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CHAPTER I

SUMMARY

The objective of this task report is to identify the present ground water quality characteristics, to determine the influence of various waste disposal facilities on this quality and to make some general projections on future water use problems in the study area. It was necessary to examine the existing data base as a first step towards this goal. The existing information was supplemented with a field sampling program when the preliminary examination indicated that more data was needed. A total of ~~250~~ 255 collection sites supply data to the report.

The chemical parameters, pH, alkalinity, hardness, sodium, chlorine, sulfate, nitrate, ammonia, fluorine, phosphorus, iron and manganese are presented for each sample. The data is related to its source both geographically and geologically. The geology is divided into five major units; Beach; Outwash; Ice Contact; Till--Ashtabula, Hiram, Kent, Lavery and Bedrock. Every unit has a constituent which exceeds the recommended minimum drinking water standards established by the United States Public Health Service. The only major contaminant that shows any regional trends is NaCl. Brines are quite extensive covering large areas in bedrock. In surficial deposits the concentrations are isolated to point locations. Some of these points are related to the underlying bedrock, some are not.

The overall quality of the ground water appears to be good. The most reliable sources are the beach and outwash units. Water in the beach unit is shallow but easily contaminated. Outwash channels are

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difficult to [illegible] however, large yields and good water quality can be expected. The tills and bedrock give variable yields. Quality problems associated with brines are common in bedrock wells of certain areas.

Disposal systems used in the study area include on-lot sewage systems, impoundments, landfills and sludge disposal sites. The major producer of contaminants from disposal systems is on-lot sewage. Sewage is identified in 14 percent of the contaminated wells and may be partially responsible for the contamination of another 14 percent. Forty-two impoundments are located in the study area. All are unlined which enhances the possibility that localized pollution is occurring. There are 27 landfills, 26 of which are causing ground water pollution. These again are localized conditions which affect the water quality of a restricted area. Spray irrigation and deep disposal wells are not suited to the study area when large volumes of waste are involved. They may be used, however, in cases of limited application where the physical conditions are suitable.

During the 70's and early 80's the principal method of disposing of solid wastes will be by sanitary landfills. This places the pollutional burden of solid waste disposal on the land. The concept by which this pollution burden (leachate) is managed is dependent upon the soils and hydrogeologic conditions of proposed waste disposal sites. There are two concepts for managing the leachate: (1) the natural renovation of leachate by the underlying earth materials; or (2) the collection and treatment of leachate. Each concept has basic soils and hydrogeologic criteria which must be met.

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In the study area the soil and hydrogeologic conditions create many problems for solid waste disposal. Existing sites are causing degradation of the ground water quality. (One site, Jennings Land Reclamation, has established leachate collection and treatment facilities.) To find a new site that is suitable is complicated by several factors: (1) the areas where natural renovation can occur are generally of a small area and not contiguous with each other or there is another demand use for the site; (2) the many streams in the study area are trout streams or contain other game fish as a result the cost to treat leachate and discharge to the streams may be prohibitive; (3) the citizens do not want the landfill in their area.

The majority of the land in the study area is unsuitable for waste disposal. Disposal systems which rely on natural renovation cannot be used in these areas as a result. On-lot sewage systems require extensive soil redesign before installation. When this cannot be accomplished, sewer systems must be used.

Impoundments are required to be impermeable and as such can be used wherever their physical integrity can be assured.

The conclusions reached indicate that the competition for land suitable for waste disposal will increase in the future. This will raise initial costs, however, since natural renovation can be used the costs of collection and treatment will be negated. Systems in areas where natural renovation cannot be used must be isolated from ground water. Greater costs will be incurred in the design and construction phase when collection and treatment systems, liners and sewer lines must be used. The water quality and quantity is sufficient to supply the needs of an expanded population. Problems may arise in local areas where the ground water is contaminated or where high yields cannot be obtained.

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CHAPTER II

INTRODUCTION

GENERAL

This report is designed to supply basic information on the ground water properties of the study area. The information which concerns the largest water resource in the area is used to evaluate potential problems in expanding existing water supply systems, in developing new waste disposal programs and in planning for the predicted population growth potential.

A major portion of the study is the establishment of an acceptable data base. This includes an evaluation of all existing literature and of a supplemental field investigation which was initiated when the existing literature proved to be insufficient. The evaluation of this data base is intended to aid management programs in locating water supply areas, waste disposal systems and potential pollution source areas. It also supplies an analysis of water quality data on a regional and on a geologic unit basis.

Objectives

The main objective for this task is to determine and evaluate the existing ground water quality of the study area. The specific task objectives involved in accomplishing this goal are as follows:

- Collect the data and compile it relative to source, i.e., geologic unit and geographic area.
- Determine the status of ground water quality characteristics in the region.

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- Analyze the various waste disposal facilities and review the extent of their use in the study area.
- Identify potential pollution sources.
- Determine areas which have potential for future development with respect to waste disposal systems.

ACKNOWLEDGMENTS

Mr. John O. Osgood served as task manager for the Pennsylvania Department of Environmental Resources. He directed the field activities, conducted the literature search, developed the text and coordinated the activities of the following contributors. Mr. John A. Moser compiled the water quality data and contributed to the water quality aspects of the study. Mr. Gary L. Merritt assisted in the sections on sanitary landfills and land disposal areas. Mr. Steven F. Curran furnished information on spray irrigation and on impoundments, identifying their location through an aerial survey. Mr. Roger Higbee, Mr. David Lindorff, Mr. Alan Welch and Mr. Robert Young collectively conducted portions of the field investigation. Each of the above mentioned individuals are ~~ground~~ water geologists with the Bureau of Water Quality Management, Pennsylvania Department of Environmental Resources.

Recognition is also given to G. R. Schiner of the United States Geologic Survey for permitting the use of his field notes in Crawford County and Mr. Thomas Merski, Environmental Protection Specialist of the Erie County Health Department who conducted portions of the field work with DER staff. A. R. Geyer, Chief Geologist of the Environmental Division, Pennsylvania Topographic and Geologic Survey.

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contributed information on the geology and mineral resources of the area. F. Glade Loughry, Chief of the Soils Science Unit, Division of Community Environmental Services, Pennsylvania DER supplied the text for the soils section of the task.

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CHAPTER III

TASK CONTEXT

Ground water reserves in the study area are a major consideration in any comprehensive waste and water management program. Any waste treatment system which includes disposal on the earth's surface may adversely affect ground water resources. Any future development of rural and suburban areas which includes non-public water supplies requires a clean, reliable subsurface water source. Any future expansion of existing public water supplies will undoubtedly require a greater reliance on subsurface ground water reserves. A statement of the present and future predictable water quality reserves in the study area is, therefore, needed in order to design an effective management program. This report intends to satisfy that objective.

The ground water investigation of Erie Basin and that portion of Erie County not included in the basin proper includes 22 townships of Erie County and parts of 6 townships of Crawford County (Table V-2). The survey consists of a review of existing ground water information and an independent field investigation which was done to obtain additional water quality data. A total of 150 ground water sampling sites are included. Samples collected during this survey were chemically analyzed for pH, alkalinity, hardness, sodium, chlorine, sulfate, nitrate, ammonia, fluorine, phosphorus, iron and manganese. The data obtained is related to the geological unit from which it came and to its geographical position. Waste disposal systems are examined and their impact and applicability to the study area is

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discussed. Future problem areas are identified so that these considerations can be included in future planning projects.

Water quality is a critical factor in locating ground water supplies, and in evaluating what treatment may be necessary. Selected chemical constituents of water analyzed in this study provide a general overview of the quality of the ground water in the study area. The total synthesis of all the information presented will protect these water resources and provide for the development of a sound waste disposal and water supply program.

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CHAPTER IV

IDENTIFICATION AND EVALUATION OF DATA SOURCES

Previously published data available on the subject of subsurface water in the study area contrasts strongly with that available on surface water. The former is as limited as the latter is profuse. The two major sources of existing literature supply water quality data on only seventeen wells. These include data from ten wells analyzed between 1928 and 1929 (Leggett, 1936) and data from seven wells analyzed in 1951 (Mangan, 1952). Supplementary unpublished data from the Pennsylvania Department of Environmental Resources Ground Water Management Information System (GWAMIS) and from the Erie County Health Department files supply information on fifty one more. This results in a total of ~~124~~ 142 analyses from ~~67~~ 72 wells to cover over 900 square miles of surface area. Since it is obvious that this is quite insufficient, a decision was made to establish a water quality sampling program to close some of the large data gaps that existed. Samples from ~~186~~ 188 wells and springs were collected during October, 1972, by ground water geologists from the Bureau of Water Quality Management, Pennsylvania Department of Environmental Resources.

