EPA Region 5 Records Ctr.
304940

CA750 Groundwater Migration Under Control Addendum

W.G. Krummrich Plant
Sauget, Illinois

April 19, 2004

Prepared for:
USEPA Region 5 RCRA
Chicago, Illinois

Submitted by:
Solutia Inc.
St. Louis, Missouri

SOLUTIA. Solutions for a better life.

April 19, 2004

Mr. Ken Bardo
U.S. EPA Region 5
Corrective Action Section
77 West Jackson Blvd
Chicago, IL 60604-3590

RE: Solutia W. G. Krummrich Plant

Dear Ken:

Enclosed is the CA750 Groundwater Migration Under Control Addendum as agreed in our meeting with the Agency on March 17/18, 2004.

This submittal is intended to resolve the March 30, 2004 Notice of Dispute Meeting, Administrative Order on Consent, EPA Docket No. R8H-5-00-003 and demonstrate that hydraulic control of the groundwater contaminant plume has and is being maintained. Specifically, this Addendum includes the following information:

- Water Level and Pumping Rate Data
- Hydraulic Control of Groundwater Migration Demonstration
- Physical Control of Groundwater Migration Demonstration
- Groundwater Control Data Gap Analysis
- Plume Stability Monitoring Plan

If you have any questions or need additional information, please let me know. We would like to schedule a meeting at your convenience to discuss this submittal and define any follow up that is needed to further demonstrate that groundwater migration is under control.

Sincerely,

Steven D. Smith

cc:	Nabil Fayoumi	EPA
	Sandra Bron	Illinois EPA
	Jim Moore	Illinois EPA
	Gina Search	Illinois EPA
	Bruce Yare	Solutia
	Richard Williams	Williams & Associates
	Bob Hiller	Solutia

TABLE OF CONTENTS

Section 1 - Water Level and Pumping Rate Data

- **Extraction Well, Water-Level Piezometer and Existing Monitoring Well Location Map**
- **Extraction Well Pumping Rate Protocol Chronology**
- **Surface Water Level, Groundwater Level (PZ-1S, PZ-2E, PZ-3E and PZ-4E) and Extraction Well Pumping Rate Data Tables and Plots**
  - October 22 to 31, 2003
  - November 2003
  - December 2003
  - January 2004
  - February 2004
  - March 2004
  - April 1 to 11, 2004
- **Surface Water Level and Groundwater Level Data Table**
  - Extraction Wells EW-1, 2 and 3
  - Water-Level Piezometers PZ-1 N/S, PZ-2 E/W, PZ-3 E/W and PZ-4 E/W
  - Existing Monitoring Wells B-21B, B-25B, B-26B, B-27B, B-28B and B-29B
  - Existing Monitoring Well GM-27B
- **Well Logs and Construction Records**
  - Screen Elevation Summary
  - Extraction Wells EW-1, 2 and 3
  - Water-Level Piezometers PW-1N/S, PW-2E/W, PW-3E/W and PW-4E/W
  - Existing Monitoring Well GM-27B
- **Geologic Sections**
  - July 2003 URS Barrier Wall Alignment Profile
  - January 1984 D'Appolonia Bedrock Investigation

Section 2 - Hydraulic Control of Groundwater Migration

- **October 22, 2003 to January 31, 2004 (Water Level vs. Time Plots)**
  - **Line of Evidence 1** - Surface Water Level > Groundwater Levels (Gradient Reversal, No Groundwater Discharge to Surface Water)
  - **Line of Evidence 2** - Surface Water Level > Pumping Water Levels (Gradient from River to Pumping Wells)
  - **Line of Evidence 3** - Groundwater Levels > Pumping Water Levels (Gradient from Water-Level Piezometers to Pumping Wells)
- **February 1, 2004 to April 11, 2004 (Groundwater Contour Maps)**

- **Line of Evidence 4** - Surface Water Level > Groundwater Levels (Gradient Reversal, No Groundwater Discharge to Surface Water)
- **Line of Evidence 5** - Groundwater Levels > Pumping Water Levels (Hydraulic Trough Along River)

Section 3 - Physical Control of Groundwater Migration (Water Level vs Time Plots)

- **Line of Evidence 6** - Surface Water Level > Outside GWL (PZ-2W) > Inside GWL (PZ-2E) > PWL (Gradient from River to Pumping Wells)
- **Line of Evidence 7** - Outside GWL (PZ-2W) > Inside GWL (PZ-2E) (Gradient Across Slurry Trench/Barrier Wall)
- **Line of Evidence 8** - Surface Water Level > Outside GWL (PZ-3W) > Inside GWL (PZ-3E) > PWL (Gradient from River to Pumping Wells)
- **Line of Evidence 9** - Outside GWL (PZ-3W) > Inside GWL (PZ-3E) (Gradient Across Slurry Trench/Barrier Wall)

Section 4 - Groundwater Control Data Gap Analysis

Section 5 - Plume Stability Monitoring Plan

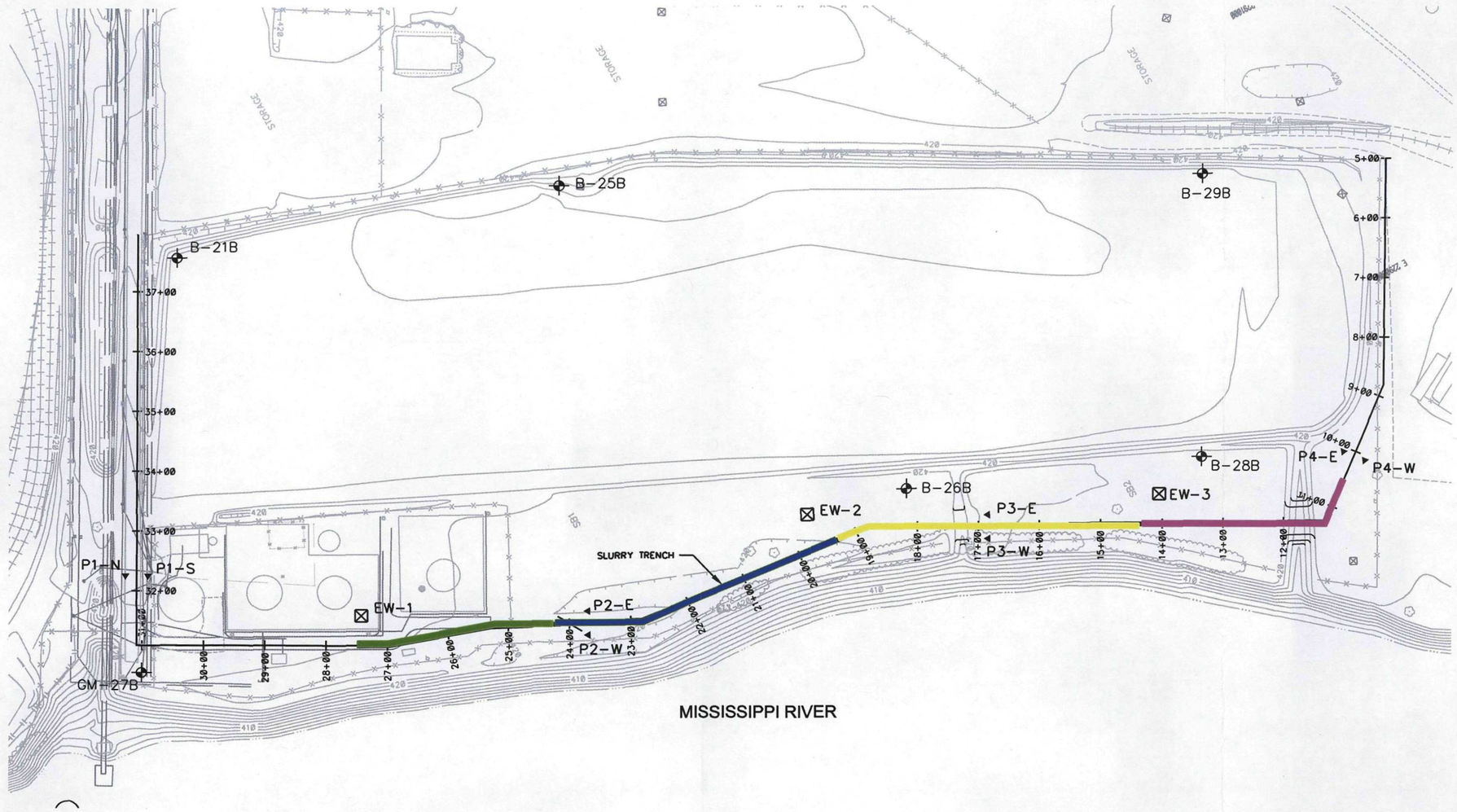
- **Monitoring Plan**
  - **Plume Volume Monitoring**
  - **Groundwater Quality Monitoring**
  - **Unstable Plume Criteria**
- **Well Location Map**

EXTRACTION WELL,

WATER-LEVEL PIEZOMETER

AND

EXISTING MONITORING WELL LOCATION MAP



LEGEND

- SEPTEMBER
- OCTOBER
- NOVEMBER
- DECEMBER

0 200
SCALE FEET

SOLUTIA™
Applied Chemistry, Creative Solutions

SOLUTIA INC.
575 MARYVILLE CENTRE DRIVE
ST. LOUIS, MO. 63141

GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

PROJECT NO.

Site Layout

FIG. NO.
1

EXTRACTION WELL

PUMPING RATE PROTOCOL

CHRONOLOGY

EXTRACTION WELL PUMPING RATE PROTOCOL CHRONOLOGY

Year	From	To	Pumping Rate Protocol
2003	July 12	September 28	Total extraction system flow restricted to 200 gpm by American Bottoms Regional Treatment Facility (ABRTF)
	September 29	October 21	Total extraction system flow restricted between 500 gpm and 1200 gpm
	October 22	November 24	ABRTF lifted flow restrictions; allowed discharge at up to maximum rate. Total extraction well system determined using Record of Decision (ROD) pumping rate look-up table for Alternative C - Hydraulic Barrier (No Wall). Flow from each extraction limited to a maximum of 600 gpm.
	November 25	December 8	Extraction well flow based on average groundwater level in two closest piezometers; pumping rate adjusted to keep average groundwater level within +/- 0.5 ft. of surface water level. Pumping rate adjustments were made on an hourly basis in increments of 10% of the look-up table. 600 gpm maximum extraction well flow rate restriction removed on December 7.
	December 9	December 14	Extraction well flow based on average groundwater level in two closest piezometers; pumping rate adjusted to keep average groundwater level within +/- 0.5 ft. of surface water level. Pumping rate adjustments made every four hours. Look-up table no longer used to control pumping rates.
	December 15	December 31	Extraction system total flow rate adjusted to keep groundwater level in each piezometer within +/- 0.5 ft. of surface water level. Pumping rate adjustments made every two hours. New algorithm used to control pumping rate changes.
2004	January 1	January 21	Extraction system total flow rate adjusted to keep groundwater level in each piezometer within +/- 0.5 ft. of surface water level. Pumping rate adjustments made every two hours. New algorithm used to control pumping rate changes.
	January 22	January 29	Extraction system total flow rate adjusted to keep groundwater level in each piezometer within 0 to - 1 ft. of surface water level. Pumping

EXTRACTION WELL PUMPING RATE PROTOCOL CHRONOLOGY

Year	From	To	Pumping Rate Protocol
			rate adjustments made every hour. New algorithm used to control pumping rate changes so that groundwater levels would track surface water levels more closely.
2004	January 29		Extraction well EW-2 pump failure.
	February 2		System temporarily shut down to replace EW-2.
			Water-level transducer in EW-2 set at incorrect depth after pump replacement.
	February 3		Extraction system operation resumed.
	February 4	February 17	Extraction system operated at maximum pumping capacity (2225 gpm).
	February 18	March 4	Extraction system operated at maximum pumping capacity (2175 gpm). EW-3 flow reduced by 50 gpm to prevent electrical overload and automatic pump shut down.
	March 5	March 15	ABRTF restricted total extraction system flow to 500 gpm because of treatment system upset that resulted in a TSS excursion.
	March 16		EW - 2 water-level transducer set at correct elevation.
	March 16	April 11	Extraction system total flow determined using Record of Decision (ROD) pumping rate look-up table for Alternative C - Hydraulic Barrier (No Wall).

WATER LEVEL AND PUMPING RATE

DATA TABLES AND PLOTS

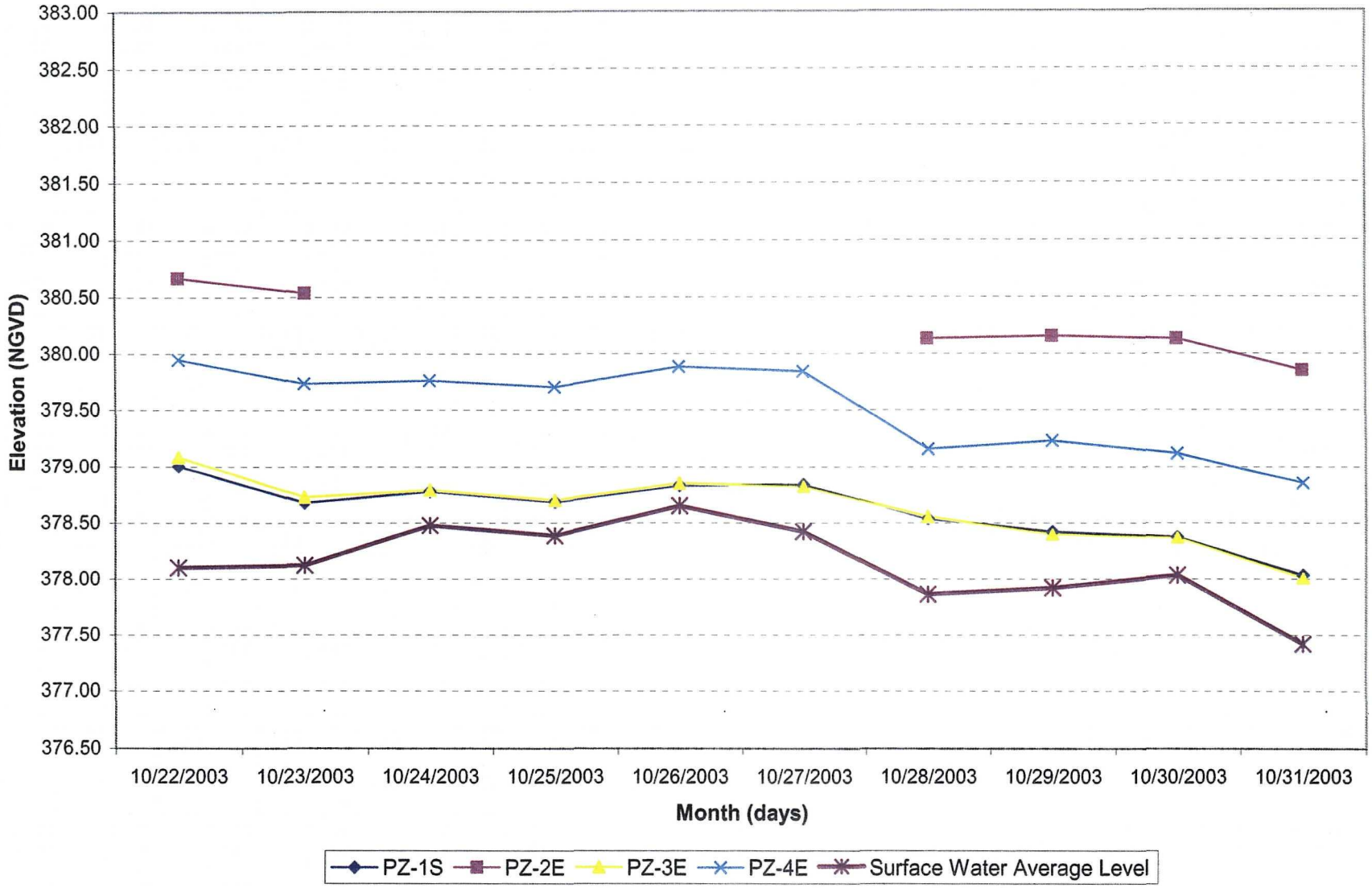
OCTOBER 22 to 31, 2003

October Water Level Data
Sauget Area 2 Groundwater Migration Control System

Date	Total Combined Flow	River Stage Average Level	Average Daily Water Level Readings			
			PZ-1S	PZ-2E	PZ-3E	PZ-4E
	GPM avg over 24 hrs	River Stage avg	24-hr average	24-hr average	24-hr average	24-hr average
10/22/2003	1492.00	378.10	379.00	380.66	379.08	379.95
10/23/2003	1744.63	378.12	378.68	380.53	378.73	379.73
10/24/2003	1727.51	378.48	378.78		378.79	379.76
10/25/2003	1674.23	378.38	378.69		378.70	379.70
10/26/2003	1717.45	378.65	378.83		378.85	379.88
10/27/2003	1727.42	378.42	378.84		378.82	379.84
10/28/2003	1755.44	377.86	378.54	380.13	378.55	379.16
10/29/2003	1755.02	377.92	378.42	380.15	378.40	379.23
10/30/2003	1745.46	378.03	378.37	380.13	378.37	379.12
10/31/2003	1778.60	377.42	378.03	379.85	378.00	378.86

GPM	Gallons per Minute
avg	Average
WL	Water Level
(blank cell)	System down

October Daily Average Water Level Readings
Sauget Area 2 Groundwater Migration Control System



WATER LEVEL AND PUMPING RATE

DATA TABLES AND PLOTS

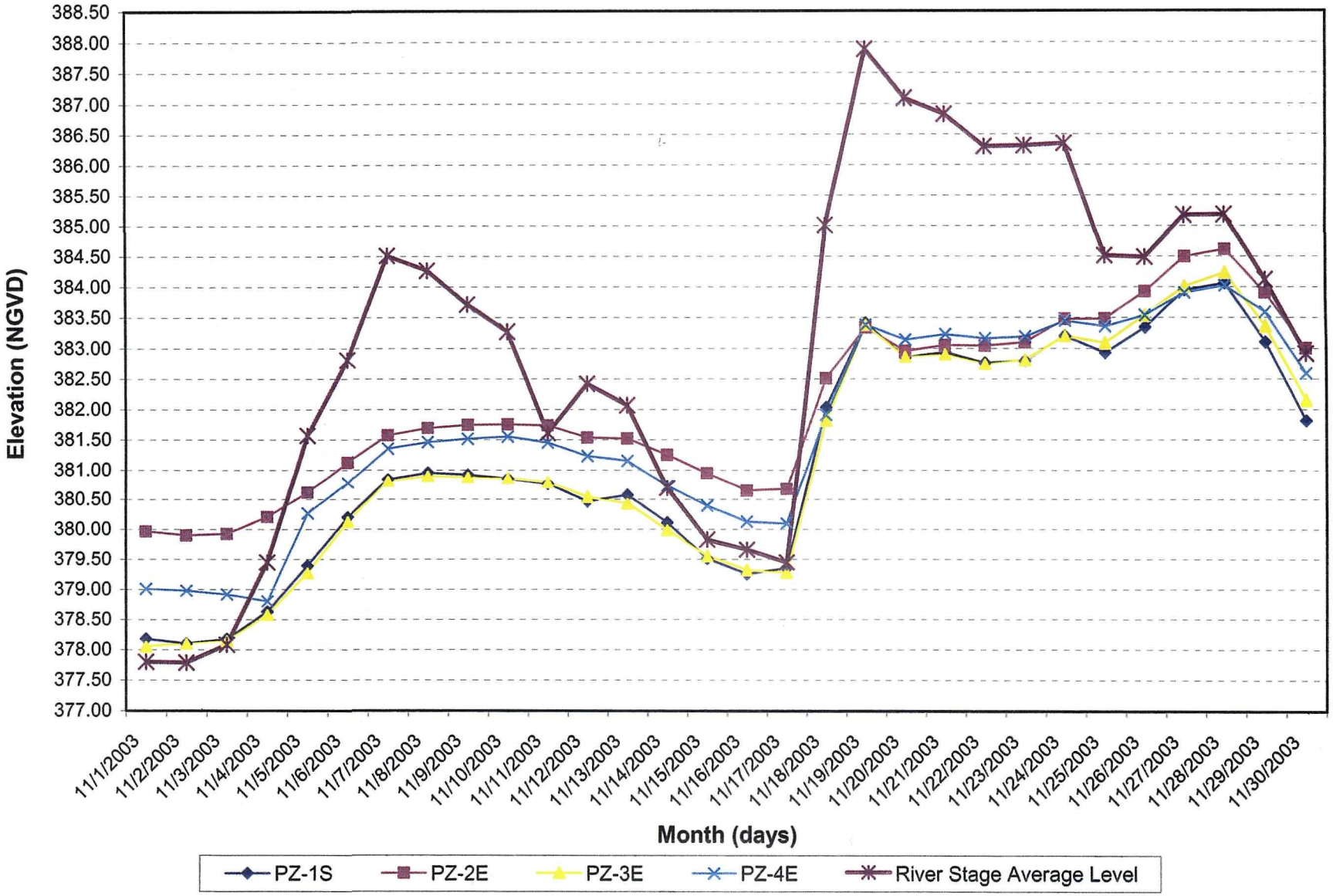
NOVEMBER 2003

November Water Level Data
Sauget Area 2 Groundwater Migration Control System

Date	Total Combined Flow	River Stage Average Level	Average Daily Water Level Readings			
			PZ-1S	PZ-2E	PZ-3E	PZ-4E
	GPM avg over 24 hrs	Daily WL avg	24-hr average	24-hr average	24-hr average	24-hr average
11/1/2003	1760.03	377.79	378.18	379.96	378.05	379.01
11/2/2003	1762.07	377.78	378.10	379.90	378.10	378.98
11/3/2003	1747.35	378.08	378.17	379.92	378.14	378.91
11/4/2003	1682.49	379.44	378.63	380.20	378.58	378.80
11/5/2003	1577.33	381.56	379.39	380.61	379.26	380.27
11/6/2003	1503.71	382.80	380.20	381.12	380.12	380.78
11/7/2003	1425.80	384.50	380.84	381.57	380.80	381.35
11/8/2003	1437.13	384.25	380.95	381.69	380.89	381.46
11/9/2003	1462.70	383.70	380.92	381.74	380.87	381.51
11/10/2003	1487.38	383.26	380.85	381.75	380.85	381.55
11/11/2003	1388.55	381.60	380.76	381.73	380.78	381.45
11/12/2003	1530.31	382.41	380.46	381.53	380.53	381.23
11/13/2003	1543.08	382.06	380.57	381.51	380.42	381.15
11/14/2003	1615.00	380.69	380.11	381.25	379.98	380.73
11/15/2003	1658.33	379.83	379.51	380.95	379.55	380.40
11/16/2003	1667.19	379.65	379.25	380.64	379.31	380.13
11/17/2003	1679.32	379.44	379.35	380.67	379.27	380.10
11/18/2003	641.30	385.00	382.03	382.50	381.81	381.91
11/19/2003	1086.62	387.88	383.40	383.33	383.37	383.38
11/20/2003	1294.62	387.08	382.85	382.95	382.85	383.14
11/21/2003	1307.92	386.83	382.93	383.05	382.89	383.23
11/22/2003	1334.53	386.29	382.75	383.04	382.74	383.16
11/23/2003	1336.20	386.30	382.79	383.09	382.80	383.19
11/24/2003	1052.11	386.34	383.20	383.47	383.19	383.45
11/25/2003	881.96	384.50	382.93	383.47	383.08	383.35
11/26/2003	458.99	384.48	383.34	383.92	383.52	383.54
11/27/2003	224.93	385.16	383.94	384.49	384.00	383.90
11/28/2003	250.08	385.17	384.06	384.60	384.22	384.02
11/29/2003	882.72	384.11	383.10	383.90	383.34	383.59
11/30/2003	1402.83	382.91	381.82	383.00	382.14	382.59

GPM Gallons per Minute
avg Average
WL Water Level

November Average Daily Water Level Readings
Sauget Area 2 Groundwater Migration Control System



WATER LEVEL AND PUMPING RATE

DATA TABLES AND PLOTS

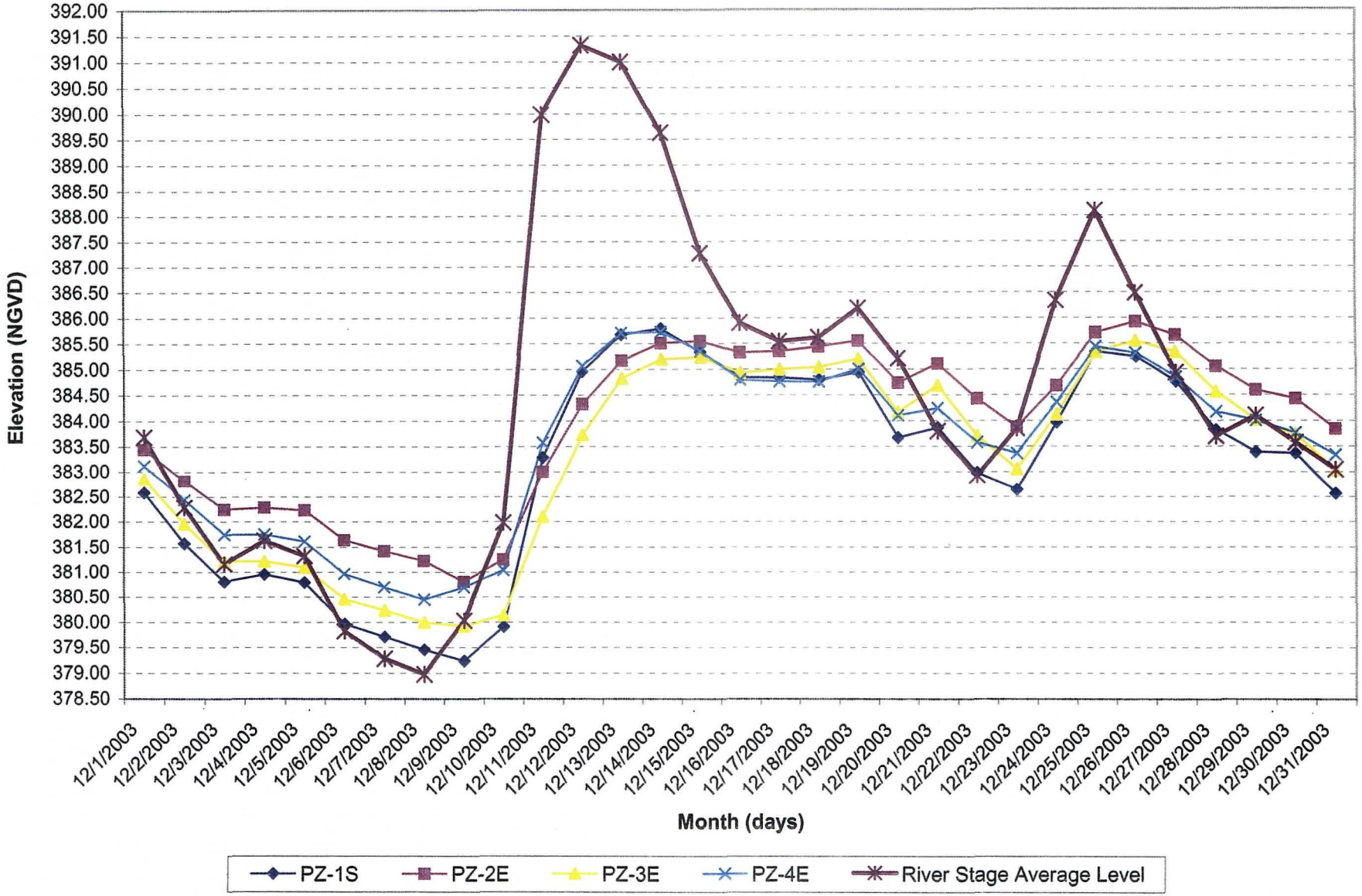
DECEMBER 2003

December Water Level Data
Sauget Area 2 Groundwater Migration Control System

Date	Total Combined Flow	River Stage Average Level	Average Daily Water Level Readings			
			PZ-1S	PZ-2E	PZ-3E	PZ-4E
	GPM avg over 24 hrs	Daily WL avg	24-hr average	24-hr average	24-hr average	24-hr average
12/1/2003	830.12	383.68	382.58	383.43	382.84	383.12
12/2/2003	1494.90	382.28	381.57	382.81	381.94	382.43
12/3/2003	1697.26	381.15	380.80	382.24	381.20	381.74
12/4/2003	1570.40	381.62	380.95	382.28	381.21	381.75
12/5/2003	1579.00	381.32	380.79	382.23	381.08	381.61
12/6/2003	1776.35	379.82	379.97	381.63	380.45	380.96
12/7/2003	1800.09	379.28	379.71	381.41	380.23	380.69
12/8/2003	1902.55	378.98	379.45	381.22	379.99	380.45
12/9/2003	2141.14	380.03	379.23	380.80	379.92	380.70
12/10/2003	1812.99	381.98	379.91	381.25	380.13	381.03
12/11/2003	1231.90	389.98	383.28	383.00	382.08	383.57
12/12/2003	748.40	391.32	384.95	384.32	383.71	385.06
12/13/2003	375.08	390.99	385.67	385.16	384.81	385.70
12/14/2003	229.15	389.62	385.79	385.51	385.18	385.73
12/15/2003	224.93	387.26	385.33	385.54	385.22	385.35
12/16/2003	225.37	385.90	384.84	385.32	384.92	384.79
12/17/2003	224.96	385.54	384.83	385.34	384.98	384.76
12/18/2003	225.28	385.61	384.79	385.43	385.02	384.75
12/19/2003	224.92	386.18	384.93	385.55	385.19	385.00
12/20/2003	235.95	385.20	383.66	384.73	384.15	384.10
12/21/2003	460.81	383.78	383.85	385.10	384.67	384.23
12/22/2003	847.52	382.92	382.98	384.42	383.69	383.57
12/23/2003	1111.96	383.84	382.63	383.86	383.04	383.36
12/24/2003	717.45	386.33	383.96	384.67	384.10	384.35
12/25/2003	330.48	388.09	385.33	385.70	385.32	385.43
12/26/2003	224.85	386.47	385.24	385.91	385.53	385.30
12/27/2003	273.80	384.93	384.75	385.65	385.32	384.84
12/28/2003	575.63	383.69	383.82	385.05	384.55	384.17
12/29/2003	836.97	384.09	383.38	384.59	384.00	384.00
12/30/2003	842.94	383.56	383.36	384.41	383.72	383.76
12/31/2003	1189.19	383.04	382.56	383.83	383.02	383.33

GPM Gallons per Minute
avg Average
WL Water Level

December Average Daily Water Level Readings
Sauget Area 2 Groundwater Migration Control System



WATER LEVEL AND PUMPING RATE

DATA TABLES AND PLOTS

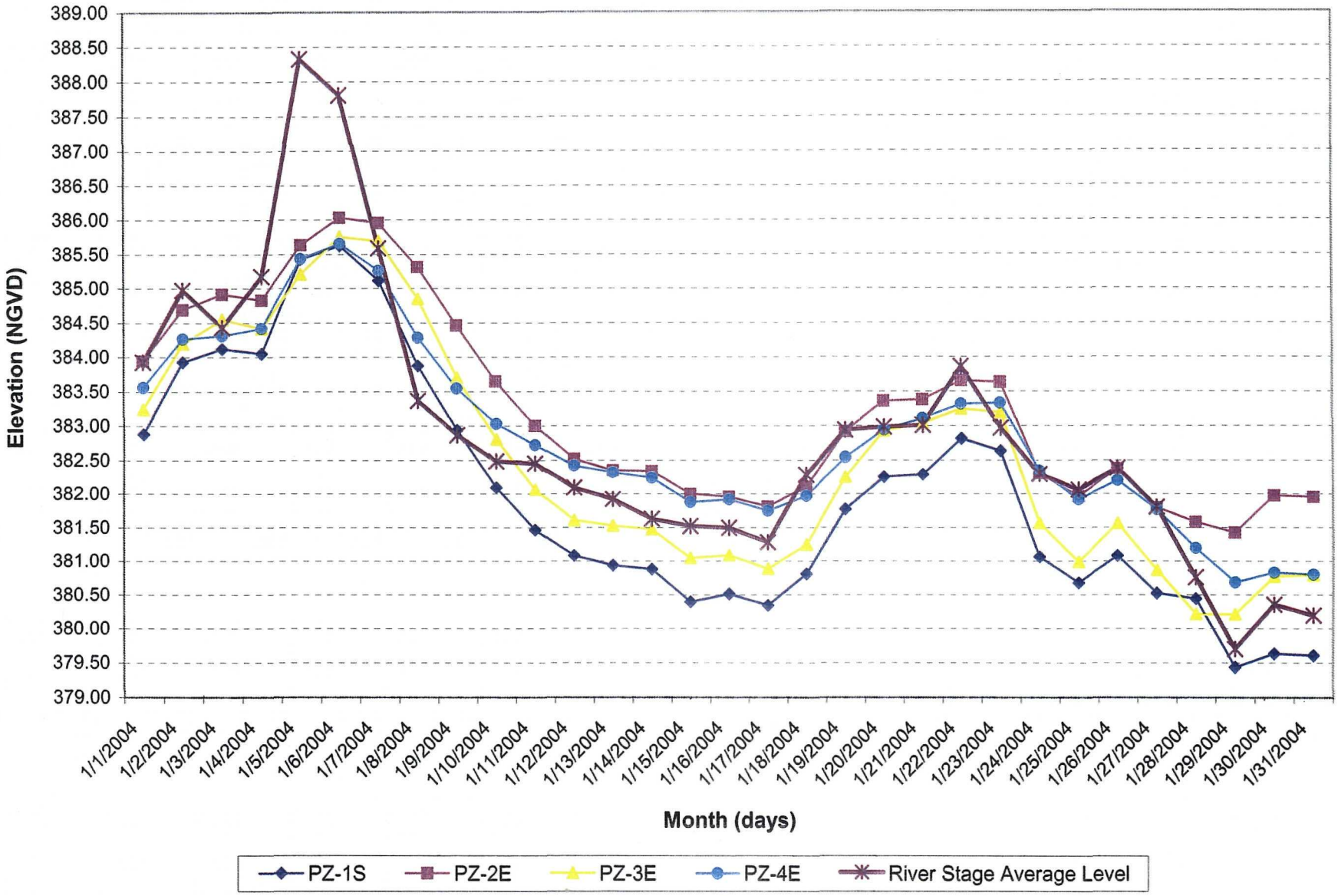
JANUARY 2004

January Water Level Data
Sauget Area 2 Groundwater Migration Control System

Date	Total Combined Flow GPM avg over 24 hrs	River Stage Average Level Daily WL avg	Average Daily Water Level Readings			
			PZ-1S 24-hr average	PZ-2E 24-hr average	PZ-3E 24-hr average	PZ-4E 24-hr average
1/1/2004	1096.83	383.92	382.88	383.94	383.23	383.56
1/2/2004	652.70	384.97	383.93	384.68	384.18	384.27
1/3/2004	487.48	384.43	384.12	384.91	384.53	384.31
1/4/2004	613.59	385.17	384.05	384.82	384.40	384.42
1/5/2004	384.96	388.32	385.42	385.63	385.19	385.43
1/6/2004	259.69	387.80	385.62	386.03	385.74	385.65
1/7/2004	245.50	385.58	385.11	385.95	385.68	385.26
1/8/2004	497.78	383.36	383.87	385.30	384.83	384.28
1/9/2004	918.29	382.86	382.93	384.45	383.69	383.55
1/10/2004	1385.42	382.48	382.09	383.64	382.79	383.03
1/11/2004	1779.93	382.45	381.46	383.00	382.05	382.72
1/12/2004	1825.97	382.09	381.08	382.51	381.60	382.42
1/13/2004	1811.48	381.92	380.93	382.35	381.52	382.32
1/14/2004	1827.17	381.62	380.88	382.33	381.46	382.24
1/15/2004	1930.95	381.52	380.40	382.00	381.04	381.88
1/16/2004	1872.59	381.49	380.51	381.95	381.08	381.92
1/17/2004	1927.83	381.28	380.35	381.81	380.88	381.75
1/18/2004	1588.03	382.28	380.81	382.10	381.24	381.97
1/19/2004	1064.58	382.93	381.77	382.91	382.24	382.55
1/20/2004	832.27	382.98	382.25	383.35	382.92	382.94
1/21/2004	904.03	383.00	382.29	383.38	383.03	383.10
1/22/2004	777.38	383.85	382.81	383.65	383.23	383.32
1/23/2004	966.47	382.96	382.63	383.63	383.18	383.33
1/24/2004	1757.30	382.29	381.06	382.30	381.55	382.35
1/25/2004	1952.70	382.06	380.68	381.96	380.98	381.92
1/26/2004	1497.70	382.38	381.08	382.38	381.55	382.20
1/27/2004	1793.29	381.80	380.53	381.79	380.85	381.77
1/28/2004	2016.60	380.75	380.44	381.58	380.21	381.20
1/29/2004	1860.00	379.70	379.43	381.42	380.20	380.68
1/30/2004	1500.01	380.35	379.63	381.97	380.76	380.83
1/31/2004	1500.03	380.19	379.60	381.95	380.78	380.80

GPM Gallons per Minute
avg Average
WL Water Level

January Average Daily Water Level Readings
Sauget Area 2 Groundwater Migration Control System



WATER LEVEL AND PUMPING RATE

DATA TABLES AND PLOTS

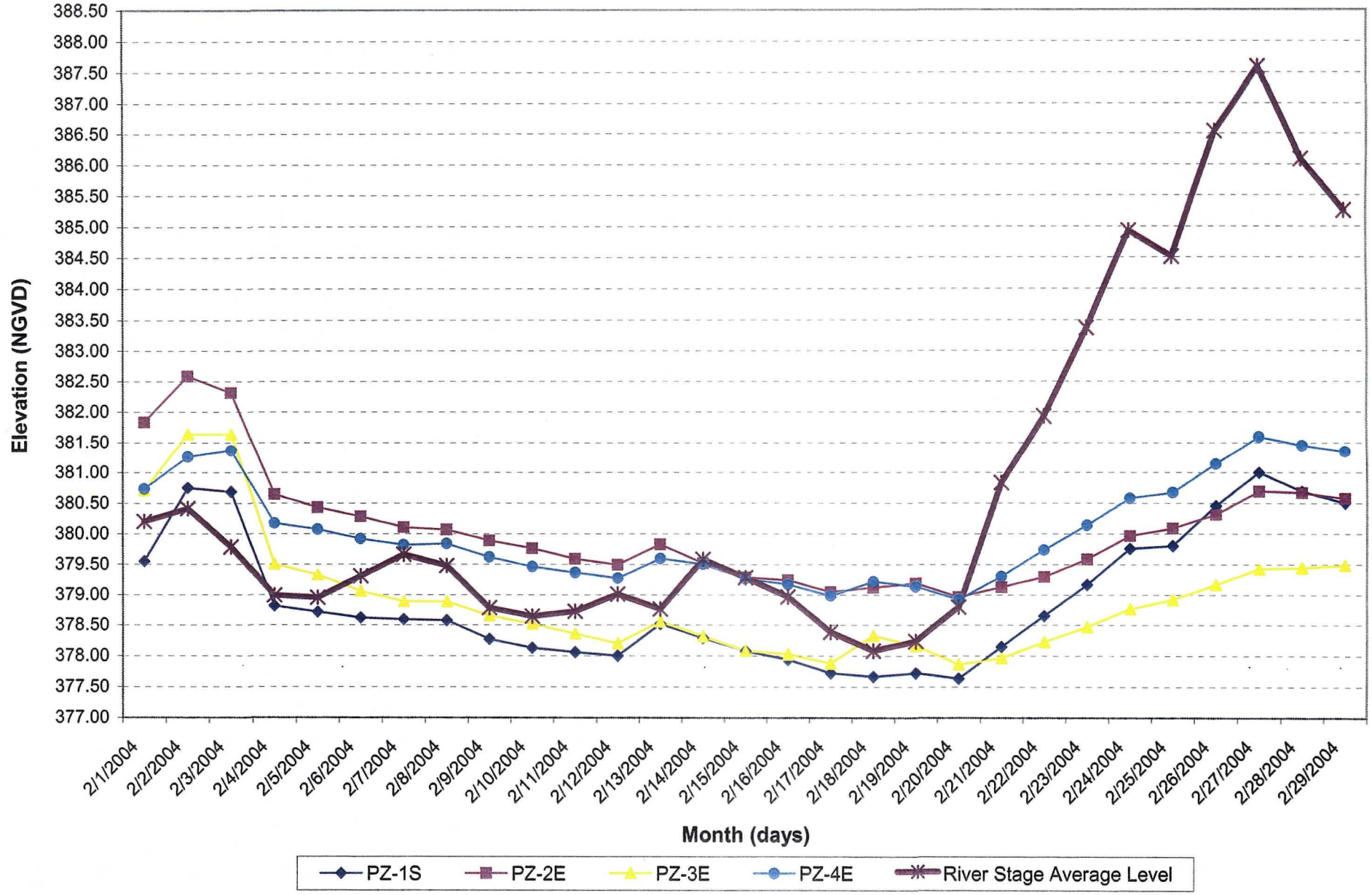
FEBRUARY 2004

February Water Level Data
Sauget Area 2 Groundwater Migration Control System

Date	Total Combined Flow GPM avg over 24 hrs	River Stage Average Level Daily WL avg	Average Daily Water Level Readings			
			PZ-1S 24-hr average	PZ-2E 24-hr average	PZ-3E 24-hr average	PZ-4E 24-hr average
2/1/2004	1500.03	380.20	379.55	381.83	380.70	380.73
2/2/2004	810.83	380.41	380.75	382.58	381.63	381.26
2/3/2004	1028.95	379.78	380.68	382.31	381.63	381.37
2/4/2004	2177.46	378.99	378.81	380.64	379.50	380.17
2/5/2004	2225.00	378.95	378.71	380.43	379.32	380.07
2/6/2004	2225.05	379.30	378.62	380.28	379.05	379.92
2/7/2004	2225.05	379.66	378.59	380.10	378.88	379.82
2/8/2004	2225.01	379.47	378.58	380.06	378.88	379.84
2/9/2004	2225.03	378.78	378.27	379.88	378.65	379.62
2/10/2004	2225.03	378.64	378.13	379.76	378.51	379.46
2/11/2004	2224.99	378.72	378.06	379.58	378.35	379.36
2/12/2004	2225.02	379.00	378.00	379.49	378.19	379.27
2/13/2004	2083.33	378.76	378.52	379.82	378.55	379.60
2/14/2004	2224.99	379.58	378.29	379.51	378.31	379.50
2/15/2004	2225.00	379.28	378.08	379.28	378.08	379.26
2/16/2004	2225.01	378.96	377.94	379.24	378.02	379.17
2/17/2004	2224.98	378.39	377.73	379.05	377.88	378.99
2/18/2004	2070.29	378.08	377.67	379.12	378.32	379.22
2/19/2004	2174.98	378.24	377.73	379.18	378.15	379.14
2/20/2004	2175.05	378.80	377.63	378.96	377.85	378.93
2/21/2004	2175.03	380.83	378.15	379.12	377.96	379.30
2/22/2004	2175.03	381.93	378.65	379.29	378.22	379.74
2/23/2004	2175.03	383.36	379.16	379.58	378.46	380.14
2/24/2004	2175.03	384.93	379.76	379.96	378.76	380.58
2/25/2004	2175.03	384.50	379.80	380.08	378.91	380.67
2/26/2004	2175.05	386.53	380.45	380.31	379.15	381.14
2/27/2004	2175.02	387.58	381.00	380.68	379.42	381.60
2/28/2004	2174.99	386.08	380.68	380.66	379.43	381.45
2/29/2004	2175.00	385.25	380.50	380.57	379.48	381.35

GPM Gallons per Minute
avg Average
WL Water Level

February Average Daily Water Level Readings
Sauget Area 2 Groundwater Migration Control System



WATER LEVEL AND PUMPING RATE

DATA TABLES AND PLOTS

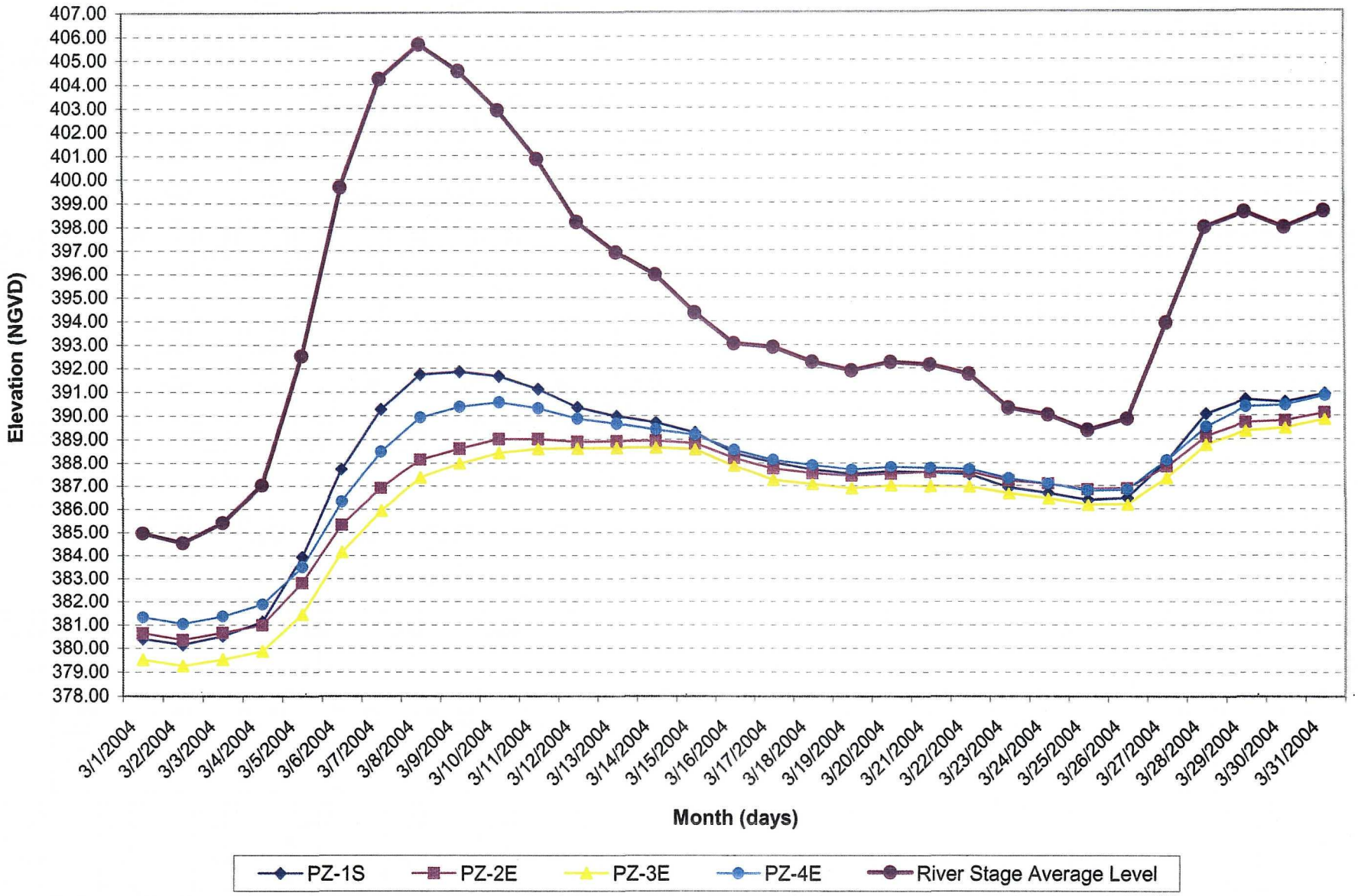
MARCH 2004

March Water Level Data
Sauget Area 2 Groundwater Migration Control System

Date	Total Combined Flow GPM avg over 24 hrs	River Stage Average Level Daily WL avg	Average Daily Water Level Readings			
			PZ-1S 24-hr average	PZ-2E 24-hr average	PZ-3E 24-hr average	PZ-4E 24-hr average
3/1/2004	2175.03	384.94	380.40	380.63	379.49	381.33
3/2/2004	2175.01	384.52	380.15	380.35	379.23	381.04
3/3/2004	2174.93	385.40	380.52	380.66	379.51	381.37
3/4/2004	2175.05	387.01	381.13	380.98	379.86	381.89
3/5/2004	1180.12	392.50	383.92	382.79	381.42	383.49
3/6/2004	449.99	399.64	387.72	385.31	384.12	386.33
3/7/2004	449.74	404.19	390.26	386.89	385.90	388.50
3/8/2004	435.44	405.64	391.73	388.14	387.33	389.93
3/9/2004	419.20	404.52	391.84	388.60	387.95	390.38
3/10/2004	449.93	402.88	391.65	389.00	388.41	390.57
3/11/2004	449.93	400.82	391.12	389.00	388.58	390.32
3/12/2004	449.85	398.18	390.35	388.88	388.60	389.87
3/13/2004	449.73	396.89	389.98	388.91	388.63	389.65
3/14/2004	449.75	395.94	389.70	388.93	388.64	389.40
3/15/2004	449.88	394.33	389.28	388.82	388.56	389.20
3/16/2004	764.33	393.03	388.43	388.20	387.83	388.55
3/17/2004	1007.17	392.88	388.02	387.73	387.23	388.14
3/18/2004	1036.44	392.25	387.70	387.53	387.04	387.91
3/19/2004	1058.11	391.88	387.49	387.42	386.85	387.71
3/20/2004	1039.30	392.23	387.61	387.51	386.98	387.82
3/21/2004	1044.42	392.12	387.56	387.58	386.93	387.78
3/22/2004	1062.90	391.72	387.48	387.58	386.91	387.72
3/23/2004	1131.91	390.31	386.90	387.20	386.63	387.30
3/24/2004	1148.66	390.02	386.66	387.08	386.41	387.07
3/25/2004	1181.36	389.36	386.37	386.83	386.14	386.78
3/26/2004	1163.03	389.83	386.45	386.86	386.15	386.81
3/27/2004	969.81	393.88	388.06	387.80	387.28	388.10
3/28/2004	758.08	397.92	390.06	389.10	388.74	389.51
3/29/2004	722.68	398.55	390.66	389.68	389.30	390.37
3/30/2004	754.41	397.91	390.56	389.76	389.44	390.45
3/31/2004	724.26	398.58	390.91	390.10	389.80	390.85

GPM	Gallons per Minute
avg	Average
WL	Water Level

March Average Daily Water Level Readings
Sauget Area 2 Groundwater Migration Control System



WATER LEVEL AND PUMPING RATE

DATA TABLES AND PLOTS

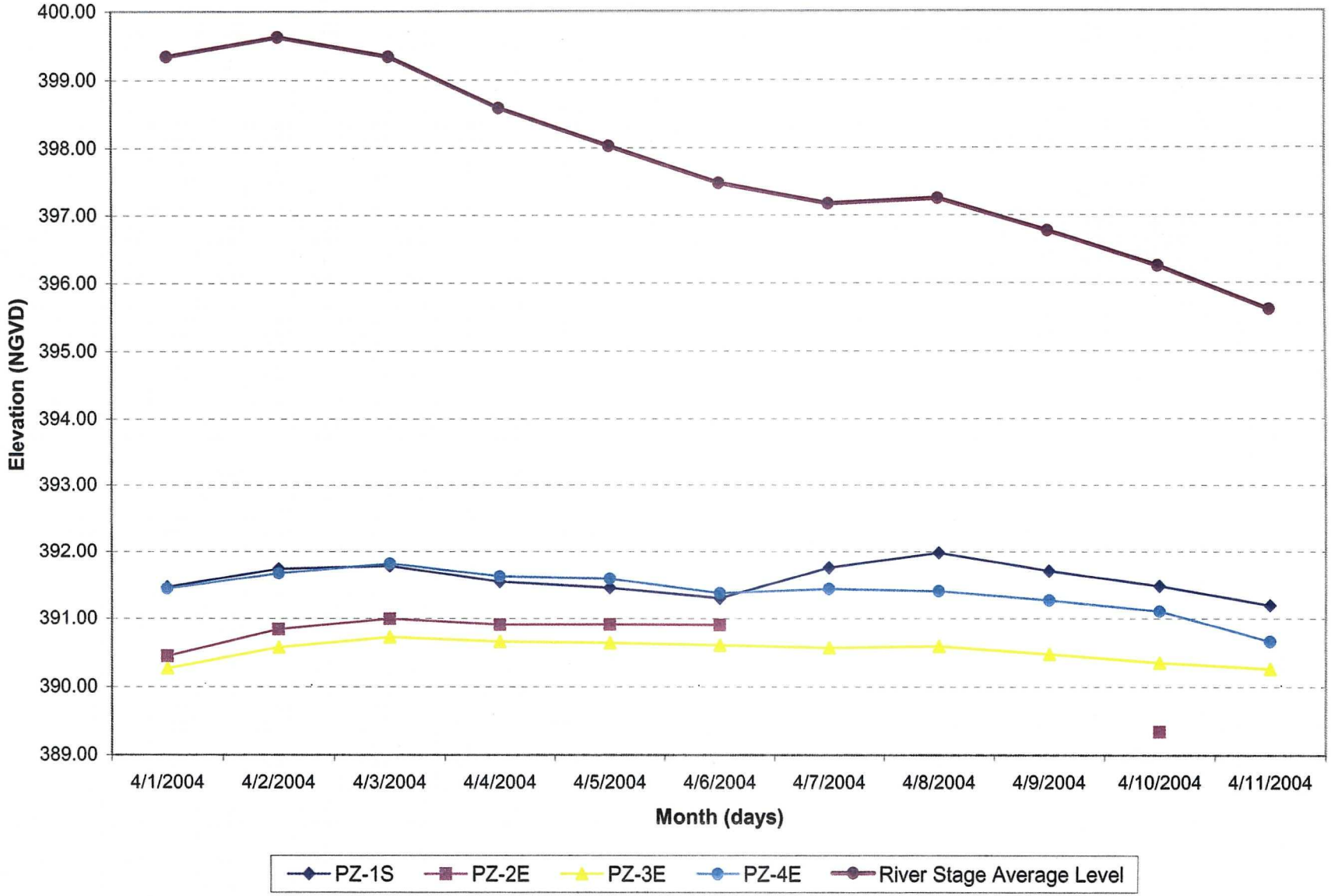
APRIL 1 to 11, 2004

April Water Level Data
Sauget Area 2 Groundwater Migration Control System

Date	Total Combined Flow	River Stage Average Level	Average Daily Water Level Readings			
			PZ-1S	PZ-2E	PZ-3E	PZ-4E
	GPM avg over 24 hrs	Daily WL avg	24-hr average	24-hr average	24-hr average	24-hr average
4/1/2004	683.75	399.34	391.47	390.45	390.27	391.45
4/2/2004	669.54	399.63	391.74	390.84	390.57	391.67
4/3/2004	682.79	399.34	391.78	390.99	390.72	391.82
4/4/2004	719.57	398.58	391.55	390.91	390.66	391.63
4/5/2004	747.69	398.02	391.46	390.91	390.64	391.59
4/6/2004	775.74	397.47	391.30	390.90	390.60	391.38
4/7/2004	792.46	397.16	391.76		390.57	391.44
4/8/2004	788.02	397.24	391.98		390.59	391.41
4/9/2004	811.06	396.76	391.71		390.47	391.28
4/10/2004	837.97	396.24	391.48	389.34	390.35	391.11
4/11/2004	868.68	395.60	391.20		390.26	390.66

GPM	Gallons per Minute
avg	Average
WL	Water Level
(blank cell)	System down.

