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Administrative Record

September 7, 1988

SUBJECT: Vanport Township Municipal Authority Water Supply
Groundwater Assessment and Investigation
Vanport Township
Beaver County

TO: Anthony D. Orlando
Regional Manager
Bureau of Waste Management
Southwestern Regional Office

FROM: Eric T. Manges ETM and Mark L. Johnson
Hydrogeologist
Bureau of Waste Management
Southwestern Regional Office

Hydrogeologist
Bureau of Water Quality Management
Southwestern Regional Office

This report has been prepared in order to summarize the Department's findings to date regarding the situation at the Vanport water supply system. This report will outline the potential sources of the volatile organic compounds (VOCs) that have been discovered in the production wells of the water supply system. A discussion and recommendations will be presented regarding the development and implementation of a hydrogeologic investigation that will enable the Department to accurately locate and define the extent and nature of the contaminant source(s).

Vanport Township Municipal Authority (VTMA) Water Supply

The water supply system is owned and operated by the Vanport Township Municipal Authority (VTMA) and services the municipalities of Vanport Township and Brighton Township. The total population supplied is approximately 10,000. The maximum daily consumption from the VTMA water supply is approximately 2.2 million gallons per day (mgd) and an average daily consumption of 1.55 mgd.

In January, 1988, analytical results of samples obtained from various points in the water supply system indicated the presence of trichloroethylene (TCE) at concentrations less than 100 ug/l (ppb). Subsequent sample results from the system have consistently showed TCE levels above 100 ug/l. Analytical results of water taken directly from the wells have shown the highest TCE levels (see Appendix I - Tables 1, 2, 3). There is no previous analytical results for TCE from these wells.

The well field consists of six (6) production wells. These wells are located on 8.9 acres owned by the Vanport Township Municipal Authority which is situated approximately 300' from the north bank of the Ohio River (See Figure 1). Wells No. 1, 2, and 3 were permitted by the Department in 1941. Wells no. 4, 5, and 6 were permitted in 1963, 1968 and 1984 respectively. Refer to Appendix II for well logs and other well details.

Geology

All six wells are located in the alluvial sediments of the Ohio River aquifer. The unconsolidated alluvial material consists of sediments ranging in size from clay to boulder and was deposited during the quaternary period (recent) by the Ohio River. In many cases, wells drilled into the Ohio River alluvial aquifer in this area are capable of yielding as much as 1,500 gallons per minute.

The geology of the area is comprised of generally flat lying Pennsylvania age rocks. The alluvial sediments are overlying the Allegheny Group which consists of cyclic sequences of sandstone, shale limestone, clay and coal and includes valuable clay deposits as well as the Vanport Limestone. Commercially valuable Freeport, Kittanning and Brookville - Clarion coals are present. The alluvial deposits, that the municipal wells are located in, are underlain by these Pennsylvania age rocks.

Preliminary Department Investigation

In order to determine the source of the TCE contamination, the Department has performed several field surveys. All of the local businesses were inspected and inventoried. Private water wells were located and sampled. Samples were also obtained from existing discharges, monitoring wells, the Vanport Sewage Treatment Plant and the Ohio River. Summaries of the surveys and sampling programs follow:

1. PRIVATE WELL SAMPLING

A sampling program of private wells in Vanport was begun in April, 1988 by the Bureau of Water Quality Management. The purpose of this program was to:

A. Locate private wells in the area.

B. To determine the extent of TCE contamination

C. Attempt to pinpoint the source of TCE contamination

Information about the well depth, construction of the wells and other information about the well could not be obtained because of incomplete records.

The following is a list of private wells that were sampled around Vanport:

LOCATION	SAMPLE POINT	DEPTH OF WELL
571 Division Lane	pump well	
210 Division Lane	kitchen tap	75'
387 State Street		
1165 Gypsy Glen Road	basement	
1275 Gypsy Glen Road	kitchen sink	

None of these wells were located immediately downgradient of the Westinghouse plant, the abandoned quarry or Crivelli Chevrolet.

Attempts were made to locate and sample other wells in the township pertinent to this case.

The laboratory results of these sampling efforts revealed that the private wells sampled were negative for TCE and other organic compounds. Since the sample results obtained from these wells revealed no organic contamination, this private well sampling program revealed little information about the extent or source(s) of TCE contamination in Vanport, except to show where there is no TCE or organic contamination in the private wells sampled.

2. DISCHARGE SAMPLING (Vanport Sewage Treatment Plant and Westinghouse Outfall 002)

A compliance evaluation inspection was conducted at the Vanport Sewage Treatment Plant in April 1988. During this inspection, the influent and effluent of the Vanport Township Sewage Treatment Plant and Outfall 002 from Westinghouse Corporation were sampled for volatile organic compounds.

Lab results revealed that organics appeared in small concentrations at each of the sampling locations (See Appendix I - Table 4).

Since each of these discharges uses the Vanport Municipal wells as a source of their water supply, it is possible that these concentrations are a result of the Vanport Municipal water supply.