Data for the impoundment study was obtained from a detailed survey conducted by light aircraft to determine the location of each site. A follow-up field investigation then permitted on site inspection of the facility. These procedures were made necessary, since many unpermitted impoundments were recognized to exist in the study and since no records exist on their locations.

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TABLE V-5 – CHEMICAL ANALYSES DATA

TILL (KENT)

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	Cl
Concord														
154	10-24-72	7.9	25	2.04	17	.18	0.03	0.14	222	26.0	0.74	0.000	–	43
157	10-24-72	7.7	14	.03	20	0.0	0.03	0.00	54	2.6	1.30	0.000	–	2
[illegible]														
32	10- 5-72	7.9	175	.04	24	.04	0.01	0.33	316	37.5	0.84	0.000	136	41
175	10-26-72	8.3	69	.23	33	.14	0.04	0.26	280	8.4	0.40	0.200	–	8
Spring														
102	10-18-72	8.0	214	.57	58	.28	0.07	0.20	374	6.00	0.32	0.000	200	2
Summit(Crawford Co.)														
139	10-19-72	7.9	128	.03	52	0.0	0.01	0.12	168	3.60	0.84	0.000	162	2
Sumpo														
41	10- 6-72	7.9	128	.28	44	.07	0.03	0.17	244	4.6	0.24	0.000	164	2
47	10- 6-72	8.1	160	.03	34	.05	0.03	0.18	252	8.2	0.24	0.000	166	2
Whiteton														
2	10-12-72	6.5	58	1.51	57	.01	0.25	0.00	844	19.50	0.32	0.000	116	35
9	10-26-72	8.4	138	.06	28	0.0	0.04	1.10	354	140.0	1.04	0.000	–	216
170	10-26-72	8.3	80	.12	0	.01	0.04	0.42	472	146.0	0.34	0.100	–	384
181	10-26-72	7.8	70	.04	24	.04	0.05	0.27	172	22.0	0.58	0.000	–	1
182	10-26-72	7.8	78	19.25	11	1.75	0.27	0.28	786	14.2	0.46	0.000	–	1
183	10-26-72	8.1	73	.14	18	.03	0.04	0.46	216	37.0	0.62	0.000	–	13
184	10-26-72	8.0	92	.38	21	.07	0.04	0.30	198	12.0	0.50	0.000	–	4
Waterford														
171	10-26-72	8.3	58	.11	32	.01	0.04	0.21	272	3.2	0.44	0.100	–	15
172	10-26-72	8.2	66	.11	32	.02	0.05	0.10	208	2.4	0.26	0.100	–	7
173	10-26-72	8.3	87	.20	19	.08	0.02	0.25	148	7.4	0.40	0.000	–	2
Zue														
151	10-24-72	8.2	46	.10	36	.01	0.03	0.00	192	13.4	1.02	0.000	–	17

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TABLE V-5 – CHEMICAL ANALYSES DATA

TILL (HIRAM)

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HO	Cl
[illegible] (Erie Co.)														
R 1	5- 1-70	7.3	228	3.9	50	.00	–	–	248	–	.8	.09	174	7.0
[illegible]	9-18-67	7.7	147	.3	–	.3	–	–	222	–	.6	.02	180	10.0
[illegible]	2-17-72	6.7	123	.8	–	–	–	–	–	–	.3	–	16	86.9
[illegible] Creek														
169	11- 9-72	8.2	82	.36	31	.07	0.04	0.14	250	6.4	0.36	0.000	–	7
190	11- 9-72	8.1	73	.09	20	.06	0.03	0.24	254	12.5	0.84	0.000	–	6
[illegible]nklin														
186	11- 9-72	8.1	83	.08	35	.03	0.03	0.14	200	2.0	0.38	0.200	–	12
[illegible]ng														
P 1 & 2 & 3	12- 7-70	7.6	205	.4	–	–	–	–	–	–	2.8	–	320	94
P 3	2- 1-72	6.8	111	.0	–	–	–	–	–	–	1.0	–	214	88
P 5	–	7.5	145	–	–	–	–	–	–	–	1.0	–	330	270
P 8	6-17-65	–	–	1.0	–	–	–	–	–	–	–	–	300	17
P 8	8- 4-65	–	–	0.4	–	–	–	–	–	–	0.4	–	304	18
P	10-11-65	7.5	–	0.3	–	–	–	–	–	–	–	–	320	19
[illegible]	5-22-66	7.6	185	0.3	–	0.2	–	–	–	–	–	–	360	25
[illegible]	3- 2-67	6.8	189	0.6	–	0.1	–	–	–	–	–	–	234	55
P 8	3-20-70	7.5	–	0.6	–	–	–	–	–	–	0.2	–	–	50
Q 1	8- 7-61	–	85	0.1	–	–	–	–	–	–	2.8	–	190	–
Q 1	7-13-66	7.1	–	1.0	58.0	–	–	–	–	–	1.1	–	215	39
Q 2	8- 7-61	7.0	87	0.2	–	–	–	–	–	–	2.8	–	190	38
Q 2	2- 3-64	6.8	–	–	–	–	–	–	–	–	5.0	–	185	39
Q 3	8- 7-61	7.0	85	–	–	–	–	–	–	–	0.9	–	190	39
Q 3	2- 3-64	6.8	–	–	–	–	–	–	–	–	5.0	–	185	39

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TABLE V-5 - CHEMICAL ANALYSES DATA

TILL (ASHTABULA)

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HB	Cl
Creek														
7	10- 3-72	07.7	183	.12	42	.02	0.17	0.33	284	57.5	.60	0.000	164	46
1	12- 4-70	7.7	179	2.0	-	-	-	-	-	-	0.3	-	204	8.0
	3-10-72	7.6	177	0.8	-	-	-	-	-	-	0.2	-	224	10.0
East														
19	10- 4-72	07.9	192	.13	94	.07	0.04	0.12	960	197	0.15	0.000	302	328
20	10- 4-72	08.8	174	.16	106	.10	0.06	0.14	436	9.2	0.20	0.000	278	25
City														
5	10- 3-72	07.4	124	61.50	26	7.40	1.05	0.17	2768	4.3	1.32	0.100	134	5
07	5-25-51	8.0	227	.11	30	-	-	.1	247	5.4	.5	-	214	4
CREEK														
1	4- 4-55	7.8	170	0.3	-	-	-	0.1	-	-	-	-	190	7.0
1	4-13-59	7.6	170	0.8	-	-	-	-	-	-	-	-	195	9.0
1	6-10-65	7.6	-	0.6	-	-	-	-	-	-	-	-	200	11
	10-19-65	7.7	-	0.4	-	-	-	-	-	-	-	-	200	17
	10-28-65	7.7	-	0.6	-	-	-	-	-	-	0.1	-	220	11
	5-19-66	7.4	-	0.6	-	-	-	-	-	-	0.1	-	210	13

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TABLE V-5 - CHEMICAL ANALYSES DATA

TILL (ASHTABULA)

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	Cl
[illegible]														
N 1	1-30-68	7.7	167	0.34	38	0.11	-	-	-	-	-	-	224	7.0
N 1	4-17-68	7.6	165	0.28	78	0.09	0.01	-	-	-	-	-	222	7.0
[illegible]	3-10-72	7.5	165	0.6	-	-	-	-	-	-	0.2	-	248	11.0
[illegible]														
O 1	3-20-70	7.2	-	7.2	-	0.00	-	-	508	-	1.9	-	-	-
O 1	4-30-70	7.1	207	32.8	0.76	0.8	-	-	444	-	0.4	0.182	280	34
O 2	3-20-70	6.8	-	23.4	-	0.88	-	-	576	-	0.3	-	-	-
O 2	12- 4-70	7.1	168	20	-	-	-	-	-	-	0.1	-	254	40
O 2		6.6	229	25.8	-	-	-	-	-	-	0.1	-	280	48
M 1	7- 6-60	7.8	97	0.2	-	-	-	-	-	-	7	-	108	9.0
M 1	8-18-60	7.5	100	-	-	-	-	-	-	-	.3	-	-	10.0
M 3	8-18-60	7.5	100	-	-	-	-	-	245	-	.3	-	-	10.0
M 3	6-24-63	7.8	142	.45	11.0	-	-	-	-	-	-	-	161	15.4
M 3	8-29-63	7.8	125	.2	-	-	-	-	-	-	.4	-	190	12.0
M 4	7- 6-60	7.8	97	.2	-	-	-	-	190	-	.7.0	-	180	9.0
M 4	8-29-63	7.8	125	.2	-	-	-	-	220	-	0.4	0.144	190	12.0
*15	28	8.0	165	0.5	-	-	-	-	230	-	0.1	-	140	23
[illegible]	28	8.0	110	0.5	-	-	-	-	180	-	1.5	-	160	3
[illegible]														
K 1	3-7-58	7.9	150	0.2	-	-	0.2	-	-	-	0.2	-	255	12.0
K 1	12-12-68	7.6	212	-	-	-	-	.1	344	-	0.4	.032	258	16.0
K 2	11- 4-64	7.3	200	0	-	0	-	-	345	-	1.0	.002	144	17.0
K 3	9-23-68	7.5	244	.01	49	.02	-	-	-	-	-	-	-	18.0
K 3	12-12-68	-	212	-	-	-	0.06	0.1	-	-	0.4	0.1	258	16.0
K 4	3- 7-58	7.6	160	0.3	-	-	-	-	-	-	0.4	-	230	18.0
K 5	3- 7-58	7.6	200	10.0	-	-	-	-	-	-	-	-	285	11.0
K	5- 4-70	7.6	168	2.9	113	-	-	-	396	-	0.1	.012	262	20.0

