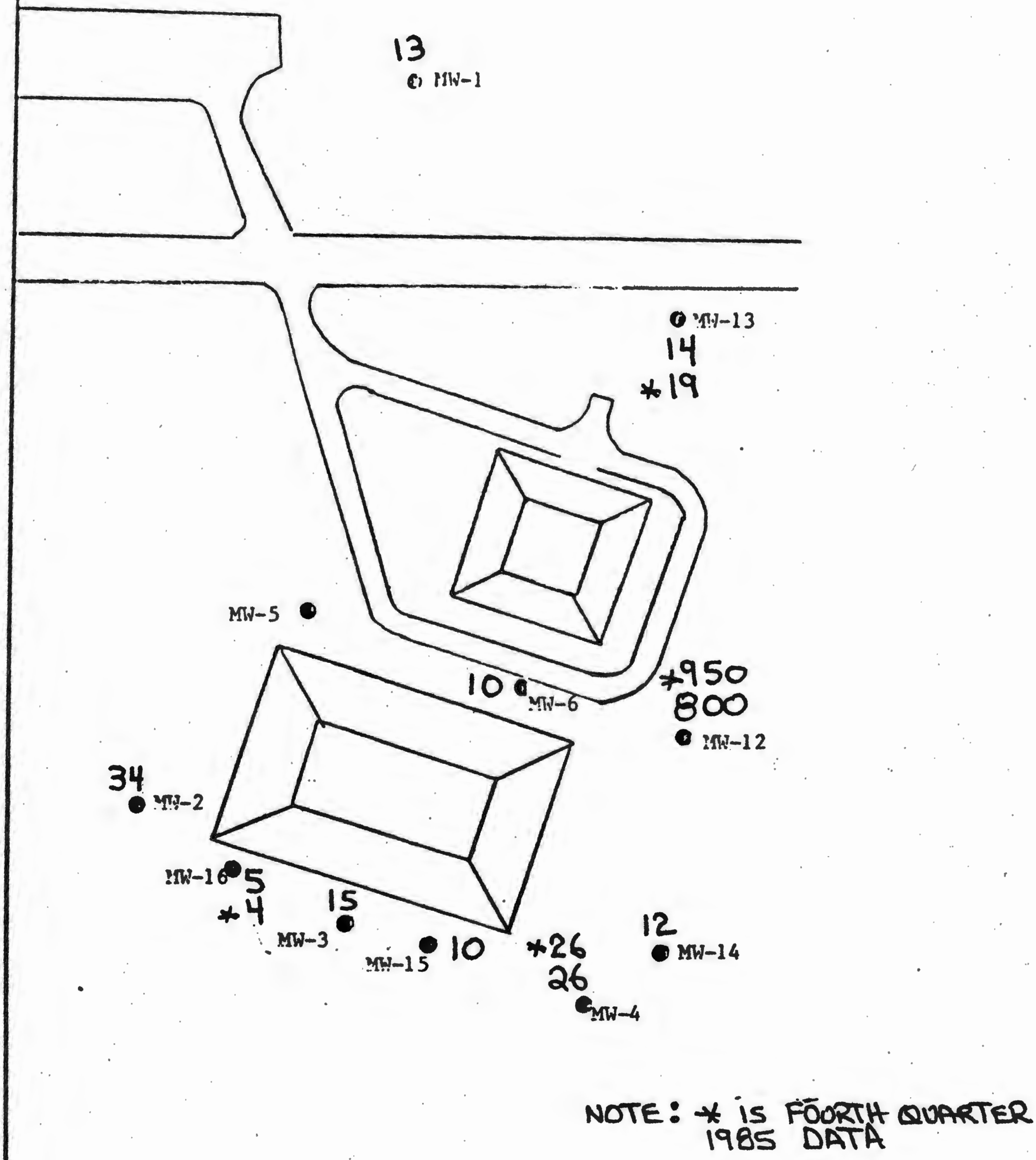
TheChesterEngineers

DWN.BY: SGM	SCALE:	DATE 4/29/86	SHEET NO.
CHKD.BY:	APPR.BY:		DWG. NO. FIGURE 5

PHILIPS ECG, SENECA FALLS, NY
TILL AQUIFER
SODIUM, mg/L
3/21/85



The Chester Engineers	SHEET NO.	PHILIPS ECG, SENECA FALLS, NY
DWN.BY: SGM / SCALE: / APPR.BY: / DATE 4/29/86	DWG. NO. FIGURE 6	TILL AQUIFER SULFATE, mg/L 3/21/85



The Chester Engineers	SHEET NO.	PHILIPS ECG, SENECA FALLS, NY TILL AQUIFER CHLORIDE, mg/L 3/21/85
DWN.BY: SGM / SCALE: / DATE 4/29/86 / APPR BY:	DWG. NO. FIGURE 7	

hester Laboratories
ivision Of
eChester Engineers
). Box 9356
tsburgh
nnsylvania 15225
hone: (412) 269-5700

Laboratory Analysis Report For

Philips ECG, Incorporated
Seneca Falls, New York

Analyses

Samples Received: 4/01/86
Report Date: 4/24/86

Source	Monitoring Well-1	Monitoring Well-2	Monitoring Well-3	Monitoring Well-4	Monitoring Well-6
Log No. 86-	03018	03019	03020	03021	03022
Date Collected	3/25/86	3/21/86	3/21/86	3/21/86	3/21/86
Chloride, mg/L Cl	13	34	15	26	10
Fluoride, mg/L F	0.28	0.23	<0.02	0.34	*
Nitrate, mg/L N	4.6	--	--	2.0	--
Nitrite, mg/L N	<0.01	--	--	<0.01	--
Phenolics, mg/L PhOH	<0.004	--	--	--	--
Sulfates, mg/L SO_4	122	236	138	89	*
Arsenic, mg/L As	<0.001	--	--	--	--
Barium, mg/L Ba	0.2	--	--	--	--
Cadmium, mg/L Cd	<0.01	--	--	--	--
Calcium, mg/L Ca	133	34	27	103	*
Total Chromium, mg/L Cr	<0.01	--	--	--	--
Total Iron, mg/L Fe	0.12	--	--	--	--
Lead, mg/L Pb	<0.01	<0.02	<0.02	--	*
Manganese, mg/L Mn	0.04	--	--	--	--
Mercury, mg/L Hg	<0.001	--	--	--	--
Nickel, mg/L Ni	<0.01	--	--	--	--
Selenium, mg/L Se	<0.001	--	--	--	--
Silver, mg/L Ag	<0.01	--	<0.01	--	--
Sodium, mg/L Na	8	8	--	16	*
Total Organic Carbon, mg/L C	--	--	34	45	*
Total Organic Halogen, mg/L Cl	--	--	*	0.015	*

