1991 ANNUAL RCRA GROUNDWATER MONITORING SUMMARY KOPPERS INDUSTRIES, INC. SUPERIOR, WISCONSIN EPA ID# WID006179493

Prepared for:

BEAZER EAST, INC.
436 SEVENTH AVENUE
PITTSBURGH, PENNSYLVANIA 15219

Prepared by:

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
3000 TECH CENTER DRIVE
MONROEVILLE, PENNSYLVANIA 15146

PROJECT NO. 178298-02

FEBRUARY 1992

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

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1.0 INTRODUCTION

This report was prepared by Keystone Environmental Resources, Inc., (Keystone) on behalf of Beazer East, Inc. (Beazer) and presents a summary of groundwater monitoring data collected during 1991 at the Koppers Industries, Inc. Superior wood treating plant located in Superior, Wisconsin. This data was compiled to satisfy Resource Conservation and Recovery Act (RCRA) permit requirements.

On June 16, 1988 BNS, a Delaware Corporation, acquired 90% of the stock of Koppers Company, Inc. BNS is a wholly-owned, indirect subsidiary of Beazer PLC. On December 28, 1988 the Superior facility was sold to Koppers Industries, Inc. (KII). On January 26, 1989 the name Koppers Company, Inc. (Koppers) was changed to Beazer Materials and Services, Inc. (BM&S). No changes in operation have resulted from the sale. Under the terms of the purchase agreement, BM&S agreed to remain the "operator" of the surface impoundments. On April 16, 1990, the name Beazer Materials and Services, Inc. was changed to Beazer East, Inc. (Beazer).

Several employees of the Wisconsin Department of Natural Resources (WDNR) observed portions of the first quarter sampling as part of a Comprehensive Monitoring Evaluation (CME). Results of the CME were reported to Beazer in an October 14, 1991 letter from WDNR. Beazer and Keystone are currently in the process of responding to requests associated with the CME, as detailed in the WDNR October 14, 1991 letter.

Water levels and groundwater samples were collected as part of a quarterly monitoring program for the RCRA regulated unit which consists of two former K001 surface impoundments. The two impoundments have been backfilled and capped in accordance with the closure plan approved by the WDNR. Closure certification was submitted to WDNR in November 1989.

During August 1988, 11 of the wells which had monitored the two impoundments during their active operation were decommissioned to allow for the capping of the impoundments. The 11 decommissioned wells were L-1S, L-2S, L-3S, L-3M, L-4S, L-

4M, L-4D, L-5S, L-5M, L-5DR and L-17. In November 1988 and 1989, four wells (MW-1S, MW-4S, MW-4D, and MW-2S) were installed by Wisconsin Test Drilling, Inc. (now WTD Environmental Drilling, Inc.) to replace several of the decommissioned wells in accordance with the interim post-closure monitoring plan. These four wells were subsequently renamed wells W-10B, W-12B, W-12C and W-6B, respectively.

In July and August of 1990, 26 new wells were installed at the Superior facility as part of the Phase II RCRA Facility Investigation (RFI). The 15 existing wells were renamed to provide a consistent nomenclature for the facility monitoring wells. Table 1 lists the original and new well names for the 15 existing wells at the Superior site, and in the third column, also lists the names of the 26 wells installed in July and August 1990.

2.0 SITE HYDROGEOLOGY

The Superior facility is immediately underlain by a sequence of Quaternary deposits. The uppermost stratigraphic unit is a clay deposit thought to represent lake bottom sediments. Previous geologic studies in the Superior area and aquifer testing at the plant have shown that this clay is characterized by a low permeability. Underlying this upper clay unit, at depths varying from 35 to 50 feet, is a semicontinuous deposit of fine to coarse sand, gravel and silt which comprises the uppermost aquifer at the site. A clay unit physically similar to the upper clay underlies the sand and gravel unit.

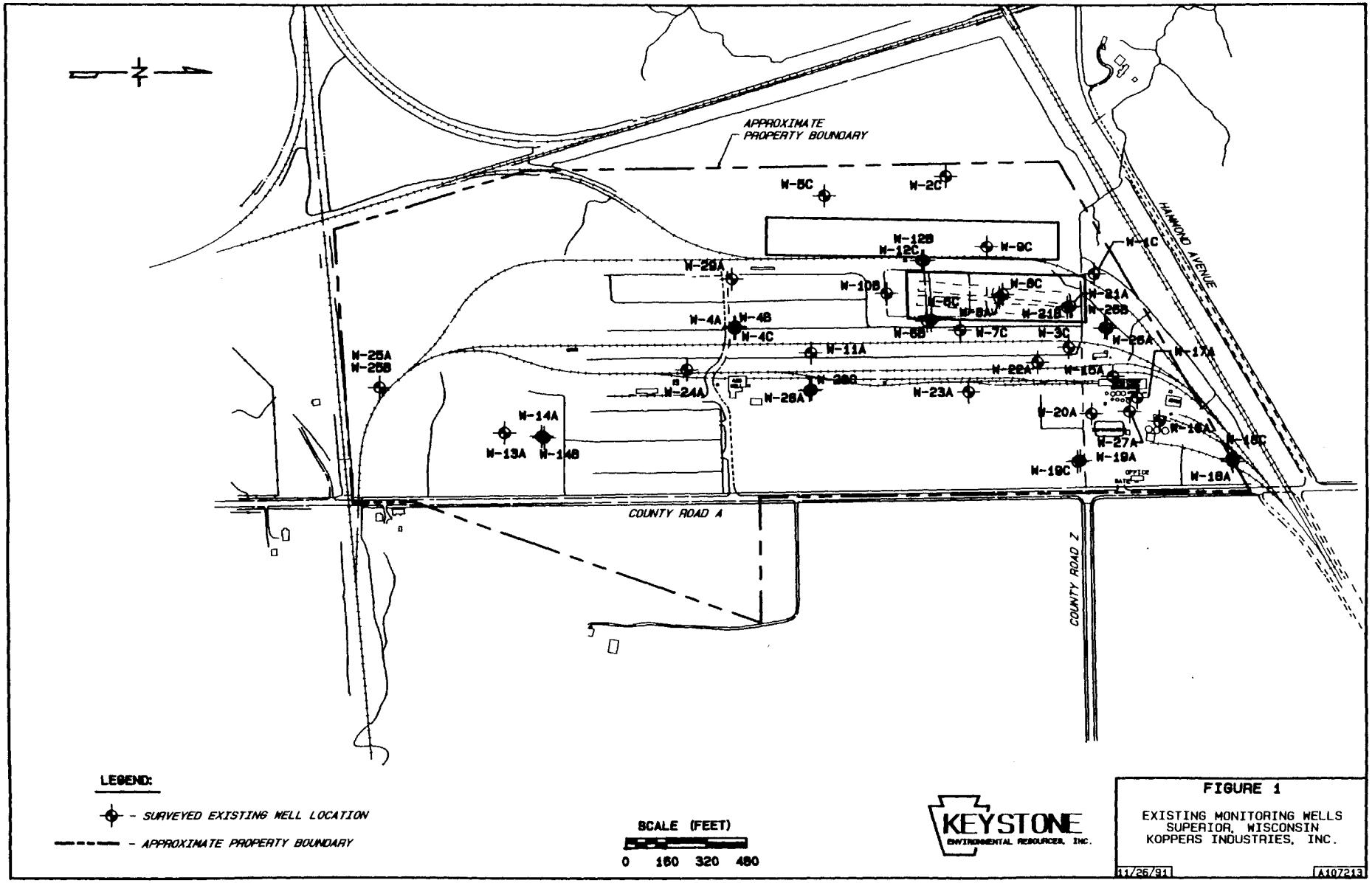
Figure 1 shows the locations of the wells currently in place at the Superior facility. The "A"-level wells are relatively shallow (13.0 to 15.5 feet deep) water table observation wells. With one exception, these wells are completed in clay (well W-17A is partially screened in sand and may be located in the area where an underground tank was removed and replaced with sand fill). The "B"-level wells are completed at an intermediate depth within the clay (generally 30.0 to 35.0 feet deep, although wells W-6B, W-10B and W-12B are completed at 17.5, 22.0 and 21.5 foot

TABLE 1

ORIGINAL AND NEW MONITORING
WELL DESIGNATIONS

KOPPERS INDUSTRIES, INC.
SUPERIOR, WISCONSIN

ORIGINAL WELL NAME FOR EXISTING WELLS	NEW WELL NAME FOR EXISTING WELLS	PHASE II RFI WELLS
MW-1S	W-10B	W-8A
MW-2S	W-6B	W-11A
MW-4S	W-12B	W-13A
MW-4D	W-12C	W-14A
		W-14B
W-1	W-1C	W-15A
W-2	W-2C	W-16A
W-3	W-3C	W-17A
W-4A	W-4B	W-18A
W-4B	W-4C	W-18C
W-4C	W-4A	W-19A
W-5	W-5C	W-19C
W-6 (R-8D)	W-8C	W-20A
		W-21A
R-6D	W-6C	W-21B
R-7D	W-7C	W-22A
R-9D	W-9C	W-23A
		W-24A
		W-25A
		W-25B
		W-26A
		W-26B
		W-27A
		W-28A
		W-28C
		W-29A


APPROXIMATE PROPERTY BOUNDARY
HAMMOND AVENUE
COUNTY ROAD A
COUNTY ROAD Z
W-5C
W-2C
W-12B
W-12C
W-9C
W-1C
W-10B
W-8C
W-8B
W-21B
W-21A
W-26B
W-26A
W-17A
W-4A
W-4B
W-4C
W-11A
W-7C
W-3C
W-22A
W-15A
W-25A
W-25B
W-24A
W-26A
W-23A
W-20A
W-14A
W-13A
W-14B
W-27A
W-19A
W-19C
W-18A
W-16C
W-16A
LEGEND:
- SURVEYED EXISTING WELL LOCATION
- APPROXIMATE PROPERTY BOUNDARY
SCALE (FEET)
0 160 320 480
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
FIGURE 1
EXISTING MONITORING WELLS
SUPERIOR, WISCONSIN
KOPPERS INDUSTRIES, INC.
11/26/91
A107213