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TABLE V-5 - CHEMICAL ANALYSES DATA

TILL (LAVERY)

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	Cl
[illegible]ne														
30	10- 5-72	7.4	78	.27	39	.03	0.05	0.25	184	5.0	0.26	0.000	118	3
[illegible]														
[illegible]	10-12-72	7.2	242	1.36	11	.03	0.11	0.81	368	107.50	0.36	0.300	60	45
[illegible]mit(Erie Co.)														
24	10- 5-72	7.3	198	4.90	72	.75	0.10	0.00	379	71.0	0.66	0.300	284	138
29	10- 5-72	8.0	194	.18	9	.03	0.04	0.30	244	32.0	0.22	0.200	160	11

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TABLE V-5 - CHEMICAL ANALYSES DATA

OUTWASH

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	F	F_2	TS	Na	NO_3	NH_3	HD	Cl
[illegible] (Crawford Co.)														
28	10- 5-72	7.7	104	124.00	57	2.55	1.11	0.17	4120	18.0	0.74	0.000	164	30
[illegible]	10-19-72	7.9	132	.32	39	.06	0.01	0.25	224	5.00	0.42	0.000	126	9
[illegible]	10-19-72	7.8	100	.54	44	.14	0.06	0.24	208	2.50	0.40	0.000	116	9
[illegible]	10-19-72	7.9	142	.14	46	.22	0.01	0.17	164	3.90	0.32	0.000	146	1
[illegible]														
42	10- 6-72	7.9	166	.02	32	.04	0.01	0.12	260	3.1	2.86	0.000	200	4
44	10- 6-72	7.6	180	.05	39	.02	0.01	0.12	330	24.3	5.28	0.000	242	33
45	10- 6-72	8.1	122	0.0	38	.02	0.02	0.11	326	3.0	4.18	0.000	168	7
C	6-23-71	8.3	147	.05	16	.03	<.1	.12	236	–	.08	.001	165	10
[illegible]														
*27	7- 3-47	8.0	95	.2	–	–	–	–	185	–	.4	.02	86	6
*28	7- 3-47	8.0	85	.1	–	–	–	–	105	–	.15	.016	80	5
*29	9- 7-45	7.5	105	.1	–	–	–	–	165	–	.4	.01	180	4
*30	10-10-67	8.4	12.4	.0	–	–	–	–	160	–	.2	–	140	4
ASHTABULA														
T_1	4-11-66	7.6	–	–	–	–	–	–	–	–	.7	–	170	10
T_2	4-11-66	7.8	–	–	–	–	–	–	–	–	.4	–	165	10
T_3	4-11-66	7.6	–	–	–	–	–	–	–	–	.7	–	170	10
T_4	4-11-66	7.8	–	.0	–	–	–	–	–	–	.4	–	165	10
[illegible]														
Water Board														
[illegible]	4-19-63	8.1	144	.6	–	–	–	.2	–	–	–	–	–	16
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	–	–	–	–					

AR101837

TABLE V-5 – CHEMICAL ANALYSES DATA

OUTWASH

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	Cl
[illegible]														
174	10-26-72	8.1	81	1.44	8	.05	0.07	0.38	218	31.9	3.52	0.000	–	[illegible]
[illegible]														
A 1	12-17-46	7.5	170	.3	–	–	–	–	–	–	–	–	224	7.0
[illegible]	6-17-57	5.7	210	.4	–	–	–	–	–	–	–	–	345	[illegible]
[illegible]	8- 6-62	7.6	–	[illegible]	–	–	–	–	–	–	–	–	–	[illegible]
A 2	11- 7-45	7.2	185	.6	–	0.1	–	–	–	–	–	–	280	6.0
B 2	12-17-46	7.2	190	.4	–	–	–	–	–	–	–	–	260	8.0
B 2	8-10-64	7.7	–	1.0	–	–	–	–	–	–	–	–	258	24.0
*3	3- 2-27	7.4	300	0.5	–	–	–	–	650	–	0.2	–	210	30
*3	9-27-27	7.4	290	0.6	–	–	–	–	680	–	0.3	–	330	37
[illegible]														
[illegible]	~~10- 5-72~~	~~7.9~~	~~112~~	~~.46~~	~~24~~	~~.06~~	~~0.02~~	~~0.21~~	~~224~~	~~08.7~~	~~0.24~~	~~0.000~~	~~146~~	~~1~~
130	10-26-72	7.7	78	.33	24	.04	0.03	0.14	164	12.4	0.44	0.000	–	14
[illegible]														
95	10-13-72	7.9	172	.01	60	.01	0.01	0.00	400	9.21	5.72	0.000	250	49
[illegible]														
	10- 3-72	7.7	132	.15	09	.06	11.97	0.21	342	34.5	0.50	0.000	150	22
54	10-10-72	6.8	324	36.65	20	2.36	0.22	0.15	1156	49.00	0.74	0.000	340	122
73	10-12-72	7.4	84	.36	51	.02	0.01	0.00	1612	4.50	1.66	0.000	120	7
[illegible]														
125	10-20-72	8.0	208	.33	32	0.0	0.01	0.24	236	15.20	0.58	0.000	160	7
A	-46	7.4	200	.3	–	.1	–	–	–	–	–	–	240	5.0
[illegible]														
118	10-20-72	8.0	142	.57	10	0.0	0.01	0.20	214	75.00	0.50	0.000	128	3
119	10-20-72	8.1	162	.26	27	.10	0.01	0.29	218	7.60	0.32	0.000	204	14

AR101838

TABLE V-5 – CHEMICAL ANALYSES DATA

ICE CONTACT

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	Cl
[illegible]														
149	10-24-72	8.2	49	.49	22	.20	0.04	0.20	196	15.0	0.26	0.100	–	47
[illegible]														
[illegible]	5-26-29	7.6	97	0.1	–	–	–	–	190	–	0.4	–	110	8.0
[illegible]														
62	10-11-72	8.0	136	.05	66	0.0	0.01	0.11	246	16.00	3.96	0.000	206	17
[illegible]														
13	10- 5-72	7.6	206	.61	40	.01	0.02	0.22	284	56.0	1.42	0.000	160	13
14	10- 5-72	7.9	209	.30	45	.03	0.02	0.16	440	56	2.64	0.000	224	98
15	10- 5-72	8.1	124	.07	46	.04	0.01	0.19	168	6.4	0.26	0.000	138	3
177	10-26-72	8.1	119	1.04	9	.03	0.04	0.34	240	37.5	0.64	0.100	–	3
[illegible]														
135	10-19-72	7.8	144	.15	8	0.0	0.02	0.34	346	122.50	0.28	0.000	88	75
[illegible]														
97	10-13-72	7.7	154	.42	80	.02	0.04	0.14	272	8.20	0.36	0.000	172	13
141	10-24-72	7.9	150	.16	30	0.0	0.03	0.21	506	34.50	1.42	0.000	168	73
146	10-24-72	8.1	212	.13	44	0.0	0.03	0.15	438	81.20	2.86	0.000	212	71
[illegible]														
37	10- 5-72	8.1	108	.27	–	.04	0.03	0.17	238	0.7	0.22	0.000	146	2
38	10- -72	7.9	142	.33	35	.05	0.08	0.17	300	69.0	0.66	0.000	170	40
45	10- 6-72	8.0	146	.02	37	.10	0.01	0.17	232	4.8	0.24	0.000	164	.2
46	10- 6-72	8.0	118	.46	30	.06	0.04	0.14	264	4.0	0.30	0.000	230	3
[illegible]														
150	10-24-72	8.4	70	1.08	36	.02	0.04	0.00	274	16.2	1.44	0.000	–	41

AR101839

TABLE V-5 – CHEMICAL ANALYSES DATA

BEDROCK (RICEVILLE)