* Insufficient Sample Volume

2887-95

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- "Less-than" (<) values are indicative of the detection limit.

hester Laboratories
Division Of
heChesterEngineers
P.O. Box 9356
Pittsburgh
Pennsylvania 15225
Phone: (412)

Laboratory Analysis Report For

Philips ECG, Incorporated
Seneca Falls, New York

Analyses

Samples Received: 4/01/86
Report Date: 4/24/86

Source	Monitoring Well-12	Monitoring Well-13	Monitoring Well-14	Monitoring Well-15	Monitoring Well-16
Log No. 86-	03023	03024	03025	03026	03027
Date Collected	3/25/86	3/21/86	3/21/86	3/21/86	3/21/86
Chloride, mg/L Cl	800	14	12	10	5.0
Fluoride, mg/L F	1.1	0.78	*	*	0.34
Nitrate, mg/L N	1.5	0.98	--	--	1.7
Nitrite, mg/L N	0.010	<0.01	--	--	0.012
Phenolics, mg/L PhOH	<0.004	<0.004	--	--	<0.004
Sulfates, mg/L SO_4	2,247	2,286	*	*	183
Arsenic, mg/L As	--	<0.001	*	*	<0.001
Barium, mg/L Ba	--	<0.1	*	*	0.1
Cadmium, mg/L Cd	--	<0.01	*	*	<0.01
Calcium, mg/L Ca	353	375	*	*	132
Total Chromium, mg/L Cr	--	<0.01	*	*	<0.01
Total Iron, mg/L Fe	--	0.12	*	*	0.48
Lead, mg/L Pb	<0.02	<0.01	*	*	<0.01
Manganese, mg/L Mn	--	0.23	*	*	0.07
Mercury, mg/L Hg	--	<0.001	*	*	<0.001
Nickel, mg/L Ni	--	<0.01	*	*	<0.01
Selenium, mg/L Se	--	<0.001	*	*	<0.001
Silver, mg/L Ag	--	<0.01	*	*	<0.01
Sodium, mg/L Na	690	220	*	*	5
Total Organic Carbon, mg/L C	--	--	*	*	--
Total Organic Halogen, mg/L Cl	--	--	*	*	—

* Insufficient Sample Volume

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2867-95

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A Division Of
The Chester Engineers
P O Box 9356
Pittsburgh
Pennsylvania 15225
Phone (412) 269-5700

Laboratory Analysis Report
For

Philips ECG, Incorporated
Seneca Falls, New York

Samples Received: 4/01/86
Report Date: 4/24/86

Replicate Analyses

Source	MW-1 Replicate #1	MW-1 Replicate #2	MW-1 Replicate #3	MW-1 Replicate #4
Log No. 86-	03018	03018	03018	03018
Date Collected	3/25/86	3/25/86	3/25/86	3/25/86
pH	7.1	7.6	7.6	7.6
Specific Conductance, µmhos/cm	1,045	1,045	1,046	1,047
Total Organic Carbon, mg/L C	91	91	90	91
Total Organic Halogens, mg/L Cl	0.154	0.140	0.172	0.156

Source	MW-2 Replicate #1	MW-2 Replicate #2	MW-2 Replicate #3	MW-2 Replicate #4
Log No. 86-	03019	03019	03019	03019
Date Collected	3/21/86	3/21/86	3/21/86	3/21/86
pH	8.0	*	*	*
Specific Conductance, µmhos/cm	526	*	*	*

Source	MW-3 Replicate #1	MW-3 Replicate #2	MW-3 Replicate #3	MW-3 Replicate #4
Log No. 86-	03020	03020	03020	03020
Date Collected	3/21/86	3/21/86	3/21/86	3/21/86
pH	8.3	8.3	8.3	8.3
Specific Conductance, µmhos/cm	546	552	*	*

* Insufficient Sample Volume

2887-95

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A Division Of
The Chester Engineers
P O Box 9356
Pittsburgh
Pennsylvania 15225
Phone (412) 269-5700

Laboratory Analysis Report For

Philips ECG, Incorporated
Seneca Falls, New York

Samples Received: 4/01/86
Report Date: 4/24/86

Replicate Analyses

Source	MW-4 Replicate #1	MW-4 Replicate #2	MW-4 Replicate #3	MW-4 Replicate #4
Log No. 86-	03021	03021	03021	03021
Date Collected	3/21/86	3/21/86	3/21/86	3/21/86
pH	8.1	8.1	8.1	8.1
Specific Conductance, µmhos/cm	960	973	973	973

Source	MW-6 Replicate #1	MW-6 Replicate #2	MW-6 Replicate #3	MW-6 Replicate #4
Log No. 86-	03022	03022	03022	03022
Date Collected	3/21/86	3/21/86	3/21/86	3/21/86
pH	*	*	*	*
Specific Conductance, µmhos/cm	*	*	*	*

Source	MW-12 Replicate #1	MW-12 Replicate #2	MW-12 Replicate #3	MW-12 Replicate #4
Log No. 86-	03023	03023	03023	03023
Date Collected	3/25/86	3/25/86	3/25/86	3/25/86
pH	7.6	7.6	7.6	7.6
Specific Conductance, µmhos/cm	6,000	6,000	6,011	6,011
Total Organic Carbon, mg/L C	42	40	39	42
Total Organic Halogens, mg/L Cl	0.014	0.013	0.010	0.011

* Insufficient Sample Volume

2887-95

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A Division Of
The Chester Engineers
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Pittsburgh
Pennsylvania 15225
Phone (412) 268-5700

Laboratory Analysis Report For

Philips ECG, Incorporated
Seneca Falls, New York

Samples Received: 4/01/86
Report Date: 4/24/86

Replicate Analyses

Source	MW-13 Replicate #1	MW-13 Replicate #2	MW-13 Replicate #3	MW-13 Replicate #4
Log No. 86-	03024	03024	03024	03024
Date Collected	3/21/86	3/21/86	3/21/86	3/21/86
pH	7.7	7.7	7.8	7.8
Specific Conductance, µmhos/cm	3,421	3,463	3,452	3,421
Total Organic Carbon, mg/L C	55	55	54	55
Total Organic Halogen, mg/L Cl	0.018	0.023	0.018	0.024

Source	MW-14 Replicate #1	MW-14 Replicate #2	MW-14 Replicate #3	MW-14 Replicate #4
Log No. 86-	03025	03025	03025	03025
Date Collected	3/21/86	3/21/86	3/21/86	3/21/86
pH	*	*	*	*
Specific Conductance, µmhos/cm	*	*	*	*