3. OHIO RIVER SAMPLING

Sampling of the Ohio River was conducted in an effort to determine to what extent, if any, the Ohio River might be contributing to the trichloroethylene (TCE) problem in the Vanport Municipal water supply.

On July 27, 1988, sampling was conducted on the Ohio River. River samples were taken approximately 1/8 of a mile upstream of the municipal wells, approximately 1/8 of a mile downstream of the municipal wells and in the vicinity of the Vanport Municipal well field.

Laboratory results obtained from these three locations indicated that TCE was not present. This indicates that the Vanport Municipal water supply TCE contamination is not affected by the inflow of contaminated water from the Ohio River, or that the TCE contamination from Vanport is not affecting the water quality of the Ohio River, based on our observations and the samples that were analyzed.

Based on all of the available information, it is believed that the cause of the VTMA water supply TCE contamination is due to one or a combination of the following sites:

Westinghouse - Beaver Plant
Crivelli Chevrolet
The abandoned sand and gravel quarry.

The following is a summary of the Department's findings regarding each of these sites:

Westinghouse

Westinghouse's Beaver plant is located approximately 2,500' to the northeast of VTMA's water supply well field (see Figure 1).

Westinghouse has been addressing an existing contamination problem at their Beaver plant. Westinghouse operates the plant as a manufacturing facility which, at one time, included electroplating operations. The electroplating operation utilized a series of inground dip tanks that contained a variety of chemicals in both acid and basic solutions. Waste tanks were also used. These tanks are located in Area A-9 (see Figure 2).

In October, 1983, Westinghouse personnel noticed a fluid seep near these outside, inground storage tanks. As a result, a groundwater investigation was undertaken which included the installation of numerous monitoring wells (see Figure 2). Also at this time the waste tanks were deactivated. The main groundwater contaminants identified during the investigation were cyanide and silver.

Based on the findings from the initial investigation, Westinghouse proposed a groundwater assessment and abatement plan entitled "Revised Remedial Action Plan - Westinghouse Plant, Area A9" dated March, 1987. The plan has not been approved by the Department and has not been implemented by Westinghouse. The proposal involves the construction of additional monitoring wells to better define groundwater conditions in Area A9. A groundwater recovery/abatement plan was also presented.

On June 15, 1988, the Department met with Westinghouse personnel and obtained "split" samples for organic analysis from two monitoring wells in Area A9 of Westinghouse's Beaver plant. The Department received the analytical results from these samples on July 1, 1988. The results indicate significant levels of volatile organic compounds (see Appendix I - Table 5). Westinghouse and VTMA were immediately notified.

The Department obtained samples from all of the monitoring wells in Area A9 on July 14, 1988. The samples were split with Westinghouse representatives. The analytical results again showed high levels of VOCs (see Appendix I - Table 5). The most prominent organic compound noted in the analyses was trichloroethylene with concentrations in one sample as high as 48,000 ug/l.

Westinghouse met with the Department on July 20, 1988 to propose a groundwater assessment plan regarding VOC contamination. The proposal involves using the same March 1987 assessment plan that was prepared in response to the cyanide waste contamination. The proposal was outlined in an August 1, 1988 letter from Westinghouse.

The Department has requested revisions to that plan. Westinghouse has responded to the Department's request in a submittal dated August 29, 1988. A meeting with Westinghouse is scheduled for September 8, 1988.

ABANDONED SAND AND GRAVEL QUARRY

Between the Westinghouse Beaver Plant and the VTMA well field, there exists an abandoned sand and gravel quarry. The quarry is located approximately 1,000 ft. north of the well field (see Figure 1). The quarry is roughly 1,300' long and 600' wide, with a depth that does not appear to exceed 100'.

The quarry was operated as the Beaver Sand and Gravel Quarry. Operations were ceased between 1965 - 1966, according to a former employee. The quarry is currently abandoned and is overgrown with vegetation. The current owners of the quarry include:

4.55 acres - Nick Crivelli Chevrolet, Inc.
294 State St.
Beaver, Pa. 15009

4.25 acres - Bell Telephone
One Parkway
Philadelphia, PA 19102

4.76 acres - Wyco Construction
Box 14
Sewickley, PA 15143

Since the abandonment of the quarry, it appears that the quarry has been partially backfilled. The most notable backfilling has been undertaken by Crivelli Chevrolet at the western portion of the quarry. He has built portions of his used car business over the filled area of the quarry.

The Department has received reports that significant amounts of industrial wastes were disposed of in the quarry while it was in operation. This allegation of dumping was made by a former quarry employee.

There is evidence of recent dumping of small amounts of household wastes and scrap in the quarry.

CRIVELLI CHEVROLET

While making site inspections and surveying the area for possible sources of Trichloroethylene (TCE) contamination, it was discovered that there was a storm sewer pipe discharging into the abandoned sand and gravel quarry behind Nick Crivelli's Chevrolet (see Figure 1). This discharge had a constant petroleum sheen on the top of the water and the discharge rate of this pipe was estimated between 0.5 to 1.5 gallons per minute. It was determined that Nick Crivelli Chevrolet's garage floor drain was connected into this PennDoT storm sewer.

