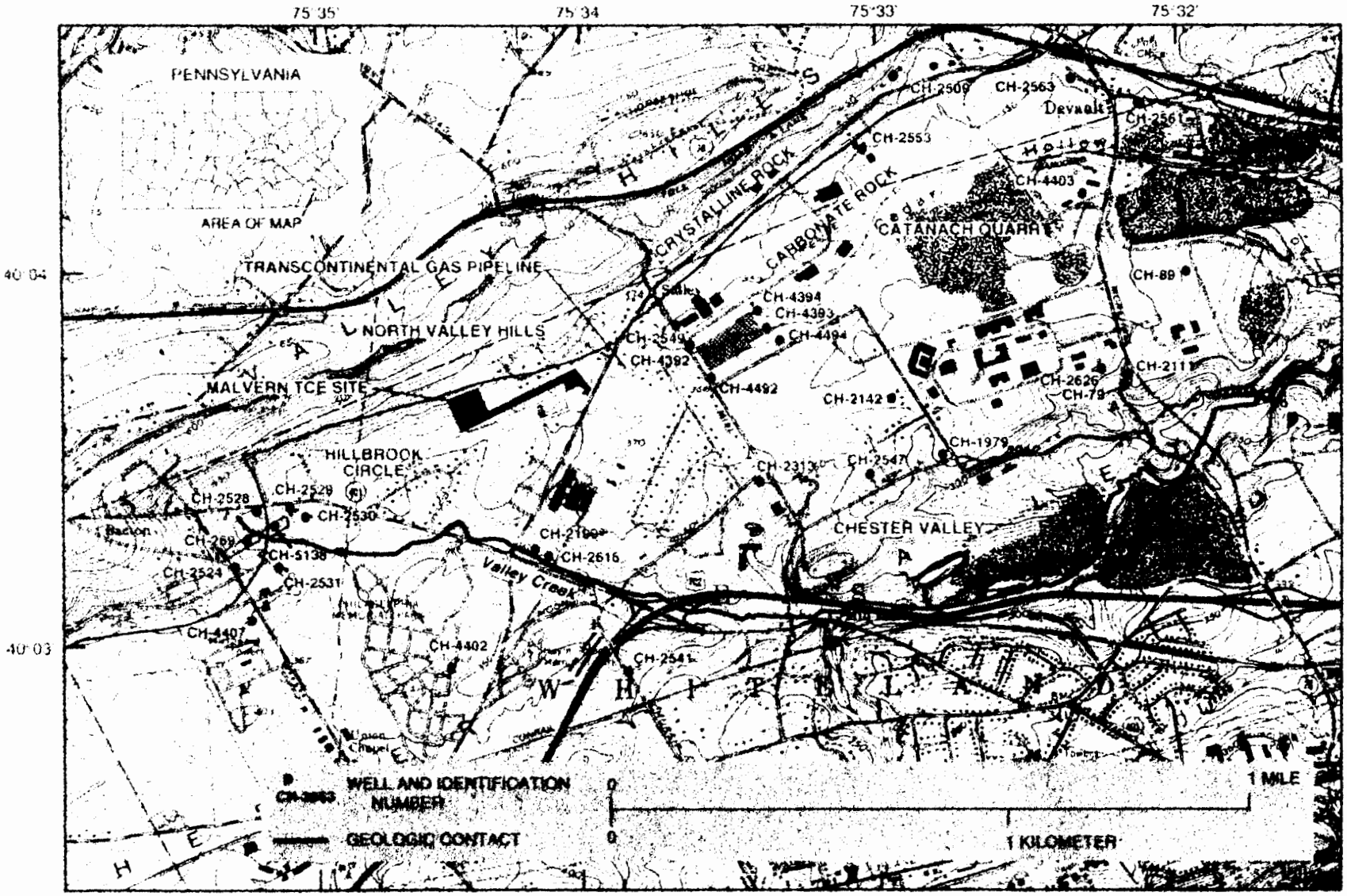
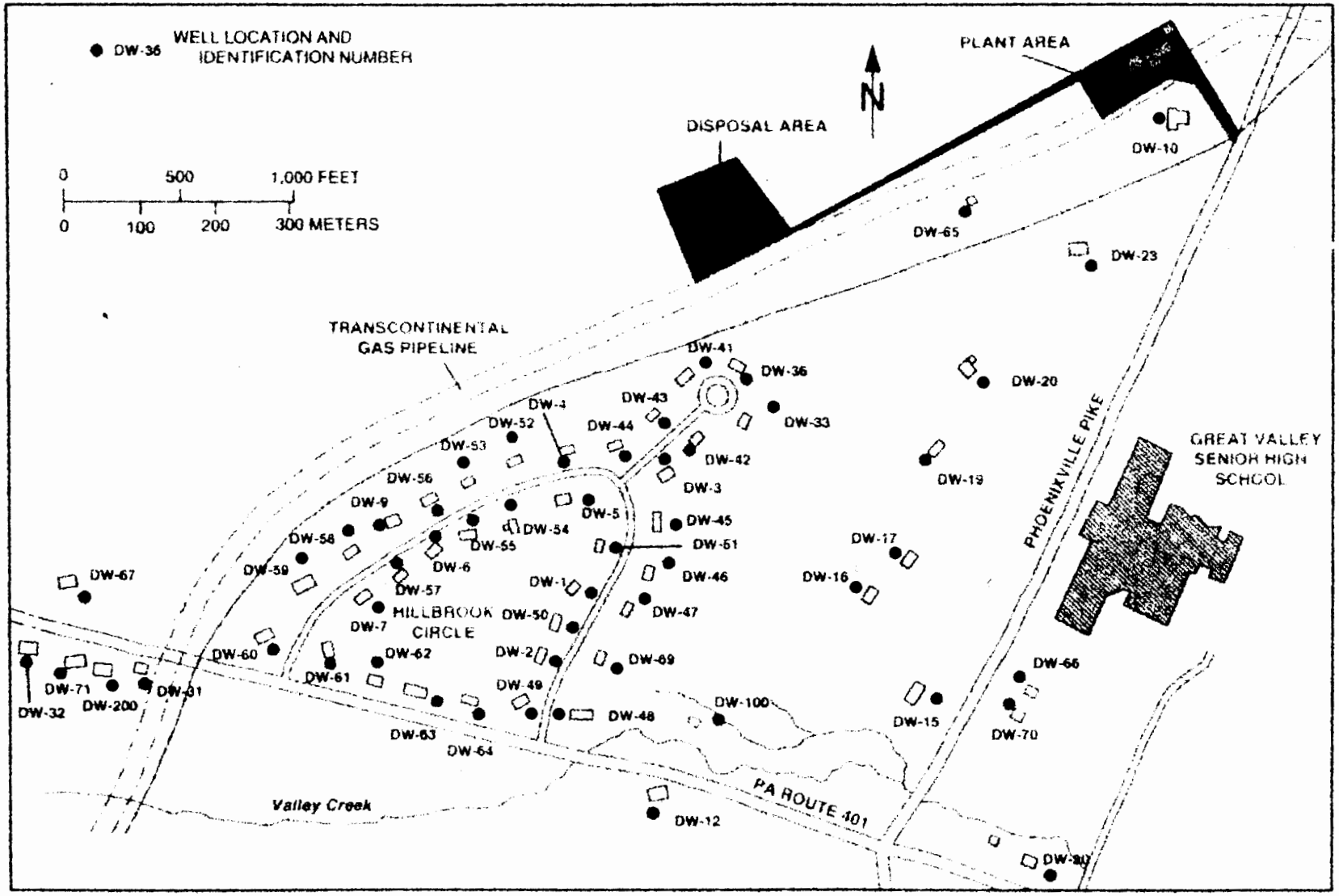
APPENDIX B - FIGURES



Base from U.S. Geological Survey Malvern 1:24,000, 1983

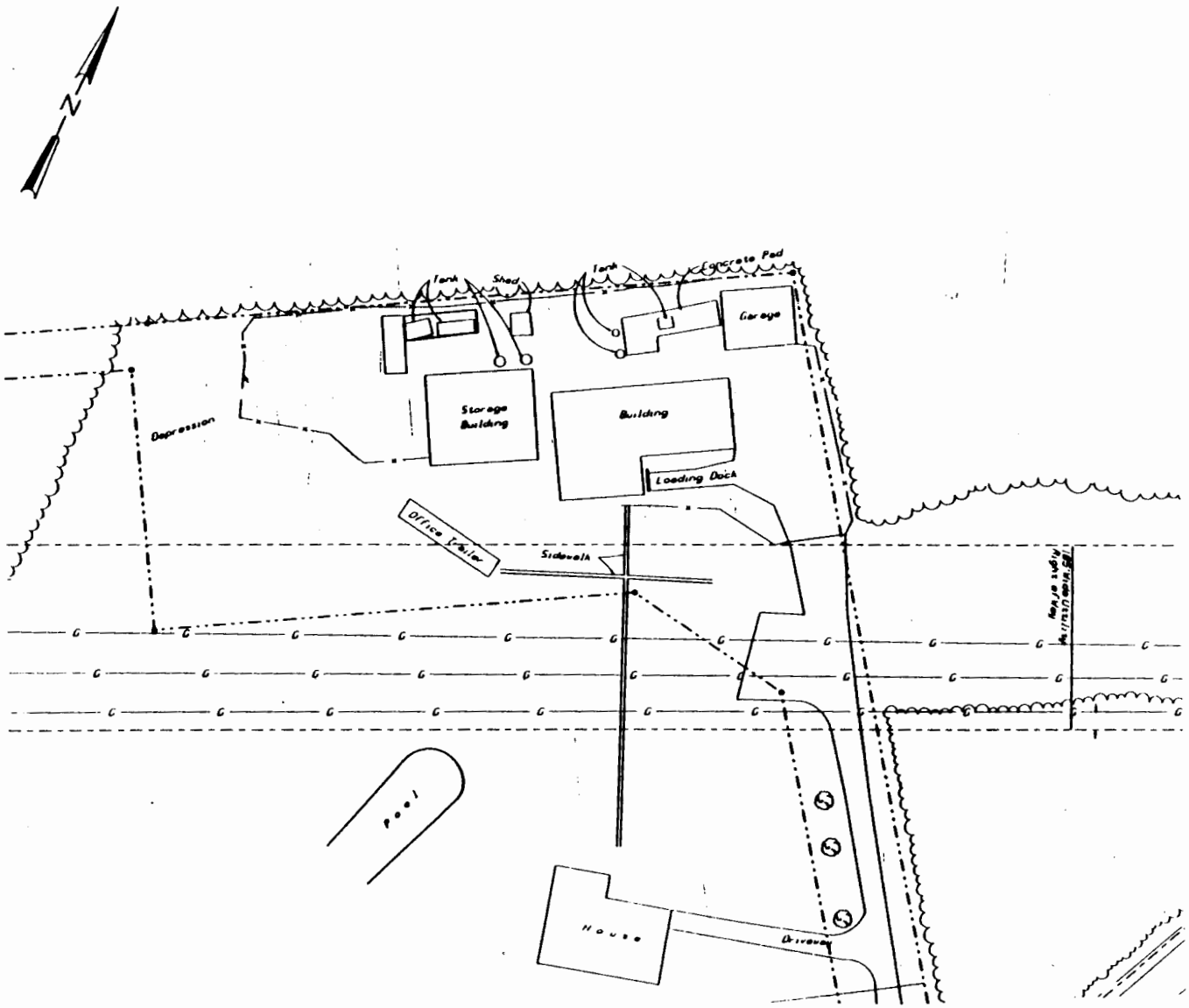
Figure 1. Location of the Malvern TCE Site and selected wells, Chester County, Pennsylvania



Location of domestic wells near the Malvern TCE Site, Chester County, Pennsylvania.