Source	MW-15 Replicate #1	MW-15 Replicate #2	MW-15 Replicate #3	MW-15 Replicate #4
Log No. 86-	03026	03026	03026	03026
Date Collected	3/21/86	3/21/86	3/21/86	3/21/86
pH	8.0	*	*	*
Specific Conductance, µmhos/cm	*	*	*	*

* Insufficient Sample Volume

2887-95

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Chester Laboratories
A Division Of
The Chester Engineers
P O Box 9356
Pittsburgh
Pennsylvania 15225
Phone (412) 269-5700

Laboratory Analysis Report
For
Philips ECG, Incorporated
Seneca Falls, New York

Replicate Analyses

Samples Received: 4/01/86
Report Date: 4/24/86

Source	MW-16 Replicate #1	MW-16 Replicate #2	MW-16 Replicate #3	MW-16 Replicate #4
Log No. 86-	03027	03027	03027	03027
Date Collected	3/21/86	3/21/86	3/21/86	3/21/86
pH	7.7	7.7	7.7	7.8
Specific Conductance, µmhos/cm	697	697	704	696
Total Organic Carbon, mg/L C	36	36	36	36
Total Organic Halogen, mg/L Cl	0.012	0.014	0.013	0.014

* Insufficient Sample Volume

28B7-95

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- "Less-than" (<) values are indicative of the detection limit.

Statistical analysis of hazardous waste site data using Cochran's Approximation to the Behrens-Fisher Students' t-test at the 0.01 level of significance.

Samples were collected on 03/21-25/86 for:

YEAR 5
PERIOD 1

Prepared for:

Philips ECG, Inc.
Seneca Falls, New York

Prepared by:

The Chester Engineers
P.O.Box 9356
Pittsburgh, Pennsylvania 15225
412 269-5700

ANALYTICAL RESULTS
UPGRADIENT MW-1

PARAMETER	ANALYTICAL RESULTS	MONITORING WELL AVERAGE	MONITORING WELL VARIANCE	BACKGROUND AVERAGE	BACKGROUND VARIANCE
pH	7.100				
	7.600				
	7.600				
	7.600	7.475	0.062	7.338	0.065
SPECIFIC COND.	1045.000				
umhos/cm	1045.000				
	1046.000				
	1047.000	1045.750	0.916	1005.384	4714.423
TOX	154.000				
ug/L Cl	140.000				
	172.000				
	156.000	155.500	171.666	46.384	70.256
TOC	91.000				
mg/L C	91.000				
	90.000				
	91.000	90.750	0.250	43.538	183.769

PARAMETER	ANALYTICAL RESULTS	MONITORING WELL AVERAGE	MONITORING WELL VARIANCE	BACKGROUND AVERAGE	BACKGROUND VARIANCE
pH	8.300				
	8.300				
	8.300				
	8.300	8.300	0.000	7.338	0.065
SPECIFIC COND.	546.000				
umhos/cm	552.000	549.000	18.000	1005.384	4714.423

PARAMETER	ANALYTICAL RESULTS	MONITORING WELL AVERAGE	MONITORING WELL VARIANCE	BACKGROUND AVERAGE	BACKGROUND VARIANCE
pH	8.100				
	8.100				
	8.100				
	8.100	8.100	0.000	7.338	0.065
SPECIFIC COND.	960.000				
umhos/cm	973.000				
	973.000				
	973.000	969.750	42.250	1005.384	4714.423

PARAMETER	ANALYTICAL RESULTS	MONITORING WELL AVERAGE	MONITORING WELL VARIANCE	BACKGROUND AVERAGE	BACKGROUND VARIANCE
pH	7.600				
	7.600				
	7.600				
	7.600	7.600	0.000	7.338	0.065
SPECIFIC COND.	6000.000				
umhos/cm	6000.000				
	6011.000				
	6011.000	6005.500	40.333	1005.384	4714.423
TOX	14.000				
ug/L Cl	13.000				
	10.000				
	11.000	12.000	3.333	46.384	70.256
TOC	42.000				
mg/L C	40.000				
	39.000				
	42.000	40.750	2.250	43.538	183.769

PARAMETER	ANALYTICAL RESULTS	MONITORING WELL AVERAGE	MONITORING WELL VARIANCE	BACKGROUND AVERAGE	BACKGROUND VARIANCE
pH	7.700				
	7.700				
	7.800				
	7.800	7.750	0.003	7.338	0.065
SPECIFIC COND.	3421.000				
umhos/cm	3463.000				
	3452.000				
	3421.000	3439.250	464.250	1005.384	4714.423
TOX	18.000				
ug/L Cl	23.000				
	18.000				
	24.000	20.750	10.250	46.384	70.256
TOC	55.000				
mg/L C	55.000				
	54.000				
	55.000	54.750	0.250	43.538	183.769

PARAMETER	ANALYTICAL RESULTS	MONITORING WELL AVERAGE	MONITORING WELL VARIANCE	BACKGROUND AVERAGE	BACKGROUND VARIANCE
pH	7.700				
	7.700				
	7.700				
	7.800	7.725	0.002	7.338	0.065
SPECIFIC COND.	697.000				
umhos/cm	697.000				
	704.000				
	696.000	698.500	13.666	1005.384	4714.423
TOX	12.000				
ug/L Cl	14.000				
	13.000				
	14.000	13.250	0.916	46.384	70.256
TOC	36.000				
mg/L C	36.000				
	36.000				
	36.000	36.000	0.000	43.538	183.769

PARAMETER	WELL	t*	tc	t-TEST RESULT
pH	MW-1	0.9491	5.1586	OK
	MW-3	13.5060	3.0550	SIGNIFICANTLY HIGHER
	MW-4	10.6968	3.0550	SIGNIFICANTLY HIGHER
	MW-12	3.6736	3.0550	SIGNIFICANTLY HIGHER
	MW-13	5.3569	3.4483	SIGNIFICANTLY HIGHER
	MW-16	5.1227	3.3608	SIGNIFICANTLY HIGHER
SPECIFIC COND.	MW-1	2.1189	2.6821	OK
	MW-3	-23.6736	3.3866	OK
	MW-4	-1.8445	2.7336	OK
	MW-12	258.9894	2.7313	SIGNIFICANTLY HIGHER
	MW-13	111.2397	3.1319	SIGNIFICANTLY HIGHER
	MW-16	-16.0397	2.6983	OK
TOX	MW-1	15.6970	4.3329	SIGNIFICANTLY HIGHER
	MW-12	-13.7674	2.9294	OK
	MW-13	-9.0820	3.2792	OK
	MW-16	-13.9602	2.7566	OK
TOC	MW-1	12.5292	2.6891	SIGNIFICANTLY HIGHER
	MW-12	-.7273	2.7521	OK
	MW-13	2.9753	2.6891	SIGNIFICANTLY HIGHER
	MW-16	-2.0050	2.6809	OK