Various site inspections were conducted of this area and samples of this discharge were taken: April 28, 1988, June 13, 1988, July 14, 1988, and August 24, 1988.

No benzene was detected in any of these samples, but many organic contaminants were found including: Toluene, Ethyl Benzene, P-Xylene, M-Xylene, O-Xylene, Cumeme, Mesitylene, 1,2,4-Trimethyl Benzene, Napthalene, 1-Methyl Napthylene, 2-Methyl Napthylene.

On June 13, 1988, the sample that was analyzed for volatile organic compounds and detected 1,1,1 Trichloroethylene.

On July 11, 1988, a Notice of Violation (NOV) letter was sent to Nick Crivelli Chevrolet by the Department. This NOV letter stated the Department's findings in this case, and stated the violations by Nick Crivelli Chevrolet.

On August 10, 1988, the Department had a meeting to discuss the violations stated in this letter and the problems of this discharge. Nick Crivelli was present and represented by Attorney Samuel J. Orr, III. At this meeting, the Department discussed this illegal discharge into the abandoned sand and gravel quarry at the rear of Nick Crivelli Chevrolet. He was told that he must stop the discharge into the quarry and hand the alternative to:

1. Apply for an NPDES discharge permit and treat the discharged waste stream to meet the proposed discharge limits.
2. Route the waste stream from his garage floor drains to the Vanport Sanitary Authority.

Questions about the connection of the storm sewer of the garage floor drains and the PennDot storm sewers were discussed. Nick Crivelli was told that he should hire a groundwater consultant to do a study. The consultant should determine the extent of the contamination, the organic contaminants present, groundwater flow, and other conditions. He should examine the effects of the discharge, if any, on the Vanport Municipal water supply; drill monitoring wells to determine the extent of groundwater contamination; submit to the Department a groundwater study which should include a clean-up plan, if needed, for soil removal, groundwater clean-up, or other remedial clean-up measures.

On August 5, 1988, the Department received a letter from Samuel J. Orr, III, stating "I have contacted Ed Monroe of Gannett, Fleming to look at this situation and give Nick Crivelli Chevrolet advice as to the appropriate steps. I have already transmitted the reports to Mr. Monroe and he will view the premises either late this week or early next week."

On August 24, 1988, during a site inspection, Nick Crivelli stated he was waiting for an answer from the Vanport Sanitary Authority to connect the discharge of the garage floor drains into the sanitary system of Vanport. He did not know the status of the consultant's review and assessment of the situation.

In a letter dated August 31, 1988, from Samuel J. Orr, III, regarding this connection to the sanitary sewer, it states "Mr. Crivelli has received tentative approval, although he still must wait until the solicitor returns from vacation in order to get final approval."

In the rear of Nick Crivelli Chevrolet, there is an underground storage tank which is actively being used. This tank is located approximately 100 feet upgradient of the storm sewer discharge. Since the contaminants of the storm sewer discharge are components found in gasoline, and possibly contributing to the problem, Nick Crivelli was asked to hydrostatically test the tank.

In an August 31, 1988 letter from Samuel J. Orr, III, the results of the tank test by Roberts Oil Company from Beaver, Pa. were enclosed. This report stated "this test shows this tank to be leak free at this time." This 2000 gallon underground storage tank was "vacuum tested" by putting a water vacuum on the tank for 34 minutes and noticing no substantial loss (.02 inches of vacuum). This test was not a hydrostatic test as requested by the Department; therefore, the results and accuracy of this "vacuum" underground storage tank test is questionable.

Discussion

The Department intends to conduct its own hydrogeologic investigation. There are obviously numerous options that the Department can pursue in developing and initiating an effective investigative plan.

From this discussion, the Department should be able to develop an appropriate investigatory approach towards determining the source of the TCE in the Vanport wells.

The Department has identified three potential sources of the observed TCE contamination in the Vanport public water supply system. At this time, it is difficult to determine which source is the cause of the problem. It may be one of the sources or it may be a combination of all three. It also is possible that the source has not yet been identified and that none of the three potential sources described herein are responsible.

At this point it is obvious that much more subsurface information is needed before a reasonable, defensible conclusion can be made regarding the source. A fairly extensive hydrogeologic investigation should be undertaken in order to determine the source(s) of contamination and to define its extent and rate of movement.

The Department has already taken steps to develop and implement hydrogeologic investigations at two of the potential source locations; Westinghouse's Beaver Plant and Crivelli Chevrolet. Westinghouse already has existing monitoring wells that will be used in an investigation and they have plans for installing additional monitoring wells, in cooperation with the Department, in the very near future. Crivelli Chevrolet has met with the Department and is in the process of developing a groundwater assessment plan to present to the Department for review.

The VTMA has contracted the Ohio Drilling Company to perform a groundwater investigation in the area around the well field. They are installing two wells at the eastern and western corners of the well field. As of this writing, Ohio Drilling has completed one monitoring well and the Department has obtained and split samples with VTMA from this point. The analytical results have not been received.