FIGURE 2

malv0.1a.dgn 19 MAR 1997



LEGEND

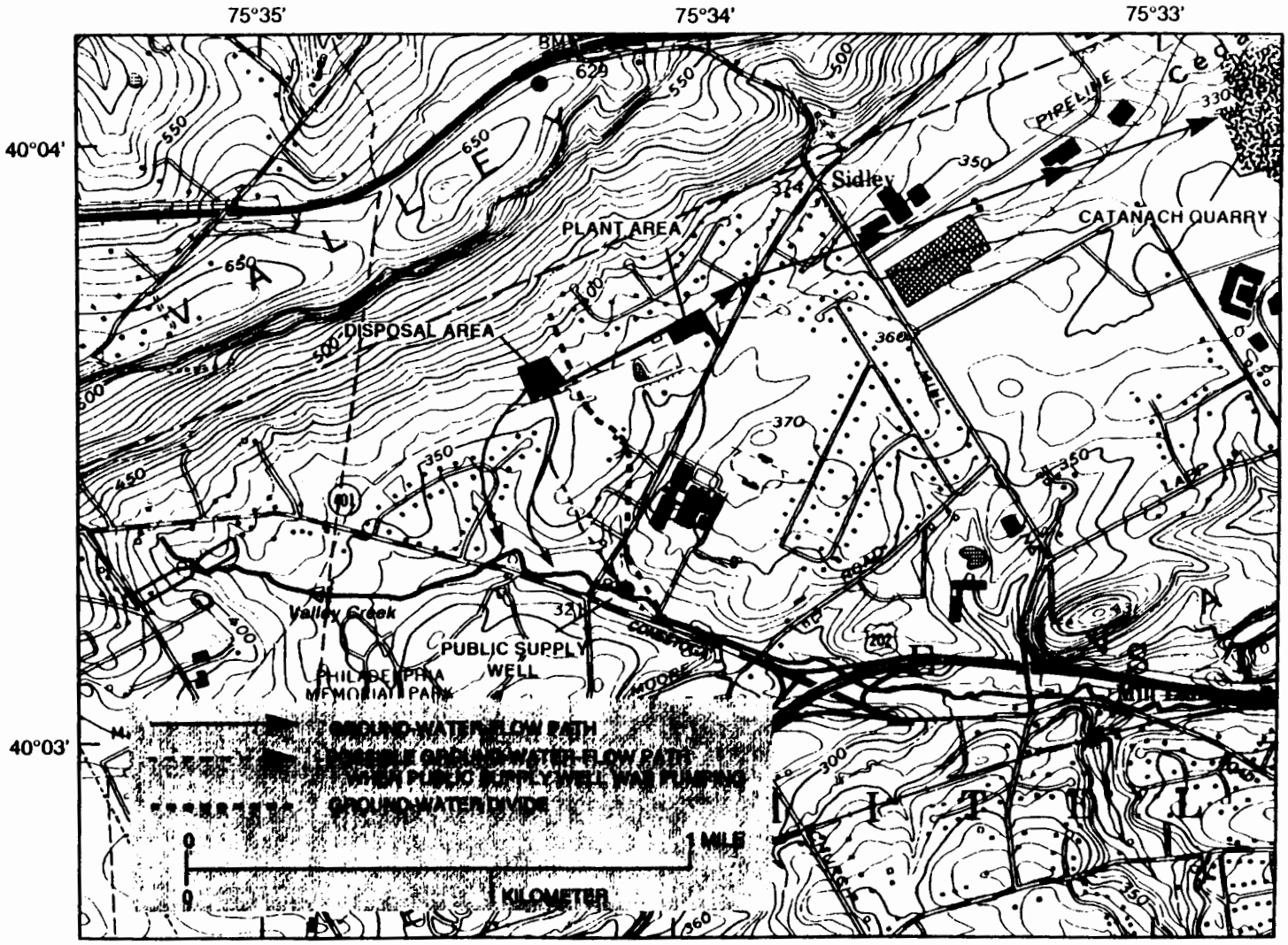
- EXISTING CONTOUR
- PROPERTY LINE
- RIGHT OF WAY LINE
- G — GAS PIPELINE
- FENCE
- TREE LINE

0 60 120 180

SCALE 1" = 60'

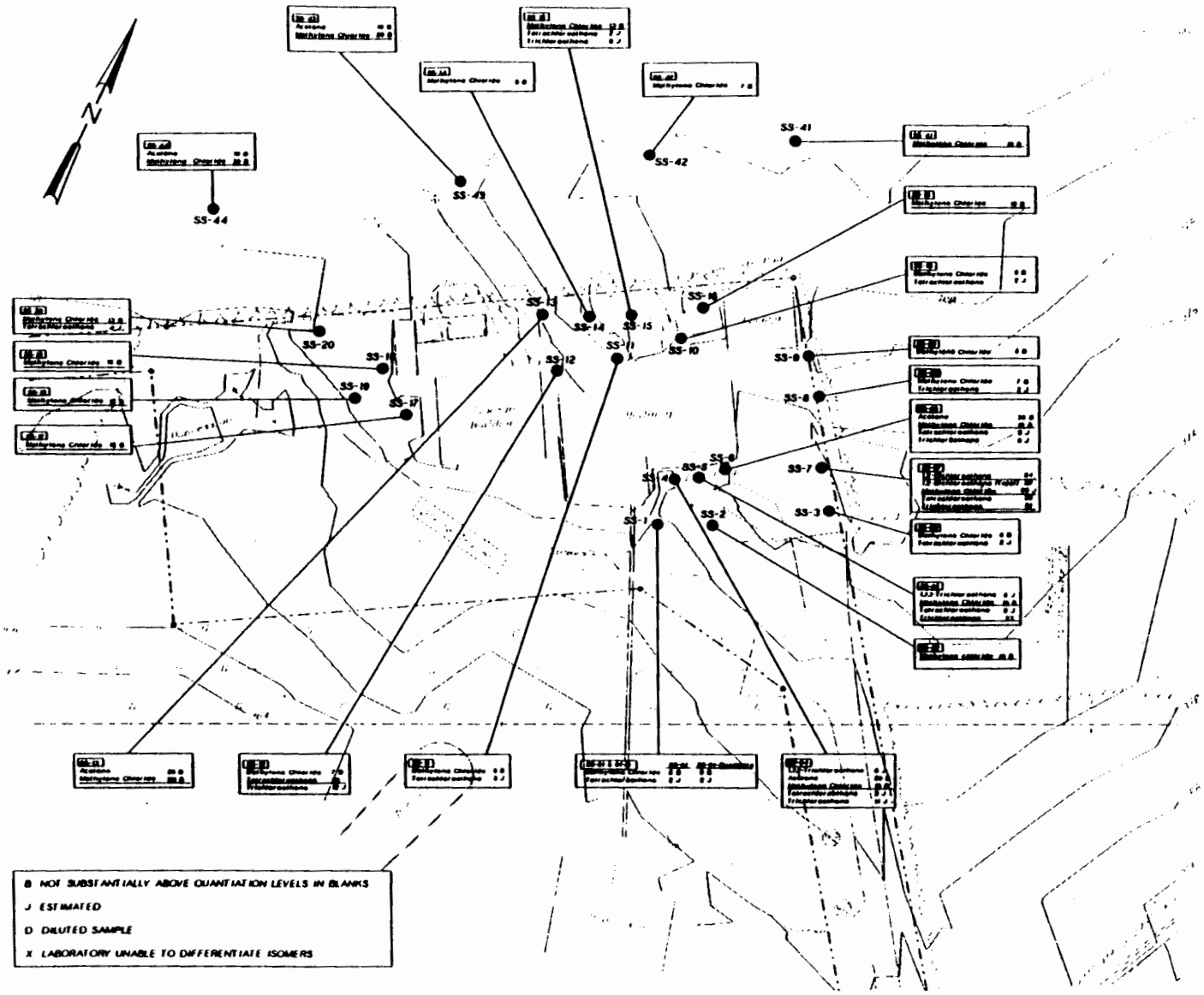
FIGURE 3
SITE LAYOUT
MAIN PLANT AREA
MALVERN TCE

CH2M HILL



Base from U.S. Geological Survey Malvern 1:24,000, 1983

Figure 4 Generalized ground-water-flow directions in the vicinity of the Malvern TCE Site, Chester County, Pennsylvania.



