



O'BRIEN & GERE
ENGINEERS, INC.

May 26, 1995

Mr. Vivek Nattanmai, P.E.
Division of Hazardous Waste Remediation
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, New York 12233-7010

Re: Former Accurate Die Casting Facility
Fayetteville, New York

File: 2488.396 #2

Dear Mr. Nattanmai:

This letter report presents the design of the bedrock ground water recovery well prepared in connection with the Remedial Design/Remedial Action (RD/RA) activities at the former Accurate Die Casting site in Fayetteville, New York. The bedrock well design, and information pertaining to the site bedrock hydrogeology, is being provided pursuant to the New York State Department of Environmental Conservation (NYSDEC) approved RD/RA Work Plan dated March 1995.

Presented below are:

1. a background data review of bedrock geology in the vicinity of the site;
2. the proposed test bedrock recovery well design; and
3. the proposed bedrock aquifer performance test specifications.

1. Background data review of bedrock geology

Background data pertaining to bedrock geology at the site was obtained from available New York State Geologic Survey reports and previous investigations conducted at the site by Stearns & Wheler.

Bedrock Geology

Bedrock in the vicinity of the site consists of evaporites, dolostone, and shale of the Upper Silurian Camillus and Bertie Formations and Cobleskill Limestone (Rickard and Fisher, 1970). Regionally, the bedrock strata dip approximately 1 degree to the south-southwest.

Information pertaining to site specific bedrock geology was obtained during a remedial investigation (RI) conducted at the site by Stearns & Wheler during 1989 and 1992, as presented in the RI Report (Stearns & Wheler, December 1993). As part of the RI, five

monitoring wells (MW-7, MW-10, MW-11, MW-15, and MW-16) were installed in the bedrock. The locations of these wells are illustrated on Figure 1. MW-10 and MW-11 are installed within the upper 15 feet of bedrock and are located proximal to the former trichloroethylene (TCE) excavation area located outside of the northeast corner of the facility. MW-7 is located northeast of the facility, and MW-15 and MW-16 are located south-southwest of the facility. Boring logs completed by Stearns & Wheler personnel indicate that bedrock consists of gray-green shale to shaley dolostone and ranges in depth from approximately 24 feet at MW-1 to approximately 48.5 feet at MW-6.

Core samples of the bedrock collected at MW-11 indicate that the top ten feet is highly fractured. As suggested in the RI report, the uppermost portion of the Upper Silurian shale formation, which underlies the site, is significantly fractured and the fracture frequency and extent diminish with depth.

Bedrock ground water at the site occurs along fractures and bedding planes. Hydraulic conductivity data obtained from bedrock wells MW-7 and MW-11 were reported by Stearns and Wheler at 2.08×10^{-3} cm/sec and 4.6×10^{-4} cm/sec, respectively. The hydraulic conductivity test data obtained from bedrock well MW-10 reportedly did not produce a smooth curve (Stearns & Wheler, December 1993), possibly indicating that MW-10 was installed in an area of low bedrock permeability.

Bedrock ground water elevation data are presented in Table 1. A bedrock ground water elevation map representing April 25, 1995 data is illustrated on Figure 2. Based on April 25, 1995 monitoring data, bedrock ground water flow is to the north under a hydraulic gradient of approximately 0.022 ft/ft. Bedrock ground water quality data are presented in Table 2. As indicated on Table 2, TCE concentrations ranged from 11 $\mu\text{g/L}$ at MW-15 to 4,300 $\mu\text{g/L}$ at MW-11 during the February 2, 1995 sampling event. TCE has not been detected in bedrock monitoring well MW-7 since its installation in November 1989.