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	GL
Beaver														
122	10-20-72	8.1	200	.09	72	0.0	.00	0.39	220	21.80	0.64	0.000	160	11
126	10-20-72	7.9	226	.3[illegible]	24	.06	0.00	0.23	280	8.60	0.38	0.000	216	3
127	10-20-72	7.9	194	.09	72	.13	0.05	0.23	264	8.00	0.30	0.000	186	2
[illegible]														
[illegible]	10-24-72	8.3	63	.12	5	.13	0.03	0.21	120	7.2	0.34	0.000	–	1
155	10-24-72	8.5	136	.03	8	.03	0.01	1.10	394	124.0	0.36	0.000	–	11
Elk Creek														
81	10-12-72	7.8	164	.08	26	.01	0.01	0.21	202	77.00	0.32	0.000	0	2
[illegible]														
143	10-19-72	7.8	166	.72	48	.05	0.01	0.42	426	88.75	0.30	0.100	134	76
[illegible]														
85	10-12-72	7.9	166	2.45	42	.04	0.05	0.20	248	9.30	0.56	0.000	154	9

AR101840

TABLE V-5 - CHEMICAL ANALYSES DATA

BEDROCK (POCONO)

Well number	Date Collected	pH	Alk.	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	Cl
[illegible]														
156	10-24-72*	7.9	79	.32	12	.01	0.08	0.17	76	6.8	1.12	0.000	-	2
153	10-24-72	8.4	82	1.43	7	.03	0.04	0.04	232	44.0	0.62	0.000	-	1
[illegible] (Crawford Co.)														
[illegible]	10-20-72	7.9	256	.14	52	0.0	0.15	0.19	360	11.20	0.46	0.000	184	4
[illegible]	10-20-72	8.0	166	1.11	22	.05	0.02	0.22	246	4.80	0.32	0.000	136	1
[illegible]														
[illegible]	10-20-72	7.6	204	.26	43	.03	0.04	0.21	272	14.00	1.40	0.000	186	1
[illegible]	10-19-72	7.7	220	.10	47	.03	0.02	0.20	262	8.70	0.32	0.000	200	0
[illegible] (Crawford Co.)														
[illegible]	10-19-72	7.6	176	.04	40	0.0	0.05	0.46	236	76.00	0.74	0.000	150	7
[illegible]	10-19-72	7.7	168	.12	17	0.0	0.03	0.33	216	22.50	0.82	0.000	142	0
[illegible]	10-19-72	7.7	142	.14	46	.02	0.01	0.22	240	12.00	0.42	0.000	184	38
[illegible]	10-19-72	7.8	116	0.0	52	0.0	0.01	0.14	178	3.90	1.44	0.000	148	7
[illegible]	10-19-72	7.4	120	0.0	52	.03	0.03	0.27	276	8.40	0.38	0.000	184	25
140	10-19-72	7.1	66	4.50	32	0.0	0.14	0.30	100	7.30	0.32	0.100	64	0
[illegible]														
84	10-12-72	8.1	188	.49	22	.01	0.01	0.20	270	7.30	0.42	0.100	158	3

AR101841

TABLE V-5 - CHEMICAL ANALYSES DATA

BEDROCK (CONNEAUT)

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	Cl
[illegible]														
52	10-10-72	7.8	216	.29	55	.16	0.04	0.22	302	8.20	0.26	0.000	248	13
53	10-10-72	7.7	224	.57	31	.04	0.07	0.25	268	5.50	0.26	0.000	202	4
	10-10-72	7.4	260	.25	85	.17	0.03	0.17	880	27.50	0.88	0.000	388	209
55	10-10-72	7.6	210	1.13	44	.04	0.03	0.25	388	63.00	1.10	-	168	64
74	10-12-72	7.9	144	.55	56	.03	0.01	0.22	266	8.30	0.32	0.000	174	4
75	10-12-72	7.8	200	.43	7	.03	0.21	0.49	370	72.50	1.42	0.000	144	75
[illegible] East														
04	5-24-51	7.3	104	.56	80	-	-	.2	241	14	.3	-	177	18
[illegible]field														
165	10-25-72	8.5	86	.11	0	.01	0.04	0.52	478	150	0.86	0.000	-	97
166	10-25-72	8.4	23	.02	65	.02	0.03	0.10	336	6.2	25.92	0.000	-	22
[illegible] (Erie Co.)														
25	10- 5-72	7.9	338	.08	46	.06	0.01	0.12	348	27.5	0.20	0.100	220	77
26	10- 5-72	8.0	114	.07	33	.94	0.03	0.40	270	57.0	0.20	0.100	110	45
27	10- 5-72	8.2	166	.03	20	.02	0.01	0.69	290	81.0	0.28	0.100	80	34
[illegible]	10-10-72	7.5	156	.05	87	0.0	0.05	0.15	370	30.25	3.52	0.000	260	48
50	10-10-72	7.2	194	.13	87	.03	0.07	0.20	608	68.40	3.52	0.000	358	188
51	10-10-72	7.8	192	.13	21	0.0	0.03	0.50	918	337.50	1.18	0.000	76	308
88	10-13-72	7.9	124	.23	35	.05	0.02	0.16	194	17.20	0.36	0.000	118	8
89	10-13-72	7.8	214	5.70	30	.30	0.01	0.14	464	12.20	0.22	0.200	278	108
190	10-13-72	8.0	154	5.90	58	0.0	0.07	0.31	326	49.00	0.54	0.000	100	24
[illegible]														
48	10- 6-72	7.4	78	575.00	34	25.00	5.82	0.14	476.60	5.2	0.52	0.200	78	4
[illegible]ford														
91	10-13-72	8.0	198	.17	9	.03	0.01	0.32	222	37.00	0.22	0.300	144	[illegible]
92	10-13-72	8.0	104	.01	74	0.0	0.0[illegible]	0.00	370	4.30	5.94	0.000	214	12

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TABLE V-5 - CHEMICAL ANALYSES DATA

BEDROCK (CONNEAUT)

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	Cl
Beaver														
111	10-19-72	7.7	202	.24	8	.01	0.01	0.70	316	170.00	3.52	0.000	76	154
Conneaut (Erie Co.)														
[illegible]	10-25-72	8.5	125	1.33	71	.04	0.05	0.39	556	156	1.58	0.000	–	473
163	10-25-72	8.3	121	5.20	123	0.0	0.04	0.30	1094	304	12.10	0.000	–	616
164	10-25-72	8.5	118	3.40	116	.20	0.04	0.30	546	140	0.24	0.000	–	498
167	10-25-72	7.8	21	.56	43	.02	0.06	0.00	168	14.2	1.72	0.100	–	8
168	10-25-72	7.8	112	.37	30	.01	0.07	0.00	176	3.2	15.84	0.000	–	2
* 8	9-27-28	–	406	0.42	3.2	–	–	–	542	160	0.33	–	137	115
* 9	7-22-29	–	404	0.42	3.9	–	–	–	1488	Na,k 596	1.4	–	49	716
*10	7-22-29	–	339	0.42	2.0	–	–	–	548	Na,k 220	0.39	–	34	164
Girard														
72	10-11-72	8.0	100	.35	68	0.0	0.01	0.00	320	54.75	1.12	0.000	154	17
188	11-09-72	8.2	80	5.3	37	.15	0.25	0.14	356	4.6	1.88	0.000	–	19
Greene														
31	10- 5-72	8.0	224	2.00	280	.01	0.03	0.21	624	09.5	0.20	0.000	350	6
40	10- 6-72	7.5	64	.03	37	.02	0.02	0.12	222	14.0	1.02	0.000	136	46
8	10-26-72	8.4	76	.11	47	.02	0.03	0.18	452	30.4	1.10	0.100	–	41
179	10-26-72	7.9	64	.22	16	.06	0.03	0.39	238	31.2	0.48	0.000	–	20
Harbor Creek														
03	5-24-51	7.4	144	.02	17	–	–	.3	491	132	.2	–	129	206
LeBoeuf														
94	10-13-72	7.5	378	.02	41	0.0	0.01	0.00	362	3.40	5.50	0.000	296	30

TABLE V-5 – CHEMICAL ANALYSES DATA

BEDROCK (CATTARAUGUS)