NOTES:

1. CONCENTRATIONS ARE IN ug/kg.
2. COMPOUNDS UNDERLINED EXCEED USEPA SSL's OR PA ACT 2 SHHS's FOR SOILS.

LEGEND

- SURFACE SOIL LOCATIONS
- EXISTING CONTOUR
- PROPERTY LINE
- RIGHT OF WAY LINE
- GAS PIPELINE
- FENCE
- TREE LINE

B NOT SUBSTANTIALLY ABOVE QUANTIATION LEVELS IN BLANKS

J ESTIMATED

D DILUTED SAMPLE

X LABORATORY UNABLE TO DIFFERENTIATE ISOMERS

0 60 120 180

SCALE 1" = 60'

FIGURE 5

DISTRIBUTIONS OF VOCS IN SURFACE SOILS MAIN PLANT AREA-1996

MALVERN TCE

CH2M HILL

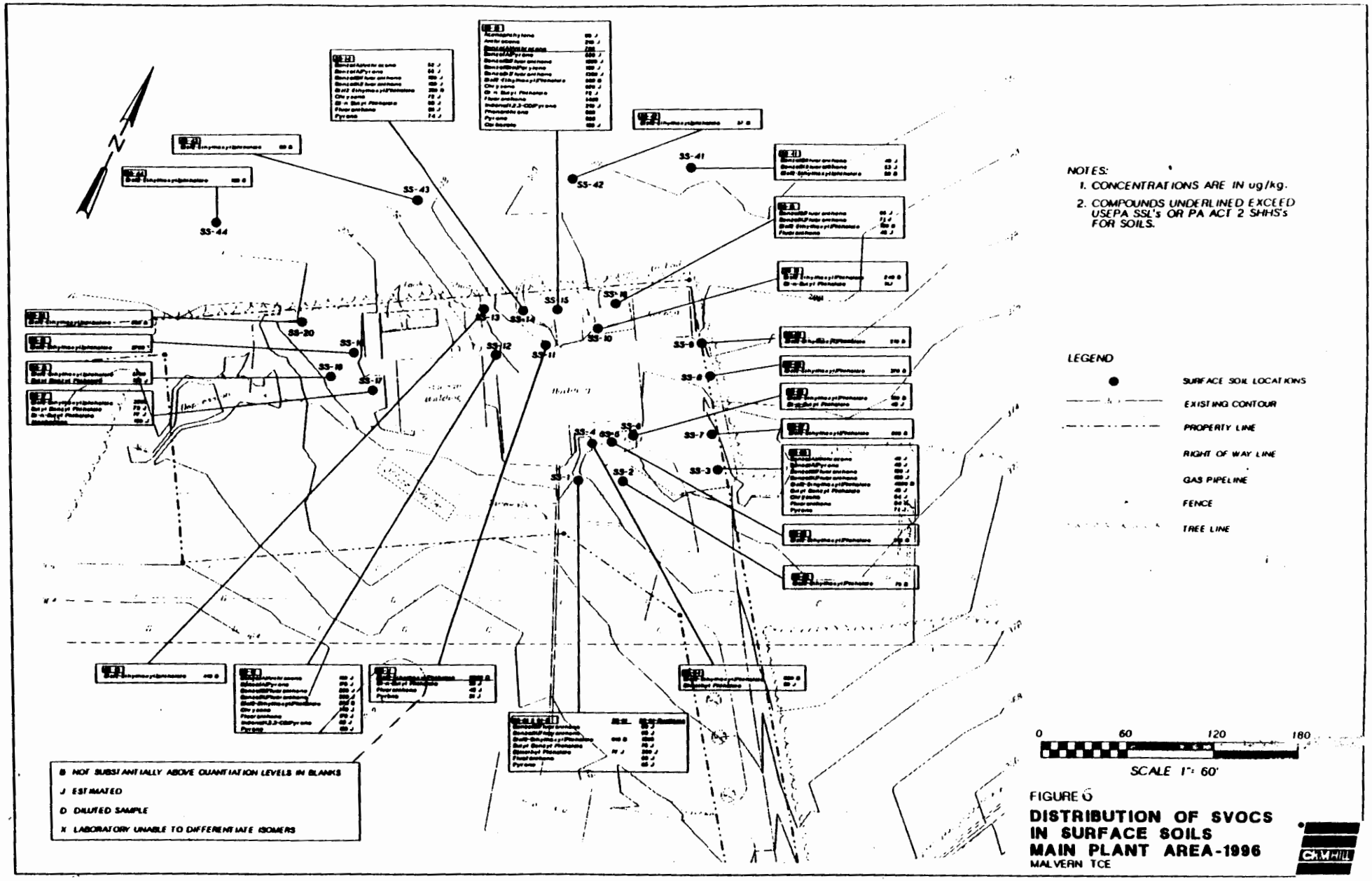


FIGURE 6

DISTRIBUTION OF SVOCS IN SURFACE SOILS MAIN PLANT AREA-1996