2. Test bedrock recovery well design

Based on the current site conditions, it is proposed that one bedrock recovery well (RW-2) be installed adjacent to bedrock monitoring well MW-11, as illustrated on Figure 1. The following conditions form the basis for the proposed location of the bedrock recovery well:

- The upper ten feet of bedrock is reported to be highly fractured in the vicinity of MW-11. This indicates 1) potentially greater bedrock transmissivity in the vicinity of MW-11, and 2) good potential for a suitable cone of capture.
- Bedrock monitoring well MW-11 is located in the vicinity of the former TCE excavation area.
- Within the bedrock, the highest dissolved TCE concentrations (4,000 to 5,000 $\mu\text{g/L}$) have been detected at MW-11 during ground water monitoring events.

Based on the above information, the proposed bedrock recovery well will be installed as described below and illustrated on Figure 3.

- The bedrock recovery well will be installed using a combination of mud rotary and air rotary drilling techniques. Initially, mud rotary drilling will be used to install a nominal 16-inch borehole approximately 5 feet into bedrock (approximately 43 feet below grade). A 12-inch diameter casing will be installed through a nominal 16-inch borehole to isolate the bedrock well from the overburden material. The annular space between the borehole and the 12-inch casing will be sealed using a cement/bentonite grout mix. The cement/bentonite grout will be allowed to cure for a minimum of 12 hours before further advancement of the bedrock well.
- After allowing the grout to cure, an 11-7/8 inch diameter borehole will be advanced using air rotary drilling methods to an estimated terminal depth of 60 feet below grade. Actual well depth will be determined during installation and will be based on estimated well yield. However, the well depth will not exceed a depth of 75 feet below grade. The terminal depth of the bedrock recovery well has been selected to provide for recovery of impacted ground water in the vicinity of MW-11. As suggested earlier, the uppermost portion of the site bedrock is fractured and fracture frequency diminishes with depth. As well, existing site bedrock wells monitor the upper 15 feet of the bedrock aquifer.

Should field conditions indicate that the competency of the shallow bedrock will not support an open-hole design, an 8-inch diameter stainless steel screen and carbon steel casing will be installed in the borehole with an 8-inch diameter, five foot long carbon steel sump welded to the bottom of the well screen. The sump would serve to protect the well pump, as well as provide the maximum potential drawdown. The screened interval will be selected based on conditions encountered during drilling.

A bentonite seal will be placed in the annular space between the sump and borehole wall to minimize potential downward migration of contaminants below the well screen. A sandpack will be installed in the annular space between the well screen and borehole wall. A bentonite seal with minimum thickness of two feet will be installed above the sandpack. The remaining annular space will be filled with a cement/bentonite grout mix to grade. RW-2 will be finished with an 8-inch diameter locking well cap.

- Subsequent to installation, the bedrock recovery well will be developed using a combination of mechanical surging and/or pumping or air lift methods. Well development will continue until the well yields relatively sediment-free water and specific capacity stabilizes.

Water exhibiting less than 100 NTUs, or having three consecutive readings within 10% of each other, will be considered sediment-free. Specific capacity, which is well capacity divided by drawdown, will be considered stable after four consecutive half-hour interval measurements fall within a 25% range.

- Soil and rock cuttings generated during drilling will be staged on and covered with plastic sheeting in an area of the site specified by O'Brien and Gere Technical Services, Inc. This material will be disposed of off-site in association with the disposal of soils excavated from the oil stained area.
- Water generated during drilling and development will be temporarily stored in a tank or 55-gallon drums prior to carbon treatment and discharge to Bishop Brook, in accordance with NYSDEC State Pollutant Discharge Elimination System (SPEDES) permit #734052, as presented in the NYSDEC approved RD/RA Work Plan.

3. **Bedrock aquifer performance test**

Following installation of the bedrock recovery well, a bedrock aquifer performance test will be performed to estimate the design flow rates and to provide a preliminary evaluation of the bedrock aquifer characteristics. The well will be pumped continuously for up to 24 hours at a constant flow rate. The flow rate for the test will be established based on well yields obtained following well installation and development. Prior to the initiation of the bedrock aquifer performance test, water level measurements will be obtained from the selected test monitoring wells to establish background conditions. Water level monitoring will be conducted in the following monitoring wells: the bedrock recovery well RW-2, bedrock monitoring wells MW-7, MW-10, MW-11, MW-15, and MW-16, and overburden monitoring wells MW-2, MW-5, MW-6, MW-8, MW-9, PZ-1, PZ-2, MW-13, and MW-14. Once the test is complete and the pump is turned off, water level monitoring will continue until the water levels approximate the water levels observed prior to the test.