April Average Daily Water Level Readings
Sauget Area 2 Groundwater Migration Control System



WATER LEVEL DATA

EXTRACTION WELLS EW-1, 2 and 3

PIEZOMETERS PZ-1 N/S, PZ-2 E/W, PZ-3 E/W and PZ-4 E/W

EXISTING MONITORING WELLS B-21B, 25B, 26B, 27B, 28B and 29B

EXISTING MONITORING WELL GM-27B

FEBRUARY To APRIL 2004

Average Daily Water Level Readings
[Piezometers, Monitoring Wells, Extraction Well, and Surface Water]
Sauget Area 2 Groundwater Migration Control System

Fig	Date	PZ-1S	PZ-2E	PZ-3E	PZ-4E	PZ-1N	PZ-2W	PZ-3W	PZ-4W	B-21B	B-25B	B-26B	B-29B	B-28B	GM-27B	EW1	EW2	EW3	RS
2	12-Feb-04	378.00	379.49	378.19	379.27	378.33	377.68	378.66	380.08	382.87	382.95	379.32	382.76	379.08	na	364.75	370.28	369.67	379.00
3	16-Feb-04	377.94	379.24	378.02	379.17	378.26	377.70	378.68	380.01	382.67	382.75	379.12	382.66	378.98	na	365.02	375.08	369.70	378.96
4	17-Feb-04	377.73	379.05	377.88	378.99	378.05	377.35	378.38	379.81	382.77	382.65	379.12	382.56	378.78	na	364.75	374.84	369.59	378.39
5	19-Feb-04	377.73	379.18	378.15	379.14	378.06	377.33	378.46	379.95	382.67	382.75	379.22	382.76	379.28	na	365.08	374.86	369.51	378.24
6	20-Feb-04	377.63	378.96	377.85	378.93	377.90	377.31	378.38	379.78	382.67	382.55	379.12	382.66	379.18	na	364.86	374.48	368.75	378.80
7	23-Feb-04	379.16	379.58	378.46	380.14	379.18	379.93	380.68	380.66	382.87	382.55	379.22	382.66	379.58	382.04	366.23	374.76	370.18	383.36
8	24-Feb-04	379.76	379.96	378.76	380.58	379.53	380.75	381.09	380.50	382.97	382.65	379.32	382.66	379.68	382.84	366.83	374.91	370.74	384.93
9	25-Feb-04	379.80	380.08	378.91	380.67	379.58	380.62	380.93	380.58	383.37	382.85	379.52	383.06	379.98	382.44	366.85	375.09	370.91	384.50
10	26-Feb-04	380.45	380.31	379.15	381.14	380.18	381.93	382.16	381.13	383.47	382.85	379.62	383.16	380.28	383.54	367.47	375.27	371.15	386.53
11	1-Mar-04	380.40	380.63	379.49	381.33	380.15	381.07	381.30	381.15	na	383.31	380.13	na	380.67	383.63	367.29	375.53	370.38	384.94
12	2-Mar-04	380.15	380.35	379.23	381.04	379.90	380.70	380.93	380.91	na	383.24	379.97	na	380.49	383.39	367.00	375.27	371.05	384.52
13	3-Mar-04	380.52	380.66	379.51	381.37	380.26	381.34	381.50	381.31	na	383.44	380.24	na	380.81	383.91	367.30	375.57	371.30	385.40
14	4-Mar-04	381.13	380.98	379.86	381.89	380.83	382.47	382.56	381.86	na	383.62	380.53	na	381.17	384.78	367.91	375.86	370.82	387.01
15	5-Mar-04	383.92	382.79	381.42	383.49	383.55	386.85	386.30	383.57	384.47	383.78	381.62	383.96	382.60	387.90	377.84	383.51	376.51	392.50
16	6-Mar-04	387.72	385.31	384.12	386.33	387.16	392.81	392.02	386.51	na	384.63	384.10	na	385.43	392.41	386.20	389.95	382.65	399.64
17	7-Mar-04	390.26	386.89	385.90	388.50	389.51	396.57	395.82	388.64	na	385.59	385.86	na	387.38	395.46	388.55	391.54	384.78	404.19
18	8-Mar-04	391.73	388.14	387.33	389.93	390.93	398.06	397.39	390.07	388.27	386.32	386.94	383.96	388.53	396.79	389.96	393.02	386.24	405.64
19	9-Mar-04	391.84	388.60	387.95	390.38	391.05	397.46	396.78	390.35	na	387.53	388.15	na	389.56	396.70	390.19	393.74	387.11	404.52
20	10-Mar-04	391.65	389.00	388.41	390.57	390.92	396.45	395.77	390.47	na	388.19	388.75	na	390.02	396.33	389.98	394.17	387.46	402.88
21	11-Mar-04	391.12	389.00	388.58	390.32	390.43	395.04	394.35	390.16	na	388.66	389.00	na	390.10	395.44	389.49	394.35	387.53	400.82
22	12-Mar-04	390.35	388.88	388.60	389.87	389.76	393.24	392.53	389.65	na	389.04	389.12	na	390.01	394.24	388.84	394.43	387.67	398.18
23	13-Mar-04	389.98	388.91	388.63	389.65	389.45	392.34	391.61	389.39	na	389.35	389.27	na	390.01	393.63	388.52	394.55	387.60	396.89
24	14-Mar-04	389.70	388.93	388.64	389.40	389.18	391.72	390.97	389.24	na	389.56	389.36	na	390.01	393.20	388.30	394.60	387.46	395.94
25	15-Mar-04	389.28	388.82	388.56	389.20	388.78	390.64	389.95	388.92	390.77	389.83	389.45	389.96	389.97	392.48	387.85	390.55	387.19	394.33
26	16-Mar-04	388.43	388.20	387.83	388.55	387.98	389.47	388.88	388.27	na	389.82	388.81	na	389.23	391.59	385.12	385.32	384.43	393.03
27	17-Mar-04	388.02	387.73	387.23	388.14	387.55	389.10	388.48	387.90	na	389.66	388.11	na	388.56	391.25	383.39	383.58	382.66	392.88
28	18-Mar-04	387.70	387.53	387.04	387.91	387.23	388.63	387.97	387.64	na	389.55	387.91	na	388.32	390.87	382.90	383.16	382.48	392.25
29	19-Mar-04	387.49	387.42	386.85	387.71	387.03	388.33	387.67	387.44	na	389.50	387.78	na	388.17	390.61	382.54	382.92	382.68	391.88
30	20-Mar-04	387.61	387.51	386.98	387.82	387.18	388.58	387.84	387.58	na	389.56	387.88	na	388.28	390.80	382.78	383.07	382.60	392.23
31	21-Mar-04	387.56	387.58	386.93	387.78	387.16	388.48	387.74	387.54	na	389.51	387.81	na	388.21	390.73	382.67	382.99	383.24	392.12
32	22-Mar-04	387.48	387.58	386.91	387.72	387.06	388.24	387.53	387.48	390.07	389.56	387.88	389.56	388.26	390.59	382.45	382.93	383.04	391.72
33	23-Mar-04	386.90	387.20	386.63	387.30	386.53	387.22	386.70	387.04	390.07	389.44	387.62	389.46	387.95	389.85	381.47	382.28	381.94	390.31
34	24-Mar-04	386.66	387.08	386.41	387.07	386.33	386.90	386.40	386.79	389.87	389.29	387.40	389.26	387.71	389.57	381.11	381.97	381.39	390.02
35	25-Mar-04	386.37	386.83	386.14	386.78	385.96	386.43	385.98	386.49	389.57	389.13	387.16	389.06	387.44	389.16	380.60	381.56	381.11	389.36
36	26-Mar-04	386.45	386.86	386.15	386.81	386.03	386.69	386.10	386.55	na	389.06	387.14	na	387.43	389.30	380.73	381.63	381.15	389.83
37	27-Mar-04	388.06	387.80	387.28	388.10	387.62	389.62	388.43	387.93	na	389.39	388.00	na	388.51	391.47	383.54	383.57	383.11	393.88
38	28-Mar-04	390.06	389.10	388.74	389.51	389.53	392.85	391.31	389.65	na	389.98	389.33	na	390.06	394.03	386.78	386.03	385.45	397.92
39	29-Mar-04	390.66	389.68	389.30	390.37	390.11	393.53	391.98	390.30	391.27	390.42	389.94	390.46	390.71	394.71	387.56	386.75	386.48	398.55
40	30-Mar-04	390.56	389.76	389.44	390.45	390.03	393.15	391.67	390.33	391.67	390.68	390.12	390.86	390.82	394.51	387.61	386.72	386.19	397.91
41	31-Mar-04	390.91	390.10	389.80	390.85	390.35	393.68	392.11	390.69	391.97	390.93	390.42	391.16	391.16	394.95	388.32	387.20	386.66	398.58

Average Daily Water Level Readings
[Piezometers, Monitoring Wells, Extraction Well, and Surface Water]
Sauget Area 2 Groundwater Migration Control System

Fig	Date	PZ-1S	PZ-2E	PZ-3E	PZ-4E	PZ-1N	PZ-2W	PZ-3W	PZ-4W	B-21B	B-25B	B-26B	B-29B	B-28B	GM-27B	EW1	EW2	EW3	RS
42	1-Apr-04	391.47	390.45	390.27	391.45	390.91	394.34	392.75	391.21	392.27	391.25	390.89	391.46	391.67	395.57	389.04	387.85	387.37	399.34
43	2-Apr-04	391.74	390.84	390.57	391.67	391.15	394.65	392.99	391.48	392.57	391.52	391.19	391.66	391.97	395.87	389.38	388.22	387.79	399.63
44	3-Apr-04	391.78	390.99	390.72	391.82	391.20	394.51	392.94	391.58	na	391.76	391.39	na	392.13	395.85	389.36	388.29	387.72	399.34
45	4-Apr-04	391.55	390.91	390.66	391.63	391.01	394.00	392.50	391.42	na	391.88	391.34	na	392.03	395.49	388.93	388.09	387.70	398.58
46	5-Apr-04	391.46	390.91	390.64	391.59	390.92	393.63	392.19	391.35	392.97	391.98	391.31	392.16	391.86	395.13	388.67	387.95	387.49	398.02
47	6-Apr-04	391.30	390.90	390.60	391.38	390.76	393.26	391.89	391.23	na	392.03	391.22	na	391.61	394.74	388.35	387.78	386.95	397.47
48	7-Apr-04	391.76	146.56	390.57	391.44	391.15	393.09	391.69	391.18	393.06	392.12	391.23	392.37	391.59	394.66	388.20	387.74	386.44	397.16
49	8-Apr-04	391.98	0.00	390.59	391.41	391.08	393.08	391.69	391.18	393.02	392.14	391.21	392.30	391.57	394.65	388.05	387.74	386.47	397.24
51	10-Apr-04	391.48	389.34	390.35	391.11	390.56	392.28	391.10	390.85	392.96	392.16	391.05	392.31	391.33	394.07	387.29	387.31	386.47	396.24
52	11-Apr-04	391.20	378.25	390.26	390.66	390.32	391.83	390.77	390.64	392.90	392.14	390.94	392.29	391.17	393.70	386.81	387.02	386.14	395.60

note: na= not available
Manual water level readings taken from wells B-21B and B-29B through April 5.
System Down between April 7 and April 8. Data from April 7 through April 11 is not considered useable for PZ-2E.

WELL LOGS AND

CONSTRUCTION RECORDS

SCREEN ELEVATION SUMMARY

Summary of Screen Intervals for Pumping Wells, Groundwater Piezometers, and Monitoring Wells
Sauget Area 2 Groundwater Migration Control System

Well ID	Screen Interval (NGVD) top	bottom
Pumping Well		
EW-1	369.02	285.82
EW-2	377.03	308.53
EW-3	364.08	289.28
Groundwater Piezometers		
PZ-1N	364.70	289.70
PZ-1S	367.68	292.68
PZ-2E	364.79	289.79
PZ-2W	367.32	292.32
PZ-3E	367.72	282.72
PZ-3W	369.23	284.23
PZ-4E	368.27	288.89
PZ-4W	368.89	288.89
Existing Monitoring Well		
B-21B	389.27	379.27
B-25B	388.05	378.05
B-26B	384.02	374.02
B-28B	383.98	373.98
B-29B	390.06	380.06
GM-27B	361.24	341.24

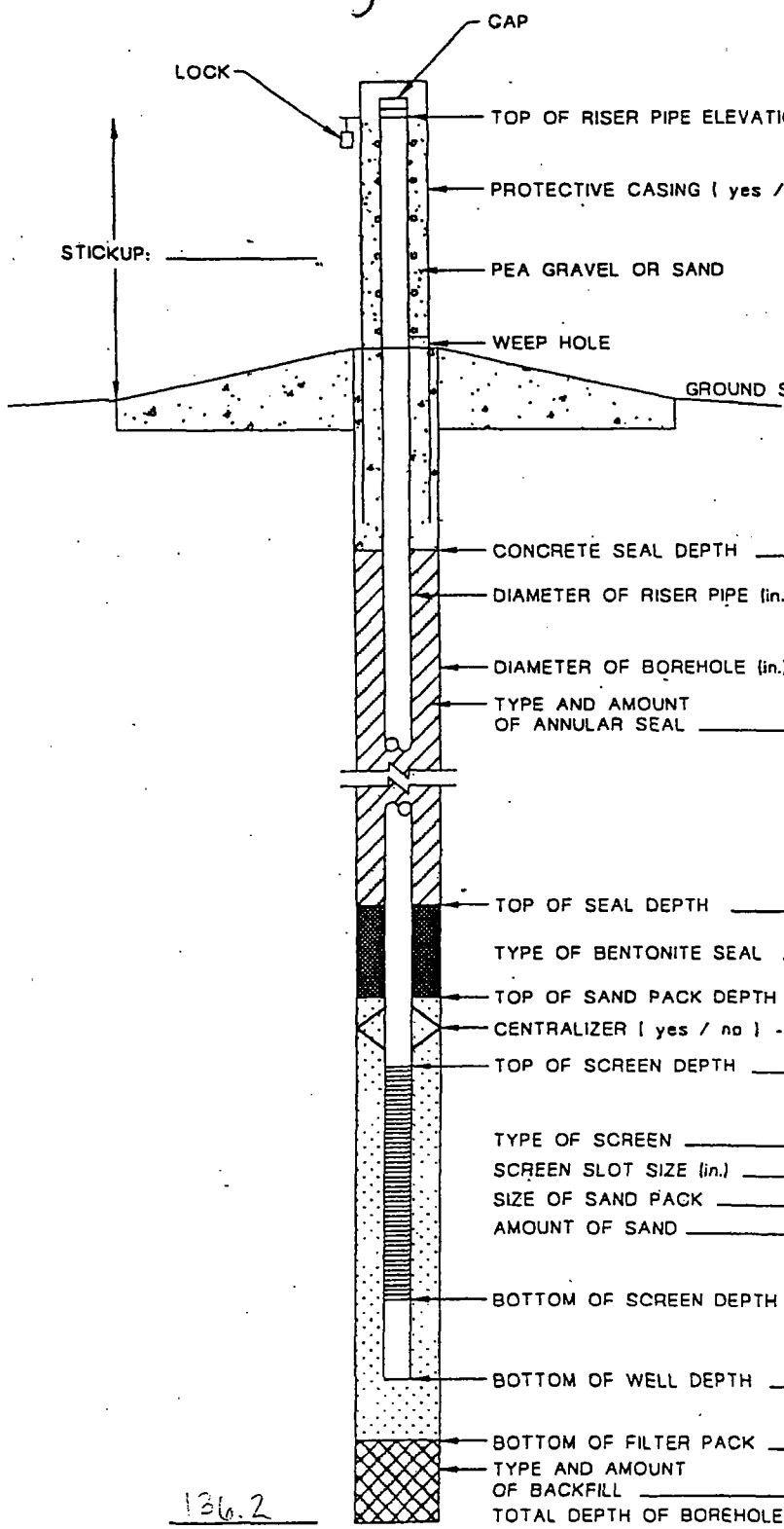
WELL LOGS AND

CONSTRUCTION RECORDS

EXTRACTION WELL EW - 1

GROUNDWATER MONITORING WELL EW 1

SITE NAME: AREA 2 SIRR		LOCATION: SANGET, IL	
CLIENT: SOLUTIA		SURFACE ELEVATION: –	
GEOLOGIST: M HADDOCK	NORTHING: –		EASTING: –
DRILLER: J. Workman	STATIC WATER LEVEL: –		COMPLETION DATE: JUNE 2003
DRILLING COMPANY: Layne		DRILLING METHODS: CABLE TOOL	



TOP OF RISER PIPE ELEVATION: –

PROTECTIVE CASING (yes / no): –

PEA GRAVEL OR SAND

WEEP HOLE

GROUND SURFACE ELEVATION: –

CONCRETE SEAL DEPTH: 6 FT. BGS.

DIAMETER OF RISER PIPE (in.): 12

DIAMETER OF BOREHOLE (in.): 12

TYPE AND AMOUNT OF ANNULAR SEAL: N/A

TOP OF SEAL DEPTH: N/A FT. BGS.

TYPE OF BENTONITE SEAL: N/A

TOP OF SAND PACK DEPTH: N/A FT. BGS.

CENTRALIZER (yes / no) - TYPE: N/A

TOP OF SCREEN DEPTH: 53 FT. BGS.

TYPE OF SCREEN: Johnson Stainless Steel wire-wrap

SCREEN SLOT SIZE (in.): 0.040

SIZE OF SAND PACK: Natural Formation

AMOUNT OF SAND: N/A

BOTTOM OF SCREEN DEPTH: 131.0 FT. BGS.

BOTTOM OF WELL DEPTH: 136.2 FT. BGS.

BOTTOM OF FILTER PACK: N/A FT. BGS.

TYPE AND AMOUNT OF BACKFILL: N/A

136.2 TOTAL DEPTH OF BOREHOLE

NOTE. DEPTHS MEASURED FROM GROUND SURFACE

Golder Associates

Field Boring Log

DEPTH HOLE 136	JOB NO. 023-9606	PROJECT SITE R AREA 2		BORING NO. EW-1	
DEPTH SOIL DRILL 136	GA INSP. MH	DRILLING METHOD CABLE TOOL		SHEET 1 OF 16	
DEPTH ROCK CORE –	WEATHER Var.	DRILLING COMPANY LAYNE		SURFACE ELEV. –	
NO. DIST. SA. – UD. SA. –	TEMP. Var.	DRILL RIG BUCYRUS ERIE	DRILLER C. SKOUBY	DATUM Ground Surf.	
DEPTH WL. –	HRS. PROD. –	WT. SAMPLER HAMMER –	DROP –	STARTED 0900 (TIME) / 5-20-03 (DATE)	
TIME WL. –	HRS. DELAYED –	WT. CASING HAMMER –	DROP –	COMPLETED 0800 / 5-30-03	

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" – 0 - 5% "SOME" – 12 - 30%
"LITTLE" – 5 - 12% "AND" – 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT		SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
2	(0.0-52) firm to stiff, dk yellowish brn and greyish blk, CLAYEY SILT, tr to little f-c sand, little f-c gravel, little organics, damp to moist, (ML)								0.0 - 4.0, excavated with hand methods, material consists of firm, dk yellowish brn and greyish blk, CLAYEY SILT tr to little f-c sand, little f-c gravel, little organics, damp, (ML)
4									4.0 Begin cable tool methods
6	- below 8, contains SILTY CLAY interbeds,								
8									
10									~52 begin compact to dense, med grey and multi-colored F-C SAND, little f-c gravel, wet, (SW)
12									
14									5/22 1600 - 5/23 10:45 ~ 4.5 hrs downtime with bailer stuck in well
16									
18									~18.5
20									
22									

Golder Associates

Field Boring Log

DEPTH HOLE 136	JOB NO. D239606	PROJECT SITE R AREA 2	BORING NO. EW1
DEPTH SOIL DRILL 136	GA INSP.	DRILLING METHOD CABLE TOOL	SHEET 2 OF 6
DEPTH ROCK CORE	WEATHER	DRILLING COMPANY	SURFACE ELEV.
NO. DIST. SA. UD. SA.	TEMP.	DRILL RIG / DRILLER	DATUM
DEPTH WL.	HRS. PROD.	WT. SAMPLER HAMMER / DROP	STARTED / (TIME / DATE)
TIME WL.	HRS. DELAYED	WT. CASING HAMMER / DROP	COMPLETED /

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" ~0 - 1% "SOME" ~12 - 30%
"LITTLE" ~5 - 12% "AND" ~30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	SAME AS ABOVE (SAA)							SAME AS ABOVE,
24							24	
26							26	below 28 becomes wet, sand content increasing
28	- wet below 28						28	
30							30	
32							32	
34							34	
36							36	
38							38	
40							40	
42							42	
44							44	

Golder Associates

Field Boring Log

DEPTH HOLE 136	JOB NO. D23 9006	PROJECT SITER AREA 2		BORING NO. EW1	
DEPTH SOIL DRILL 136	GA INSP.	DRILLING METHOD CABLE TOOL		SHEET 3 OF 6	
DEPTH ROCK CORE	WEATHER	DRILLING COMPANY		SURFACE ELEV.	
NO. DIST. SA. UD. SA.	TEMP.	DRILL RIG	DRILLER	DATUM	
DEPTH WL.	HRS. PROD.	WT. SAMPLER HAMMER	DROP	STARTED / (TIME / DATE)	
TIME WL.	HRS. DELAYED	WT. CASING HAMMER	DROP	COMPLETED /	

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	SAME AS ABOVE							
48								
50								
52	(52-126) dense, grey and multi-colored, F-C SAND, tr to some f-c gravel, wet							
54								
56								
58								
60								
62								
64								
66								
68								

Golder Associates

Field Boring Log

DEPTH HOLE 136	JOB NO. 023 9606	PROJECT SITE R AREA 2	BORING NO. EW1
DEPTH SOIL DRILL 136	GA INSP.	DRILLING METHOD CABLE TOOL	SHEET 4 OF 6
DEPTH ROCK CORE	WEATHER	DRILLING COMPANY	SURFACE ELEV.
NO. DIST. SA. UD. SA.	TEMP.	DRILL RIG / DRILLER	DATUM
DEPTH WL.	HRS. PROD.	WT. SAMPLER HAMMER / DROP	STARTED / TIME DATE
TIME WL.	HRS. DELAYED	WT. CASING HAMMER / DROP	COMPLETED /

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT		SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
70	SAME AS ABOVE								
72									
74									
76									
78									
80									
82									
84									
86									
88									
90									

Golder Associates

Field Boring Log

DEPTH HOLE 136	JOB NO. 023 9606	PROJECT SITE B AREA 2	BORING NO. EW1
DEPTH SOIL DRILL 136	GA INSP.	DRILLING METHOD CABLE TOOL	SHEET 5 OF 6
DEPTH ROCK CORE	WEATHER	DRILLING COMPANY	SURFACE ELEV.
NO. DIST. SA. UD. SA.	TEMP.	DRILL RIG / DRILLER	DATUM
DEPTH WL.	HRS. PROD.	WT. SAMPLER HAMMER / DROP	STARTED / (TIME / DATE)
TIME WL.	HRS. DELAYED	WT. CASING HAMMER / DROP	COMPLETED /

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" ~0 - 5% "SOME" ~12 - 30%
"LITTLE" ~5 - 12% "AND" ~30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	SAME AS ABOVE							
94								
96								
98								
100								
102								
104								
106								
108								
110								
112								
114								

Golder Associates

Field Boring Log

DEPTH HOLE 136	JOB NO. 0239606	PROJECT SOLUTIA SITE R AREA Z				BORING NO. EW1	
DEPTH SOIL DRILL 136	GA INSP. MH	DRILLING METHOD CABLE TOOL				SHEET 6 OF 6	
DEPTH ROCK CORE –	WEATHER var.	DRILLING COMPANY LAYNE				SURFACE ELEV. –	
NO. DIST. SA. – UD. SA. –	TEMP. var.	DRILL RIG BUCYRUS ERIE	DRILLER C SLOUGH			DATUM Ground Surf	
DEPTH WL. –	HRS. PROD. –	WT. SAMPLER HAMMER –	DROP –			STARTED 0900 (TIME) 5-20-03 (DATE)	
TIME WL. –	HRS. DELAYED –	WT. CASING HAMMER –	DROP –			COMPLETED 0800 (TIME) 5-30-03 (DATE)	

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" ~0 - 5% "SOME" - 12 - 30%
"LITTLE" ~5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	SAME AS ABOVE							
116								
118								
120								
122								
124								
126	(126 - 133) interbedded, v. dense, grey and multi-colored, F-C GRAVEL, little f-c sand, tr cobbles, wet interbedded with v. stiff, olive grey, SILTY CLAY, little f-c gravel, little cobbles, wet							@ 126 v. dense, grey and multi-colored F-C Gravel, rounded grains, @ 127 interbedded with gravelly silty clay, little cobbles; 128 Same as above; 129 Same as above; 130 Same; 132 more clay, clay content increasing; ~133 begin weathered limestone
128								
130								
132								
134	(133 - 136) v. dense F-C GRAVEL interbedded with WEATHERED LIMESTONE							
136	END OF BORING @ 136 FT BGS							
138								

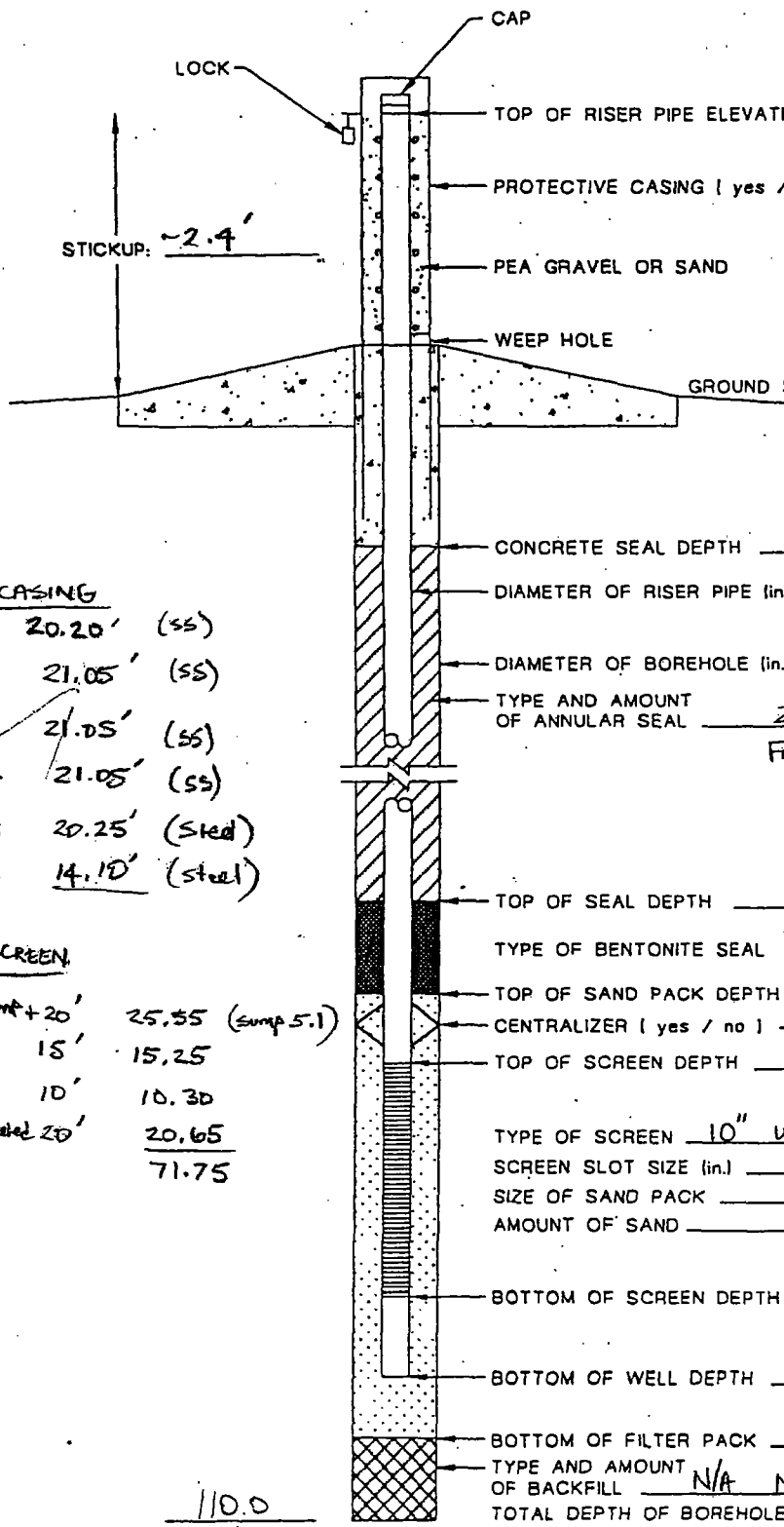
WELL LOGS AND

CONSTRUCTION RECORDS

EXTRACTION WELL EW - 2

GROUNDWATER MONITORING WELL EW-2

SITE NAME: SOLUTIA SITE R		LOCATION: Sauget, IL	
CLIENT: SOLUTIA		SURFACE ELEVATION:	
GEOLOGIST: M HADDOCK	NORTHING: –		EASTING: –
DRILLER: J WORKMAN	STATIC WATER LEVEL: –		COMPLETION DATE: 11-12-02
DRILLING COMPANY: LAYNE		DRILLING METHODS: CABLE TOOL	



TOP OF RISER PIPE ELEVATION: –

PROTECTIVE CASING (yes / no): –

PEA GRAVEL OR SAND

WEEP HOLE

GROUND SURFACE ELEVATION: _____

CONCRETE SEAL DEPTH: 6 FT. BGS.

DIAMETER OF RISER PIPE (in.): 10

DIAMETER OF BOREHOLE (in.): 11

TYPE AND AMOUNT OF ANNULAR SEAL: 2 BAGS BENTONITE CHIPS (50 lb. bags) FROM 1.5 - 8.0 FT BGS IN ANNULUS

TOP OF SEAL DEPTH: N/A FT. BGS.

TYPE OF BENTONITE SEAL: N/A

TOP OF SAND PACK DEPTH: N/A NATURAL FORMATION FT. BGS.

CENTRALIZER (yes / no) - TYPE: N/A

TOP OF SCREEN DEPTH: 38.25 FT. BGS. (casing @ ~41.5 FT BGS)

TYPE OF SCREEN: 10" WIRE WRAP STAINLESS STEEL

SCREEN SLOT SIZE (in.): 0.040

SIZE OF SAND PACK: NATURAL FORMATION

AMOUNT OF SAND: –

BOTTOM OF SCREEN DEPTH: 104.9 FT. BGS.

BOTTOM OF WELL DEPTH: 110.0 FT. BGS.

BOTTOM OF FILTER PACK: N/A NATURAL FORMATION FT. BGS.

TYPE AND AMOUNT OF BACKFILL: N/A NATURAL FORMATION

TOTAL DEPTH OF BOREHOLE: 110.0

CASING

#1	20.20'	(SS)
#2	21.05'	(SS)
#3	21.05'	(SS)
#4	21.05'	(SS)
#5	20.25'	(Steel)
#6	14.10'	(steel)

SCREEN

Sump + 20'	25.55	(sump 5.1)
15'	15.25	
10'	10.30	
gasketed 20'	20.65	
	71.75	

NOTE. DEPTHS MEASURED FROM GROUND SURFACE

Golder Associates

Field Boring Log

DEPTH HOLE 110	JOB NO. 023-9606	PROJECT SOLUTIA SITE R	BORING NO. EW12
DEPTH SOIL DRILL 110	GA INSP. MNH	DRILLING METHOD CABLE TOOL 10"	SHEET 1 OF 5
DEPTH ROCK CORE —	WEATHER VARIABLE	DRILLING COMPANY LAYNE	SURFACE ELEV.
NO. DIST. SA. — UD. SA. —	TEMP. 28-70	DRILL RIG BUCYRUS ERIE 28 DRILLER J. WORKMAN	DATUM
DEPTH WL.	HRS. PROD. —	WT. SAMPLER HAMMER — DROP —	STARTED 1310 (TIME) / 11-4-02 (DATE)
TIME WL.	HRS. DELAYED —	WT. CASING HAMMER — DROP —	COMPLETED /

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT		SAMPLES NO.	TYPE	HAMM. BLOWS PER 5 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	(0.0-38.0) soft to firm, grayish black, SILTY CLAY, moist to wet, (CL)								0.0-38.0, soft, grayish blk, SILTY CLAY, moist to wet, (CL)
									firm and wet below 23, olive grey
2									(38.0-41.0) grades to F-M sand, SILTY
									(41.0-52.0) compact, F-C SAND, m. lithified, wet, SW, olive grey (ALLUVIAL SAND)
4									
									(52-65) compact to dense, M-C SAND, tr to little f-c gravel, wet olive grey
6									below 65, SAA with tr to little cobbles
									@ 75, tr wood fragments, wood pieces ~1.5" diameter
8									@ 78', thin < 2 inches thick? SILTY CLAY lens
									below 90, tr f-c gravel, no cobbles
10									below 100, tr cobbles, tr to little f-c gravel
									109.?-110, STIFF, olive grey, SILTY CLAY, tr fe sand, wet,
12									
									Casing advanced to 110 ft BGS
14									
16									
18									
20									
	- below 23, firm and wet								
22	- below 25, olive grey								

Golder Associates

Field Boring Log

DEPTH HOLE	110	JOB NO.	023-9606	PROJECT	SOLUTIA SITE R	BORING NO.	EW 2
DEPTH SOIL DRILL	110	GA INSP.	MNH	DRILLING METHOD	CABLE TOOL 10"	SHEET	2 OF 5
DEPTH ROCK CORE	—	WEATHER	VARIABLE	DRILLING COMPANY	LAYNE	SURFACE ELEV.	
NO. DIST. SA. — UD. SA. —		TEMP.	28 - 70	DRILL RIG	BUCYRUS ERIE 28	DRILLER J. WORKMAN	DATUM
DEPTH WL.		HRS. PROD.	—	WT. SAMPLER HAMMER	—	DROP —	STARTED / (TIME / DATE)
TIME WL.		HRS. DELAYED	—	WT. CASING HAMMER	—	DROP —	COMPLETED /

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	STY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC. / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
24	(0.0-38.0) soft to firm, grayish black, SILTY CLAY, moist to wet, (CL)							
26								
28	- below 23, firm and wet							
30	- below 25, olive grey							
32					CUTTINGS			
34								
36	- SILTY CLAY grades to F-C SAND							
38	(38.0-41.0) firm, olive grey, SILTY F-M SAND, wet, (SM)							
40								
42	(41.0-52.0) compact, olive grey with multi-colored grains, F-C SAND, wet, (SW)							
44								

Golder Associates
Field Boring Log

DEPTH HOLE 110	JOB NO. 023-9606	PROJECT SOLUTIA SITE R				BORING NO. EW2	
DEPTH SOIL DRILL 110	GA INSP. MNH	DRILLING METHOD CABLE TOOL 10"				SHEET 3 OF 5	
DEPTH ROCK CORE —	WEATHER VARIABLE	DRILLING COMPANY LAYNE				SURFACE ELEV.	
NO. DIST. SA. — UD. SA. —	TEMP. 28-70	DRILL RIG BUCYRUS ERIE 28	DRILLER J. WORKMAN			DATUM	
DEPTH WL.	HRS. PROD. —	WT. SAMPLER HAMMER —	DROP —			STARTED / (TIME / DATE)	
TIME WL.	HRS. DELAYED —	WT. CASING HAMMER —	DROP —			COMPLETED /	

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
48	(41.0-52.0) compact, olive grey with multicolored grains, F-C SAND wet, (SW)							
50								
52	(52.0-109.0) compact to dense, olive grey, M-C SAND, tr to little f-c gravel, wet (SP)							
54								
56					CUTTINGS			
58								
60								
62								
64	below 65, tr to little cobbles							
66								
68								

Golder Associates

Field Boring Log

DEPTH HOLE 110	JOB NO. D23-9606	PROJECT SOLUTIA SITE R				BORING NO. EW2	
DEPTH SOIL DRILL 110	GA INSP. MNH	DRILLING METHOD CABLE TOOL 10"				SHEET 4 OF 5	
DEPTH ROCK CORE —	WEATHER VAR.	DRILLING COMPANY LAYNE				SURFACE ELEV.	
NO. DIST. SA. — UD. SA. —	TEMP. 28-70	DRILL RIG BUCYRUS ERIE 28	DRILLER J. WORKMAN			DATUM	
DEPTH WL.	HRS. PROD.	WT. SAMPLER HAMMER	DROP			STARTED / TIME / DATE	
TIME WL.	HRS. DELAYED	WT. CASING HAMMER	DROP			COMPLETED /	

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
70	(52.0-109.0) compact to dense, olive grey, M-C SAND, tr to little f-c gravel, tr to little cobbles, wet, (SP)							
72								
74								
	tr wood fragments @ 75							
76								
78	thin, < 2-INCH thick SILTY CLAY lens @ 78							
80								
82								
84								
86								
88								
90	below 90, tr f-c gravel, no cobbles							

Golder Associates

Field Boring Log

DEPTH HOLE 110	JOB NO. 023-9606	PROJECT SOLUTIA SITE R				BORING NO. EW2	
DEPTH SOIL DRILL 110	GA INSP. MNH	DRILLING METHOD CABLE TOOL 10"				SHEET 5 OF 5	
DEPTH ROCK CORE –	WEATHER VAR.	DRILLING COMPANY LAYNE				SURFACE ELEV.	
NO. DIST. SA. – UD. SA. –	TEMP. 28-70	DRILL RIG BUCYRUS ERIE 28	DRILLER J. WORKMAN			DATUM	
DEPTH WL.	HRS. PROD.	WT. SAMPLER HAMMER		DROP		STARTED 1310 / 11-9-02 (TIME / DATE)	
TIME WL.	HRS. DELAYED	WT. CASING HAMMER		DROP		COMPLETED 11-12-02	

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL.	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" – 0 - 5% "SOME" – 12 - 30%
"LITTLE" – 5 - 12% "AND" – 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT		SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
92	(52.0-109.0) compact to dense, olive grey, M-C SAND, tr f-c gravel, wet, (SP)								
94									
96									
98									
100	below 100, tr cobbles, tr to little f-c gravel								
102									
104									
106									Below 108-109, stiff, olive grey, SILTY CLAY, tr f-c sand, wet, (CL)
108	(~109-110?) stiff, olive grey, SILTY CLAY, tr f-c sand, wet, (CL)								
110	END OF BORING @ 110 FT BGS								
112									
114									

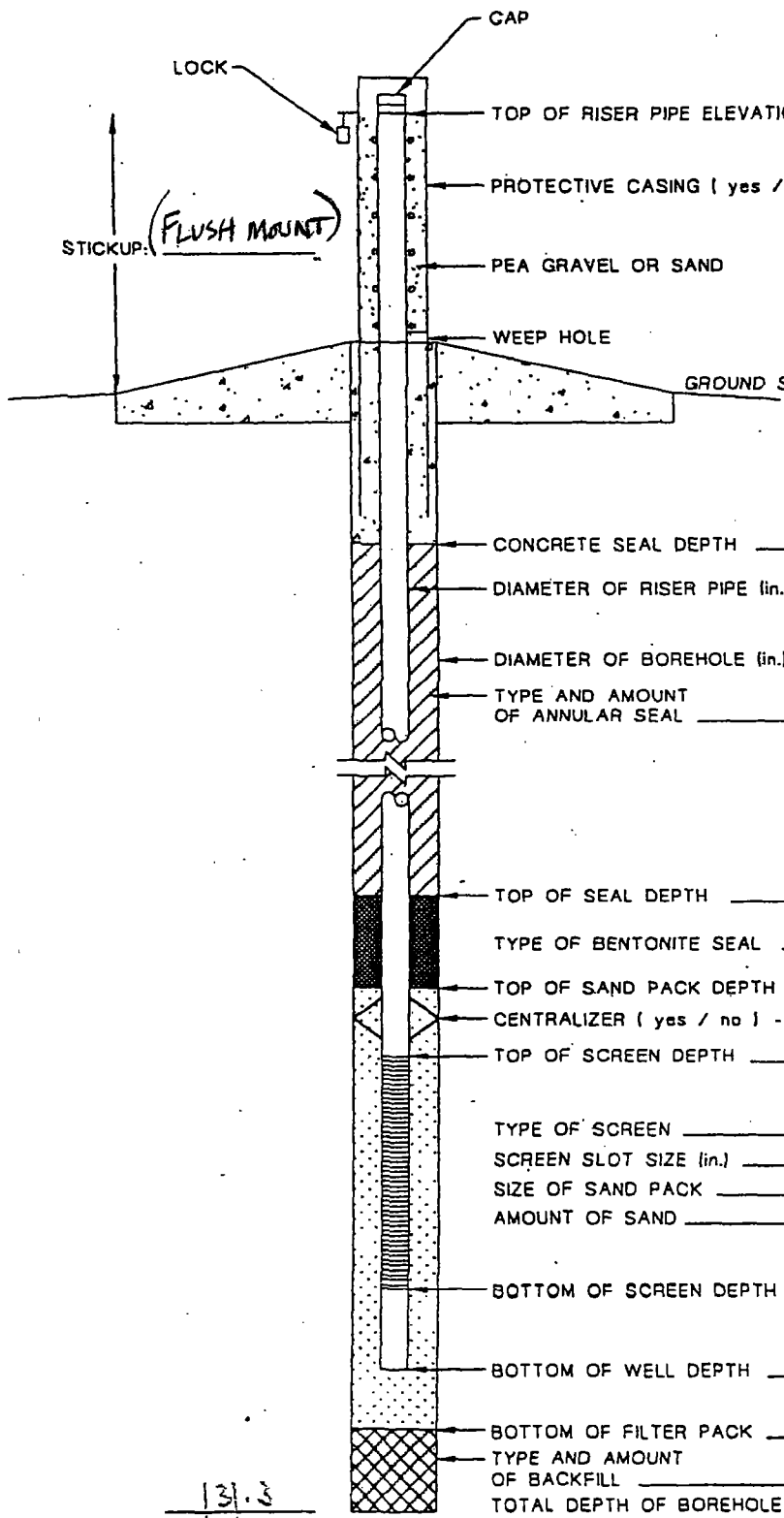
WELL LOGS AND

CONSTRUCTION RECORDS

EXTRACTION WELL EW - 3

GROUNDWATER MONITORING WELL EW3

SITE NAME: AREA 2 SITE R		LOCATION: SAUGET, ILL	
CLIENT: SOLUTIA		SURFACE ELEVATION: –	
GEOLOGIST: M HADDOCK	NORTHING: –		EASTING: –
DRILLER: E. SNOWBY	STATIC WATER LEVEL: –		COMPLETION DATE: JUNE 2003
DRILLING COMPANY: LAYNE		DRILLING METHODS: CABLE TOOL	



TOP OF RISER PIPE ELEVATION: –

PROTECTIVE CASING (yes / no): –

PEA GRAVEL OR SAND

WEEP HOLE

GROUND SURFACE ELEVATION: –

CONCRETE SEAL DEPTH: 6 FT. BGS.

DIAMETER OF RISER PIPE (in.): 12" ID

DIAMETER OF BOREHOLE (in.): 12.8"

TYPE AND AMOUNT OF ANNULAR SEAL: N/A

TOP OF SEAL DEPTH: N/A FT. BGS.

TYPE OF BENTONITE SEAL: N/A

TOP OF SAND PACK DEPTH: N/A FT. BGS.

CENTRALIZER (yes / no) - TYPE: N/A

TOP OF SCREEN DEPTH: 56.5 FT. BGS.

TYPE OF SCREEN: Johnson Wire Wrap

SCREEN SLOT SIZE (in.): 0.040

SIZE OF SAND PACK: N/A Natural Formation

AMOUNT OF SAND: N/A

BOTTOM OF SCREEN DEPTH: 126.0 FT. BGS.

BOTTOM OF WELL DEPTH: 131.3 FT. BGS.

BOTTOM OF FILTER PACK: N/A FT. BGS.

TYPE AND AMOUNT OF BACKFILL: N/A

TOTAL DEPTH OF BOREHOLE: 131.3

NOTE. DEPTHS MEASURED FROM GROUND SURFACE

Golder Associates
Field Boring Log

DEPTH HOLE 131.5	JOB NO. 023-96016	PROJECT SITE R AREA 2		BORING NO. EW3	
DEPTH SOIL DRILL	GA INSP. MNH	DRILLING METHOD CABLE TOOL		SHEET 1 OF 4	
DEPTH ROCK CORE	WEATHER Var	DRILLING COMPANY LAYNE		SURFACE ELEV. —	
NO. DIST. SA. UD. SA.	TEMP. Var.	DRILL RIG BUCYRUS ERIE	DRILLER C. SKOVBY	DATUM Ground Surf	
DEPTH WL.	HRS. PROD.	WT. SAMPLER HAMMER —	DROP —	STARTED 0800 (TIME), 6-3-03 (DATE)	
TIME WL.	HRS. DELAYED	WT. CASING HAMMER —	DROP —	COMPLETED 1600, 6-11-03	

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 6 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	(0.0 - 44.0) firm, black and olive black, CLAYEY SILT, little organics, tr f sand, moist to wet, ML							(0.0 - 44.0) firm, black and olive black, CLAYEY SILT, little organics, tr f sand, moist to wet, (ML)
2								
								— wet below 32
4								(44 - 54) compact, med. grey, SILTY F SAND, wet, SM
								(54 - 88) dense, med. grey and [illegible] F.C. SAND, tr to little f.c. gravel, wet, SW
6								
8								
10								
12								
14								
								TIMES:
16								6/6 1215 - 1700 lost time due to pittman break
								88 -
								Some cobbles @ 90 ft [illegible]
18								tr cobbles below 90
20								
22								

casing, 56.5 [illegible]

Screen to 131 [illegible]

Golder Associates

Field Boring Log

DEPTH HOLE 131.3	JOB NO. 023 9626	PROJECT SITE B AREA 2			BORING NO. EW3
DEPTH SOIL DRILL 131.3	GA INSP.	DRILLING METHOD CABLE TOOL			SHEET 2 OF 6
DEPTH ROCK CORE	WEATHER	DRILLING COMPANY			SURFACE ELEV.
NO. DIST. SA. UD. SA.	TEMP.	DRILL RIG	DRILLER		DATUM
DEPTH WL.	HRS. PROD.	WT. SAMPLER HAMMER	DROP		STARTED / (TIME / DATE)
TIME WL.	HRS. DELAYED	WT. CASING HAMMER	DROP		COMPLETED /

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	SAME AS ABOVE							— SAA —
24								
26								
28								
30								
32	below 32, same as above & wet							wet
34								
36								
38								
40								
42								
44	grades to (44 - 54) compact med grey, SILTY F SAND, wet, (SM)							@ 44 grades to compact, med - grey, SILTY F SAND, wet, SM
46								

Golder Associates

Field Boring Log

DEPTH HOLE 131.3 JOB NO. 023 9606 PROJECT SITE R AREA 2 BORING NO. EW3

DEPTH SOIL DRILL 131.3 GA INSP. _____ DRILLING METHOD CABLE TOOL SHEET 3 OF 6

DEPTH ROCK CORE _____ WEATHER _____ DRILLING COMPANY _____ SURFACE ELEV. _____

NO. DIST. SA. ___ UD. SA. ___ TEMP. _____ DRILL RIG _____ DRILLER _____ DATUM _____

DEPTH WL. _____ HRS. PROD. _____ WT. SAMPLER HAMMER _____ DROP _____ STARTED ____ / ____ (TIME / DATE)

TIME WL. _____ HRS. DELAYED _____ WT. CASING HAMMER _____ DROP _____ COMPLETED ____ / ____

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	(44-54) compact, med grey, SILTY F SAND, wet, (SM)							
48								
50								
52								
54								@ 54 begin dense to v. dense F-c SAND, tr to little f-c gravel, (SW)
	(54-130) dense to v. dense, med grey and multi-c brown, F-c SAND, tr to little f-c gravel, wet (SW)							
56								
58								
60								
62								
64								
66								
68								

Golder Associates

Field Boring Log

EPTH HOLE	131.3	JOB NO.	023 9606	PROJECT	SITE R AREA 2	BORING NO.	EW3
EPTH SOIL DRILL	131.3	GA INSP.		DRILLING METHOD	CABLE TOOL	SHEET	4 OF 6
EPTH ROCK CORE		WEATHER		DRILLING COMPANY		SURFACE ELEV.	
O.DIST.SA.	UD.SA.	TEMP.		DRILL RIG	DRILLER	DATUM	
EPTH WL.		HRS. PROD.		WT. SAMPLER HAMMER	DROP	STARTED	/ TIME / DATE
IME WL.		HRS. DELAYED		WT. CASING HAMMER	DROP	COMPLETED	/

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT		SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	SAME AS ABOVE								SAME
70									
72									
74									
76									
78									
80									
82									
84									
86									
88	88-90, SAME but some cobbles in this interval								88-90, occasional cobbles encountered
90	below 90, tr cobbles								below 90, tr cobbles
91									

Golder Associates

Field Boring Log

DEPTH HOLE 131.3	JOB NO. 023 9606	PROJECT SITE B AREA 2	BORING NO. EW3
DEPTH SOIL DRILL 131.3	GA INSP.	DRILLING METHOD CABLE TOOL	SHEET 5 OF 6
DEPTH ROCK CORE	WEATHER	DRILLING COMPANY	SURFACE ELEV.
O. DIST. SA. UD. SA.	TEMP.	DRILL RIG / DRILLER	DATUM
DEPTH WL.	HRS. PROD.	WT. SAMPLER HAMMER / DROP	STARTED / (TIME / DATE)
TIME WL.	HRS. DELAYED	WT. CASING HAMMER / DROP	COMPLETED /

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	SAME AS ABOVE							SAA
94								
96								
98								
100								
102								
104								
106								
108								
110								
112								
114								

Golder Associates

Field Boring Log

DEPTH HOLE	131.3	JOB NO.	0239606	PROJECT	SITE R AREA 2	BORING NO.	EW3
DEPTH SOIL DRILL	131.3	GA INSP.	MH	DRILLING METHOD	CABLE TOOL	SHEET	6 OF 6
DEPTH ROCK CORE	—	WEATHER	Var	DRILLING COMPANY	LAYNE	SURFACE ELEV.	—
NO. DIST. SA. — UD. SA. —		TEMP.	Var	DRILL RIG	BUCYRUS ERIE	DRILLER C. SKOUBY	DATUM Ground Surf
DEPTH WL.	—	HRS. PROD.	—	WT. SAMPLER HAMMER	—	DROP —	STARTED 0800 TIME 6-3-03 DATE
TIME WL.	—	HRS. DELAYED	—	WT. CASING HAMMER	—	DROP —	COMPLETED 1600 TIME 6-11-03 DATE

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	v. dense, med gray and multi-colored, F-C SAND, little f-c gravel, tr cobbles, wet (SW)							SAA
116								
118								
120								
122								
124								
126								
128								
130	(130-131.3) SAME with few weathered LIMESTONE FRAGMENTS							@ ~130 drilling becomes difficult, few weathered limestone fragments in sampler
132	END OF BORING @ 131.3 FT BGS							
134								
136								

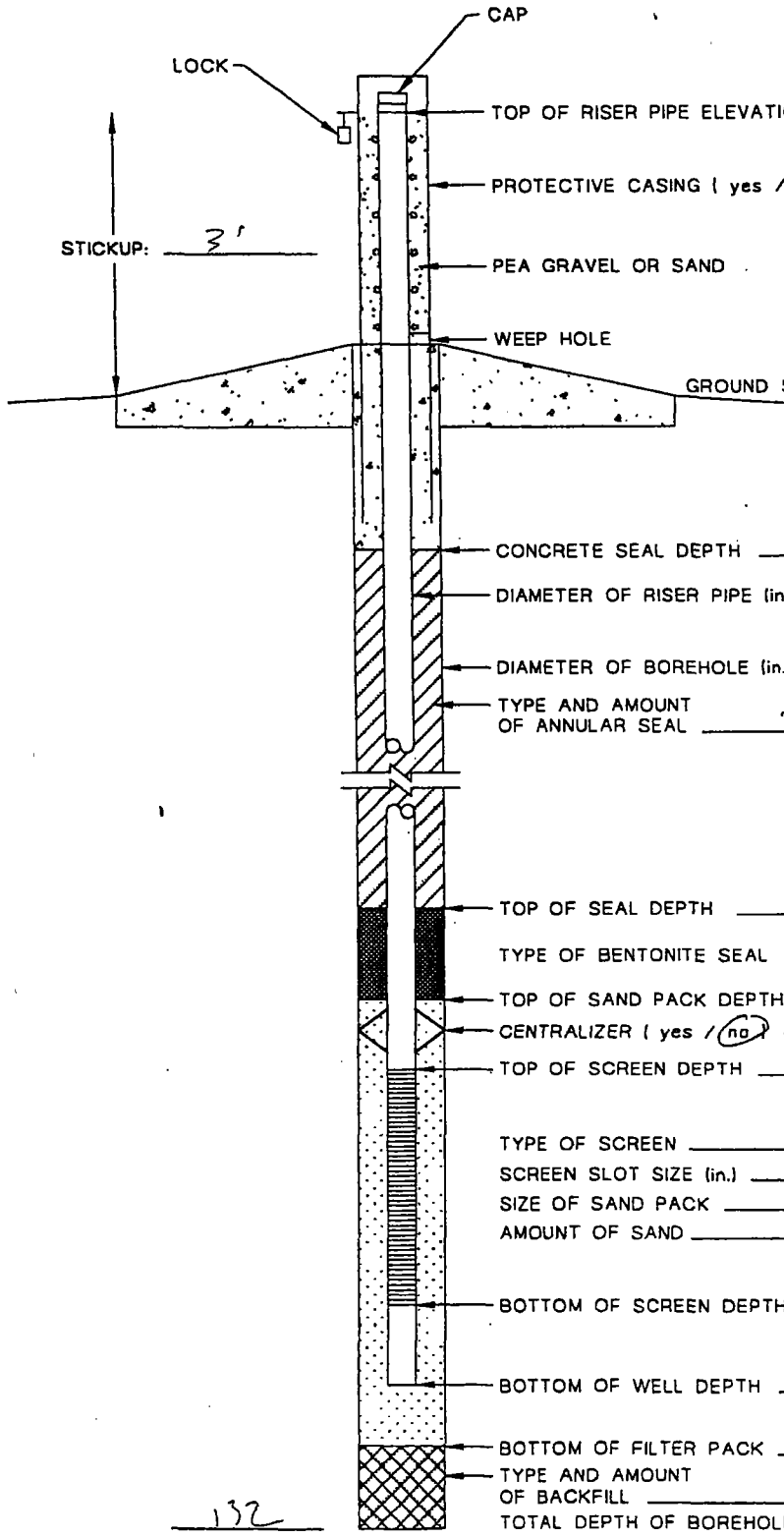
WELL LOGS AND

CONSTRUCTION RECORDS

WATER-LEVEL PIEZOMETER PZ - 1N

GROUNDWATER MONITORING WELL PN

SITE NAME: Site R	LOCATION: South of Concrete wall/In Road	
CLIENT: Solutia	SURFACE ELEVATION: —	
GEOLOGIST: JAP	NORTHING: —	EASTING: —
DRILLER: J CRANE	STATIC WATER LEVEL: —	COMPLETION DATE: 7-9-03
DRILLING COMPANY: Roberts	DRILLING METHODS: 6.5" Mud Rotary	



TOP OF RISER PIPE ELEVATION: —

PROTECTIVE CASING (yes / no): concrete ring

PEA GRAVEL OR SAND

WEEP HOLE

GROUND SURFACE ELEVATION: —

CONCRETE SEAL DEPTH: — FT. BGS.

DIAMETER OF RISER PIPE (in.): 2.0"

DIAMETER OF BOREHOLE (in.): 4.0"

TYPE AND AMOUNT OF ANNULAR SEAL: Bentonite/Cement Grout

TOP OF SEAL DEPTH: 44.0 FT. BGS.

TYPE OF BENTONITE SEAL: medium chip

TOP OF SAND PACK DEPTH: 54.0 FT. BGS.

CENTRALIZER (yes / no) - TYPE: No

TOP OF SCREEN DEPTH: 57.00 FT. BGS.

TYPE OF SCREEN: SS 10 slot

SCREEN SLOT SIZE (in.): .010

SIZE OF SAND PACK:

AMOUNT OF SAND: 24 x 50 lbs Bags

BOTTOM OF SCREEN DEPTH: 132.0 FT. BGS.

BOTTOM OF WELL DEPTH: 132.0 FT. BGS.

BOTTOM OF FILTER PACK: 132.0 FT. BGS.

TYPE AND AMOUNT OF BACKFILL:

TOTAL DEPTH OF BOREHOLE: 132.0

NOTE: DEPTHS MEASURED FROM GROUND SURFACE

Golder Associates

Field Boring Log

DEPTH HOLE 126.5'	JOB NO. AREA 2	PROJECT MW PZ Installation		BORING NO. P1-N	
DEPTH SOIL DRILL 126.5'	GA INSP. MRF	DRILLING METHOD HSA / MUR ROTARY		SHEET 1 OF 3	
DEPTH ROCK CORE —	WEATHER P Cloudy	DRILLING COMPANY REDI.		SURFACE ELEV. —	
NO. DIST. SA. 23 UD. SA. N/A	TEMP. Mid 80's	DRILL RIG CME 75	DRILLER M Cooper	DATUM —	
DEPTH WL. 19.0' BGS	HRS. PROD. —	WT. SAMPLER HAMMER 140 lb	DROP Auto	STARTED 6/17/03 (TIME) / ~~6-18-03~~ (DATE)	
TIME WL. —	HRS. DELAYED —	WT. CASING HAMMER NA	DROP —	COMPLETED 1445 / 6/18/03	

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.D.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" -0-5% "SOME" -12-30%
"LITTLE" -5-12% "AND" -30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0-4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4-10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. DEPTH	DESCRIPTION	BLOWS/FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6-IN (FORCE)	REC/ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	(0-?) v soft to firm, dk gray, SILT, tr f sand, moist to wet, (ML) (alluvium)							
5		6 12	1	SS	3,3,4,8	24/24	5	Soft, moist, dk. grey SILT (ML) w/ trace f. grained sand
10		2 6	2	SS	1,1,2,4	24/24	10	Same as above
15		2 3	3	SS	1,1,2,1	24/24	15	Becomes V. Soft
20	▼ H_2O @ 19.0' bgs	14 24	4	SS	4,10,11,13	24/24	20	becomes Firm & wet
	(?-?) v. soft, to firm, CLAY, tr silt, tr f sand, wet (CL) (alluvium) - f-m sand lense @ 30'							
25		4 7	5	SS	2,2,3,4	24/24	25	Soft, wet, grey CLAY (CL) w/ trace silt & f. grained sand
30		6 21	6	SS	2,4,7,14	18/24	30	Same as above Compact, wet, grey, f. to m. grained SAND (SP)
35		2 3	7	SS	1,1,1,2	24/24	35	V. Soft, wet, grey CLAY (CL) w/ trace silt & f. grained sand
40		2 5	8	SS	1,1,2,3	24/24	40	becomes Soft
45		2 16	9	SS	1,1,4,12	24/24	45	becomes Firm
	(?-?) compact to dense, gray f-c SAND wet, (SW) (alluvium) - grades coarser with depth.							
50		24 50	10	SS	9,15,20,30	18/24	50	Dense wet, grey, f. to m. grained SAND (SP) w/ chert fragments (trace)
55		29 39	11	SS	14,15,17,22	18/24	55	becomes f. to c. grained SAND (SP)

Golder Associates

Field Boring Log

DEPTH HOLE 126.5	JOB NO. Area 2	PROJECT MW/PZ Installation		BORING NO. P1W	
DEPTH SOIL DRILL 126.5	GA INSP. MRE	DRILLING METHOD HSA Mud Rotary		SHEET 2 OF 3	
DEPTH ROCK CORE -	WEATHER P Cloudy	DRILLING COMPANY Roberts		SURFACE ELEV. -	
NO. DIST. SA. 23 UD. SA. -	TEMP. Mid 80's	DRILL RIG CME 75	DRILLER M Cooper	DATUM -	
DEPTH WL. 19.0 BGS	HRS. PROD. -	WT. SAMPLER HAMMER 140 lb	DROP AUTO	STARTED 1617.03	
TIME WL. -	HRS. DELAYED -	WT. CASING HAMMER NA	DROP -	COMPLETED TIME 1445 DATE 6.18.03	

SAMPLE TYPES

A.S.	AUGER SAMPLE	BL	BLACK
C.S.	CHUNK SAMPLE	BR	BROWN
D.O.	DRIVE OPEN	C	COARSE
D.S.	DENISON SAMPLE	CA	CASING
P.S.	PITCHER SAMPLE	CL	CLAY
R.C.	ROCK CORE	CLY	CLAYEY
S.T.	SLOTTED TUBE	F	FINE
T.O.	THIN-WALLED, OPEN	FRAG	FRAGMENTS
T.P.	THIN-WALLED, PISTON	GL	GRAVEL
W.S.	WASH SAMPLE	LYD	LAYERED
		LI	LITTLE

ABBREVIATIONS

M	MEDIUM	SA	SAMPLE
MIC	MICACEOUS	SAT	SATURATED
MOT	MOTTLED	SD	SAND
NP	NON-PLASTIC	SI	SILT
OG	ORANGE	SIY	SILTY
ORG	ORGANIC	SM	SOME
PH	PRESSURE-HYDRAULIC	TR	TRACE
PM	PRESSURE-MANUAL	WL	WATER LEVEL
R	RED	WH	WEIGHT OF HAMMER
RES	RESIDUAL	Y	YELLOW
RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. DEPTH	DESCRIPTION	BLOWS/FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6-IN (FORCE)	REC/ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
60		35 28	12	SS	19,16,12,16	18/24	60	Same as above
65		22 32	13	SS	9,13,17,15		65	becomes Compact
70		17 19	14	SS	8,9,13,6		70	Same as above
75		21 19	15	SS	10,11,10,9		75	Same as above
80		18 16	16	SS	10,8,8,8		80	Same as above
85		45 41	17	SS	22,23,23,18		85	becomes Dense & brown
90		19 29	18	SS	8,11,16,13		90	becomes Compact & grades coarser w/ little f. grains
95		28 39	19	SS	13,15,17,22		95	becomes Dense
100		32 29	20	SS	14,18,17,12		100	Same as above
105		38 55	21	SS	15,23,26,29		105	becomes V. Dense w/ trace f. grains
110		37 50+	22	SS	15,24,50(24)		110	Same as above
	Limestone boulders and cobbles, no recovery	N/A	-	-	N/A	N/A	115	LS Boulders & Cobbles

Golder Associates

Field Boring Log

DEPTH HOLE 126.5'	JOB NO. Area 2	PROJECT MW & PZ Installation		BORING NO. P1-N	
DEPTH SOIL DRILL 126.5'	GA INSP. MRF	DRILLING METHOD HSA / Mud Rotary		SHEET 3 OF 3	
DEPTH ROCK CORE -	WEATHER P. Cloudy	DRILLING COMPANY REDI		SURFACE ELEV. -	
NO. DIST. SA. 23 UD. SA. N/A	TEMP. mid 80's	DRILL RIG CME 75	DRILLER M. Cooper	DATUM -	
DEPTH WL. 19.0' bgs	HRS. PROD. -	WT. SAMPLER HAMMER 140 lb	DROP Auto	STARTED 6-17-03	
TIME WL. -	HRS. DELAYED -	WT. CASING HAMMER N/A	DROP -	COMPLETED TIME 1445 DATE 6-18-03	

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	STY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6-IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
		N/A	-	-	N/A	N/A	115	
120	(?-?) Stm to Vi stiff, brown CLAY, tr silty tr f-m Sand, wet, (CL)(alluvium)	18 51	23	SS	8,10,27,29	24/24	120	Firm, wet, brown CLAY (CL) w/ trace silt + f. to m. grained sand becomes Vi stiff
125	Limestone Boulders and cobbles, no recovery	N/A	-	-	N/A	N/A	125	LS Boulders & Cobbles
	TOR @ 126.5' bgs							

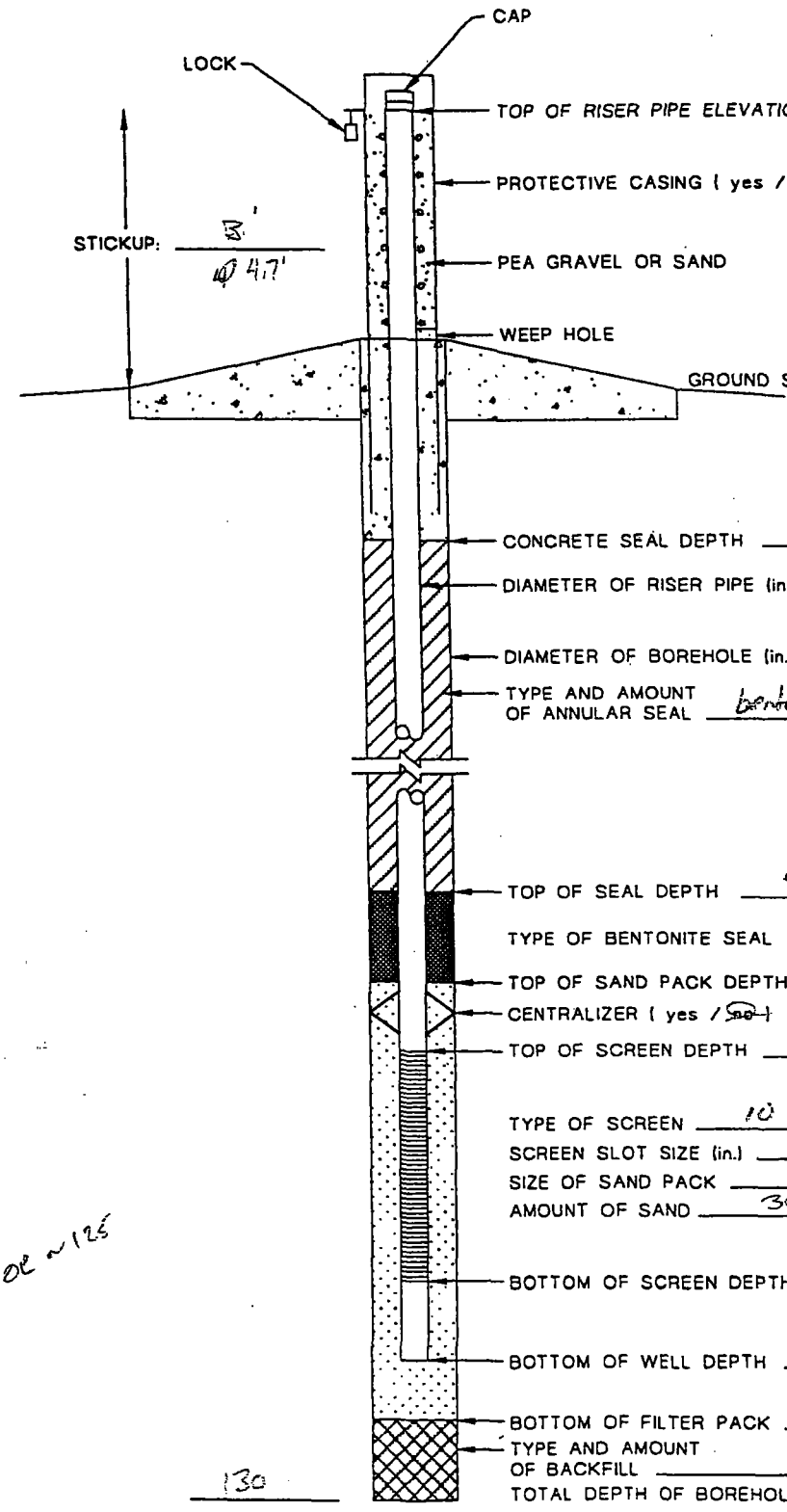
WELL LOGS AND

CONSTRUCTION RECORDS

WATER-LEVEL PIEZOMETER PZ - 1S

GROUNDWATER MONITORING WELL P1S

SITE NAME: Site R		LOCATION: S of Road - N Piezo Dir
CLIENT: Solutia		SURFACE ELEVATION: —
GEOLOGIST: JAC	NORTHING: —	EASTING: —
DRILLER: J Crank	STATIC WATER LEVEL: —	COMPLETION DATE: 6-27-03
DRILLING COMPANY: Roberts		DRILLING METHODS: 6.5" Mud Rotary



TOP OF RISER PIPE ELEVATION: —

PROTECTIVE CASING (yes / no): concrete ring

PEA GRAVEL OR SAND

GROUND SURFACE ELEVATION: —

CONCRETE SEAL DEPTH: — FT. BGS.