MALVERN TCE

CH2M HILL

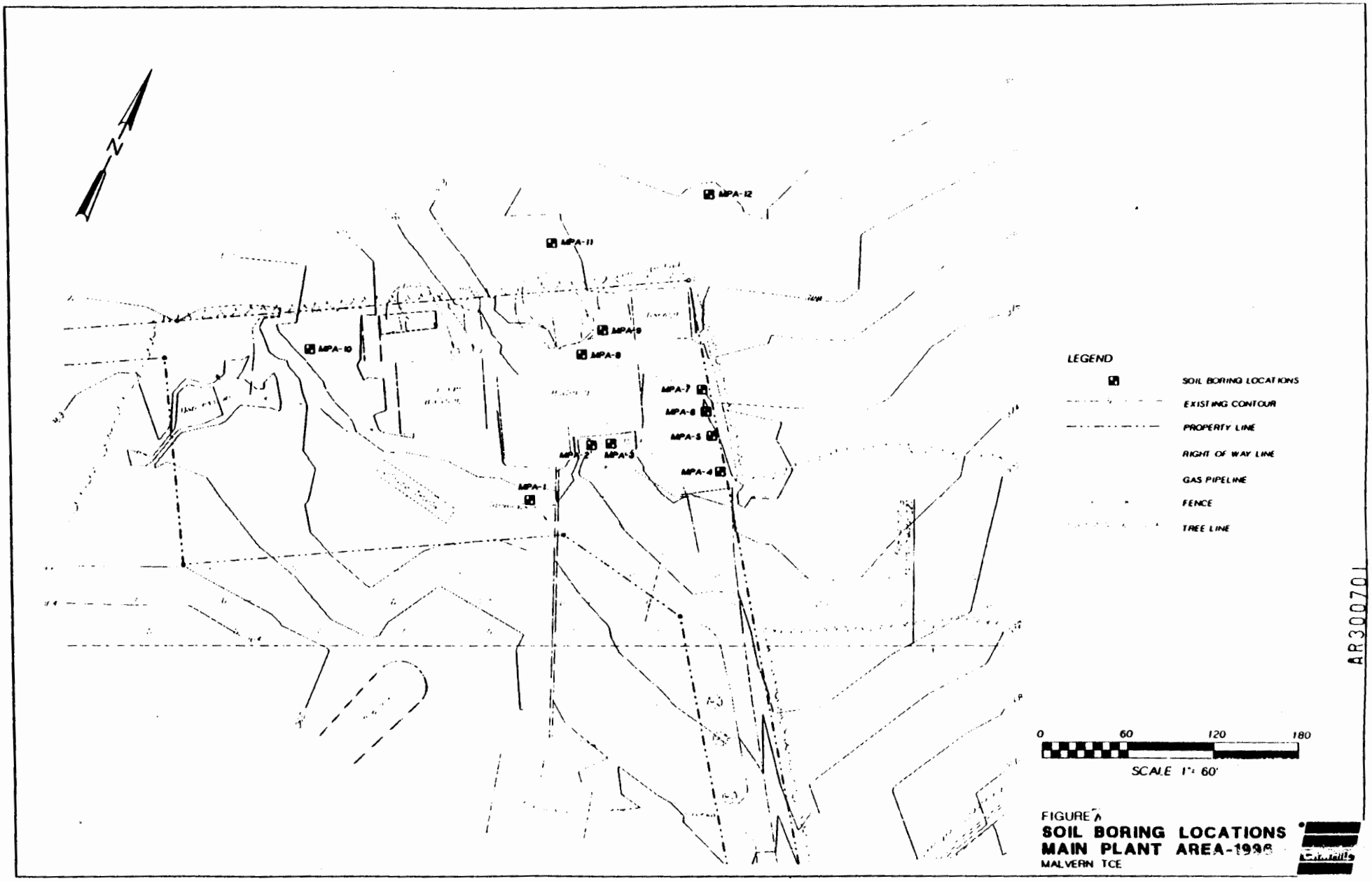


FIGURE A
SOIL BORING LOCATIONS
MAIN PLANT AREA-1996
MALVERN TCE

AR300701

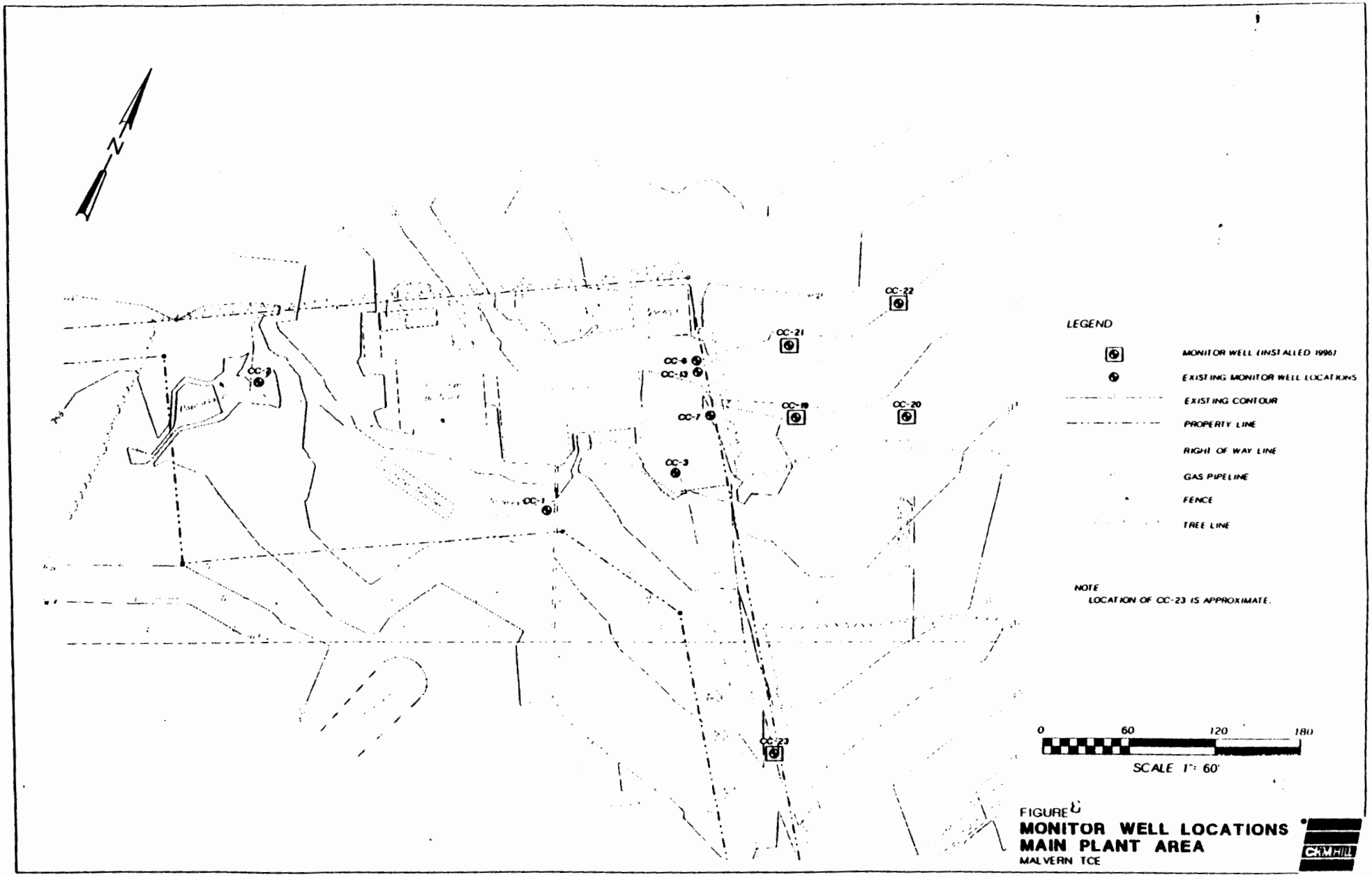


FIGURE 2
MONITOR WELL LOCATIONS
MAIN PLANT AREA
MALVERN TCE

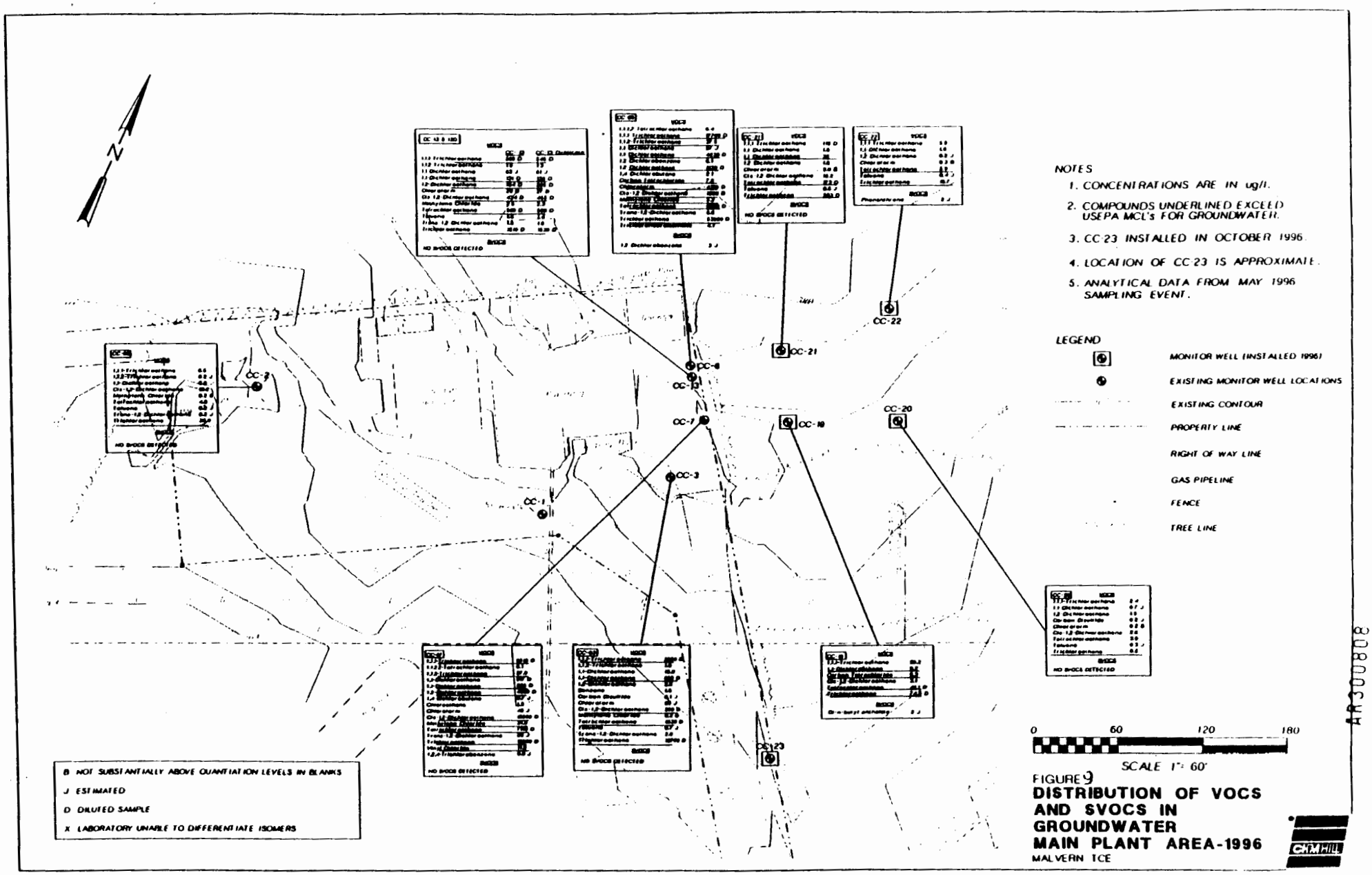
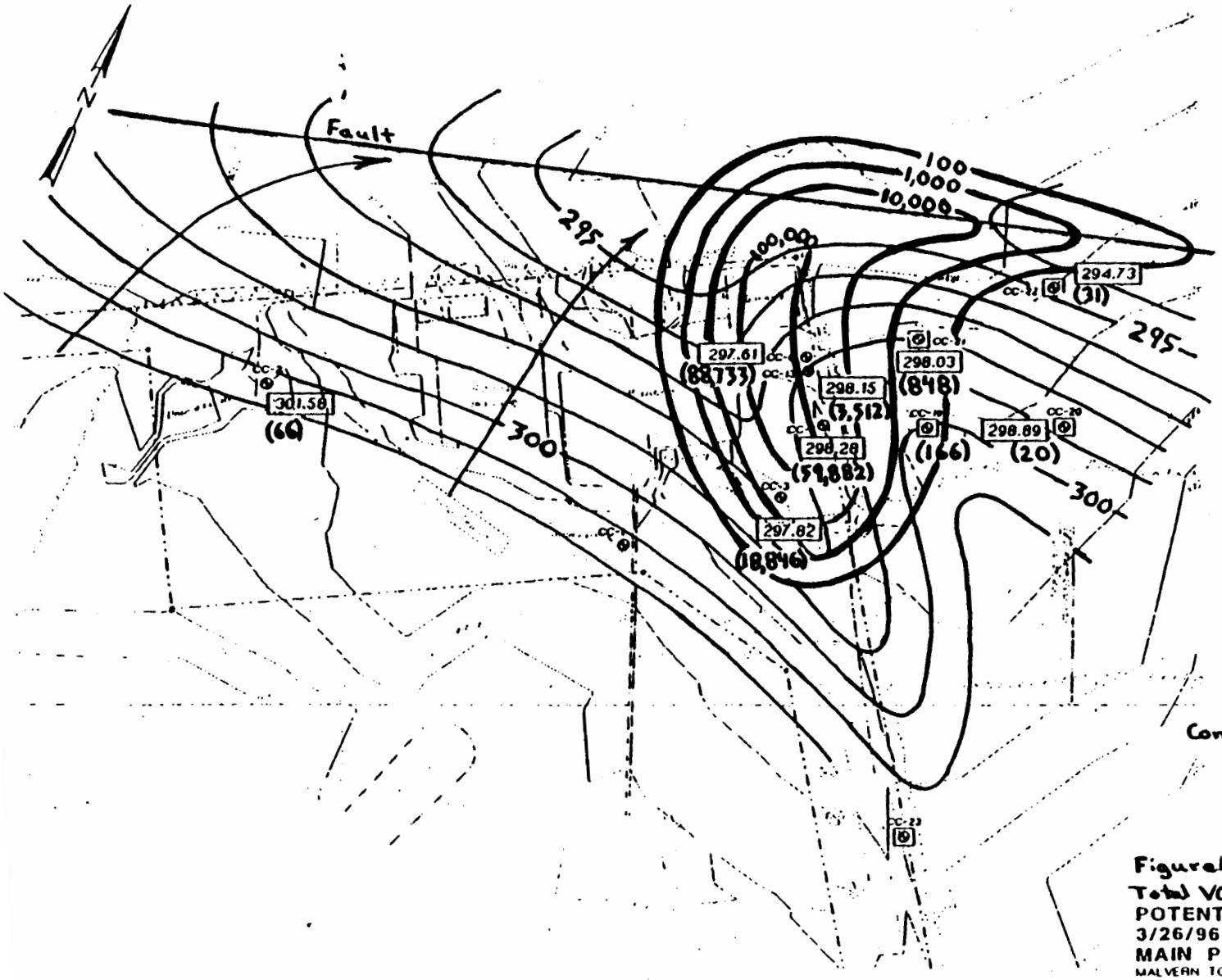


FIGURE 9
DISTRIBUTION OF VOCS AND SVOCS IN GROUNDWATER MAIN PLANT AREA-1996
MALVERN TCE

CH2M HILL

AR300808



NOTES
1. ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL
2. CONTOUR INTERVAL=1.0'
3. CC-23 INSTALLED IN OCTOBER 1996.
4. LOCATION OF CC-23 IS APPROXIMATE.