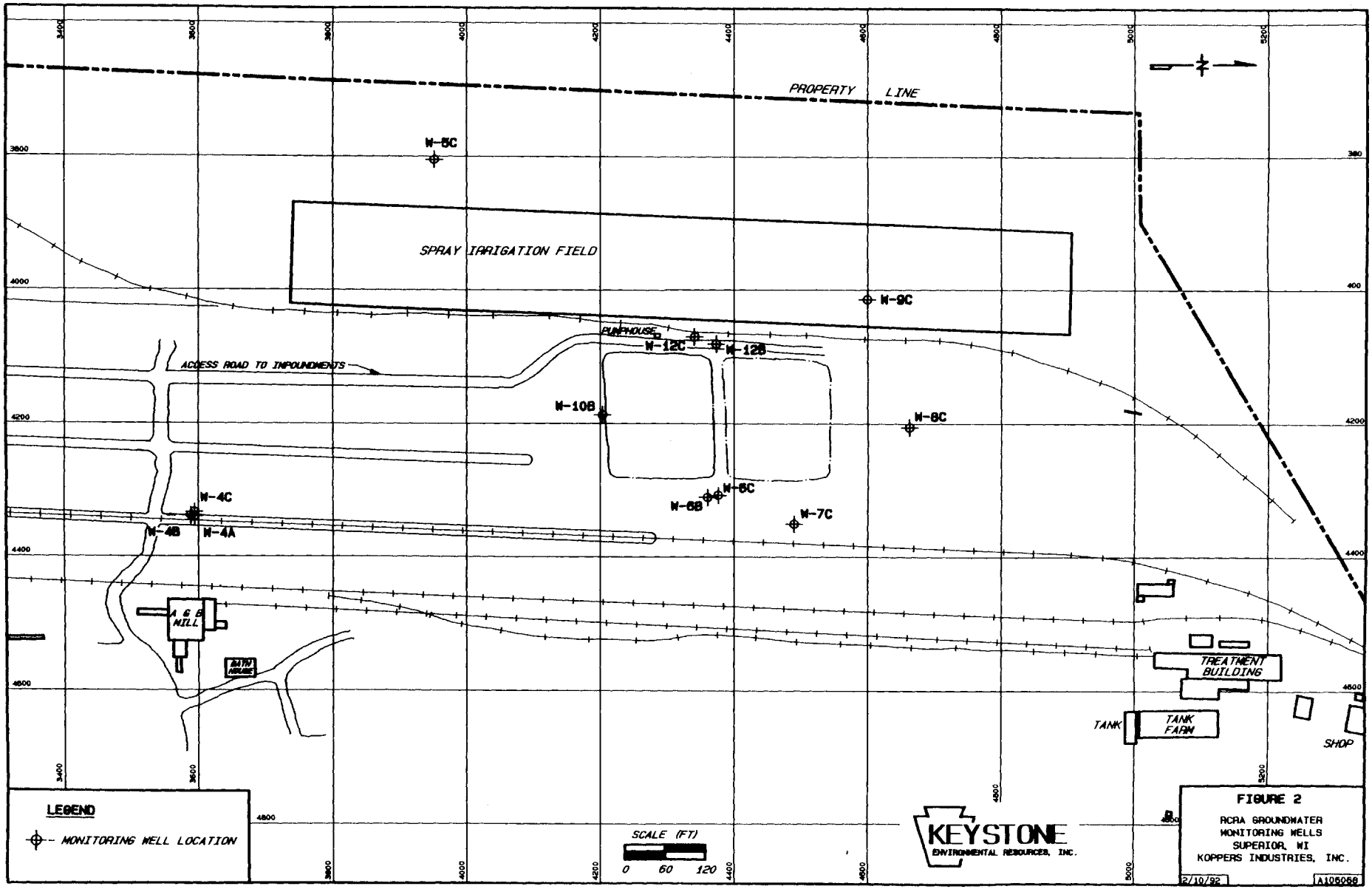
depths, respectively). The "C"-level wells are completed within the semi-continuous sand unit, and are generally 39 to 49 feet in depth.

Wells included in the RCRA monitoring well network for the closed K001 surface impoundments include upgradient well nest W-4, (W-4A, W-4B, W-4C) and sidegradient or downgradient wells W-5C, W-6B, W-6C, W-7C, W-8C, W-9C, W-10B, W-12B and W-12C. These wells are shown on Figure 2. Well W-5C was part of the RCRA quarterly monitoring program only for the first three quarters of 1991. In an October 14, 1991 letter, WDNR permitted Beazer to omit well W-5C from the quarterly monitoring program, beginning with the fourth quarter of 1991. However, WDNR reserved the right to require sampling of this well in the future.

Water levels were measured quarterly (March 4, June 3, July 30, and December 4, 1991) in selected wells. Groundwater elevations calculated from these quarterly measurements are presented in Table 2. These data were then used to produce groundwater elevation contour maps, which are presented as Figures 3 through 13.

Due to a paucity of data, contour maps could not be developed for the shallow clay zone for the second quarter of 1991. During this sampling round, water levels were inadvertently obtained only in wells sampled as part of the RCRA program, (i.e., only one groundwater elevation was available for the shallow clay zone). Groundwater elevation contours were likewise not developed for the first and second quarters of 1991 for the intermediate clay zone, due to either a paucity of data or inconsistency of data. In both cases, the groundwater elevations were simply plotted on the map. It should be noted that the nature of the erratic groundwater elevations do render firm interpretations of flow directions based on contour maps somewhat imprecise. The site proximity in relation to surface waters, should also come into subjective consideration.

Groundwater contours for the shallow clay zone are depicted on Figures 3 through 5. Groundwater flow across the impoundments is generally in a northerly direction. Figure 4 also suggests a slight groundwater mounding effect at the southeastern corner of the property and in the process area. Data from well W-17A was not used in any contouring efforts for the shallow clay, as it is partially completed in sand.


PROPERTY LINE
W-5C
SPRAY IRRIGATION FIELD
W-9C
PUMPHOUSE
W-12C
W-12B
ACCESS ROAD TO IMPOUNDMENTS
W-10B
W-8C
W-6C
W-6B
W-7C
W-4C
W-4B
W-4A
A & B MILL
TREATMENT BUILDING
TANK
TANK FARM
SHOP
LEGEND
MONITORING WELL LOCATION
SCALE (FT)
0 60 120
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
FIGURE 2
RCRA GROUNDWATER MONITORING WELLS
SUPERIOR, WI
KOPPERS INDUSTRIES, INC.
2/10/92
A105058

3a

TABLE 2

SUMMARY OF GROUNDWATER ELEVATIONS - 1991

KOPPERS INDUSTRIES, INC.
SUPERIOR, WISCONSIN

			3/4/91		6/3/91	
ORIGINAL WELL DESIGNATION	CURRENT WELL DESIGNATION	TOP OF CASING ELEVATION (feet)	DEPTH TO GROUNDWATER (feet)	GROUNDWATER ELEVATION (feet)	DEPTH TO GROUNDWATER (feet)	GROUNDWATER ELEVATION (feet)
W-1	W-1C	674.05	15.26	658.79	NM	—
W-2	W-2C	672.65	NM	—	NM	—
W-3	W-3C	674.29	13.23	661.06	NM	—
W-4C	W-4A	677.22	7.57	669.65	5.08	672.14
W-4A	W-4B	677.69	12.28	665.41	12.58	665.11
W-4B	W-4C	677.23	16.70	660.53	17.19	660.04
W-5	W-5C	674.92	13.72	661.20	15.18	659.74
MW-2S	W-6B	674.65	7.58	667.07	5.48	669.17
R-6D	W-6C	675.73	14.68	661.05	15.08	660.65
R-7D	W-7C	674.10	12.98	661.12	14.38	659.72
—	W-8A	676.49	5.65	670.84	NM	—
W-6 (R-8D)	W-8C	676.48	15.33	661.15	16.78	659.70
R-9D	W-9C	673.13	12.06	661.07	13.52	659.61
MW-1S	W-10B	676.84	7.48	669.36	5.28	671.56
—	W-11A	676.66	7.43	669.23	NM	—
MW-4S	W-12B	677.89	16.45	661.44	17.69	660.20
MW-4D	W-12C	678.18	17.01	661.17	18.43	659.75
	W-13A	680.00	NM	—	NM	—
	W-14A	677.69	5.89	671.80	NM	—
	W-14B	677.37	6.70	670.67	NM	—
	W-15A	672.50	NM	—	NM	—
	W-16A	675.15	6.57	668.58	NM	—
	W-17A	673.46	NM	—	NM	—
	W-18A	674.53	NM	—	NM	—
	W-18C	674.91	13.60	661.31	NM	—
	W-19A	675.56	6.55	669.01	NM	—
	W-19C	675.17	14.22	660.95	NM	—
	W-20A	674.87	3.95	670.92	NM	—
	W-21A	674.04	6.16	667.88	NM	—
	W-21B	674.87	8.57	666.30	NM	—
	W-22A	674.87	6.32	668.55	NM	—
	W-23A	674.38	6.55	667.83	NM	—
	W-24A	675.09	NM	—	NM	—
	W-25A	676.55	4.65	671.90	NM	—
	W-25B	676.53	6.80	669.73	NM	—
	W-26A	674.25	5.87	668.38	NM	—
	W-26B	674.28	8.49	665.79	NM	—
	W-27A	675.82	6.13	669.69	NM	—
	W-28A	676.28	6.02	670.26	NM	—
	W-28C	676.55	15.24	661.31	NM	—
	W-29A	673.38	NM	—	NM	—

NOTES:

(1) All elevations are in feet above mean sea level.
(2) NM indicates water level not measured.
(3) Obstruction at 3.2 to 3.4 feet.
(4) Well could not be located due to excessive snow.

TABLE 2 (Continued)

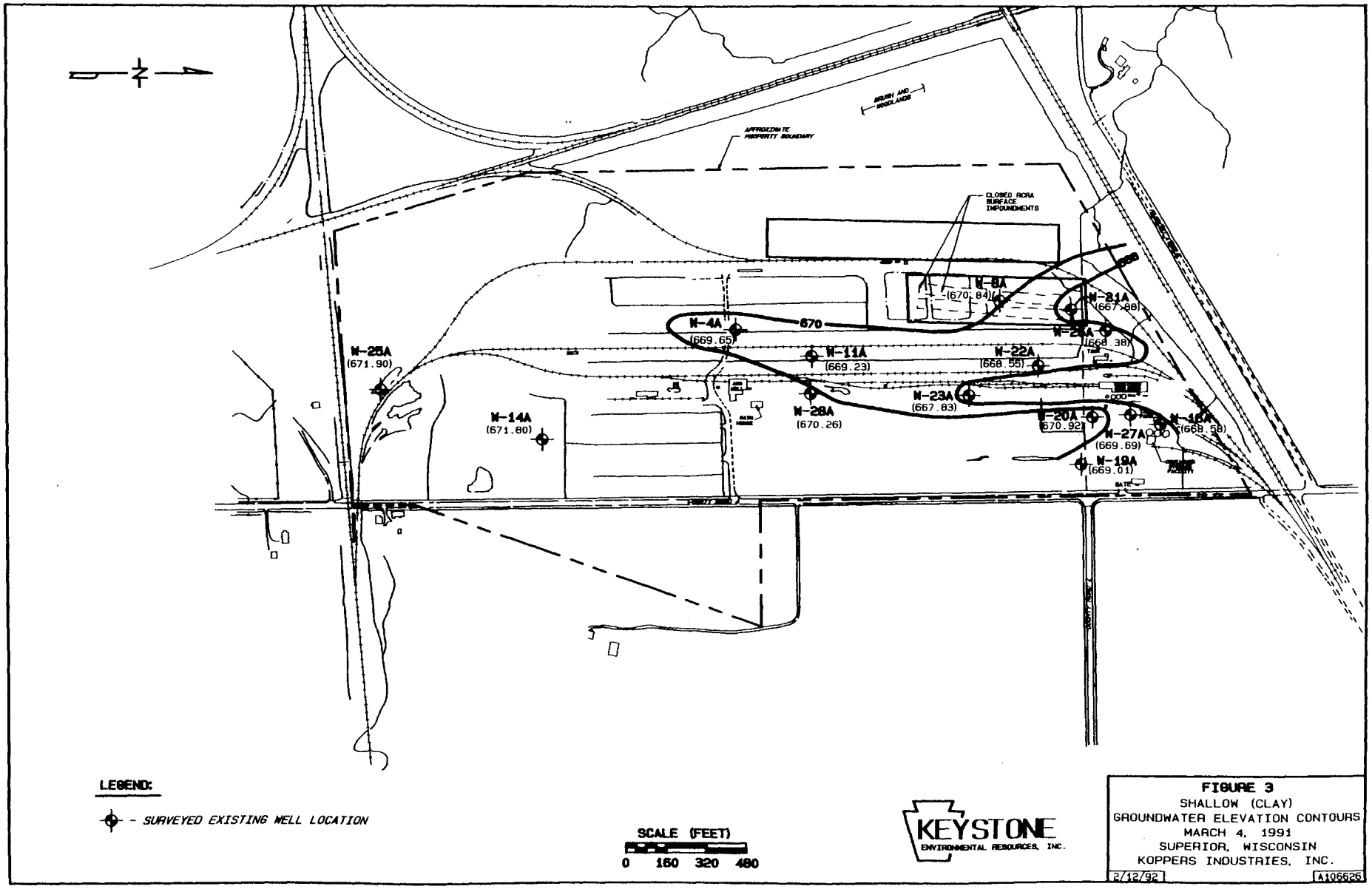
SUMMARY OF GROUNDWATER ELEVATIONS - 1991