PARAMETER	ANALYTICAL RESULTS 03/28/83	06/16/83	09/14/83	12/14/83
pH	7.700	7.100	7.300	7.500
	7.600	7.000	7.200	0.000
	7.600	7.000	7.300	0.000
	7.700	7.100	7.300	0.000
	average=	7.33846	variance=	0.06589
SPECIFIC COND.	990.000	1000.000	965.000	1225.000
	995.000	1000.000	970.000	0.000
	985.000	1010.000	955.000	0.000
	990.000	1020.000	965.000	0.000
	average=	1005.38461	variance=	4714.42307
TOX	56.000	41.000	41.000	38.000
	59.000	43.000	45.000	0.000
	59.000	35.000	48.000	0.000
	56.000	39.000	43.000	0.000
	average=	46.38461	variance=	70.25641
TOC	30.000	44.000	65.000	26.000
	31.000	46.000	63.000	0.000
	32.000	42.000	58.000	0.000
	29.000	44.000	56.000	0.000
	average=	43.53846	variance=	183.76923

APPENDIX E

Groundwater Sampling and Analysis Protocol

III. GROUNDWATER SAMPLING AND ANALYSIS PLAN

This section consists of revisions to the Philips ECG, April 1983 report.

A. RCRA GROUNDWATER MONITORING NETWORK

RCRA groundwater monitoring regulations [40 CFR 265. 91(a)] require that at least one upgradient and three downgradient wells be utilized to monitor the uppermost aquifer at the limit of the waste management area. Since the waste management area has been defined as the two waste holding impoundments; and since the flow direction of the groundwater in the uppermost aquifer is to the east-southeast; monitoring well MW-1 has been selected as the upgradient well and wells MW-2, MW-3, MW-4 and MW-7 have been selected as the downgradient wells. Wells TB-5 and TB-6 are for water level observation purposes within the waste management area and are to be considered as part of the RCRA network. Monitoring point reference elevations are as follows:

Monitoring Point	Top of Casing Elevation (ft)	Ground Surface Elevation (ft)
MW-1	462.13	459.33
MW-2	449.19	445.95
MW-3	446.00	443.20
MW-4	444.56	441.96
TB-5	457.47	454.36
TB-6	457.22	454.39
MW-7	443.12	440.52

Well locations are presented on Seneca Falls Drawing F-W25457.

B. GROUNDWATER SAMPLING

All groundwater sampling will be done after the wells have been properly developed. Because drilling and well construction disturb the natural groundwater system, samples should not be collected until the groundwater system returns to chemical equilibrium.

1. <u>Procedures for Sampling Wells</u>

a. Water level readings should be obtained from the five monitoring wells and the two observation wells. Measure the depth from the top of the casing to the top of the water. Record the depth for future use in the development of the groundwater contour map. All measuring devices used in the well must be thoroughly rinsed with distilled water prior to use.

b. Measure the depth from the top of the casing to the bottom of the well casing (total depth of cased hole) for initial sampling of a new well or use the previously recorded depth for resampling of an established well.

c. Subtract the depth to top of the water from the depth to the bottom of the casing to determine the height of standing water in the casing. Calculate the volume of water standing in the well casing. (For a 4 in.

well this equals approximately 0.7 gal per ft of standing water.)

d. Wells are presently bailed and sampled using a 1-1/2 in. ID Teflon bailer. It is permissible to use bailers of PVC construction. Bailer sizes may be changed according to well yield conditions.

e. Remove a quantity of water from the well equal to three to five times the calculated volume of water in the well. For rapidly recharged wells, the recharge rate should ideally continue until the pH and/or conductivity of the water has stabilized. These measurements are not required.

f. If the well goes dry during bailing, allow the well to recover.

g. Obtain a sample for chemical analyses immediately after bailing is complete. In case a well is bailed dry, obtain a groundwater sample as soon as possible after the well has recovered. Repeated bailings may be necessary. Any sampling sequence should not extend longer than seven days.

h. The sampling bailer should be flushed with distilled water after sampling to prevent cross contamination between monitoring wells. Materials incidental to sampling such as bailer ropes and tubing must also be flushed with distilled water. Sampling equipment must be protected from the ground surface by clean plastic sheeting or other measures of equal effectiveness. No sampling should be accomplished when wind blown particles may contaminate the sample or sampling equipment.

i. All samples for extractable organic compound analyses should be placed in amber glass bottles with teflon lined lids. It is not permissible to allow partially filled amber bottles to stand overnight in an attempt to obtain adequate sample volume. If necessary, multiple smaller bottles should be utilized. Samples for inorganic chemical analyses, on the other hand, may be placed in polyethylene bottles. Samples for purgeable organic compound analyses should be placed in glass containers such that no air bubbles pass through the sample as the container is filled. Those bottles should be sealed with teflon lined lids so that no air bubbles are entrapped.

j. For inorganic or metal analyses, the sample bottle may be prerinsed by partially filling the bottle with sample and discarding the contents. The cap may also be rinsed with the water to be sampled. For organic compound or microbiological analyses, the sample containers should not be prerinsed with the sample.

k. The sample bottle should be filled, capped securely and immediately placed in a chest where the temperature is about 4 deg C. The samples should be delivered to the laboratory as soon as possible.

1. At some point in the future Philips may elect to utilize submersible pumps on some or all of the wells. For dedicated pump systems no revisions to the previous procedures are required, other than ensuring that the pumping volume is sufficient to remove any stagnant water within the pumping system prior to sampling from the output of the pump. A nondedicated pumping system may also be used if the pumping system is thoroughly flushed between wells with water known to be contaminant free. For a nondedicated system it is recommended that the pump only be used for well evacuation purposes and that the water quality samples be obtained with a bailer following the removal of the non-dedicated pump.

C. SAMPLE PRESERVATION

Immediate analysis is ideal. Since this is usually impossible for most tests, storage at a low temperature (4 deg C) is perhaps the best way to preserve most samples until the next day. Chemical additions, on the other hand, will preserve the samples for a longer period of time. Chemical preservation of samples, however, is difficult because chemical additions used to preserve one constituent of the sample may interfere with the analyses of other constituents. As such, no single chemical preservation technique is entirely satisfactory. Samples may require splitting with different chemical additions made to each aliquot. The preservative should be chosen with due regard to the determinations that are to be made. Table III-1 is a list of suggested preservation methods for various parameters plus the suggested maximum length of time the samples can be held prior to analysis.