At this point it is believed that the quarry pit is one of the most probable sources of the contamination. This belief is based on the following points:

1. The quarry is the closest potential source to the well field.

2. The quarry lies between the well field and the Westinghouse plant.

3. Crivelli Chevrolet discharged waste into the quarry.

4. Analysis of the Crivelli discharge did not indicate the presence of TCE.

5. Allegations have been made that significant amounts of industrial and potentially hazardous waste may have been dumped into the quarry.

6. The physical location of the quarry may be altering normal groundwater flow conditions and may be acting as a recharge area for the aquifer.

The above points may seem like justifiable reasons to exclude Crivelli and Westinghouse as potential sources. This is not the case. They may indeed be contributing factors.

Crivelli Chevrolet or previous businesses at this location may have been discharging into the pit area for close to 20 years and the nature of that discharge may have changed significantly over that time period in both quantity and chemistry. It is also quite possible that local flow conditions in the western portion of the quarry are isolated or variable due to backfilling activities. The Crivelli discharge may be entering a local groundwater system that is controlled by conditions different than the conditions controlling groundwater that leaves the majority of the quarry site.

It is therefore important that the groundwater situation be adequately addressed in the area of the Crivelli discharge. As indicated earlier in this discussion, the Department is in the process of developing and implementing an assessment with Crivelli via regulatory measures.

As was indicated earlier in this report, significant amounts of TCE was discovered in on-site monitoring wells at the Westinghouse plant. Westinghouse is in the process of assessing the groundwater conditions in regard to the observed TCE contamination. The sand and gravel quarry lies between the well field and Westinghouse contamination.

Based on the limited amount of information contained to date, it is difficult to ascertain whether the groundwater contamination at the Westinghouse plant may be impacting the VTMA well field.

There are several reasons that make a determination, at this point, premature, which includes:

1. Lack of hydrogeologic information. It has not yet been determined how groundwater is moving at the Westinghouse site.

2. The extent of the contaminant problem has not yet been determined at the Westinghouse plant. The contamination observed to date may be on the periphery of a much larger contamination problem or it may be the maximum levels that are or will be encountered.

   Under normal conditions, it would be unlikely, at the levels shown thus far, that the Westinghouse problem would be effecting the Vanport wells.

   The groundwater conditions are not however, necessarily normal conditions. Many other factors may influence the situation such as pumping rates and the sphere of influence of the Vanport wells; the effect of the quarry on groundwater flow conditions; and the lack of recharge to the upper portions of the aquifer due to lack of precipitation.

   The point to be made is that a great deal of information is required before determination can be made regarding the impact of the Westinghouse plant on the Vanport wells.

3. To date, the only signficant TCE contamination observed at the Westinghouse site is located in a shallow, perched water-bearing zone, above the main Ohio River aquifer.

4. The observed Westinghouse contamination is approximately 2,500 ft. away from the Vanport well field and is located upgradient from the abandoned quarry.

Recommendations

The Department investigation should focus on the following points.

1. The quarry pit is the closest potential source to the well field; based on all the available information and the location of other potential sources, the abandoned sand and gravel quarry would appear to have the most direct influence on the well field. The Department should attempt to determine the effect of the quarry on the well field.

   The Ohio Drilling Company is currently installing monitoring wells in the well field to help assess groundwater conditions and quality in the immediate area. The Department should acquire the information that is being produced by the Ohio Drilling Company in their investigation. From this information the Department could make a better determination towards the direction of physical investigation (i.e., monitoring well placement and construction, pump testing, geophysical analysis).

2. The Department should investigate the groundwater quality upgradient of the quarry in the Ohio River aquifer. This will be important in determining if there are other sources contributing to the groundwater quality in the area of the quarry. It must be determined whether groundwater contamination exists between the quarry and the Westinghouse plant.

3. It is important, as part of the investigation, that the hydrogeologic conditions around the quarry be determined in order to determine groundwater flow directions. This would include investigating the following:

    A. Subsurface geology/lithology.
    B. Vertical and horizontal components of groundwater flow
    C. The hydraulic conductivity of the aquifer

    This would be done during the course of the investigation and not necessarily as a first step.

4. The cone of depression created by pumping of the municipal water supply wells should be defined, and the effect on the area groundwater flow conditions and rates should be determined for all pumping scenarios. This would be done by observing water levels in surrounding monitoring and production wells during actual pumping.