DIAMETER OF RISER PIPE (in.): 2

DIAMETER OF BOREHOLE (in.): ~6.5"

TYPE AND AMOUNT OF ANNULAR SEAL: bentonite / portland cement

TOP OF SEAL DEPTH: 40 FT. BGS.

TYPE OF BENTONITE SEAL: 3 bags bentonite chips

TOP OF SAND PACK DEPTH: 52 FT. BGS.

CENTRALIZER (yes / ~~no~~) - TYPE: —

TOP OF SCREEN DEPTH: 55 FT. BGS.

TYPE OF SCREEN: 10 Slot SS

SCREEN SLOT SIZE (in.): 0.010

SIZE OF SAND PACK: —

AMOUNT OF SAND: 30 x 50 # bags

TOC ~125

BOTTOM OF SCREEN DEPTH: ~130 FT. BGS.

BOTTOM OF WELL DEPTH: 130 FT. BGS.

BOTTOM OF FILTER PACK: 130 FT. BGS.

TYPE AND AMOUNT OF BACKFILL: —

TOTAL DEPTH OF BOREHOLE: 130

NOTE: DEPTHS MEASURED FROM GROUND SURFACE

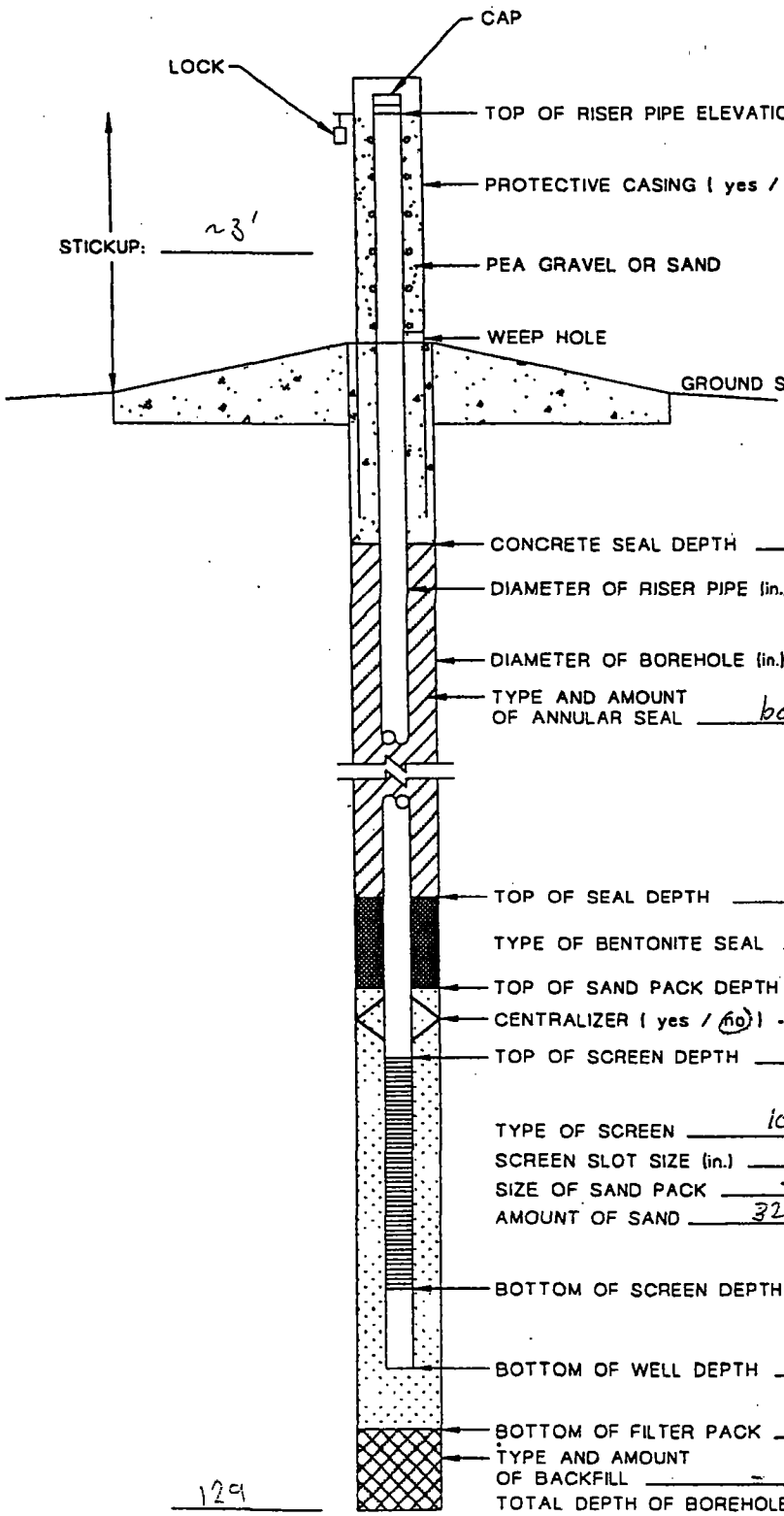
WELL LOGS AND

CONSTRUCTION RECORDS

WATER-LEVEL PIEZOMETER PZ - 2E

GROUNDWATER MONITORING WELL P2E

SITE NAME: Site D GMCS		LOCATION: P2-East
CLIENT: Solutia		SURFACE ELEVATION: —
GEOLOGIST: MRF	NORTHING: —	EASTING: —
DRILLER: J Crank	STATIC WATER LEVEL: —	COMPLETION DATE: 6-18-03
DRILLING COMPANY: REDI		DRILLING METHODS: 6 3/4" Mud Rotary



TOP OF RISER PIPE ELEVATION —

PROTECTIVE CASING (yes / no) concrete ring

PEA GRAVEL OR SAND

WEEP HOLE

GROUND SURFACE ELEVATION —

CONCRETE SEAL DEPTH NA FT. BGS.

DIAMETER OF RISER PIPE (in.) 2

DIAMETER OF BOREHOLE (in.) ~7"

TYPE AND AMOUNT OF ANNULAR SEAL bentonite / cement grout

TOP OF SEAL DEPTH ~46 FT. BGS.

TYPE OF BENTONITE SEAL CHIPS

TOP OF SAND PACK DEPTH ~51 FT. BGS.

CENTRALIZER (yes / no) - TYPE —

TOP OF SCREEN DEPTH ~54 FT. BGS.

TYPE OF SCREEN 10 Slot SS

SCREEN SLOT SIZE (in.) 0.010

SIZE OF SAND PACK —

AMOUNT OF SAND 32 x 50 # bags

BOTTOM OF SCREEN DEPTH ~129 FT. BGS.

BOTTOM OF WELL DEPTH 129 FT. BGS.

BOTTOM OF FILTER PACK 129 FT. BGS.

TYPE AND AMOUNT OF BACKFILL —

TOTAL DEPTH OF BOREHOLE 129

NOTE: DEPTHS MEASURED FROM GROUND SURFACE

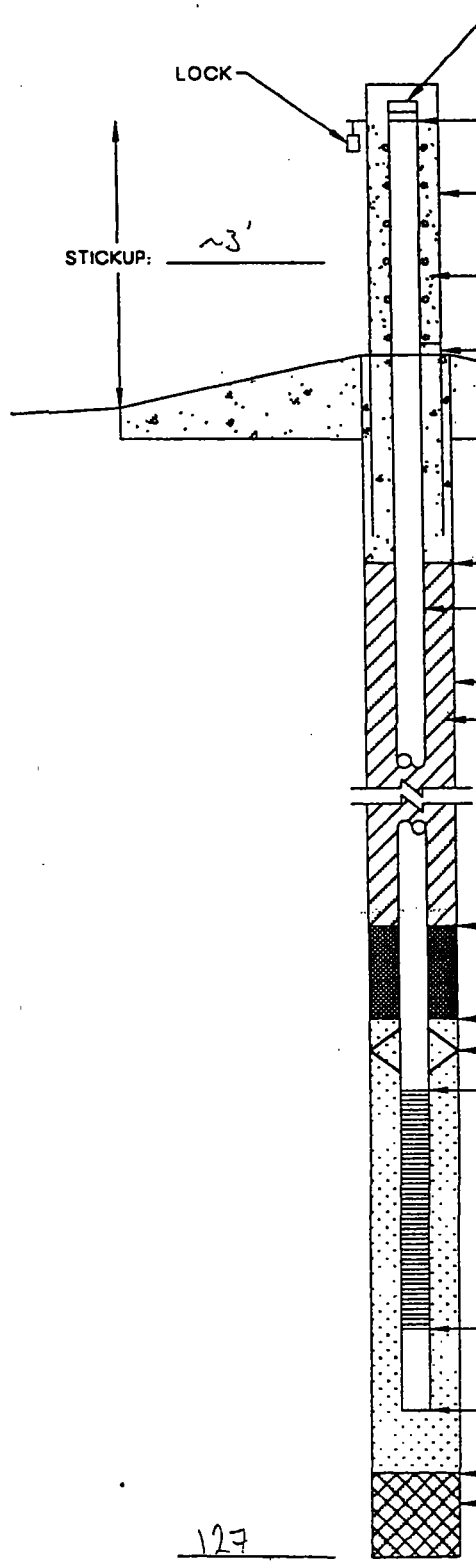
WELL LOGS AND

CONSTRUCTION RECORDS

WATER-LEVEL PIEZOMETER PZ - 2W

GROUNDWATER MONITORING WELL P2W

SITE NAME: Site R GMCS	LOCATION: P2-West	
CLIENT: Solutia	SURFACE ELEVATION: —	
GEOLOGIST: MRF	NORTHING: —	EASTING: —
DRILLER: J Crank	STATIC WATER LEVEL: —	COMPLETION DATE: 6-16-03
DRILLING COMPANY: Roberts	DRILLING METHODS: 6 3/4" Mud Rotary	



TOP OF RISER PIPE ELEVATION: —

PROTECTIVE CASING (yes / no): concrete ring

PEA GRAVEL OR SAND

WEEP HOLE

GROUND SURFACE ELEVATION: —

CONCRETE SEAL DEPTH: — FT. BGS.

DIAMETER OF RISER PIPE (in.): 2"

DIAMETER OF BOREHOLE (in.): ~7"

TYPE AND AMOUNT OF ANNULAR SEAL: bentonite / cement grout

TOP OF SEAL DEPTH: ~45 FT. BGS.

TYPE OF BENTONITE SEAL: CHIPS

TOP OF SAND PACK DEPTH: ~49 FT. BGS.

CENTRALIZER (yes / (no)) - TYPE: —

TOP OF SCREEN DEPTH: ~52' FT. BGS.

TYPE OF SCREEN: 10 slot SS

SCREEN SLOT SIZE (in.): 0.010

SIZE OF SAND PACK: —

AMOUNT OF SAND: 26 x 50# bags

BOTTOM OF SCREEN DEPTH: ~127 FT. BGS.

BOTTOM OF WELL DEPTH: 127 FT. BGS.

BOTTOM OF FILTER PACK: 127 FT. BGS.

TYPE AND AMOUNT OF BACKFILL: —

TOTAL DEPTH OF BOREHOLE: 127

NOTE: DEPTHS MEASURED FROM GROUND SURFACE

Golder Associates

Field Boring Log

DEPTH HOLE 128.0' bgs	JOB NO. Area 2	PROJECT GMCS - MW & PZ Installation		BORING NO. P2-W	
DEPTH SOIL DRILL 128.0' bgs	BA INSP. MRF	DRILLING METHOD Auger & Mud Rotary		SHEET 1 OF 3	
DEPTH ROCK CORE N/A	WEATHER Sunny	DRILLING COMPANY REDI		SURFACE ELEV. —	
NO. DIST. SA. 25 UD. SA. N/A	TEMP. low 80's	DRILL RIG CME 75	DRILLER C. Hebel	DATUM —	
DEPTH WL. 19.0' bgs	HRS. PROD. —	WT. SAMPLER HAMMER 140 lb	DROP Auto	STARTED 810 (TIME) 6-12-03 (DATE)	
TIME WL. 945	HRS. DELAYED —	WT. CASING HAMMER N/A	DROP —	COMPLETED 1600 (TIME) 6-12-03 (DATE)	

SAMPLE TYPES

A.S.	AUGER SAMPLE	BL	BLACK
C.S.	CHUNK SAMPLE	BR	BROWN
D.O.	DRIVE OPEN	C	COARSE
D.S.	DENISON SAMPLE	CA	CASING
P.S.	PITCHER SAMPLE	CL	CLAY
R.C.	ROCK CORE	CLY	CLAYEY
S.T.	SLOTTED TUBE	F	FINE
T.O.	THIN-WALLED, OPEN	FRAG	FRAGMENTS
T.P.	THIN-WALLED, PISTON	GL	GRAVEL
W.S.	WASH SAMPLE	LYD	LAYERED
		LI	LITTLE

ABBREVIATIONS

M	MEDIUM	SA	SAMPLE
MIC	MICACEOUS	SAT	SATURATED
MOT	MOTTLED	SD	SAND
NP	NON-PLASTIC	SI	SILT
OG	ORANGE	STY	SILTY
ORG	ORGANIC	SM	SOME
PH	PRESSURE-HYDRAULIC	TR	TRACE
PM	PRESSURE-MANUAL	WL	WATER LEVEL
R	RED	WH	WEIGHT OF HAMMER
RES	RESIDUAL	Y	YELLOW
RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6-IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	(0-?) v. loose, gray and black, GRAVEL and CINDERS, moist (GW, C) (fill)							moist
5		2 3	1	SS	1,1,2,1	6/24	5	V. Loose gray GRAVEL (GW) & black CINDERS (C) - fill
	(?-?) loose, brown f SAND, moist (SP) (alluvium)							
10		6 3	2	SS	3,3,2,1	24/24	10	Loose, moist, brown f. grained SAND (SP)
15		6 5	3	SS	3,3,2,3	24/24	15	Same as above
	▼ H_2O @ 19.0' bgs							
20	v. soft, brown, SILT, some clay, some f-sand, wet, (ML) (alluvium)	2 2	4	SS	1,1,1,1	24/24	20	v. Soft, wet, brown, clayey, sandy SILT (ML)
	(?-?) soft to firm gray CLAY, tr to some silt, tr to some f sand, wet, (CL) (alluvium)							Soft, wet, grey, sandy, silty CLAY (CL)
25		4 14	5	SS	2,2,5,9	24/24	25	becomes firm @ 25.0' bgs
30		2 4	6	SS	1,1,2,2	24/24	30	becomes soft
35		4 4	7	SS	2,2,3,1	24/24	35	becomes CLAY (CL) w/ trace silt & fine-grained sand
40		3 5	8	SS	1,2,2,3	24/24	40	Same as above
	(?-?) firm, gray, SILT, some clay, some f-sand, wet (ML) (alluvium)							becomes silty CLAY (CL) w/ trace sand
45		6 11	9	SS	3,3,3,8	24/24	45	Firm, wet, grey, clayey, sandy SILT (ML)
	(?-?) compact to dense gray, f-c SAND, tr limestone fragments, tr chert fragments, wet, (SW) (alluvium)							
50		38 28	10	SS	15,23,18,10	18/24	50	Dense, wet, grey, f. to m. grained SAND (SP)
55		15 36	11	SS	6,9,14,22	12/24	55	becomes f. to c. grained

Golder Associates

Field Boring Log

DEPTH HOLE 128.0	JOB NO. Area 2	PROJECT GMCS			BORING NO. P2-W
DEPTH SOIL DRILL 128.0	GA INSP. MRF	DRILLING METHOD Auger Mud Rotary			SHEET 2 OF 3
DEPTH ROCK CORE –	WEATHER Sunny	DRILLING COMPANY REDI			SURFACE ELEV. –
NO. DIST. SA. 23 UD. SA. –	TEMP. low 80s	DRILL RIG CME 75	DRILLER C Hebel		DATUM –
DEPTH WL. 19.0' BGS	HRS. PROD. –	WT. SAMPLER HAMMER 140	DROP Auto		STARTED 810 / 6-12-03 (TIME / DATE)
TIME WL. 945	HRS. DELAYED –	WT. CASING HAMMER na	DROP –		COMPLETED 1600 / 6-12-03 (TIME / DATE)

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" – 0 - 5% "SOME" – 12 - 30%
"LITTLE" – 5 - 12% "AND" – 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6-IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
60		43 45	12	SS	20,23,24,21	24/24	60	Same as above
65		35 43	13	SS	15,20,21,22	24/24	65	Same as above
70		26 36	14	SS	15,11,16,20	12/24	70	Same as above - grading coarser
75		26 22	15	SS	13,13,11,11	18/24	75	Same as above - becomes compact
80		29 46	16	SS	13,16,20,26	18/24	80	becomes Dense
85		32 46	17	SS	13,19,23,23	18/24	85	becomes m. to c. grained
90		22 19	18	SS	11,11,10,9	12/24	90	w/ LS fragments - becomes compact
95		31 41	19	SS	15,16,16,25	12/24	95	w/ Chert fragments - becomes Dense
100		36 31	20	SS	18,18,18,13	12/24	100	w/ LS fragments
105		22 22	21	SS	11,11,11,11	12/24	105	Same as above - becomes compact
110		44 44	22	SS	20,24,20,24	12/24	110	becomes Dense
		64+	23	SS	19,50(2")	6/24	115	becomes V. Dense

Golder Associates

Field Boring Log

DEPTH HOLE 128	JOB NO. Area 2	PROJECT GMCS		BORING NO. P2-W	
DEPTH SOIL DRILL 128	GA INSP. MRF	DRILLING METHOD Auger & Mud Rotary		SHEET 3 OF 3	
DEPTH ROCK CORE –	WEATHER Sunny	DRILLING COMPANY REDI		SURFACE ELEV. –	
NO. DIST. SA. 23 UD. SA. –	TEMP. low 80s	DRILL RIG CME 75	DRILLER C Hebel	DATUM –	
DEPTH WL. 19.0'	HRS. PROD. –	WT. SAMPLER HAMMER 140#	DROP Auto	STARTED 810 (TIME) 6-12-03 (DATE)	
TIME WL. 945	HRS. DELAYED –	WT. CASING HAMMER –	DROP –	COMPLETED 1608 (TIME) 6-12-03 (DATE)	

SAMPLE TYPES

A.S.	AUGER SAMPLE	BL	BLACK
C.S.	CHUNK SAMPLE	BR	BROWN
D.O.	DRIVE OPEN	C	COARSE
D.S.	DENISON SAMPLE	CA	CASING
P.S.	PITCHER SAMPLE	CL	CLAY
R.C.	ROCK CORE	CLY	CLAYEY
S.T.	SLOTTED TUBE	F	FINE
T.O.	THIN-WALLED, OPEN	FRAG	FRAGMENTS
T.P.	THIN-WALLED, PISTON	GL	GRAVEL
W.S.	WASH SAMPLE	LYD	LAYERED
		LI	LITTLE

ABBREVIATIONS

M	MEDIUM	SA	SAMPLE
MIC	MICACEOUS	SAT	SATURATED
MOT	MOTTLED	SD	SAND
NP	NON-PLASTIC	SI	SILT
OG	ORANGE	STY	SILTY
ORG	ORGANIC	SM	SOME
PH	PRESSURE-HYDRAULIC	TR	TRACE
PM	PRESSURE-MANUAL	WL	WATER LEVEL
R	RED	WH	WEIGHT OF HAMMER
RES	RESIDUAL	Y	YELLOW
RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6-IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	No recovery, limestone boulders and cobbles.	–	23	SS	19 50 (20")	6/24	115	~~Same~~ – LS Boulder & Cobbles
120		N/A	24	SS	N/A	N/A	120	Same as above
125		N/A	25	SS	N/A	N/A	125	Same as above
								LS Bedrock
	TOR @ 128.0' bgs End of Boring							

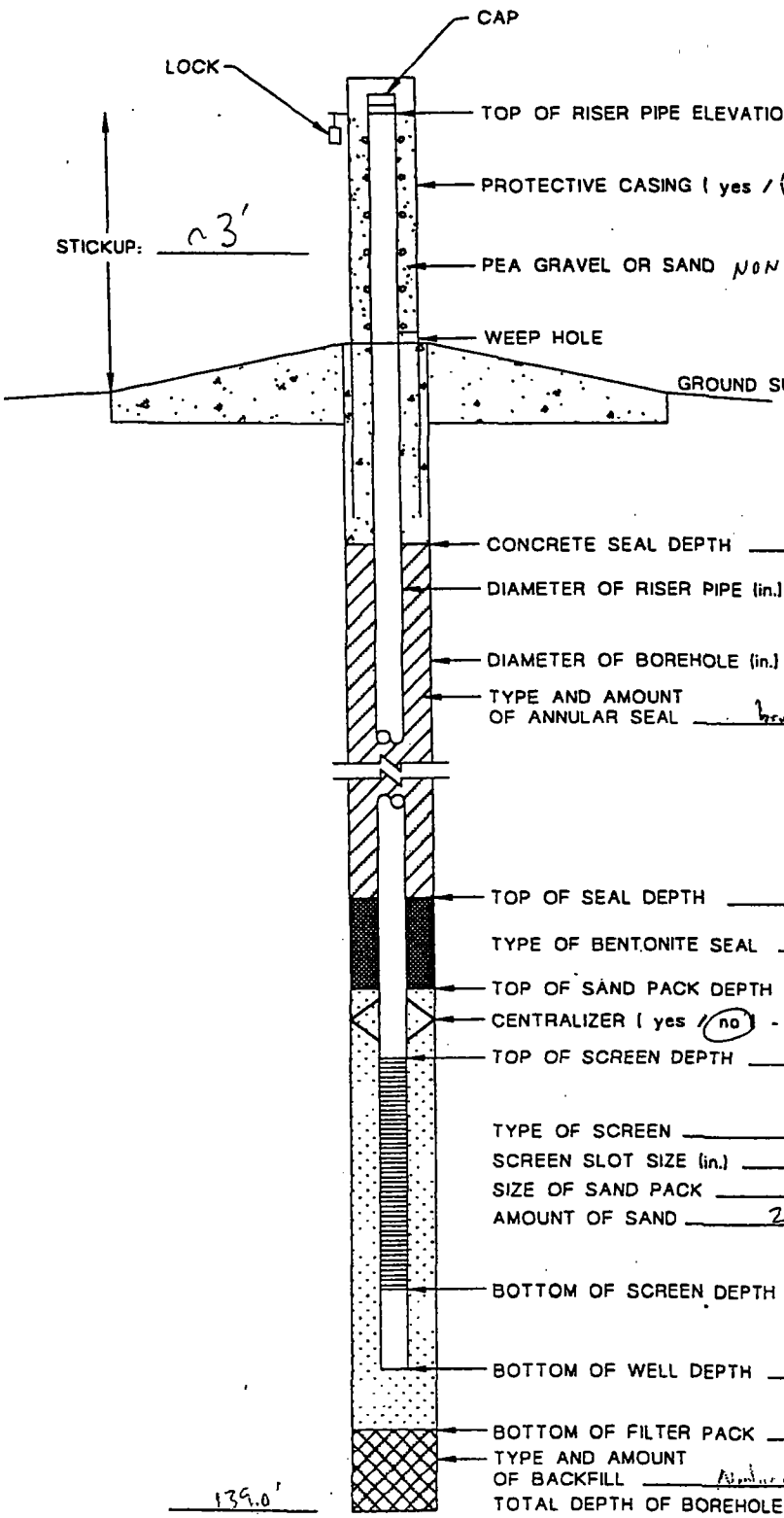
WELL LOGS AND

CONSTRUCTION RECORDS

WATER-LEVEL PIEZOMETER PZ - 3E

GROUNDWATER MONITORING WELL P3E

SITE NAME: Site R	LOCATION: –	
CLIENT: Solutia	SURFACE ELEVATION: –	
GEOLOGIST: J Perez	NORTHING: –	EASTING: –
DRILLER: J Crane	STATIC WATER LEVEL: –	COMPLETION DATE: 7-8-03
DRILLING COMPANY: REDI	DRILLING METHODS: 5 7/8" Mud Rotary	



TOP OF RISER PIPE ELEVATION: –

PROTECTIVE CASING (yes / no): concrete ring

PEA GRAVEL OR SAND: NONE

GROUND SURFACE ELEVATION: –

CONCRETE SEAL DEPTH: – FT. BGS.

DIAMETER OF RISER PIPE (in.): 2 in

DIAMETER OF BOREHOLE (in.): ~6" Below 50', 8" 0-50'

TYPE AND AMOUNT OF ANNULAR SEAL: bentonite/cement grout

TOP OF SEAL DEPTH: 41.0' FT. BGS.

TYPE OF BENTONITE SEAL: chips

TOP OF SAND PACK DEPTH: 51.0 FT. BGS.

CENTRALIZER (yes / no) - TYPE: No

TOP OF SCREEN DEPTH: ~54 FT. BGS.

TYPE OF SCREEN: 10 slot pvc

SCREEN SLOT SIZE (in.): 0.010

SIZE OF SAND PACK: –

AMOUNT OF SAND: 24 x 50 lbs

BOTTOM OF SCREEN DEPTH: ~139 FT. BGS.

BOTTOM OF WELL DEPTH: 139.0 FT. BGS.

BOTTOM OF FILTER PACK: 139.0 FT. BGS.

TYPE AND AMOUNT OF BACKFILL: Natural materials

TOTAL DEPTH OF BOREHOLE

NOTE: DEPTHS MEASURED FROM GROUND SURFACE

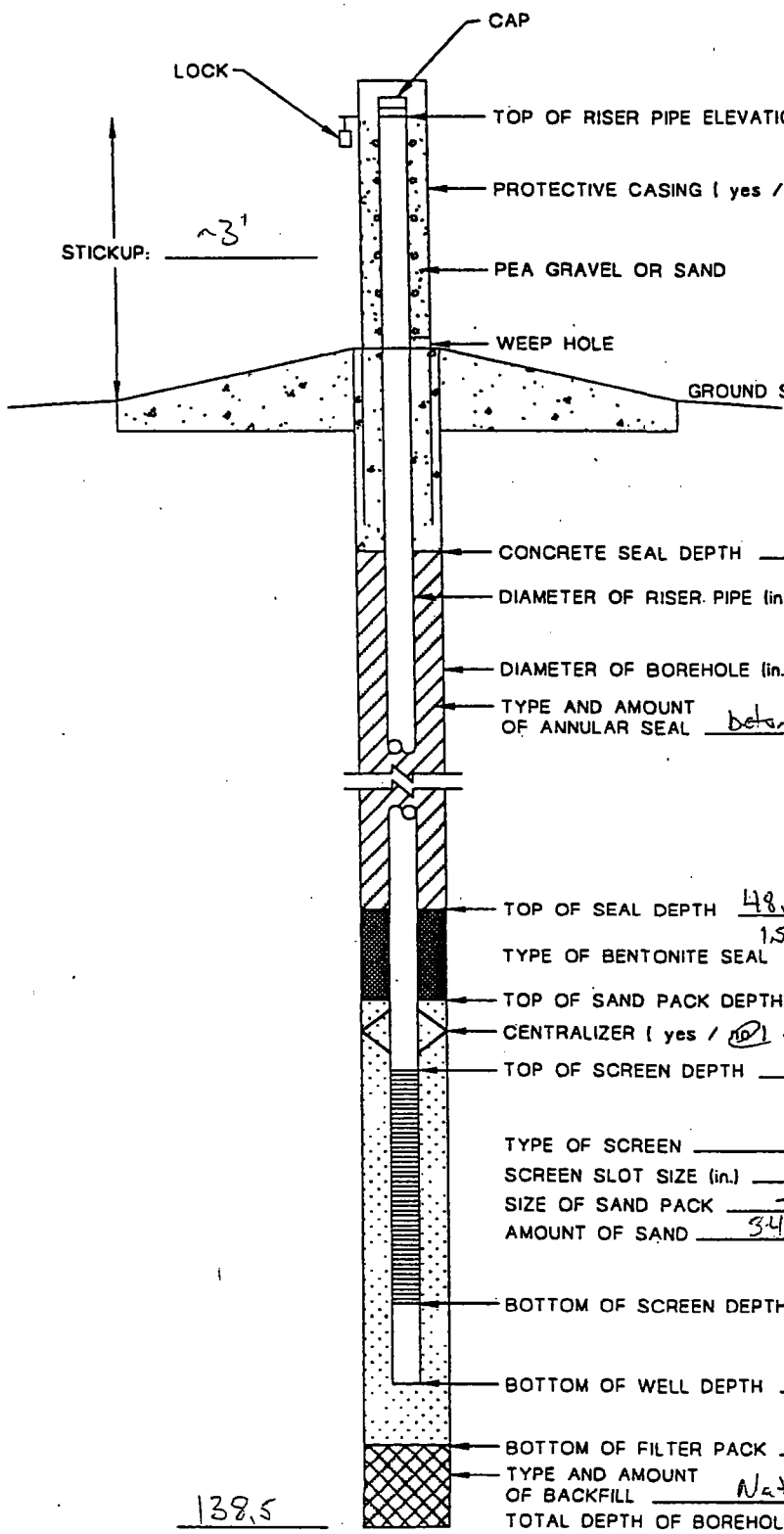
WELL LOGS AND

CONSTRUCTION RECORDS

WATER-LEVEL PIEZOMETER PZ - 3W

GROUNDWATER MONITORING WELL P3W

SITE NAME: SITE R	LOCATION: –	
CLIENT: SCOTIA	SURFACE ELEVATION: –	
GEOLOGIST: J CLARK	NORTHING: –	EASTING: –
DRILLER: J CRANK	STATIC WATER LEVEL: –	COMPLETION DATE: 7-2-03
DRILLING COMPANY: Roberts	DRILLING METHODS: 5 7/8" Mud Rotary	



TOP OF RISER PIPE ELEVATION –

PROTECTIVE CASING (yes / no) concrete ring

PEA GRAVEL OR SAND

GROUND SURFACE ELEVATION –

CONCRETE SEAL DEPTH – FT. BGS.

DIAMETER OF RISER PIPE (in.) 2

DIAMETER OF BOREHOLE (in.) ~6" Below 50', -8" 0-50'

TYPE AND AMOUNT OF ANNULAR SEAL bentonite/cement grout

TOP OF SEAL DEPTH 48.5' - chips / ~45' grout FT. BGS.

TYPE OF BENTONITE SEAL 1.5' chips / bentonite grout

TOP OF SAND PACK DEPTH 50 FT. BGS.

CENTRALIZER (yes / no) - TYPE –

TOP OF SCREEN DEPTH ~52.5' FT. BGS.

TYPE OF SCREEN 10 Slot SS

SCREEN SLOT SIZE (in.) 0.010

SIZE OF SAND PACK –

AMOUNT OF SAND 34 x 50# bags

BOTTOM OF SCREEN DEPTH ~ 137.5 FT. BGS.

BOTTOM OF WELL DEPTH 137.5 FT. BGS.

BOTTOM OF FILTER PACK 137.5 FT. BGS.

TYPE AND AMOUNT OF BACKFILL Natural materials

138.5 TOTAL DEPTH OF BOREHOLE

NOTE: DEPTHS MEASURED FROM GROUND SURFACE

Golder Associates

Field Boring Log

DEPTH HOLE 128.5	JOB NO. Area 2	PROJECT MW & PZ Installation & Development		BORING NO. PZ-W	
DEPTH SOIL DRILL 128.5	GA INSP. MRF	DRILLING METHOD HSA & Mud Rotary		SHEET 1	OF 3
DEPTH ROCK CORE N/A	WEATHER Cloudy	DRILLING COMPANY REDI		SURFACE ELEV.	
NO. DIST. SA. ___ UD. SA N/A	TEMP. high 70's	DRILL RIG CME 75	DRILLER M. Cooper	DATUM	
DEPTH WL. 20.5 ft	HRS. PROD. —	WT. SAMPLER HAMMER 140 lb	DROP Auto	STARTED 1545 (TIME), 6-10-03 (DATE)	
TIME WL. 1625	HRS. DELAYED —	WT. CASING HAMMER N/A	DROP —	COMPLETED (TIME), 6-11-03 (DATE)	

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	(0-?) v. soft to soft brown, CLAYEY SILT, tr to some f sand, moist, (ml) (alluvium)							
5		3 3	1	SS	1,2,2,1	24/24	5	v. Soft, moist, brown clayey SILT (ML) w/ trace f.g. sand becomes grey clayey, sandy SILT (ML) @ 4.5 ft bgs
10		3 3	2	SS	2,1,2,1	24/24	10	Same as above
15		1 3	3	SS	1,0,1,2	24/24	15	Same as above
20	H_2O @ 20.5 ft bgs	3 6	4	SS	1,2,3,3	24/24	20	Same as above becomes soft, wet @ 20.5 ft bgs
25	(?-?) v. soft, grey, SILTY CLAY, tr f sand, wet, (CL) (alluvium)	3 4	5	SS	1,2,1,3	24/24	25	v. Soft, wet, grey, silty CLAY (CL) w/ trace f.g. sand
30	(?-?) v. soft, grey, SILT, some Clay, some f sand, wet, (ml) (alluvium)	3 5	6	SS	2,1,2,3	24/24	30	v. Soft, wet, grey, clayey, sandy SILT (ML)
35	(?-?) compact, grey f-m SAND, wet @ (SP) (alluvium) - becomes v. dense @ 54'	22 28	7	SS	11,11,15,13	24/24	35	Compact, wet, grey, f.g. to m.g. ~~Same as above~~ SAND (SP)
40	Stop drilling 6-10-03 @ 45.0' bgs	12 28	8	SS	6,6,13,18	12/24	40	Same as above
45		36 42	9	SS	16,20,21,21	12/24	45	Same as above becomes Dense
50	Resume drilling 6-11-03	36 45	10	SS	17,19,23,22	12/24	50	Same as above
55		41 64	11	SS	16,25,26,38	12/24	55	Same as above becomes v. Dense

Golder Associates

Field Boring Log

DEPTH HOLE 128.5	JOB NO. Area 2	PROJECT MW & PZ				BORING NO. P3-W	
DEPTH SOIL DRILL 128.5	GA INSP. MRF	DRILLING METHOD HSA & Mud Rotary				SHEET 2 OF 3	
DEPTH ROCK CORE n/a	WEATHER P. Cloudy	DRILLING COMPANY REDI				SURFACE ELEV.	
NO. DIST. SA. ___ UD. SA. n/a	TEMP. mid 70s	DRILL RIG CME 75		DRILLER C. Hebel		DATUM	
DEPTH WL. 20.5 ft	HRS. PROD.	WT. SAMPLER HAMMER 140 lb		DROP Auto		STARTED 1545 / 6-10-03 (TIME / DATE)	
TIME WL. 1625	HRS. DELAYED	WT. CASING HAMMER n/a		DROP –		COMPLETED 6-11-03	

SAMPLE TYPES

A.S.	AUGER SAMPLE	BL	BLACK
C.S.	CHUNK SAMPLE	BR	BROWN
D.O.	DRIVE OPEN	C	COARSE
D.S.	DENISON SAMPLE	CA	CASING
P.S.	PITCHER SAMPLE	CL	CLAY
R.C.	ROCK CORE	CLY	CLAYEY
S.T.	SLOTTED TUBE	F	FINE
T.O.	THIN-WALLED, OPEN	FRAG	FRAGMENTS
T.P.	THIN-WALLED, PISTON	GL	GRAVEL
W.S.	WASH SAMPLE	LYD	LAYERED
		LI	LITTLE

ABBREVIATIONS

M	MEDIUM	SA	SAMPLE
MIC	MICACEOUS	SAT	SATURATED
MOT	MOTTLED	SD	SAND
NP	NON-PLASTIC	SI	SILT
OG	ORANGE	SIY	SILTY
ORG	ORGANIC	SM	SOME
PH	PRESSURE-HYDRAULIC	TR	TRACE
PM	PRESSURE-MANUAL	WL	WATER LEVEL
R	RED	WH	WEIGHT OF HAMMER
RES	RESIDUAL	Y	YELLOW
RX	ROCK		

SOIL DESCRIPTION – RANGE OF PROPORTION

"TRACE" – 0 - 5% "SOME" – 12 - 30%
"LITTLE" – 5 - 12% "AND" – 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
60		15 12	12	SS	9,6,6,6	0/24	60	No Recovery (NR)
65	(?-?) compact to v. dense, f-c SAND, multi-colored grains, tr gravel, wet (SW) (alluvium)	11 21	13	SS	5,6,9,12	12/24	65	Compact, wet, f.g. to c.g. SAND (SP) w/ multi-colored grains & trace gravel
70	– cobbles or boulders @ 82', 110' – grades coarser with depth	26 37	14	SS	13,13,14,23	12/24	70	becomes Dense @ 70.5 ft bgs
75		54 59	15	SS	26,28,27,32	18/24	75	Same as above
80		39 59	16	SS	17,22,22,37	12/24	80	w/ trace chert fragments Cobbles and/or Boulders @ 82.0' bgs
85		27 48	17	SS	14,13,18,20	12/24	85	Same as above
90		18 22	18	SS	9,9,10,12	18/24	90	Same as above grading coarser, becomes compact
95		35 37	19	SS	14,21,18,19	12/24	95	becomes Dense
100		32 67	20	SS	16,16,37,30	12/24	100	becomes V. Dense @ 100.0' bgs
105		48 58	21	SS	26,22,31,27	12/24	105	becomes m. to c. grained w/ trace fines
110		50+	22	SS	50 (3")	3/24	110	L.S. fragments (Boulder or Cobble)
	(?-?) firm, gray, CLAY tr f-m sand, tr silt wet, (CL) (alluvium)	18	~~23~~ 23	SS	7,11,15,7	24/24	115	Firm, wet, grey CLAY (CL) w/ trace f. to m. grained sand and trace silt

Golder Associates

Field Boring Log

DEPTH HOLE 128.5	JOB NO. Area 2	PROJECT MW & Piezo				BORING NO. P3-W	
DEPTH SOIL DRILL 128.5	GA INSP. MRF	DRILLING METHOD HSA + Mud Rotary				SHEET 3 OF 3	
DEPTH ROCK CORE –	WEATHER P. Cloudy	DRILLING COMPANY REDI				SURFACE ELEV. –	
NO. DIST. SA. – UD. SA. –	TEMP. mid 70s	DRILL RIG CME 75		DRILLER C Hedel		DATUM –	
DEPTH WL. –	HRS. PROD. –	WT. SAMPLER HAMMER 140		DROP Auto		STARTED 1545 / 6.10.03 (TIME / DATE)	
TIME WL. –	HRS. DELAYED –	WT. CASING HAMMER –		DROP –		COMPLETED 16.11.03	

SAMPLE TYPES

A.S.	AUGER SAMPLE	BL	BLACK
C.S.	CHUNK SAMPLE	BR	BROWN
D.O.	DRIVE OPEN	C	COARSE
D.S.	DENISON SAMPLE	CA	CASING
P.S.	PITCHER SAMPLE	CL	CLAY
R.C.	ROCK CORE	CLY	CLAYEY
S.T.	SLOTTED TUBE	F	FINE
T.O.	THIN-WALLED, OPEN	FRAG	FRAGMENTS
T.P.	THIN-WALLED, PISTON	GL	GRAVEL
W.S.	WASH SAMPLE	LYD	LAYERED
		LI	LITTLE

ABBREVIATIONS

M	MEDIUM	SA	SAMPLE
MIC	MICACEOUS	SAT	SATURATED
MOT	MOTTLED	SD	SAND
NP	NON-PLASTIC	SI	SILT
OG	ORANGE	SIY	SILTY
O/G	ORGANIC	SM	SOME
PH	PRESSURE-HYDRAULIC	TR	TRACE
PM	PRESSURE-MANUAL	WL	WATER LEVEL
R	RED	WH	WEIGHT OF HAMMER
RES	RESIDUAL	Y	YELLOW
RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" – 0 - 5% "SOME" - 12 - 20%
"LITTLE" – 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
		22	23	SS	7, 11, 15, 7	24/24	115	Same as above
120	(?-?) v. dense, gray, GRAVEL, some clay, some sand, wet (GP) (alluvium)	91+	24	SS	37, 54 (5")	12/24	120	V. Dense wet, grey, clayey, sandy GRAVEL (GP)
125	(?-128.5) v. dense gray, m-c SAND, tr gravel, wet (SP) (alluvium)	65 55	25	SS	27, 38, 25, 30	18/24	125	V. Dense, wet, grey, m. to c. grained SAND w/ trace gravel and multi-colored grains
	TOR @ 128.5' bgs							

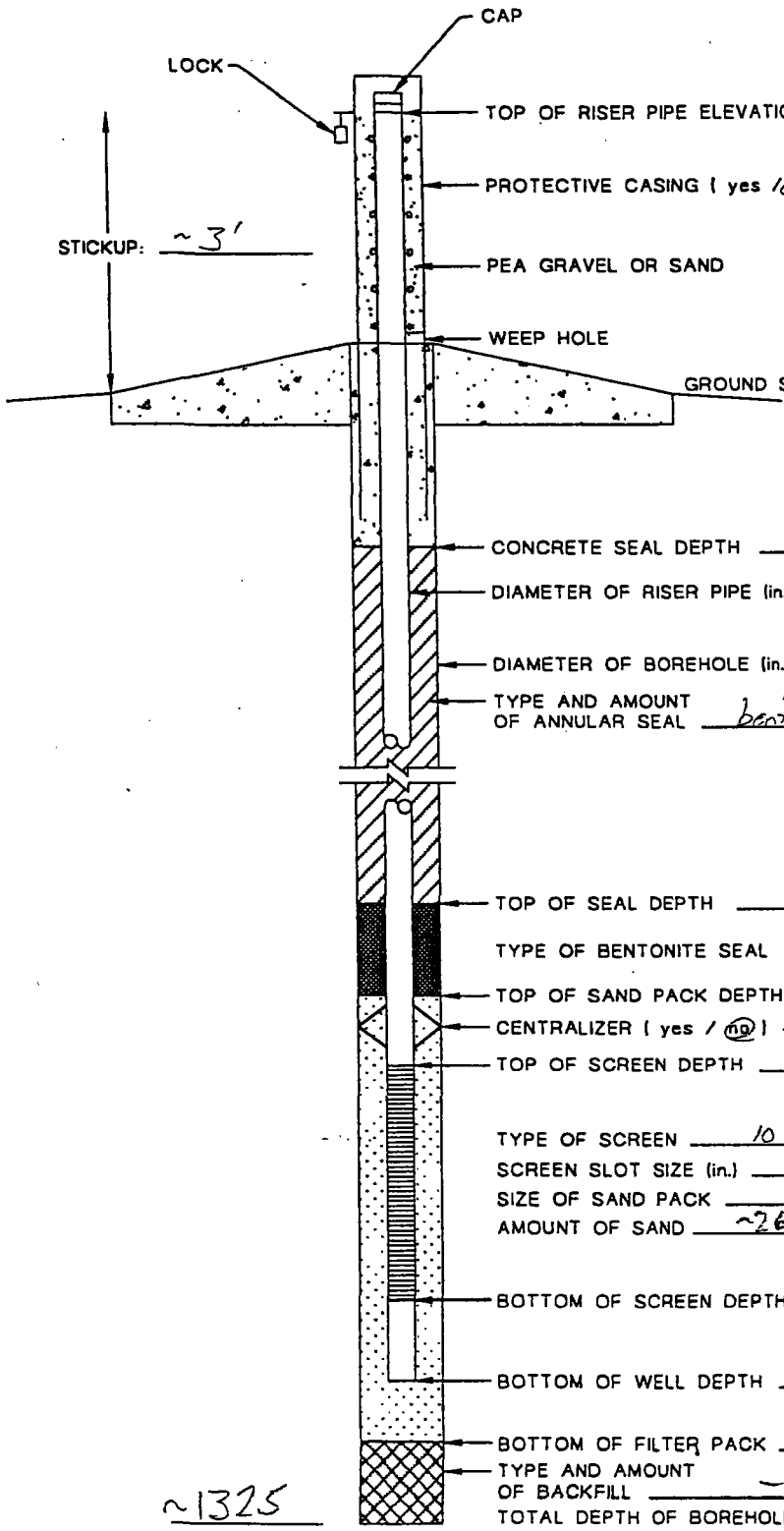
WELL LOGS AND

CONSTRUCTION RECORDS

WATER-LEVEL PIEZOMETER PZ - 4E

GROUNDWATER MONITORING WELL P4E

SITE NAME: Solutia Site R		LOCATION: S end
CLIENT: Solutia		SURFACE ELEVATION: —
GEOLOGIST: MRF	NORTHING: —	EASTING: —
DRILLER: J Crank	STATIC WATER LEVEL: —	COMPLETION DATE:
DRILLING COMPANY: Roberts		DRILLING METHODS: 6 3/4" Mud Rotary



TOP OF RISER PIPE ELEVATION —

PROTECTIVE CASING (yes / no) —

PEA GRAVEL OR SAND

WEEP HOLE

GROUND SURFACE ELEVATION —

CONCRETE SEAL DEPTH NA FT. BGS.

DIAMETER OF RISER PIPE (in.) 2'

DIAMETER OF BOREHOLE (in.) ~7"

TYPE AND AMOUNT OF ANNULAR SEAL bentonite / cement grout

TOP OF SEAL DEPTH ~45 FT. BGS.

TYPE OF BENTONITE SEAL chips

TOP OF SAND PACK DEPTH ~50 FT. BGS.

CENTRALIZER (yes / no) - TYPE —

TOP OF SCREEN DEPTH ~52.5 FT. BGS.

TYPE OF SCREEN 10 slot SS

SCREEN SLOT SIZE (in.) 0.010

SIZE OF SAND PACK —

AMOUNT OF SAND ~26 x 50# bags

BOTTOM OF SCREEN DEPTH ~132.5 FT. BGS.

BOTTOM OF WELL DEPTH ~132.5 FT. BGS.

BOTTOM OF FILTER PACK ~132.5 FT. BGS.

TYPE AND AMOUNT OF BACKFILL —

TOTAL DEPTH OF BOREHOLE

NOTE: DEPTHS MEASURED FROM GROUND SURFACE

Golder Associates

Field Boring Log

DEPTH HOLE 130.5	JOB NO. Area 7	PROJECT MW & PZ Installation and Development				BORING NO. P4-E	
DEPTH SOIL DRILL 130.5	GA INSP. MRF	DRILLING METHOD HSA & Mud Rotary				SHEET 1 OF 3	
DEPTH ROCK CORE n/a	WEATHER Sunny	DRILLING COMPANY REDI				SURFACE ELEV.	
NO. DIST. SA. 25 UD. SA. n/a	TEMP. mid 80's	DRILL RIG CME 75	DRILLER M. Cooper			DATUM	
DEPTH WL. 24.0' bgs	HRS. PROD. —	WT. SAMPLER HAMMER 140 lb	DROP Auto			STARTED 950 (TIME) 6-9-03 (DATE)	
TIME WL. 1045	HRS. DELAYED —	WT. CASING HAMMER n/a	DROP —			COMPLETED 410 (TIME) 6-10-03 (DATE)	

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
	(0-7) v. soft, brown SILT, tr to some clay, tr to some f sand, moist (ML)(alluvium) - dense f-m sand seam @ 20' - wet @ 24'							
5		1 / 2	1	SS	1, 0, 1, 1	12/24	5	V. Soft, moist, brown, clayey SILT (ML) w/trace f.g. sand becomes gray, sandy SILT (ML) @ 5.0' bgs
10		3 / 3	2	SS	2, 1, 2, 1	24/24	10	Same as above
15		3 / 2	3	SS	1, 2, 1, 1	24/24	15	Same as above
20		15 / 37	4	SS	5, 10, 16, 21	18/24	20	M. Dense, moist, lt. grey SAND (SP) - fine to m. grained w/ multi-colored grains becomes Dense @ 20.5 ft bgs
	▽ H_2O @ 24.0' bgs							Soft, wet, grey sandy SILT (ML)
25		3 / 3	5	SS	2, 1, 2, 1	24/24	25	
30		5 / 4	6	SS	2, 3, 2, 2	24/24	30	becomes sandy, clayey, SILT (ML)
	(7-40) soft, gray, CLAY, some sand, some silt, wet, (CL)(alluvium)							
35		2 / 4	7	SS	1, 1, 2, 2	24/24	35	becomes sandy, silty, CLAY (CL)
40		15 / 39	8	SS	5, 10, 18, 21	18/24	40	SAME as above Dense, wet, grey, f. to m.-grained SAND (SP) w/ multi-colored grains
	(40-?) dense to v dense gray, f-c SAND, wet, (SP)(alluvium)							
45		25 / 32	9	SS	12, 13, 17, 15	12/24	45	Same as above
50		13 / 33	10	SS	5, 8, 15, 18	12/24	50	becomes f. to c. grained SAND (SP)
55		23 / 37	11	SS	8, 15, 17, 20	12/24	55	Same as above

Golder Associates

Field Boring Log

DEPTH HOLE 130.5	JOB NO. Area 2	PROJECT MW & PZ Installation & Development				BORING NO. P4-E	
DEPTH SOIL DRILL 130.5	QA INSP. MRF	DRILLING METHOD HSA & Mud Rotary				SHEET 2	OF 3
DEPTH ROCK CORE n/a	WEATHER Sunny	DRILLING COMPANY REDI				SURFACE ELEV.	
NO. DIST. SA. 25 UD. SA. n/a	TEMP. mid 80's	DRILL RIG CME 75	DRILLER M. Cooper			DATUM	
DEPTH WL. 24.0' bgs	HRS. PROD. —	WT. SAMPLER HAMMER 140 lb	DROP Auto			STARTED 950 (TIME) 6-9-03 (DATE)	
TIME WL. 1045	HRS. DELAYED —	WT. CASING HAMMER n/a	DROP —			COMPLETED 1410 (TIME) 6-10-03 (DATE)	

SAMPLE TYPES

A.S.	AUGER SAMPLE	BL	BLACK
C.S.	CHUNK SAMPLE	BR	BROWN
D.O.	DRIVE OPEN	C	COARSE
D.S.	DENISON SAMPLE	CA	CASING
P.S.	PITCHER SAMPLE	CL	CLAY
R.C.	ROCK CORE	CLY	CLAYEY
S.T.	SLOTTED TUBE	F	FINE
T.O.	THIN-WALLED, OPEN	FRAG	FRAGMENTS
T.P.	THIN-WALLED, PISTON	GL	GRAVEL
W.S.	WASH SAMPLE	LYD	LAYERED
		LI	LITTLE

ABBREVIATIONS

M	MEDIUM	SA	SAMPLE
MIC	MICACEOUS	SAT	SATURATED
MOT	MOTTLED	SD	SAND
NP	NON-PLASTIC	SI	SILT
OG	ORANGE	SIY	SILTY
ORG	ORGANIC	SM	SOME
PH	PRESSURE-HYDRAULIC	TR	TRACE
PM	PRESSURE-MANUAL	WL	WATER LEVEL
R	RED	WH	WEIGHT OF HAMMER
RES	RESIDUAL	Y	YELLOW
RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0-5% "SOME" - 12-30%
"LITTLE" - 5-12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0-4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4-10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. DEPTH	DESCRIPTION	BLOWS/FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC/ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
60		26 66	12	SS	9,17,29,37	24/24	60	Same as above becomes V. Dense @ 60.0 ft bgs
65		18 22	13	SS	11,7,7,15	18/24	65	becomes M. Dense @ 64.0 ft bgs
70		41 55	14	SS	19,22,30,25	24/24	70	becomes V. Dense @ 70.0 ft bgs
75		37 69	15	SS	14,23,27,40	24/24	75	Same as above
80		58 43	16	SS	28,30,18,25	18/24	80	becomes Dense @ 80.0 ft bgs w/ trace chert fragments
85		34 39	17	SS	18,16,19,20	12/24	85	Same as above
90	(?-130.5) Dense, gray M-C SAND, little fines, tr chert fragments, 60% (alluvium) - little gravel @ 107' - little clay @ 115'	22 40	18	SS	9,13,22,18	18/24	90	~~w/ little~~ m. to c. grained w/ little fines
95		22 30	19	SS	8,14,14,16	18/24	95	w/ trace chert fragments
100	Stop drilling 6-9-03	51 73	20	SS	22,29,36,37	18/24	100	w/o chert fragments
105	Resume drilling 6-10-03	40 56	21	SS	17,23,25,31	18/24	105	w/ trace chert fragments
		60+	22	SS	60+ 60+	4/24		Same as above w/ little gravel
110							110	
		48	23	SS	22,26,29,18	18/24	115	Same as above w/ little gray CLAY (CL)

Golder Associates

Field Boring Log

DEPTH HOLE 130.5	JOB NO. Area 2	PROJECT MW & PZ Instrumentation & Development		BORING NO. P4-E	
DEPTH SOIL DRILL 130.5	GA INSP. MRF	DRILLING METHOD HSA & Mud Rotary		SHEET 3	OF 3
DEPTH ROCK CORE n/a	WEATHER Rainy	DRILLING COMPANY REDI		SURFACE ELEV.	
NO. DIST. SA 25 UD. SA n/a	TEMP. mid 60's	DRILL RIG CME 75	DRILLER M. Cooper	DATUM	
DEPTH WL. 24.0' bgs	HRS. PROD. —	WT. SAMPLER HAMMER 140 lb	DROP Auto	STARTED 950, 6.9.03	
TIME WL. 1045	HRS. DELAYED —	WT. CASING HAMMER n/a	DROP —	COMPLETED 1410, 6.10.03	

SAMPLE TYPES

A.S.	AUGER SAMPLE	BL	BLACK
C.S.	CHUNK SAMPLE	BR	BROWN
D.O.	DRIVE OPEN	C	COARSE
D.S.	DENISON SAMPLE	CA	CASING
P.S.	PITCHER SAMPLE	CL	CLAY
R.C.	ROCK CORE	CLY	CLAYEY
S.T.	SLOTTED TUBE	F	FINE
T.O.	THIN-WALLED, OPEN	FRAG	FRAGMENTS
T.P.	THIN-WALLED, PISTON	GL	GRAVEL
W.S.	WASH SAMPLE	LYD	LAYERED
		LI	LITTLE

ABBREVIATIONS

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MOT	MOTTLED	SD	SAND
NP	NON-PLASTIC	SI	SILT
OG	ORANGE	SIY	SILTY
ORG	ORGANIC	SM	SOME
PH	PRESSURE-HYDRAULIC	TR	TRACE
PM	PRESSURE-MANUAL	WL	WATER LEVEL
R	RED	WH	WEIGHT OF HAMMER
RES	RESIDUAL	Y	YELLOW
RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" - 12 - 30%
"LITTLE" - 5 - 12% "AND" - 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT	SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
		39	23	SS	22,26,29,[illegible]	18/24	115	same as above
120		37 42	24	SS	16,21,21,21	12/24	120	Same as above grading to coarser grains
								becomes V. Dense
125		51 76	25	SS	22,29,37,57	18/24	125	
130							130	
	TOR @ 130.5' bgs							

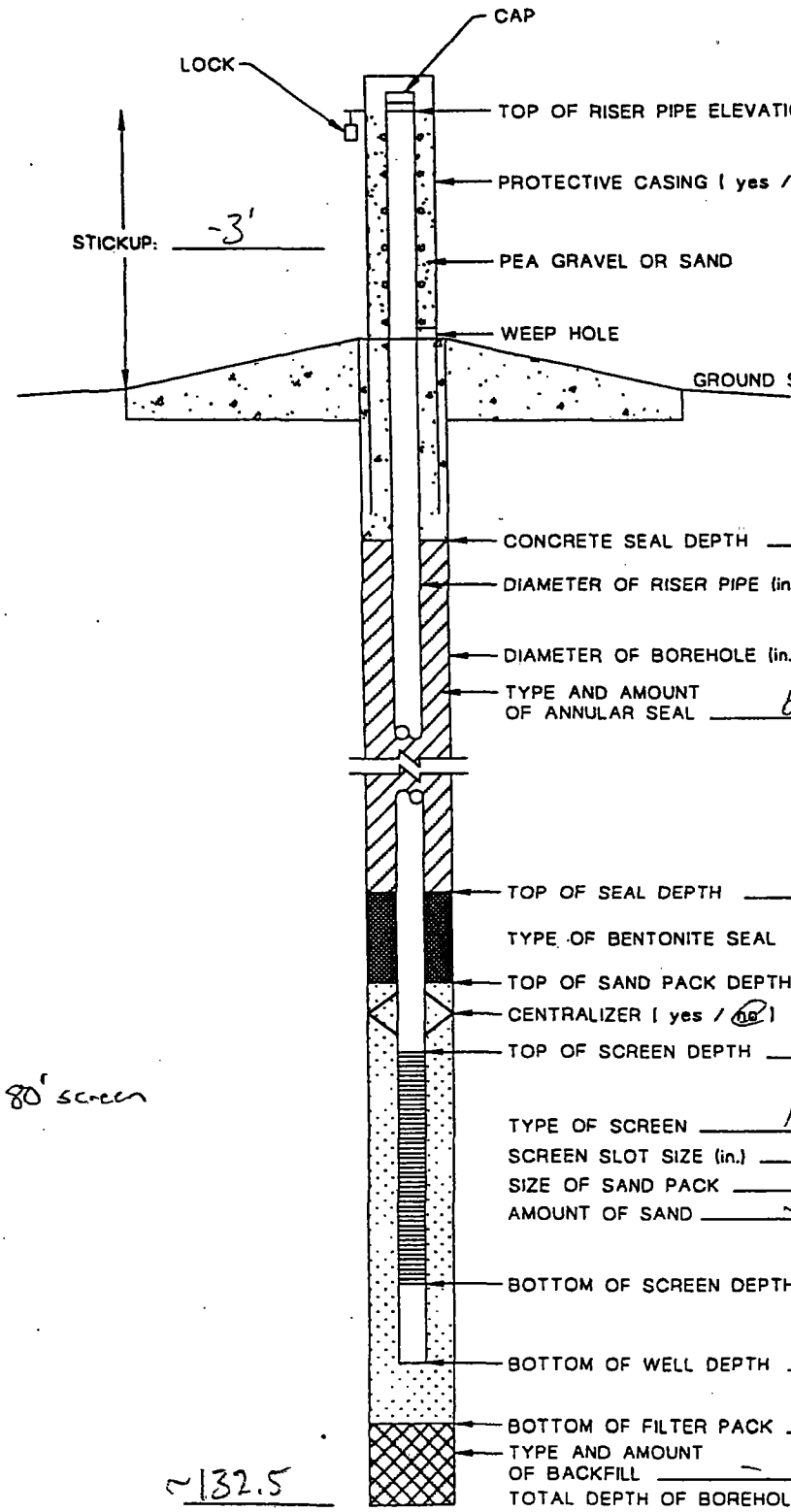
WELL LOGS AND

CONSTRUCTION RECORDS

WATER-LEVEL PIEZOMETER PZ - 4W

GROUNDWATER MONITORING WELL P4W

SITE NAME: Solutia Site R		LOCATION: S end of Site
CLIENT: Solutia		SURFACE ELEVATION: —
GEOLOGIST: MRF	NORTHING: —	EASTING: —
DRILLER: J Crank	STATIC WATER LEVEL: —	COMPLETION DATE:
DRILLING COMPANY: REDI		DRILLING METHODS: 6 3/4" Mud Rotary



TOP OF RISER PIPE ELEVATION —

PROTECTIVE CASING (yes / no) —

PEA GRAVEL OR SAND

WEEP HOLE

GROUND SURFACE ELEVATION —

CONCRETE SEAL DEPTH NA FT. BGS.