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	CL
Number [illegible]														
142	10-19-72	3.0	316	.10	5	.04	0.02	1.80	1598	626.25	0.30	0.000	62	93
[illegible]														
[illegible]	[illegible]-13-72	8.1	112	.34	27	.02	0.03	0.00	154	6.40	0.30	0.000	108	1
94	10-13-72	8.2	210	.06	29	0.0	0.02	0.36	278	70.25	0.26	0.200	44	3
147	10-24-72	8.2	86	.39	5	.31	0.03	0.46	222	11.8	0.26	0.000	–	1
159	10-24-72	8.3	59	1.42	43	.01	0.08	0.19	222	4.8	0.30	0.000	–	2
Washington														
77	10-12-72	7.8	104	.08	36	–	0.01	0.13	122	4.40	0.84	0.000	126	[illegible]
78	10-12-72	8.0	114	.50	39	.02	0.01	0.15	194	17.00	0.24	0.100	124	18
79	10-12-72	8.0	166	.10	58	–	0.04	0.12	330	9.10	0.40	0.000	220	40
84	10-12-72	8.2	300	.06	15	.02	0.01	0.75	566	197.50	0.56	0.100	28	98
86	10-12-72	7.8	132	.21	34	.06	0.00	0.17	210	10.00	0.40	0.000	140	10
Hartford														
90	10-13-72	7.9	138	.21	24	.04	0.01	0.28	240	13.25	0.46	0.000	152	12
93	10-13-72	7.2	272	.30	95	.12	0.01	0.14	456	14.25	5.28	0.000	270	50
[illegible]														
148	10-24-72	8.4	76	1.53	2	.02	0.06	0.28	368	100	0.32	0.000	–	92
152	10-24-72	8.4	72	.04	28	0.	0.05	0.00	234	9.4	1.86	0.000	–	24

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TABLE V-5 - CHEMICAL ANALYSES DATA

BEDROCK (CATTARAUGUS)

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	Cl
[illegible]														
[illegible]	10-19-72	7.9	266	.35	11	.01	0.01	0.33	352	73.00	0.42	0.300	112	15
123	10-19-72	7.8	294	.28	99	.01	0.01	0.22	378	24.00	0.80	0.000	218	12
[illegible]	10-19-72	7.9	308	.19	34	0.0	0.01	0.52	462	70	0.34	0.200	118	59
[illegible]	10-19-72	7.7	274	.39	29	.03	0.02	0.50	374	105.00	0.84	0.000	92	2
123	10-20-72	8.0	196	1.93	21	.01	0.01	0.26	284	30	0.36	0.100	156	15
[illegible] (Crawford Co.)														
121	10-20-72	8.0	244	.32	25	0.0	0.01	0.45	244	50	0.70	0.000	130	1
[illegible] Creek														
83	10-12-72	7.9	230	.12	50	.03	0.01	0.34	390	63.00	0.72	0.000	144	7
[illegible]														
185	11-09-72	7.6	73	.08	30	.07	0.04	0.17	306	19.0	3.30	0.000	–	30
187	11-09-72	8.0	65	.48	23	.39	0.03	0.17	474	7.2	0.46	0.000	–	118
[illegible]														
176	10-26-72	8.1	118	.13	23	.06	0.04	0.39	168	40.5	0.58	0.100	–	7
[illegible]														
96	10-13-72	8.1	130	.26	28	.04	0.01	0.00	214	15.20	0.50	0.000	124	6
[illegible]														
[illegible]	10-18-72	8.2	228	1.90	51	0.0	0.02	0.95	312	115	0.76	0.000	30	2
103	10-18-72	8.0	172	.18	51	0.0	0.01	0.95	188	12.60	0.32	0.000	128	.3
104	10-18-72	7.9	137	.21	42	0.0	0.01	0.25	308	58.75	0.58	0.000	130	29
105	10-18-72	8.4	330	.04	11	0.0	0.07	1.40	452	170	0.86	0.000	16	7
[illegible]	10-19-72	7.7	146	.35	47	.70	0.01	0.20	276	10.40	0.38	0.000	160	2
187	10-19-72	7.9	190	.95	32	0.0	0.03	0.50	292	86.25	0.96	0.000	72	25
194	10-19-72	7.8	278	1.40	8	0.0	0.01	0.31	352	54	0.34	0.200	134	[illegible]
201	10-19-72	7.9	222	.50	24	0.0	0.01	0.35	226	42.50	0.64	0.100	110	[illegible]
[illegible]	10-19-72	7.7	194	.42	0	0.0	0.25	0.23	212	24	1.08	0.000	156	1

TABLE V-5 - CHEMICAL ANALYSES DATA

BEDROCK (CANADAWAY)

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	CL
[illegible] Creek														
4	10- 3-72	6.9	[illegible]	.02	88	.03	0.24	0.12	394	70.0	14.08	0.000	280	[illegible]
12	10- 4-72	8.0	132	–	114	.01	0.01	0.12	322	3.3	0.76	0.000	226	4
[illegible]	10- 6-72	7.4	94	.23	54	.02	–	0.16	234	10.6	2.64	0.000	160	21
[illegible]	9-27-28	–	48	0.34	43	–	–	–	137	4.4	5.0	–	96	10.0
[illegible] Creek														
2	10- 3-72	7.7	354	.14	480	2.90	0.04	0.20	1304	11.5	2.20	0.000	382	31
[illegible] Creek														
87	10-12-72	7.0	170	3.10	89	.30	0.01	0.49	552	103.75	0.24	0.300	136	16
[illegible] Lake														
13	10- 4-72	7.7	116	.06	121	.02	0.10	0.12	406	4.4	0.20	0.000	234	8
22	10- 4-72	7.0	22	.05	69	.02	–	0.10	178	07.8	6.38	0.000	100	9
[illegible] Cr.														
1	10- 3-72	7.7	174	8.75	51	.75	0.23	0.20	606	3.3	0.39	0.000	188	3
9	10- 4-72	7.9	188	10.25	290	.65	0.02	0.23	452	18.5	0.40	0.100	346	34

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TABLE V-5 - CHEMICAL ANALYSES DATA

BENCH

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	Cl
MILLCREEK														
[illegible]	5- 1-70	7.6	193	1.1	116	.00	–	.9	684	–	1.3	.01	340	[illegible]
[illegible]	2- 1-72	7.3	215	.0	–	–	–	–	–	–	.7	–	326	[illegible]
[illegible] 2	2- 1-72	6.7	112	.1	–	–	–	–	–	–	1.5	–	226	[illegible]
[illegible] 1 & 2 & 3	12- 1-70	7.6	205	.4	–	–	–	–	–	–	2.8	–	320	[illegible]
[illegible]	2- 1-72	6.8	111	.0	–	–	–	–	–	–	1.0	–	[illegible]	[illegible]
[illegible] 4	1-27-70	7.2	173	.65	65	–	–	–	–	–	–	–	280	[illegible]
[illegible] 4	2- 4-70	7.7	171	.37	110	.12	–	–	–	–	–	–	270	[illegible]
[illegible] 4	3-20-70	7.2	–	7.2	–	–	–	–	–	–	1.9	–	–	–
[illegible] 4	3-20-70	7.6	–	0.8	–	–	–	–	–	–	.1	–	–	–
[illegible] 5	–	7.5	145	–	–	–	–	–	–	–	1.0	–	330	[illegible]
[illegible] 5	5-26-65	–	–	–	–	–	–	–	–	–	.4	–	164	[illegible]
[illegible] 6	6-17-65	7.2	–	–	–	–	–	–	–	–	.4	–	164	[illegible]
[illegible] 7	6-22-65	7.7	–	1.2	–	–	–	–	–	–	–	–	250	[illegible]
[illegible] 7	8- 4-65	7.7	–	0.4	–	–	–	–	–	–	.2	–	256	23
[illegible] 7	10-11-65	7.7	–	–	–	–	–	–	–	–	–	–	265	27
[illegible] 7	5- 2-66	7.6	180	0.4	110	–	–	–	–	–	–	–	310	41
[illegible] 7	3- 2-67	6.9	185	0.8	–	0.05	–	–	–	–	–	–	312	23
[illegible] 7	3-20-70	7.2	–	0.6	–	–	–	0.6	–	–	.1	–	–	64
[illegible] 8	6-17-65	–	–	1.0	–	–	–	–	–	–	–	–	300	17
[illegible] 8	8- 4-65	–	–	0.4	–	–	–	–	–	–	0.4	–	304	18
[illegible] 8	10-11-65	7.5	–	0.3	–	–	–	–	–	–	–	–	320	19
[illegible] 8	5-22-66	7.6	185	0.3	–	0.2	–	–	–	–	–	–	360	25
[illegible] 8	3- 2-67	6.8	189	0.6	–	0.1	–	–	–	–	–	–	284	55
[illegible] 8	3-20-70	7.5	–	0.6	–	–	–	–	–	–	0.2	–	–	50

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TABLE V-5 - CHEMICAL ANALYSES DATA