5. Geophysical methods and possibly a soil gas survey may prove to be effective in determining sources of contamination.

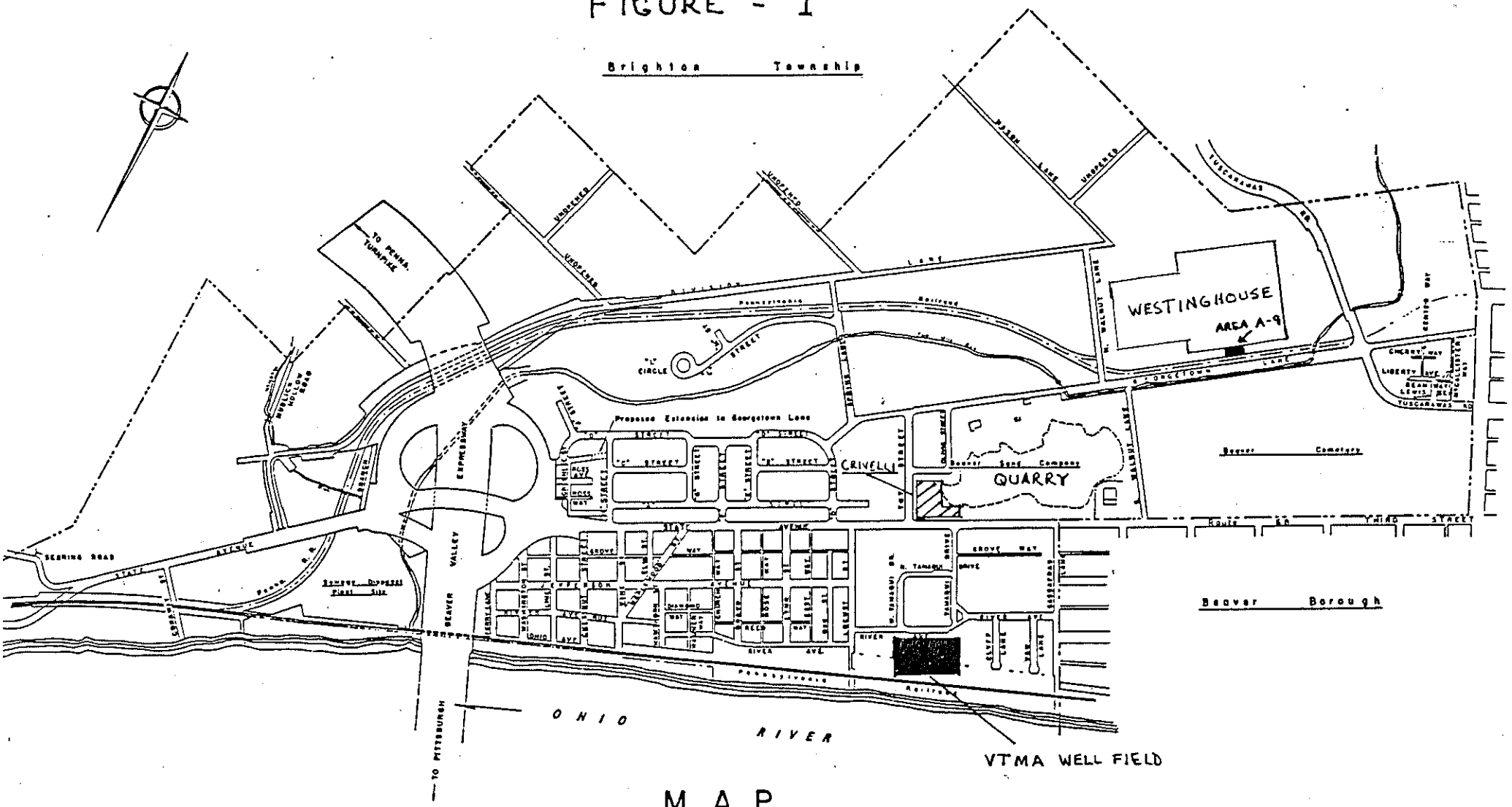
6. The Department should pursue independent groundwater assessment investigations by Westinghouse and Crivelli Chevrolet through the State's hazardous waste regulations.

7. It should be noted that the Department's investigation will not be specific in defining the finite extent and rate of migration of a potential contaminant plume. The investigation will center on locating the source of the TCE contamination. The Department should then be able to determine the origin of the source and relate it to a responsible party.

ETM/ld

cc: C. Duritsa
T. Vayansky
M. Watson
J. Shack
J. Jones
J. Haluszczak
M. Johnson
T. Pallas
H. Richey
E. Manges
Region
Central
Chron