DIAMETER OF RISER PIPE (in.) 2"

DIAMETER OF BOREHOLE (in.) ~7"

TYPE AND AMOUNT OF ANNULAR SEAL bentonite / cement grout

TOP OF SEAL DEPTH ~45 FT. BGS.

TYPE OF BENTONITE SEAL chips

TOP OF SAND PACK DEPTH ~50' FT. BGS.

CENTRALIZER (yes / no) - TYPE —

TOP OF SCREEN DEPTH ~52.5 FT. BGS.

TYPE OF SCREEN 10 Slot SS

SCREEN SLOT SIZE (in.) 0.010

SIZE OF SAND PACK —

AMOUNT OF SAND ~26 x 50# bags

BOTTOM OF SCREEN DEPTH ~132.5 FT. BGS.

BOTTOM OF WELL DEPTH ~132.5 FT. BGS.

BOTTOM OF FILTER PACK ~132.5 FT. BGS.

TYPE AND AMOUNT OF BACKFILL —

TOTAL DEPTH OF BOREHOLE

NOTE: DEPTHS MEASURED FROM GROUND SURFACE

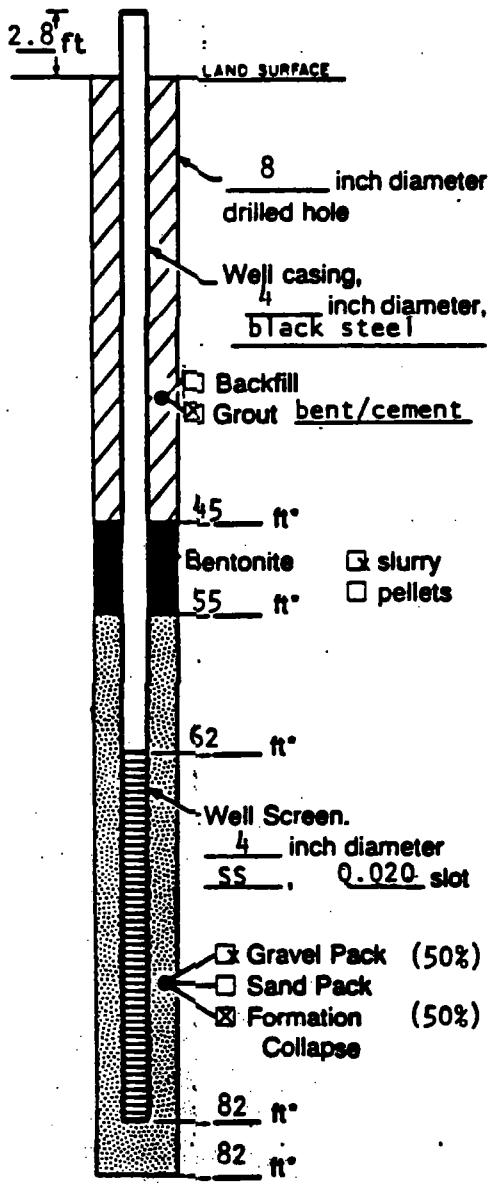
WELL LOGS AND

CONSTRUCTION RECORDS

EXISTING MONITORING WELL GM - 27B

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Monsanto Company Well GM-27B
Town/City Sauget
County St. Clair State IL
Permit No.
Land-Surface Elevation
and Datum _____ feet ☒ surveyed
Measuring Point 426.04 Ft (MSL) ☐ estimated
Installation Dates(s) 8/6/84
Drilling Method Mud Rotary
Drilling Contractor John Mathes & Associates, Inc.
Drilling Fluid Bentonite

Development Techniques(s) and Date(s)
surged with compressed air

Fluid Loss During Drilling _____ gallons
Water Removed During Development 1200 gallons
Static Depth to Water _____ feet below M.P.
Pumping Depth to Water _____ feet below M.P.
Pumping Duration 2 hours
Yield 10 gpm Date _____
Specific Capacity _____ gpm/ft
Well Purpose ground-water monitoring well

Remarks

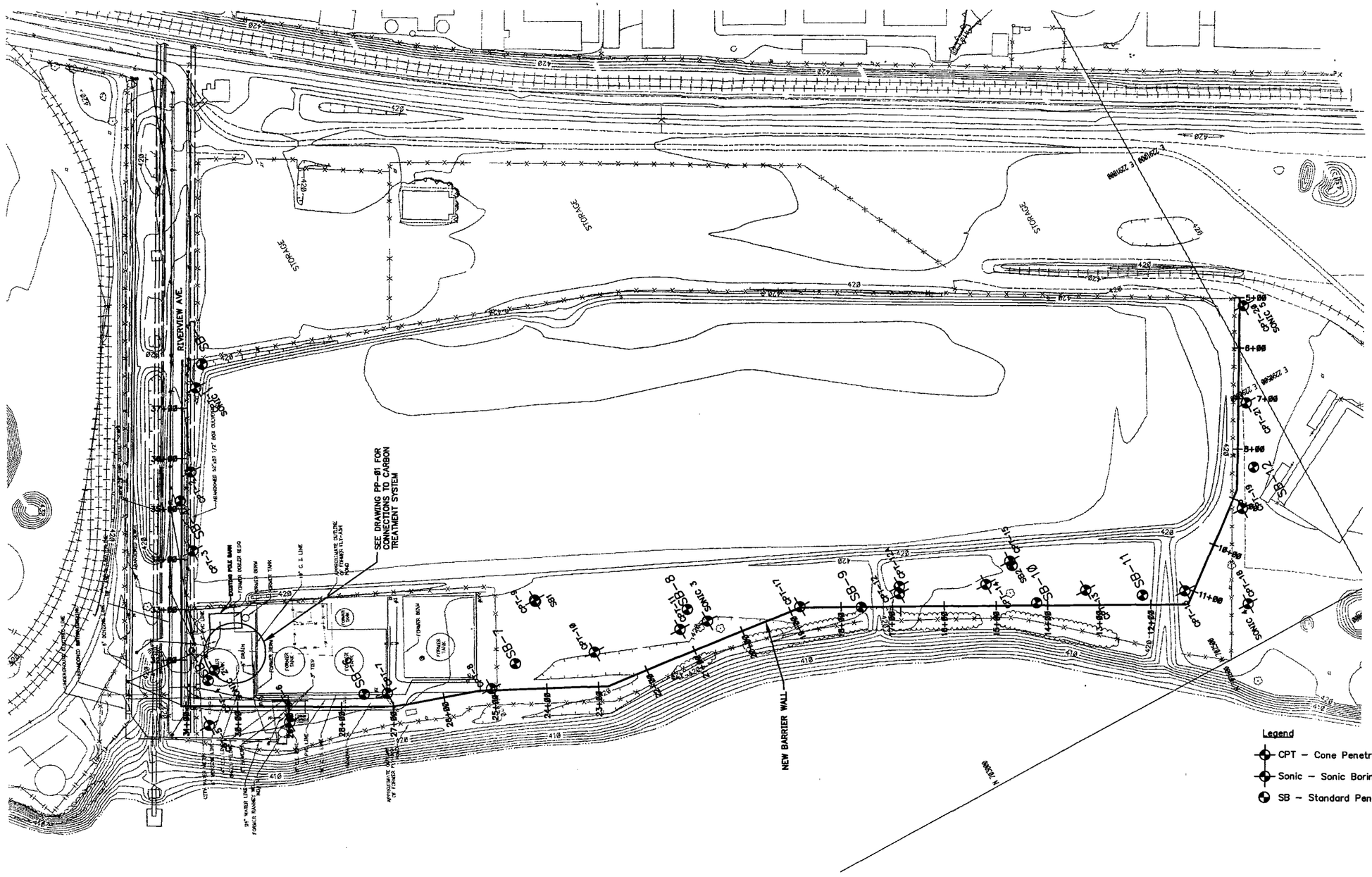
Prepared by D. Colton

Description	Depth (feet)
Wells GM-16AB	
Silt, sandy, brown	1 - 6
Sand, very fine to fine, very silty, brown	6 - 29
Sand, fine, gray; some silt	29 - 40
Sand, fine, gray	40 - 50
Sand, fine to medium, gray; some gravel	50 - 70
Sand, fine to coarse, gray; with gravel	70 - 90
Wells GM-17ABC	
Sand, very fine, silty, brown	0 - 4
Clay, gray; some silt and fine sand	4 - 11
Sand, very fine, tan; some silt	11 - 23
Sand, very fine, brown; trace of medium sand and silt	23 - 50
Sand, fine to medium, gray; some fine gravel	50 - 70
Sand, fine to coarse, gray; with fine to medium gravel	70 -107
Wells GM-18AB	
Silt, clayey, brown; trace of fine sand and gravel	0 - 6
Sand, fine, grayish-brown; some silt	6 - 38
Sand, fine, grayish-brown	38 - 50
Sand, fine to medium, grayish-brown; some fine gravel and coal fragments	50 - 80
Sand, fine to coarse, gray; with fine to medium gravel	80 - 92
Wells GM-25AB	
Sand, very fine, silty, brown	0 - 14
Sand, fine, brown; some silt	14 - 33
Sand, fine, gray	33 - 50
Sand, fine to medium, gray; some silt and coarse sand	50 - 70
Sand, fine to coarse, gray; some fine to medium gravel	70 - 88
Wells GM-27BC	
Sand, fine, silty, brown and black	0 - 13
Silt, sandy, gray; some fine sand	13 - 22
Sand, fine, gray; some silt	22 - 33
Clay, silty, gray; some fine sand	33 - 36
Sand, fine, silty, gray	36 - 48
Sand, fine to medium, gray; little silt	48 - 75
Sand, fine to coarse, gray; some fine to medium gravel	75 -105

GEOLOGIC SECTIONS

URS BARRIER WALL ALIGNMENT PROFILE

JULY 2003


RIVERVIEW AVE.
STORAGE
STORAGE
STORAGE
SEE DRAWING PP-01 FOR CONNECTIONS TO CARBON TREATMENT SYSTEM
NEW BARRIER WALL
SB-1
SB-2
SB-3
SB-8
SB-9
SB-10
SB-11
SB-12
SB-13
SONIC 1
SONIC 2
SONIC 3
SONIC 5
CPT-1
CPT-2
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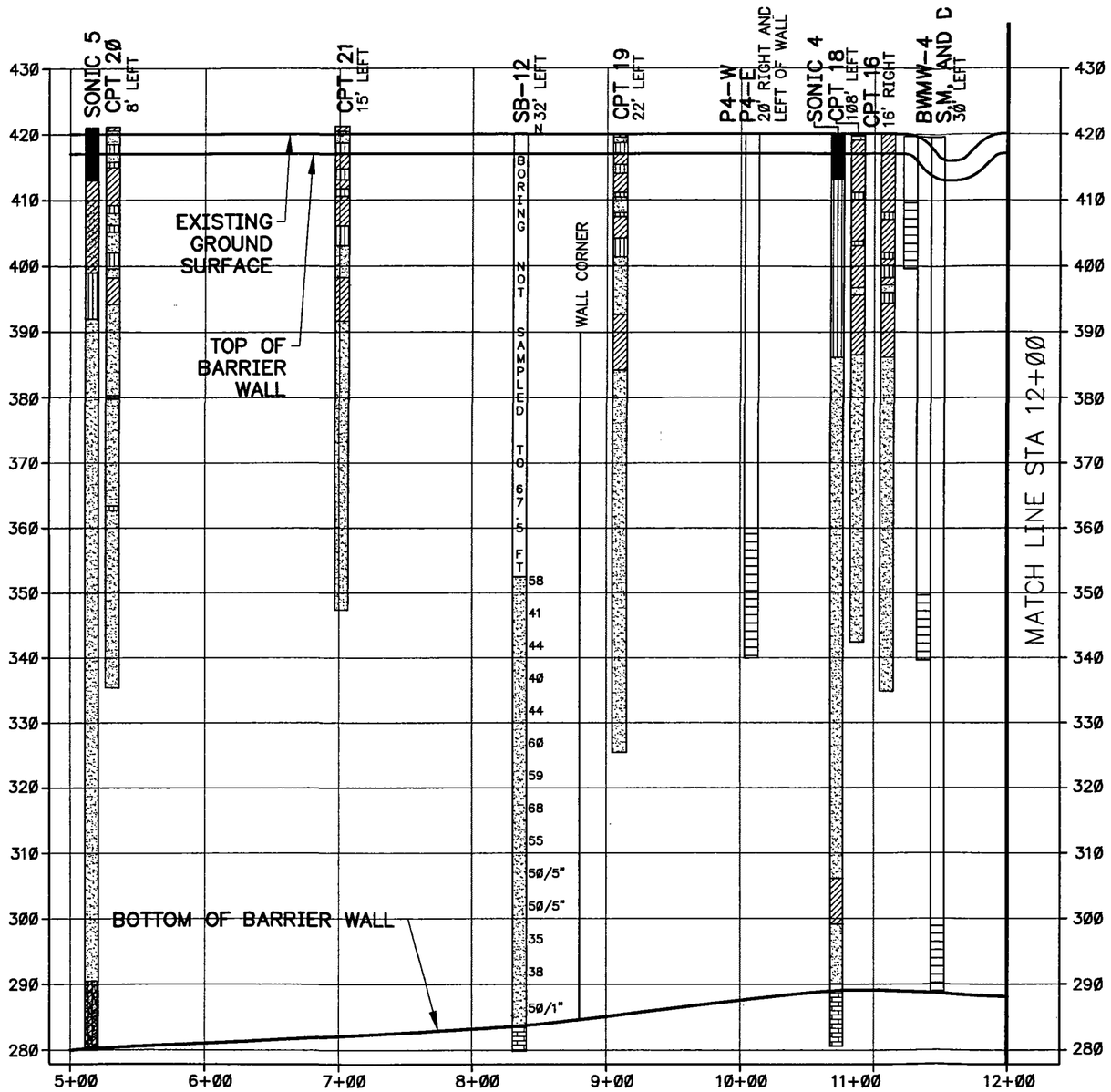

LEGEND

- CLAY (CL OR CH)
- SILT (ML)
- CLAYEY SAND (SC)
- SAND (SP OR SW)
- GRAVEL AND/OR COBBLES
- LIMESTONE
- PROPOSED SCREENED INTERVAL OF EXTRACTION WELL OR PIEZOMETER
- 10+00 — WALL STATION AT CENTERLINE OF BARRIER WALL
- CPT-1 — CONE PENETROMETER TEST NUMBER (2001)
- SONIC 1 — SONIC BORING NUMBER (2002)
- SB-1 — SOIL BORING NUMBER (2002)
- 62 — STANDARD PENETRATION TEST BLOW COUNT (N). BLOWS /12" PENETRATION OF SAMPLER UNLESS INDICATED OTHERWISE
- P — HYDRAULICALLY PUSHED SAMPLE

NOTES:

1) THESE GRAPHIC LOGS DEPICT GENERALIZED SOIL CONDITIONS. REFER TO INDIVIDUAL LOGS FOR DETAILS.

2) TOP AND BOTTOM OF BARRIER WALL AS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS ARE SUBJECT TO CHANGE DUE TO DESIGN AND CONSTRUCTION ISSUES.

0 10 VERTICAL SCALE FEET

0 50 HORIZONTAL SCALE FEET

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NO.	DATE	REVISION DESCRIPTION	APPROVED

PREPARED BY:

URS

1001 Highlands Plaza Dr. West, Suite 300
St. Louis, MO 63110
Tel: 314-429-0100
fax: 314-429-0462

SEAL

DATE: 7/3/03
SCALE: AS SHOWN
DESIGNED: KMB
DRAWN: DJD/WDL
CHECKED: KMB
SUBMITTED:

SOLUTIA™
Applied Chemistry, Creative Solutions

SOLUTIA INC.
575 MARYVILLE CENTRE DRIVE
ST. LOUIS, MO. 63141

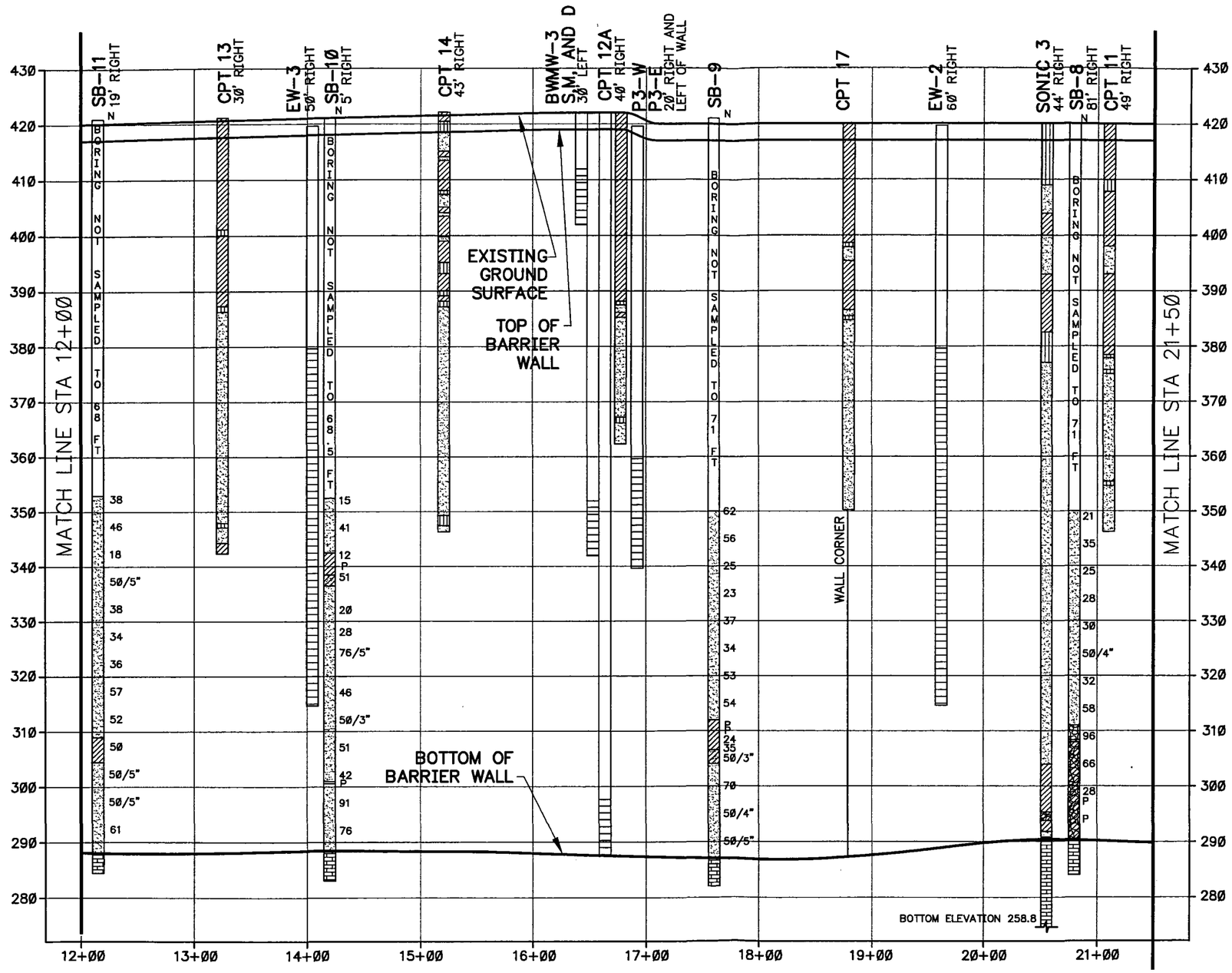
GROUNDWATER MIGRATION CONTROL SYSTEM

PACKAGE 2 - BARRIER WALL

BARRIER WALL - PROFILE
STA 5+00 TO 12+00

URS PROJECT NO.
21561192.00001

SHEET NO.
2-09



LEGEND

- CLAY (CL OR CH)
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- PROPOSED SCREENED INTERVAL OF EXTRACTION WELL OR PIEZOMETER
- 10+00 WALL STATION AT CENTERLINE OF BARRIER WALL
- CPT-1 CONE PENETROMETER TEST NUMBER (2001)
- SONIC 1 SONIC BORING NUMBER (2002)
- SB-1 SOIL BORING NUMBER (2002)
- 62 STANDARD PENETRATION TEST BLOW COUNT (N). BLOWS /12" PENETRATION OF SAMPLER UNLESS INDICATED OTHERWISE
- P HYDRAULICALLY PUSHED SAMPLE

NOTES:

1) THESE GRAPHIC LOGS DEPICT GENERALIZED SOIL CONDITIONS. REFER TO INDIVIDUAL LOGS FOR DETAILS.

2) TOP AND BOTTOM OF BARRIER WALL AS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS ARE SUBJECT TO CHANGE DUE TO DESIGN AND CONSTRUCTION ISSUES.

VERTICAL SCALE 0 10 FEET

HORIZONTAL SCALE 0 50 FEET

NO.	DATE	REVISION DESCRIPTION	APPROVED

PREPARED BY:

URS

1001 Highlands Plaza Dr. West, Suite 300
St. Louis, MO 63110
Tel: 314-429-0100
fax: 314-429-0462

SEAL

DATE: 7/3/03
SCALE: AS SHOWN
DESIGNED: KMB
DRAWN: DJD/WDL
CHECKED: KMB
SUBMITTED:

SOLUTIA™
Applied Chemistry, Creative Solutions

SOLUTIA INC.
575 MARYVILLE CENTRE DRIVE
ST. LOUIS, MO. 63141

GROUNDWATER MIGRATION CONTROL SYSTEM

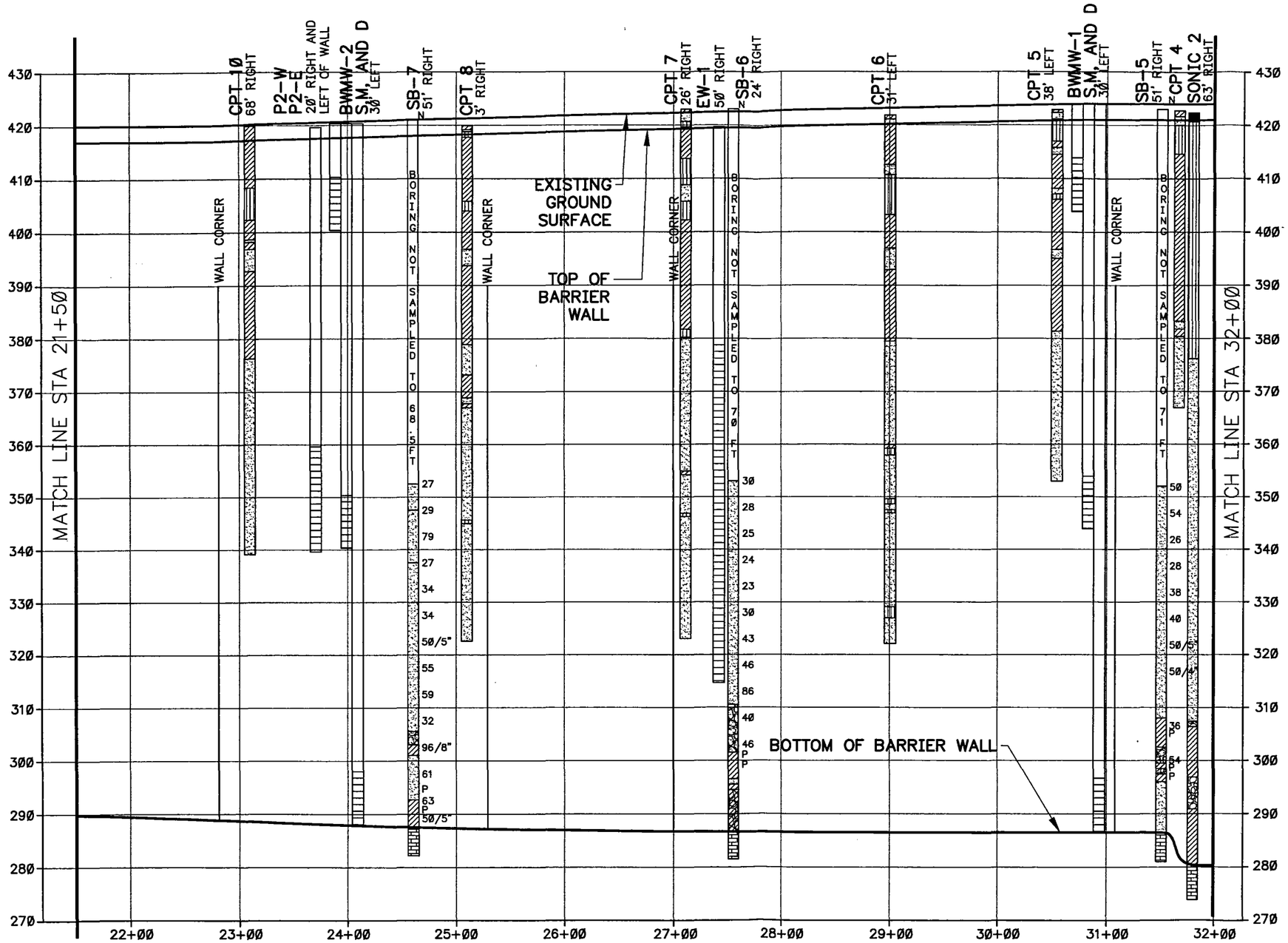
PACKAGE 2 - BARRIER WALL

BARRIER WALL - PROFILE
STA 12+00 TO 21+50

URS PROJECT NO. 21561192.00001

SHEET NO. 2-10

File: E:\21561192.00001\FINAL DESIGN 7-3-03\SHEETS 2-09 THRU 2-12.DWG Last edited: JUL. 02, 03 @ 1:08 p.m. by: DJDEGUO



LEGEND

- CLAY (CL OR CH)
- SILT (ML)
- CLAYEY SAND (SC)
- SAND (SP OR SW)
- GRAVEL AND/OR COBBLES
- LIMESTONE
- PROPOSED SCREENED INTERVAL OF EXTRACTION WELL OR PIEZOMETER
- 10+00 WALL STATION AT CENTERLINE OF BARRIER WALL
- CPT-1 CONE PENETROMETER TEST NUMBER (2001)
- SONIC 1 SONIC BORING NUMBER (2002)
- SB-1 SOIL BORING NUMBER (2002)
- 62 STANDARD PENETRATION TEST BLOW COUNT (N). BLOWS /12" PENETRATION OF SAMPLER UNLESS INDICATED OTHERWISE
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NOTES:

1) THESE GRAPHIC LOGS DEPICT GENERALIZED SOIL CONDITIONS. REFER TO INDIVIDUAL LOGS FOR DETAILS.

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VERTICAL SCALE 0 10 FEET

HORIZONTAL SCALE 0 50 FEET

NO.	DATE	REVISION DESCRIPTION	APPROVED

PREPARED BY:

URS

1001 Highlands Plaza Dr. West, Suite 300
St. Louis, MO 63110
Tel: 314-429-0100
fax: 314-429-0462

SEAL

DATE: 7/3/03
SCALE: AS SHOWN
DESIGNED: KMB
DRAWN: DJD/WDL
CHECKED: KMB
SUBMITTED:

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Applied Chemistry, Creative Solutions

SOLUTIA INC.
575 MARYVILLE CENTRE DRIVE
ST. LOUIS, MO. 63141

GROUNDWATER MIGRATION CONTROL SYSTEM

PACKAGE 2 - BARRIER WALL

BARRIER WALL - PROFILE
STA 21+50 TO 32+00

URS PROJECT NO. 21561192.00001

SHEET NO. 2-11

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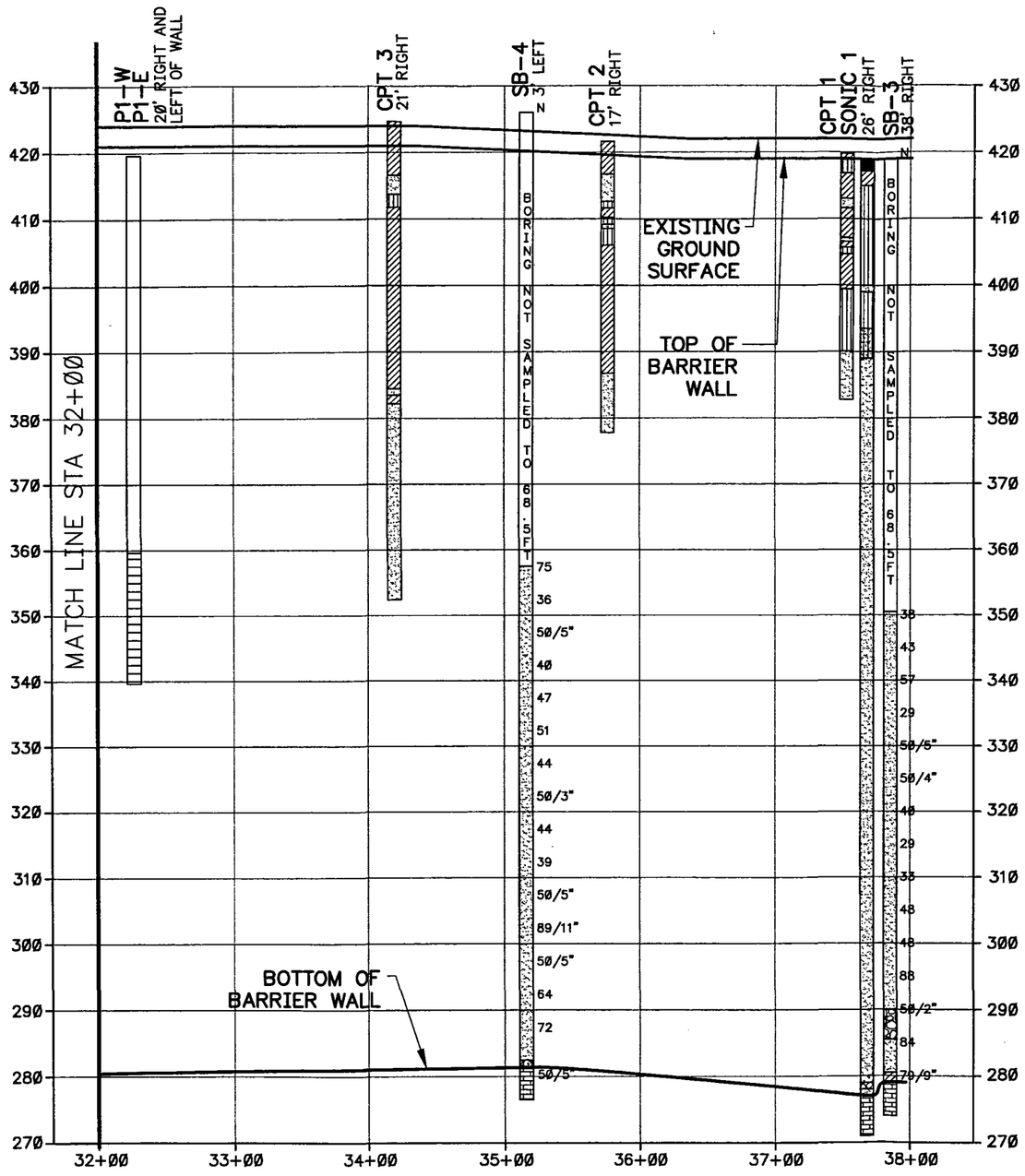

LEGEND

- CLAY (CL OR CH)
- SILT (ML)
- CLAYEY SAND (SC)
- SAND (SP OR SW)
- GRAVEL AND/OR COBBLES
- LIMESTONE
- PROPOSED SCREENED INTERVAL OF EXTRACTION WELL OR PIEZOMETER
- 10+00 — WALL STATION AT CENTERLINE OF BARRIER WALL
- CPT-1 — CONE PENETROMETER TEST NUMBER (2001)
- SONIC 1 — SONIC BORING NUMBER (2002)
- SB-1 — SOIL BORING NUMBER (2002)
- 62 — STANDARD PENETRATION TEST BLOW COUNT (N). BLOWS /12" PENETRATION OF SAMPLER UNLESS INDICATED OTHERWISE
- P — HYDRAULICALLY PUSHED SAMPLE

NOTES:

1) THESE GRAPHIC LOGS DEPICT GENERALIZED SOIL CONDITIONS. REFER TO INDIVIDUAL LOGS FOR DETAILS.

2) TOP AND BOTTOM OF BARRIER WALL AS SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS ARE SUBJECT TO CHANGE DUE TO DESIGN AND CONSTRUCTION ISSUES.

0 10 VERTICAL SCALE FEET

0 50 HORIZONTAL SCALE FEET

NO.	DATE	REVISION DESCRIPTION	APPROVED

PREPARED BY:

URS

1001 Highlands Plaza Dr. West, Suite 300
St. Louis, MO 63110
Tel: 314-429-0100
fax: 314-429-0462

SEAL

DATE: 7/3/03
SCALE: AS SHOWN
DESIGNED: KMB
DRAWN: DJD/WDL
CHECKED: KMB
SUBMITTED:

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Applied Chemistry, Creative Solutions

SOLUTIA INC.
575 MARYVILLE CENTRE DRIVE
ST. LOUIS, MO. 63141

GROUNDWATER MIGRATION CONTROL SYSTEM

PACKAGE 2 - BARRIER WALL

BARRIER WALL - PROFILE
STA 32+00 TP 37+97

URS PROJECT NO. 21561192.00001

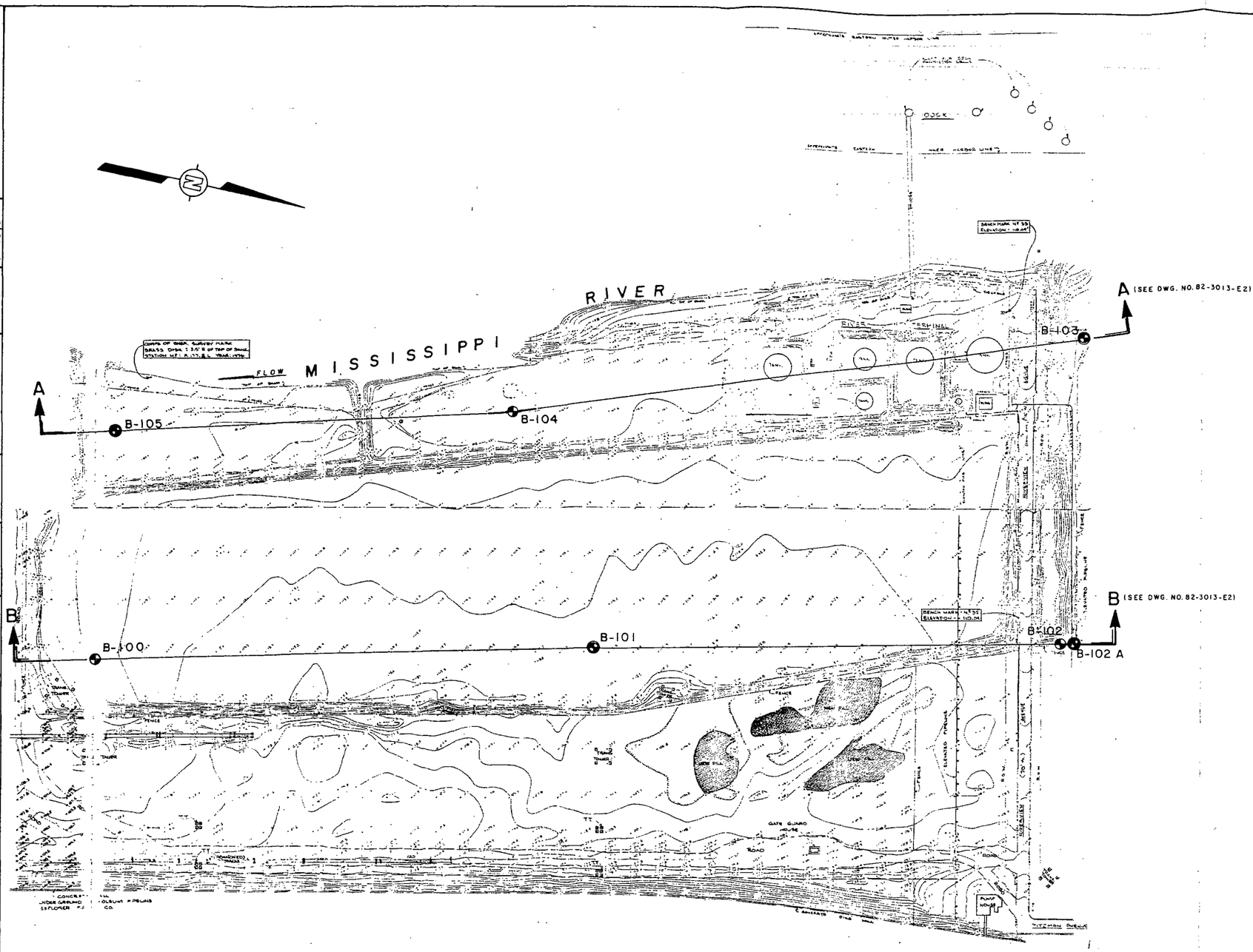
SHEET NO. 2-12

File: E:\21561192.00001\FINAL DESIGN 7-3-03\SHEETS 2-09 THRU 2-12.DWG Last edited: JUL 02, 03 @ 1:06 p.m. by DJDEJUO

GEOLOGIC SECTIONS

D'APPOLONIA BEDROCK INVESTIGATION

JANUARY 1984



LEGEND:

B-100 BORING LOCATION

B-102A BORING LOCATION WITH PIEZOMETER INSTALLED

NOTE:

PLANT ELEVATION 100.0' IS EQUAL TO USGS MEAN SEA LEVEL ELEVATION 412.5.

REFERENCE:

MONSANTO, KRUMMRICH PLANT SITE DEVELOPMENT MANUAL, 1.6 ART 4, DEC. 1977.

WGK 1045235

SCALE

100 0 100 200 FEET

REFERENCE:

MONSANTO DRAWINGS TS-E-17408 AND TS-E-17409. TITLED: TOPOGRAPHIC SURVEY LOT "H" LANDFILL AREA DRILL SITE 5, AND DRILL SITES 1, 2, 4. SCALE: 1"=50' DATED: SEPT. 1982.

FIGURE 1

PLAN AND LOCATION OF BORINGS
BEDROCK INVESTIGATION

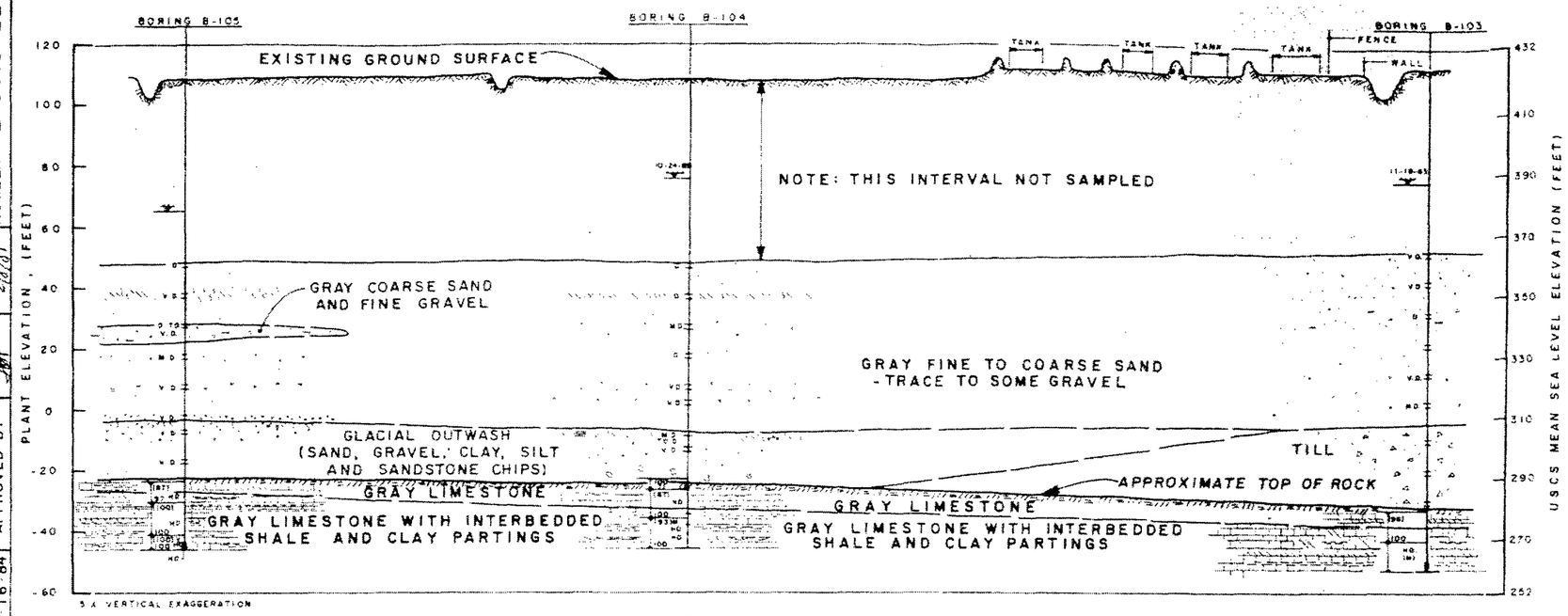
WASTE LANDFILL
W. G. KRUMMRICH PLANT
SAUGET, ILLINOIS

PREPARED FOR

MONSANTO COMPANY
ST. LOUIS, MISSOURI

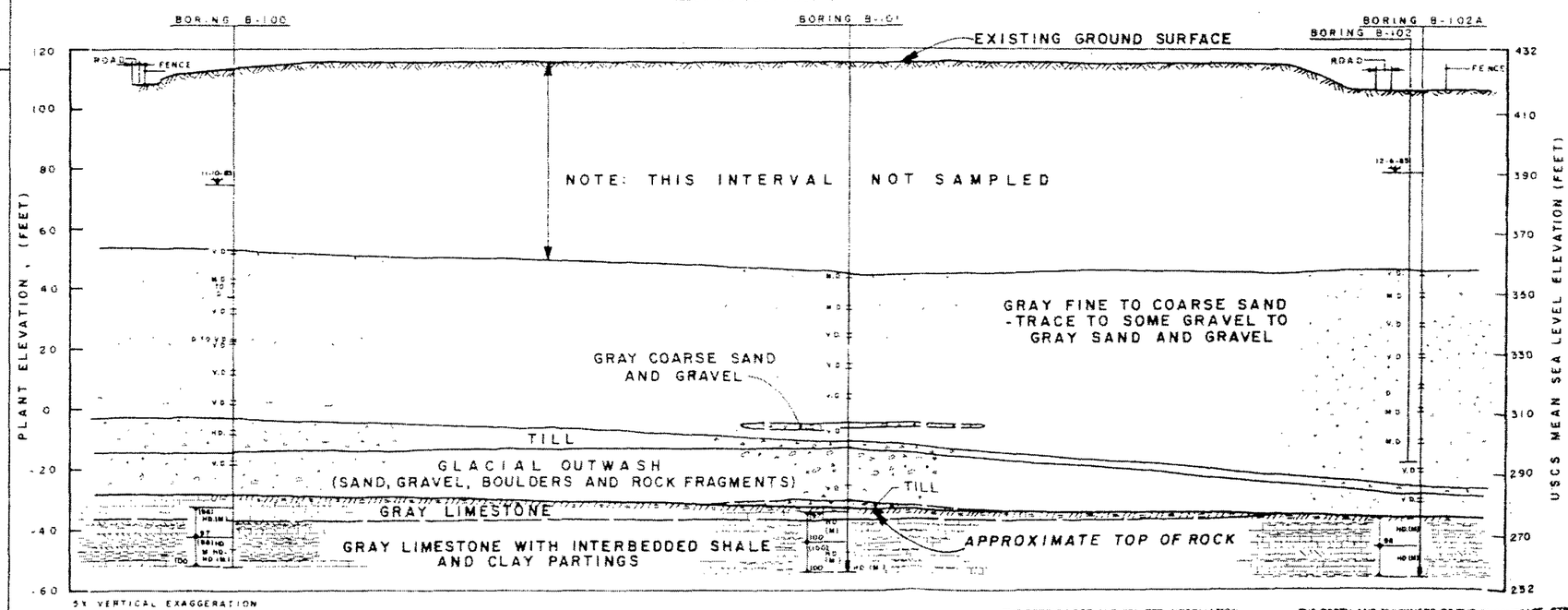
D'APPOLONIA

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
JJL 1-5-84	SAP 2/8/84	SAP 2/8/84	82-3013-E1



SECTION A-A

(LOOKING SOUTHWEST)



SECTION B-B

(LOOKING SOUTHWEST)

THE BORING LOGS AND RELATED INFORMATION DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND DATES INDICATED SOIL CONDITIONS AND WATER LEVELS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURRING AT THESE BORING LOCATIONS ALSO THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE CONDITIONS AT THESE BORING LOCATIONS

THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE TEST BORINGS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT THE LOCATION OF THE TEST BORINGS AND IT IS POSSIBLE THAT SUBSURFACE CONDITIONS BETWEEN THE TEST BORINGS MAY VARY FROM THOSE INDICATED

SOIL CLASSIFICATION

CONSISTENCY OF COHESIVE SOILS
- V.SO. - VERY SOFT
- SO - SOFT
- M ST - MEDIUM STIFF
- ST - STIFF
- V.ST. - VERY STIFF
- HD - HARD

DENSITY OF GRANULAR SOILS
- V.L - VERY LOOSE
- L - LOOSE
- M.D - MEDIUM DENSE
- D. - DENSE
- V.D - VERY DENSE

ROCK CLASSIFICATION

RELATIVE DEGREES OF ROCK CORE HARDNESS
- V. SO. - VERY SOFT
- SO. - SOFT
- M.HD. - MEDIUM HARD
- HD. - HARD
- V. HD. - VERY HARD

SPACING OF DISCONTINUITIES IN THE ROCK
- V.B. - VERY BROKEN
- B. - BROKEN
- S.B. - SLIGHTLY BROKEN
- M. - MASSIVE

WGK 1045236

NOTES

1. PLANT ELEVATION 100.0' IS EQUAL TO USGS MEAN SEA LEVEL ELEVATION 412.5
2. FOR PLAN AND LOCATION OF BORINGS AND SECTIONS SEE DWG. NO. 82-3013-E1
3. FOR DETAILED DESCRIPTION OF BORINGS, SEE APPENDIX OF REPORT.

SCALES

VERTICAL: 20 0 20 FEET — HORIZONTAL: 100 0 100 FEET

FIGURE 2

BEDROCK INVESTIGATION
SECTIONS A-A AND B-B
WASTE LANDFILL
W.G. KRUMMRICH PLANT
SAUGET, ILLINOIS
PREPARED FOR

MONSANTO COMPANY
ST. LOUIS, MISSOURI

D'APPOLONIA

DRAWN BY	J.J.L.	1-16-84
CHECKED BY		
APPROVED BY		

DRAWING NUMBER 82-3013-E2

LINE OF EVIDENCE 1

SURFACE WATER LEVEL > GROUNDWATER LEVEL

GRADIENT REVERSAL - NO DISCHARGE TO SURFACE WATER

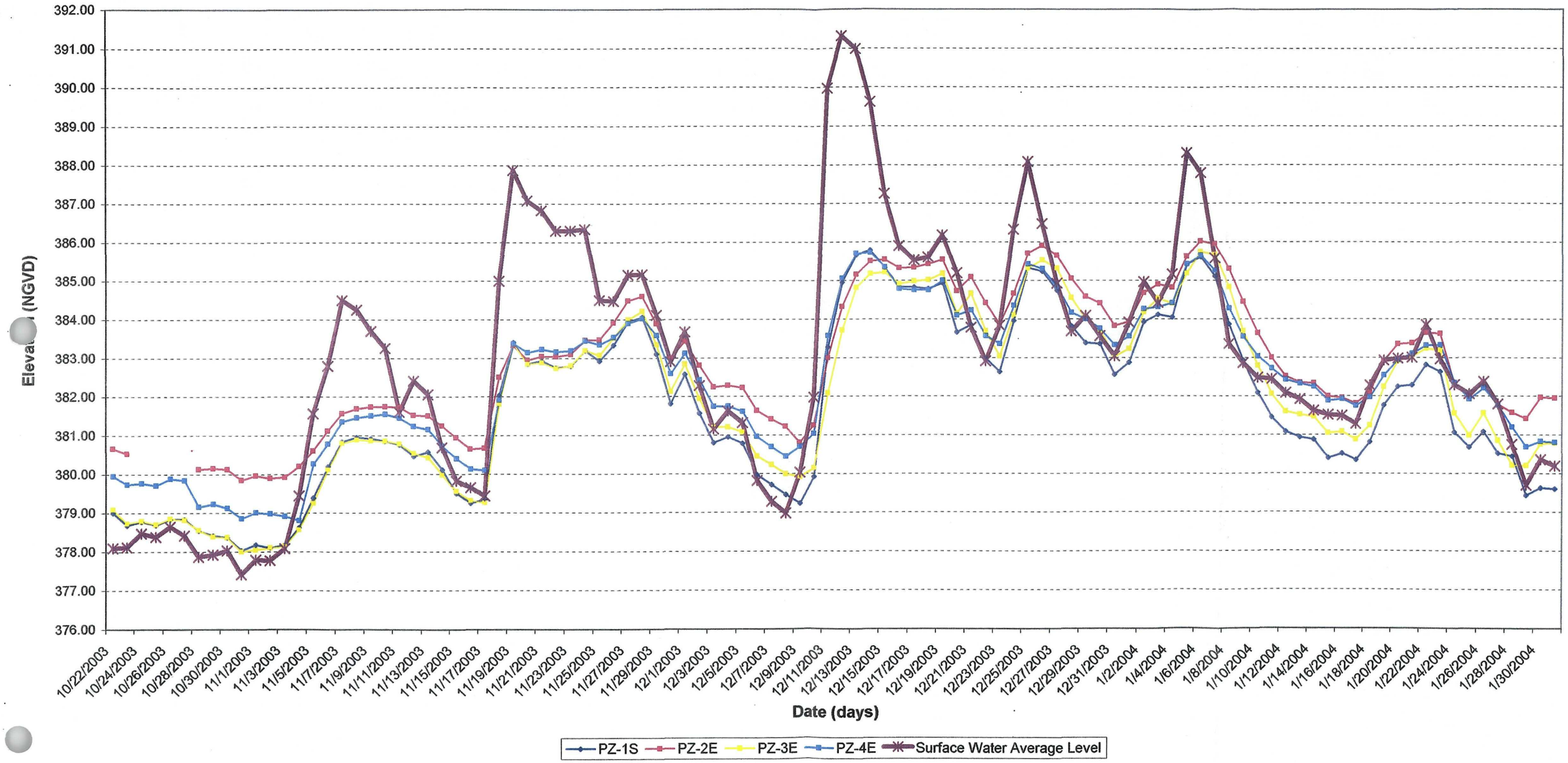
OCTOBER 2003 to JANUARY 2004

LINE OF EVIDENCE 1

Surface Water Levels Greater Than Groundwater Levels
Gradient Reversal - No Discharge to Surface Water
October 22, 2003 to January 31, 2004

Day	Days with Groundwater Control			
	October 2003	November 2003	December 2003	January 2004
1			•	
2				•
3				
4				•
5		•		•
6		•		•
7		•		
8		•		
9		•		
10		•	•	
11			•	
12		•	•	
13		•	•	
14			•	
15			•	
16			•	
17			•	
18		•	•	
19		•	•	•
20		•	•	
21		•		
22		•		•
23		•		
24		•	•	
25		•	•	•
26		•	•	•
27		•		
28		•		
29		•		
30				
31				

Hydraulic Control
Sauget Area 2 Groundwater Migration Control System
Line of Evidence 1
Surface Water Level Greater Than Groundwater Level
(SWL > GWL)



LINE OF EVIDENCE 2

SURFACE WATER LEVEL > PUMPING WATER LEVEL

GRADIENT FROM RIVER TO PUMPING WELLS

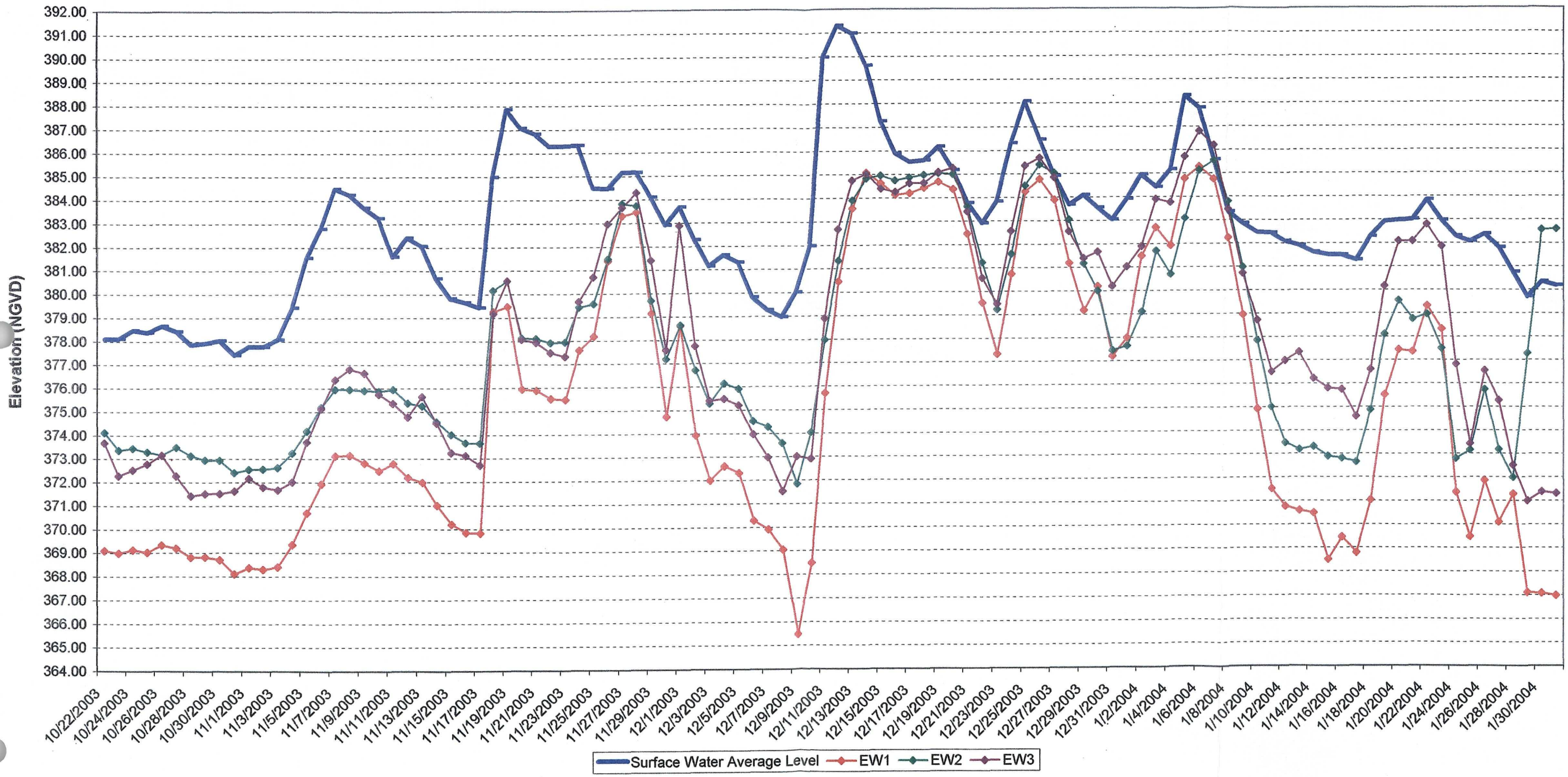
OCTOBER 2003 to JANUARY 2004

LINE OF EVIDENCE 2

Surface Water Levels Greater Than Pumping Water Levels
Gradient from River to Pumping Wells
October 22, 2003 to January 31, 2004

Day	Days with Groundwater Control			
	October 2003	November 2003	December 2003	January 2004
1		•	•	•
2		•	•	•
3		•	•	•
4		•	•	•
5		•	•	•
6		•	•	•
7		•	•	•
8		•	•	•
9		•	•	•
10		•	•	•
11		•	•	•
12		•	•	•
13		•	•	•
14		•	•	•
15		•	•	•
16		•	•	•
17		•	•	•
18		•	•	•
19		•	•	•
20		•	•	•
21		•	•	•
22	•	•	•	•
23	•	•	•	•
24	•	•	•	•
25	•	•	•	•
26	•	•	•	•
27	•	•	•	•
28	•	•	•	•
29	•	•	•	•
30	•	•	•	•
31	•		•	•

Hydraulic Control
Sauget Area 2 Groundwater Migration Control System
Line of Evidence 2
Surface Water Level Greater Than Pumping Water Level
(SWL > PWL)



LINE OF EVIDENCE 3

GROUNDWATER LEVEL > PUMPING WATER LEVEL

GRADIENT FROM PIEZOMETERS TO PUMPING WELLS

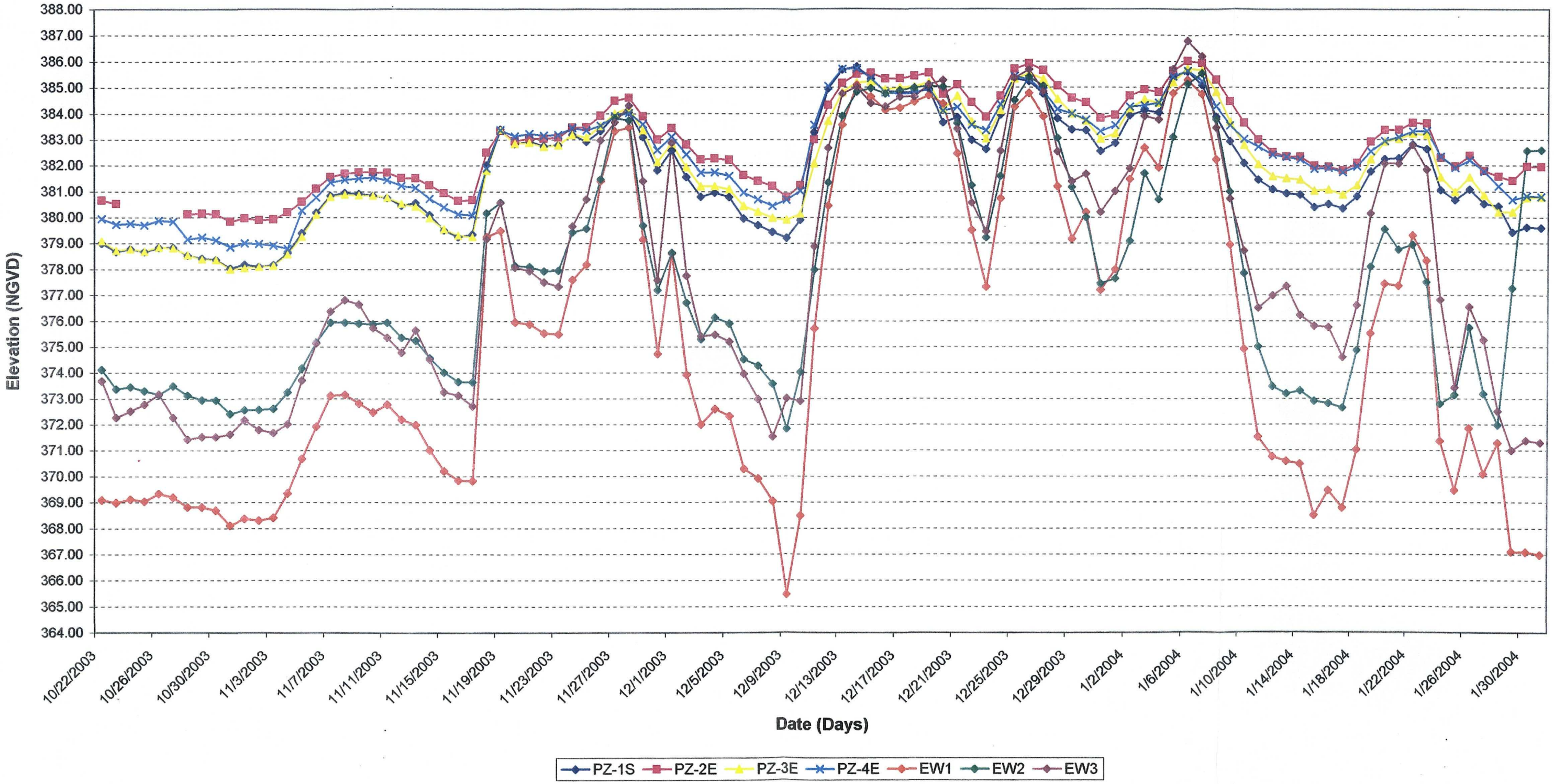
OCTOBER 2003 to JANUARY 2004

LINE OF EVIDENCE 3

Groundwater Levels Greater Than Pumping Water Levels
Gradient from Piezometers to Pumping Wells
October 22, 2003 to January 31, 2004