1. Samples will be placed in the proper type of container; e.g., glass or plastic (refer to Table III-1).

2. To prevent or retard the degradation/modification of constituents in samples during transportation and storage, the samples will be preserved and stored as outlined in Table III-1 for the compounds of interest.

3. Efforts to preserve the integrity of the samples will be initiated at the time of sampling and will continue until analyses are performed.

4. In the event that samples obtained from the well contain a great amount of sediment, they should be quiescently settled and only the supernatant liquors placed in the bottles before the chemical preservatives are added. For the measurement of dissolved constituents, the samples should be filtered on-site using a 0.45 μm membrane filter before the chemical preservatives are added.

PHILIPS ECG, INC.
SENECA FALLS, NEW YORK

TABLE III-1

CONTAINERS, PRESERVATION AND HOLDING TIMES

MEASUREMENT	CONTAINER[a]	PRESERVATIVE[b]	MAXIMUM HOLDING TIME[c]
Acidity	P, G	Cool, 4°C	14 days
Alkalinity	P, G	Cool, 4°C	14 days
Ammonia	P, G	Cool, 4°C H_2SO_4 to pH <2	28 days
Coliform	P, G	Cool, 4°C 0.008% $Na_2S_2O_3$[f]	6 hours
Fecal streptococci	P, G	Cool, 4°C 0.008% $Na_2S_2O_3$[f]	6 hours
Biochemical oxygen demand	P, G	Cool, 4°C	48 hours
Biochemical oxygen demand carbonaceous	P, G	Cool, 4°C	48 hours
Bromide	P, G	None Required	28 days
Chemical oxygen demand	P, G	Cool, 4°C H_2SO_4 to pH <2	28 days
Chloride	P, G	None Required	28 days
Chlorinated organic compounds	G, teflon-lined cap	Cool, 4°C 0.008% $Na_2S_2O_3$[f]	7 days (until extraction) 30 days (after extraction)
Chlorine, total residual	P, G	Determine on site	2 hours
Color	P, G	Cool, 4°C	48 hours

(continued)

TABLE III-1

CONTAINERS, PRESERVATION AND HOLDING TIMES
(continued)

MEASUREMENT	CONTAINER[a]	PRESERVATIVE[b]	MAXIMUM HOLDING TIME[c]
Cyanide, total and amenable to chlorination	P, G	Cool, 4°C NaOH to pH <12 0.008% $Na_2S_2O_3$ [f]	14 days
Dissolved oxygen			
Probe	G bottle and top	Determine on site	1 hour
Winkler	G bottle and top	Fix on site	8 hours
Fluoride	P	None Required	28 days
Hardness	P, G	HNO_3 to pH <2	6 months
Hydrogen ion (pH)	P, G	Determine on site	2 hours
Kjeldahl and organic nitrogen	P, G	Cool, 4°C H_2SO_4 to pH <2	28 days
Metals[d]			
Chromium VI	P, G	Cool, 4°C	48 hours
Mercury	P, G	HNO_3 to pH <2 0.05% $K_2Cr_2O_7$	28 days
Metals, other than above	P, G	HNO_3 to pH <2	6 months
Nitrate	P, G	Cool, 4°C	48 hours
Nitrate-nitrite	P, G	Cool, 4°C H_2SO_4 to pH <2	28 days 28 days
Nitrite	P, G	Cool, 4°C	48 hours

(continued)

TABLE III-1

CONTAINERS, PRESERVATION AND HOLDING TIMES
(continued)

MEASUREMENT	CONTAINER[a]	PRESERVATIVE[b]	MAXIMUM HOLDING TIME[c]
Oil and Grease	G	Cool, 4°C	28 days
Organic Carbon	P, G	Cool, 4°C H_2SO_4 to pH <2	28 days
Organic Compounds[e]			
Extractables (including): phthalates nitrosamines organochlorine pesticides PCB's nitroaromatics isophorone polynuclear armotic hydrocarbons haloethers chlorinated hydrocarbons TCDD	G, teflon-lined cap	Cool, 4°C 0.008% $Na_2S_2O_3$[f]	7 days (until extraction) 30 days (after extraction)
Extractables (phenols)	G, teflon-lined cap	Cool, 4°C H_2SO_4 to pH <2 0.008% $Na_2S_2O_3$[f]	7 days (until extraction) 30 days (after extraction)
Purgeables (Halocarbons and Aromatics)	G, teflon-lined septum	Cool, 4°C 0.008% $Na_2S_2O_3$[f]	14 days
Purgeables (Acrolein and Acrylonitrite)	G, teflon-lined septum	Cool, 4°C 0.008% $Na_2S_2O_3$[f]	3 days
Orthophosphate	P, G	Filter on site Cool, 4°C	48 hours

(continued)

TABLE III-1

CONTAINERS, PRESERVATION AND HOLDING TIMES
(continued)

MEASUREMENT	CONTAINER[a]	PRESERVATIVE[b]	MAXIMUM HOLDING TIME[c]
Pesticides	G, teflon-lined cap	Cool, 4°C 0.008% $Na_2S_2O_3$[f]	7 days (until extraction) 30 days (after extraction)
Phenols	P, G	Cool, 4°C H_2SO_4 to pH <2	28 days
Phosphorus	P, G	Cool, 4°C H_2SO_4 to pH <2	28 days
Alpha, Beta and Radium	P, G	HNO_3 to pH <2	6 months
Residue, total	P, G	Cool, 4°C	14 days
Residue, filterable	P, G	Cool, 4°C	14 days
Residue, nonfilterable	P, G	Cool, 4°C	7 days
Residue, settleable	P, G	Cool, 4°C	7 days
Residue, volatile	P, G	Cool, 4°C	7 days
Silica	P	Cool, 4°C	28 days
Specific conductance	P, G	Cool, 4°C	28 days
Sulfate	P, G	Cool, 4°C	28 days
Sulfide	P, G	Cool, 4°C Zinc Acetate	28 days
Sulfite	P, G	Cool, 4°C	48 hours
Surfactants	P, G	Cool, 4°C	48 hours
Temperature	P, G	Determine on site	Immediately
Turbidity	P, G	Cool, 4°C	48 hours

(continued)

[a] Polyethylene (P) or Glass (G)

[b] Sample preservation should be performed immediately upon sample collection. For composite samples each aliquot should be preserved at the time of collection. When use of an automatic sampler makes it impossible to preserve each aliquot, then samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.