The aquifer performance test data for each well influenced by pumping will be analyzed in the field using the Cooper-Jacob straight-line method. The analysis will be used in the design of a bedrock ground water recovery system.

A ground water sample will be collected during the test for volatile organic compounds (VOCs) analyses by USEPA Methods 8010/8020. The results of the analyses and the expected well yield rate established by the bedrock aquifer performance test will be used to evaluate the treatment capacity of the water treatment system being installed as part of the Interim Remedial Measures to address overburden ground water. A ground water sample will also be collected and analyzed for pH, specific conductance, methylene blue active substances, total alkalinity, total dissolved solids, total suspended solids, calcium carbonate, iron, sulfate and manganese to enable assessment of treatment system fouling potential.

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Water generated during development and aquifer testing will be treated and discharged to Bishop Brook as described in the RD/RA Work Plan. The results of the pump test and bedrock aquifer evaluation will be provided in a Bedrock Recovery Basis of Design report, as described in the RD/RA Work Plan.

Upon NYSDEC approval of the bedrock recovery well design and bedrock aquifer performance test plan, described above, arrangements will be made to install the well and conduct the aquifer test. After arrangements have been made, the NYSDEC will be provided a schedule for these activities.

If you have any questions or comments please do not hesitate to contact David Towers, P.E. at (315) 437-6100.

Very truly yours,

O'BRIEN AND GERE ENGINEERS, INC.



David S. Towers, P.E.
Senior Project Engineer

DJC:bdm/TEC396.30

cc: C. Johnson, Esq (ITT Corporation)
U. Wright (ITT Corporation)
R. Alessi, Esq (LeBoeuf, Lamb, Greene & MacRae)
T. Brown, P.E. (O'Brien and Gere Technical Services, Inc.)

TABLE 1
 MONITORING WELL SPECIFICATIONS AND GROUND WATER ELEVATIONS
 ACCURATE DIE CASTING
 FAYETTVILLE, NY

Well No.	Ground Elevation	Well Casing Elevation	Screened Interval Elevation	GROUND WATER ELEVATIONS										
				5/28/92	6/26/92	8/7/92	9/26/94	9/27/94	10/18/94	11/2/94	11/17/94	11/30/94	12/15/94	
MW-1	99.36	101.11	75.4 - 85.4	DRY	DRY	79.69	---	---	---	DRY	---	---	---	---
MW-2	91.8	94.68	76.6 - 86.6	83.21	82.81	84.32	83.10	83.28	80.12	---	---	---	---	---
MW-3	97.65	99.63	73.7 - 83.7	80.44	80.09	81.63	---	---	---	---	---	---	---	---
MW-4	65.62	68.52	46.6 - 56.6	51.08	49.95	50.81	47.22	52.21	46.79	---	---	---	---	---
MW-5	88.21	90.42	49.2 - 59.2	60.71	63.76	61.22	59.87	59.91	59.45	---	---	---	---	---
MW-6	77.46	79.38	46.4 - 56.4	60.50	60.49	60.46	59.51	59.52	59.05	---	---	---	---	---
MW-7(B)	75.66	78.34	34.3 - 44.3	54.59	54.55	54.47	53.90	53.97	53.55	---	---	---	---	---
MW-8	88.21	91.78	53.9 - 63.9	66.38	66.38	66.83	61.59	61.65	60.99	---	---	---	---	---
MW-9	102.44	104.03	49.7 - 59.7	60.46	60.51	61.83	59.57	59.59	59.08	---	---	---	---	---
MW-10(B)	97.51	99.69	43.03 - 53.03	61.15	61.99	61.69	---	---	56.02	55.07	55.19	54.94	55.19	---
MW-11(B)	91.48	93.80	43.1 - 53.1	62.34	63.70	63.66	58.41	58.39	57.47	50.01	56.68	55.59	56.63	---
MW-12	93.62	94.14	51.9 - 61.9	62.24	60.74	62.77	59.77	59.79	59.31	---	---	---	---	---
MW-13	98.73	100.92	77.7 - 87.7	DRY	80.62	80.92	---	---	78.70	82.92	78.21	78.21	80.92	---
MW-14	98.76	100.62	74.6 - 84.6	75.11	79.07	81.54	---	---	86.18	80.12	80.54	80.54	80.20	---
MW-15(B)	96.1	98.90	32.7 - 42.7	NI	NI	NI	---	---	53.47	---	---	---	---	---
MW-16(B)	98.5	100.85	50.8 - 60.8	NI	NI	NI	---	---	61.67	---	---	---	---	---
MW-17	66.9	69.24	53.7 - 63.7	NI	NI	NI	54.61	54.61	54.08	---	---	---	---	---
PZ-1	81.8	83.95	49.8 - 59.8	NI	NI	NI	59.56	59.57	59.10	---	---	---	---	---
PZ-2	80.6	83.06	42.8 - 52.8	NI	NI	NI	59.35	59.36	58.89	---	---	---	---	---
RW-1	78.4	80.28	29.4-39.4 - 45.4-50.4	NI	NI	NI	56.88	56.89	58.22	---	---	---	---	---
Sump	---	98.50	---	---	---	---	---	---	---	---	76.04	74.83	75.00	75.17