KOPPERS INDUSTRIES, INC.
SUPERIOR, WISCONSIN

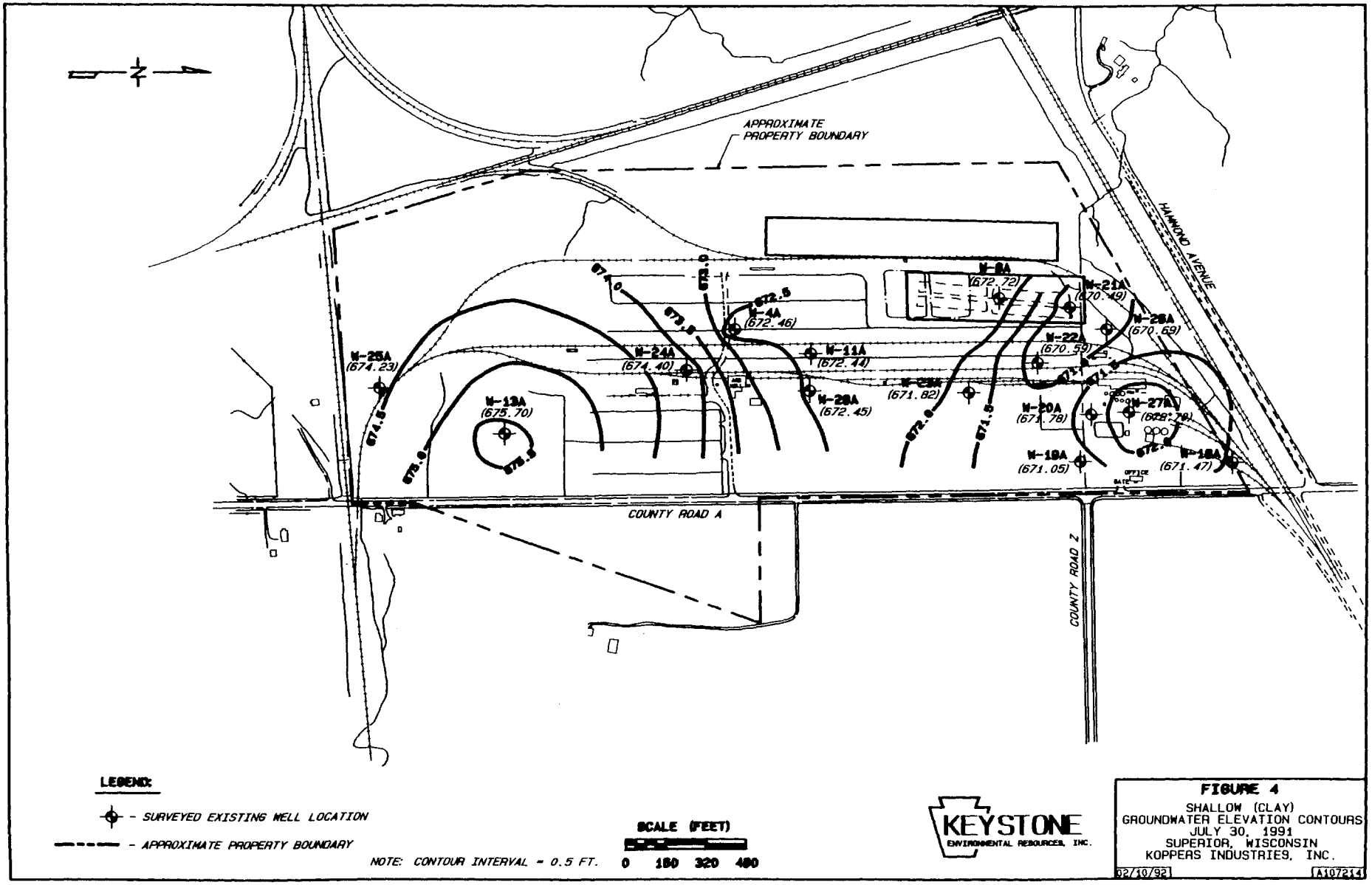
ORIGINAL WELL DESIGNATION	CURRENT WELL DESIGNATION	TOP OF CASING ELEVATION (feet)	7/30/91 DEPTH TO GROUNDWATER (feet)	7/30/91 GROUNDWATER ELEVATION (feet)	12/4/91 DEPTH TO GROUNDWATER (feet)	12/4/91 GROUNDWATER ELEVATION (feet)
W-1	W-1C	674.05	13.41	660.64	NM (4)	—
W-2	W-2C	672.65	NM	—	NM	—
W-3	W-3C	674.29	13.47	660.82	12.76	661.53
W-4C	W-4A	677.22	4.76	672.46	5.82	671.40
W-4A	W-4B	677.69	11.72	665.97	10.95	666.74
W-4B	W-4C	677.23	15.90	661.33	15.15	662.08
W-5	W-5C	674.92	13.75	661.17	NM	—
MW-2S	W-6B	674.65	5.71	668.94	4.25	670.40
R-6D	W-6C	675.73	14.99	660.74	14.17	661.56
R-7D	W-7C	674.10	13.22	660.88	12.49	661.61
—	W-8A	676.49	3.77	672.72	3.65	672.84
W-6 (R-8D)	W-8C	676.48	15.55	660.93	14.80	661.68
R-9D	W-9C	673.13	12.30	660.83	11.57	661.56
MW-1S	W-10B	676.84	5.69	671.15	5.19	671.65
—	W-11A	676.66	4.22	672.44	NM (4)	—
MW-4S	W-12B	677.89	17.23	660.66	15.75	662.14
MW-4D	W-12C	678.18	16.52	661.66	16.44	661.74
	W-13A	680.00	4.30	675.70	4.71	675.29
	W-14A	677.69	17.23	660.46	17.82	659.87
	W-14B	677.37	16.52	660.85	17.31	660.06
	W-15A	672.50	NM	—	NM	—
	W-16A	675.15	NM	—	4.19	670.96
	W-17A	673.46	NM	—	NM	—
	W-18A	674.53	3.06	671.47	3.28	671.25
	W-18C	674.91	13.15	661.76	12.03	662.88
	W-19A	675.56	4.51	671.05	5.28	670.28
	W-19C	675.17	14.46	660.71	13.71	661.46
	W-20A	674.87	3.09	671.78	NM (4)	—
	W-21A	674.04	3.55	670.49	3.96	670.08
	W-21B	674.87	8.60	666.27	9.13	665.74
	W-22A	674.87	4.28	670.59	5.03	669.84
	W-23A	674.38	2.56	671.82	2.71	671.67
	W-24A	675.09	0.69	674.40	NM (4)	—
	W-25A	676.55	2.32	674.23	NM (4)	—
	W-25B	676.53	5.79	670.74	NM (4)	—
	W-26A	674.25	3.56	670.69	3.97	670.28
	W-26B	674.28	8.51	665.77	7.26	667.02
	W-27A	675.82	3.12 (3)	672.70	(3)	—
	W-28A	676.28	3.83	672.45	NM (4)	—
	W-28C	676.55	15.46	661.09	NM (4)	—
	W-29A	673.38	NM	—	NM	—

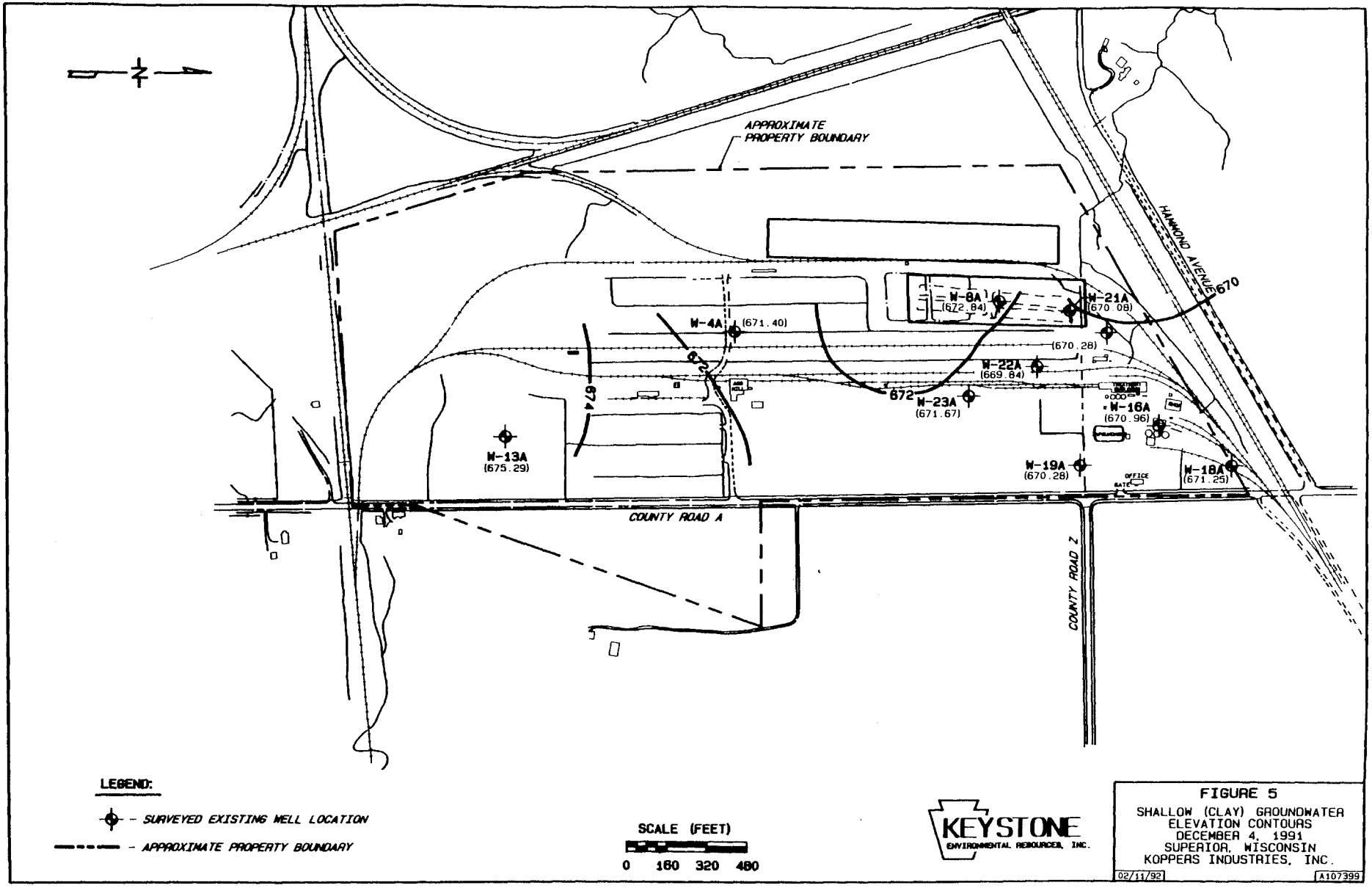
NOTES:

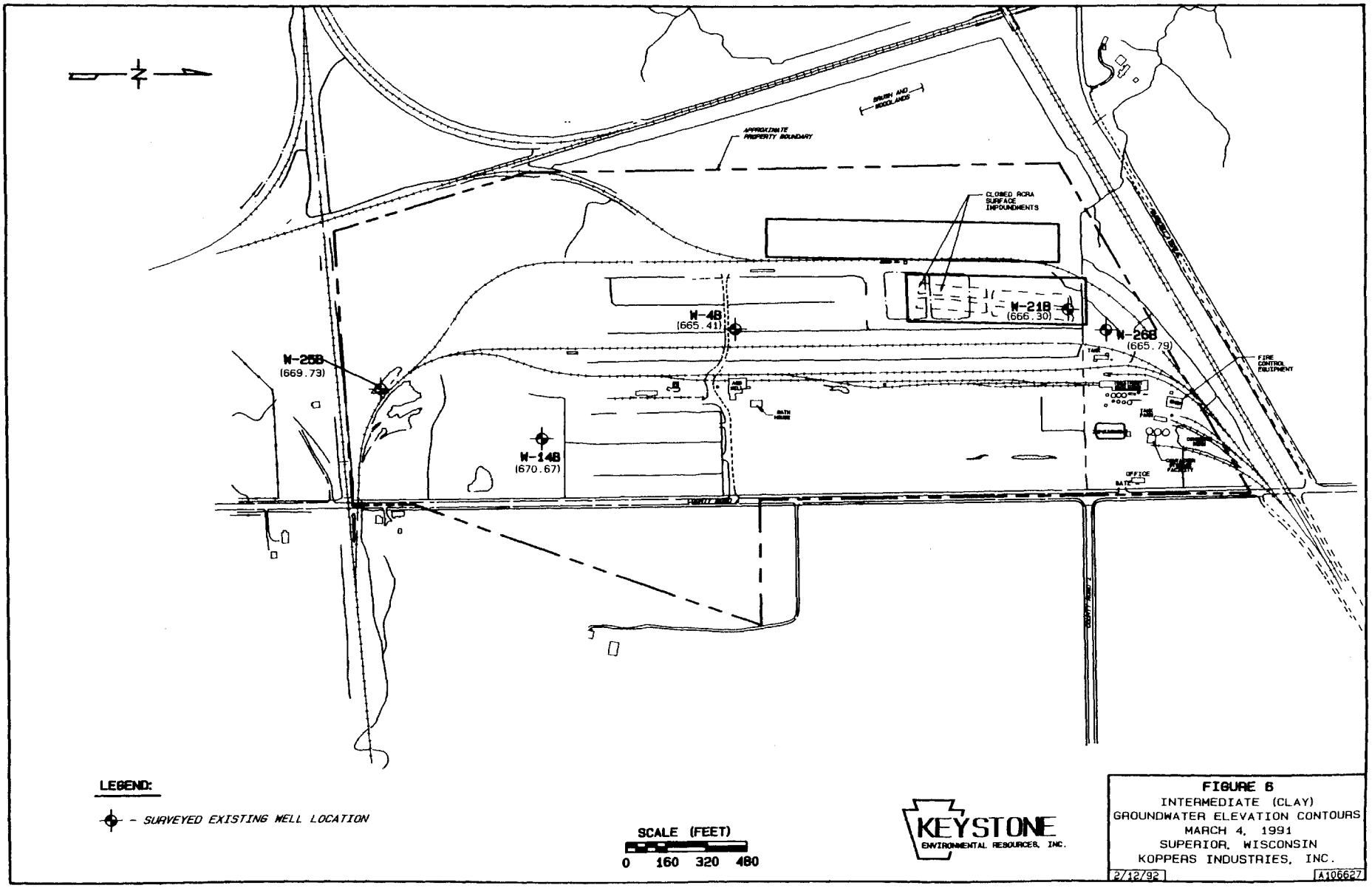
(1) All elevations are in feet above mean sea level.
(2) NM indicates water level not measured.
(3) Obstruction at 3.2 to 3.4 feet.
(4) Well could not be located due to excessive snow.

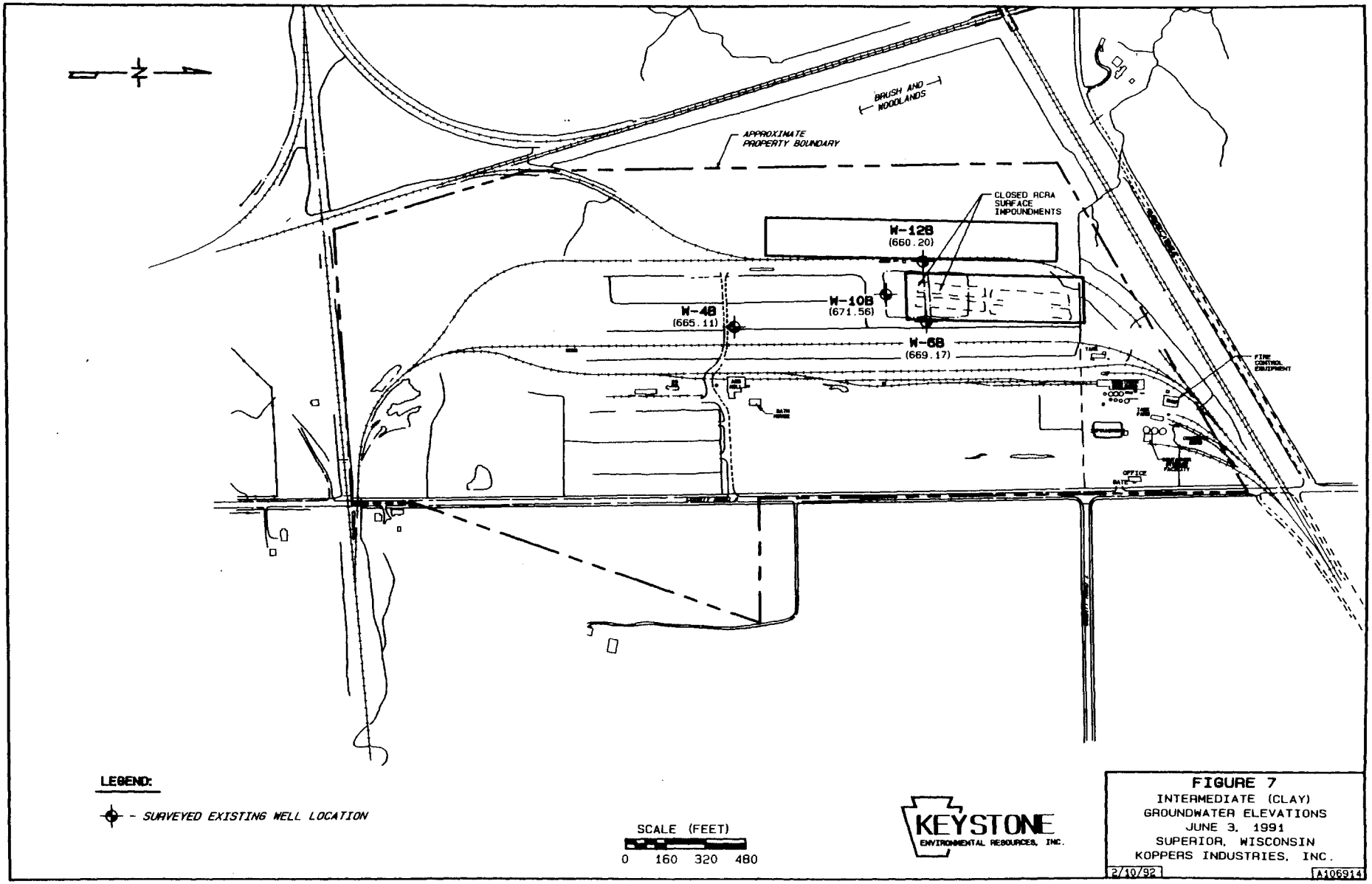

N
BRUSH AND WOODLANDS
APPROXIMATE PROPERTY BOUNDARY
CLOSED RCRA SURFACE IMPOUNDMENTS
M-8A (670.84)
M-21A (667.89)
M-20A (668.38)
M-4A (669.65)
670
M-11A (669.23)
M-22A (668.55)
M-25A (671.90)
M-23A (667.83)
M-14A (671.80)
M-26A (670.26)
M-20A (670.92)
M-27A (669.69)
M-19A (669.01)
M-18A (668.58)
LEGEND:
- SURVEYED EXISTING WELL LOCATION
SCALE (FEET)
0 160 320 480
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
FIGURE 3
SHALLOW (CLAY)
GROUNDWATER ELEVATION CONTOURS
MARCH 4, 1991
SUPERIOR, WISCONSIN
KOPPERS INDUSTRIES, INC.
2/12/92
A106626