[c] Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis are still considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of samples under study are stable for the longer time.

Some samples may not be stable for the maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for shorter time if knowledge exists to show this is necessary to maintain sample stability.

[d] Samples should be filtered immediately on-site before adding preservative for dissolved metals.

[e] Guidance applies to samples to be analyzed by GC, LC, or GC/MS for specific organic compounds.

[f] Should only be used in the presence of residual chlorine.

D. CONTAINER PREPARATION

For the analysis of certain parameters, special cleaning procedures of the sample bottles or containers are required. It is advisable to use new containers. Previously used containers may require more thorough cleaning such as with a chromic acid solution before the following special cleaning procedures are utilized.

1. Organic Compounds

a. Purgeable

Detergent wash vials or bottles and cap liners. Rinse with tap and then distilled water. Dry at 105 deg C for at least one hour.

b. Extractables

Detergent wash bottles and cap liners. Rinse with tap and then distilled water. Rinse with acetone followed by hexane (pesticide grade). Drain and air dry.

2. Metals

Rinse containers with a solution of 1 part nitric acid to 4 parts water followed by distilled water.

3. Microbiological Analyses (Coliforms)

Sterilize container and its stopper or cap by autoclaving at 121 deg C for 15 minutes or by dry heat at 180 deg C for two hours. Prior to sterilization, the container should be wrapped in kraft paper or aluminum foil to protect against contamination during handling. Any chemical preservatives utilized (sodium thiosulfate) must be added to the container before the sterilization process.

E. SAMPLE MANAGEMENT AND CHAIN OF CUSTODY

1. The management of samples, from the point of collection to the point of analysis, should be carefully controlled. It is possible that analytical results could be used as evidence in legal proceedings. For this reason, it is important that an accounting of the sample be made from the time of collection until the sample is analyzed.

2. The accounting of samples is generally referred to as "chain of custody". Since most samples must be transported back to the laboratory for analysis, it is good practice to treat each sample as though the results will be used in legal proceedings.

   A field notebook is an excellent and acceptable means of recording and recalling facts and circumstances of the sample collection in the event of adjudication. Examples of information that should be recorded are:

   - Sampling Location
   - Time and Date
   - Weather Conditions

- Sampling Method - grab samples, automatic composites, etc.

- Method of Preservation

- Disposition of Sample - transferred to John Smith for transport to lab, mailed to lab, stored prior to transporting to lab, etc.

- Reason for Sampling

- Pertinent Well Data - depth to water surface, pumping date, etc.

- On-Site Analysis - pH, temperature, etc.

An example of field data record is attached as Figure III-1.

The sampler should sign each page of his field notebook in order to strengthen the case for its authenticity. If the sampler transfers the samples to someone else, the person receiving the samples should be indicated and should sign the field notebook. If samples are sent through the mail, the recipient should return a signed sheet indicating the receipt of the sample. Another good practice when shipping samples through the mail is to place a seal across the access point to the container. This seal is signed and dated by the person sending the samples. The person receiving the samples notes the condition of the seal and records his findings.

An example of chain of custody record tag is shown in Figure III-2.

3. Internal laboratory identification numbers should be assigned to all incoming samples and quality control (QC) samples according to the format of

Samplers: ____________

FIELD DATA RECORD

Station	Sample Number	Date of Collection	Time		pH	Temperature	Other Parameters		
			Sample Taken	Sample Received					

Figure III-1
Example of Field Data Record

(FRONT SIDE)

CHAIN OF CUSTODY RECORD

Sample No.	Time Taken (hrs)	Date Taken

Source of Sample	Preservative

Sample Collector	Witness(es)

Remarks: (Analyses Requires, Sample Type, etc.)

(BACK SIDE)

I hereby certify that I received this sample and disposed of it as noted below:

Receipt of Sample			
	Received from	Date Received	Time Received
	Disposition of Sample	Signature	

I hereby certify that I received this sample and disposed of it as noted below:

Receipt of Sample			
	Received from	Date Received	Time Received
	Disposition of Sample	Signature	

I hereby certify that I obtained this sample and dispatched it as shown below:

Dispatch of Sample			
	Date Obtained	Time Obtained	Source
	Date Dispatched	Time Dispatched	Method of Shipment
	Sent to	Signature	

Figure III-2
Example Chain of Custody
Record Tag

the laboratory. The identification numbers will be sequential and will be recorded in a log book which identifies the sample with the assigned number.

Also, although not always practiced, one of the people associated with the laboratory should be designated to safeguard the sample in the laboratory. The sample custodian should maintain a permanent record containing information such as:

- Type of Sample
- Sampling Location
- Date Sampled
- Sample Number
- Sample Assigned to Whom
- Date Assigned
- Analyses Made and Results
- Completion Date of Analyses

Unused portions of the sample should be stored for a specified time period until results have been verified.

F. NUMBER OF SAMPLES AND FREQUENCY

The number of groundwater samples required to meet RCRA well monitoring requirements for the first and second years are tabulated in Tables III-2 and III-3. These are based on a typical system of upgradient (Well 1) and three downgradient (Wells 2, 3, and underdrain discharge pipe) points.

The tables also indicate the type and number of analyses that are required. The number of determinations are based on existing regulations of the U. S. EPA and New York State Department of Environmental Conservation. Table III-4 lists the parameters designated as "primary drinking water standards" in the aforementioned tables. It should be noted that four replicate determinations for the "indicator parameters" are required in the first year on the upgradient well and on all wells in the second year as designated in the tabulations.

As shown on Tables III-2 through III-4, samples are required quarterly for all parameters during the first year of sampling. During the second and subsequent years, the frequency of sampling is diminished to quarterly for the "indicator parameters" and to semi-annually for the "quality parameters". Analyses for the "primary drinking water parameters" are not required after the first year unless further assessment of the groundwater is required. It should be remembered that groundwater level measurements are required each time a well is sampled.

Tables III-5 and III-6 present typical sample container requirements for each first year, and second and subsequent years sampling, respectively.