Notes: (B) - Bedrock well.
 NI - Well not installed at time of monitoring.
 --- - Water level not monitored.
 MW-1 through MW-16 installed during Remedial Investigation (Stearns & Wheeler).
 MW-3 was abandoned (6/94).

TABLE 1
 MONITORING WELL SPECIFICATIONS AND GROUND WATER ELEVATIONS
 ACCURATE DIE CASTING
 FAYETTVILLE, NY

Well No.	12/27/94	1/13/95	1/25/95	2/9/95	2/23/95	3/9/95	4/25/95
MW-1	---	---	---	---	---	---	Dry
MW-2	---	---	---	---	---	---	83.28
MW-3							
MW-4	---	---	---	---	---	---	51.44
MW-5	---	---	---	---	---	---	60.34
MW-6	---	---	---	---	---	---	60.02
MW-7(B)	---	---	---	---	---	---	54.51
MW-8	---	---	---	---	---	---	63.41
MW-9	---	---	---	---	---	---	60.10
MW-10(B)	55.02	54.94	54.95	54.52	54.36	55.02	57.49
MW-11(B)	56.55	55.63	55.63	56.13	55.63	56.55	58.86
MW-12	---	---	---	---	---	---	60.30
MW-13	78.34	78.25	77.83	77.84	77.75	77.67	Dry
MW-14	80.54	80.62	80.45	78.95	79.54	80.12	80.61
MW-15(B)	---	---	---	---	---	---	54.71
MW-16(B)	---	---	---	---	---	---	63.86
MW-17	---	---	---	---	---	---	59.02
PZ-1	---	---	---	---	---	---	60.08
PZ-2	---	---	---	---	---	---	59.88
RW-1	---	---	---	---	---	---	59.14
Sump	74.83	75.00	75.00	74.88	75.00	78.00	75.09

Notes: (B) - Bedrock well.

NI - Well not installed at time of monitoring.

--- - Water level not monitored.

MW-1 through MW-16 installed during Remedial Investigation (Stearns & Wheler).

MW-3 was abandoned (6/94).