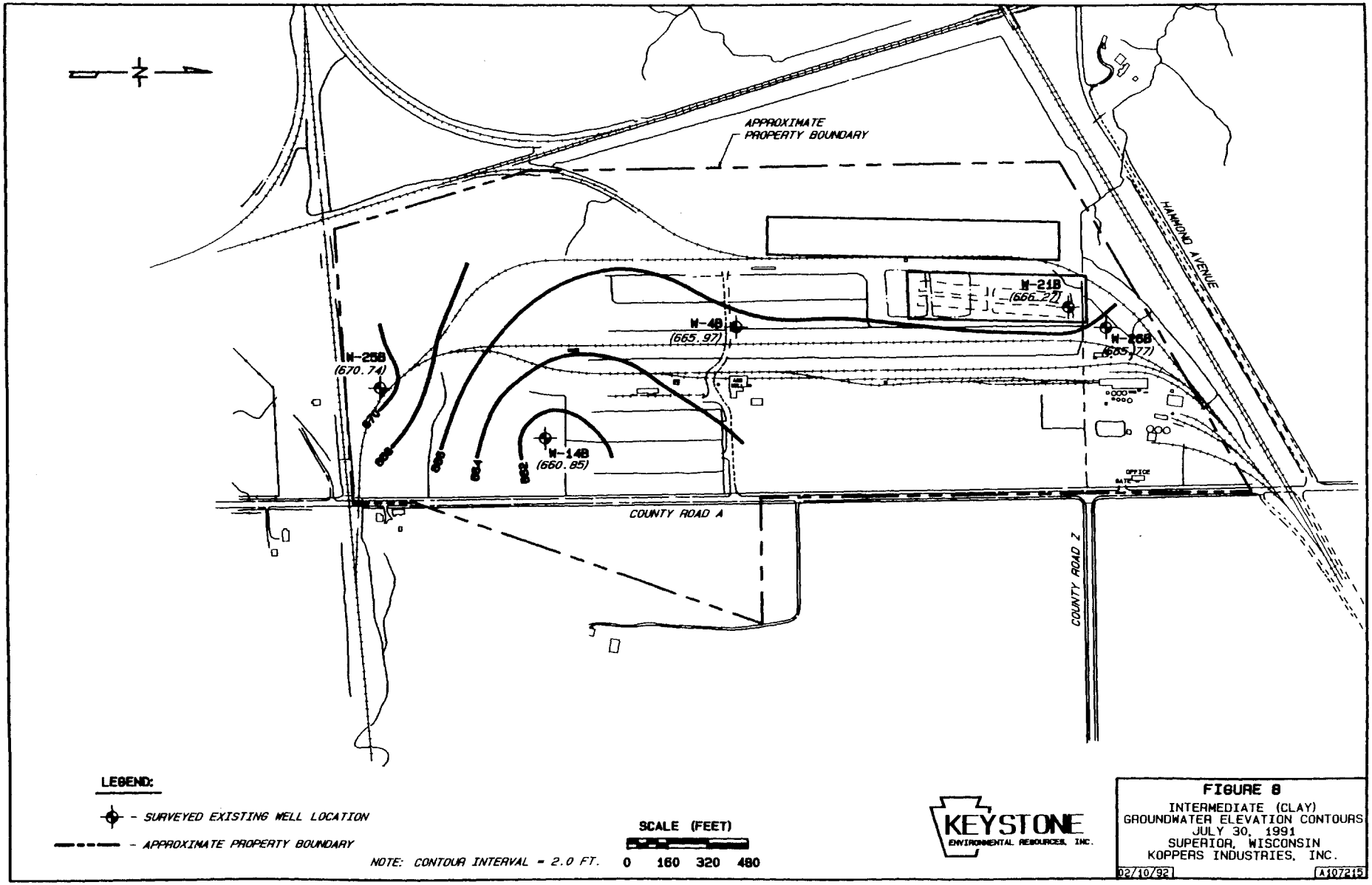
3d

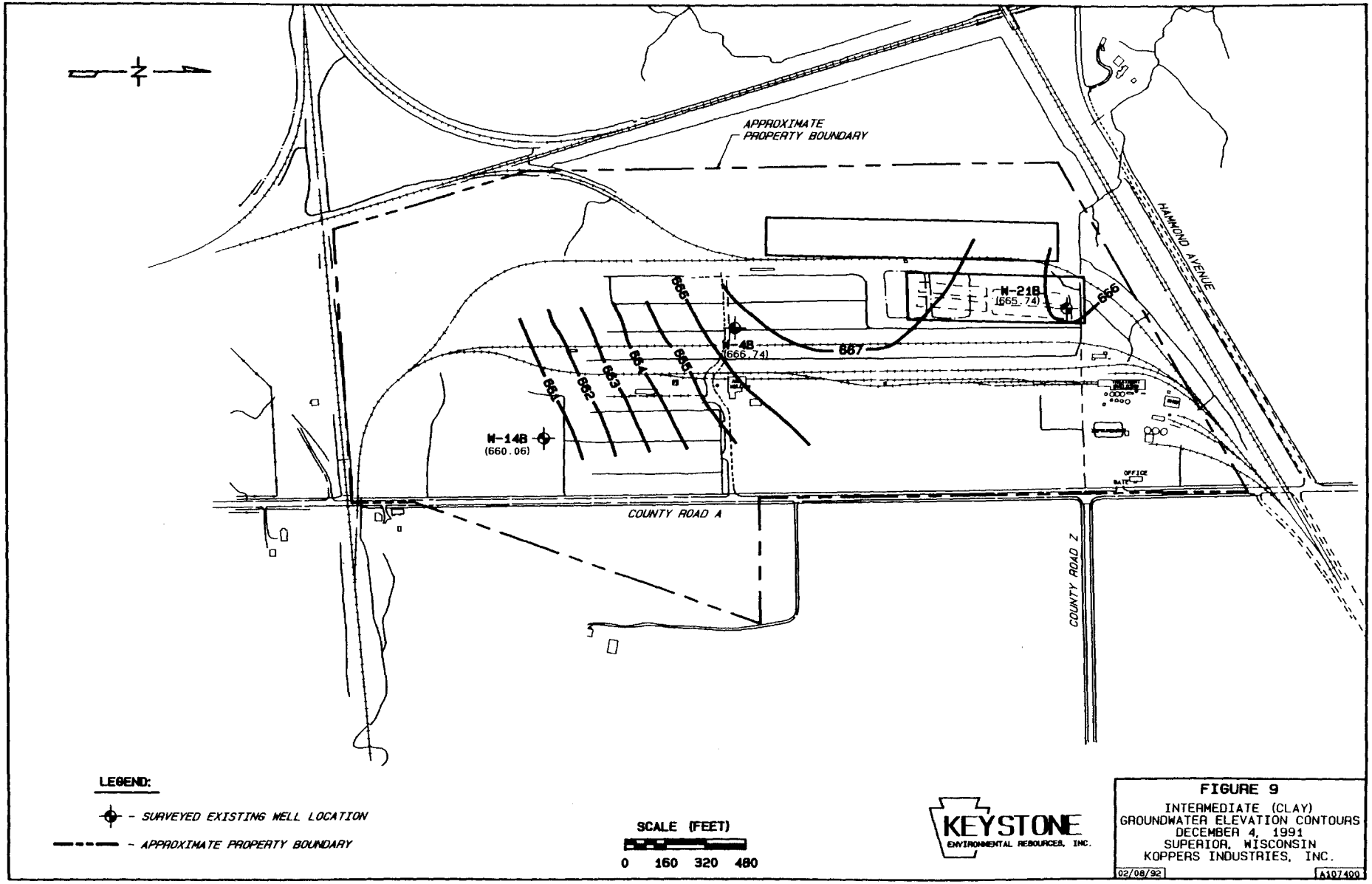

APPROXIMATE PROPERTY BOUNDARY
HAMMOND AVENUE
COUNTY ROAD A
COUNTY ROAD Z
OFFICE
SHED
W-8A (672.72)
W-21A (670.49)
W-4A (672.46)
W-28A (670.69)
W-22A (670.59)
W-25A (674.23)
W-24A (674.40)
W-11A (672.44)
W-23A (671.82)
W-13A (675.70)
W-29A (672.45)
W-20A (671.78)
W-27A (672.78)
W-19A (671.05)
W-18A (671.47)
675.0
674.5
673.0
672.5
672.0
671.5
LEGEND:
- SURVEYED EXISTING WELL LOCATION
- APPROXIMATE PROPERTY BOUNDARY
NOTE: CONTOUR INTERVAL = 0.5 FT.
SCALE (FEET)
0 160 320 480
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
FIGURE 4
SHALLOW (CLAY)
GROUNDWATER ELEVATION CONTOURS
JULY 30, 1991
SUPERIOR, WISCONSIN
KOPPERS INDUSTRIES, INC.
02/10/92
A107214

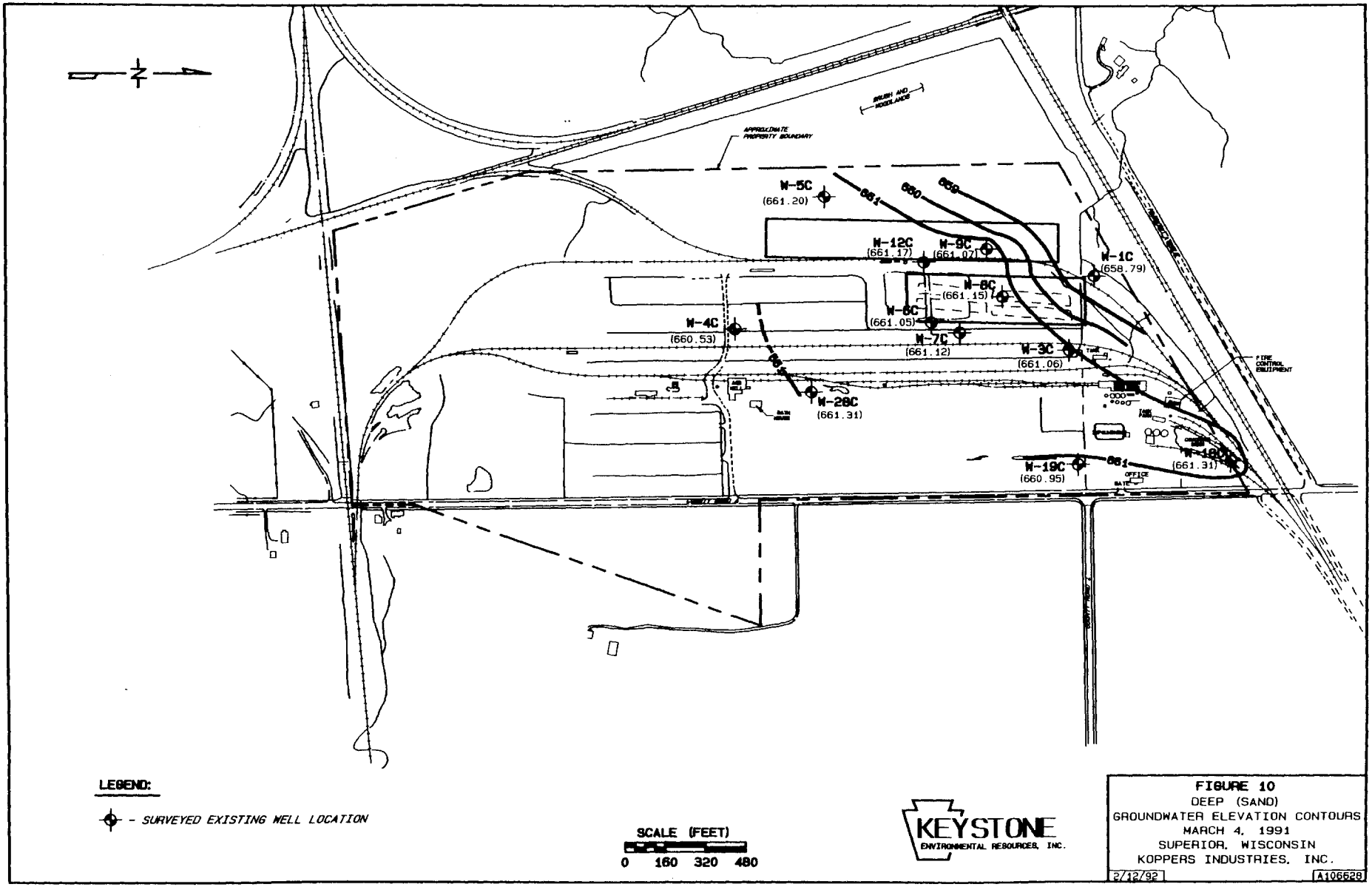

APPROXIMATE PROPERTY BOUNDARY
HAMMOND AVENUE
670
W-8A (672.84)
W-21A (670.08)
W-4A (671.40)
(670.28)
W-22A (669.84)
672
W-23A (671.67)
W-16A (670.96)
674
W-13A (675.29)
W-19A (670.28)
W-18A (671.25)
OFFICE
GATE
COUNTY ROAD A
COUNTY ROAD Z
LEGEND:
- SURVEYED EXISTING WELL LOCATION
- APPROXIMATE PROPERTY BOUNDARY
SCALE (FEET)
0 160 320 480
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
FIGURE 5
SHALLOW (CLAY) GROUNDWATER ELEVATION CONTOURS
DECEMBER 4, 1991
SUPERIOR, WISCONSIN
KOPPERS INDUSTRIES, INC.
02/11/92
A107399