G. RECORD KEEPING AND REPORTING

The results of all analyses performed on groundwater samples and water table elevation measurements must be

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TABLE III-2

NUMBER OF SAMPLES AND DETERMINATIONS
FIRST YEAR - RCRA WELL MONITORING

Parameter	Number of Individual Analyses Upgradient	Downgradient				Total Samples (Five Wells)	Total Number of Analyses
Well Number	1	2	3	4	7		
Suitability Parameters:							
Primary Drinking Water Standards*	84	84	84	84	84		420
Quality Parameters:							
Chloride	4	4	4	4	4		20
Iron	4	4	4	4	4		20
Manganese	4	4	4	4	4		20
Phenols	4	4	4	4	4		20
Sodium	4	4	4	4	4		20
Sulfate	4	4	4	4	4		20
Indicator Parameters:							
pH	16**	4	4	4	4		32
Sp. Cond.	16**	4	4	4	4		32
TOC	16**	4	4	4	4		32
TOX	16**	4	4	4	4		32
Total Samples for Five Wells - First Year						20***	
Total Determinations - First Year							668

* Refer to Table III-4 - 84 Analyses = 21 parameters x 4 samples.

** Four replicate analyses made for each quarterly sample taken for the upgradient well.

*** Quarterly Samples - one for each well per quarter.

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TABLE III-3

NUMBER OF SAMPLES AND DETERMINATIONS
SECOND YEAR AND SUBSEQUENT YEARS - RCRA WELL MONITORING
FEDERAL EPA REQUIREMENTS

Parameter	Number of Individual Analyses per Year: Upgradient	Downgradient				Total Annual Samples (Five Wells)	Total Annual Number of Analyses
Well Number	MW-1	MW-2	MW-3	MW-4	MW-7		
Suitability Parameters:							
Primary Drinking Water Standards	Not Req'd.		Not Req'd.			0	5
Quality Parameters:							
Chloride	1	1	1	1	1		5
Iron	1	1	1	1	1		5
Manganese	1	1	1	1	1		5
Phenols	1	1	1	1	1		5
Sodium	1	1	1	1	1		5
Sulfate	1	1	1	1	1		5
Total Samples for Five Wells						5*	
Indicator Parameters:**							
pH	8	8	8	8	8		40
Sp. Cond.	8	8	8	8	8		40
TOC	8	8	8	8	8		40
TOX	8	8	8	8	8		40
Total Samples for Five Wells						10***	
Total Determinations per year							190

* Annual samples -- one for each well per year.

** Four replicate determinations for each sample.

*** Semi-annual samples - two for each well per year.

kept on-site during the active life of the site. In addition, certain results must be reported to the New York State Department of Environmental Conservation as follows:

1. During the first year, report the results of analysis for the primary drinking water parameters listed in Table III-4 within 15 days after completing each quarterly analysis. Also, separately identify for each monitoring well any parameters whose concentration or value has been found to exceed the allowable concentration listed in Table III-4.

2. After the first year's sampling, calculate the initial background concentration by pooling the replicate measurements for each individual "indicator parameter" (see Table III-2) concentration or value in samples obtained from upgradient wells (Well 1) during the first year, and calculating the average and variance.

3. After the first year, calculate the mean and variance, based on at least four replicate measurements on each sample, for each well for each individual "indicator parameter" (see Table II-2). For each well, compare these results with the initial background arithmetic mean calculated in 2 above, utilizing the Student's t-test at the 0.01 level of significance to determine statistically significantly increases (or decreases in the case of pH) over initial background.

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TABLE III-4

SUITABILITY PARAMETERS FOR GROUNDWATER ANALYSES

Primary Drinking Water Standards:

Parameter	Allowable Concentration (mg/L)	Parameter	Allowable Concentration (mg/L)
Arsenic	0.05	Lindane	0.004
Barium	1.0	Methoxychlor	0.01
Cadmium	0.01	Toxophene	0.005
Chromium	0.05	2,4,D	0.1
Fluoride	1.4-2.4	2,4,5 TP Silvex	0.01
Lead	0.05	Radium	5 pCi/L
Mercury	0.002	Gross Alpha	15 pCi/L
Nitrate (as N)	10	Gross Beta	4 millirem/yr
Selenium	0.01	Turbidity	1 TU
Silver	0.05	Coliform Bacteria	1/100 mL
Endrin	0.0002		

Total of 21 Parameters

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TABLE III-5

SAMPLE CONTAINER REQUIREMENTS
FIRST YEAR - QUARTERLY SAMPLES

Container Type	Required Volume	Preservative	Parameters
Plastic	Liter	HNO_3	Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver, Iron, Manganese, Sodium
Plastic	Liter	HNO_3	Radium, Gross Alpha, Gross Beta
Plastic	Liter	None	Fluoride, Nitrate, Turbidity Chloride, Sulfate, pH, Specific Conductivity
Plastic	200 mL	HNO_3 & $K_2Cr_2O_7$	Mercury
Amber Glass, Teflon Lined Cap	Gallon	None	Total Organic Halogen (TOX); Endrin; Lindane; Methoxy-chlorine; Toxophene; 2,4,D; 2,4,5,TP Silvex
Plastic	Liter	H_2SO_4	Phenol, TOC
Sterile Bottle	100 mL	None	Coliform Bacteria

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TABLE III-6

SAMPLE CONTAINER REQUIREMENTS
SECOND AND SUBSEQUENT YEARS

Container Type	Required Volume	Preservative	Parameters
		FIRST SAMPLING DURING YEAR	
Plastic	Liter	HNO_3	Iron, Manganese, Sodium
Plastic	Liter	None	Chloride, Sulfate, pH, Specific Conductivity
Amber Glass, Teflon Lined Cap	2 Liters	None	Total Organic Halogen (TOX)
Plastic	Liter	H_2SO_4	Phenol, TOC
		SECOND SAMPLING DURING YEAR	
Plastic	500 mL	None	pH, Specific Conductivity
Amber Glass, Teflon Lined Cap	2 Liters	None	Total Organic Halogen (TOX)
Plastic	200 mL	H_2SO_4	TOC

4. Report all analyses, groundwater elevations and the results of required statistical comparisons annually in the annual report for the facility. Also, separately identify any significant differences from initial background found in upgradient wells.

5. Annually review groundwater elevation data to determine that at least one upgradient well and three downgradient wells are being monitored. If yes, continue monitoring. If no, immediately modify number, location, or depth of monitoring wells to bring the monitoring network into compliance.

Sample formats for compiling results are presented in Tables III-7 and III-8 for the first year and the second and subsequent years, respectively.

H. Analytical Procedures

All analytical methods shall conform to state and federal requirements and/or EPA approved alternate procedures. The basic references are as follows:

- "Handbook for Analytical Quality Control in Water and Wastewater Laboratories"; EPA-600/4-79-019.
- "Methods for Chemical Analysis of Water and Wastes"; EPA-600/4-79-020, March 1979
- O.I. Corporation. Adsorption with Conductivity Determination, using O.I. Corp. Model 610 Total Organic Halogen Analyzer.