Day	Days with Groundwater Control			
	October 2003	November 2003	December 2003	January 2004
1		•	•	•
2		•	•	•
3		•	•	•
4		•	•	•
5		•	•	•
6		•	•	•
7		•	•	•
8		•	•	•
9		•	•	•
10		•	•	•
11		•	•	•
12		•	•	•
13		•	•	•
14		•	•	•
15		•	•	•
16		•	•	•
17		•	•	•
18		•	•	•
19		•	•	•
20		•	•	•
21		•	•	•
22	•	•	•	•
23	•	•	•	•
24	•	•	•	•
25	•	•	•	•
26	•	•	•	•
27	•	•	•	•
28	•	•	•	•
29	•	•	•	•
30	•	•	•	•
31	•		•	•

Hydraulic Control
Sauget Area 2 Groundwater Migration Control System
Line of Evidence 3
Ground Water Level Greater Than Pumping Water Level
(GWL > PWL)



LINE OF EVIDENCE 4

SURFACE WATER LEVEL > GROUNDWATER LEVEL

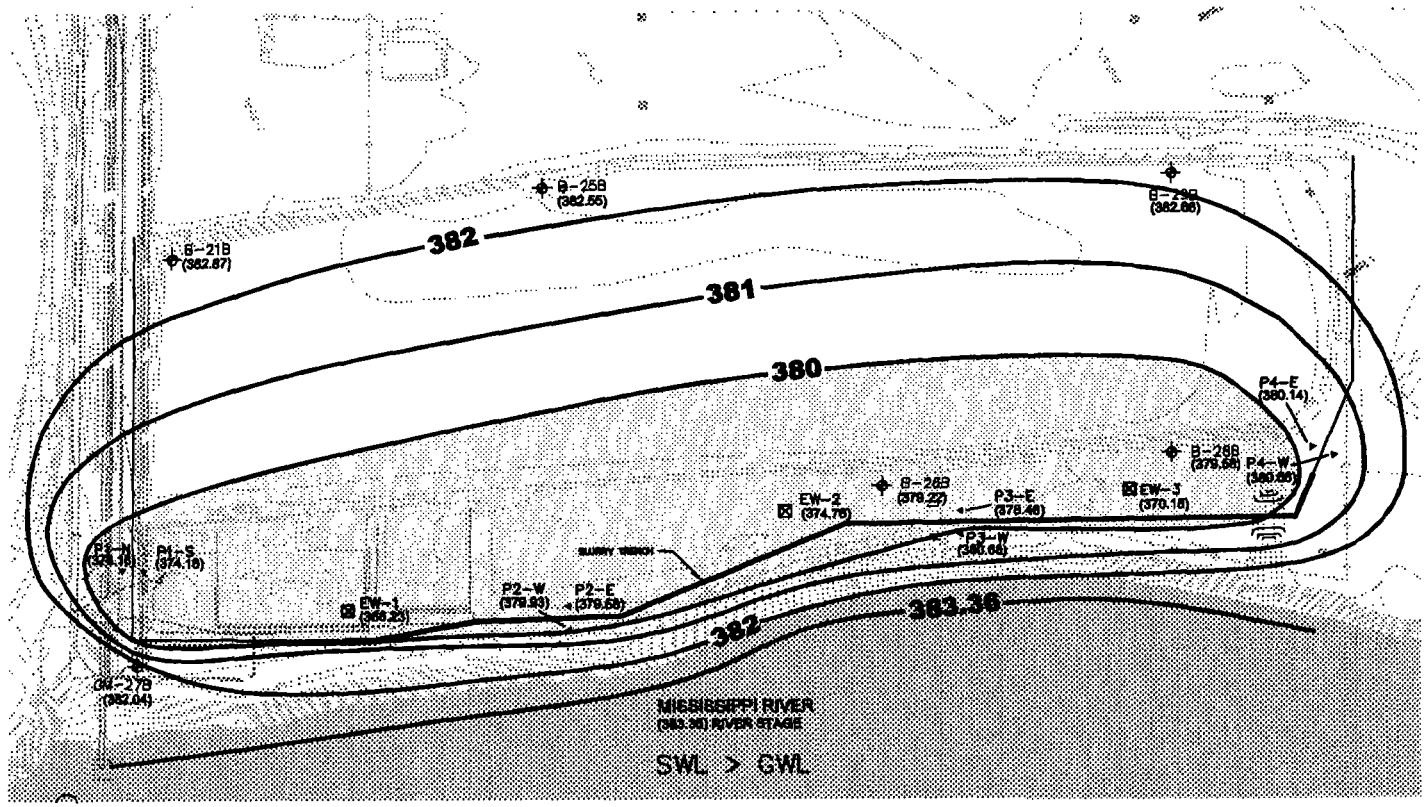
GRADIENT REVERSAL - NO DISCHARGE TO SURFACE WATER

FEBRUARY to APRIL 2004

LINE OF EVIDENCE 4

Surface Water Levels Greater Than Groundwater Levels
Gradient Reversal - No Discharge to Surface Water
February 1, 2004 to April 11, 2004

Day	Days with Groundwater Control		
	February 2004	March 2004	April 2004
1		•	•
2		•	•
3		•	•
4		•	•
5		•	•
6		•	•
7		•	•
8		•	•
9		•	•
10		•	•
11		•	•
12		•	
13		•	
14		•	
15		•	
16		•	
17		•	
18		•	
19		•	
20		•	
21	•	•	
22	•	•	
23	•	•	
24	•	•	
25	•	•	
26	•	•	
27	•	•	
28	•	•	
29	•	•	
30		•	
31		•	



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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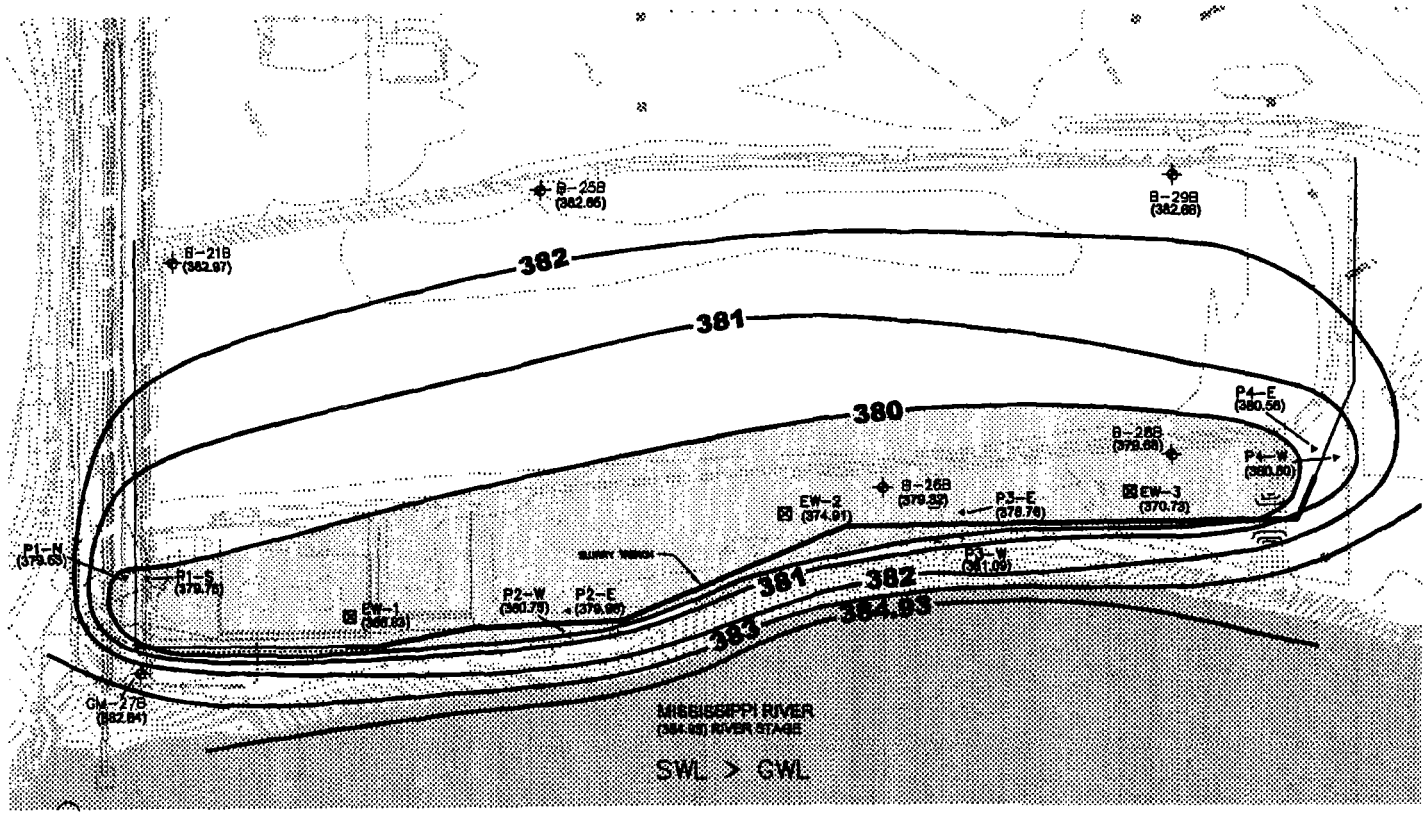
Applied Chemistry, Creative Solutions

GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
February 23, 2004

PROJECT NO.

FIG. NO.
7



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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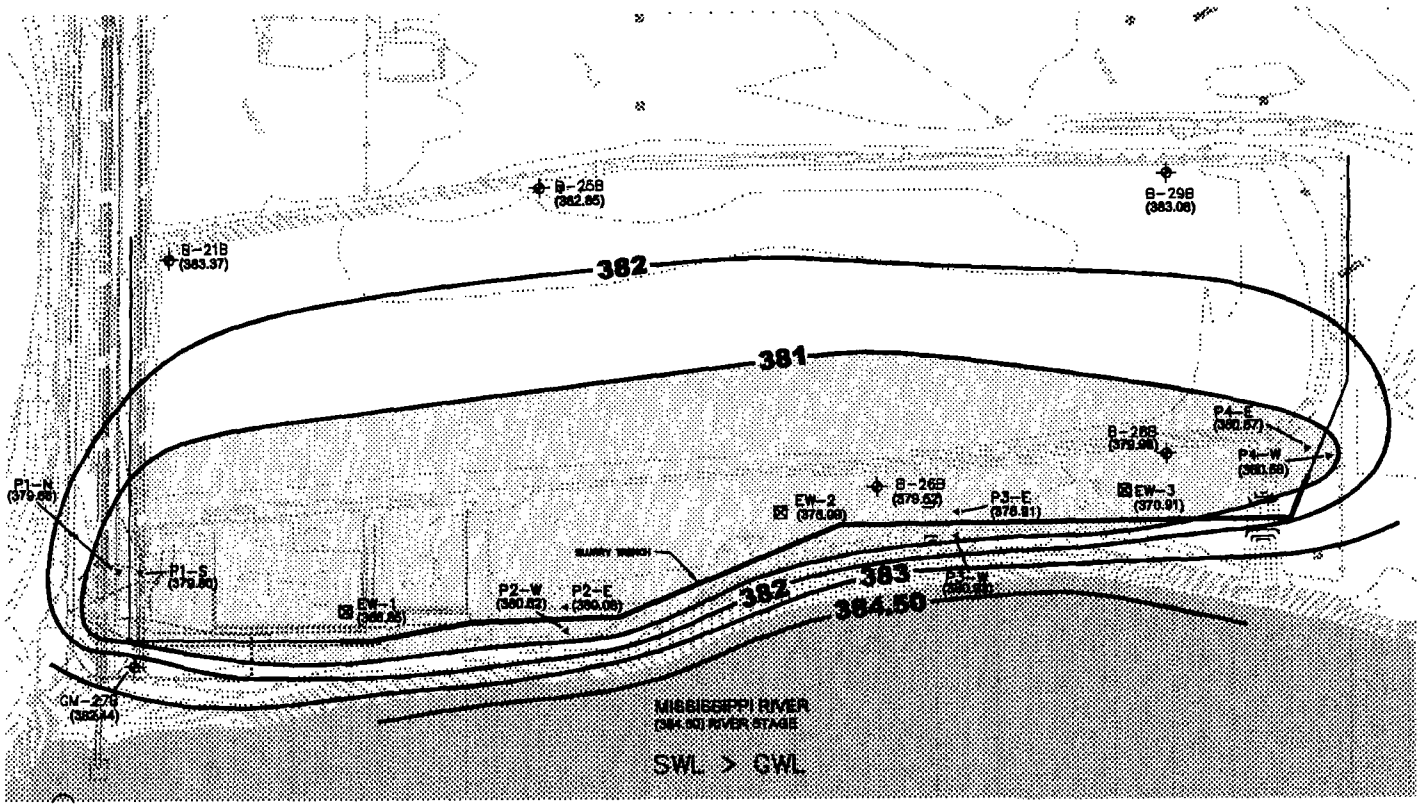
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
February 24, 2004

PROJECT NO.

FIG. NO.
8



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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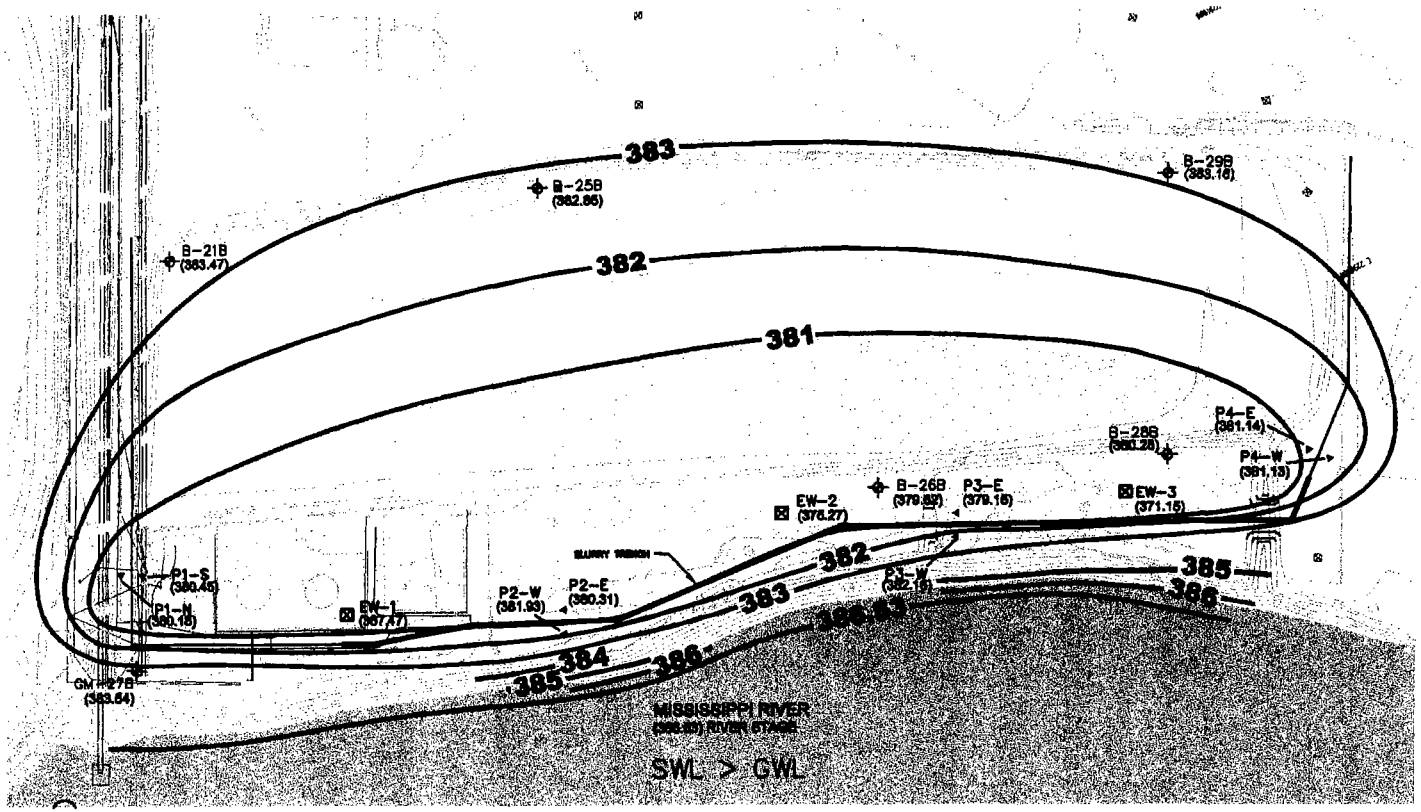
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

PROJECT NO.

Groundwater Elevation
February 25, 2004

FIG. NO.
9



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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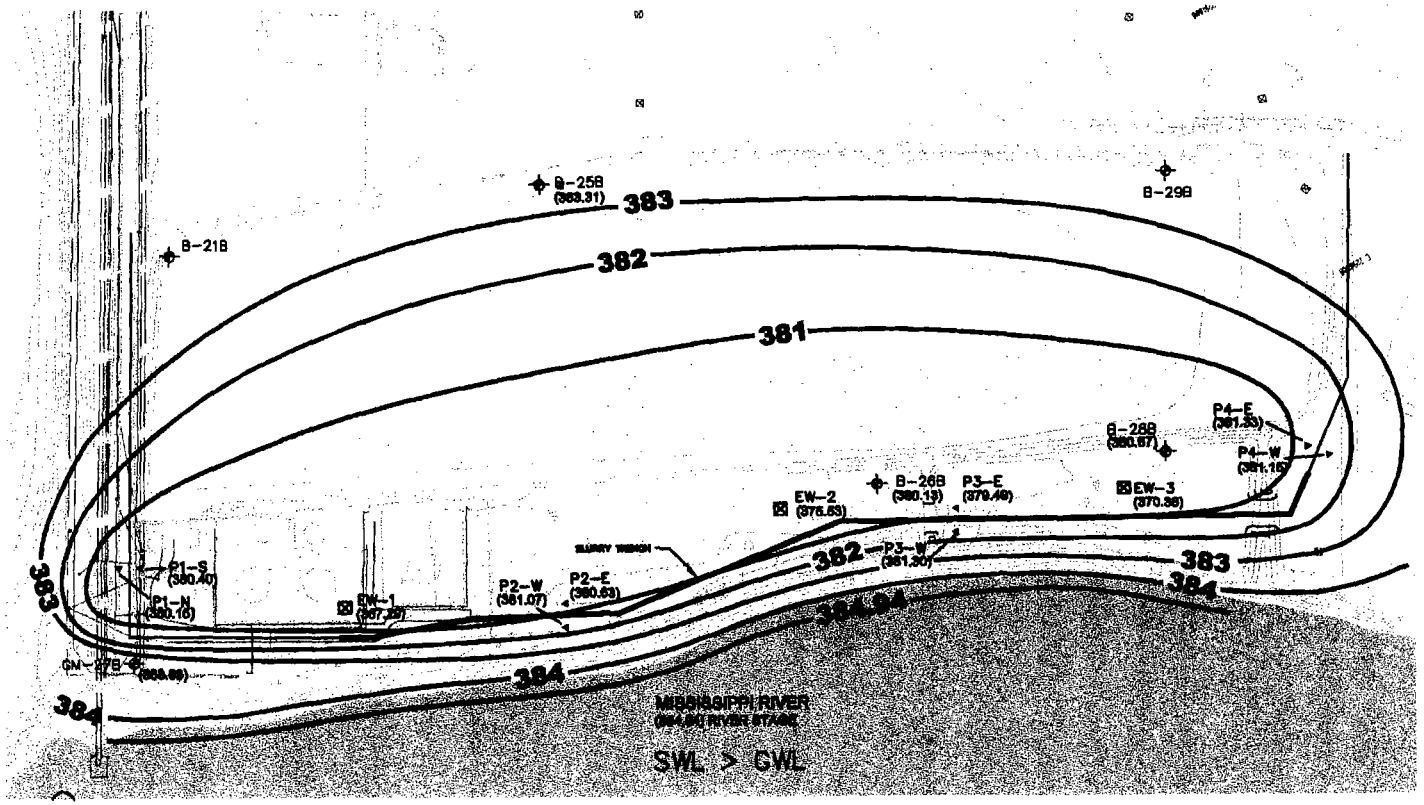
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
February 26, 2004

PROJECT NO.

FIG. NO.
10



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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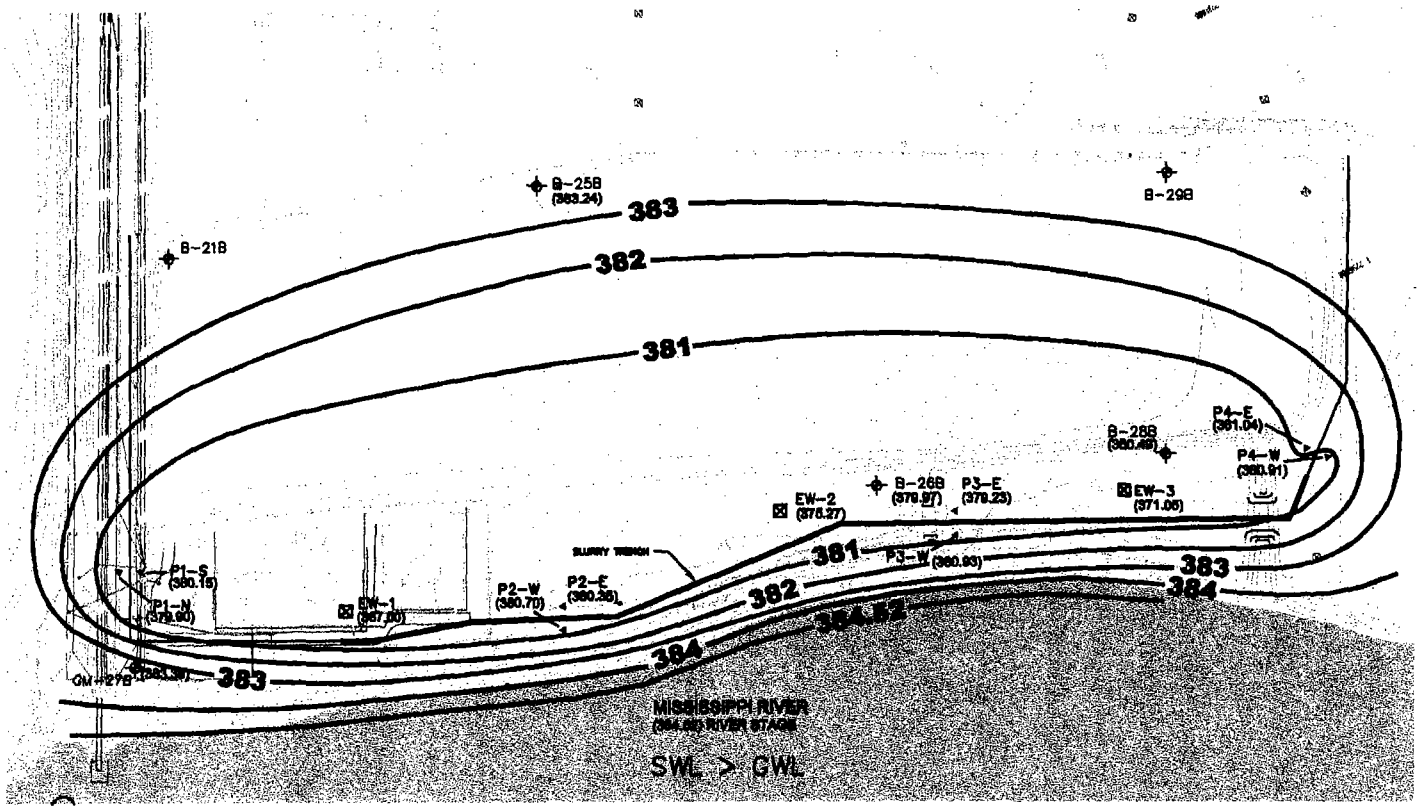
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 01, 2004

PROJECT NO.

FIG. NO.
11



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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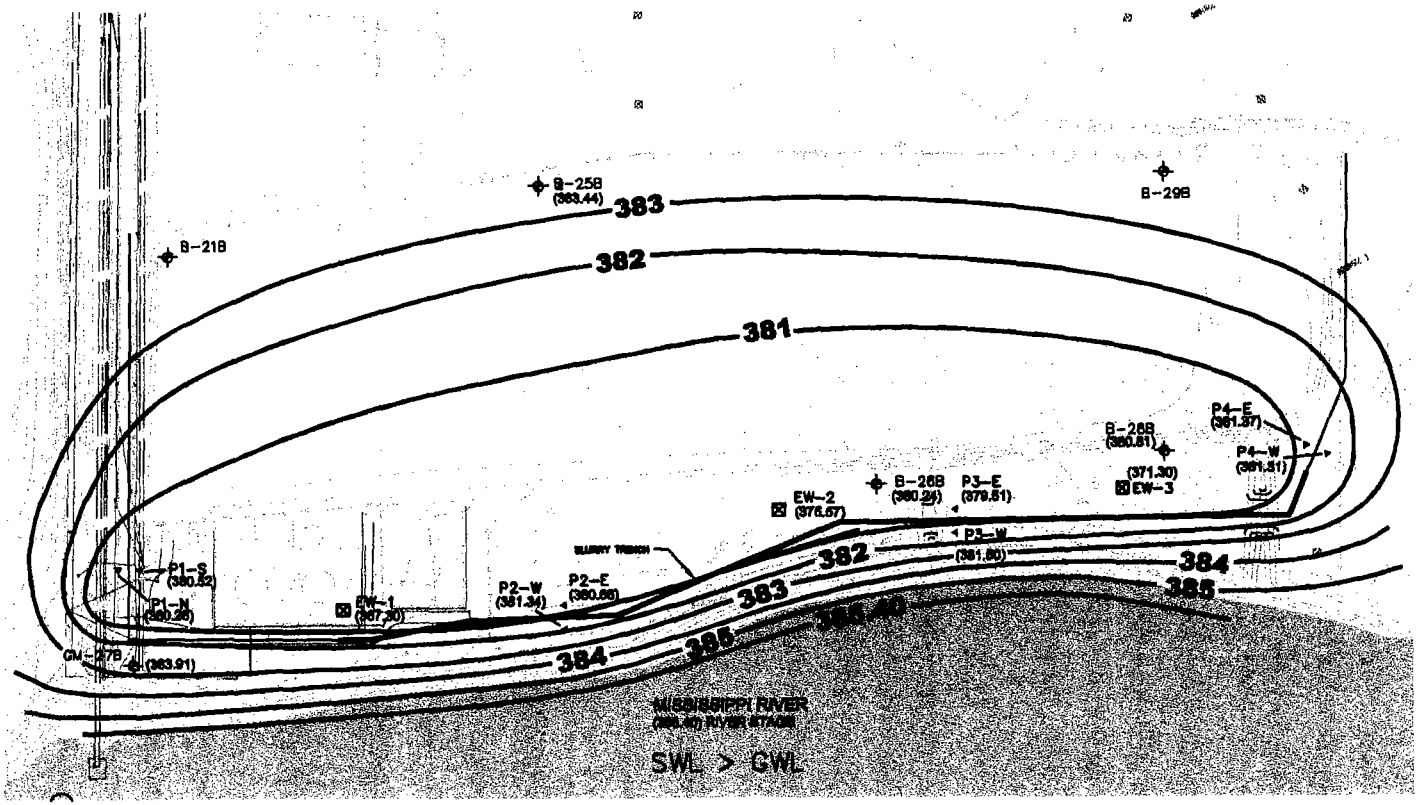
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 02, 2004

PROJECT NO.

FIG. NO.
12



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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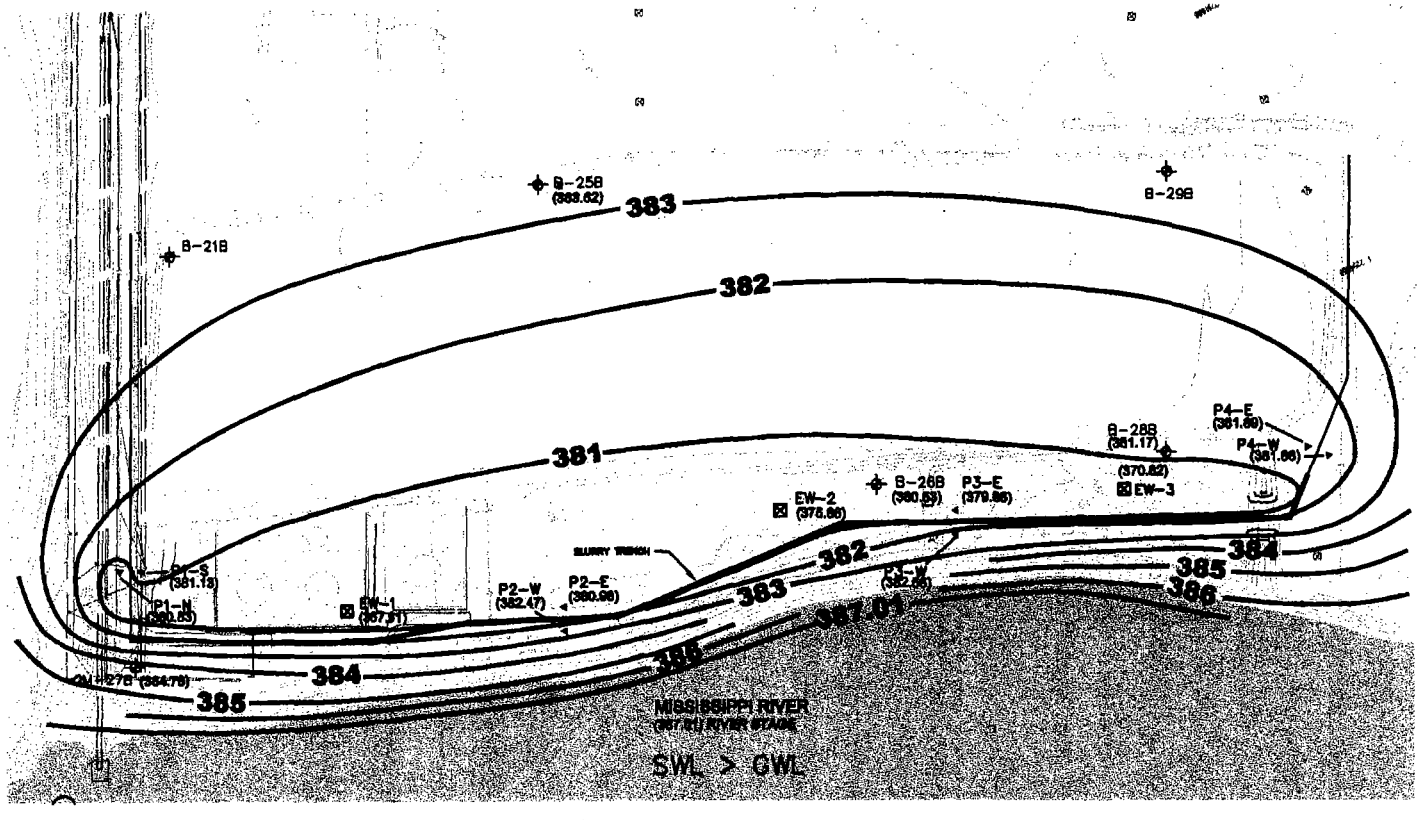
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 03, 2004

PROJECT NO.

FIG. NO.
13



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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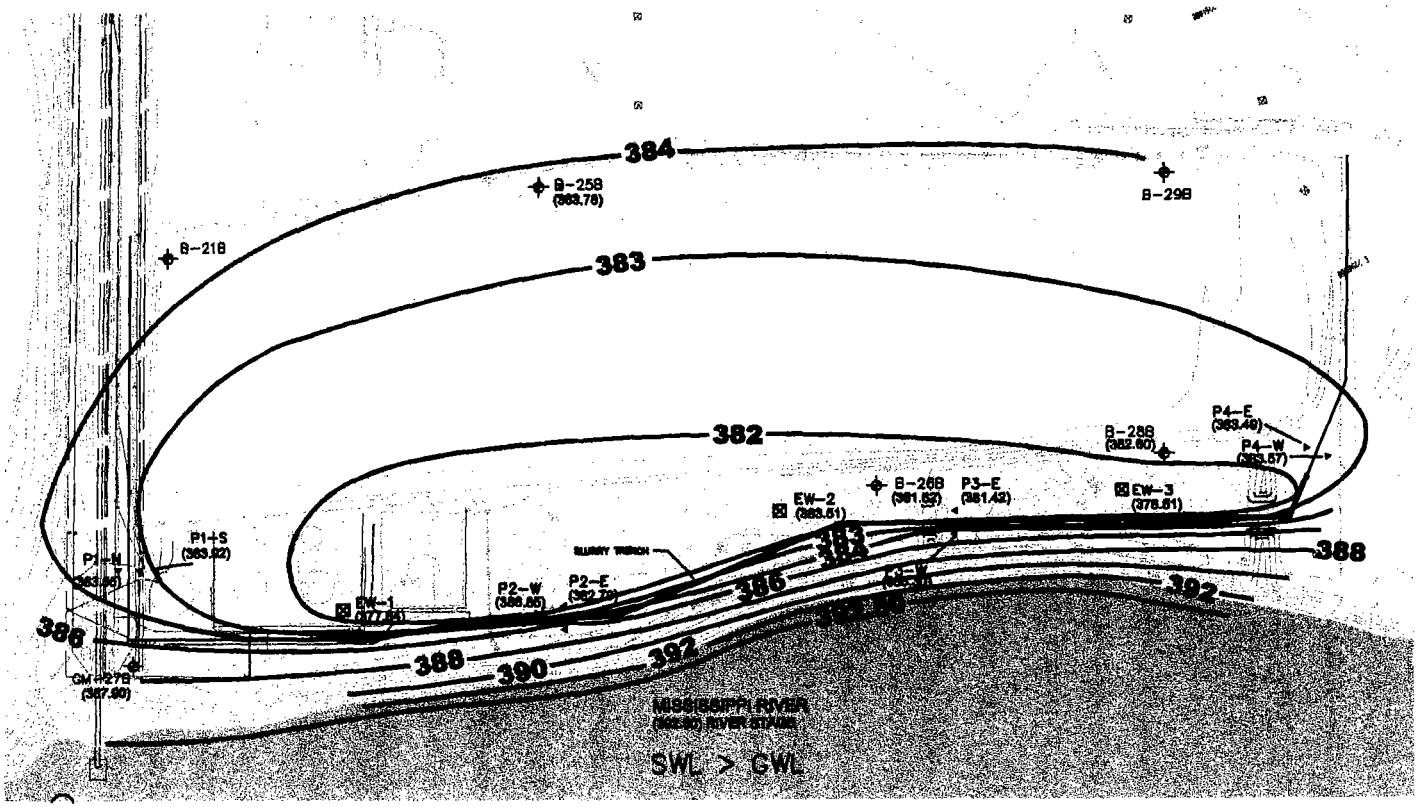
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 04, 2004

PROJECT NO.

FIG. NO.
14



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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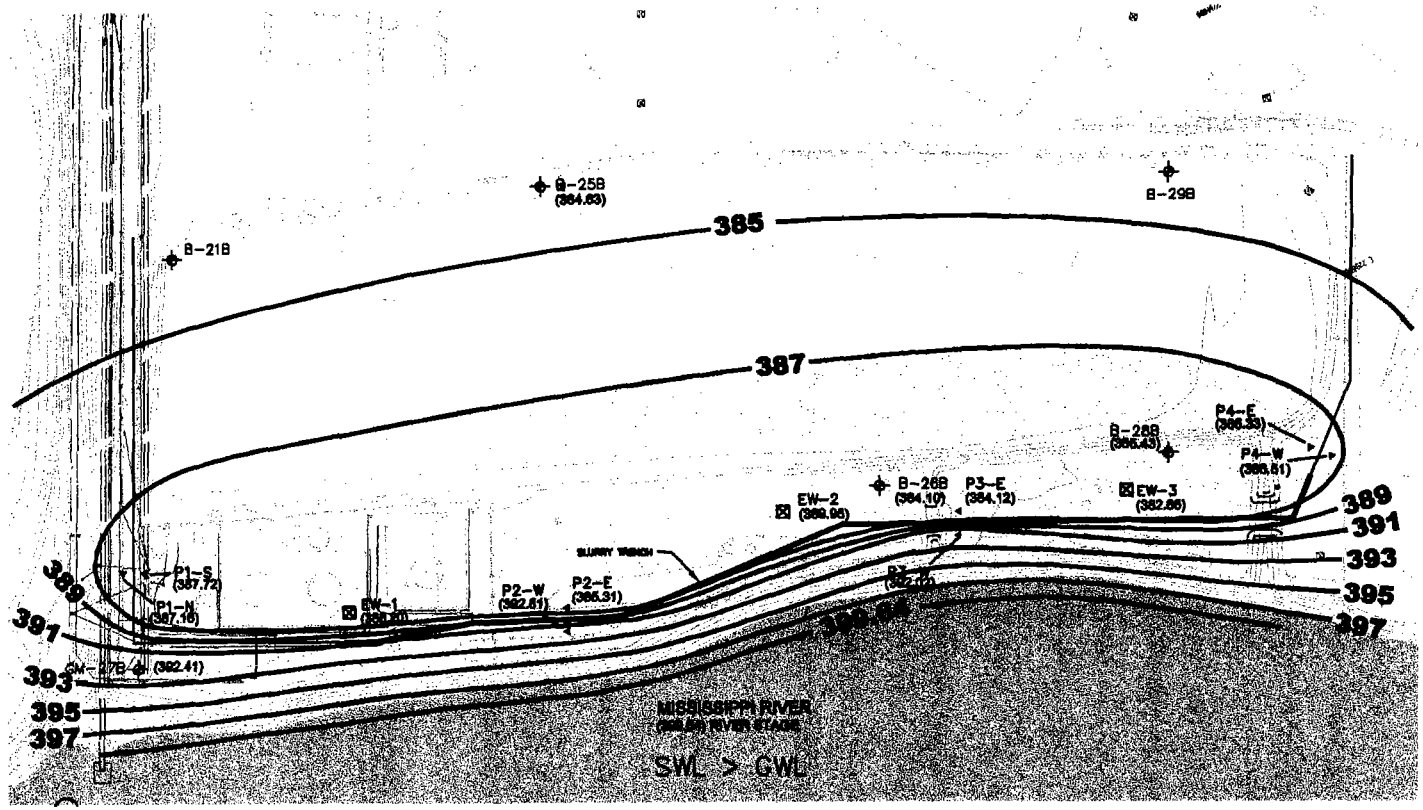
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 05, 2004

PROJECT NO.

FIG. NO.
15



LEGEND

—379— GROUNDWATER CONTOUR LINE (2FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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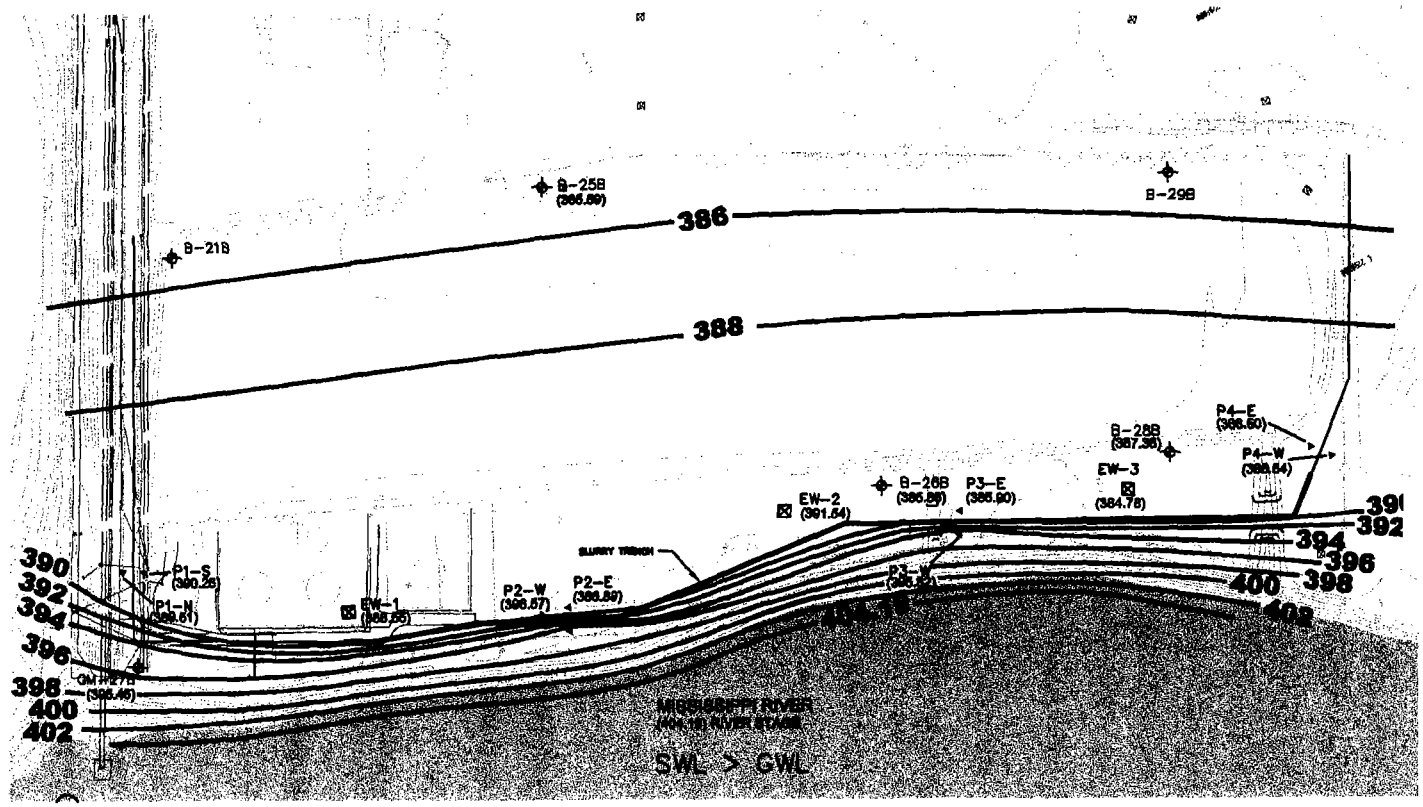
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 06, 2004

PROJECT NO.

FIG. NO.
16



LEGEND

—379— GROUNDWATER CONTOUR LINE (2FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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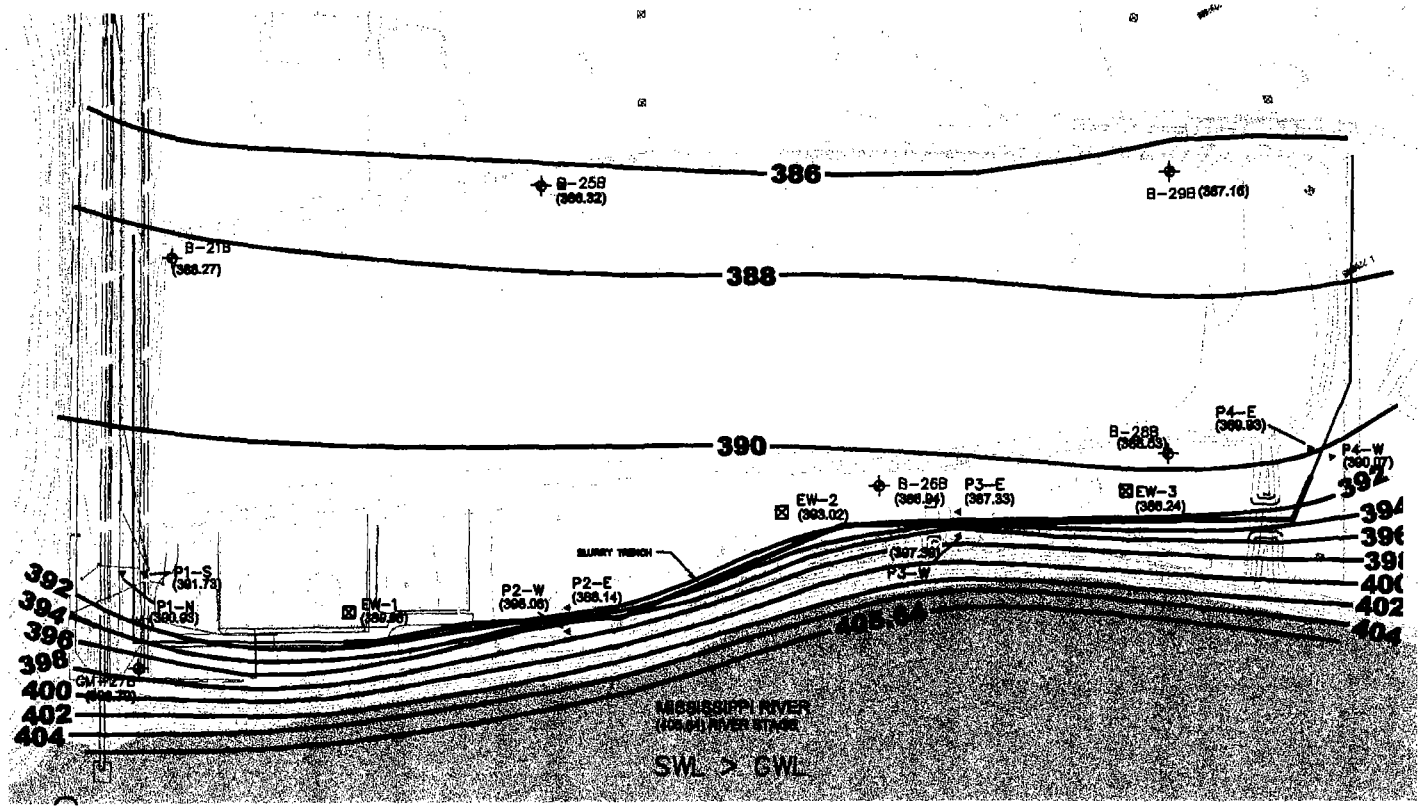
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 07, 2004

PROJECT NO.

FIG. NO.
17



LEGEND

—379— GROUNDWATER CONTOUR LINE (2FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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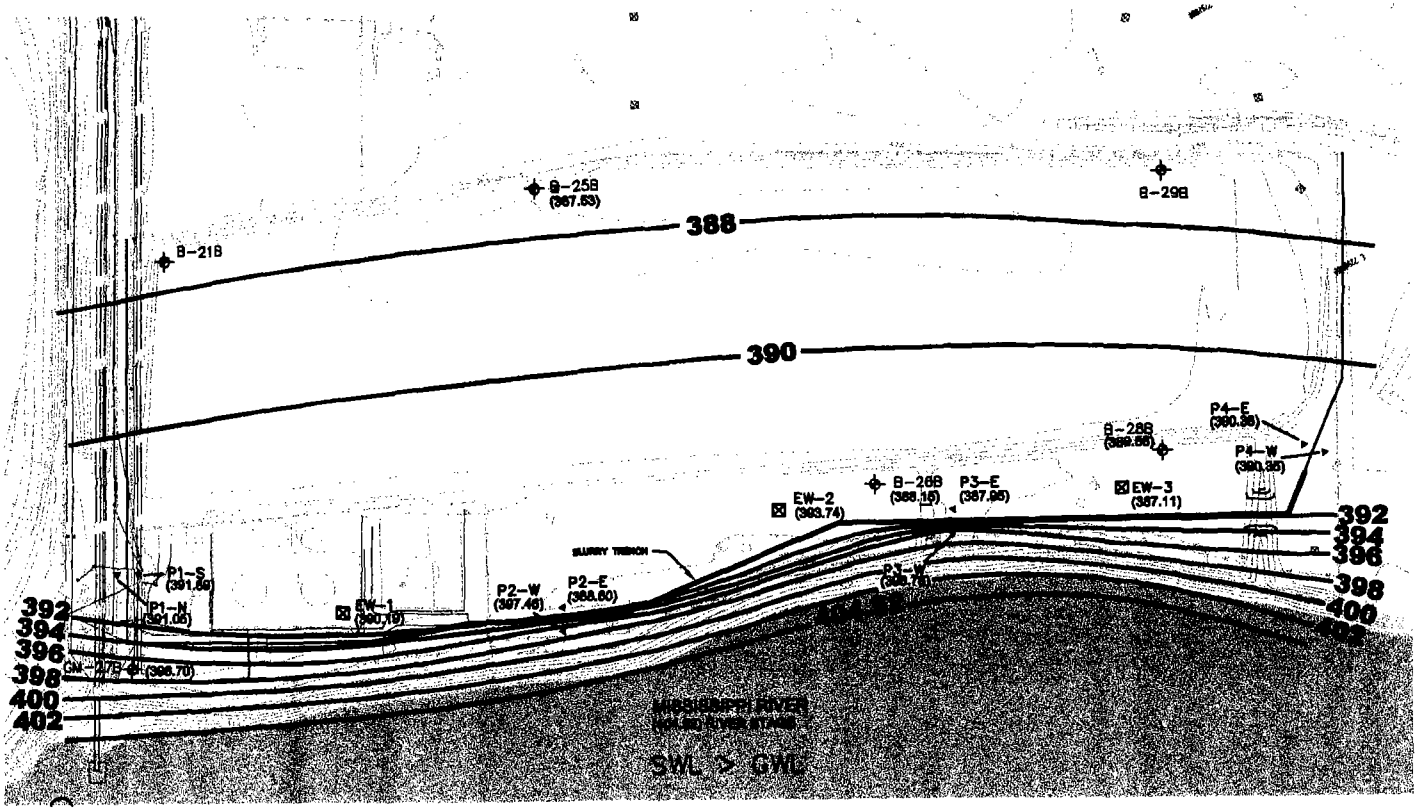
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 08, 2004

PROJECT NO.

FIG. NO.
18



LEGEND

—379— GROUNDWATER CONTOUR LINE (2 FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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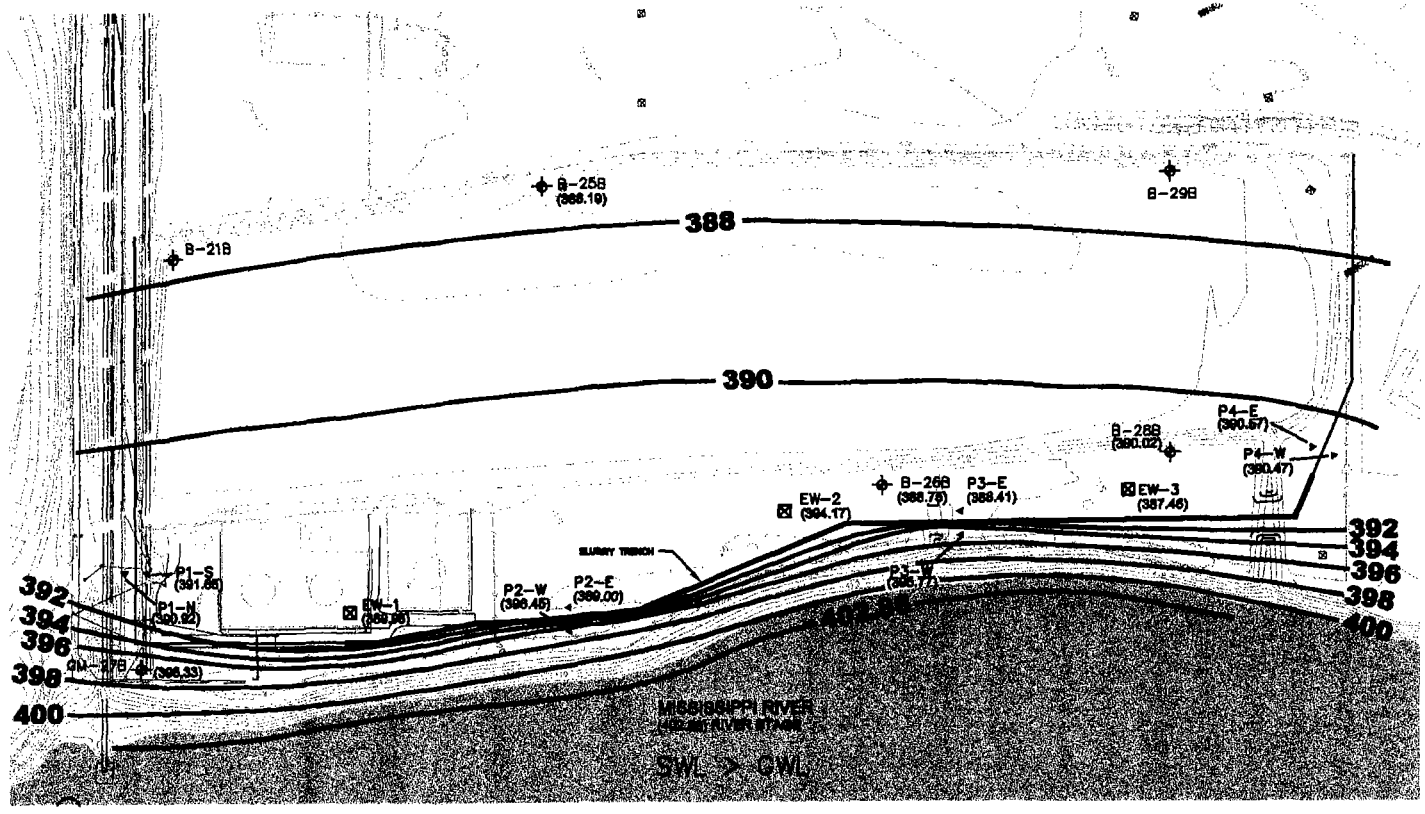
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 09, 2004

PROJECT NO.

FIG. NO.
19



LEGEND

—379— GROUNDWATER CONTOUR LINE (2 FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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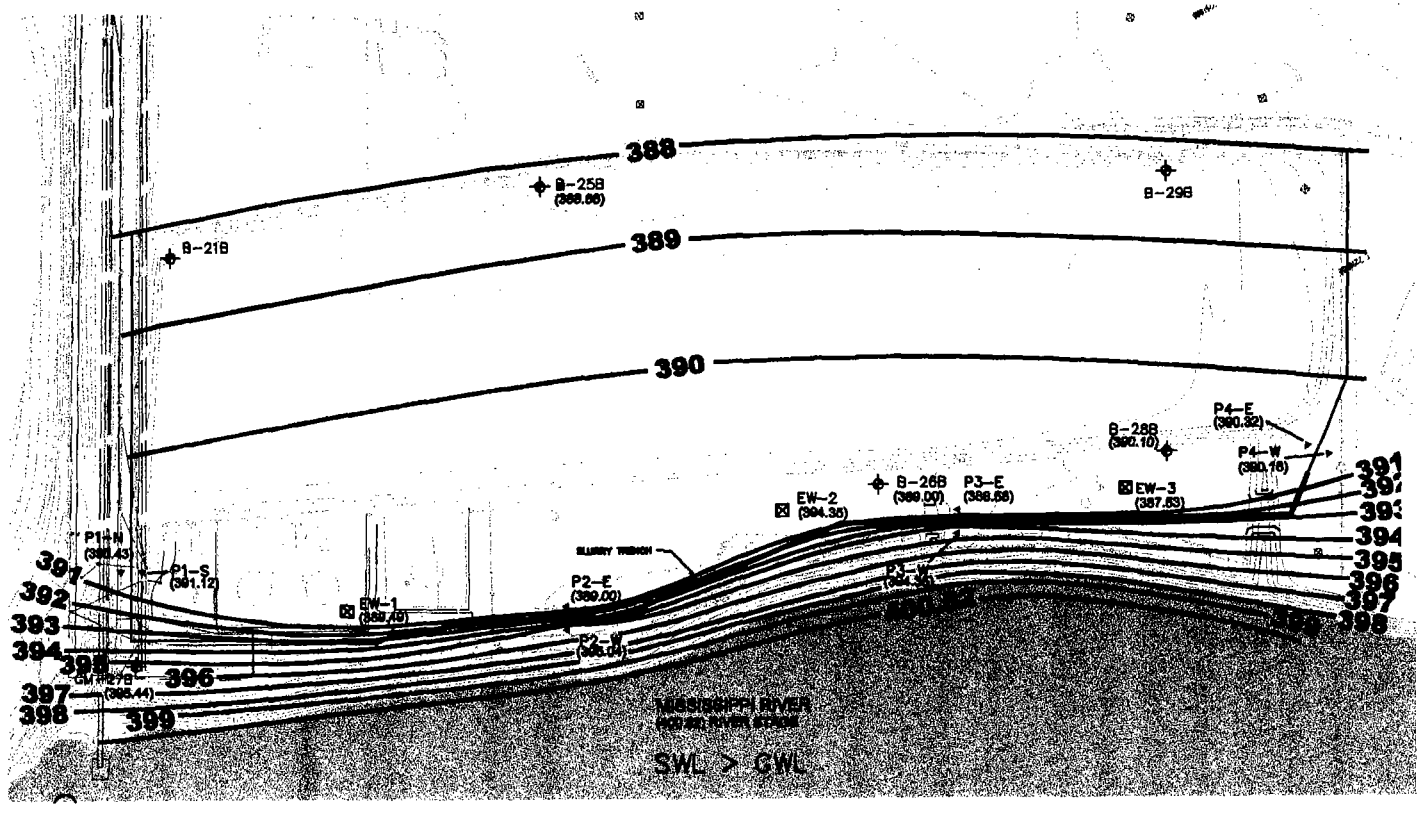
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 10, 2004

PROJECT NO.

FIG. NO.
20



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

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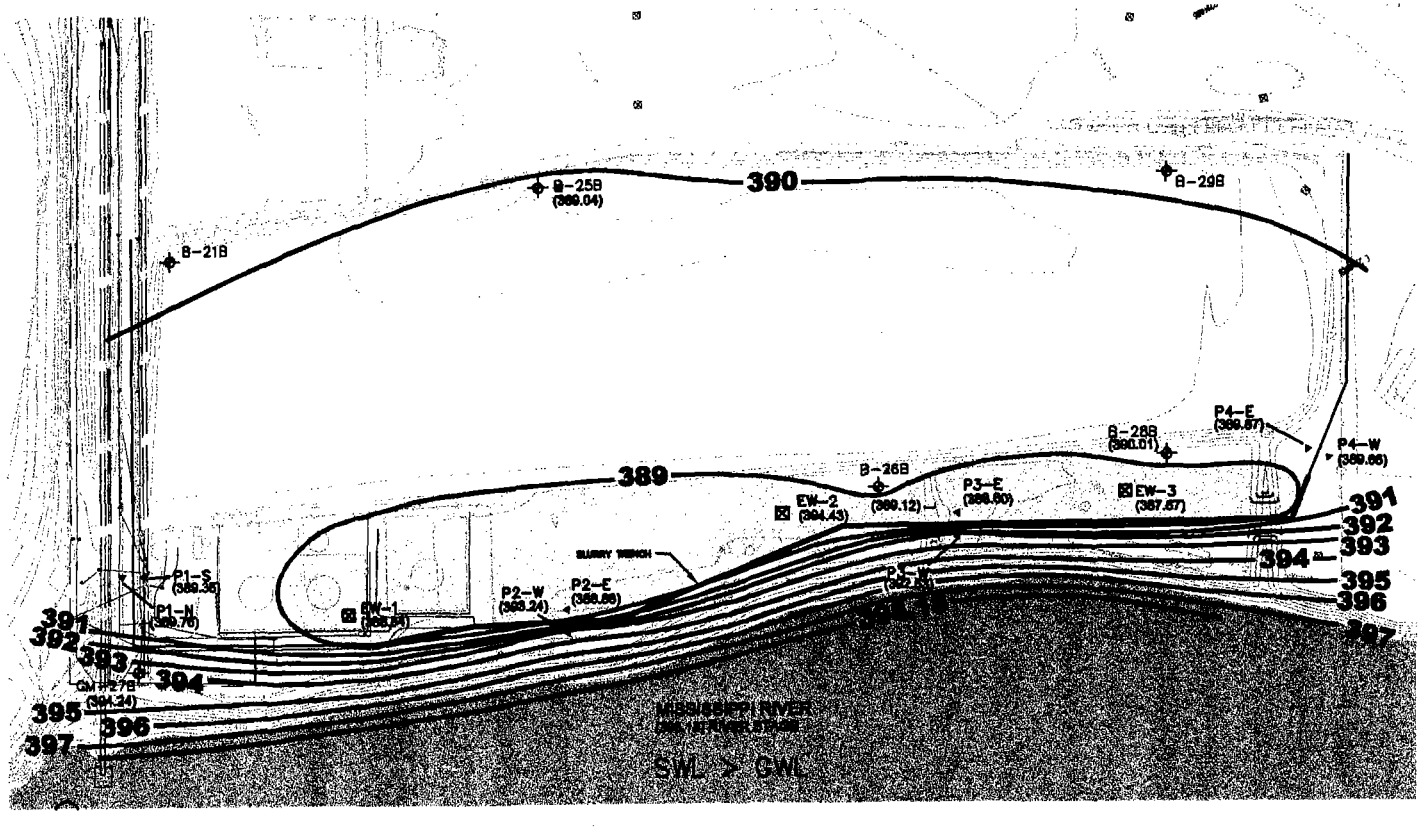
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 11, 2004

PROJECT NO.