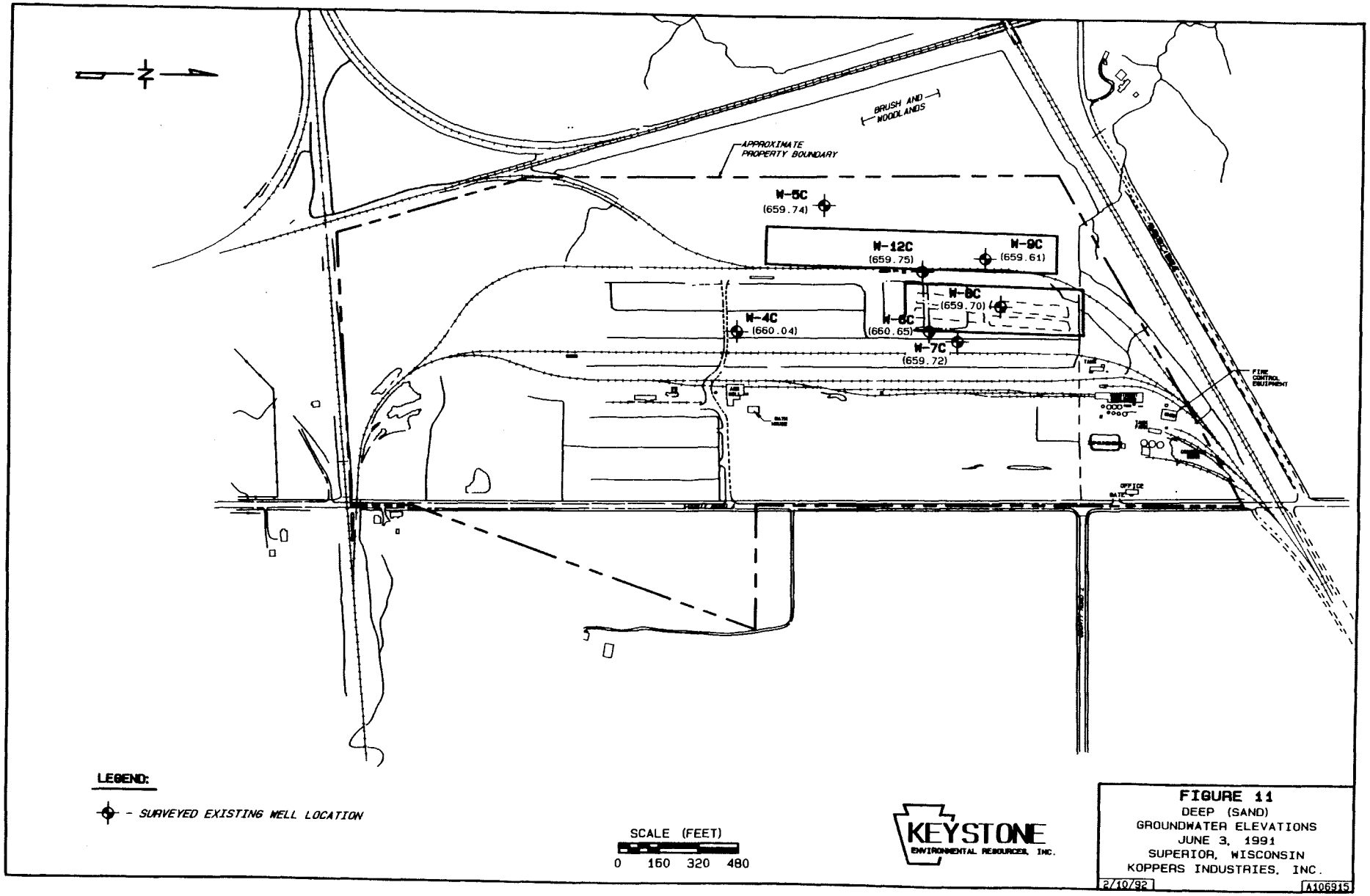

BRUSH AND WOODLANDS
APPROXIMATE PROPERTY BOUNDARY
CLOSED RCRA SURFACE IMPOUNDMENTS
W-4B (665.41)
W-21B (666.30)
W-26B (665.79)
W-25B (669.73)
W-14B (670.67)
FIRE CONTROL EQUIPMENT
BATH HOUSE
OFFICE
LEGEND:
- SURVEYED EXISTING WELL LOCATION
SCALE (FEET)
0 160 320 480
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
FIGURE 6
INTERMEDIATE (CLAY)
GROUNDWATER ELEVATION CONTOURS
MARCH 4, 1991
SUPERIOR, WISCONSIN
KOPPERS INDUSTRIES, INC.
2/12/92
A106627

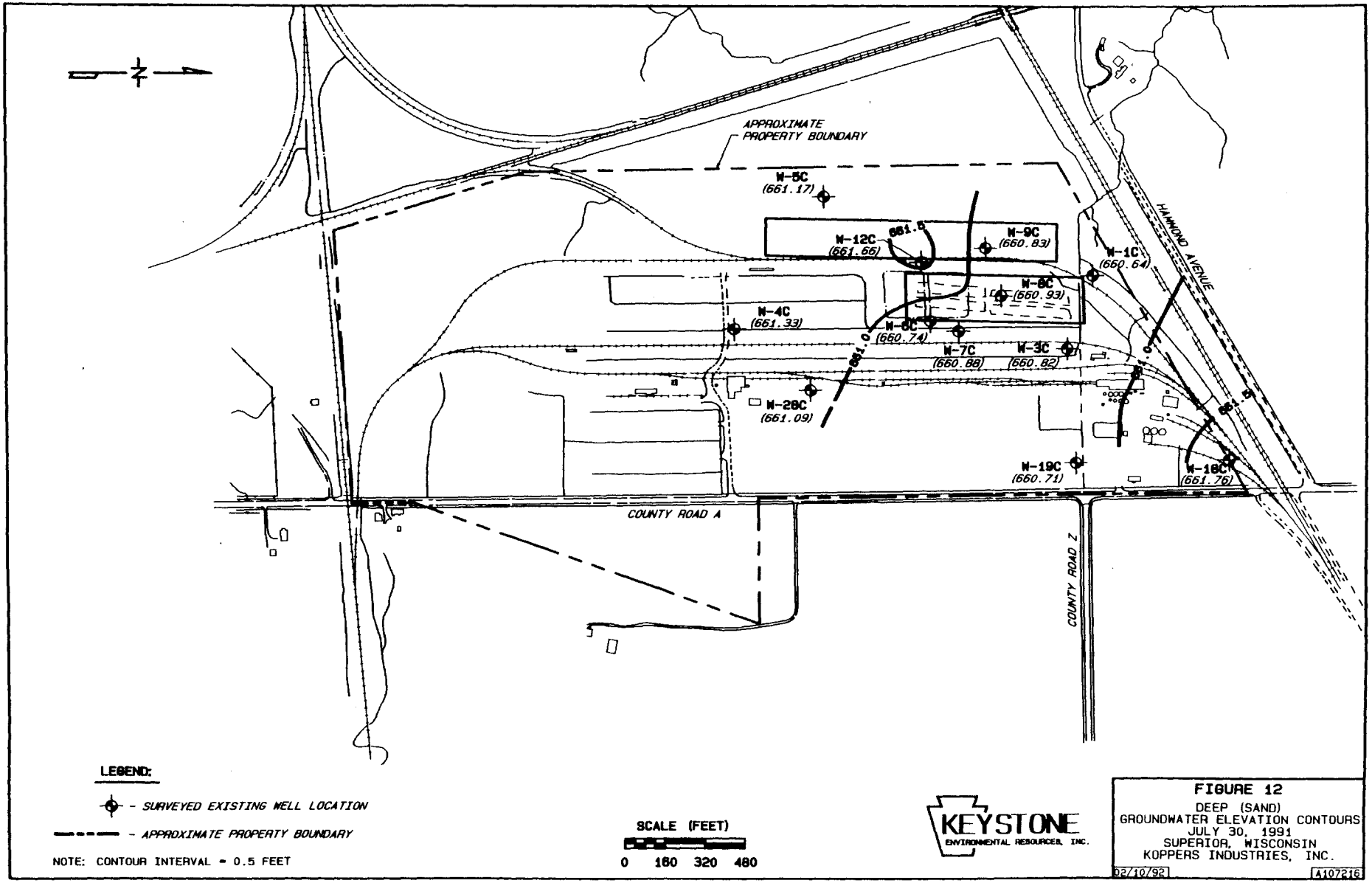

BRUSH AND WOODLANDS
APPROXIMATE PROPERTY BOUNDARY
CLOSED RCRA SURFACE IMPOUNDMENTS
W-12B
(660.20)
W-10B
(671.56)
W-4B
(665.11)
W-6B
(669.17)
FIRE CONTROL EQUIPMENT
OFFICE
SCALE (FEET)
0 160 320 480
LEGEND:
- SURVEYED EXISTING WELL LOCATION
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
FIGURE 7
INTERMEDIATE (CLAY)
GROUNDWATER ELEVATIONS
JUNE 3, 1991
SUPERIOR, WISCONSIN
KOPPERS INDUSTRIES, INC.
2/10/92
A106914


APPROXIMATE
PROPERTY BOUNDARY
HAMMOND AVENUE
M-21B
(666.27)
M-4B
(665.97)
M-26B
(665.77)
M-25B
(670.74)
M-14B
(660.85)
670
660
650
640
630
COUNTY ROAD A
COUNTY ROAD Z
OFFICE
GATE
LEGEND:
- SURVEYED EXISTING WELL LOCATION
- APPROXIMATE PROPERTY BOUNDARY
NOTE: CONTOUR INTERVAL = 2.0 FT.
SCALE (FEET)
0 160 320 480
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
FIGURE 8
INTERMEDIATE (CLAY)
GROUNDWATER ELEVATION CONTOURS
JULY 30, 1991
SUPERIOR, WISCONSIN
KOPPERS INDUSTRIES, INC.
02/10/92
A107215