FIGURE - 1



MAP

OF THE

TOWNSHIP OF VANPORT
BEAVER CO., PENNSYLVANIA

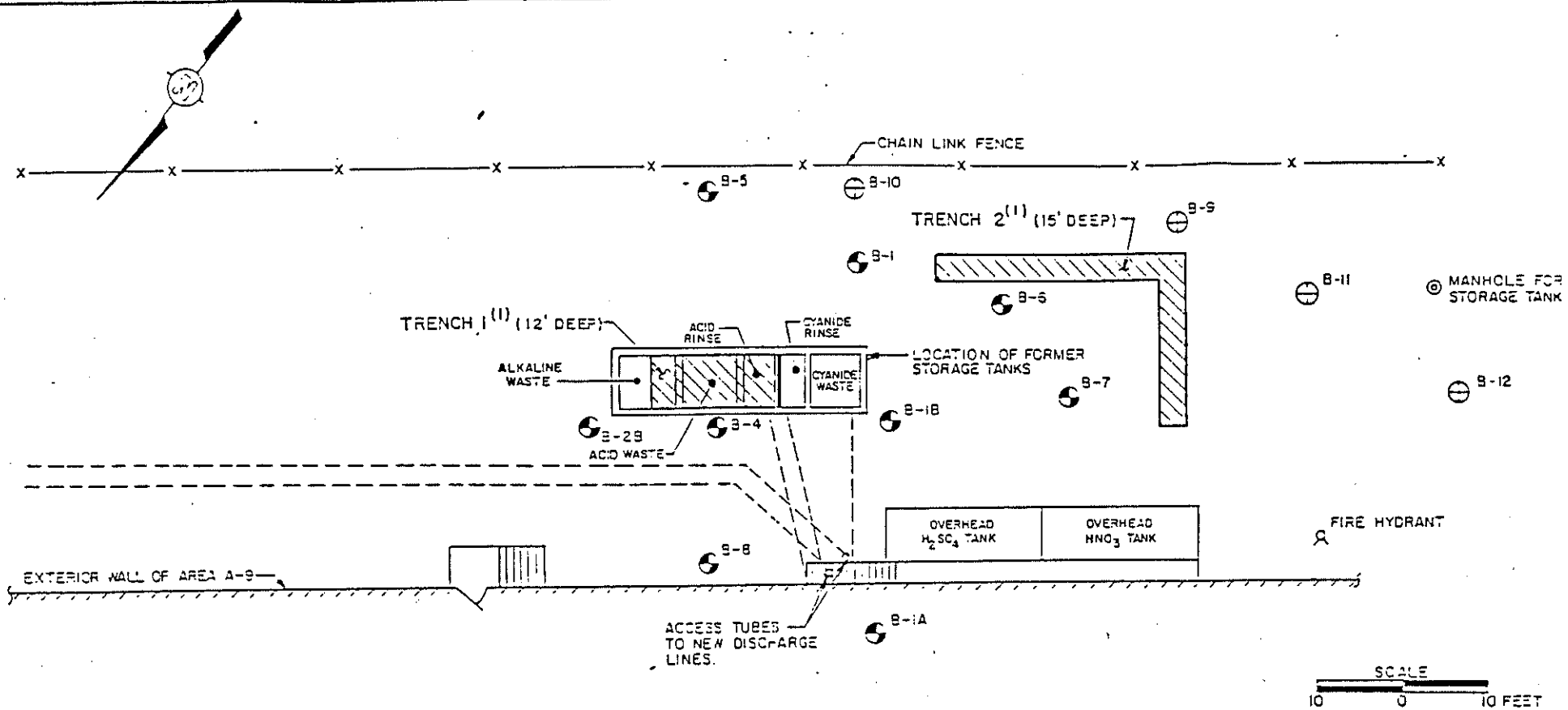
1949

Michael Baker Jr. Inc.
Consulting Engineers
Rochester, Pa.

REVISED 3-16-62
REVISED 10-3-62
REVISED 10-18-67

3-1-163

FIGURE - 2



LEGEND

- EXISTING WELL
- NEW WELL

NOTES:

(1) EXACT LOCATION AND DIMENSIONS TO BE DETERMINED AFTER NEW WELLS ARE INSTALLED AND EXPLORATORY BORING PROGRAM IS COMPLETED.

FIGURE 3

AREA A-9:
LOCATION MAP OF EXISTING AND PROPOSED WELLS, AND PROPOSED CUT-OFF TRENCHES

PREPARED FOR

WESTINGHOUSE ELECTRIC CORPORATION
BEAVER, PENNSYLVANIA

Paul C. Rizzo Associates, Inc
CONSULTANTS

A P P E N D I X - I

Analytical Results

VANPORT WATER SYSTEM
TCE MONITORING

Door	Location	TCE (conc. in ppb)
1/7	Vanport Office Sink	40
1/10	McDonald's (Rt. 68)	75
1/11	Vanport Office Sink	40
1/12	Vanport Office Sink	7.5
1/14	Vanport Office Sink	30
1/15	Vanport Office Sink	18
1/27	Well #1	19
1/27	Well #2	3.5
1/27	Well #4	17
1/27	Well #5	60
1/27	Well #6	12
2/3	Vanport Office Sink	70
2/11	Vanport Office Sink	110
3/17	Vanport Office Sink	48

TABLE - 1

102 - 138' deep for all wells. All screened completely.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
Bureau of Community Environmental Control
8th Avenue & 15th Streets
Beaver Falls, Pennsylvania 15010
(412) 846-2050

August 4, 1988

Vanport Township Municipal Authority
Attention: David Brooks
285 River Avenue
Vanport, Pennsylvania 15009

Dear Mr. Brooks:

The following table shows results of our first week of well samples:

Trichloroethylene Concentration

	Well #4		Well #5
July 26th @ 0910	5.8 ppb	@ 0920	14 ppb
July 27th @ 0900	27 ppb	@ 0910	180 ppb
July 28th @ 0900	32 ppb	@ 0910	175 ppb

If you have any questions, please call me at 846-2050.