Table 2
Ground Water TCE Concentrations
Accurate Die Casting Facility
Fayetteville, NY

Date Sampled:	Trichloroethylene Concentrations (1)						
	8/30/89	12/4/89	5/20/90	5/28/92	7/22/94	10/18/94	2/3/95
Monitoring Well (3)							
MW-1	112	ND	2	ND	NS	Dry	NA
MW-2	ND	ND	1	ND	NS	ND	ND
MW-3	Free Product	>55,000	440,000	340,000	Abandoned	Abandoned	Abandoned
MW-4	NS	7	43	6	270	23	13
MW-5	NI	340	344	110	330	410	290
MW-6	NI	700	454	510	390	360	330
MW-7 (B)	NI	ND	ND	ND	ND	ND	ND
MW-8	NI	ND	ND	ND	NA	ND	ND
MW-9	NI	109	106	60	72	74	74
MW-10 (B)	NI	NI	NI	4,500	1,600	1300	1400
MW-11 (B)	NI	NI	NI	5,200	5,500	5300	4300
MW-12	NI	NI	NI	36	44	35	33
MW-13	NI	NI	NI	110	740	510	NA
MW-14	NI	NI	NI	67	150	120	79
MW-15 (B)	NI	NI	NI	NI	NS	14	11
MW-16 (B)	NI	NI	NI	NI	NS	6	17
MW-17	NI	NI	NI	NI	260	140	200(13 PCE)
Sump							17000

Notes: ND - Not detected at concentrations greater than analytical detection limit.

NS - Not sampled.

NI - Well not installed at time of sampling.

NA - Not analyzed.

(1) - Concentrations reported in ug/L (ppb).

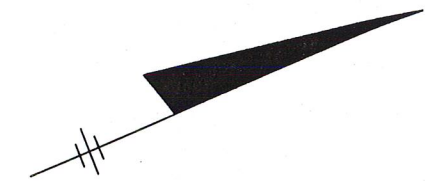
(2) - Sample collected 8/19/92 because MW-13 and MW-14 were dry on 5/28/92.

(3) - Monitoring wells MW-1 through MW-16 installed by Stearns & Wheler, monitoring well MW-17 installed by O'Brien & Gere Engineers, wells MW-1, MW-7, MW-10, MW-11, MW-15, and MW-16 are bedrock ground water monitoring wells.

(B) - Bedrock well.

MWH H: \2488396\71\36F.DWG SF:150 5/22/95

FIGURE 1



LEGEND

- PROPERTY LINE
- MONITORING WELL
- PIEZOMETER LOCATION
- PZ-1
- RW-1 OVERBURDEN AQUIFER RECOVERY WELL
- RW-2 PROPOSED BEDROCK GROUND WATER RECOVERY WELL