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TABLE III-7

FIRST YEAR ANALYTICAL RESULTS - SUITABILITY PARAMETERS
WELL NUMBER ___

Parameter	Analytical Results - Quarterly Samples (mg/L)				Allowable Concentration (mg/L)	Date Violations Measured
Date Sample Collected	___	___	___	___	--	--
Arsenic	___	___	___	___	0.05	___
Barium	___	___	___	___	1.0	___
Cadmium	___	___	___	___	0.01	___
Chromium	___	___	___	___	0.05	___
Fluoride	___	___	___	___	1.4-2.4	___
Lead	___	___	___	___	0.05	___
Mercury	___	___	___	___	0.002	___
Nitrate (as N)	___	___	___	___	10	___
Selenium	___	___	___	___	0.01	___
Silver	___	___	___	___	0.05	___
Endrin	___	___	___	___	0.0002	___
Lindane	___	___	___	___	0.004	___
Methoxychlor	___	___	___	___	0.01	___
Toxophene	___	___	___	___	0.005	___
2,4,D	___	___	___	___	0.1	___
2,4,5 TP Silvex	___	___	___	___	0.01	___
Radium	___	___	___	___	5 pCi/L	___
Gross Alpha	___	___	___	___	15 pCi/L	___
Gross Beta	___	___	___	___	4 millirem/yr	___
Turbidity	___	___	___	___	1 TU	___
Fecal Coliform	___	___	___	___	1/100 mL	___

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TABLE III-7
(continued)

FIRST YEAR ANALYTICAL RESULTS -
UPGRADIENT WELL 1

Parameter	Analytical Results Quarterly Samples (mg/L)				Initial Background	
					Average (mg/L)	Variance (mg/L)
Date Sample Collected	____	____	____	____	---	---
Quality Parameters						
Chloride	____	____	____	____	---	---
Iron	____	____	____	____	---	---
Manganese	____	____	____	____	---	---
Phenol	____	____	____	____	---	---
Sodium	____	____	____	____	---	---
Sulfate	____	____	____	____	---	---
Indicator Parameters						
pH	____	____	____	____		
	____	____	____	____		
	____	____	____	____		
	____	____	____	____	____	____
Specific Conductivity	____	____	____	____		
	____	____	____	____		
	____	____	____	____		
	____	____	____	____	____	____
Total Organic Carbon	____	____	____	____		
	____	____	____	____		
	____	____	____	____		
	____	____	____	____	____	____
Total Organic Halogen	____	____	____	____		
	____	____	____	____		
	____	____	____	____		
	____	____	____	____	____	____
Groundwater Elevation	____	____	____	____	---	---

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TABLE III-7
(continued)

FIRST YEAR ANALYTICAL RESULTS -
DOWNGRADIENT WELL (____)

Parameter	Analytical Results Quarterly Samples (mg/L)			
Date Sampled Collected	____	____	____	____
Quality Parameters				
Chloride	____	____	____	____
Iron	____	____	____	____
Manganese	____	____	____	____
Phenol	____	____	____	____
Sodium	____	____	____	____
Sulfate	____	____	____	____
Indicator Parameters				
pH	____	____	____	____
Specific Conductivity	____	____	____	____
Total Organic Carbon	____	____	____	____
Total Organic Halogen	____	____	____	____
Groundwater Elevation	____	____	____	____

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TABLE III-8

SECOND AND SUBSEQUENT YEARS
ANALYTICAL RESULTS - QUALITY PARAMETERS

Parameter	Upgradient Well 1	Downgradient Wells 2	3	4	7
Date Sample Collected	____	____	____	____	____
Chloride	____	____	____	____	____
Iron	____	____	____	____	____
Manganese	____	____	____	____	____
Phenol	____	____	____	____	____
Sodium	____	____	____	____	____
Sulfate	____	____	____	____	____
Groundwater Elevation	____	____	____	____	____

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TABLE III-8
(continued)

SECOND AND SUBSEQUENT YEARS
ANALYTICAL RESULTS - INDICATOR PARAMETERS
WELL NUMBER ___
DATE SAMPLE COLLECTED ____

Parameter	Analytical Results (mg/L)	Average (mg/L)	Variance (mg/L)	Initial Background[1] Average (mg/L)	Initial Background[1] Variance (mg/L)	Statistically Significant Difference?
pH	______					
	______					
	______					
	______	____	____	____	____	________
Specific Conductivity	______					
	______					
	______					
	______	____	____	____	____	________
Total Organic Carbon	______					
	______					
	______					
	______	____	____	____	____	________
Total Organic Halogen	______					
	______					
	______					
	______	____	____	____	____	________

[1]From first year sampling of upgradient well.

and references therein cited:

- *"Standard Methods for the Examination of Water and Wastewater"; 14th Edition, 1975
- "Annual Book of ASTM Standards" especially Parts 31, 41, 42
- Selected NBS publications

Note: *Standard Methods for the Examination of Water and Wastewater"; 15th Edition, 1980, are followed whenever applicable.

Table III-9 contains a listing of the laboratory methods currently utilized for the analysis of groundwater samples from this facility approved alternative procedures may be substituted without modification of this plan.

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TABLE III-9

ANALYTICAL METHODS

Suitability Parameter	Method Reference	Method Number
Arsenic	U. S. EPA	206.3
Barium	U. S. EPA	208.1
Cadmium	U. S. EPA	213.1
Chromium	U. S. EPA	218.1
Fluoride	U. S. EPA	340.1
Lead	U. S. EPA	239.1
Mercury	U. S. EPA	245.4
Nitrate	U. S. EPA	353.3
Selenium	U. S. EPA	270.3
Silver	U. S. EPA	272.1
Endrin	Std. Meth.	509A
Lindane	Std. Meth.	509A
Methoxychlor	Std. Meth.	509A
Toxaphene	Std. Meth.	509A
2,4-D	Std. Meth.	509A
2,4,5-TP Silvex	Std. Meth.	509A
Radium 226	ASTM	D-1943
Gross Alpha	ASTM	D-1890
Gross Beta	ASTM	D-2460
Turbidity	U. S. EPA	180.1
Total Coliform	Std. Meth.	909A
Indicator Parameter		
pH	U. S. EPA	150.1
Specific Conductivity	U. S. EPA	120.1
Total Organic Carbon	U. S. EPA	415.1
Total Organic Halogen	O. I. Corp.	None
Quality Parameter		
Chloride	U. S. EPA	325.3
Iron	U. S. EPA	236.1
Manganese	U. S. EPA	243.1
Phenol	U. S. EPA	420.1
Sodium	U. S. EPA	273.1
Sulfate	U. S. EPA	375.4