LEGEND
- MONITOR WELL (INSTALLED 1996)
- EXISTING MONITOR WELL LOCATIONS
- EXISTING CONTOUR
- PROPERTY LINE
- FENCE
- TREE LINE
- INFERRED GROUNDWATER FLOW DIRECTION
- 283.71 POTENTIOMETRIC ELEVATION
- GROUNDWATER CONTOUR
- (166) Total VOC Concentration in ug/l
- Total VOC Concentration Isopleth Contours Interpreted by EPA (9/28/97)

0 60 120 180
SCALE 1" = 60'

Figure 10
Total VOC Concentration Isopleth Map
POTENTIOMETRIC SURFACE MAP
3/26/96
MAIN PLANT AREA
MALVERN TCE

056011 28.dgn 04 Oct 1996

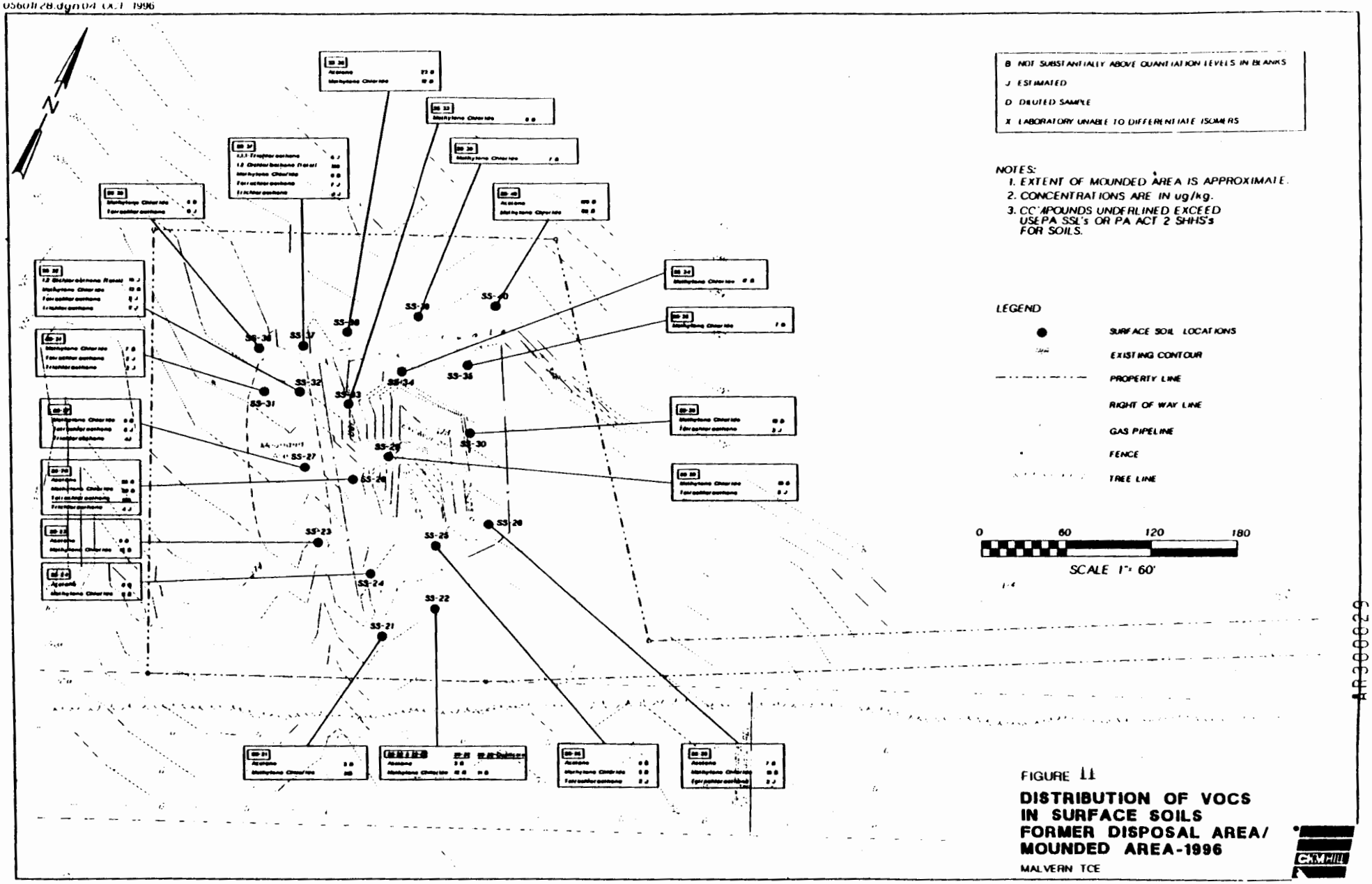