ACCURATE DIE CASTING
FAYETTEVILLE, NEW YORK
BEDROCK RECOVERY WELL
DESIGN REPORT

SITE PLAN



APPROX. SCALE IN FEET
FILE NO. 2488.396-36F

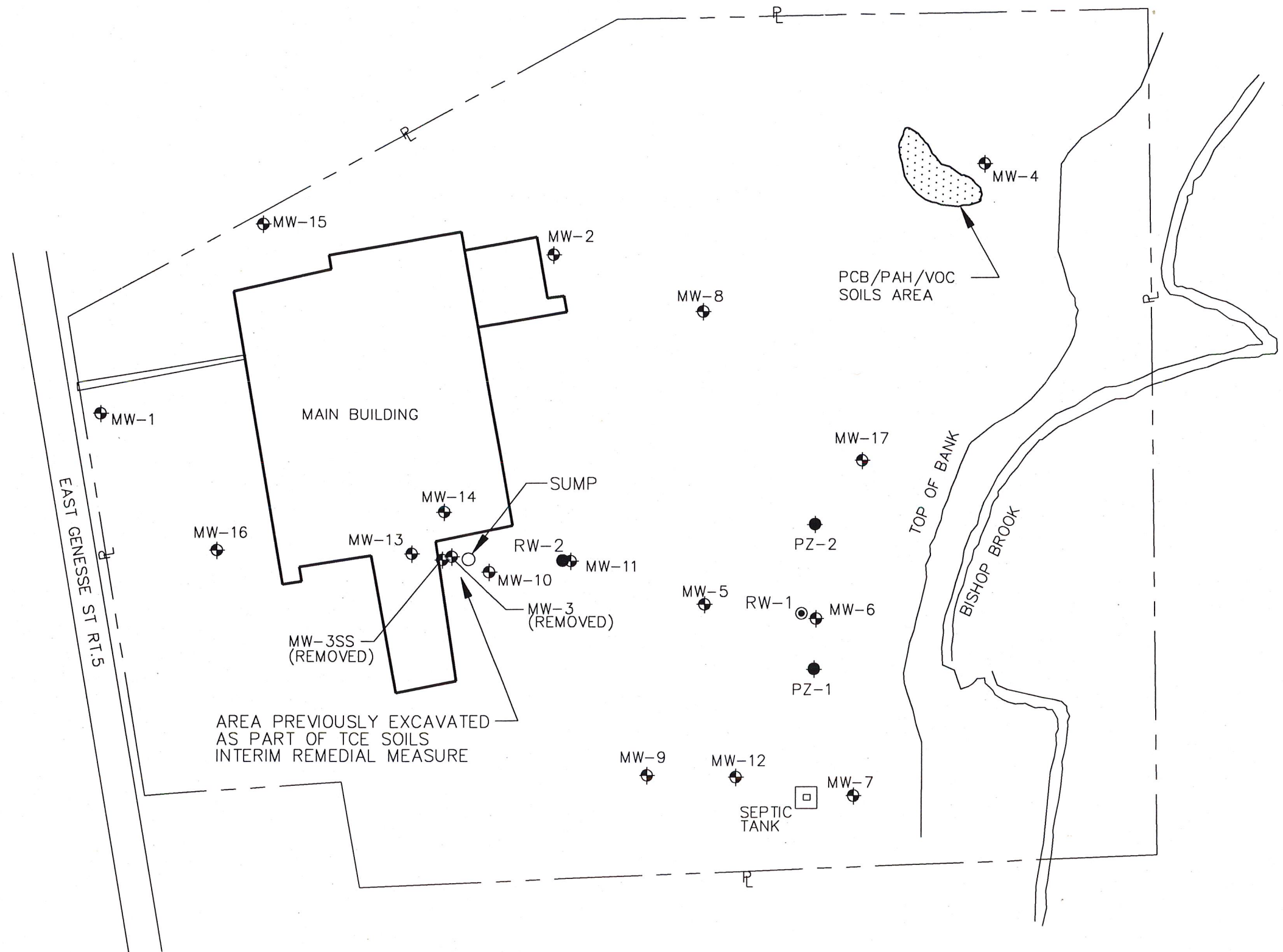
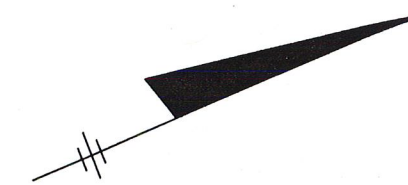


FIGURE 2

MWH H:\2488396\71\37F.DWG SF:150 5/22/95



LEGEND

- PROPERTY LINE
- MONITORING WELL
- PIEZOMETER LOCATION
- PZ-1
- RW-1
- OVERBURDEN AQUIFER RECOVERY WELL
- RW-2
- PROPOSED BEDROCK GROUND WATER RECOVERY WELL
- BEDROCK GROUND WATER ELEVATION CONTOUR (DASHED WHERE INFERRED)