Sincerely,

Barry K. Herr
Sanitarian

BKH/ljе

cc: Willard Bradshaw

TABLE - 2

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
Bureau of Community Environmental Control
8th Avenue & 15th Streets
Beaver Falls, Pennsylvania 15010
(412) 846-2050

August 19, 1988

Vanport Township Municipal Authority
Attention: Mr. David Brooks
285 River Avenue
Vanport, Pennsylvania 15009

Dear Mr. Brooks:

The following table shows results of our well samples over the past few weeks:

Trichloroethylene Concentration

	Well #1	Well #2
August 2nd	11 ppb	10 ppb
August 3rd	5.6 ppb	88 ppb
August 4th	12 ppb	146 ppb
	Well #5	Well #6
August 9th	50 ppb	5.5 ppb
August 10th	275 ppb	39 ppb
August 11th	260 ppb	43 ppb

If you have any questions, please call me at 846-2050.

Sincerely,

Barry K. Herr

Barry K. Herr
Sanitarian

BKH/lje

cc: Willard Bradshaw

TABLE - 3

LOCATION	METHYLENE CHLORIDE	CHLOROFORM	TOLUENE	BROMODICHLORO-METHANE	DIBROMOCHLORO-METHANE	1,2 DICHLOROETHANE	1,1,1 TRICHLOROETHANE	TRICHLOROETHYLENE
Brighton Twp Influent	6.0	6.8	-	-	-	2.8	-	3.6
Vanport Twp. Influent	-	5.0	4.6	2.9	2.4	-	-	2.5
Vanport STP CL_2 Contact Tank	-	42.0	-	-	29.0	-	3.5	7.6
Westinghouse Elec. Outfall 002	-	42.0	-	120.0	2.8	-	3.0	67.0

NOTE: Sample results are in parts per billion (ug/l)

TABLE - 4

ANALYTICAL RESULTS - GROUNDWATER - BEAVER PLANT
(All concentrations in ppb, unless noted)

Performed Sampling	Date	Well Number	TCE	1,1,1 TCEA	1,1,2 TCEA	1,1 DCEE	1,2 DCEE	1,1 DCEA	1,2 DCEA	Toluene	Cyanide (ppm)	Aceton
PADER	6/15/88	B-1	50,000	50,000	100	11,000	100	1,400	450	360		
NUS	7/5/88	B-1	6,400	4,300						<500		
NUS	7/8/88	B-1	14,000	10,000	<500	<500	<500	<500	900	<500		
PADER	7/14/88	B-1	30,000	18,500	40	3600	41.6	400	265	100		
SPLIT	7/14/88	B-1	12,000	7,900	<625	<625	<625	<625	<625	<625		
NUS	7/8/88	B-1A	<5	<5	<5	<5	<5	<5	<5	<5		
PADER	7/14/88	B-1A	86	24		5	11.7	9.8		13		18
SPLIT	7/14/88	B-1A	64	19	<5	<5	7	6	<5	13		
NUS	7/5/88	B-1B	15,000	110,000						<5,000		
NUS	7/7/88	B-1B									1100	
PADER	7/14/88	B-1B	780	3,300		185		650	95	75		
SPLIT	7/14/88	B-1B	350	1,900	<125	<125	<125	330	<125	<125		
NUS	7/5/88	B-4	1,100	7,600						<500		
NUS	7/7/88	B-4									3.2	
PADER	7/14/88	B-4	125	820		26						
SPLIT	7/14/88	B-4	88	540	<25	<25	<25	<25	<25	<25		
PADER	6/15/88	B-5	300	2		2						
NUS	7/5/88	B-5	150	<10						<10		
NUS	7/8/88	B-5	170	<5	<5	<5	<5	<5	<5	<5		
PADER	7/14/88	B-5	750									
SPLIT	7/14/88	B-5	140	<5	<5	<5	<5	<5	<5	<5	<0.005	
NUS	7/5/88	B-6	1,500	6,500						<500		
NUS	7/7/88	B-6									8.1	
PADER	7/14/88	B-6	900	850				330				
SPLIT	7/14/88	B-6	210	250	<8.5	<8.5	<8.5	93	17	<8.5		
PADER	7/14/88	B-7	48,000	475	6.9	550	217	425	33	25		18
SPLIT	7/14/88	B-7	20,000	<500	<500	<500	<500	640	<500	<500		

TABLE - 5

A P P E N D I X - II

Vanport Township Municipal Authority

Well Field

VANPORT TOWNSHIP MUNICIPAL AUTHORITY'S WELL FIELD

The Vanport Township Municipal Authority's well field contains six (6) municipal wells. It is located approximately 300' north of the Ohio River bank. The elevation of the well heads are approximately 70' above the normal pool elevation of the Ohio River in this area and is 47.5' above the highest recorded flood elevation. The well field is enclosed by fencing and is located on 8.9 acres in Vanport Township.

The Authority's system includes: Wells No. 1, 2, 3, which were originally permitted (#6149) in 1941; Wells No. 4 was permitted (#363W009) in 1963; Well No. 5 was permitted (#368W008) in 1968; Well No. 6 was permitted (#0484501) in 1984.