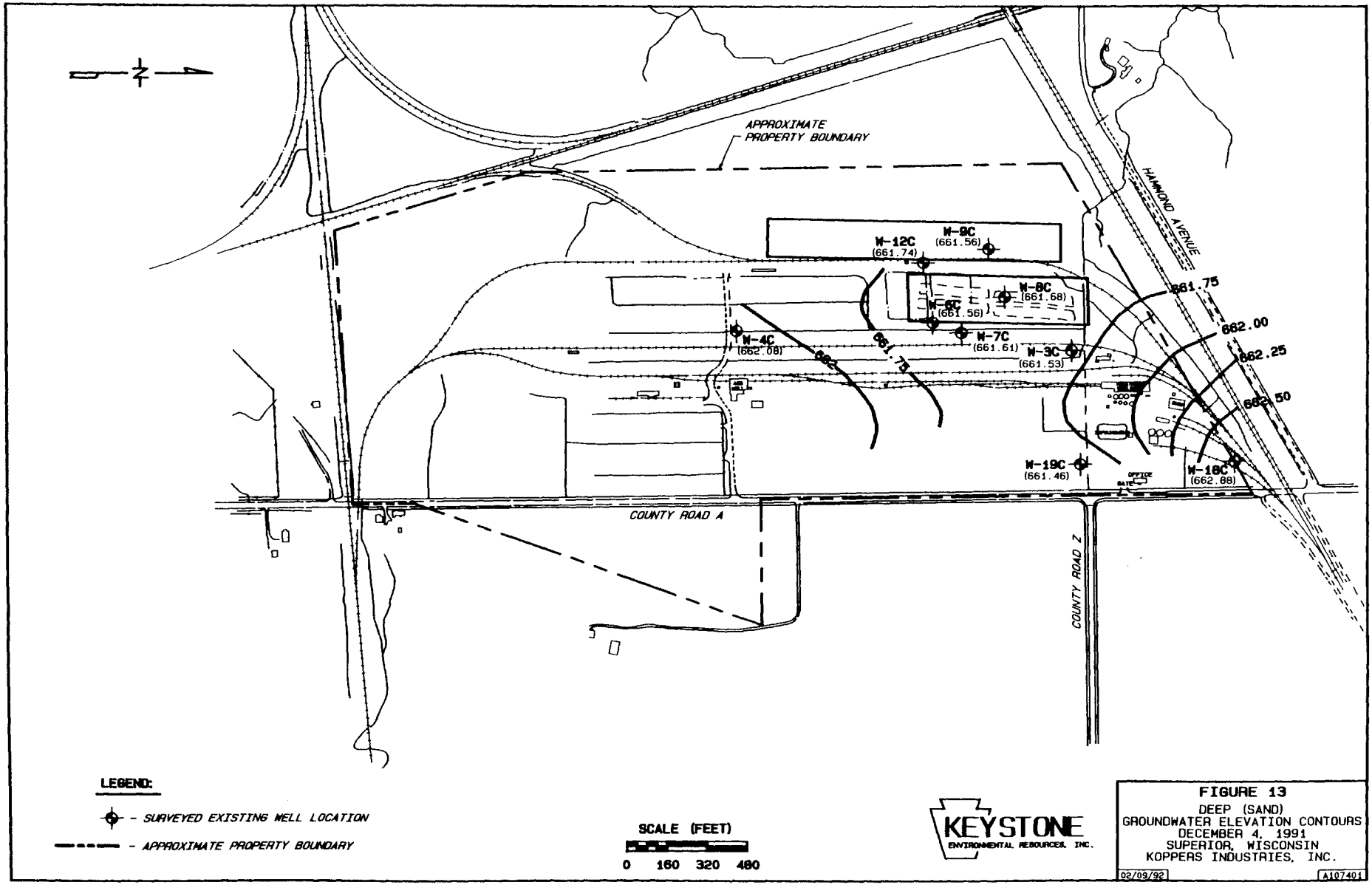

APPROXIMATE
PROPERTY BOUNDARY
HAMMOND AVENUE
M-21B
(665.74)
M-4B
(666.74)
M-14B
(660.06)
662
663
664
665
666
667
COUNTY ROAD A
COUNTY ROAD Z
OFFICE
BATH
LEGEND:
- SURVEYED EXISTING WELL LOCATION
- APPROXIMATE PROPERTY BOUNDARY
SCALE (FEET)
0 160 320 480
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
FIGURE 9
INTERMEDIATE (CLAY)
GROUNDWATER ELEVATION CONTOURS
DECEMBER 4, 1991
SUPERIOR, WISCONSIN
KOPPERS INDUSTRIES, INC.
02/08/92
A107400


APPROXIMATE PROPERTY BOUNDARY
BRUSH AND WOODLANDS
W-5C (661.20)
W-12C (661.17)
W-9C (661.02)
W-1C (658.79)
W-8C (661.15)
W-6C (661.05)
W-4C (660.53)
W-7C (661.12)
W-3C (661.06)
W-2BC (661.31)
W-19C (660.95)
W-10C (661.31)
650
659
661
FIRE CONTROL EQUIPMENT
OFFICE
LEGEND:
- SURVEYED EXISTING WELL LOCATION
SCALE (FEET)
0 160 320 480
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
FIGURE 10
DEEP (SAND)
GROUNDWATER ELEVATION CONTOURS
MARCH 4, 1991
SUPERIOR, WISCONSIN
KOPPERS INDUSTRIES, INC.
2/12/92
A106628


BRUSH AND WOODLANDS
APPROXIMATE PROPERTY BOUNDARY
W-5C (659.74)
W-12C (659.75)
W-9C (659.61)
W-8C (659.70)
W-4C (660.04)
W-6C (660.65)
W-7C (659.72)
FIRE CONTROL EQUIPMENT
OFFICE
LEGEND:
- SURVEYED EXISTING WELL LOCATION
SCALE (FEET)
0 160 320 480
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
FIGURE 11
DEEP (SAND)
GROUNDWATER ELEVATIONS
JUNE 3, 1991
SUPERIOR, WISCONSIN
KOPPERS INDUSTRIES, INC.
2/10/92
A106915


APPROXIMATE
PROPERTY BOUNDARY
W-5C
(661.17)
W-12C
(661.66)
661.5
W-9C
(660.83)
W-1C
(660.64)
HAMMOND AVENUE
W-8C
(660.93)
W-4C
(661.33)
W-6C
(660.74)
661.0
W-7C
(660.88)
W-3C
(660.82)
W-28C
(661.09)
W-19C
(660.71)
W-18C
(661.76)
COUNTY ROAD A
COUNTY ROAD Z
LEGEND:
- SURVEYED EXISTING WELL LOCATION
- APPROXIMATE PROPERTY BOUNDARY
NOTE: CONTOUR INTERVAL = 0.5 FEET
SCALE (FEET)
0 160 320 480
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
FIGURE 12
DEEP (SAND)
GROUNDWATER ELEVATION CONTOURS
JULY 30, 1991
SUPERIOR, WISCONSIN
KOPPERS INDUSTRIES, INC.
02/10/92
A107216

3m


APPROXIMATE
PROPERTY BOUNDARY
HAMMOND AVENUE
COUNTY ROAD A
COUNTY ROAD Z
W-12C
(661.74)
W-9C
(661.56)
W-8C
(661.68)
W-6C
(661.56)
W-4C
(662.08)
W-7C
(661.61)
W-3C
(661.53)
W-19C
(661.46)
W-16C
(662.88)
661.75
662.00
662.25
662.50
662
661.75
OFFICE
GATE
LEGEND:
- SURVEYED EXISTING WELL LOCATION
- APPROXIMATE PROPERTY BOUNDARY
SCALE (FEET)
0 160 320 480
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.
FIGURE 13
DEEP (SAND)
GROUNDWATER ELEVATION CONTOURS
DECEMBER 4, 1991
SUPERIOR, WISCONSIN
KOPPERS INDUSTRIES, INC.
02/09/92
A107401

3n

Also, during the first quarter of 1991, data from well W-15A was not utilized in contouring efforts for the first quarter due to an anomalously high elevation, which may have been caused by leakage into the flushmount cover. During the third and fourth quarters of 1991, the groundwater elevations calculated for well M-14A were anomalous, and not used for contouring. Comparing these figures to the USGS topographic map, a groundwater divide in the vicinity of the site is suggested by regional surface water drainage patterns. A northward component of flow is also suggested, toward Lake Superior, although easterly and/or westerly components are possible, towards Crawford Creek and/or Bluff Creek.

Groundwater contours drawn for the intermediate clay zone are depicted on Figures 8 and 9. Groundwater elevations for wells W-6B, W-10B and W-12B were not used in contouring in the intermediate clay level as the elevations of the bottom of the screened intervals of these three wells is higher than other site "B"-level wells. Groundwater elevations which may be contoured together (due to similar bottom elevations of wells) are scarce in the immediate vicinity of the impoundments, and the gradient between wells W-4B and W-21B is not consistent between drawings. However, considering historical groundwater contour maps and the projected regional drainage direction, groundwater most likely flows in a northerly direction across the impoundments in the intermediate clay zone, although easterly and/or westerly components are also possible at this level, towards Crawford Creek and/or Bluff Creek.

Figures 10, 12 and 13 are groundwater contour maps developed for the deep (sand) unit. Groundwater generally flows to the north in the sand unit across the impoundments.

During the first quarter of 1991, a measurable thickness of dense, nonaqueous phase liquid (DNAPL) was detected in well W-27A; its apparent thickness was 4.32 feet. During the third quarter of 1991, well W-8A was found to contain a trace of DNAPL of non-measurable thickness. By the third quarter 1991 sampling event, well W-27A had been damaged. The well was obstructed at 3.2 to 3.4 feet. The outer casing was bent and the concrete pad destroyed. The interface probe with which a DNAPL measurement was being attempted, was found to be coated with

bentonite upon its removal, thus it is suspected that the PVC riser is ruptured. Due to very adverse winter weather conditions at Superior, Beazer is currently planning to repair or replace this well, and inspect and maintain other cracked concrete pads in the second quarter of 1992.

An average annual estimated horizontal groundwater flow velocity was calculated for both portions of the clay unit, and the sand aquifer using the equation $v = Ki/n$, where (v) is the average linear groundwater flow velocity, (K) is the hydraulic conductivity, (i) is the average hydraulic gradient and (n) is effective porosity.

The horizontal hydraulic conductivity of the shallow and intermediate clay from slug tests conducted in December 1987 and during the Phase II RFI averages 8.53×10^{-6} cm/sec. An effective porosity of 0.30 (30%) was determined for the clay from literature references. For the shallow ("A"-level) clay zone, unitless hydraulic gradients of 0.0092, 0.0012 and 0.0073 (0.0059 average) were measured across the impoundments from Figures 3, 4 and 5, respectively. The calculated horizontal groundwater flow velocity is 1.68×10^{-7} cm/sec (4.8×10^{-4} ft/day, 0.18 ft/yr). For the intermediate ("B"-level) clay zone, a hydraulic gradient of 0.0022 was measured in a northerly direction (between wells W-6B and W-21B) from Figure 9. The calculated horizontal groundwater flow velocity is 6.30×10^{-8} cm/sec (1.8×10^{-4} ft/day, 0.07 ft/yr).

The horizontal hydraulic conductivity of the sand averages 8.00×10^{-3} cm/sec from a previous pump test and slug tests conducted during the Phase II RFI. An effective porosity of 0.20 (20%) was determined for the sand from literature references. For the sand ("C"-level) unit, unitless hydraulic gradients determined from Figures 10 and 11, respectively, were 0.0102 and 0.0003 in a northerly direction. The average of these values is 0.0053. The calculated horizontal groundwater flow velocity is 2.12×10^{-4} cm/sec (0.6 ft/day, 220 ft/yr) for the sand.

All of these calculated average horizontal groundwater flow velocities represent conservatively high estimates of the rate of migration of constituents dissolved in groundwater. Processes such as adsorption and biochemical degradation have not been considered in these estimates.

3.0 GROUNDWATER QUALITY

Four sampling rounds were conducted during 1991 at the Superior, Wisconsin site. The wells sampled during each round and the parameters for which each sample was analyzed are indicated in Table 3. Notes at the bottom of Table 3 explain that certain analyses could not be performed on some samples. Several wells screened within the clay at the Superior site exhibit extremely slow recoveries after purging. During groundwater sampling, there is sometimes insufficient water in the well to enable sample collection. The Appendix contains the laboratory analytical data for 1991.