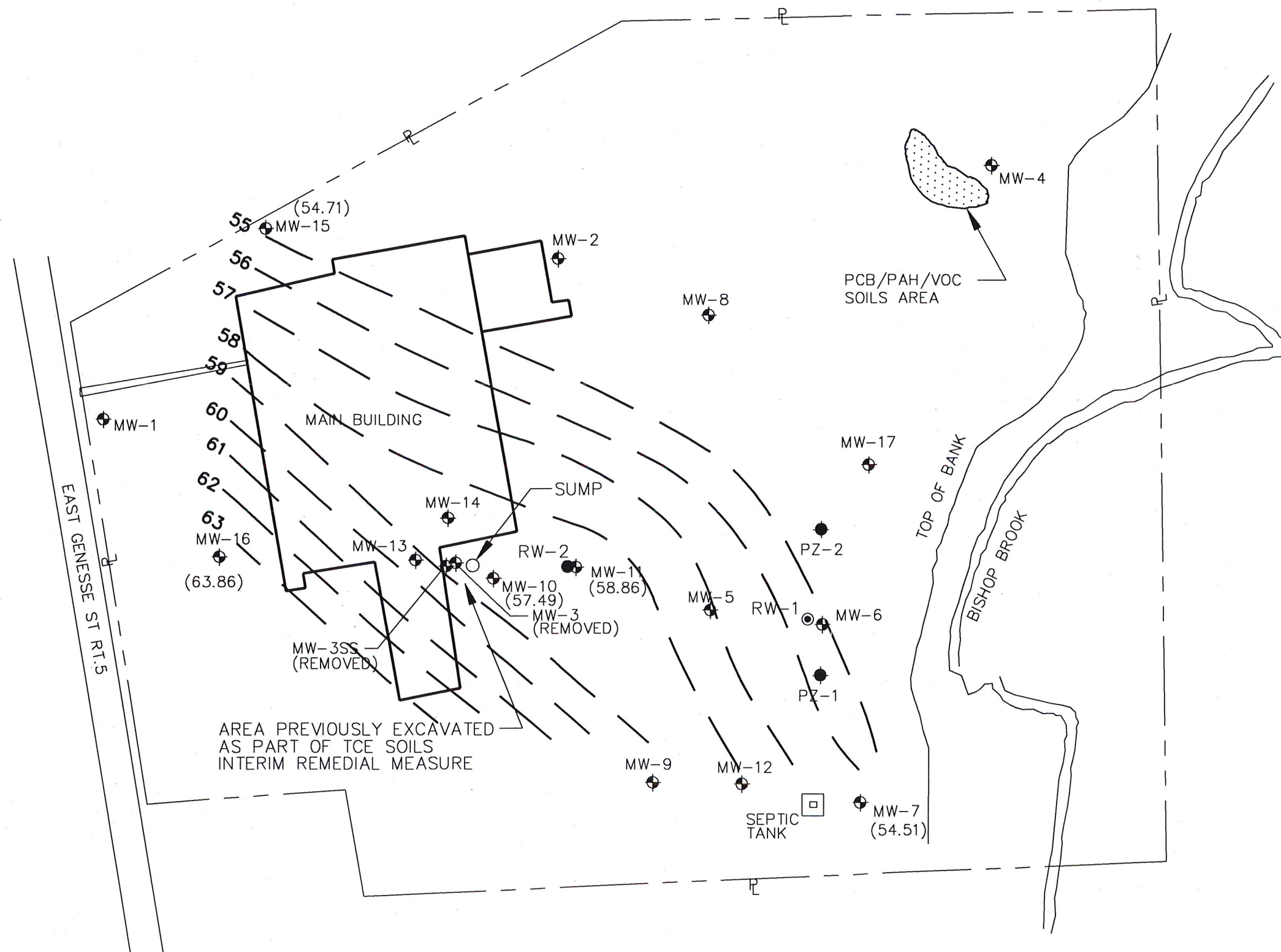
ACCURATE DIE CASTING
FAYETTEVILLE, NEW YORK
BEDROCK RECOVERY WELL
DESIGN REPORT

BEDROCK GROUND
WATER ELEVATION MAP
4/25/95



APPROX. SCALE IN FEET

FILE NO. 2488.396-37F



PROPOSED BEDROCK RECOVERY WELL
 ACCURATE DIE CASTING
 FAYETTEVILLE, N.Y.

OPEN - BEDROCK HOLE

CASED - BEDROCK HOLE