FIGURE 11

DISTRIBUTION OF VOCS IN SURFACE SOILS FORMER DISPOSAL AREA/ MOUNDED AREA-1996

MALVERN TCE

CH2M HILL

AR300829

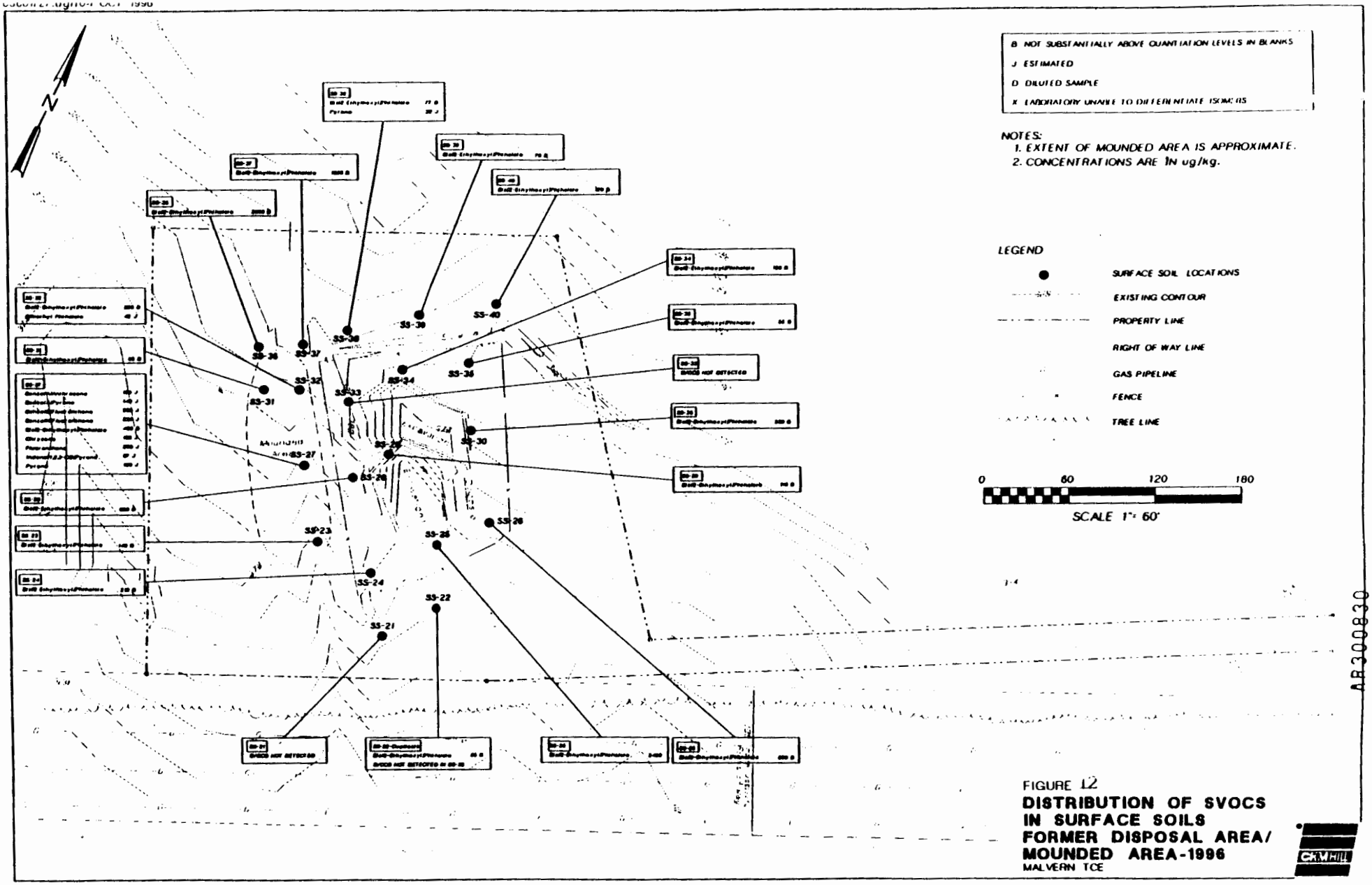


FIGURE 12
DISTRIBUTION OF SVOCS IN SURFACE SOILS FORMER DISPOSAL AREA/ MOUNDED AREA-1996
MALVERN TCE

CH2M HILL

AR300830

0560fi11.dgn 26 SEP 1996

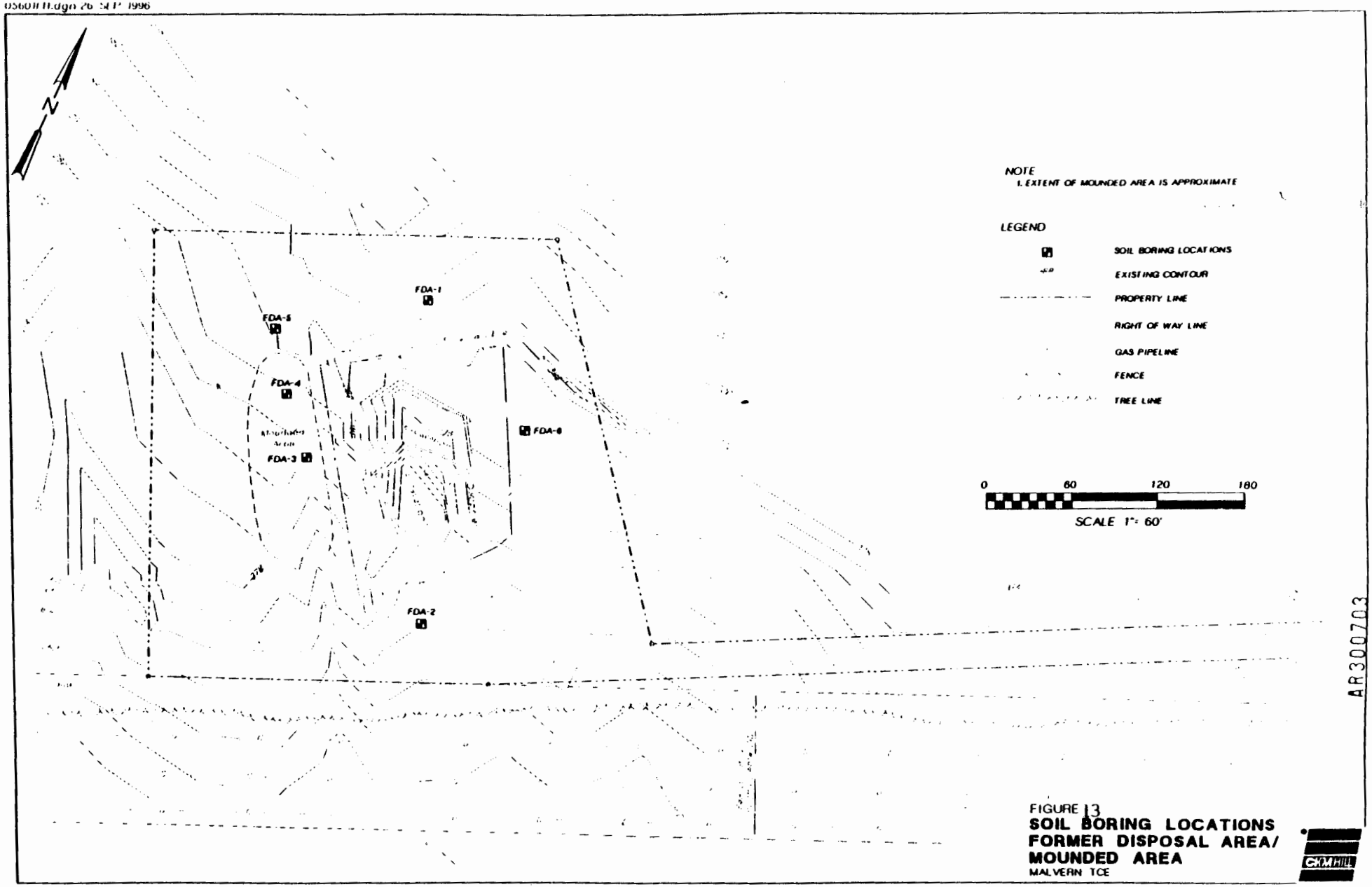


FIGURE 13
SOIL BORING LOCATIONS FORMER DISPOSAL AREA/ MOUNDED AREA
MALVERN TCE

CH2M HILL

AR300703

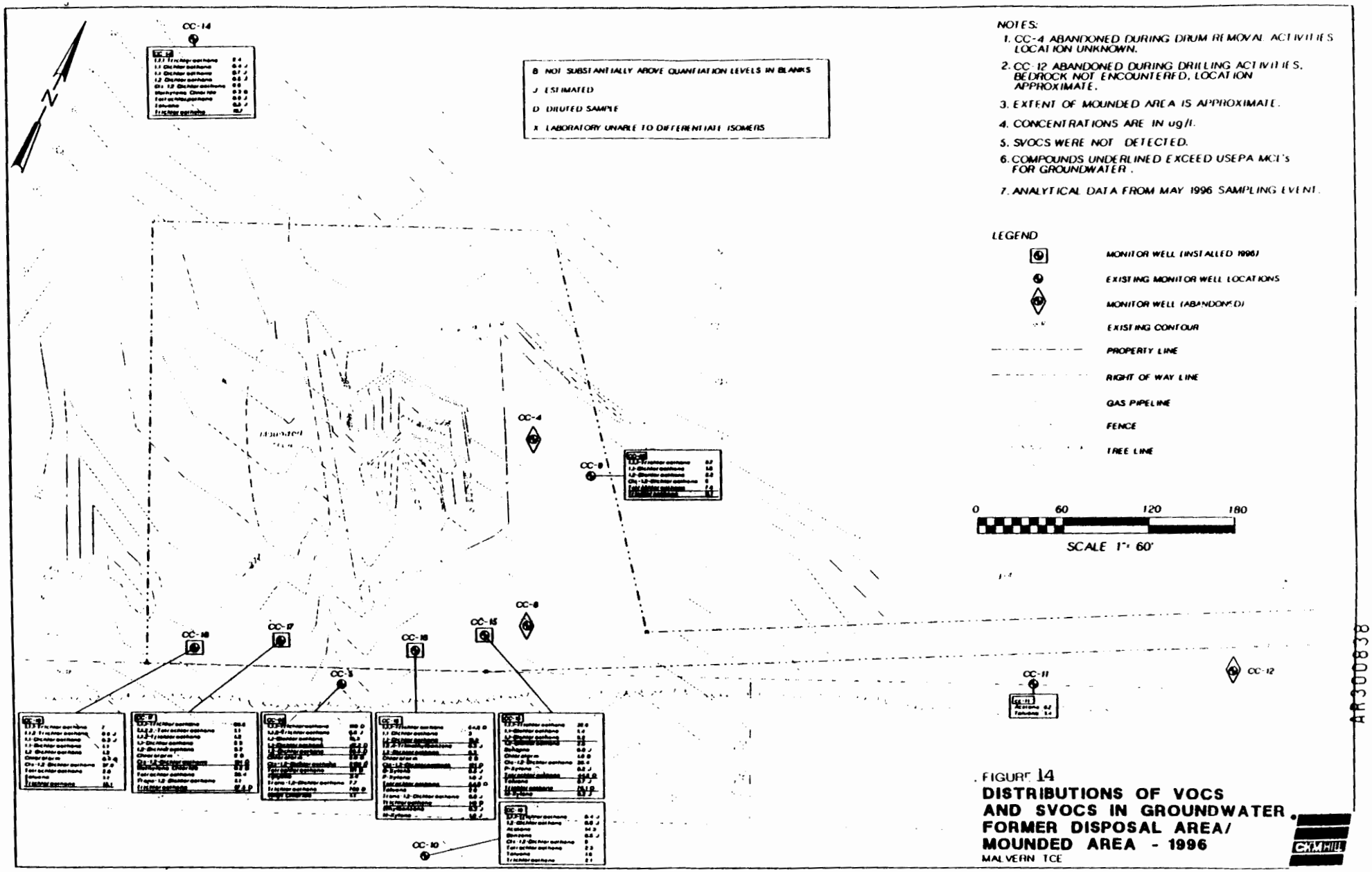
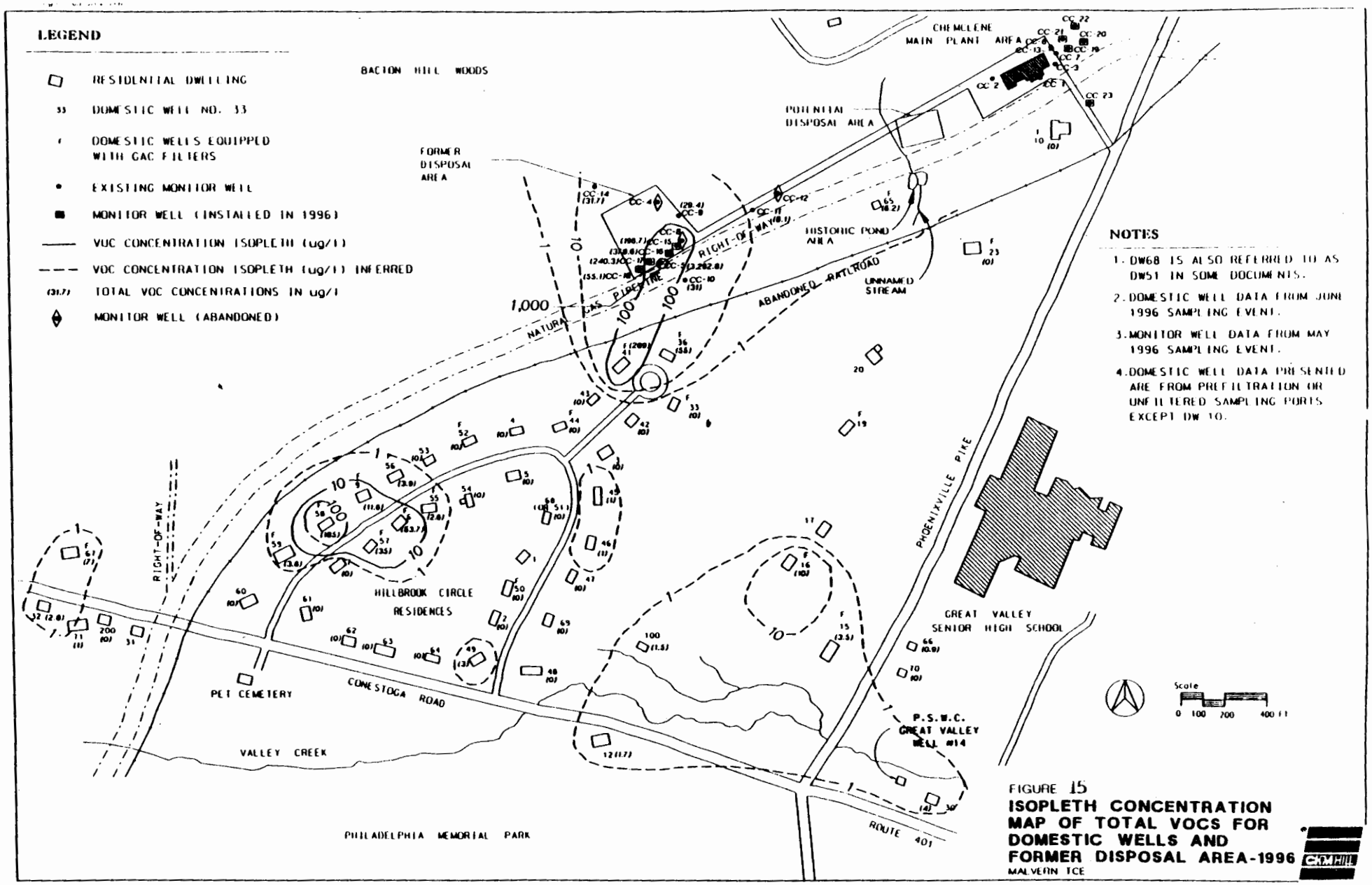