During all four quarters of 1991, the commonly detected dissolved metals were calcium, manganese and sodium. Dissolved potassium was detected in the groundwater sample from well W-5C at a concentration close to the method detection limit during the first quarter of 1991, and dissolved lead was detected at a concentration equivalent to the method detection limit of 3.00 ug/L in the sample from well W-12B during the third quarter of 1991.

During the fourth quarter of 1991, all samples collected were analyzed for the Appendix IX suite of metals, with the exception of well W-10B, where groundwater recovery was insufficient. During the fourth quarter, only dissolved barium, calcium, manganese and sodium were detected in groundwater samples. Five of the ten samples analyzed contained dissolved barium, at concentrations ranging from 200 to 290 ug/L; these concentrations are just slightly above the detection limit of 200 ug/L.

During the second quarter of 1991, the sample from well W-5C and the accompanying field (equipment) and trip blanks were analyzed separately for pentachlorophenol (PCP) and phenol. The concentration of phenol was below the method detection limit. PCP was detected by Keystone Method 589, at a concentration of 2.59 ug/L in the sample from well W-5C.

During the fourth quarter of 1991, Appendix IX analyses were performed on groundwater samples collected from the Superior facility. These analyses included

TABLE 3

SUMMARY OF GROUNDWATER QUALITY SAMPLING
1991 RCRA MONITORING

KOPPERS INDUSTRIES, INC.
SUPERIOR, WISCONSIN

DATE	SAMPLED WELLS	PARAMETERS
March 4–6, 1991	W-4A, W-4B, W-4C, W-5C, W-6B, W-6C, W-7C, W-8C, W-9C, W-10B, W-12B, W-12C, TB, FB, TB, FB	pH, SC, Temperature, TOC, TOX, TDS, Soluble COD, Chloride, Nitrate as N, Ammonia Nitrogen as N, Turbidity, Hardness, Apparent Color, Dissolved Metals (Al, As, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Na, V, Zn) Volatiles, Semivolatiles
June 4, 1991	W-4A, W-4B, W-4C, W-5C, W-6B, W-6C, W-7C, W-8C, W-9C, W-10B, W-12B, W-12C, TB, FB	pH, SC, Temperature, TOC, TOX, TDS, Soluble COD, Chloride, Nitrate as N, Ammonia Nitrogen as N, Turbidity, Hardness, Apparent Color, Dissolved Metals (Al, As, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Na, V, Zn) Volatiles, Semivolatiles
July 30 to August 1, 1991	W-4A, W-4B, W-4C, W-5C, W-6B, W-6C, W-7C, W-8C, W-9C, W-10B, W-12B, W-12C, TB, FB	pH, SC, Temperature, TOC, TOX, TDS, Soluble COD, Chloride, Nitrate as N, Ammonia Nitrogen as N, Turbidity, Hardness, Apparent Color, Dissolved Metals (Al, As, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Na, V, Zn) Volatiles, Semivolatiles
December 5, 1991	W-4A, W-4B, W-4C, W-6B, W-6C, W-7C, W-8C, W-9C, W-10B, W-12B, W-12C, TB, FB, TB, FB	pH, SC, Temperature, TOC, TOX, TDS, Soluble COD, Chloride, Fluoride, Nitrate as N Ammonia Nitrogen as N, Turbidity, Hardness, Apparent Color, Total Cyanide Total Sulfide, Total and Dissolved Metals (Ag, As, Ba, Be, Cd, Co, Cr, Cu, Hg, Ni, Pb, Sb, Se, Sn, Th, V, Z), Dissolved Metals (Al, Ca, Fe, K, Mn, Na), Appendix IX (Volatiles, Semivolatiles, Organochlorine Pesticides, Organophsophorous Pesticides, Herbicides) Dioxins, Furans

NOTES:

(1) FB denotes field (equipment) blank. TB denotes trip blank. These were analyzed for selected parameters.
(2) During the June 4, 1991 sampling, samples from well W-5C and associated field and trip blanks were also analyzed for phenol and pentachlorophenol.
(3) During the July 30 to August 1, 1991 sampling, samples from wells W-4A, W-4C, W-5C and W-12B were not analyzed for soluble COD, and nitrate analyses were performed outside of holding time allowances.
(4) During the December 5, 1991 sampling, the following analyses were not run due to insufficient water present in the well at the time of sampling: Well W-10B (dissolved metals and organophosphorous pesticides).

the Appendix IX lists of volatile and semivolatile constituents by EPA Methods 8240 and 8270, respectively, organochlorine pesticides (EPA Method 8080), organophosphorous pesticides (EPA Method 8140) and herbicides (EPA Method 8150). Dioxins and furans were also analyzed on these samples (EPA Method 8280).

Organophosphorous pesticides and herbicides were not detected in groundwater from any well. It should be noted that the sample from well W-10B was not analyzed for organophosphorous pesticides due to poor recovery. An organochlorine pesticide, kepone, was detected in all of the fourth quarter 1991 samples at concentrations ranging from 1.25 ug/L to 4.60 ug/L. The method detection limit for kepone is 0.100 ug/L. Kepone was also found in the field and trip blanks at respective concentrations of 1.87 ug/L and 1.09 ug/L. Dieldrin was detected in the sample from well W-9C at a concentration of 0.123 ug/L.

Table 4 lists all detected volatile and semivolatile organic constituents for the four quarters of 1991, including the fourth quarter Appendix IX detected volatiles and semivolatiles. As may be seen from examination of this list, the only potentially site-related constituent detected was pentachlorophenol (PCP). PCP was detected at a concentration of 360 ug/L in groundwater from well W-12B and 59.2 ug/L in groundwater from well W-12C during the second quarter (June 4, 1991) sampling event. PCP was detected again in groundwater from well W-12B during the third quarter (July 30 through August 1, 1991) sampling event. During the fourth quarter (December 5, 1991) sampling event, PCP was detected only in the sample from well W-10B, at a concentration of 74.5 ug/L. Acetone, 2-butanone, chloroform and methylene chloride are not considered to be site-related, as they are commonly used in the laboratory, and were detected in several blank samples collected for quality control purposes. Bis(2-ethylhexyl)phthalate was detected in some blank samples and in several groundwater samples. Traces of this constituent, which may be associated with rubber or plastic, are commonly noted as a result of sampling procedures, and are not considered to be due to activities at the facility.

Table 5 lists concentrations of dioxins and furans, which are presented at the parts per trillion (nanograms per liter) level. No concentrations exceeded the EMPC

TABLE 4

DETECTED VOLATILE AND
SEMIVOLATILE ORGANIC CONSTITUENTS - 1991

KOPPERS INDUSTRIES, INC.
SUPERIOR, WISCONSIN

SAMPLE	PARAMETER	CLASSIFICATION	CONCENTRATION (ug/l)
March 4-6, 1991			
W-4B	acetone	volatile	24.5
W-4B	2-butanone	volatile	12.0
W-5C	acetone	volatile	16.9
W-9C	bis(2-ethylhexyl)phthalate	semivolatile	19.6
FB2 (3-6-91)	chloroform	volatile	7.60
TB (3-5-91)	chloroform	volatile	7.70
TB (3-5-91)	chloroform	volatile	8.60
LB	bis(2-ethylhexyl)phthalate	semivolatile	22.7
June 4, 1991			
W-5C	pentachlorophenol*	semivolatile	2.59
W-4B	acetone	volatile	22.4
W-4C	acetone	volatile	18.4
W-6B	acetone	volatile	11.8
W-12B	pentachlorophenol	semivolatile	360
W-12C	pentachlorophenol	semivolatile	59.2
FB (6-4-91)	acetone	volatile	26.6
FB (6-4-91)	2-butanone	volatile	11.9
TB (6-4-91)	acetone	volatile	12.0
TB (6-4-91)	2-butanone	volatile	30.4
LB	bis(2-ethylhexyl)phthalate	semivolatile	12.2
July 30-August 1, 1991			
W-9C	bis(2-ethylhexyl)phthalate	semivolatile	200
W-12B	pentachlorophenol	semivolatile	565
W-12B	bis(2-ethylhexyl)phthalate	semivolatile	157
W-12C	bis(2-ethylhexyl)phthalate	semivolatile	23.7
TB (7-31-91)	bis(2-ethylhexyl)phthalate	semivolatile	38.9
LB	methylene chloride	volatile	6.20
LB	bis(2-ethylhexyl)phthalate	semivolatile	109
December 5, 1991			
W-6B	acetone	volatile	24.0
W-6C	acetone	volatile	24.0
W-10B	pentachlorophenol	semivolatile	74.5

NOTES:

(1) Concentrations of volatile and semivolatile organic constituents in water were determined by EPA Methods 8240 and 8270, respectively.
(2) FB denotes field (equipment) blank. TB denotes trip blank. LB denotes laboratory blank.
(3) The fourth quarter (December 5, 1991) volatile and semivolatile organics analyses were performed as part of the Appendix IX analyses.
(4) The * indicates that the pentachlorophenol determination for well W-5C during the second quarter was via Keystone 589 Method, which utilizes electron capture detection.

TABLE 5

DETECTED DIOXINS/FURANS - 1991

KOPPERS INDUSTRIES, INC.
SUPERIOR, WISCONSIN

WELL/SAMPLE	ANALYTE	CONCENTRATION (ppt)
Method Blank	Total TCDD	EMPC
Method Blank	Total TCDF	EMPC
W-4A	Total TCDD	EMPC
W-4A	Total TCDF	EMPC
W-4B	Total TCDD	EMPC
W-4B	Total PeCDD	EMPC
W-4B	Total TCDF	EMPC
W-4C	Total TCDD	EMPC
W-4C	Total TCDF	EMPC
W-6B	Total TCDD	EMPC
W-6B	Total TCDF	EMPC
W-6C	Total TCDD	EMPC
W-6C	Total TCDF	EMPC
W-7C	Total TCDD	EMPC
W-7C	Total TCDF	EMPC
W-8C	Total TCDD	EMPC
W-8C	Total TCDF	EMPC
W-9C	Total TCDD	EMPC
W-9C	Total TCDF	EMPC
W-10B	Total TCDD	EMPC
W-10B	Total TCDF	EMPC
W-12B	Total TCDD	EMPC
W-12B	Total TCDF	EMPC
W-12C	Total TCDD	EMPC
W-12C	Total TCDF	EMPC
FB	Total TCDD	EMPC
FB	Total TCDF	EMPC
TB	Total TCDD	EMPC
TB	Total TCDF	EMPC

NOTES:

(1) "EMPC" indicates estimated maximum possible concentration.
(2) Samples were collected during the December 5, 1991 sampling round.
(3) FB indicates field (equipment) blank. TB indicates trip blank.

(which is the estimated maximum possible concentration). The EMPC includes all isomers and are generally considered to be below the detection limit for toxicity equivalent concentration calculations for risk evaluations, as the compound did not meet identification criteria.

4.0 CURRENT SITE STATUS

The Phase II RFI Report, which was prepared by Keystone on behalf of Beazer was submitted to the WDNR and the U.S. EPA, Region V in June 1991. This Report is currently under review by both agencies.

Keystone, on behalf of Beazer, has also recently completed an Existing Conditions Report which proposes a revised RCRA quarterly post-closure compliance monitoring program for the two former RCRA K001 impoundments. The current quarterly groundwater monitoring program for the former RCRA surface impoundments will remain unchanged in 1992, until the proposed post-closure groundwater compliance monitoring program, under review by WDNR, is approved or the program is otherwise amended.

Diane M. Smith

Diane M. Smith
Hydrogeologist