FIG. NO.
21



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

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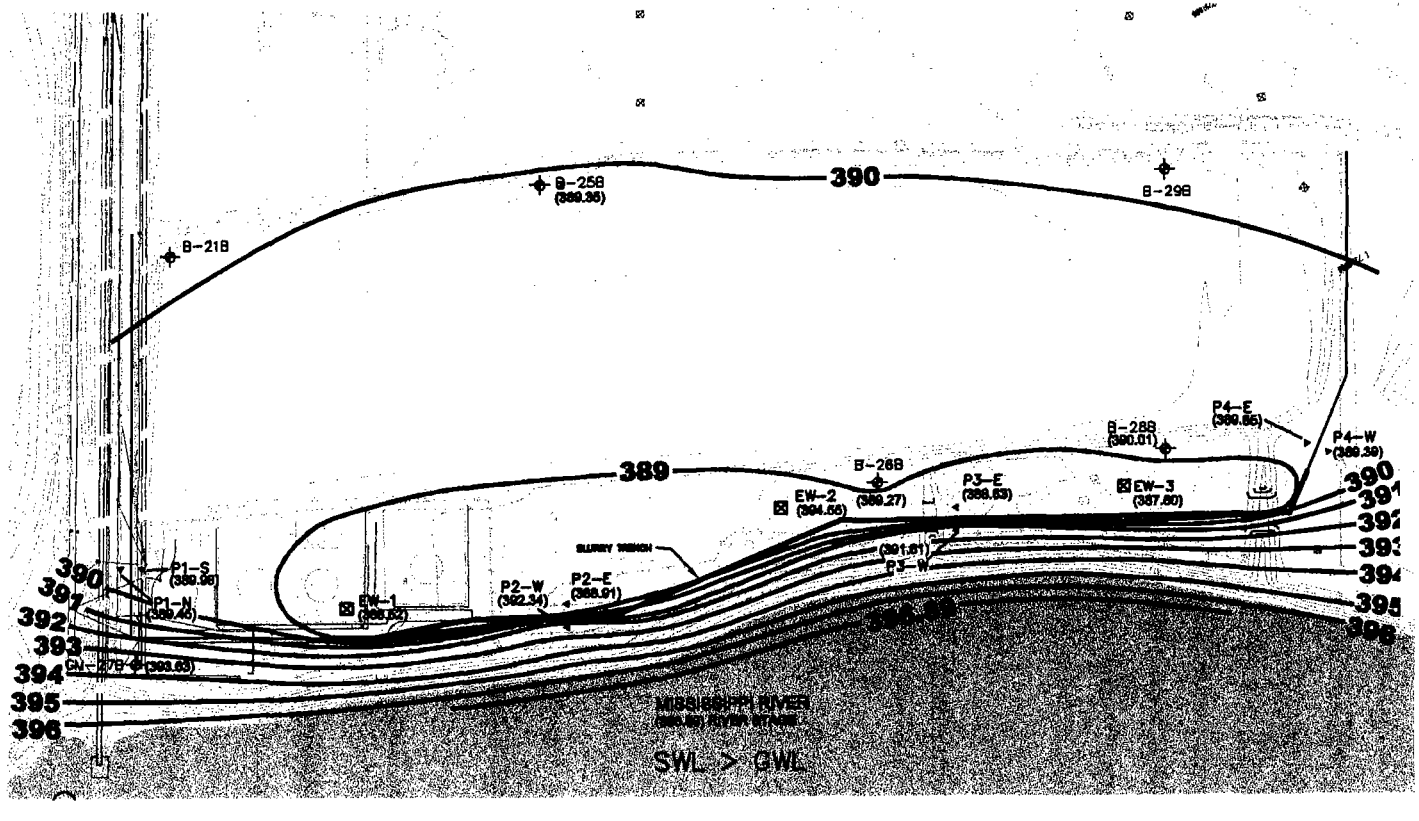
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 12, 2004

PROJECT NO.

FIG. NO.
22



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

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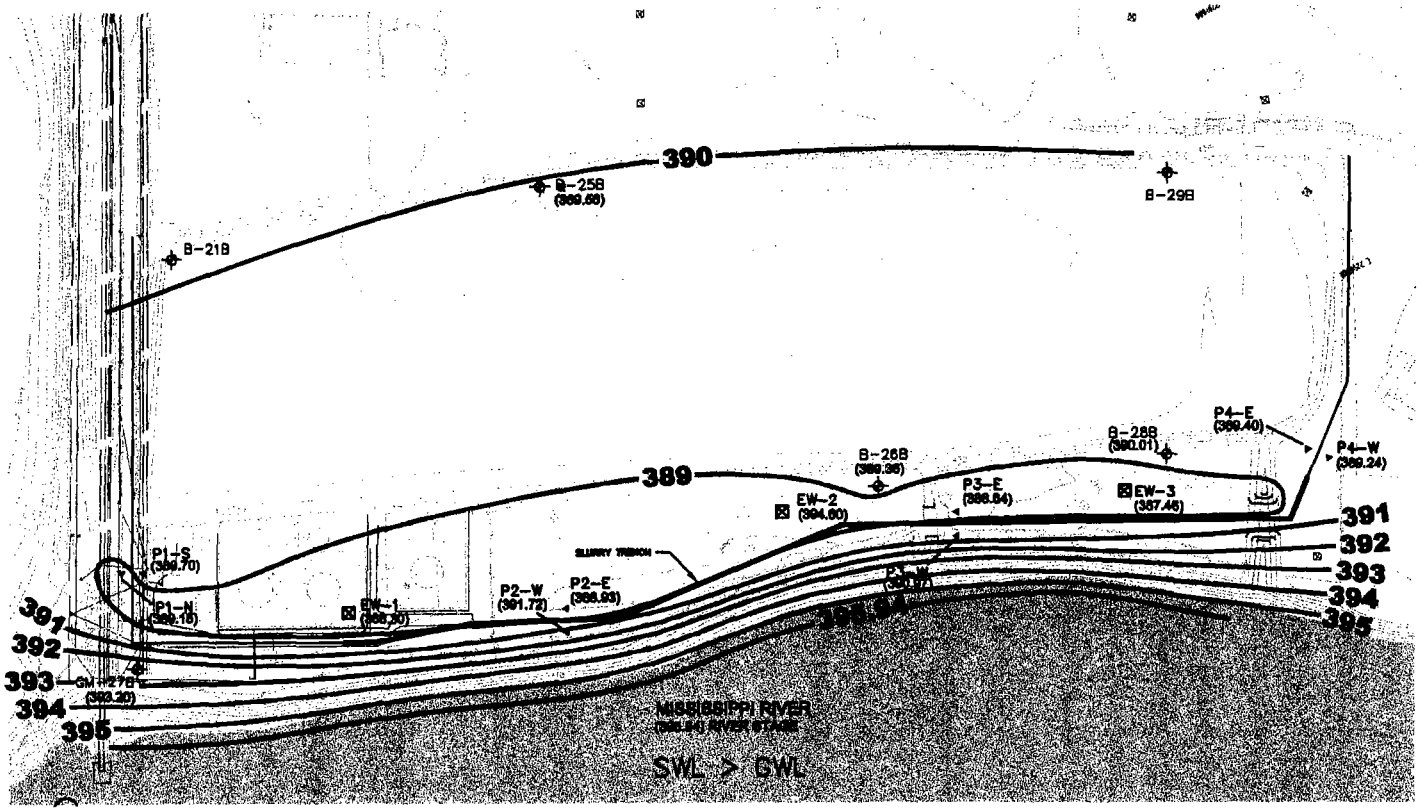
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 13, 2004

PROJECT NO.

FIG. NO.
23



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

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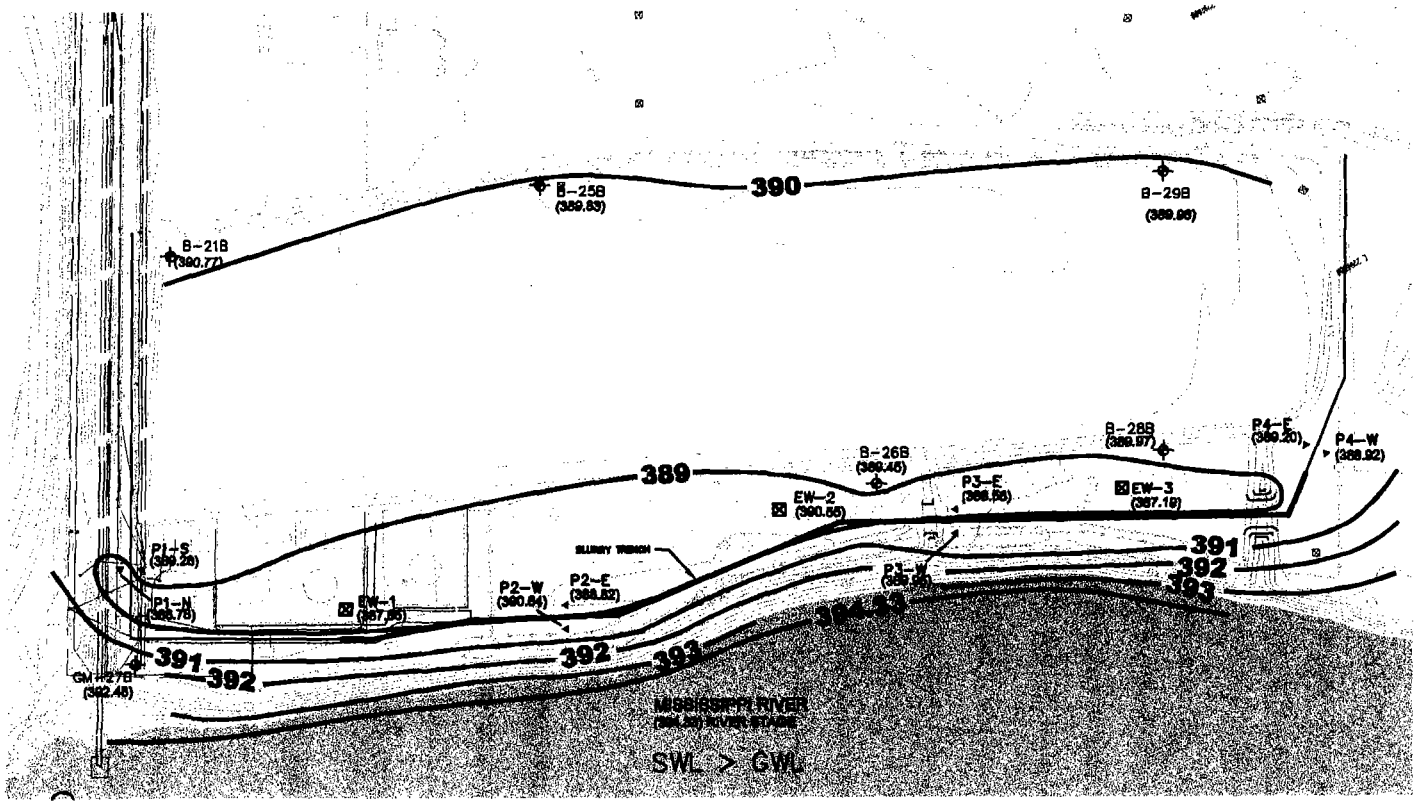
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 14, 2004

PROJECT NO.

FIG. NO.
24



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

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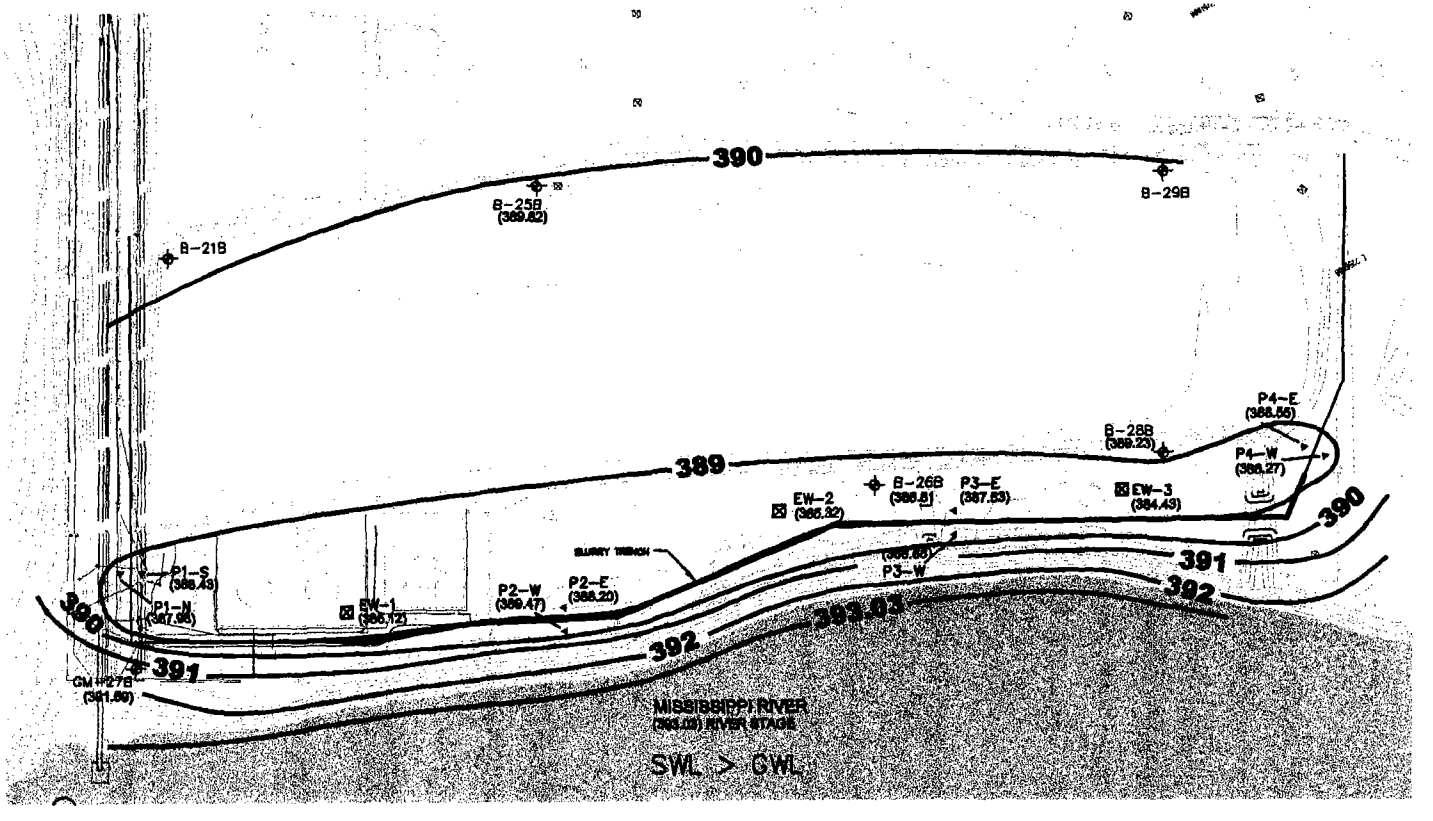
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 15, 2004

PROJECT NO.

FIG. NO.
25



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

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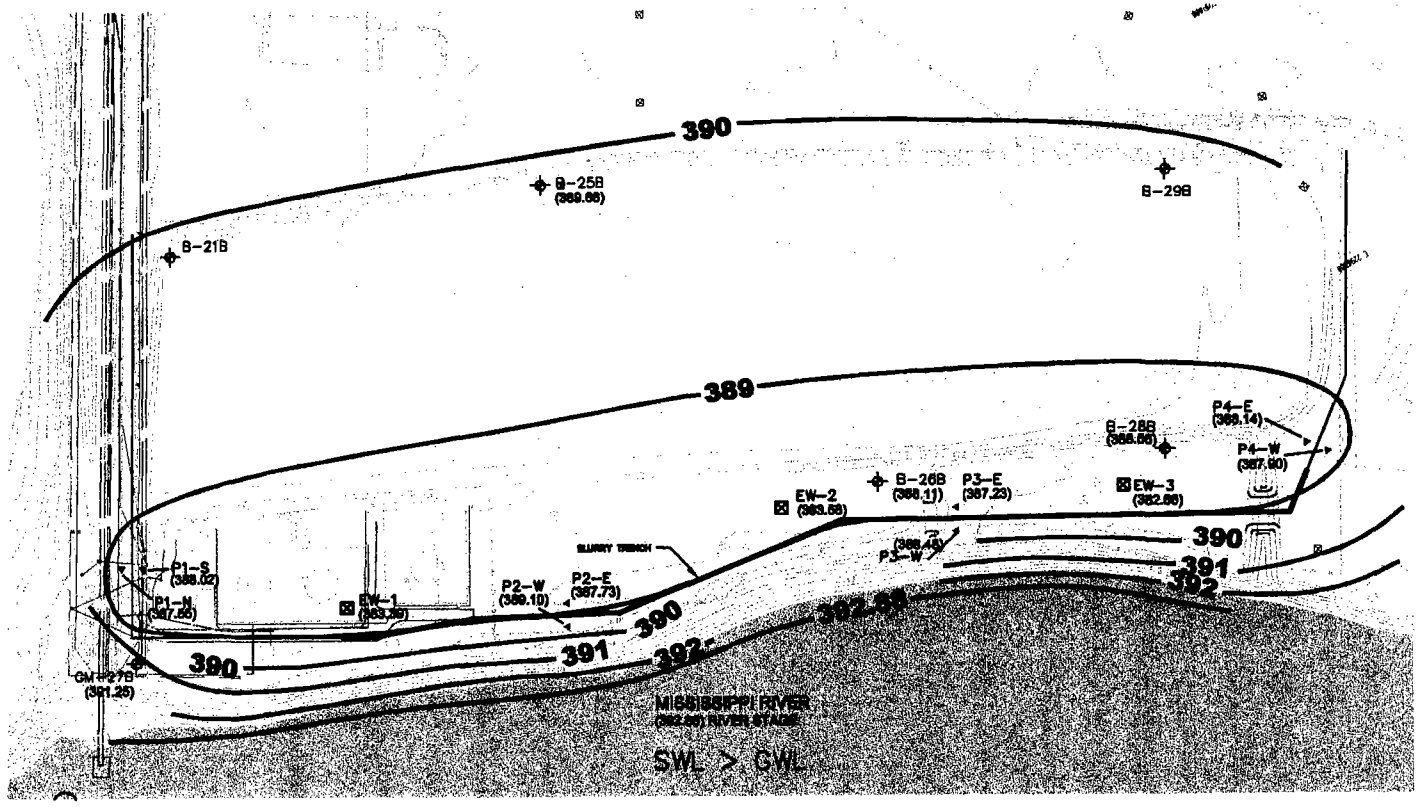
PROJECT NO.

Groundwater Elevation
March 16, 2004

FIG. NO.
26



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

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GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
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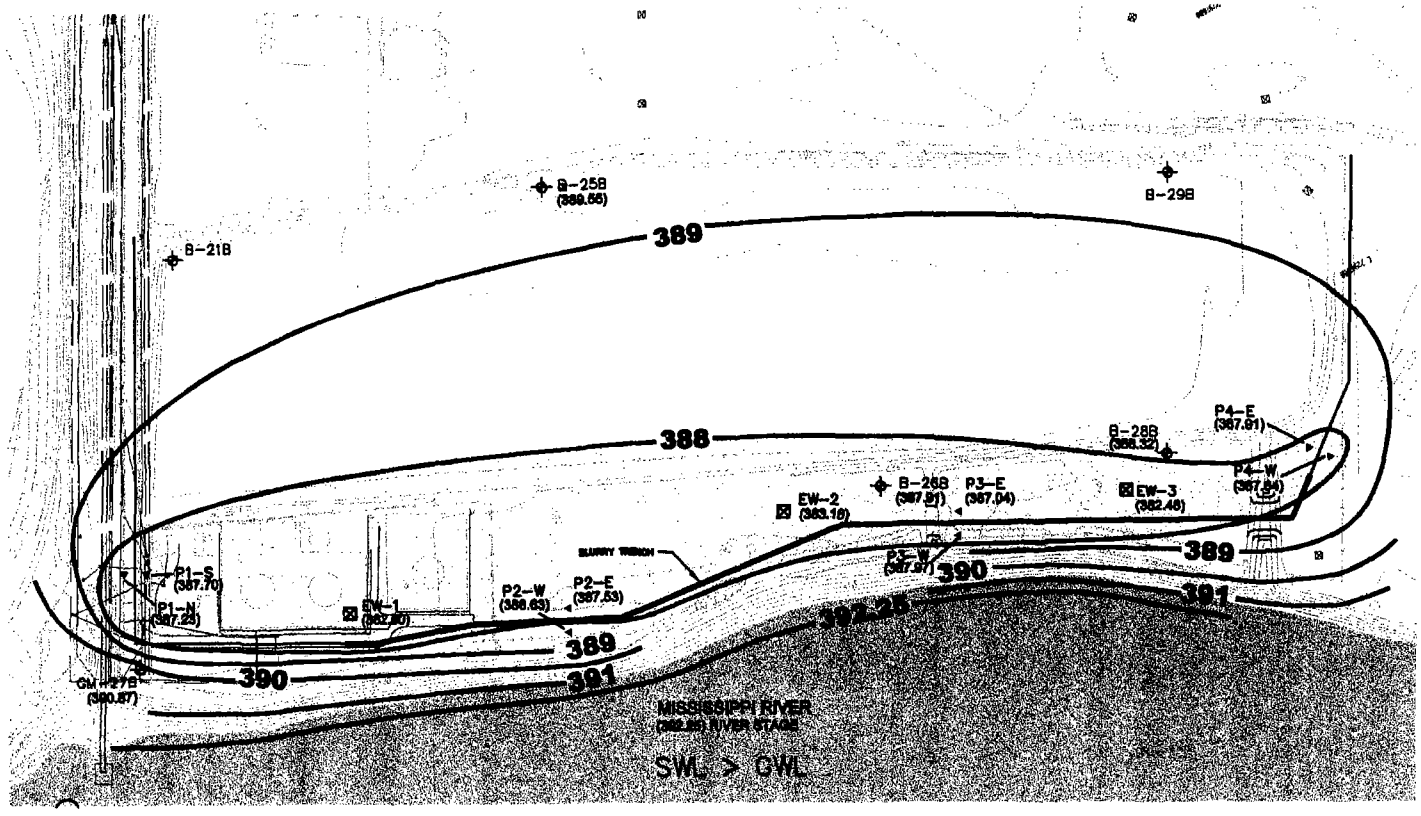
Groundwater Elevation
March 17, 2004

PROJECT NO.

FIG. NO.
27



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

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GROUNDWATER MIGRATION CONTROL SYSTEM
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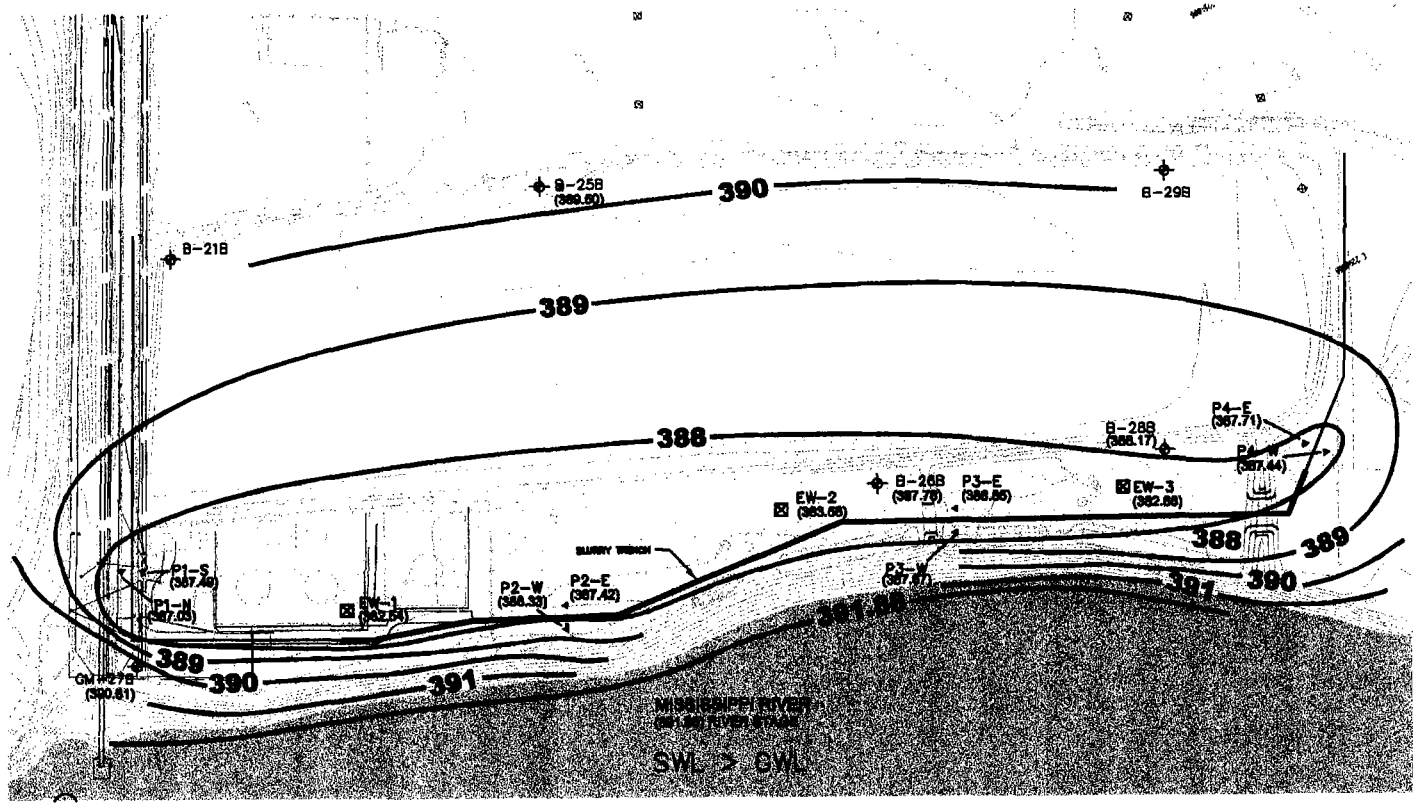
Groundwater Elevation
March 18, 2004

PROJECT NO.

FIG. NO.
28



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

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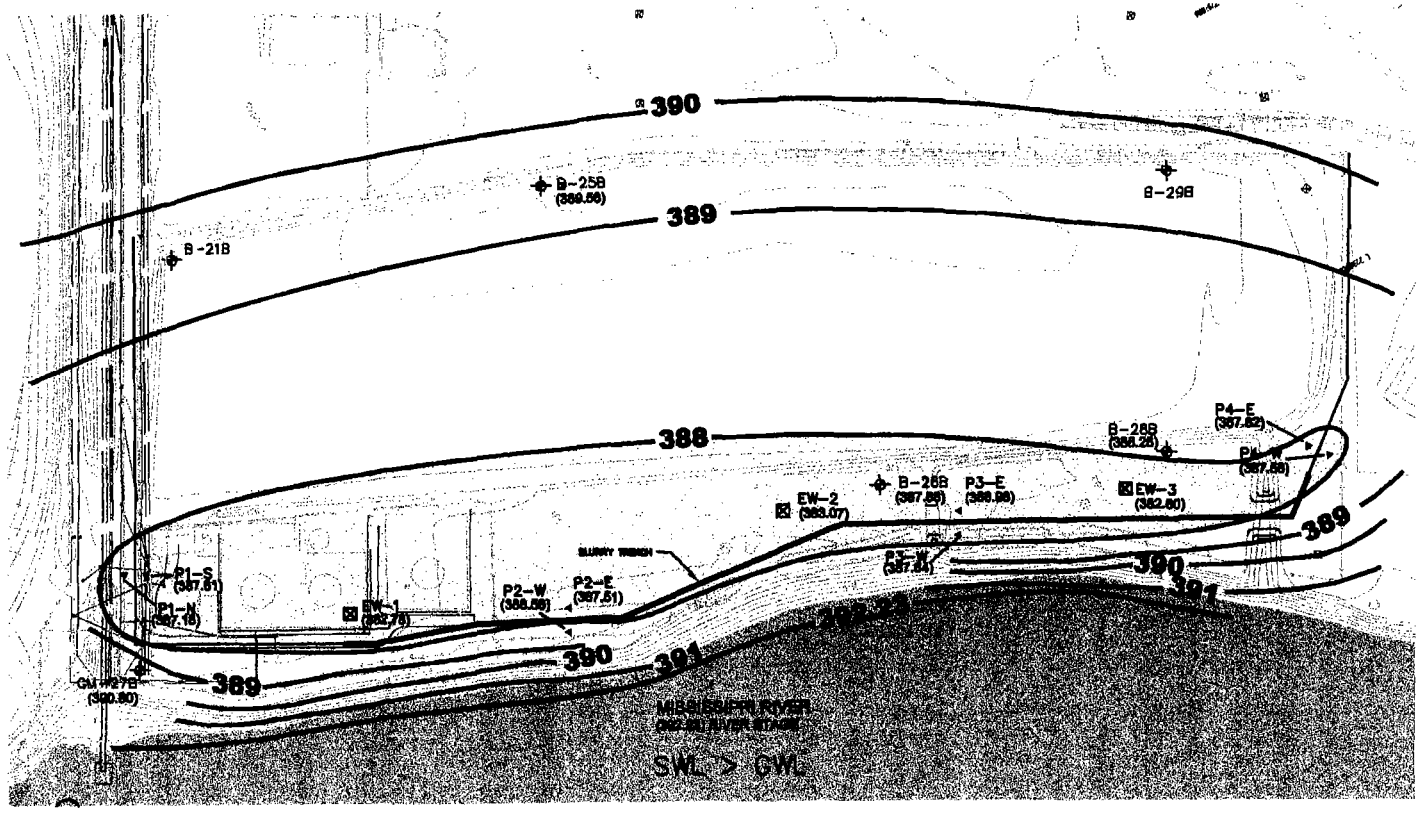
Groundwater Elevation
March 19, 2004

PROJECT NO.

FIG. NO.
29



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

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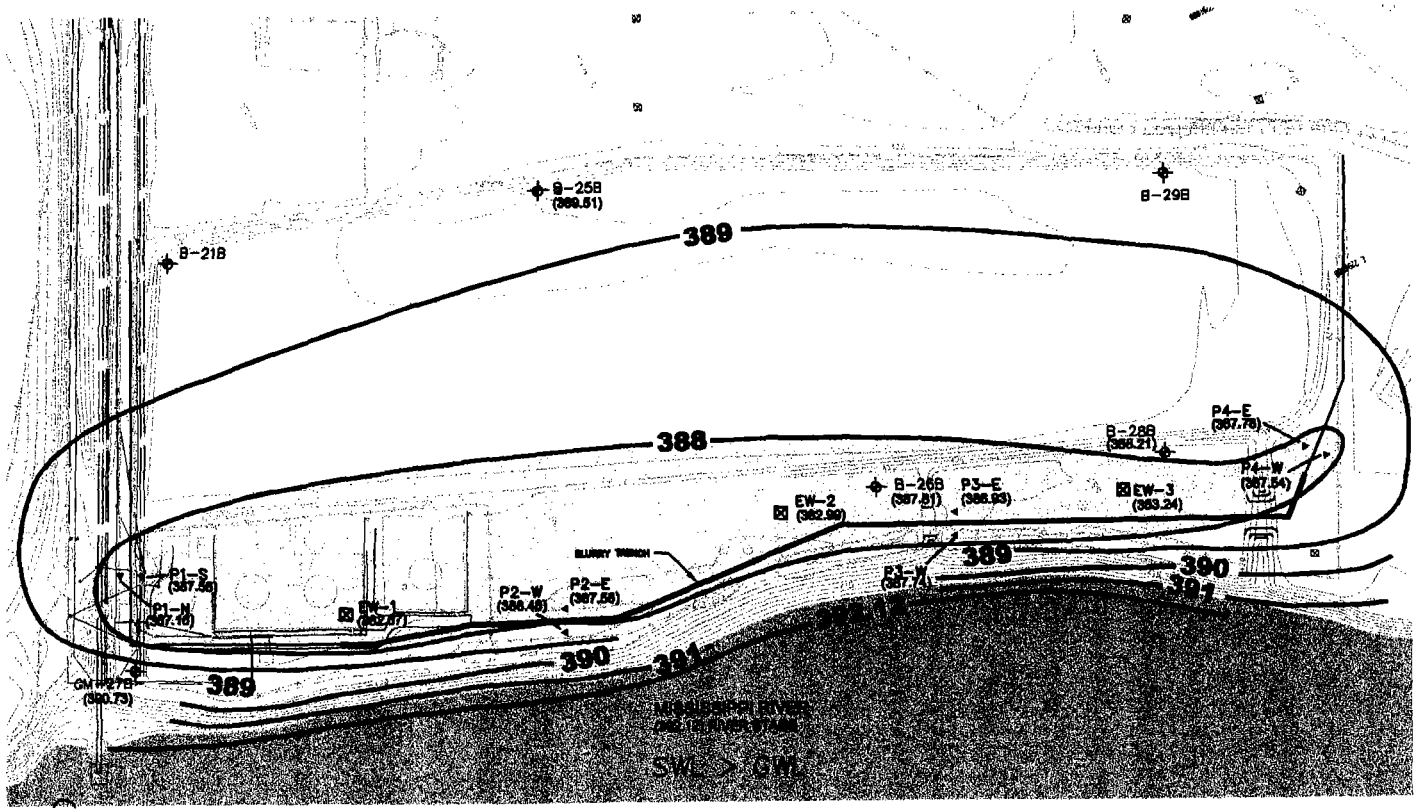
Groundwater Elevation
March 20, 2004

PROJECT NO.

FIG. NO.
30



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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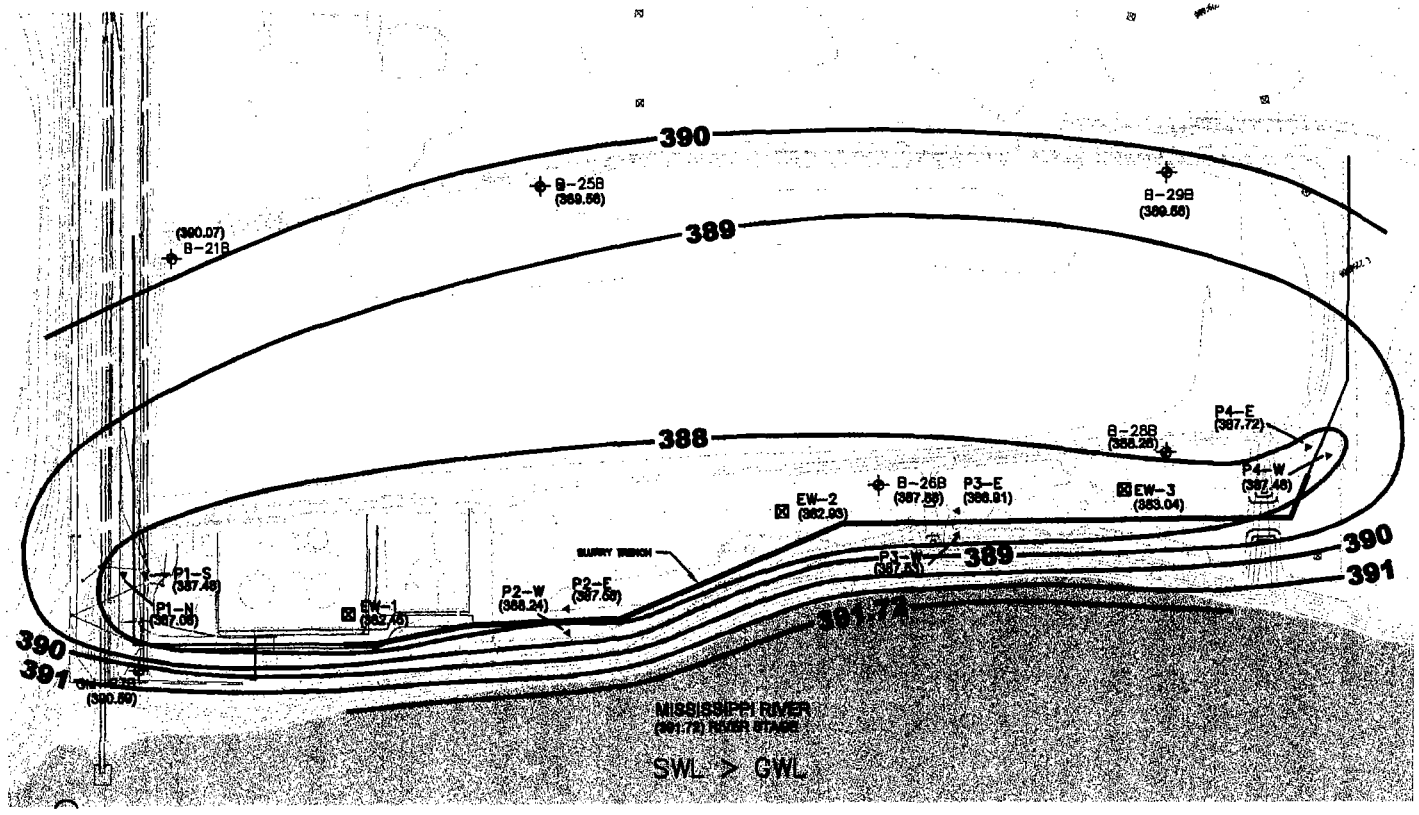
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 21, 2004

PROJECT NO.

FIG. NO.
31



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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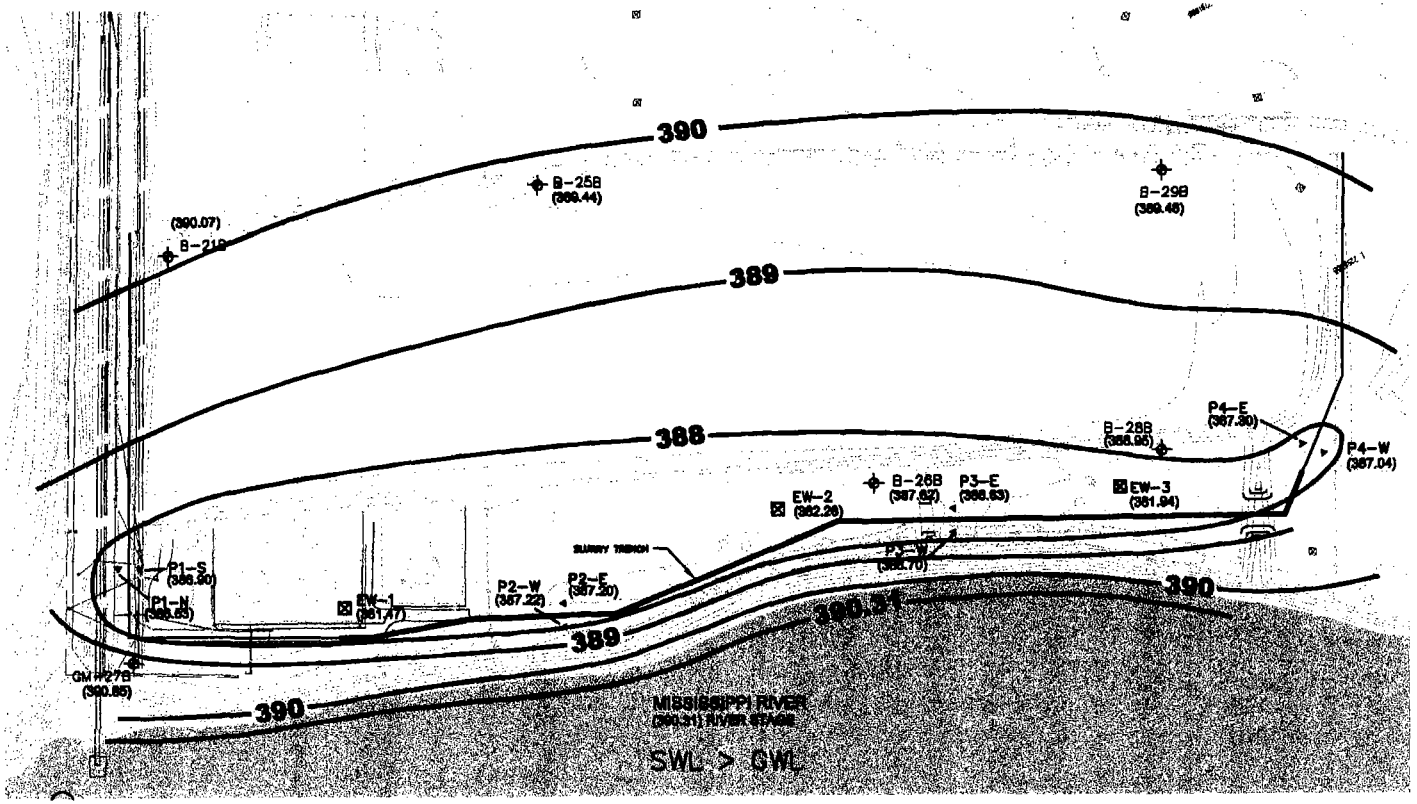
SAUGET, ILLINOIS

Groundwater Elevation
March 22, 2004

PROJECT NO.

FIG. NO.
32



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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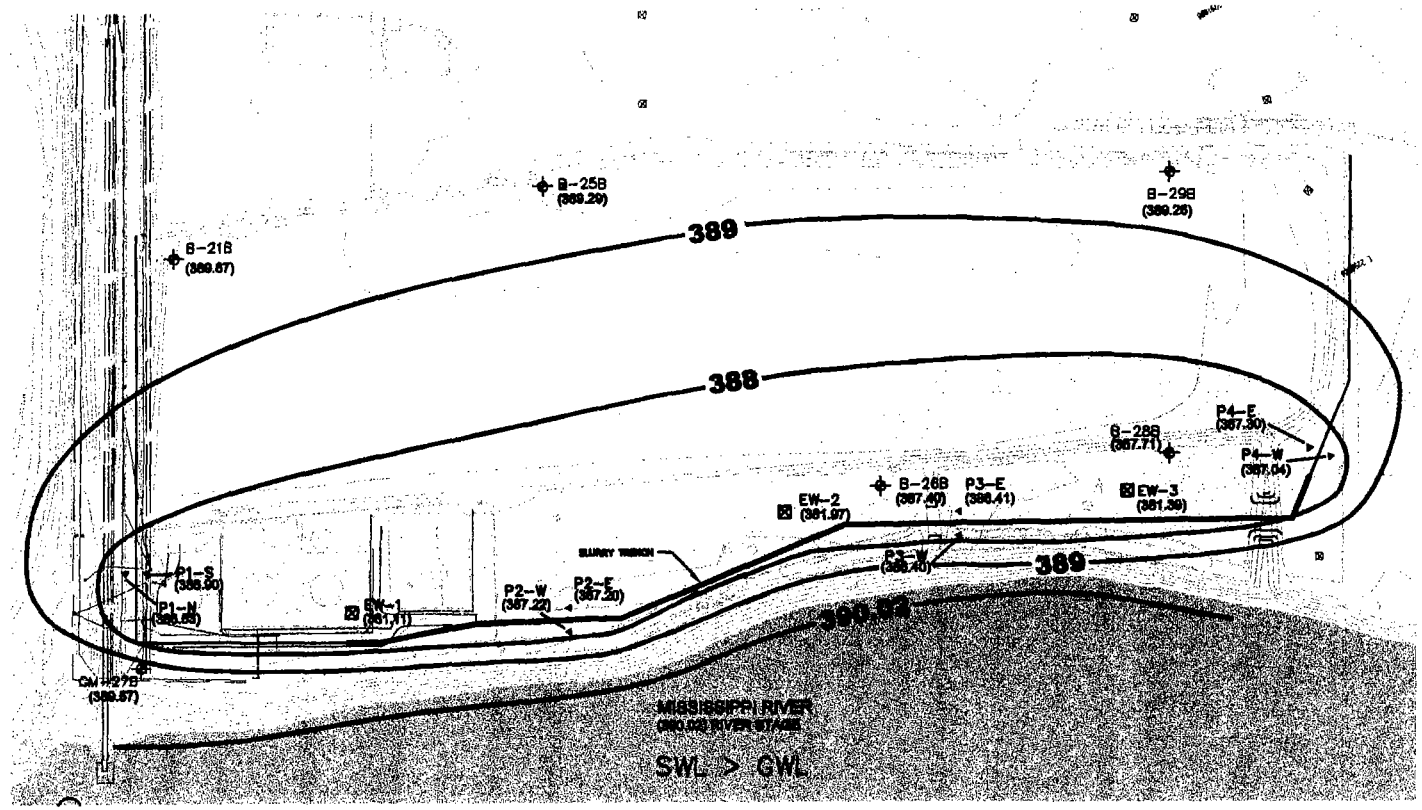
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 23, 2004

PROJECT NO.

FIG. NO.
33



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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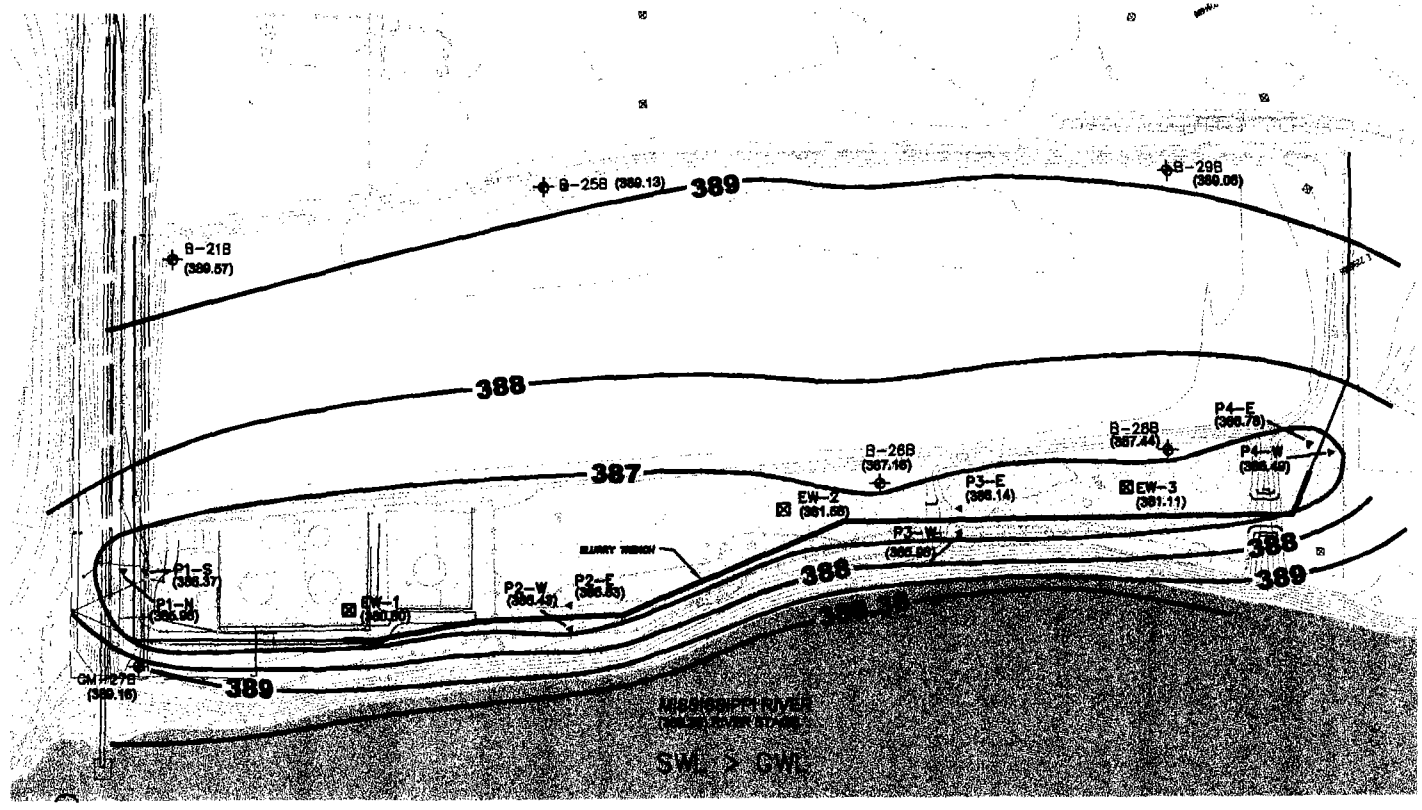
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 24, 2004

PROJECT NO.

FIG. NO.
34



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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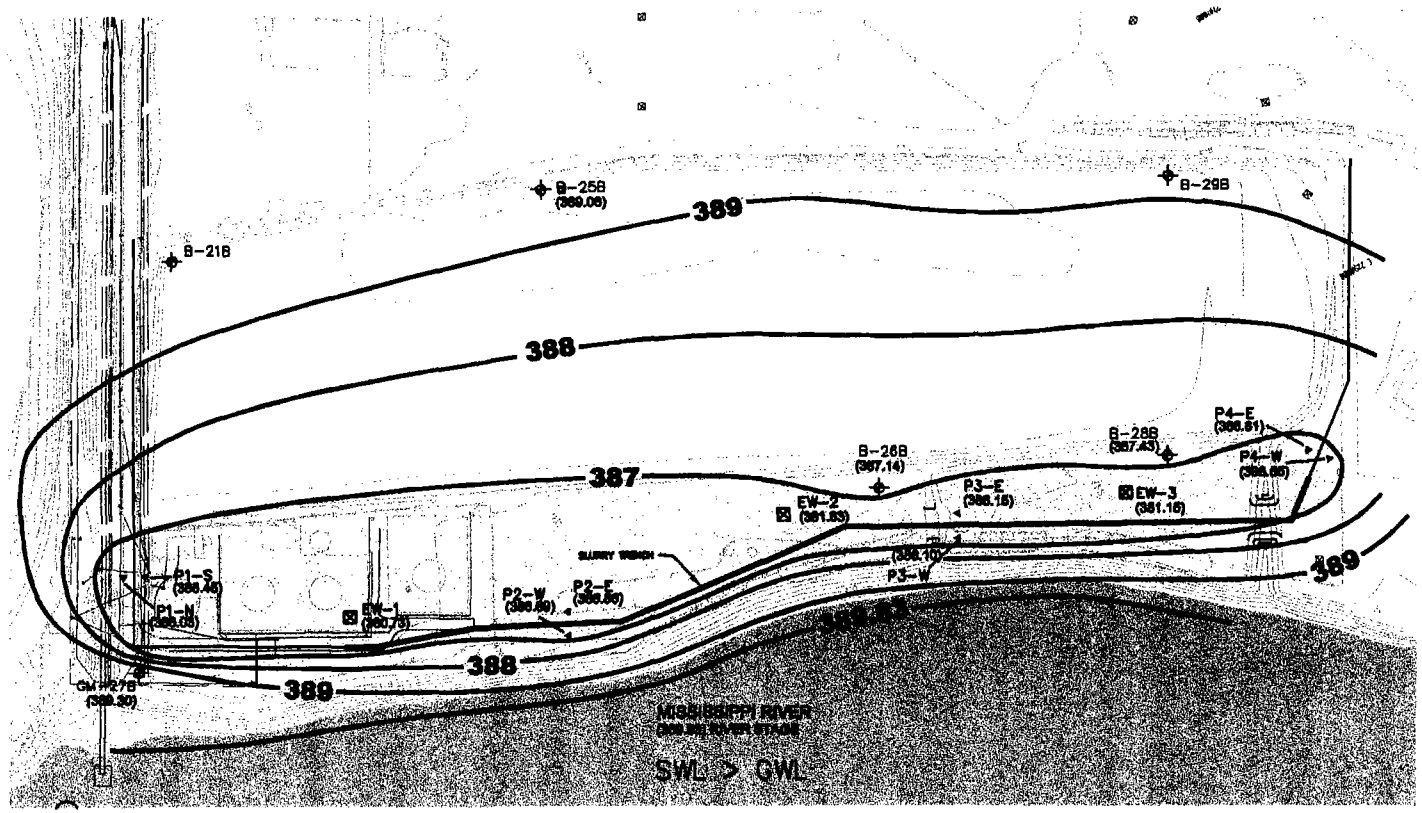
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 25, 2004

PROJECT NO.

FIG. NO.
35



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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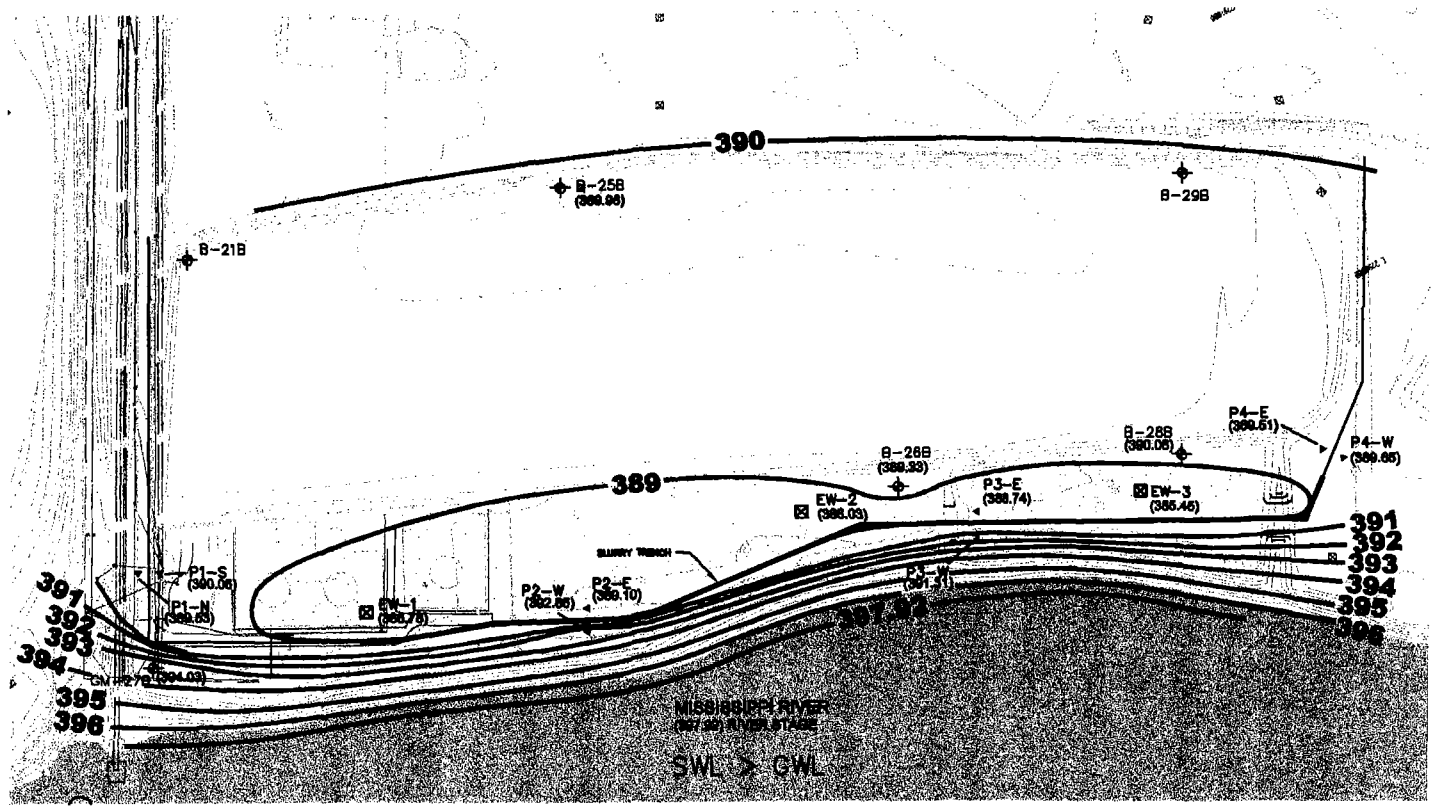
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 26, 2004

PROJECT NO.