FIGURE 14
DISTRIBUTIONS OF VOCS AND SVOCS IN GROUNDWATER, FORMER DISPOSAL AREA/ MOUNDED AREA - 1996
MALVERN TCE

CH2M HILL

AR300838

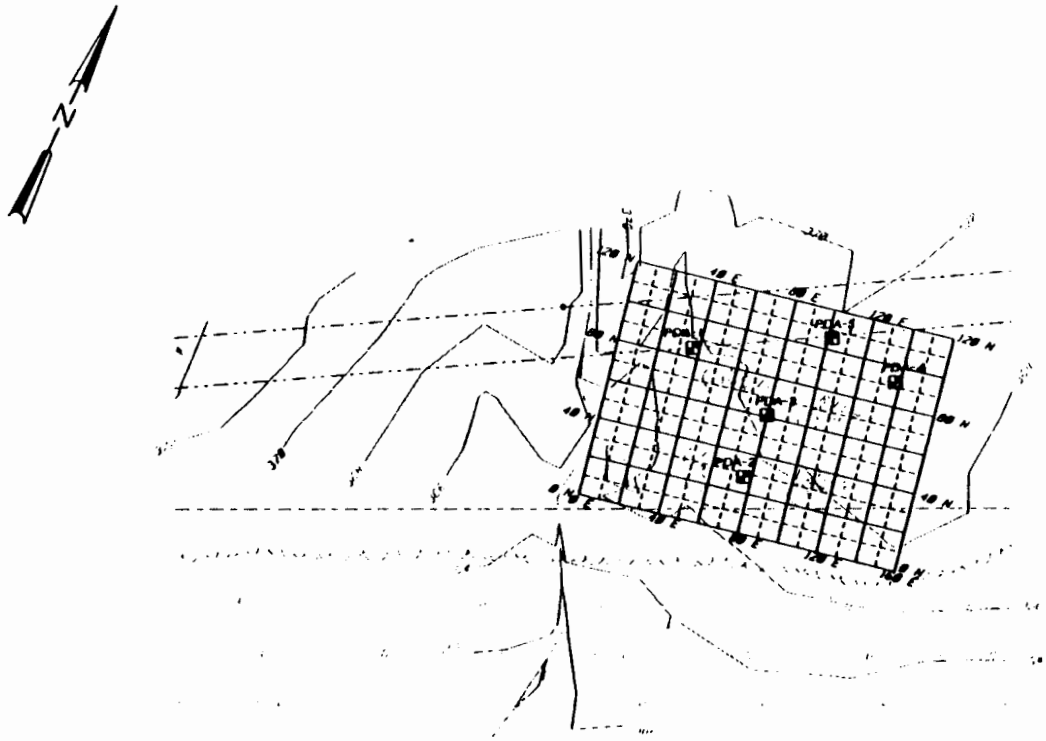


NOTES

1. DW68 IS ALSO REFERRED TO AS DW51 IN SOME DOCUMENTS.
2. DOMESTIC WELL DATA FROM JUNE 1996 SAMPLING EVENT.
3. MONITOR WELL DATA FROM MAY 1996 SAMPLING EVENT.
4. DOMESTIC WELL DATA PRESENTED ARE FROM PREFILTRATION OR UNFILTERED SAMPLING PORTS EXCEPT DW 10.

FIGURE 15
ISOPLETH CONCENTRATION MAP OF TOTAL VOCS FOR DOMESTIC WELLS AND FORMER DISPOSAL AREA-1996
MALVERN TCE

CH2M HILL



LEGEND

- SOIL BORING LOCATIONS
- ESTABLISHED GEOPHYSICAL SURVEY GRID
- INTERNAL GEOPHYSICAL SURVEY GRID
- EXISTING CONTOUR
- PROPERTY LINE
- RIGHT OF WAY LINE
- GAS PIPELINE
- FENCE
- TREE LINE
- STREAM

0 60 120 180

SCALE 1" = 60'

FIGURE 16

GEOPHYSICAL SURVEY GRID AND SOIL BORING LOCATIONS POTENTIAL DISPOSAL AREA-1996

MALVERN TCE

CH2M HILL

AR300704

APPENDIX C - TABLES

Table 1
Malvern TCE Site
Maximum Concentrations in Surface Soil
Main Plant Area - 1996

Detected Analyte	Maximum Concentration	Location of Maximum Concentration	Number of Samples where Analyte Detected
INORGANICS (MG/KG)			
ALUMINUM	20000	SS09	25 of 25
ARSENIC	9.9	SS06	25 of 25
BARIUM	140	SS15	25 of 25
BERYLLIUM	3.2	SS07	24 of 25
CADMIUM	12.3	SS17	19 of 25
CALCIUM	87600	SS17	25 of 25
CHROMIUM	113	SS04	25 of 25
COBALT	28.3	SS07	25 of 25
COPPER	209	SS17	25 of 25
IRON	91800	SS17	25 of 25
LEAD	338	SS17	25 of 25
MAGNESIUM	51600	SS17	25 of 25
MANGANESE	2040	SS07	25 of 25
MERCURY	1.3	SS17	9 of 25
NICKEL	92.1	SS09	25 of 25
POTASSIUM	1190 J	SS20	25 of 25
SELENIUM	2.4 JL	SS15	3 of 25
SILVER	3.2	SS17	7 of 25
SODIUM	357 J	SS02	25 of 25
THALLIUM	1.6 JL	SS08	1 of 25
VANADIUM	39.8	SS04	25 of 25
ZINC	1660 J	SS17	25 of 25
SEMIVOLATILE ORGANICS (UG/KG)			
ACENAPHTHYLENE	98 J	SS15	1 of 25
ANTHRACENE	210 J	SS15	1 of 25
BENZO(A)ANTHRACENE	780	SS15	4 of 25
BENZO(A)PYRENE	520 J	SS15	4 of 25
BENZO(B)FLUORANTHENE	1200 J	SS15	7 of 25
BENZO(GHI)PERYLENE	180 J	SS15	1 of 25
BENZO(K)FLUORANTHENE	1300 J	SS15	7 of 25
BIS(2-ETHYLHEXYL)PHTHALATE	11000 D	SS11	25 of 25
BUTYL BENZYL PHTHALATE	100 J	SS19	4 of 25
CARBAZOLE	160 J	SS15	1 of 25
CHRYSENE	620 J	SS15	4 of 25
DI-N-BUTYL PHTHALATE	93 J	SS14	6 of 25
DIMETHYL PHTHALATE	350 J	SS01D	3 of 25
FLUORANTHENE	1400	SS15	7 of 25
INDENO(1,2,3-CD)PYRENE	210 J	SS15	2 of 25
ISOPHORONE	108 J	SS17	1 of 25
PHENANTHRENE	760	SS15	1 of 25
PYRENE	950	SS15	6 of 25
VOLATILE ORGANICS (UG/KG)			
1,1,1-TRICHLOROETHANE	8 J	SS04	2 of 25
1,2-DICHLOROETHANE	24	SS07	1 of 25
1,2-DICHLOROETHENE (TOTAL)	22	SS07	1 of 25
ACETONE	56 B	SS13	5 of 25
METHYLENE CHLORIDE	110 B	SS13	25 of 25
TETRACHLOROETHENE	56	SS12	12 of 25
TRICHLOROETHENE	81	SS07	7 of 25

NOTES:
B = not detected substantially above blanks
J = estimated value
D = Sample diluted for analysis
L = estimated value, biased low

Table 2

Malvern TCE Site
Maximum Concentrations in Subsurface Soil
Main Plant Area - 1996

Detected Analyte	Maximum Concentration	Location of Maximum Concentration	Number of Samples where Analyte Detected
INORGANICS (MG/KG)			
ALUMINUM	27400	MPA6/35-37	40 of 40
ANTIMONY	3.5 J	MPA2/50-52	14 of 40
ARSENIC	28.9	MPA5/40-42	34 of 40
BARIUM	287	MPA2/50-52	40 of 40
BERYLLIUM	7.1.	MPA2/50-52	17 of 40
CADMIUM	2.3	MPA10/45-47	3 of 40
CALCIUM	3680	MPA6/10-12	40 of 40
CHROMIUM	30.7	MPA6/35-37	40 of 40
COBALT	142	MPA7/40-42	36 of 40
COPPER	52.9	MPA11/20-22	40 of 40
CYANIDE	37	MPA6/20-22	1 of 40
IRON	82300	MPA5/40-42	40 of 40
LEAD	87.2	MPA7/40-42	40 of 40
MAGNESIUM	3570	MPA6/10-12	40 of 40
MANGANESE	5320	MPA10/45-47	40 of 40
MERCURY	1	MPA10/45-47	4 of 40
NICKEL	62.3	MPA5/40-42	40 of 40
POTASSIUM	1730	MPA8/25-27	40 of 40
SILVER	72 J	MPA6/10-12	1 of 40
SODIUM	199 J	MPA7/45-47	40 of 40
VANADIUM	57.4	MPA2/50-52	40 of 40
ZINC	1060	MPA4/50-52	40 of 40
SEMIVOLATILE ORGANICS (UG/KG)			
1,2-DICHLOROBENZENE	1500 J	MPA6/10-12	1 of 40
2-METHYLNAPHTHALENE	2100 J	MPA6/10-12	3 of 40
ACENAPHTHYLENE	210 J	MPA6/10-12	1 of 40
BENZO(A)ANTHRACENE	460 J	MPA6/10-12	2 of 40
BENZO(A)PYRENE	340 J	MPA6/10-12	2 of 40
BENZO(B)FLUORANTHENE	850 J	MPA6/10-12	2 of 40
BENZO(GHI)PERYLENE	220 J	MPA6/10-12	1 of 40
BENZO(K)FLUORANTHENE	880 J	MPA6/10-12	2 of 40
BIS(2-ETHYLHEXYL)PHTHALATE	62000 BD	MPA6/10-12	24 of 40
BUTYL BENZYL PHTHALATE	510 J	MPA6/10-12	3 of 40
CHRYSENE	600 J	MPA6/10-12	2 of 40
DI-N-BUTYL PHTHALATE	940 B	MPA3/20-22D	19 of 40
DIBENZOFURAN	520 J	MPA6/10-12	1 of 40
FLUORANTHENE	1400 J	MPA6/10-12	2 of 40
FLUORENE	630 J	MPA6/10-12	2 of 40
INDENO(1,2,3-CD)PYRENE	250 J	MPA6/10-12	1 of 40
NAPHTHALENE	4100 J	MPA6/10-12	3 of 40
PENTACHLOROPHENOL	53 J	MPA5/40-42	1 of 40
PHENANTHRENE	2200 J	MPA6/10-12	5 of 40
PHENOL	62 J	MPA10/30-32	1 of 40
PYRENE	1300 J	MPA6/10-12	2 of 40