BEACH

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	Cl
[illegible]														
[illegible]	10- 3-72	7.4	96	.08	83	.01	0.03	0.14	446	100.0	3.30	0.000	146	148
[illegible]	10- 4-72	07.8	[illegible]	.36	58	.05	0.04	0.12	276	96.3	0.42	0.400	140	98
[illegible]	10- 4-72	07.5	96	.16	121	.03	0.28	0.18	472	02.4	4.18	0.100	260	04
[illegible]	10- 4-72	06.6	40	[illegible]	85	.02	0.04	0.00	648	87.5	5.72	0.000	208	189
[illegible]	9-16-71	7.1	6[illegible]	[illegible]	-	4.0	-	-	198	-	-	-	-	-
06	5-24-51	8.0	386	.06	46	-	-	.2	587	159	.2	-	185	110
[illegible]														
57	10-11-72	7.3	104	.21	45	.10	0.02	0.10	400	46.25	4.40	0.000	194	53
[illegible]														
[illegible]	10- 4-72	08.0	142	.06	16	.01	0.04	0.25	208	40.5	0.20	0.300	96	17
[illegible]	10- 4-72	07.1	222	.39	120	.06	0.01	0.16	504	05.8	0.20	0.000	334	25
[illegible]	10- 4-72	08.2	242	.28	110	.03	0.04	0.19	488	18.0	0.54	0.000	306	31
[illegible]	10- 4-72	08.0	210	.20	101	.03	0.04	0.17	448	07.3	0.24	0.000	256	25
[illegible]	10- 4-72	08.1	144	.17	82	.09	0.01	0.16	414	13.0	1.08	0.000	228	44
21	10- 4-72	07.2	030	.05	50	.01	0.04	0.13	144	07.1	2.64	0.000	98	07
05	5-24-51	8.0	182	.17	67	-	-	.1	268	4.2	.2	-	219	7
*1010	9-28-28	-	112	0.02	17	-	-	-	139	0.9	4.1	-	112	1.6
[illegible]														
65	10-11-72	7.4	108	.14	64	0.0	0.01	0.12	238	3.90	7.48	0.000	176	18
66	10-11-72	07.7	152	.37	103	.01	0.01	0.10	444	60.50	1.74	0.000	256	77
67	10-11-72	07.0	398	27.50	63	.48	0.11	0.14	560	19.75	<0.32	0.200	398	43
68	10-11-72	07.0	52	.08	93	.76	0.01	0.00	320	30.00	8.80	0.000	150	13
69	10-11-72	07.3	30	.30	49	.01	0.03	0.00	254	4.75	0.62	0.000	92	.05
70	10-11-72	07.2	68	.33	57	0.0	0.01	0.00	348	9.40	5.94	0.000	128	15
E	10- 5-69	6.9	88	1.24	55	0.24	-	0.1	-	-	0.1	.005	138	9.0
[illegible] City														
01	5-23-51	8.0	217	.49	37	-	-	.2	259	11	.5	-	210	[illegible]

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POWAMP

TABLE V-5 - CHEMICAL ANALYSES DATA

BEACH

Well Number	Date Collected	pH	Alk	Fe	SO_4	Mn	P	F_2	TS	Na	NO_3	NH_3	HD	Cl
Fairview														
58	10-11-72	7.8	128	.09	69	0.0	0.02	0.11	296	5.90	2.64	0.000	198	17
59	10-11-72	07.7	90	.09	69	0.0	0.05	0.10	216	11.63	7.04	0.209	160	[illegible]
60	10-11-72	7.2	36	.18	[illegible]	0.0	0.02	0.00	264	3.25	0.46	0.000	72	[illegible]
61	10-11-72	7.7	230	.18	115	.01	0.07	0.16	2760	675.00	3.08	0.000	318	[illegible]
[illegible]	2- 7-69	6.9	137	10	-	2.75	-	-	928	-	-	.102	660	[illegible]
[illegible] 1	3-20-70	6.6	-	19	-	0.6	-	-	1088	-	1.0	-	-	-
[illegible] 1	4-30-70	6.6	113	50	420	1.68	-	0.2	972	-	.8	.19	524	77
[illegible] & 2	--	6.8	167	18.0	-	-	-	-	-	-	0.1	-	532	[illegible]
[illegible] 2	3-20-70	6.6	-	9.2	-	1.75	-	-	1068	-	0.4	-	-	-
[illegible]	1-24-69	6.7	70	16.0	-	-	-	-	-	-	-	-	-	-
[illegible] 3	--	7.0	185	0.7	-	-	-	-	-	-	0.9	-	336	81
[illegible] 1	3-20-70	7.2	-	1.9	-	0.1	-	-	472	-	0.1	-	-	-
[illegible] 1	12- 4-70	6.4	76	43.2	-	-	-	-	-	-	0.5	-	500	[illegible]
[illegible] 1	11-20-61	7.3	135	0.4	-	0.1	-	-	330	-	0.1	-	225	37
[illegible] 1	10-19-62	7.0	-	0.4	-	-	-	-	-	-	0.1	-	-	100
[illegible] 1	12-26-63	6.9	-	0.4	-	-	-	-	-	-	0.4	-	335	135
[illegible] 1	3-20-70	6.9	167	-	-	0.4	-	-	532	-	1.0	-	216	96
[illegible] 1	2-19-69	7.6	115	-	-	-	-	-	-	-	1.6	-	244	52
[illegible] 1	8-21-69	8.3	130	0.03	50	-	-	-	-	-	0.1	-	216	70
Lirar														
63	10-11-72	07.5	79	.86	66	.01	0.04	0.11	218	34.50	6.82	0.000	108	30
64	10-11-72	07.3	46	.14	84	.01	0.01	0.00	140	3.70	6.16	0.000	148	15
72	10-11-72	07.3	54	.13	44	0.0	0.01	0.12	352	8.40	1.54	0.000	142	42
F 1	7- 5-63	7.7	155	-	-	-	-	-	245	-	2.5	.006	220	14.0
F 1	12- 9-65	7.7	-	-	-	-	-	-	-	-	5.0	-	240	14.0
F 2	12- 9-65	7.7	-	-	-	-	-	-	-	-	2.0	-	220	13.0
F 2	12-17-71	7.0	153	0.2	-	-	-	-	-	-	1.7	-	50	112
F 3	8-20-63	7.4	145	.1	-	-	-	-	-	-	2.0	-	230	8.0
F 3	12- 9-65	7.7	-	-	-	-	-	-	-	-	3.2	-	235	-
F 3	12-17-71	7.2	174	-	-	-	-	-	-	-	0.8	-	62	121
F 4	12-17-71	7.3	166	-	-	-	-	-	-	-	1.0	-	36	[illegible]
02	5-23-51	7.8	230	.14	88	-	-	.1	348	4.5	.2	-	294	[illegible]
*14	5-26-29	7.6	150	-	-	-	-	-	253	-	1.6	-	160	4.0

0101849

TABLE 058101 LOCATION AND DESCRIPTION OF SAMPLING SITES

Well #	Longitude	Latitude	Location Description
K_2	42 00 50	80 19 50	Lake City Municipal Water Works, 44 ± deep, 600 gpm yie
K_3	42 01 00	80 19 22	Lake City Municipal Water Works, 20 ± deep
K_4	42 00 45	80 20 06	Lake City Municipal Water Works, 39 ± deep
K_5	42 00 47	80 20 06	Lake City Municipal Water Works, 38 ± deep, 75 gpm yiel
K	one of the above K wells		Lake City Municipal Water Works
L_1	42 03 23	80 10 21	Tulane Well 45±' deep, 150 gpm yield
M_1	42 01 28	80 15 22	Fairview Boro 43±' deep, 200 gpm yield
M_3	42 01 24	80 15 22	Fairview Boro, ~~44.5±' deep~~ 38± deep, 200 yield
M_4	42 01 24	80 15 22	Fairview Boro 46± deep, 290 gpm
N_1	42 03 45	80 11 12	Greenbriar Hill Subdivision 73±' deep, 150 gpm
N_2	42 03 45	80 11 12	Greenbriar Hill Subdivision 40± deep
O_1	42 02 18	80 13 55	Walnut Heights, 63'± deep
O_2	42 02 18	80 13 55	Walnut Heights, 63'± deep
P_1	42 05 04	80 09 55	Westminster Water Company 18± deep
P_2	42 05 08	80 09 02	Westminster Water Company 26± deep, 200
P_3	42 05 11	80 09 04	Westminster Water Company 34± deep, 100 gpm
P_4	42 05 04	80 09 25	Westminster Water Company 29± deep
P_5	42 04 43	80 10 07	Westminster Water Company 450 gpm yield, 26± deep
P_6	42 04 45	80 10 09	Westminster Water Company 34± deep, 75 gpm yield
P_7	42 04 04	80 10 09	Westminster Water Company 36'± deep, 100 gpm yield
P_8	42 04 04	80 11 05	Westminster Water Company, 30'± deep, 150 gpm yield
Q_1	41 50 15	80 22 47	Ridgeville Water Company, 26'± deep, 14 gpm yield
Q_2	41 50 15	80 22 47	Ridgeville Water Company, 26'± deep, 14 gpm yield
Q_3	41 50 15	80 22 47	Ridgeville Water Company, 26'± deep, 14 gpm yield
R_1	41 52 12	80 21 06	Albion Well House, 43'± deep
R_2	41 52 12	80 21 06	Albion Pump House, 43'± deep
R_3	41 52 12	80 21 06	Albion Pont Well, 39'± deep
S_1	41 03 59	80 10 45	Asbury Water Co, 30'± deep
T_{1-3}	41 52 18	80 07 55	Edinboro Water Co. 33± deep, 36' casing; yield 1-500; 2-750; 3-75
T_4	41 52 18	80 07 55	Edinboro Water Co. 20± deep, dugwell; 20' casing; yield 350 gpm
			Mangan et al, 1952
[illegible]	3127 Asbury Rd Erie		Well in glacial drift at Kallenback residence, 18'± deep
[illegible]	No Girard Borough		Well in glacial drift, 36± feet deep
[illegible]	Wattsburg Road, Erie		Well in shale at Lyons residence, 72±' deep
[illegible]	R.D. 5, North East		Well in shale at Orton residence, 59±' deep
[illegible]	Cemetary Road, No East		Well in glacial drift at Parmenter residence, 52'± deep
[illegible]	R.D. 1 Harbor Creek		Well in glacial drift at Moser residence, 72'± deep
[illegible]	4705 Wattsburg Rd, Erie		Well in glacial drift at Zillman residence, 82'± deep
			Leggette, 1936
#3			Well, 30± deep
#5-6			Well, 25± deep, glacial drift
#8			Well, 36'± deep, shale
#9			Well, 54± deep, shale
#10			Well, 50± deep, shale
#14			Dugwell, sand and gravel 12'± deep
#15			Well, 52± deep, Fairview Boro
#16			Well, 51± deep, Fairview Boro
#17			Well, 104± deep
#18			Well, 90± deep glacial drift
#19			Well, 100± deep glacial drift
#20			Well, 201± deep, glacial drift
#28			Drilled well, shale, 40'± deep
#1010			Spring