FIG. NO.
36



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

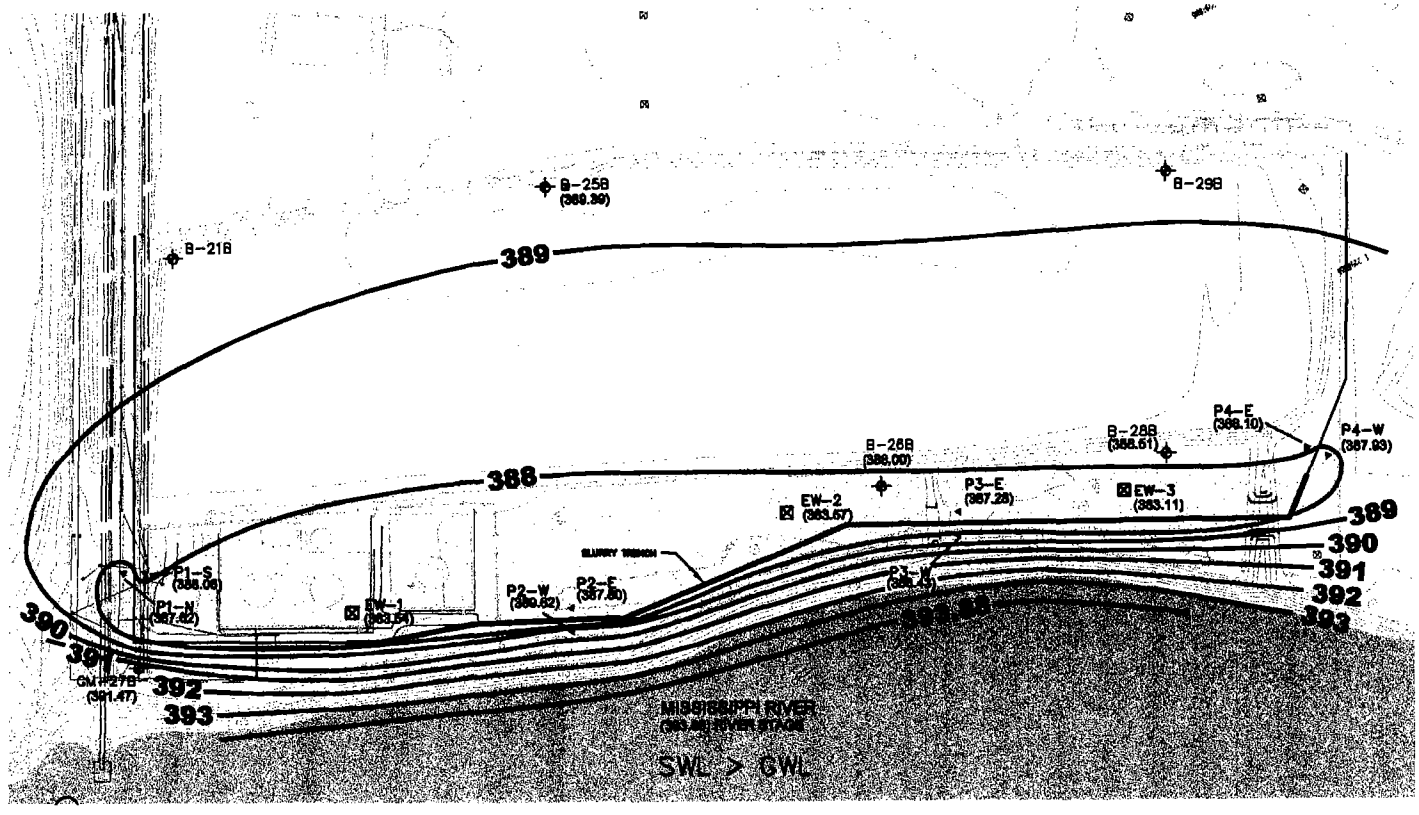
SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

Solutia™ Applied Chemistry, Creative Solutions	SOLUTIA INC. 575 MARYVILLE CENTRE DRIVE ST. LOUIS, MO. 63141	GROUNDWATER MIGRATION CONTROL SYSTEM SITE-R SAUGET, ILLINOIS	PROJECT NO.
		Groundwater Elevation March 28, 2004	FIG. NO. 38



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

SOLUTIA INC.
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ST. LOUIS, MO. 63141

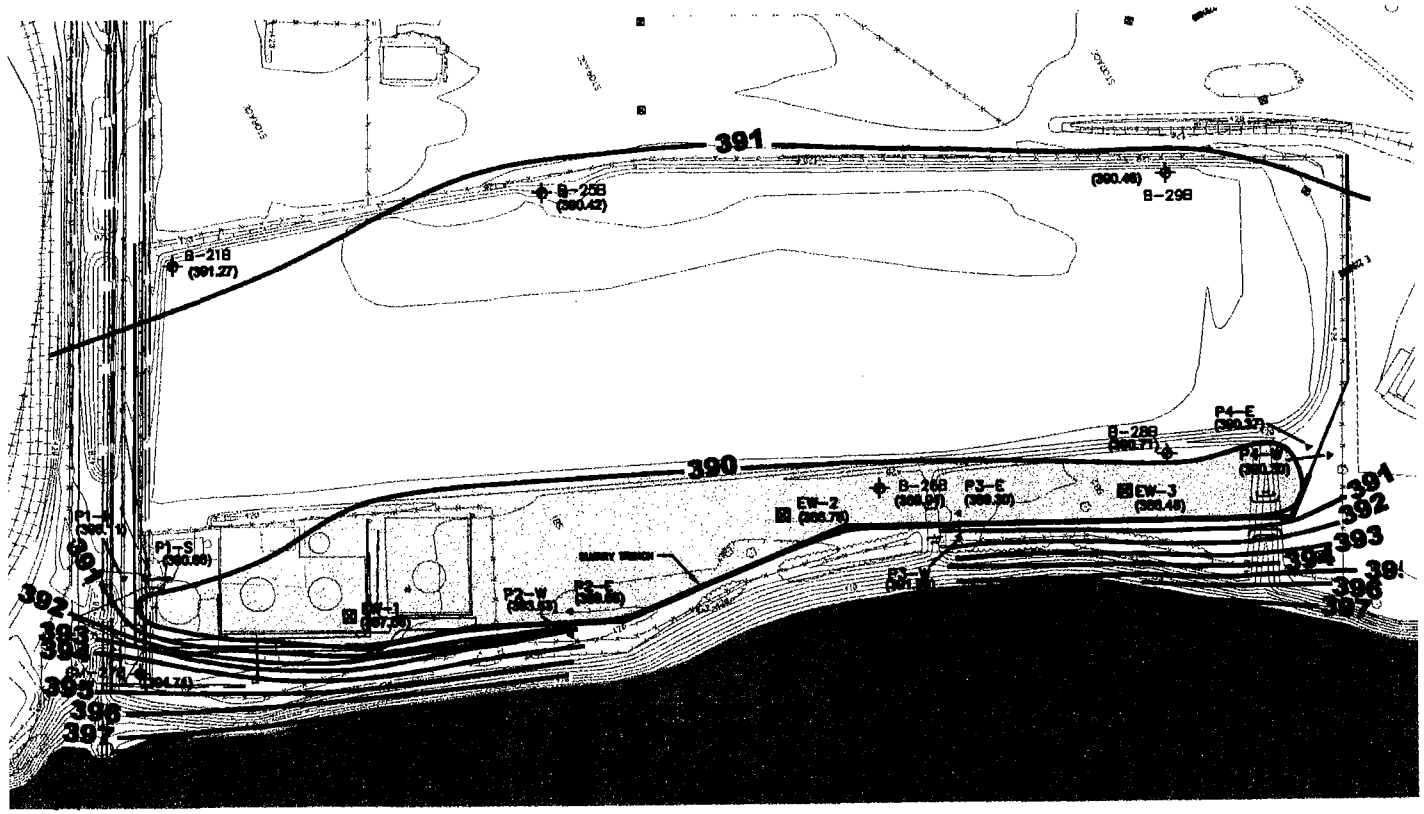
Applied Chemistry, Creative Solutions

GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 27, 2004

PROJECT NO.

FIG. NO.
37



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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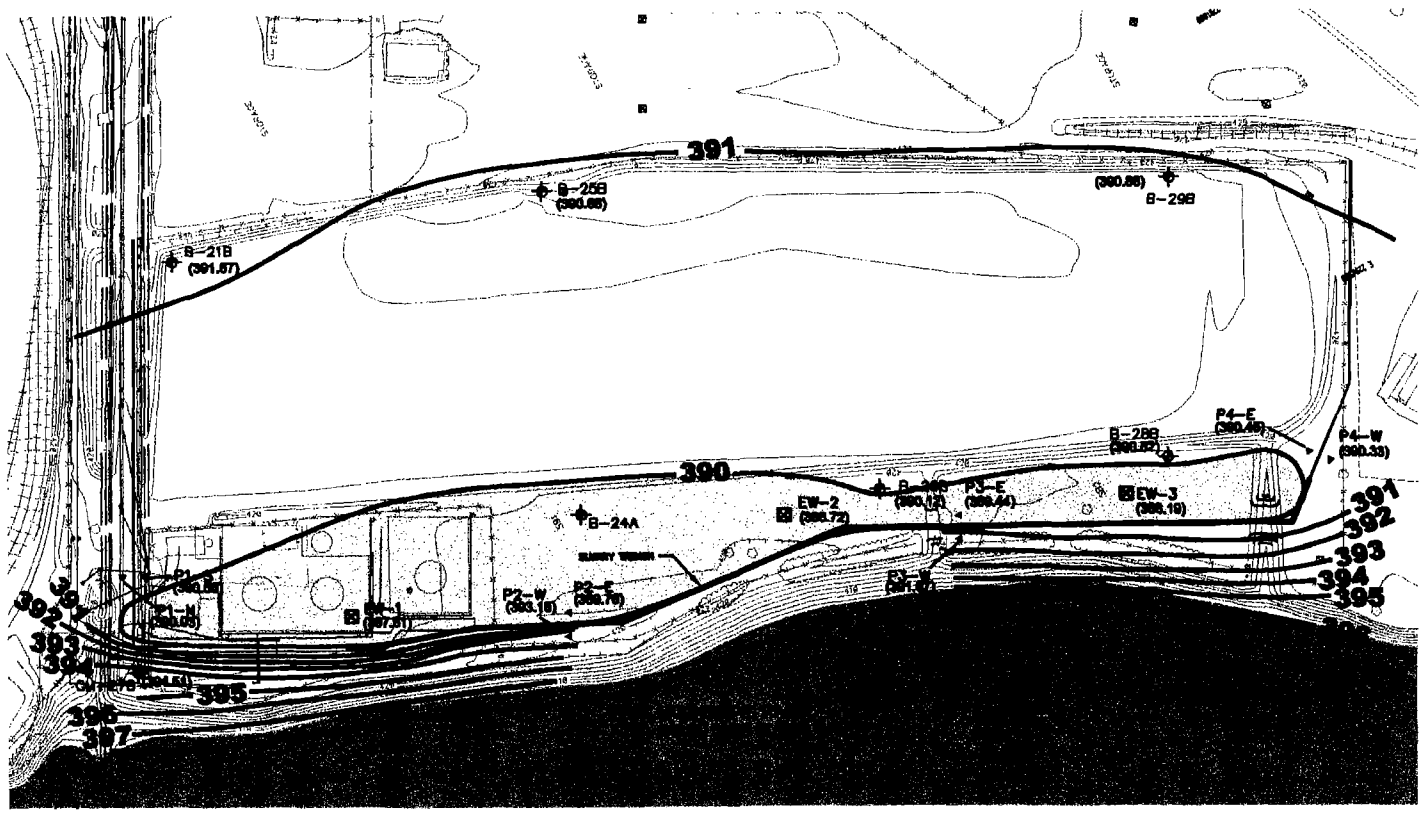
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 29, 2004

PROJECT NO.

FIG. NO.
39



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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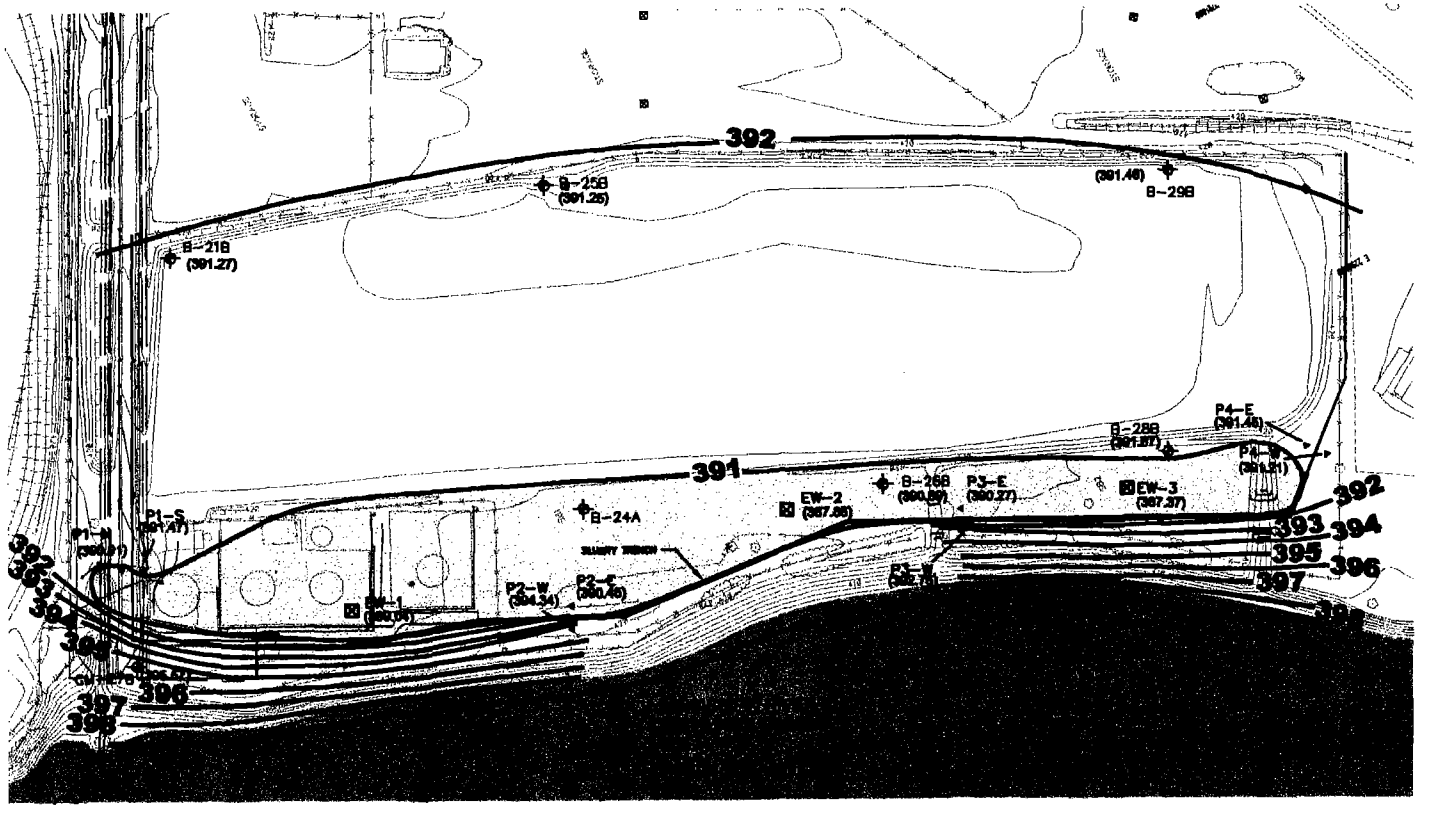
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

PROJECT NO.

Groundwater Elevation
March 30, 2004

FIG. NO.
40



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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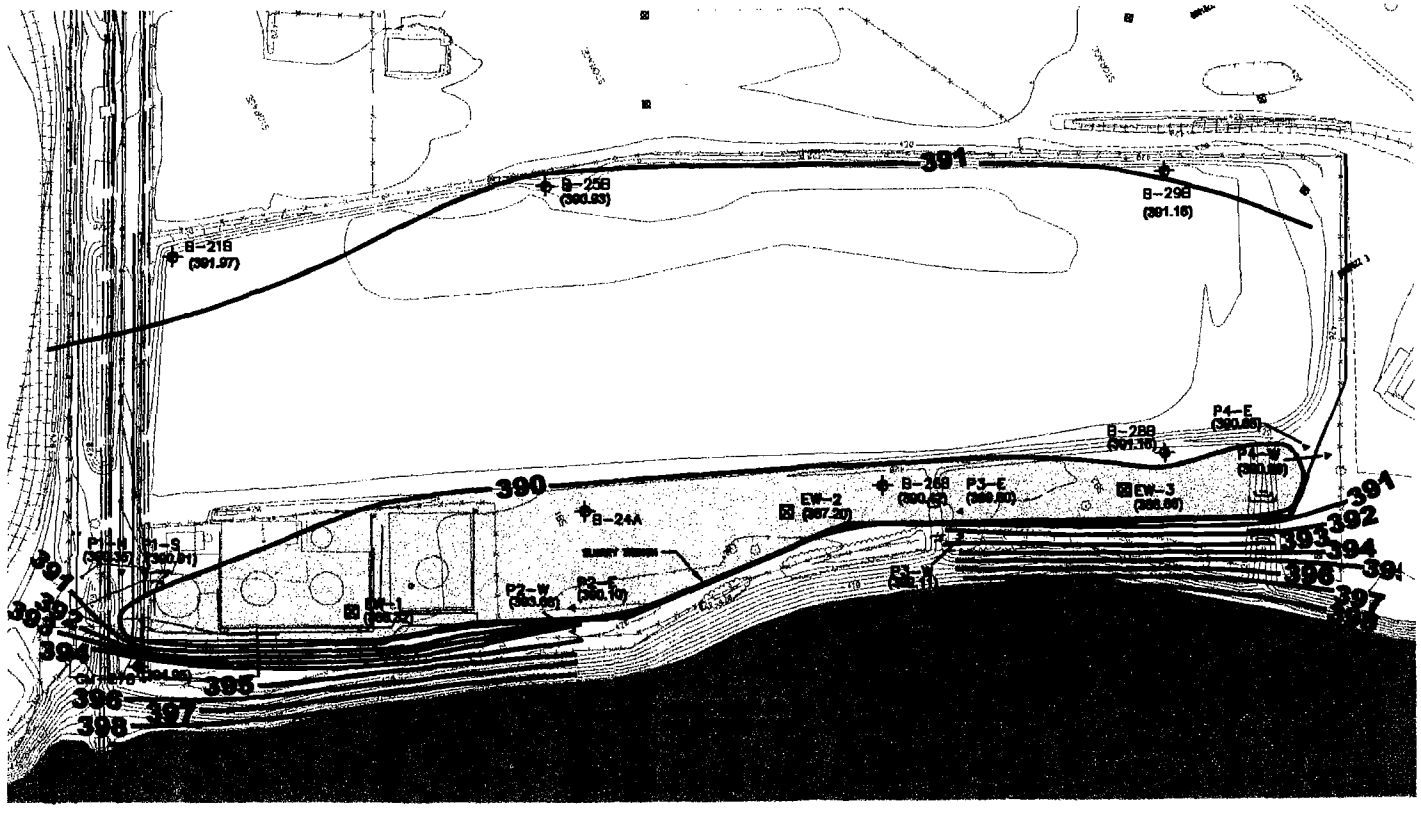
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 01, 2004

PROJECT NO.

FIG. NO.
42



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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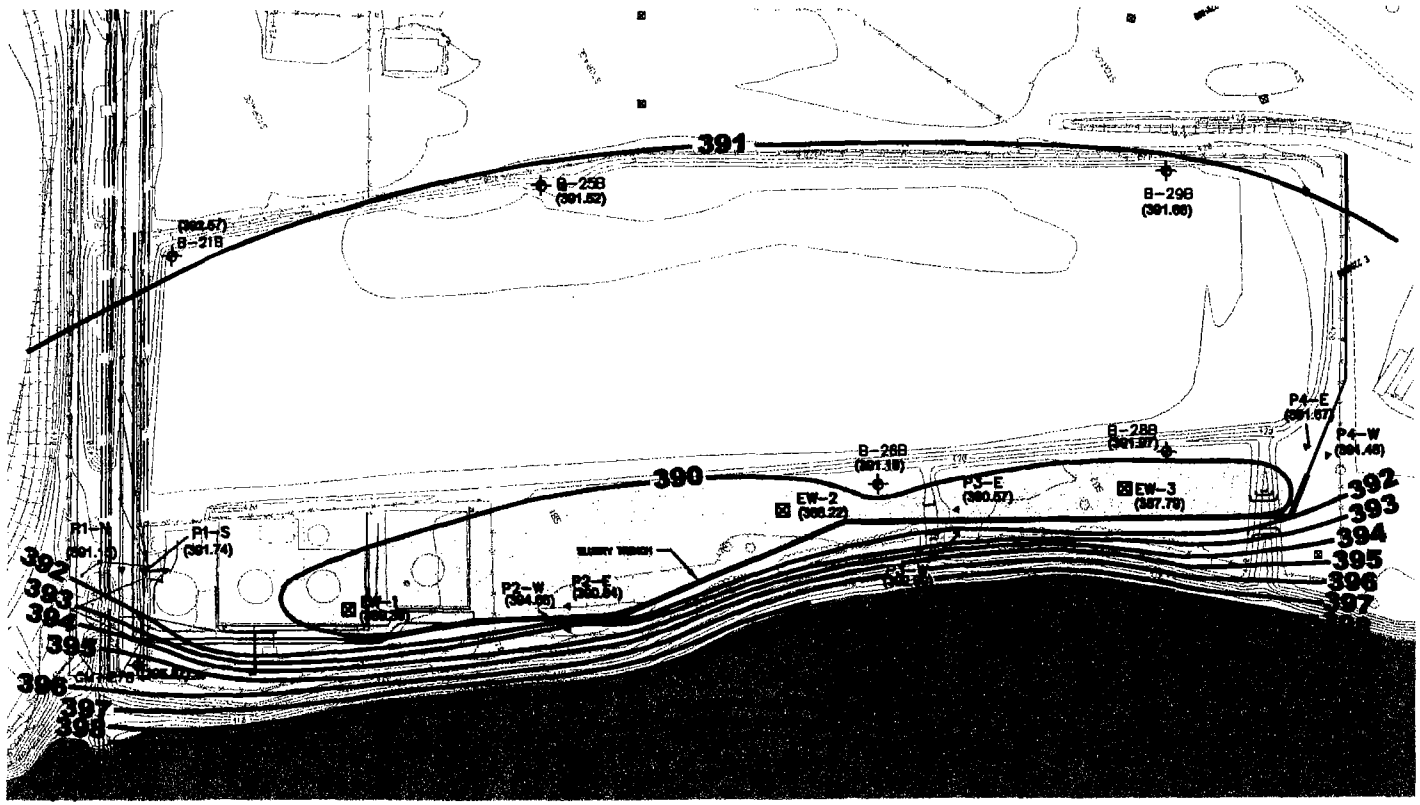
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
March 31, 2004

PROJECT NO.

FIG. NO.
41



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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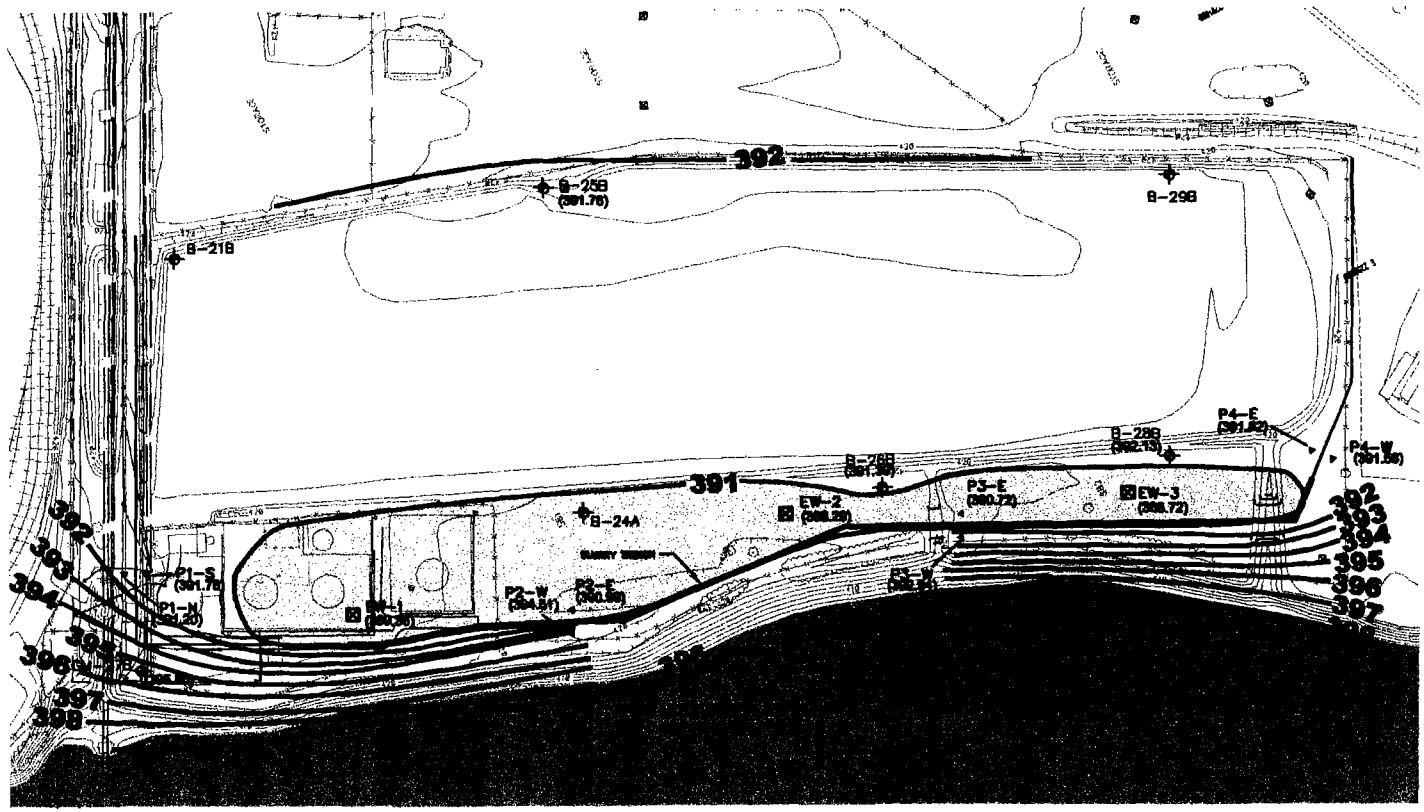
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 02, 2004

PROJECT NO.

FIG. NO.
43



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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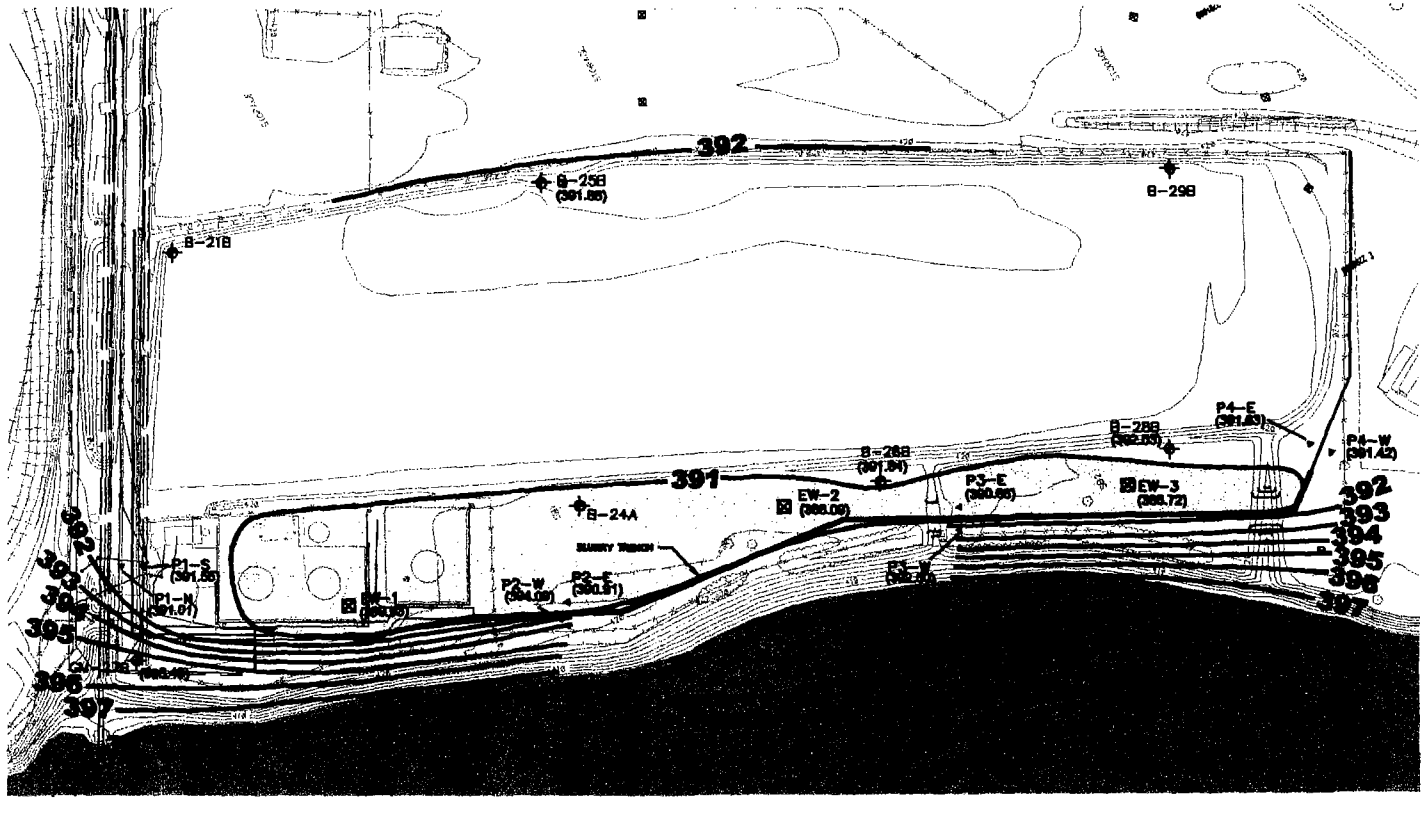
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 03, 2004

PROJECT NO.

FIG. NO.
44



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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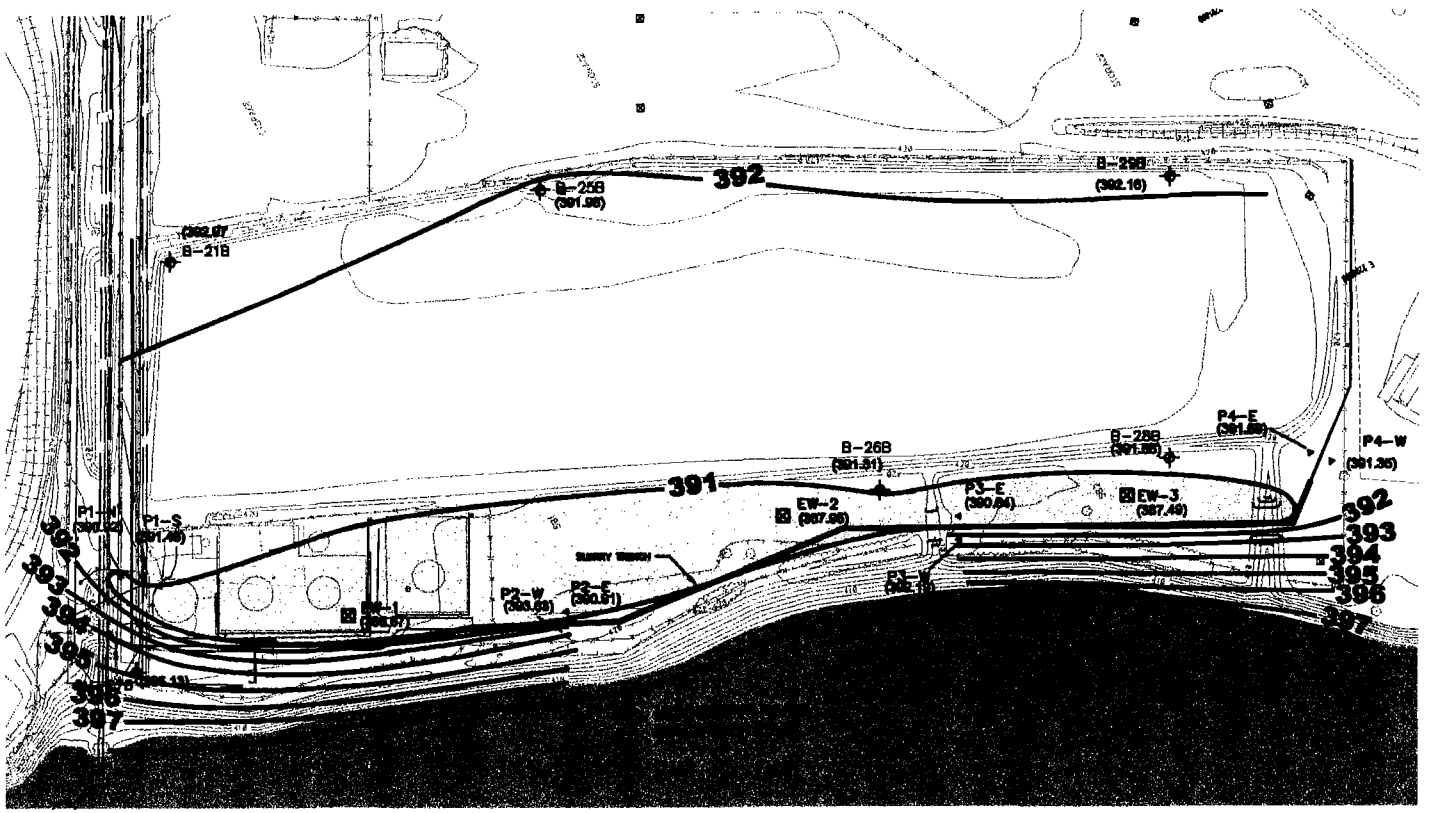
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 04, 2004

PROJECT NO.

FIG. NO.
45



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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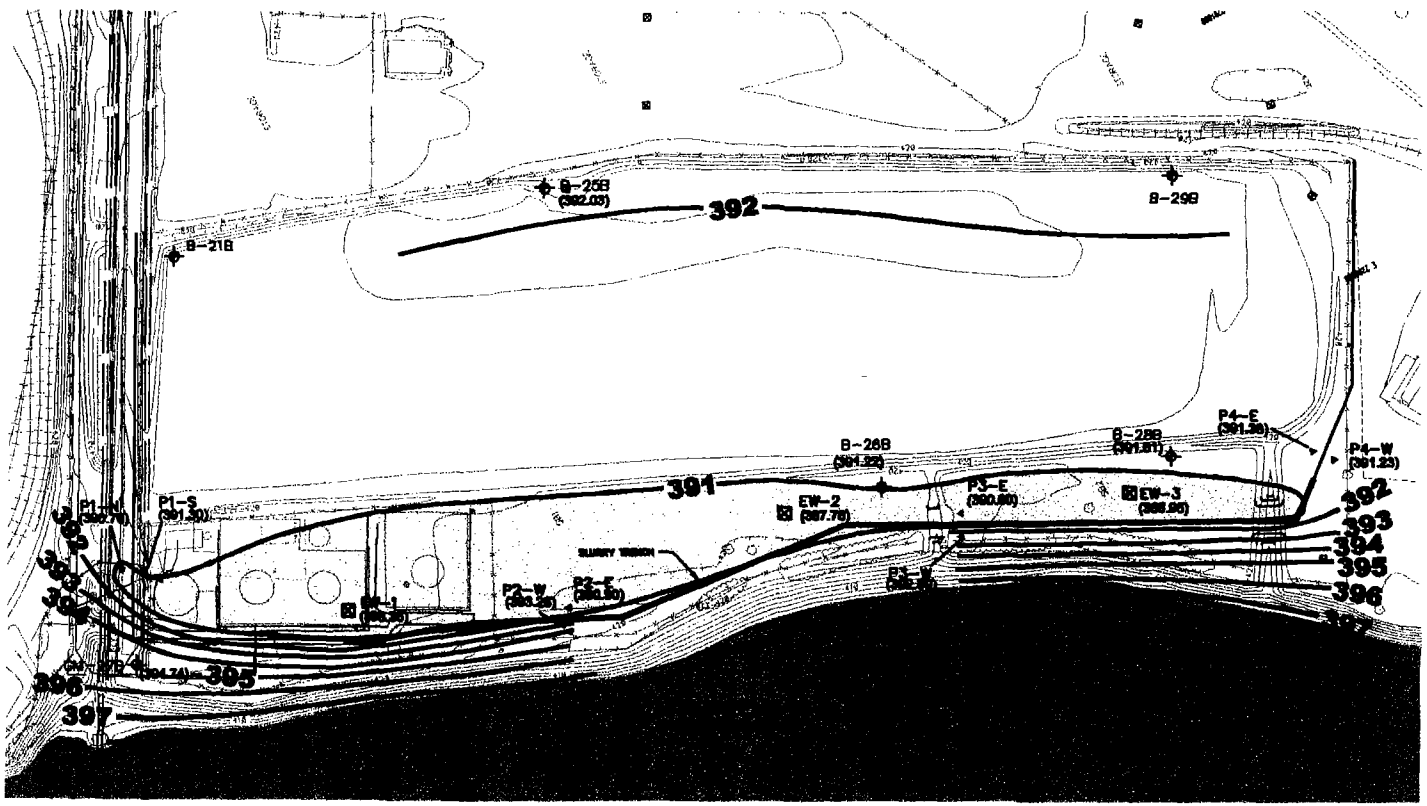
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 05, 2004

PROJECT NO.

FIG. NO.
46



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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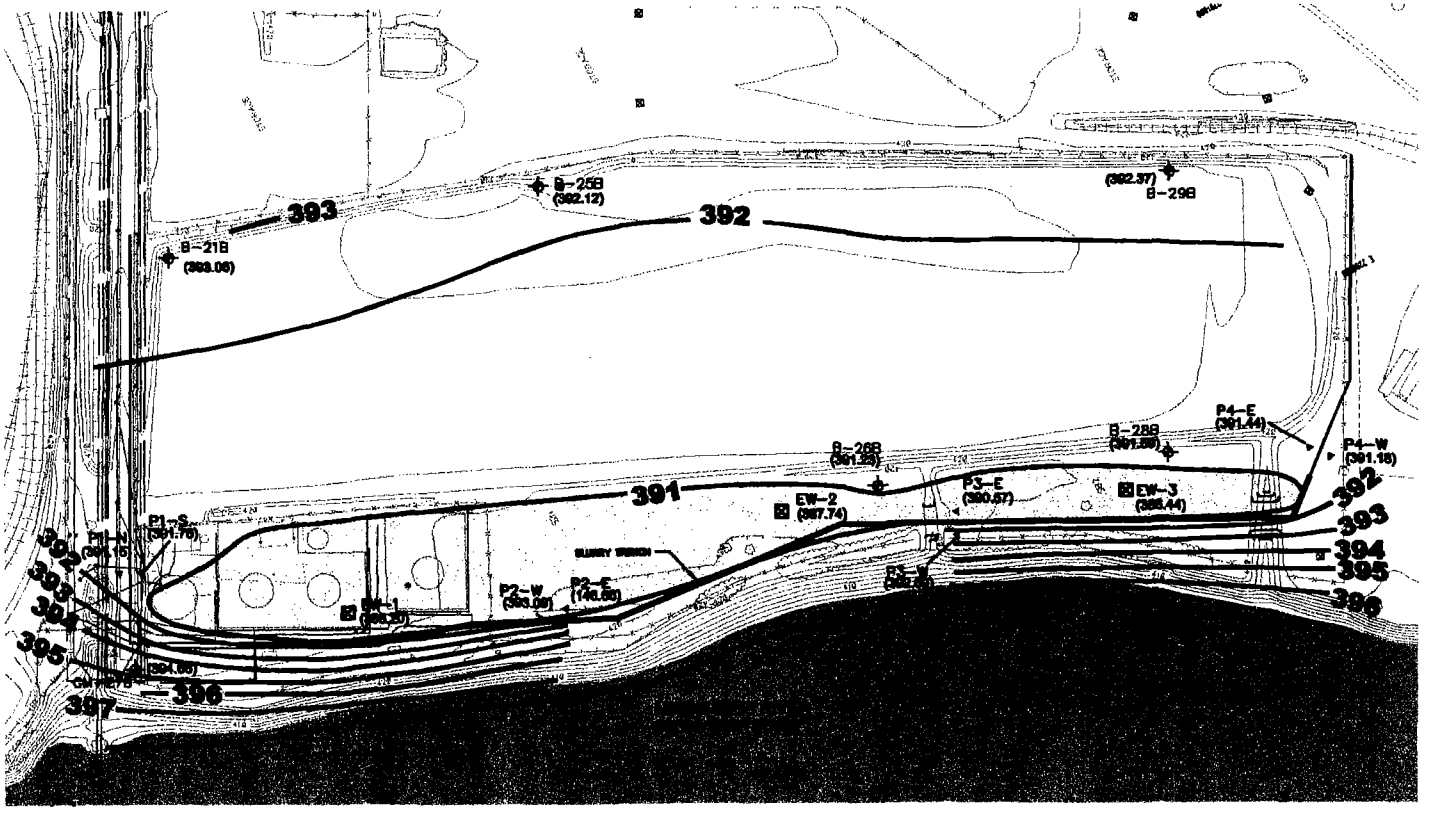
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

PROJECT NO.

Groundwater Elevation
April 06, 2004

FIG. NO.
47



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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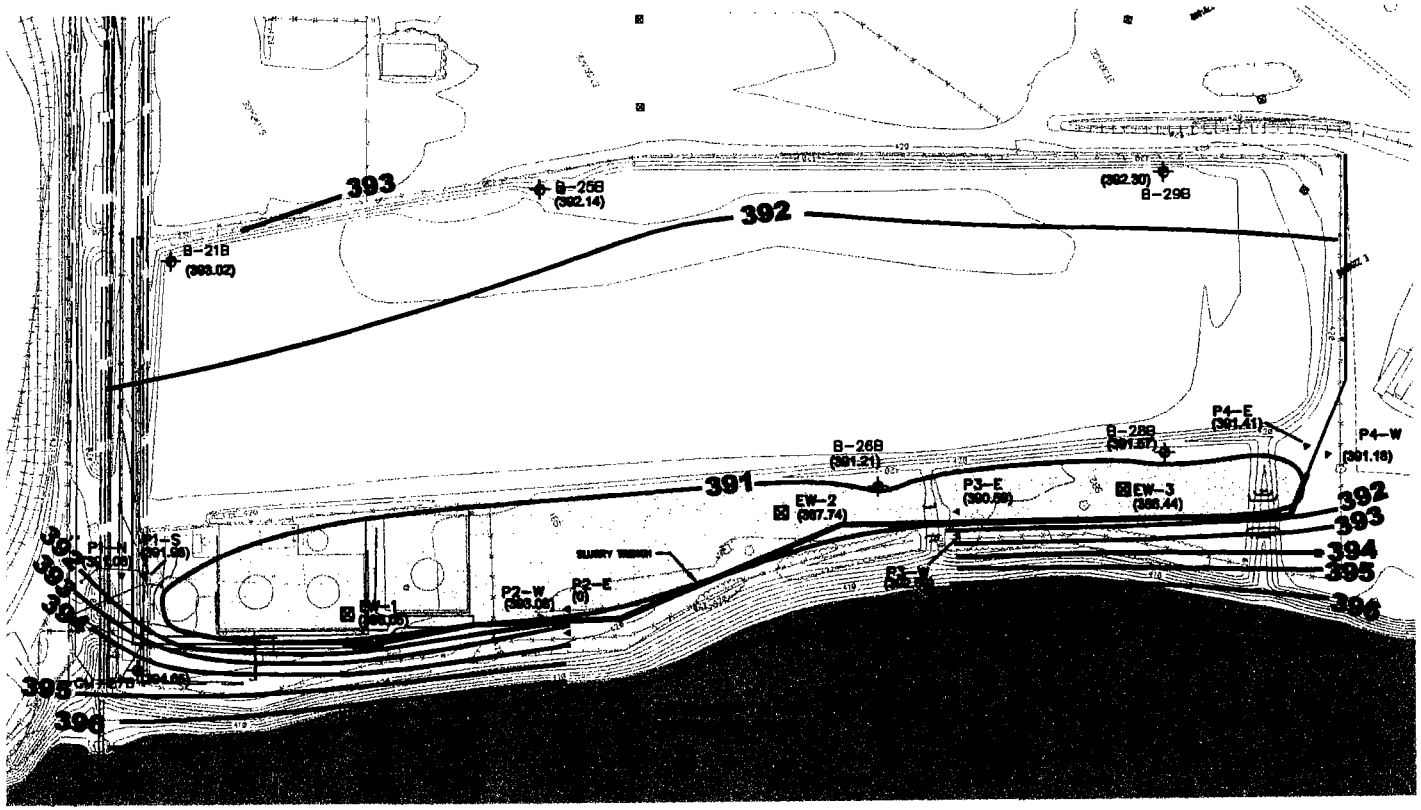
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 07, 2004

PROJECT NO.

FIG. NO.
48



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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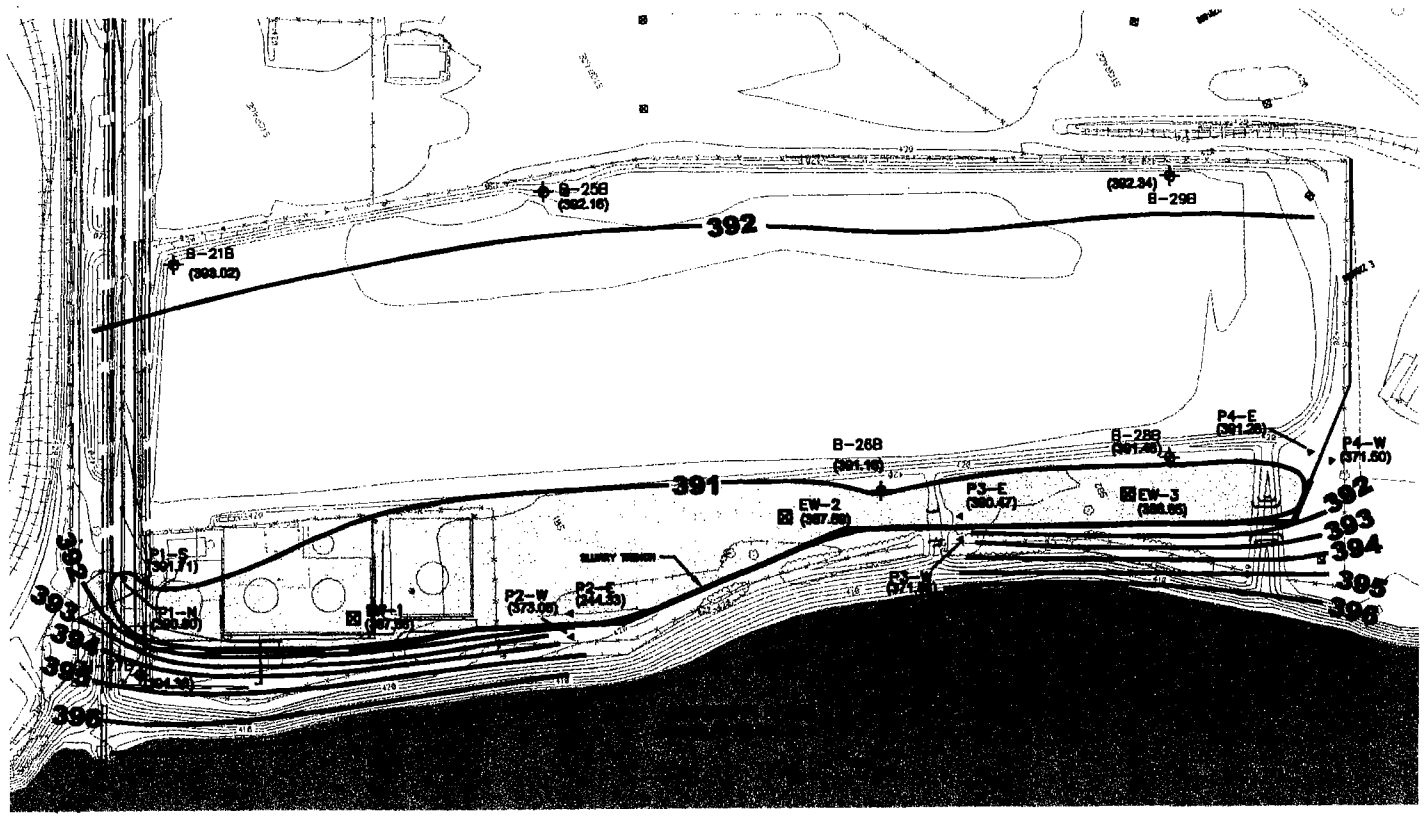
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 08, 2004

PROJECT NO.

FIG. NO.
49



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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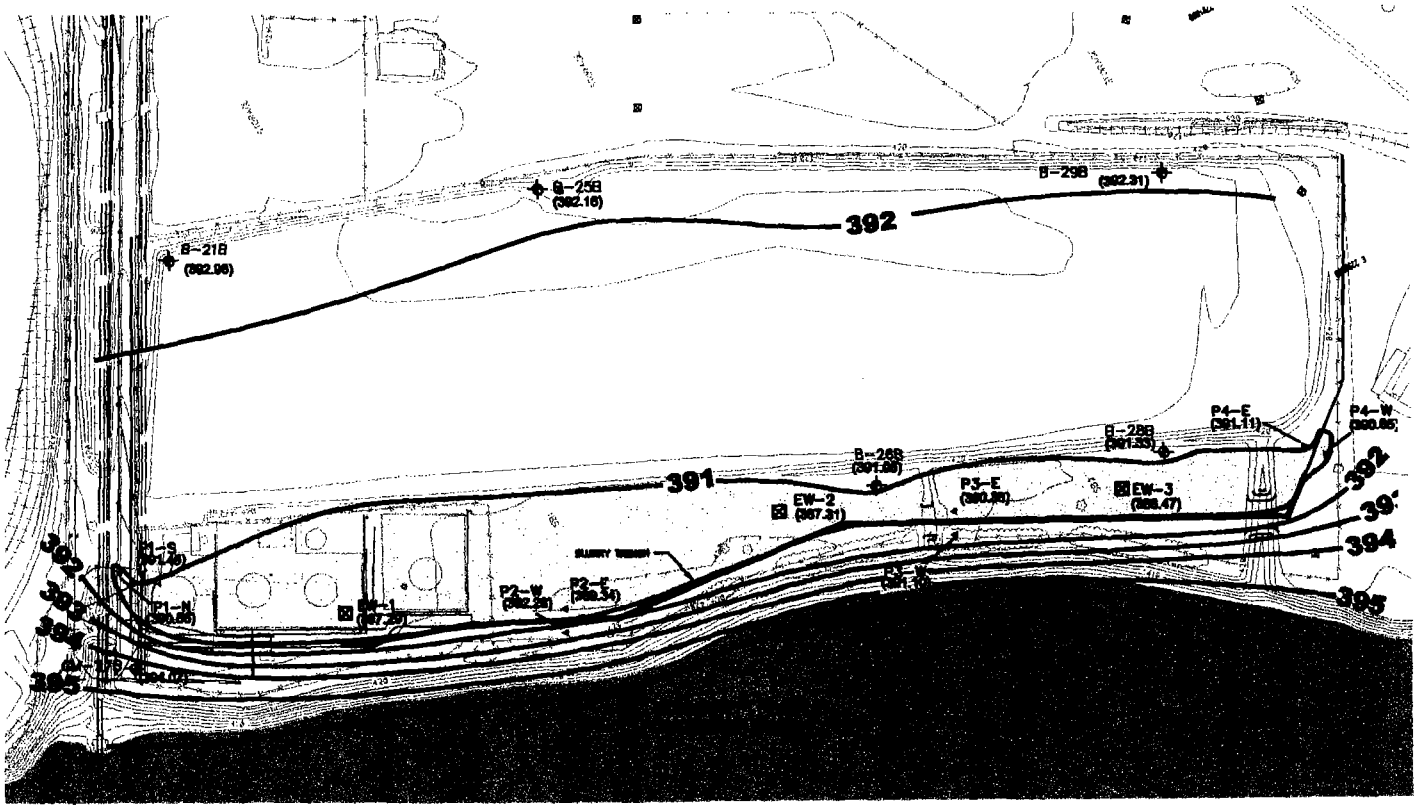
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 09, 2004

PROJECT NO.

FIG. NO.
50



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200
SCALE FEET

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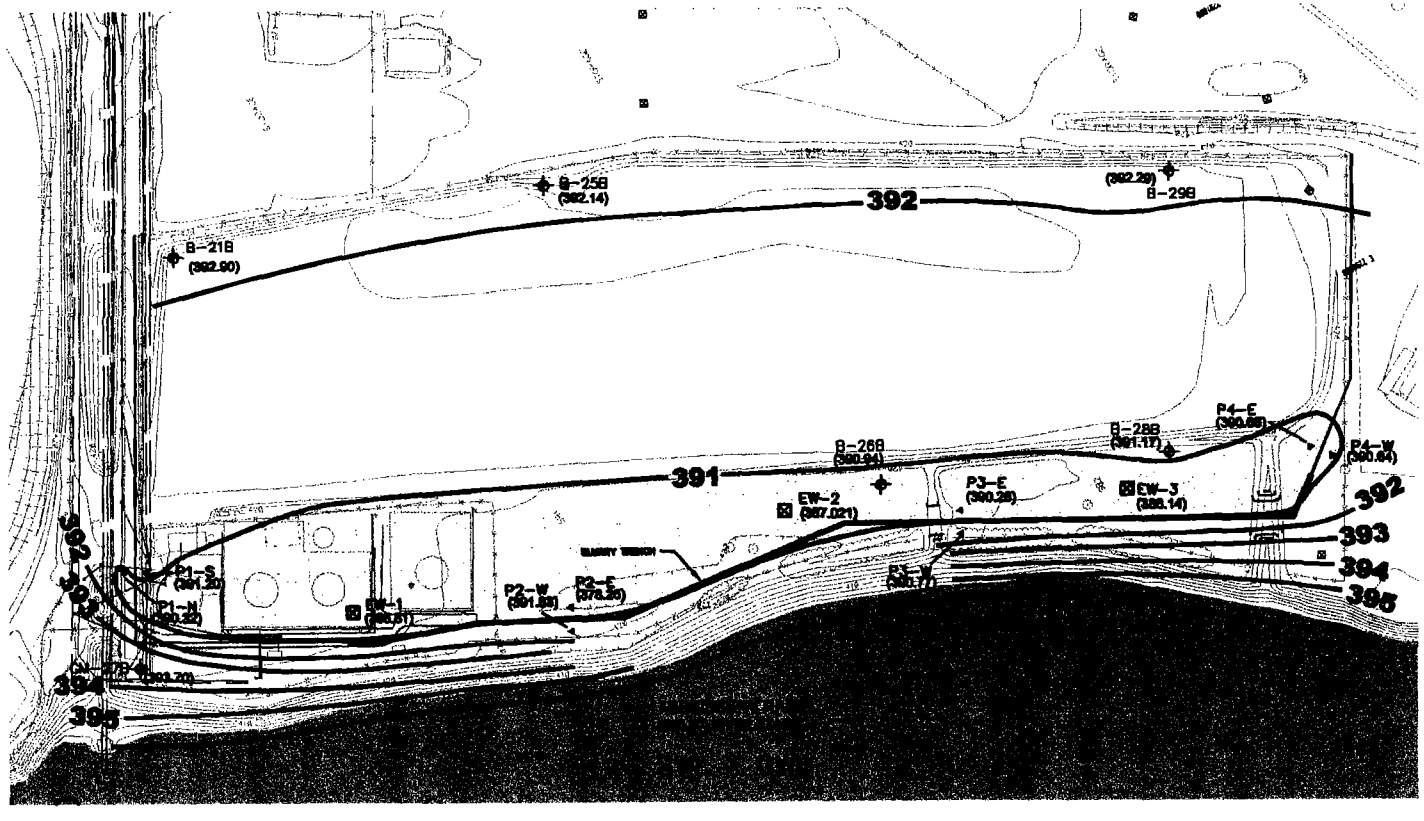
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 10, 2004

PROJECT NO.

FIG. NO.
51



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

SWL > GWL

GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
April 11, 2004

PROJECT NO.

FIG. NO.
52

LINE OF EVIDENCE 5

GROUNDWATER LEVEL > PUMPING WATER LEVEL

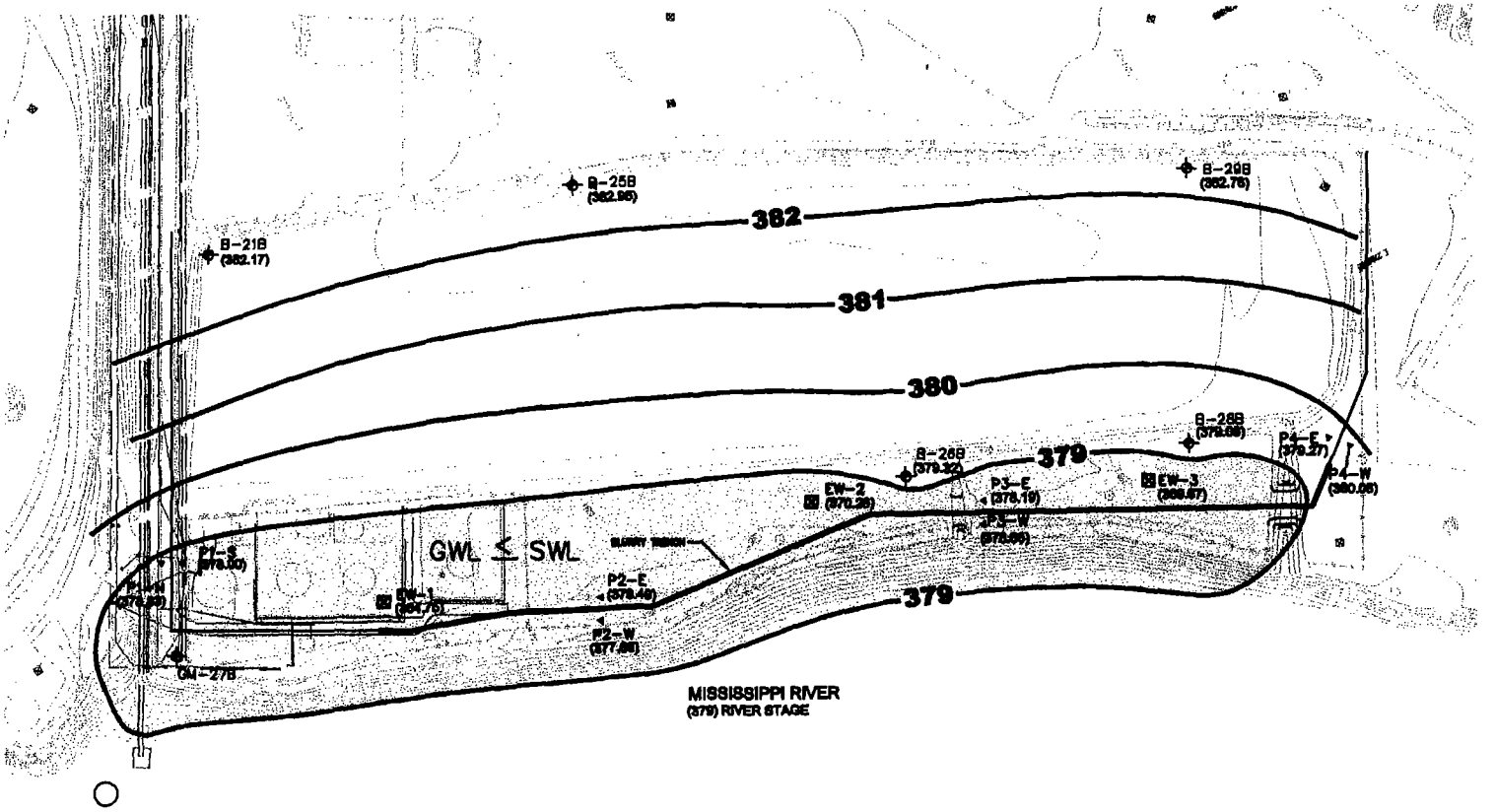
HYDRAULIC TROUGH ALONG RIVER

FEBRUARY to APRIL 2004

LINE OF EVIDENCE 5

Groundwater Levels Greater Than Pumping Water Levels
Hydraulic Trough along River
February 1, 2004 to April 11, 2004

Day	Days with Groundwater Control		
	February 2004	March 2004	April 2004
1	•	•	•
2	•	•	•
3	•	•	•
4	•	•	•
5	•	•	•
6	•	•	•
7	•	•	•
8	•	•	•
9	•	•	•
10	•	•	•
11	•	•	•
12	•	•	
13	•	•	
14	•	•	
15	•	•	
16	•	•	
17	•	•	
18	•	•	
19	•	•	
20	•	•	
21	•	•	
22	•	•	
23	•	•	
24	•	•	
25	•	•	
26	•	•	
27	•	•	
28	•	•	
29	•	•	
30	•	•	
31		•	



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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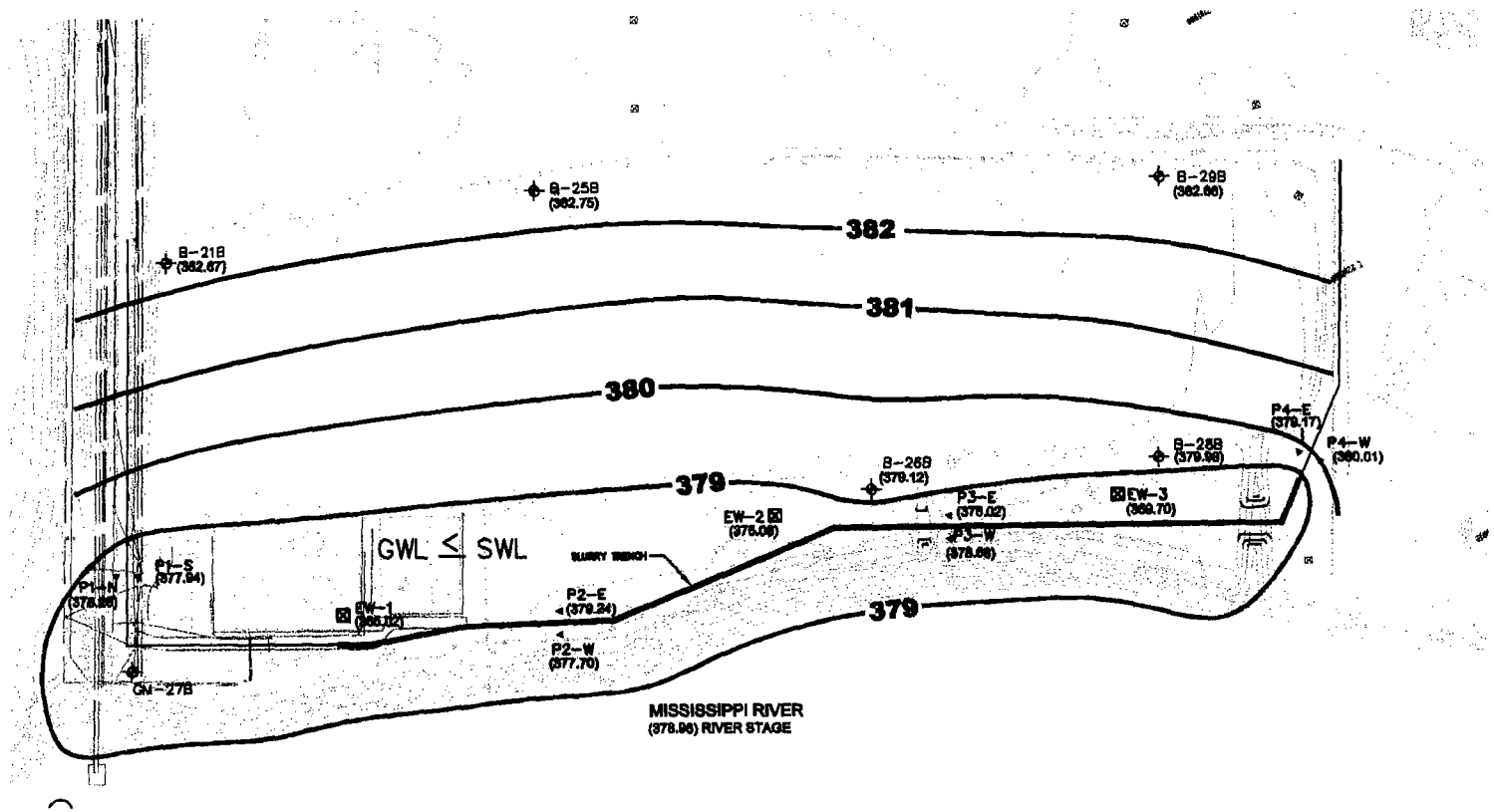
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
February 12, 2004

PROJECT NO.