The Vanport Township Municipal Authority serves Vanport Township with a population of 2,100 people with an average daily consumption of 0.877 million gallons per day and Brighton Township with a population of 7,800 people with an average daily consumption of 0.673 million gallons per day. The maximum daily consumption served by the Vanport Township Municipal Authority is 2.2 million gallons per day and a minimum daily consumption of 0.489 million gallons per day. The average daily consumption of the Vanport Township Municipal Authority is 1.55 million gallons per day.

There are six wells all manifolded together which terminate in a series of five detention chambers under approximately 95 PSI pressure. Three of these detention tanks have a 9,000 gallon capacity; one tank with a capacity of 4,500 gallons; and one tank with a capacity of 2,500 gallons. Chlorine gas is injected into the common manifold lines just before entry into the detention tanks. From here, water is served under this pressure, without any further assistance from boosters, throughout the distribution system. There are two water storage tanks in the distribution system; one has a capacity of 2,000,000 gallons and the other has a capacity of 500,000 gallons.

Vanport supplies water to Brighton Township through two booster stations which are owned and operated by Brighton Township Municipal Authority. There is also an emergency interconnection with Beaver Borough's water system.

The following are a composite of well logs and other characteristics of the six municipal wells.

VANPORT MUNICIPAL WELL NO. 1

Well Log	Feet
Sandy loam and clay	6'
Coarse gravel and sand	60'
Brown sand and gravel	33'
Water bearing sand and coarse gravel	20'
Sand strata with small fine gravel	3'
Coarse gravel and sand	3' 4"
Total depth of well	125' 4"

Well Description	
Total length of 12" pipe in well	102' 1"
Length of screen	16' 5-3/4"
Nipple in bottom of screen	8"
Cement plug at bottom of screen	1' 2"
Casing Diameter	16"
Casing Depth	105'

Data on Pump Test	
Gallons per minute	610
Drawdown	16'
Current average yield (GPM)	550
Static water level	74'

MUNICIPAL WELL NO. 2

Well Log	
Sandy loam and clay	5'
Coarse gravel and sand	59'
Brown sand and small amount of fine gravel	35'
Water bearing sand and coarse gravel	18' 4"
Total depth of well	117' 4"
Well Description	
Total length of 18" pipe	101' 10"
Total length of screen	17'
Length of nipple at bottom of screen	8"
Cement plug at bottom of screen	1' 6"
Casing diameter	16"
Casing depth	100'
Date on Pump Test	
Gallons per minute	720
Drawdown	5'
Current average yield (GPM)	550
Static water level	75'

MUNICIPAL WELL NO. 3

Well Log	
Sandy loam and clay	4'
Coarse gravel and sand	58'
Brown sand and small amount of gravel	37'
Water bearing sand and fine gravel	8'
Coarse gravel and small amount of sand	3'
Fine sand and gravel	6' 6"
Total depth of well	116' 6"
Well Description	
Total length of 12" pipe in well	101'
Total length of screen	17'
Length of nipple at top of screen	8"
Cement plug at bottom of screen	18"
Casing diameter	12"
Casing depth	101'
Data on Pump Test	
Gallons per minute	640
Drawdown	13'
Water level	72' 6"
Current average yield (GPM)	400
Static water level	76'

MUNICIPAL WELL NO. 4

Incomplete well logs

Well Log	
Total depth of well	106'
Well Description	
Casing diameter	16"
Casing depth	92'
Data on Pump Test	
Current average yield (GPM)	550
Static Water Level	77'

MUNICIPAL WELL NO. 5

Well Log	
Clay	0'-2'
Coarse gravels (6" largest), little sand	2'-90'
Gravel, sand, little clay, loose heaving formation	90'-110'
Hardpan	110'
Well Description	
Top 30' of well cemented between 16" and 20" casing	
Bottom 20' location of 20' stainless steel (Cook) strainer screen	
Casing diameter	16"
Casing depth	91' 6"
Data on Pump Test	
Current average yield (GPM)	750
Static Water Level	73' 6"

MUNICIPAL WELL NO. 6

Well Log	
Dry sand, gravel and large stones (brown)	60'
Sand, large gravel and clay	13'
Sand, large gravel and clay	6'
Sand, gravel and clay (stratified)	6'
Sand, large gravel and clay (stratified)	6'
Sand, gravel and little clay	6'
Sand, gravel and clay (stratified)	6'
Sand, little gravel and clay	5'
Sand, clay and large stones (tight, hard pan)	6'
Sand, clay and gravel	6'
Sand, gravel and little clay	6'
Sand, clay and large gravel	2'
Gray shale at 128'	
Total depth of well	128' 6"

Well Description	
Total length of stainless steel screen	33'
Casing diameter (inside diameter 15.25")	16"
Casing depth (steel, 0.375" thick)	95'
Upper portion of well encased in 1.5" grout	10'

Data on Pump Test	
Current average yield (GPM)	700
Static Water Level	75'

MJ/ld