TABLE 3 - LOCATION AND DESCRIPTION OF SAMPLING SITES

Well #	Longitude	Latitude	Location Description
1	42 07 31	80 00 52	Spring in hill along lake coast near Cascade Creek
2	42 09 21	80 02 06	Spring from shale in cliff along lake coast
3	42 09 56	79 58 05	Dug well at quarry company
4	42 09 03	79 59 40	Private well along Rte 20
5	42 06 39	80 01 04	Spring behind housing development
6	42 05 36	80 00 11	Well on Ramada Inn property
7	42 04 27	80 03 58	Well #1 Shenandoah Water Assn.
9	42 06 33	80 07 02	Well in Lords Corp. Building, about 100 ft. deep
10	42 10 58	79 58 14	Shallow dug well
11	42 11 35	79 56 57	14 ft. dug well off Rte 5
12	42 12 33	79 54 38	Private well along Rte 5
13	42 13 08	79 53 29	Well on Penn Shore Winery property, Rte 5
14	42 14 06	79 50 19	Private well along Rte 5
15	42 14 51	79 48 53	Spring along lake coast
16	42 15 04	79 48 20	Private well north of Rte 5
17	42 15 16	79 48 09	Spring along coast north of Rte 5
18	42 15 51	79 46 23	Dug well off Rte 5
19	42 13 58	79 46 56	Well at Penn-N. Y. truck stop
20	42 10 50	79 49 22	Well at Lakeview Country Club
21	42 11 35	79 53 39	Spring on grape farm south of Rte 20
22	42 11 36	79 53 53	Private well along Rte 20
23	42 10 29	79 56 26	14 ft. dug well at Rainbow Motel, Rte 20
24	42 04 08	80 02 39	Well at Holiday Inn, Rte 89
25	42 03 35	80 01 44	Well at mobile home park, Rte 89
[illegible]	42 02 02	80 01 09	Private well along Rte 89
[illegible]	42 00 39	80 00 39	Well at Surevief's Service Station, Rte 89
33	42 02 50	80 01 15	Pit along Walnut Creek near Rte 89
39	42 03 50	80 01 10	Private well
40	42 04 17	80 00 26	Private well
41	42 05 00	80 00 26	Private well
42	42 04 32	79 58 58	Well at Township Maintenance Building
43	42 04 26	79 58 00	Spring in hill north of Hammett
[illegible]	42 03 58	79 58 09	Dug well 20'± deep, Rte 8, Hammett
[illegible]	42 03 57	79 58 09	Private well 40'± deep, Rte 8
[illegible]	42 03 26	79 50 18	Well along Rte 8
47	42 03 08	79 50 30	Private well, Rte 8
48	42 03 21	79 51 27	Dug well off Colts Station Road
49	42 10 13	79 59 12	Private well
50	42 03 59	79 56 34	Private well along Rte 89
51	42 02 30	79 51 09	Private well
52	42 00 15	79 48 21	Private well on Lowville Road
53	42 00 24	79 48 54	Driven well along Rte 89
54	42 01 28	79 49 13	Dug well in Lowville
55	42 01 46	79 49 09	Private well, Rte 89
56	42 01 47	79 48 53	Spring near top of hill north of Lowville
57	42 03 00	79 49 09	Well in mobile home park, Rte 89
58	42 03 00	79 49 00	Spring feeding pond off Rte 89
59	42 03 25	80 05 44	Outside spigot-well at Huber Fan Co.
[illegible]	42 03 22	80 05 53	Outside spigot-well at Platz residence
[illegible]	42 02 45	80 06 31	Spigot in barn-well at Kessering residence
[illegible]	42 01 02	80 07 44	Well at Pennock's Garage

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TABLE 3 - LOCATION AND DESCRIPTION SAMPLING SITES

Well #	Longitude	Latitude	Location Description
53	42 00 19	80 08 30	Well at Hochn residence
54	42 00 08	80 08 45	Dug spring
55	41 59 47	80 08 44	Well at Laube Hardware
56	41 59 40	80 09 33	Well at Idyll Wylde village
57	42 04 43	80 12 15	Dug well at Freeman residence
58	42 04 18	80 12 56	Dug well at Gack residence
59	42 03 30	80 14 37	Dug well at Munch Fisheries
60	42 03 17	80 16 14	Dug well at Szuba residence
61	42 03 22	80 16 17	Dug well at Mason residence
62	42 01 57	80 16 44	Spring sample
63	42 02 09	80 18 34	Dug well at Northrop residence
64	42 01 36	80 21 37	Dug well at Repoff residence
65	42 00 22	80 23 31	Dug well at Kolar residence
66	41 59 42	80 25 33	Dug well at Bailey residence
67	41 59 22	80 26 46	Dug well at Racoon County Park
68	41 59 32	80 27 46	Dug well at Smith residence
69	41 58 03	80 27 22	Dug well at Pennzoil Station
70	41 58 03	80 24 16	Dug well at Sherman residence
71	41 59 08	80 21 54	Dug well at Zurn Aluminum Co.
72	41 59 44	80 19 36	Spring from bedrock at access area near Rte 20 bridge
73	41 59 46	80 09 12	Spring at Ottenl residence
74	41 59 25	80 08 38	Well at McKean Township Building
75	41 58 37	80 08 27	Well at Harrison residence
[illegible]	41 57 47	80 08 09	Spring
[illegible]	41 56 25	80 07 49	Well
78	41 55 44	80 07 28	Well at Burt Ford Sales
79	41 52 49	80 09 32	Well at Country Villa
80	41 52 49	80 10 41	Well at Baron Station
81	41 52 49	80 12 42	Well at Zelina residence
82	41 53 01	80 12 02	Spring 3/4 mi. east of lake at Zeling residence
83	41 52 45	80 14 56	Well at Connel residence
84	41 52 47	80 06 29	Well at Thompson Insurance
85	41 53 21	80 04 53	Well at Danyiko residence
86	41 53 19	80 05 27	Well at Sandar residence
87	42 05 51	80 09 35	Well at Yogi's Bar
88	42 01 33	80 04 27	Well at Volvo-new
89	42 01 24	80 05 15	Well at Arco Station, Rte 19
90	41 59 58	80 01 06	Well at Ranch Motel
91	41 57 16	79 59 36	Well at Waterford Beverage Co.
92	41 55 31	79 51 29	Well at Troyer Paper Chip Co.
93	41 55 07	79 55 09	Well at Holman residence
94	41 54 19	79 55 46	Well at Cross Gravel Pit
95	41 54 16	79 54 45	Spring from pipe in side of hill
96	41 54 22	79 53 15	Well at Troyer Dairy
97	41 53 51	79 51 46	Artesian well in front of Brown Thompson Newspaper
98	41 53 51	79 52 39	Well at Bennet residence
99	41 53 22	79 50 59	Intersection Rte 6 and Rte 8
100	42 03 06	80 04 52	Well at Howard Johnsons
[illegible]	41 45 08	80 20 34	Well at Plantz residence
[illegible]	41 45 57	80 20 18	Well at Snyder residence, 90'± deep, 4 gpm yield
3	41 46 47	80 21 49	Well at Lehman residence
4	41 46 47	80 21 59	Well at Conneaut Valley Elementary School