FIG. NO.
2



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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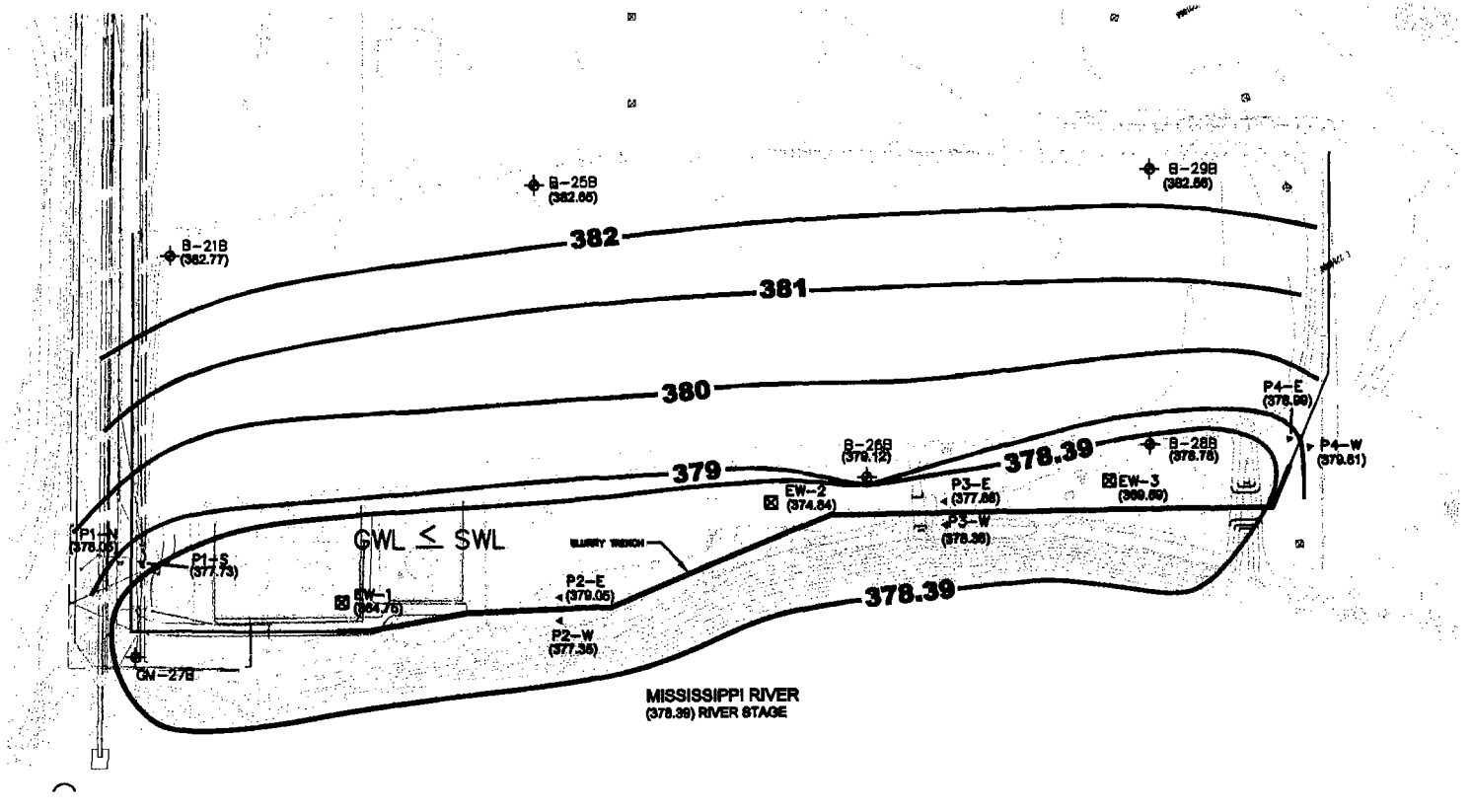
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
February 16, 2004

PROJECT NO.

FIG. NO.
3



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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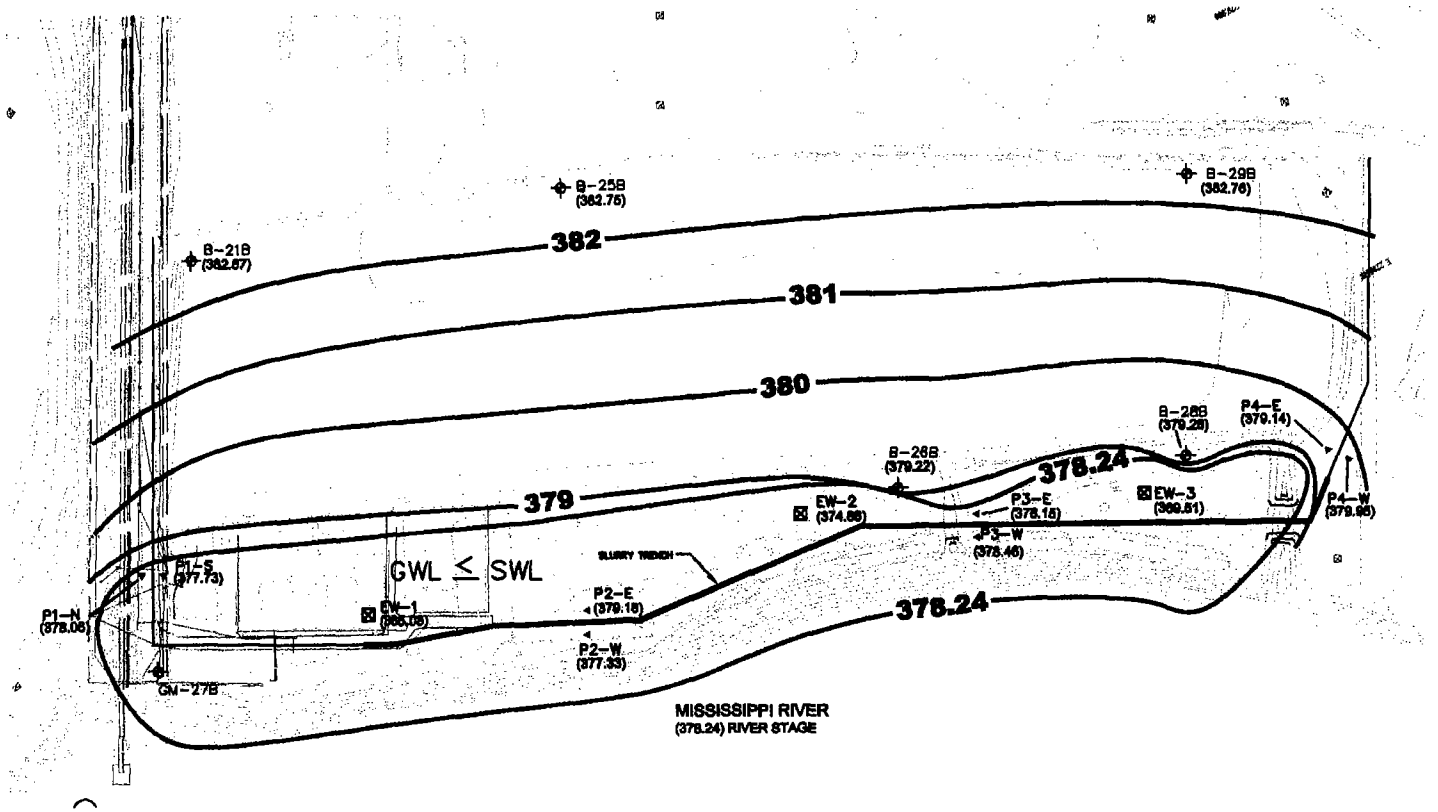
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
February 17, 2004

PROJECT NO.

FIG. NO.
4



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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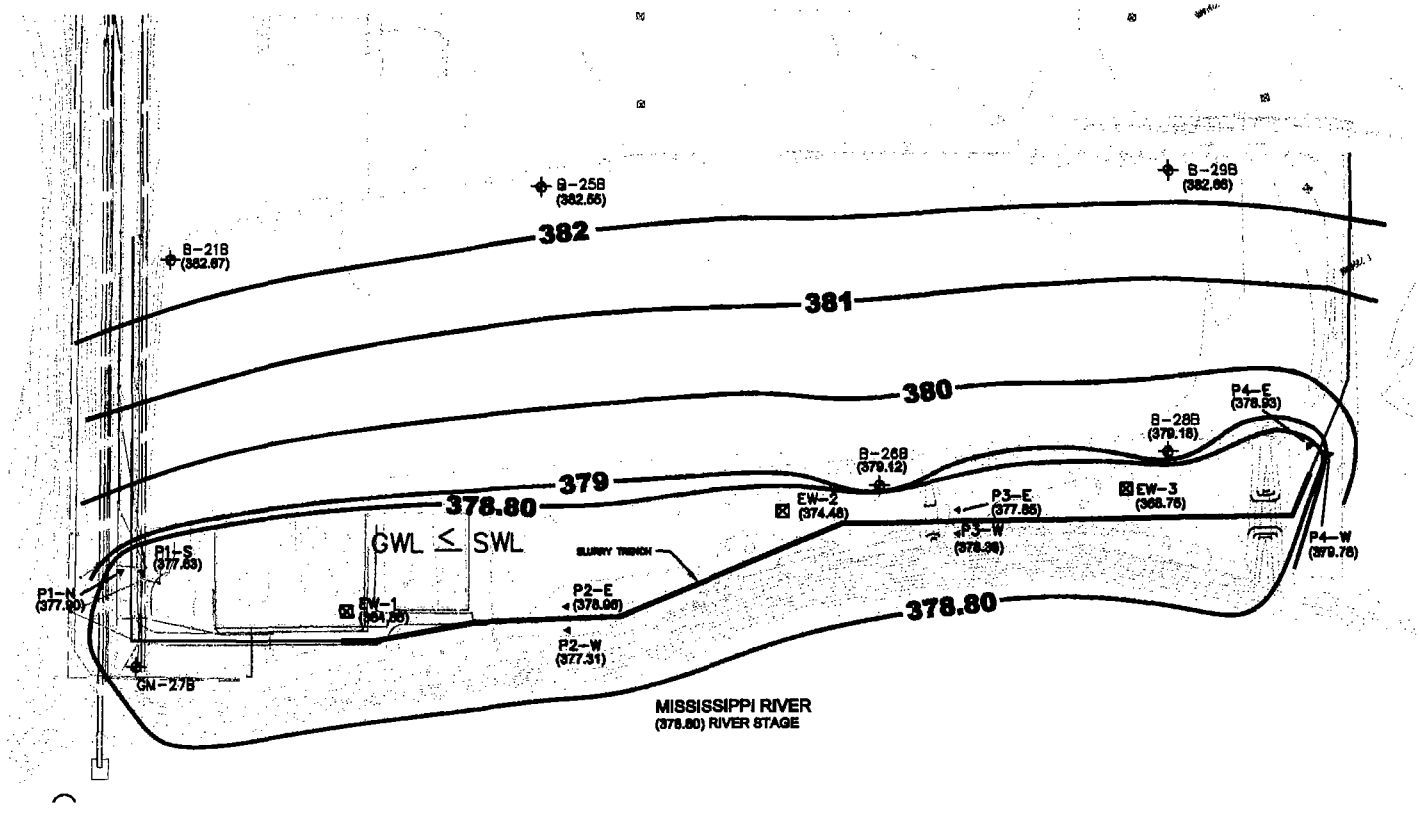
GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
SAUGET, ILLINOIS

Groundwater Elevation
February 19, 2004

PROJECT NO.

FIG. NO.
5



LEGEND

—379— GROUNDWATER CONTOUR LINE (1FT INTERVAL)

(379) GROUNDWATER ELEVATION

COMPLETED SLURRY TRENCH

TRENCH WALL ALIGNMENT

HYDRAULIC TROUGH

GWL ≤ SWL GWL = GROUNDWATER LEVEL, SWL = SURFACE WATER LEVEL

0 200

SCALE FEET

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GROUNDWATER MIGRATION CONTROL SYSTEM
SITE-R
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Groundwater Elevation
February 20, 2004

PROJECT NO.

FIG. NO.
6

LINE OF EVIDENCE 6

SWL > OUTSIDE GWL > INSIDE GWL > PWL

(SWL > PZ-2W > PZ-2E > EW-1)

GRADIENT FROM RIVER TO PUMPING WELLS

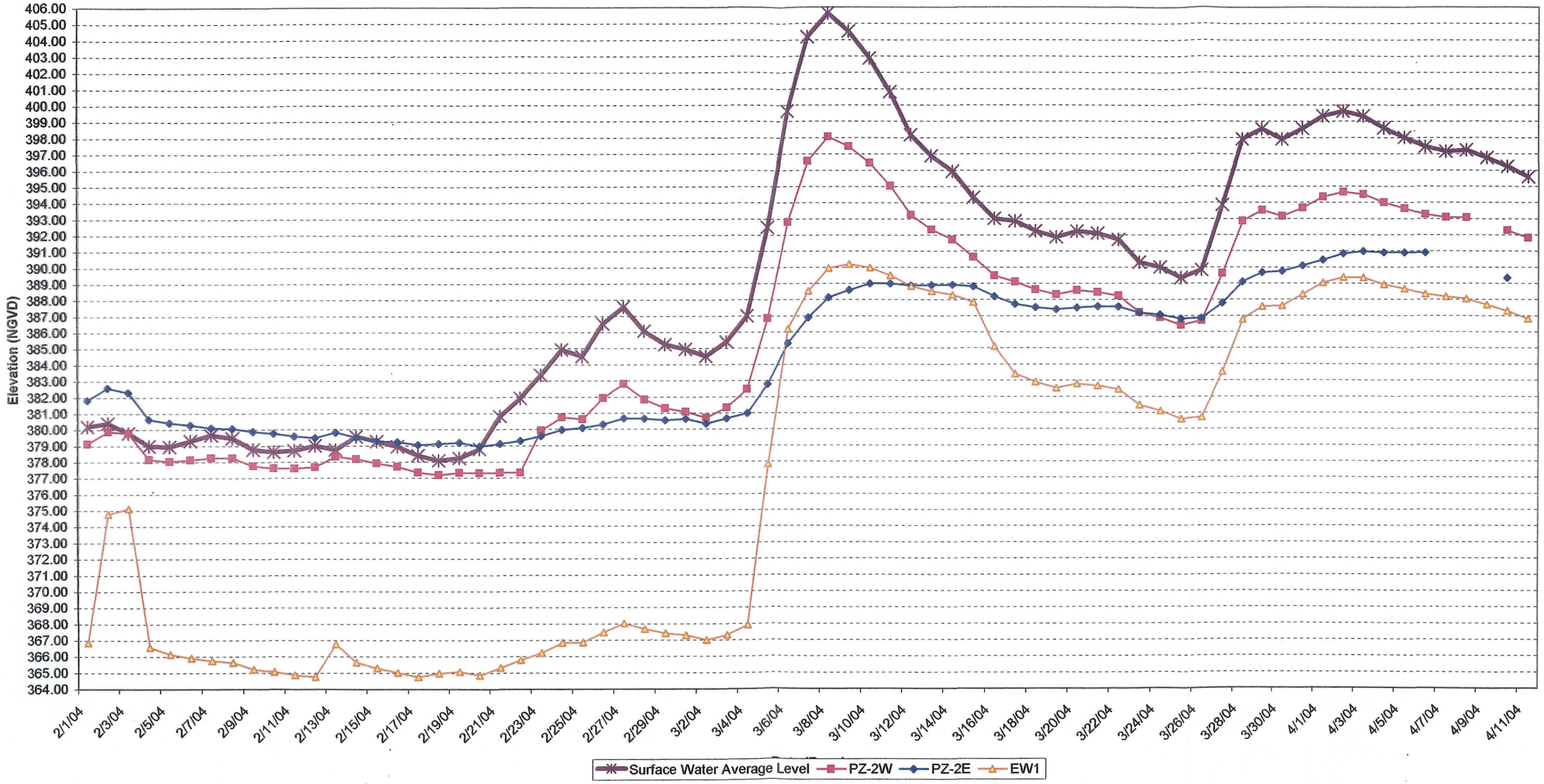
FEBRUARY to APRIL 2004

LINE OF EVIDENCE 6

Surface Water Levels > Outside Groundwater Levels (PZ-2W) > Inside Groundwater Levels (PZ-2E) > Pumping Water Levels (EW-1)
Gradient from River to Pumping Wells February 1 to April 11, 2004

Day	Days with Groundwater Control		
	February 2004	March 2004	April 2004004
1		•	•
2		•	•
3		•	•
4		•	•
5		•	•
6			•
7			•
8			•
9			•
10			•
11			•
12			
13		•	
14		•	
15		•	
16		•	
17		•	
18		•	
19		•	
20		•	
21		•	
22		•	
23	•	•	
24	•		
25	•		
26	•		
27	•	•	
28	•	•	
29	•	•	
30		•	
31		•	

Physical Control
Sauget Area 2 Groundwater Migration Control System
Line of Evidence 6
Surface Water Level > Outside (West) Ground Water Level > Inside (East) Ground Water Level > Pumping Water Level
[SWL > Outside GWL > Inside GWL >PWL]



LINE OF EVIDENCE 7

OUTSIDE GROUNDWATER LEVEL > INSIDE GROUNDWATER LEVEL

(PZ-2W > PZ-2E)

GRADIENT ACROSS SLURRY TRENCH/BARRIER WALL

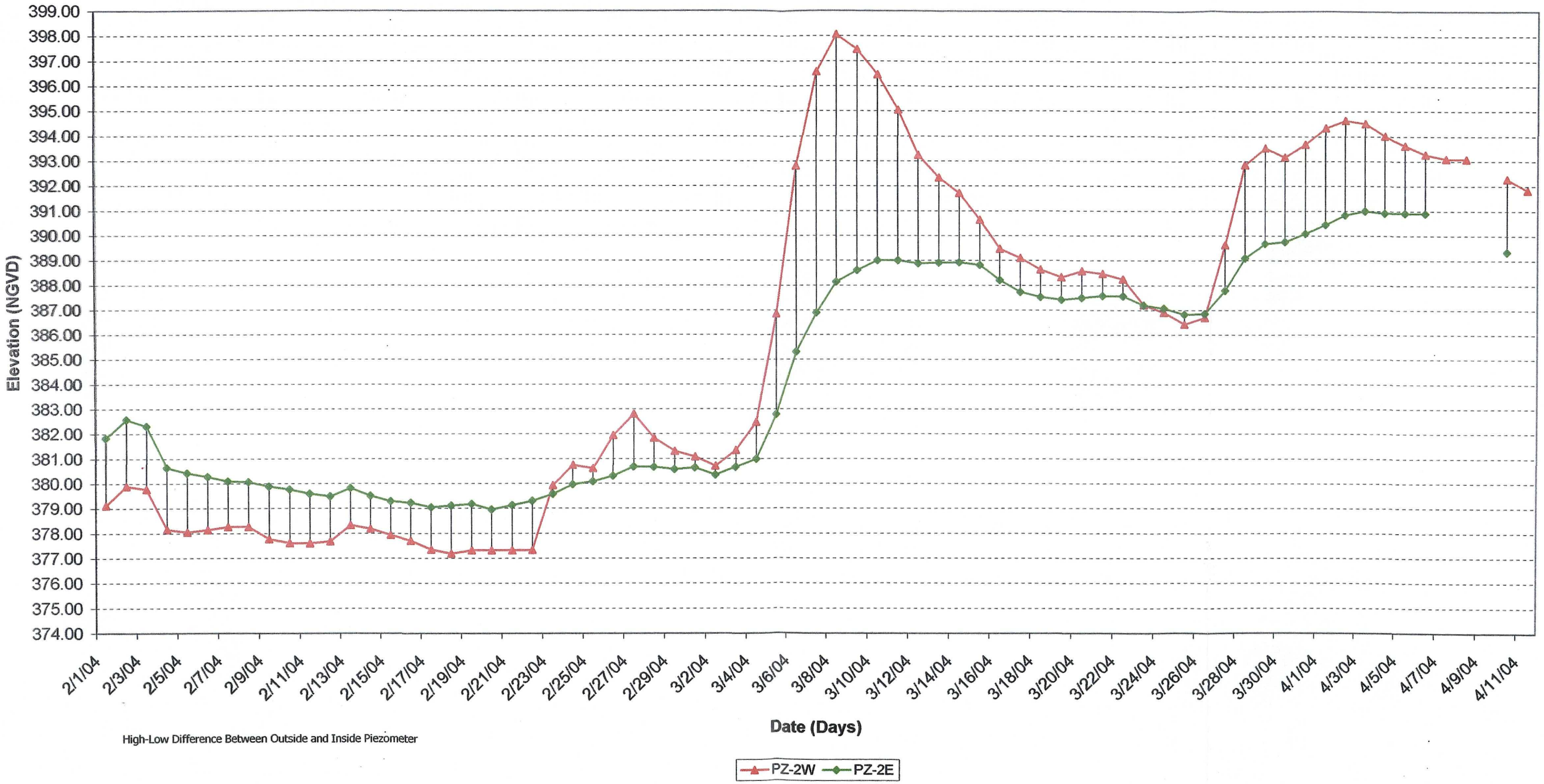
FEBRUARY to APRIL 2004

LINE OF EVIDENCE 7

Outside Groundwater Levels > Inside Groundwater Levels
Gradient across Slurry Trench/Barrier Wall (PZ-2W to PZ-2E)
February 1, 2004 to April 11, 2004

Day	Days with Groundwater Control		
	February 2004	March 2004	April 2004
1		•	•
2		•	•
3		•	•
4		•	•
5		•	•
6		•	•
7		•	•
8		•	•
9		•	•
10		•	•
11		•	•
12		•	
13		•	
14		•	
15		•	
16		•	
17		•	
18		•	
19		•	
20		•	
21		•	
22		•	
23	•	•	
24	•		
25	•		
26	•		
27	•	•	
28	•	•	
29	•	•	
30	•	•	
31		•	

Physical Control
Sauget Area 2 Groundwater Migration Control System
Line of Evidence 7
Outside GWL versus Inside GWL



LINE OF EVIDENCE 8

SWL > OUTSIDE GWL > INSIDE GWL > PWL

(SWL > PZ-3W > PZ-3E > EW-3)

GRADIENT FROM RIVER TO PUMPING WELLS

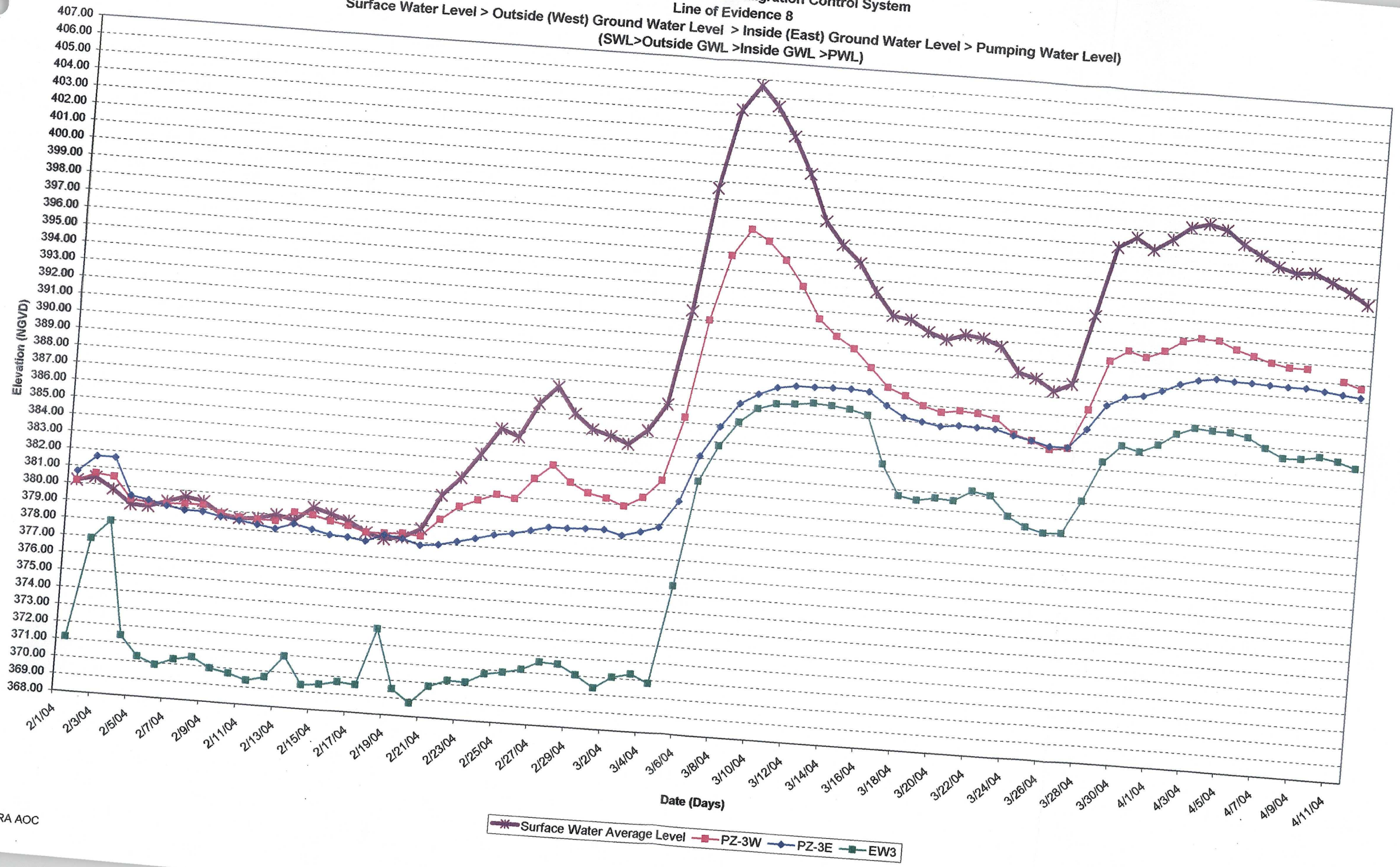
FEBRUARY to APRIL 2004

LINE OF EVIDENCE 8

Surface Water Levels > Outside Groundwater Levels (PZ-3W) > Inside Groundwater Levels (PZ-3E) > Pumping Water Levels (EW-3)
Gradient from River to Pumping Wells February 1 to April 11, 2004

Day	Days with Groundwater Control		
	February 2004	March 2004	April 2004
1		•	•
2		•	•
3		•	•
4		•	•
5		•	•
6		•	•
7	•	•	•
8	•	•	•
9	•	•	•
10	•	•	•
11	•	•	•
12	•	•	
13	•	•	
14	•	•	
15	•	•	
16	•	•	
17	•	•	
18	•	•	
19	•	•	
20	•	•	
21	•	•	
22	•	•	
23	•	•	
24	•		
25	•		
26	•		
27	•	•	
28	•	•	
29	•	•	
30		•	
31		•	

Physical Control
Sauget Area 2 Groundwater Migration Control System
Line of Evidence 8
Surface Water Level > Outside (West) Ground Water Level > Inside (East) Ground Water Level > Pumping Water Level)
(SWL>Outside GWL >Inside GWL >PWL)



WGK RCRA AOC

April 19, 2004

LINE OF EVIDENCE 9

OUTSIDE GROUNDWATER LEVEL > INSIDE GROUNDWATER LEVEL

(PZ-3W > PZ-3E)

GRADIENT ACROSS SLURRY TRENCH/BARRIER WALL

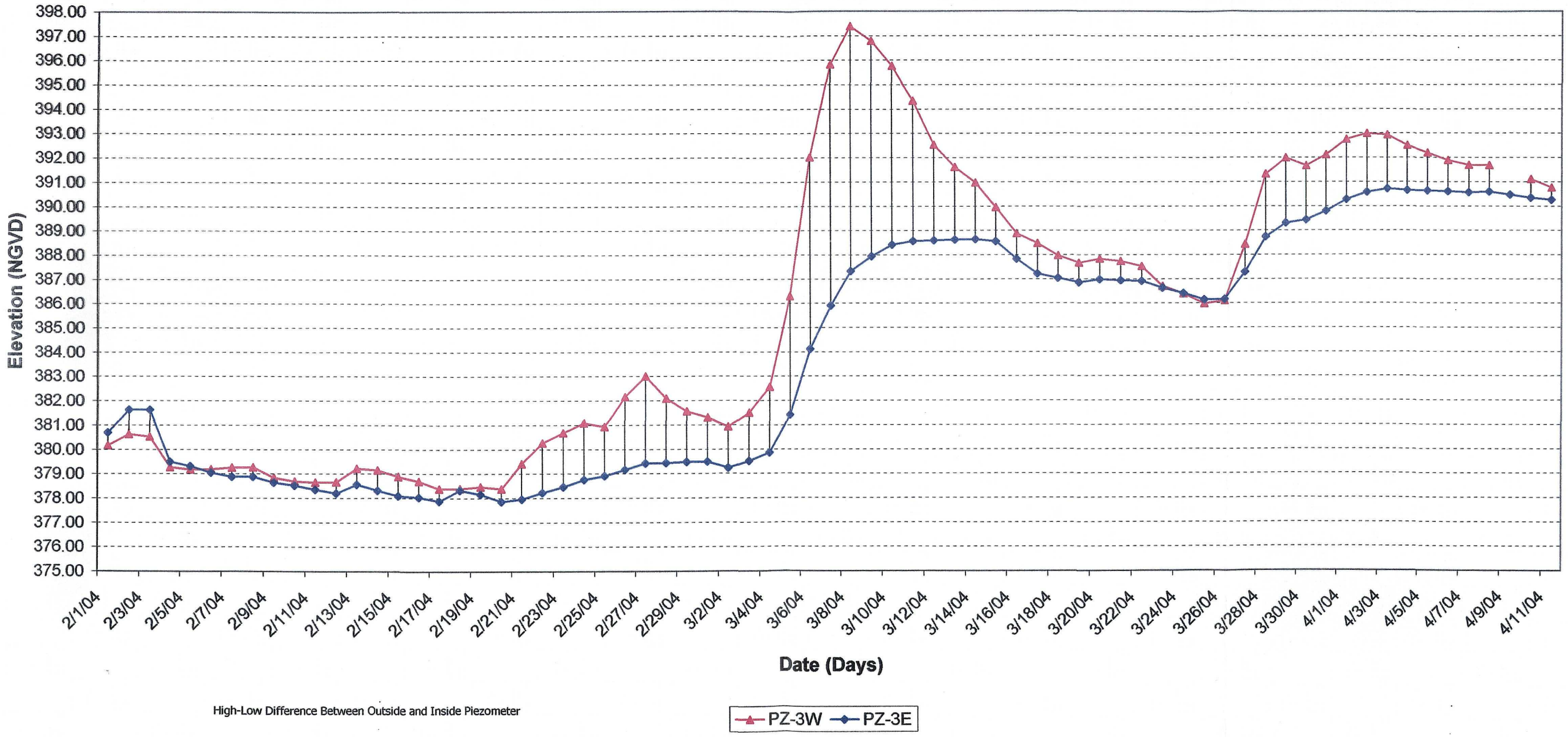
FEBRUARY to APRIL 2004

LINE OF EVIDENCE 9

Outside Groundwater Levels > Inside Groundwater Levels
Gradient across Slurry Trench/Barrier Wall (PZ-3W to PZ-3E)
February 1, 2004 to April 11, 2004

Day	Days with Groundwater Control		
	February 2004	March 2004	April 2004
1		•	•
2		•	•
3		•	•
4		•	•
5		•	•
6		•	•
7	•	•	•
8	•	•	•
9	•	•	•
10	•	•	•
11	•	•	•
12	•	•	
13	•	•	
14	•	•	
15	•	•	
16	•	•	
17	•	•	
18	•	•	
19	•	•	
20	•	•	
21	•	•	
22	•	•	
23	•	•	
24	•		
25	•		
26	•		
27	•	•	
28	•	•	
29	•	•	
30		•	
31		•	

Physical Control
Sauget Area 2 Groundwater Migration Control System
Line of Evidence 9
Outside GWL versus Inside GWL



GROUNDWATER CONTROL

DATA GAP ANALYSIS

OCTOBER 22, 2003 TO APRIL 11, 2004

OCTOBER 2003 **Groundwater Control Data Gap Analysis**

		Line of Evidence								
Date	Hydraulic Control	1	2	3	4	5	6	7	8	9
		Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11,2004					
10/22/2003	Yes		•	•						
10/23/2003	Yes		•	•						
10/24/2003	Yes		•	•						
10/25/2003	Yes		•	•						
10/26/2003	Yes		•	•						
10/27/2003	Yes		•	•						
10/28/2003	Yes		•	•						
10/29/2003	Yes		•	•						
10/30/2003	Yes		•	•						
10/31/2003	Yes		•	•						

NOVEMBER 2003 **Groundwater Control Data Gap Analysis**

		Line of Evidence								
Date	Hydraulic Control	1	2	3	4	5	6	7	8	9
		Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11,2004					
11/1/2003	Yes		●	●						
11/2/2003	Yes		●	●						
11/3/2003	Yes		●	●						
11/4/2003	Yes		●	●						
11/5/2003	Yes	●	●	●						
11/6/2003	Yes	●	●	●						
11/7/2003	Yes	●	●	●						
11/8/2003	Yes	●	●	●						
11/9/2003	Yes	●	●	●						
11/10/2003	Yes	●	●	●						
11/11/2003	Yes		●	●						
11/12/2003	Yes	●	●	●						
11/13/2003	Yes	●	●	●						
11/14/2003	Yes		●	●						
11/15/2003	Yes		●	●						
11/16/2003	Yes		●	●						
11/17/2003	Yes		●	●						
11/18/2003	Yes	●	●	●						
11/19/2003	Yes	●	●	●						
11/20/2003	Yes	●	●	●						
11/21/2003	Yes	●	●	●						
11/22/2003	Yes	●	●	●						
11/23/2003	Yes	●	●	●						
11/24/2003	Yes	●	●	●						
11/25/2003	Yes	●	●	●						
11/26/2003	Yes	●	●	●						
11/27/2003	Yes	●	●	●						
11/28/2003	Yes	●	●	●						
11/29/2003	Yes	●	●	●						
11/30/2003	Yes		●	●						

DECEMBER 2003 **Groundwater Control Data Gap Analysis**

		Line of Evidence								
Date	Hydraulic Control	1	2	3	4	5	6	7	8	9
		Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11,2004					
12/1/2003	Yes	•	•	•						
12/2/2003	Yes		•	•						
12/3/2003	Yes		•	•						
12/4/2003	Yes		•	•						
12/5/2003	Yes		•	•						
12/6/2003	Yes		•	•						
12/7/2003	Yes		•	•						
12/8/2003	Yes		•	•						
12/9/2003	Yes		•	•						
12/10/2003	Yes	•	•	•						
12/11/2003	Yes	•	•	•						
12/12/2003	Yes	•	•	•						
12/13/2003	Yes	•	•	•						
12/14/2003	Yes	•	•	•						
12/15/2003	Yes	•	•	•						
12/16/2003	Yes	•	•	•						
12/17/2003	Yes	•	•	•						
12/18/2003	Yes	•	•	•						
12/19/2003	Yes	•	•	•						
12/20/2003	Yes	•	•	•						
12/21/2003	Yes		•	•						
12/22/2003	Yes		•	•						
12/23/2003	Yes		•	•						
12/24/2003	Yes	•	•	•						
12/25/2003	Yes	•	•	•						
12/26/2003	Yes	•	•	•						
12/27/2003	Yes		•	•						
12/28/2003	Yes		•	•						
12/29/2003	Yes		•	•						
12/30/2003	Yes		•	•						
12/31/2003	Yes		•	•						

JANUARY 2004 **Groundwater Control Data Gap Analysis**

		Line of Evidence								
Date	Hydraulic Control	1	2	3	4	5	6	7	8	9
		Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11,2004					
1/1/2004	Yes		●	●						
1/2/2004	Yes	●	●	●						
1/3/2004	Yes		●	●						
1/4/2004	Yes	●	●	●						
1/5/2004	Yes	●	●	●						
1/6/2004	Yes	●	●	●						
1/7/2004	Yes		●	●						
1/8/2004	Yes		●	●						
1/9/2004	Yes		●	●						
1/10/2004	Yes		●	●						
1/11/2004	Yes		●	●						
1/12/2004	Yes		●	●						
1/13/2004	Yes		●	●						
1/14/2004	Yes		●	●						
1/15/2004	Yes		●	●						
1/16/2004	Yes		●	●						
1/17/2004	Yes		●	●						
1/18/2004	Yes		●	●						
1/19/2004	Yes	●	●	●						
1/20/2004	Yes		●	●						
1/21/2004	Yes		●	●						
1/22/2004	Yes	●	●	●						
1/23/2004	Yes		●	●						
1/24/2004	Yes		●	●						
1/25/2004	Yes	●	●	●						
1/26/2004	Yes	●	●	●						
1/27/2004	Yes		●	●						
1/28/2004	Yes		●	●						
1/29/2004	Yes		●	●						
1/30/2004	Yes		●	●						
1/31/2004	Yes		●	●						

FEBRUARY 2003 **Groundwater Control Data Gap Analysis**

		Line of Evidence								
Date	Hydraulic Control	1	2	3	4	5	6	7	8	9
		Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11,2004					
2/1/2004	Yes					•				
2/2/2004	Yes					•				
2/3/2004	Yes					•				
2/4/2004	Yes					•				
2/5/2004	Yes					•				
2/6/2004	Yes					•				
2/7/2004	Yes					•			•	•
2/8/2004	Yes					•			•	•
2/9/2004	Yes					•			•	•
2/10/2004	Yes					•			•	•
2/11/2004	Yes					•			•	•
2/12/2004	Yes					•			•	•
2/13/2004	Yes					•			•	•
2/14/2004	Yes					•			•	•
2/15/2004	Yes					•			•	•
2/16/2004	Yes					•			•	•
2/17/2004	Yes					•			•	•
2/18/2004	Yes					•			•	•
2/19/2004	Yes					•			•	•
2/20/2004	Yes					•			•	•
2/21/2004	Yes				•	•			•	•
2/22/2004	Yes				•	•			•	•
2/23/2004	Yes				•	•	•	•	•	•
2/24/2004	Yes				•	•	•	•	•	•
2/25/2004	Yes				•	•	•	•	•	•
2/26/2004	Yes				•	•	•	•	•	•
2/27/2004	Yes				•	•	•	•	•	•
2/28/2004	Yes				•	•	•	•	•	•
2/29/2004	Yes				•	•	•	•	•	•

MARCH 2004 **Groundwater Control Data Gap Analysis**

		Line of Evidence								
Date	Hydraulic Control	1	2	3	4	5	6	7	8	9
		Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11,2004					
3/1/2004	Yes				•	•	•	•	•	•
3/2/2004	Yes				•	•	•	•	•	•
3/3/2004	Yes				•	•	•	•	•	•
3/4/2004	Yes				•	•	•	•	•	•
3/5/2004	Yes				•	•	•	•	•	•
3/6/2004	Yes				•	•		•	•	•
3/7/2004	Yes				•	•		•	•	•
3/8/2004	Yes				•	•		•	•	•
3/9/2004	Yes				•	•		•	•	•
3/10/2004	Yes				•	•		•	•	•
3/11/2004	Yes				•	•		•	•	•
3/12/2004	Yes				•	•		•	•	•
3/13/2004	Yes				•	•	•	•	•	•
3/14/2004	Yes				•	•	•	•	•	•
3/15/2004	Yes				•	•	•	•	•	•
3/16/2004	Yes				•	•	•	•	•	•
3/17/2004	Yes				•	•	•	•	•	•
3/18/2004	Yes				•	•	•	•	•	•
3/19/2004	Yes				•	•	•	•	•	•
3/20/2004	Yes				•	•	•	•	•	•
3/21/2004	Yes				•	•	•	•	•	•
3/22/2004	Yes				•	•	•	•	•	•
3/23/2004	Yes				•	•	•	•	•	•
3/24/2004	Yes				•	•				
3/25/2004	Yes				•	•				
3/26/2004	Yes				•	•				
3/27/2004	Yes				•	•	•	•	•	•
3/28/2004	Yes				•	•	•	•	•	•
3/29/2004	Yes				•	•	•	•	•	•
3/30/2004	Yes				•	•	•	•	•	•
3/31/2004	Yes				•	•	•	•	•	•

APRIL 2004 **Groundwater Control Data Gap Analysis**

		Line of Evidence								
Date	Hydraulic Control	1	2	3	4	5	6	7	8	9
		Oct 22, 2003 to Jan 31, 2004			Feb 1, 2004 to April 11,2004					
4/1/2004	Yes				●	●	●	●	●	●
4/2/2004	Yes				●	●	●	●	●	●
4/3/2004	Yes				●	●	●	●	●	●
4/4/2004	Yes				●	●	●	●	●	●
4/5/2004	Yes				●	●	●	●	●	●
4/6/2004	Yes				●	●	●	●	●	●
4/7/2004	Yes				●	●	●	●	●	●
4/8/2004	Yes				●	●	●	●	●	●
4/9/2004	Yes				●	●	●	●	●	●
4/10/2004	Yes				●	●	●	●	●	●
4/11/2004	Yes				●	●	●	●	●	●

LINE OF EVIDENCE	SUMMARY
Line of Evidence 1	Surface Water Level Greater than Groundwater Level Gradient Reversal - No Discharge to Surface Water October 2003 to January 2004
Line of Evidence 2	Surface Water Level Greater than Pumping Water Level Gradient from River to Pumping Wells October 2003 to January 2004
Line of Evidence 3	Groundwater Level Greater than Pumping Water Level Gradient from Piezometers to Pumping Wells October 2003 to January 2004
Line of Evidence 4	Surface Water Level Greater than Groundwater Level Gradient Reversal - No Discharge to Surface Water February to April 2004
Line of Evidence 5	Groundwater Level Greater than Pumping Water Level Gradient from Piezometers to Pumping Wells February to January 2004
Line of Evidence 6	Surface Water Level > Outside Groundwater Level (PZ-2W) > Inside Groundwater Level (PZ-2E) > Pumping Water Level Gradient from River to Pumping Wells February to April 2004
Line of Evidence 7	Outside Groundwater Level (PZ-2W) > Inside Groundwater Level (PZ-2E) Gradient across Slurry Trench/Barrier Wall February to April 2004
Line of Evidence 8	Surface Water Level > Outside Groundwater Level (PZ-3W) > Inside Groundwater Level (PZ-3E) > Pumping Water Level Gradient from River to Pumping Wells February to April 2004
Line of Evidence 9	Outside Groundwater Level (PZ-3W) > Inside Groundwater Level (PZ-3E) Gradient across Slurry Trench/Barrier Wall February to April 2004

PLUME STABLITY MONITORING PLAN

PLUME VOLUME MONITORING

- **Baseline Plume Volume Determination**
  - Measure water levels in WGK piezometers quarterly for one year
  - Input groundwater levels for each quarter into particle track model
  - Determine plume area for each quarter
  - Overlay boundaries of quarterly plume areas and determine maximum plume area by tracing the outside boundary of the overlapping plume areas
  - Calculate baseline plume volume using 100 ft. aquifer saturated thickness
- **Plume Volume Monitoring**
  - Measure water levels in WGK piezometers
  - Input groundwater levels into particle track model
  - Determine plume area
  - Calculate plume volume using 100 ft. aquifer saturated thickness

GROUNDWATER QUALITY MONITORING

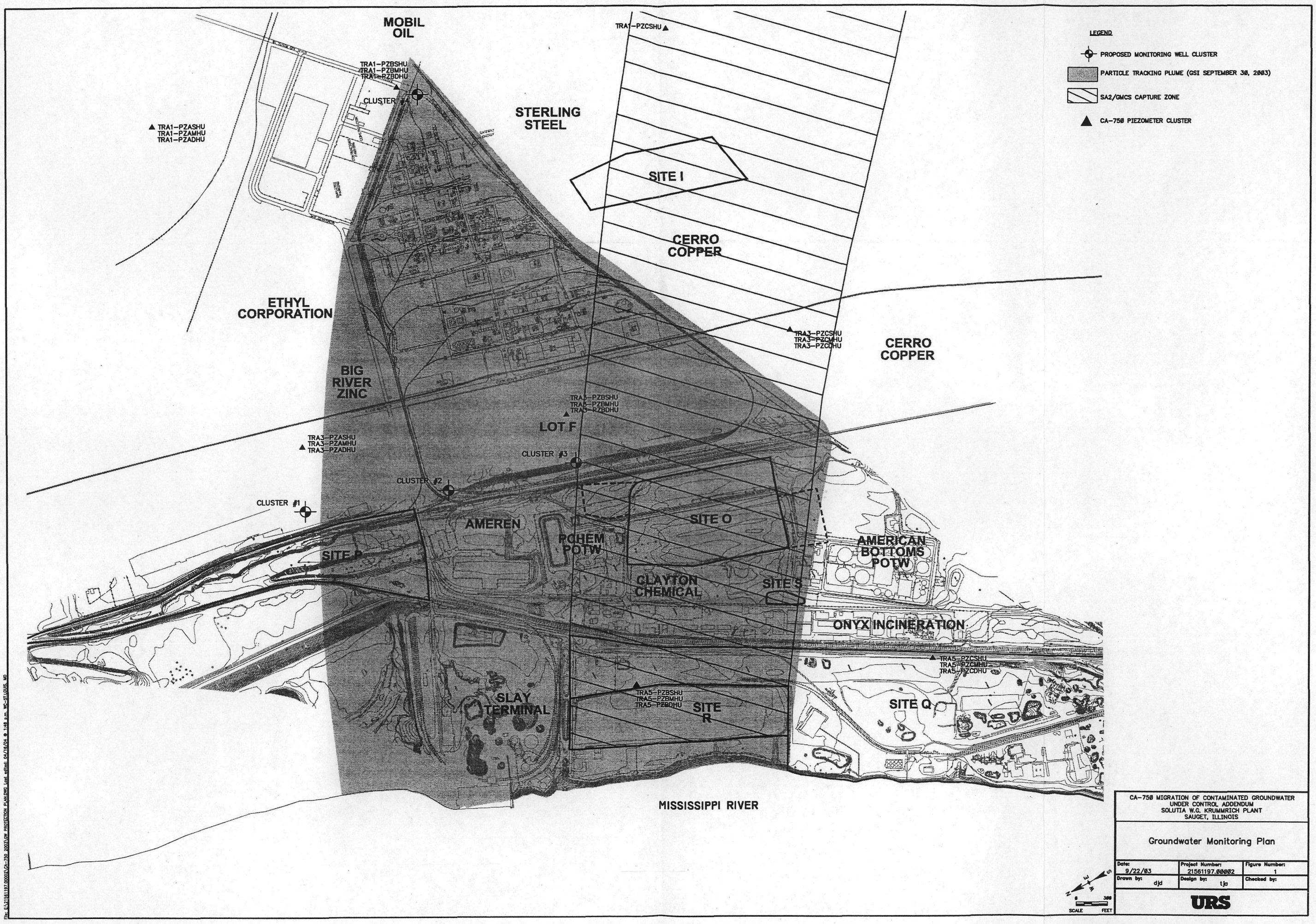
- **Upgradient Groundwater Quality Monitoring**
  - One upgradient monitoring well cluster, MW-4 (SHU, MHU, DHU) at eastern tip of plant process area to define influent groundwater concentrations.
- **Downgradient Groundwater Quality Monitoring**
  - Two downgradient monitoring well clusters, MW-2 (SHU, MHU, DHU) and MW-3 (SHU, MHU, DHU), located within the WGK Plume at the western boundary of Lot F
    - One cluster located north of the north boundary of the SA2/GMCS capture zone
    - One cluster located in the northwest corner of Lot F
- **Northern Plume Boundary Groundwater Quality Monitoring**
  - One monitoring well cluster located on a line parallel to the western boundary of Lot F and outside of the north boundary of the WGK Particle Track Plume
  - One year baseline monitoring of VOCs and SVOCs to determine average and standard deviation

UNSTABLE PLUME CRITERIA

- Plume volume increases > 10 %; and
- Four consecutive sampling rounds in monitoring well clusters MW-2 and MW-3 at the downgradient edge of Lot F show a consistent upward trend using CUSUM Chart Statistical Method; and
- Four consecutive sampling rounds at the north boundary of the WGK Plume show consistent VOC and SVOC concentrations greater than three standard deviations in monitoring well cluster MW-1 using the Shewart Control Chart Statistical Method.

PLUME STABILITY

MONITORING WELL LOCATION MAP



CA-750 MIGRATION OF CONTAMINATED GROUNDWATER
UNDER CONTROL ADDENDUM
SOLUTIA W.G. KRUMMRICH PLANT
SAUGET, ILLINOIS

Groundwater Monitoring Plan

Date:	Project Number:	Figure Number:
9/22/03	21561197.00002	1
Drawn by: djd	Design by: tjo	Checked by:

URS

SOLUTIA. Solutions for a better life.

April 19, 2004

Mr. Ken Bardo
U.S. EPA Region 5
Corrective Action Section
77 West Jackson Blvd
Chicago, IL 60604-3590

RE: Solutia W. G. Krummrich Plant

Dear Ken:

The following is being submitted in respond to questions raised during our March 17th and 18th meeting, and in further support our CA725 for the W. G. Krummrich Plant.

- **Recreational Fisher Exposure Scenario**

On May 6, 2003, USEPA Region 5 CERCLA approved the RI/FS Support Sampling Plan (SSP) for the Sauget Area 2 Sites (Attachment 1). In Section 8.0 (Surface Water, Sediment and Biota Sampling Plan) of this USEPA-approved work plan, specifically Pages 8-1 and 8-2 (Attachment 2), buffalo fish fillets were selected for sampling and subsequent input into the recreational fisher exposure scenario evaluated in the Sauget Area 2 Sites Human Health Risk Assessment. Channel catfish and shad were sampled for use in the Sauget Area 2 Sites Ecological Risk Assessment.

- **Trespassing Teenager Exposure Scenario**

Sauget Area 2 Site R is a closed industrial-waste disposal area located between the US Army Corps of Engineers flood control levee and the Mississippi River. It is surrounded by bulk storage and shipping operations (Slay Terminals and Eagle Marine Industries), waste treatment facilities (Onyx hazardous waste incinerators, the Village of Sauget P-Chem Plant and the American Bottoms Regional Treatment Facility), a disused electricity generation station and an active electric power distribution station. Access to Site R, and the Mississippi River downgradient of Site R, are restricted by fencing and locked gates. Riverview Road is the only road that leads to Site R and a locked gate prevents access to the site and river. In 1985, a 2,250 ft. long rock revetment was installed along the east bank of the Mississippi River adjacent to Site R. The purpose of the stabilization was to prevent further erosion of the riverbank and thereby minimize potential for release of waste material from the landfill. This rip rap revetment restricts access to the river bank down gradient of Site R and, combined with a steep slope, makes walking on the river bank very difficult. High river velocity limits access to the water immediately adjacent to Site

R and the presence of a barge fleeting facility in this area further restricts access. Large barge strings are assembled and moored in this area, making it difficult to trespass in this area.

All of these factors, which restrict access to the site and adjacent river, make trespassing an incomplete exposure pathway. Therefore, there is no current human exposure to sediments and surface water down gradient of Sauget Area 2 Site R.

- **Groundwater Exposure**

As demonstrated in the April 19, 2004 CA750 Groundwater Migration Under Control Addendum, groundwater discharging to the Mississippi River down gradient of Sauget Area 2 Site R is hydraulically controlled by the Sauget Area 2 Groundwater Migration Control System. Therefore, there is no current human exposure to groundwater.

Please advise if further information is required.

Sincerely,

Steven D. Smith

cc:	Nabil Fayoumi	EPA
	Sandra Bron	Illinois EPA
	Jim Moore	Illinois EPA
	Gina Search	Illinois EPA
	Bruce Yare	Solutia
	Richard Williams	Williams & Associates
	Bob Hiller	Solutia

Rebardy / Smith 052/02

MAY 8 2002

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

ATTACHMENT 1

May 6, 2002

REPLY TO THE ATTENTION OF:
(SR-6J)

Mr. Steven D. Smith
Solutia, Inc.
P.O. Box 66760
St. Louis, Missouri 63166-6760

RE: Conditional Approval - RI/FS Support Sampling Plan
Sauget Area 2 Site - St. Clair County, Illinois

Dear Mr. Smith:

The United States Environmental Protection Agency (U.S. EPA) has completed the review of the April 15, 2002, Revised RI/FS Support Sampling Plan (SSP) for the Sauget Area 2 Site. Based on recent correspondence with you, the U.S. EPA is willing to approve the above referenced document in anticipation of final resolution of all Agency comments. Enclosed with this letter are the outstanding comments on the SSP.

Discussions are ongoing regarding the modification of the ecological risk assessment process contained in the SSP. These discussions center around replacing the aquatic portion of the ecological risk assessment for Sauget Area 2 with the RCRA Krummrich Ecological Risk Assessment. If an agreement can be reached, an addendum to the SSP will be necessary to modify the scope and objectives of the ecological risk assessment work plan.

Pursuant to Section 2.2 of the November 24, 2000, Administrative Order on Consent, U.S. EPA conditionally approves the RI/FS Support Sampling Plan for the Sauget Area 2 Site. The conditions of approval requires the Sauget Area 2 Sites Group (Group) to address the comments in the enclosure, and resubmit the revised pages within 14 days of receipt of this letter. The Group should begin field activities as soon as practicable.

Recycled/Recyclable . Printed with Vegetable Oil Based Inks on 100% Recycled Paper (50% Postconsumer)

If you have any questions regarding this letter or the enclosure, please feel free to call me at (312) 886-4592.

Sincerely,

Mike Ribordy
Remedial Project Manager
Superfund Division

cc: Thomas Martin, USEPA
Terry Stanuch, USEPA
Sandra Bron, IEPA
Peter Barrett, CH2M HILL
Kevin de la Bruere, USFWS
Michael Henry, IDNR

ENCLOSURE

Comments on Revised RI/FS Support Sampling Plan
Sauget Area 2 Site - St. Clair County, Illinois

Site O - After reviewing the historical aerial photographs for Sauget Area 2 Sites, the Group suggested that the actual waste disposal area at Site O was slightly larger than what had been defined. It appeared that two additional small areas were located northeast and southwest of former lagoons, possible indications of waste disposal activities in the past. In addition, a wet area was observed west of the lagoons based on the historical aerial photographs. It was suspected that the wet area could be connected or related to the lagoons.

At the March 7, 2002, meeting, it was agreed that the proposed soil gas survey at Site O would be extended to cover the three new areas. Volume 2A, Section 5.1.1.1 adequately discusses the 3 additional areas. However, Figure 5-2 in Volume 1 and Figure 3 in Volume 2A do not show these three areas, and the 200 by 200 ft. grid has not been superimposed on them. Please correct the two figures along with Table 2 in Volume 2A and the total number of soil gas samples for Site O on page 6-3 in Volume 1.

Volume 1, Section 6.9 Off-Site Soil Samples - This section references Figure 5-1 instead of Figure 5-3. Please make the correction.

Volume 1, Section 11.3.2.3 Toxicity Screen and Section 11.5.1 Identification of Potential Exposure Scenarios - The Sauget Area 2 Sites Group's (Group) December 18, 2001, Response to Comments, the Group agreed to use Class I standards in evaluating risks associated with site groundwater contamination. The April 15, 2002, revised RI/FS Support Sampling Plan still references Class II standards. Please make the correction.

Volume 1, Section 12.7.6.1 - Exposure Model Input Parameters - The only outstanding issue is the seasonal use factor for osprey. In order to resolve this issue, the Group has agreed to use a 100% SUF for osprey. Please make the correction on page 12-50.

Volume 2A, Section 3.1.7 Non-Aqueous Phase Liquid (NAPL) - The Group included a section on NAPLs as agreed to at the March 7, 2002, meeting. The text should also state that for

groundwater sampling (push point/geoprobe or bedrock), the presence of NAPL will be screened and samples of NAPL collected before the well is purged. NAPL samples will be collected using a top entry bailer for LNAPL, and a bottom entry bailer for DNAPL.

ATTACHMENT 2

8.0 Surface Water, Sediment and Biota Sampling Plan

Surface water, sediment and ecological samples will be collected in the Mississippi River. Surface water and sediments will also be collected from the two ponds located at the Southern end of Site Q. Terrestrial samples of biota will be collected from each of the five Sites. Samples will be analyzed to determine the concentration of site-related constituents in these media and to provide information for the risk assessments. Surface water and sediment samples will be collected from the Mississippi River along three transects running parallel to the river bank at the following three locations: 1) downgradient of Site P, 2) downgradient of Sites O, R, S and the northern end of Site Q, and 3) downgradient of the southern end of Site Q.

The three sampling transects will be located 50, 150 and 300 feet from shore. The location of these sample transects are based on Mississippi River sediment samples collected by USEPA in October and November, 2000. The following results were identified in that sampling:

	Distance From Riverbank		
Maximum Detected Concentration, ppb	**50 to 100 Feet**	**150 Feet**	**315 Feet**
Total VOCs	22,000	6,758	3,360
Total SVOCs	11,410	11,500	ND

Sediment sample analytical results and sampling location maps are included at the end of this section.

Benthic macroinvertabrates will be sampled at each of the nine sampling locations. This data will be used to evaluate benthic community structure (species richness and biomass) to provide data for the sediment triad evaluation. Bioassays will be conducted on surface water and sediment samples to determine the toxicity, if any, of these environmental media to sensitive organisms.

Fish will be sampled in three areas of the Mississippi River associated with the Sites: 1) downgradient of Site P, 2) downgradient of Sites O, R, S and the northern end of Site Q, and 3)

the southern end of Site Q. A food source approach has been used to select fish for fish tissue analysis:

Food Source	Fish	Trophic Level	Endpoint Organism
Omnivore	Channel Catfish	Bottom Feeder	Fish
Plankton	Shad (Large)	Forager	Osprey
	Shad (Small)	Forager	Great Blue Heron
Detritus	Buffalo (Fillets)	Omnivore	Recreational Fisher

Small shad will be those fish ranging in size from approximately 4 inches to 8 inches in length. Large shad will be those fish greater than 8 inches in length.

These fish tissue samples, collected in plume discharge areas, will be used to determine the impact, if any, of groundwater discharge on higher trophic level organisms. Fish will also be sampled in reference areas upstream and in areas downstream of Sauget Area 2 in order to assess the potential for downstream migration of constituents.

Information collected as part of the Surface Water, Sediment and Ecological Sampling Plan will be used in the Human Health Risk Assessment and the Ecological Risk Assessment. With five disposal sites located adjacent to or near the east bank of the Mississippi River, the primary ecological exposure pathway is groundwater water discharge to surface water. Other exposure pathways include terrestrial organism exposure to site soils and aquatic organism exposure to water and sediments in on-site ponded areas. These exposure pathways will be included in the site conceptual model section of the Ecological Risk Assessment Work Plan.

Aquatic endpoint organisms to be evaluated in the ERA are: 1) benthic macroinvertabrate, 2) fish, 3) great blue heron (small fish predator) and 4) osprey (large fish predator). Terrestrial endpoint organisms that will be evaluated in the ERA are: 1) plants, 2) prairie vole (herbivore), 3) short-tailed shrew (vermivore) and 4) red fox (predator). Ponded area endpoint-organisms to be evaluated in the ERA are 1) benthic macroinvertabrate and 2) fish or amphibians, if fish are not present.

LETTER OF TRANSMITTAL

From: Bruce Yare
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St. Louis, MO 63141
(314) 674-4922 FAX (314) 674-8957

Date: 4/19/04

Nabil Fayoumi
USEPA CERCLA

WGK RCRA AOC

The following items are:

_X_ Enclosed ____Requested ____ Sent Separately Via:_____

No. of Copies	Description
1	**WGK CA750 Groundwater Migration Under Control Addendum**
1	**WGK CA725 Human Exposure Under Control Addendum**

The above items are submitted:

____ At your request ____ For your review ____ For your signature

____ For your files ____ For your action _X_ For your information

Comments:

By: Bruce Yare