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TABLE 3 - LOCATION AND DESCRIPTION O. SAMPLING SITES

Well #	Longitude	Latitude	Location Description
.05	41 48 01	80 21 12	Well at Ebert residence
06	41 48 47	80 22 29	Well at Ransom residence
.07	41 50 41	80 22 36	Well at Pattor residence
.08	41 50 08	80 02 05	Well at Stagl residence
.09	41 50 03	80 18 12	Well at Francis residence
.10	41 49 29	80 21 34	Well at Barron residence
.11	41 50 51	80 25 16	Well at Braden residence, 31'± deep, 1 gpm yield
.12	41 49 01	80 28 14	Well at Blood residence, 40'± deep, 1.5 gpm yield
.13	41 48 07	80 28 13	Well at Foller residence, 34'± deep, 1.5 gpm yield
14	41 48 10	80 29 04	Well at Reinke residence
.15	41 47 15	80 29 36	Well at Kuchta residence
.16	41 45 20	80 29 50	Well at Bortnick residence
.17	41 44 40	80 19 30	Well at Joslin residence
.18	41 44 44	80 21 16	Well at Brown residence
.19	41 44 58	80 21 56	Well at Ohio Rubber Co., 73'± deep, 650 gpm
.20	41 43 39	80 02 33	Well at Wytcherly residence
21	41 44 46	80 23 49	Well at Weaver residence, 80'± deep, 4 gpm yield
.22	41 46 05	80 25 44	Well at Crowley residence, 44'± deep, 6 gpm yield
.23	41 48 04	80 25 48	Well at Reinhart residence
24	41 47 10	80 22 50	Well at Watson residence
.25	41 46 34	80 22 56	Well at Ranson residence
.26	41 46 47	80 24 31	Well at Casbohm residence
.27	41 45 33	80 24 37	Well at Lawrence residence, 49'± deep, 20 gpm yield
.28	41 40 47	80 22 56	Well at Anderton residence
[illegible]	41 41 12	80 19 23	Well at Agnew residence, 64'± deep, 20 gpm yield
[illegible]	41 41 01	80 19 17	Well at Fenton residence, 70'± deep, 20 gpm yield
.2	41 41 23	80 20 15	Well at Smith residence, 78'± deep, 20 gpm yield
.3	41 41 32	80 20 20	Well at Noel residence
.4	41 42 14	80 02 11	Well at Waylo residence, 85'± deep, 10 gpm yield
.5	41 42 18	80 21 16	Well at Richmond residence, 100'± deep, 25 gpm yield
.6	41 39 53	80 21 42	Well
.7	41 39 48	80 21 25	Well at Ferraino residence, 80'± deep, 50 gpm yield
.8	41 39 49	80 21 42	Well at Eaton residence
.9	41 40 01	80 22 21	Well at A. D. Henderson residence
.0	41 41 05	80 21 35	Well at McGuire residence, 73'± deep, 3 gpm yield
.1	41 42 11	80 22 15	Well at J. E. Hills residence
.2	40 43 52	80 22 02	Well at Troop residence
.3	41 44 34	80 22 07	Well at N. Crawill residence
.5	41 56 09	79 46 34	3'± dug well at Union City Fish Hatchery
.6	41 56 17	79 45 46	17'± driven well at Dowler residence
.7	41 55 25	79 31 19	75'± well at Horvath residence
.8	41 55 06	79 43 40	Deep well at Troyer residence
.9	41 55 03	79 42 46	Well at Carroll Colonial Estates, 42'± deep
.0	41 55 46	79 41 18	Well at Corry Fish Hatchery, 45'± deep
.1	41 55 46	79 41 20	Spring at Corry Fish Hatchery
.2	41 54 59	79 42 44	Well at Corry Police Barricks
.3	41 54 10	79 39 05	Well at Gluvna residence, 65'± deep
.4	41 53 32	79 41 44	Well at Stile residence, 40'± deep
.5	41 53 32	79 41 46	Well at Malek residence, 180'± deep
	41 51 28	79 42 56	Well at A. G. Bell residence, 150'± deep, water at 20'

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TABLE 3 - LOCATION AND DESCRIPTION SAMPLING SITES

Well #	Longitude	Latitude	Location Description
.57	41 51 28	79 42 54	Spring at A. G. Bell residence
.58	41 51 52	79 49 01	Well at H. Webb residence
.59	41 53 15	79 49 32	Well at Sharke residence
.62	41 53 28	80 24 34	Well at Rudlers Auto Service
.63	41 54 24	80 26 22	Well at Henderson residence
.64	41 54 42	80 26 46	Well at Barnes residence
.65	41 56 30	80 27 53	Well at Keystone Station
.66	41 55 40	80 23 58	Well at English residence
.67	41 55 30	80 22 59	Well at McCain residence
.68	41 55 04	80 22 25	Well at Wheeler residence
.69	41 55 54	80 05 07	Well at Fellows residence, 64'± deep
.70	41 56 30	80 05 03	Well at R. Stovers residence, 60'± deep
.71	41 57 58	79 56 01	Well at Leonart residence, 45'± deep
.72	41 58 22	79 55 30	Well at Peffer residence, 60'± deep
.73	41 59 25	79 54 20	Well 60'± deep
.74	41 59 37	79 53 14	Well at O'Sullivan residence, 55'± deep
.75	42 00 57	79 52 46	Well at Niebauer residence, 50'± deep
.76	42 01 35	79 55 39	Well at Gemler residence, 78'± deep
.77	42 01 33	79 55 39	Dug well at Gemler Barn, 8'± deep
.78	42 02 26	79 56 52	Well at H. Ratajczak residence, 80'± deep
.9	42 02 23	79 56 45	Well at Tomlin residence, 85'± deep
.0	42 01 13	79 58 43	Well at J. Schroeder residence, 60'± deep
.	41 53 53	80 03 07	Well at intersection of Rte 86 and 6 N, 50'± deep
.	41 55 01	80 03 18	Well at E. Melzler residence, 54'± deep
.	41 55 07	80 03 21	Well at E. Melzler Barn, 54'± deep
.	41 55 53	80 06 27	Well 56'± deep
.5	41 56 02	80 10 30	Well at M. Kaylowski residence, 60'± deep
.6	41 56 02	80 12 43	Dug well at P. Mills residence, 25'± deep
.7	41 56 07	80 14 06	Well at R. Flynn residence, 80'± deep
.8	41 56 44	80 17 05	Well at E. Murphy residence, 75'± deep
.9	41 54 57	80 17 11	Dug well at T. Rader residence, 25'± deep
.0	41 54 16	80 17 49	Dug well at A. G. Ward residence, 29'± deep

WAMIS and/or Erie County Health Department Records

	41 45 08	80 22 03	Conneautville Municipal Water Works, 87'± deep, 250 gpm yield
	41 48 04	80 22 27	Springboro Municipal Water Works, 80'± deep, 240
	41 48 04	80 22 27	Springboro Municipal Water Works, 79'± deep, 153 gpm yield
	42 00 22	79 48 36	Wattsburg Joint High School
	42 09 46	79 57 15	Harbor Creek High School, 72'± deep
	42 57 50	80 24 16	East Springfield Elementary School
	42 01 07	80 18 40	Girard Municipal Water Works, 30'± deep, 600 gpm yield
	42 01 07	80 18 31	Girard Municipal Water Works, 12'± deep, 200 gpm yield
	42 01 09	80 18 35	Girard Municipal Water Works, 22'± deep, 800 gpm yield
	42 01 07	80 18 31	Girard Municipal Water Works, 18'± deep
	42 03 58	80 15 31	Whitehall Village, 30'± deep, [illegible] gpm yield
	42 03 58	80 15 31	Whitehall Village, 30'± deep, [illegible] gpm yield
	42 03 58	80 15 31	Whitehall Village, 22'± deep, 22 gpm yield
	42 03 52	80 12 03	White Swan South, 16'± deep, [illegible]
	42 03 17	[illegible]	White Swan South, [illegible] deep, [illegible] gpm yield
	42 02 30	80 17 05	Palmer Shore Water Company, [illegible] gpm yield
	42 00 42	80 20 27	Lake City Municipal Water Works, 10'± deep, 250 gpm yield

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