Table 2 continued

Malvern TCE Site
Maximum Concentrations in Subsurface Soil
Main Plant Area - 1996

Detected Analyte	Maximum Concentration	Location of Maximum Concentration	Number of Samples where Analyte Detected
VOLATILE ORGANICS (UG/KG)			
1,1,1-TRICHLOROETHANE	31000 D	MPA6/10-12	8 of 40
1,1,2,2-TETRACHLOROETHANE	3 B	MPA5/65-67	1 of 40
1,1,2-TRICHLOROETHANE	6 DJ	MPA9/100-102	5 of 40
1,1-DICHLOROETHANE	44	MPA6/10-12	3 of 40
1,1-DICHLOROETHENE	15	MPA2/50-52	2 of 40
1,2-DICHLOROETHANE	220	MPA6/10-12	9 of 40
1,2-DICHLOROETHENE (TOTAL)	4000 DJ	MPA6/10-12	13 of 40
2-BUTANONE	12 J	MPA5/20-22D	3 of 40
4-METHYL-2-PENTANONE	19 DJ	MPA9/100-102	2 of 40
ACETONE	130 B	MPA9/100-102	32 of 40
BENZENE	52	MPA6/10-12	1 of 40
CHLOROFORM	240	MPA2/50-52	3 of 40
ETHYLBENZENE	18000 D	MPA6/10-12	4 of 40
METHYLENE CHLORIDE	480 BD	MPA2/50-52	40 of 40
TETRACHLOROETHENE	270000 D	MPA6/10-12	12 of 40
TOLUENE	24000 D	MPA6/10-12	7 of 40
TRICHLOROETHENE	420000 D	MPA8/25-27	22 of 40
XYLENE (TOTAL)	110000 D	MPA6/10-12	8 of 40

NOTES:
B = not detected substantially above blanks
J = estimated value
D = Sample diluted for analysis

Table 3
Malvern TCE Site
Monitor Well Sampling Organic Analytical Results
Main Plant Area - 1996

STATION ID SAMPLE DATE	USEPA MCLI (ug/l)	CC-02 5/2/96	CC-03 5/3/96	CC-06 5/3/96	CC-07 5/3/96	CC-13 5/3/96	CC-13D 5/3/96	CC-19 5/2/96	CC-20 5/3/96	CC-21 5/3/96	CC-22 5/3/96	CC-JO 5/17/96
SEMIVOLATILE ORGANICS (UG/L)												
1,2-DICHLOROBENZENE	600	-	-	3 J	-	-	-	-	-	-	-	-
BIS(2-ETHYLHEXYL)PHTHALATE	6	-	-	-	-	-	-	-	-	-	-	2 J
DI-N-BUTYL PHTHALATE	NA	-	-	-	-	-	-	2 J	-	-	-	-
PHENANTHRENE	NA	-	-	-	-	-	-	-	-	-	2 J	-
VOLATILE ORGANICS (UG/L)												
1,1,1,2-TETRACHLOROETHANE	NA	-	-	6.4	-	-	-	-	-	-	-	-
1,1,1-TRICHLOROETHANE	200	8.5	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	29.2	2.4	116 D	5.9	-
1,1,2,2-TETRACHLOROETHANE	NA	-	-	-	9.1	-	-	-	-	-	-	-
1,1,2-TRICHLOROETHANE	5	.2 J	1.8	[redacted]	[redacted]	1.6	1.3	-	-	-	-	-
1,1-DICHLOROETHANE	NA	8	18.8	57 J	917 D	63 J	61 J	-	-	1.6	-	-
1,1-DICHLOROETHENE	7	-	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	.7 J	[redacted]	1.9	-
1,2,4-TRICHLOROBENZENE	70	-	-	-	.9 J	-	-	-	-	-	-	-
1,2-DICHLOROBENZENE	600	-	-	6.1	-	-	-	-	-	-	-	-
1,2-DICHLOROETHANE	5	-	2.6	[redacted]	[redacted]	[redacted]	[redacted]	-	1.5	1.6	.2 J	-
1,4-DICHLOROBUTANE	NL	-	-	2.1	.7 J	-	-	-	-	-	-	-
BENZENE	5	-	1.6	-	-	-	-	-	-	-	-	-
CARBON DISULFIDE	NL	-	.1 J	-	-	-	-	-	.2 J	-	-	-
CARBON TETRACHLORIDE	5	-	-	[redacted]	-	-	-	[redacted]	-	-	-	-
CHLOROETHANE	NA	-	-	-	1.3	-	-	-	-	-	-	-
CHLOROFORM	100	-	85 J	[redacted]	46 J	28 B	27 B	-	.2 B	3 B	.3 B	-
CIS-1,2-DICHLOROETHENE	70	13.2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	3.1	2.6	15.2	-	-
METHYLENE CHLORIDE	5	.2 B	.2 B	[redacted]	[redacted]	2.5	2.3	-	-	-	-	1 B
TETRACHLOROETHENE	5	4.9	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	3.9	[redacted]	[redacted]	-
TOLUENE	1000	.2 J	.7 J	-	-	1.6	1.4	-	.3 J	.6 J	.4 J	-
TRANS-1,2-DICHLOROETHENE	100	.2 J	2.6	6.6	50 J	1.6	1.6	-	-	-	-	-
TRICHLOROETHENE	5	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-
TRICHLOROFLUOROMETHANE	NL	-	-	4.1	-	-	-	-	-	-	-	-
VINYL CHLORIDE	2	-	-	-	[redacted]	-	-	-	-	-	-	-

Notes:
- - primary USEPA MCL(s) standards
- - secondary USEPA MCL(s) standards
- - USEPA action level
- NA - Parameter is listed as "-" in USEPA MCL(s) standards
- NL - parameter is not listed in USEPA MCL(s) standards
- B - parameter detected in blank
- D - sample diluted for analysis
- J - estimated value
- E - dissolved metals value exceeds total metals value
- C - see data package report narrative for laboratory observation
- shaded - exceeds primary or secondary USEPA MCL(s) or USEPA action level

AR300000

Table 4

Malvern TCE Site
Monitor Well Sampling Inorganic Analytical Results
Main Plant Area - 1995

STATION ID / SAMPLE DATE	USEPA MCL (ug/l)	CC-02 6/3/95 TOTAL	CC-02 6/3/95 DISSOLVED	CC-03 6/3/95 TOTAL	CC-03 6/3/95 DISSOLVED	CC-06 6/3/95 TOTAL	CC-06 6/3/95 DISSOLVED	CC-07 6/3/95 TOTAL	CC-07 6/3/95 DISSOLVED	CC-15 6/3/95 TOTAL	CC-15 6/3/95 DISSOLVED	CC-15B 6/3/95 TOTAL	CC-15B 6/3/95 DISSOLVED	CC-16 6/3/95 TOTAL	CC-16 6/3/95 DISSOLVED	CC-20 6/3/95 TOTAL	CC-20 6/3/95 DISSOLVED	CC-21 6/3/95 TOTAL	CC-21 6/3/95 DISSOLVED	CC-22 6/3/95 TOTAL	CC-22 6/3/95 DISSOLVED	CC-JO 6/17/95 TOTAL	CC-JO 6/17/95 DISSOLVED
INORGANICS (MGA.)																							
ALUMINUM	50 to 200	[illegible]	-	201	-	[illegible] G	-	[illegible]	-	-	-	-	-	-	-	[illegible]	-	-	-	[illegible]	-	33.8 JB	33.7 JB
ANTIMONY	6	-	-	-	-	10 G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARSENIC	50	-	-	-	-	5 C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.8 JB
BARIUM	2000	-	-	-	-	2000 G	-	-	-	-	-	-	-	-	-	202	-	-	-	207	202 E	6.7 J	6 J
BERYLLIUM	4	-	-	-	-	20 G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CADMIUM	5	-	-	-	-	100 G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CALCIUM	NL	61600	50200	48300	43200	[illegible] C	16700	144000	135000	34600	33300	34000	30200	47400	46200	21600	10100	16800	16700	348000	340000	53100	50100
CHROMIUM	100	-	-	-	-	600 G	-	11	-	-	-	-	-	-	-	22	-	-	-	26	-	2.7 JB	-
COBALT	NL	-	-	-	-	400 C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.3 JB
COPPER	1300	-	-	-	-	340 C	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	12.1 JB	5.6 JB
CYANIDE	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.6 J	-
IRON	300	[illegible] G	200 G	2000	-	[illegible] G	-	[illegible]	-	[illegible]	170	[illegible]	101	-	-	[illegible]	-	-	-	[illegible]	-	[illegible]	22.2 JB
LEAD	15	0	-	-	-	200 G	-	0	4	-	-	-	-	-	-	12	-	-	-	-	-	0.5	1.2 JB
MAGNESIUM	NL	20000	20700	31400	27000	[illegible] C	41000	34300	33000	24000	23000	24300	23700	30000	30000	12000	7040	6030	30100	2200	-	37400	36300
MANGANESE	50	[illegible]	70	40	-	[illegible] G	-	[illegible]	60	171	60	[illegible]	91	-	-	44	-	-	-	60	-	3.5	0.4 JB
MERCURY	2	3	-	-	-	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NICKEL	100	-	-	-	-	300 G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
POTASSIUM	NL	1040	1300	-	-	2040 C	1300	[illegible]	6100 E	1000	-	-	-	-	-	13000	12400	1320	1340 E	60100	61600 E	1630 J	1070 J
SELENIUM	50	-	-	-	-	2 C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SILVER	100	-	-	-	-	10 C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SODIUM	NA	4340	4660 E	2870	2630	[illegible] C	6300	12000	12000 E	6140	7040	6800	7000	12000	11600	110000	108000	7110	7100 E	160000	163000 E	21300	20700
THALLIUM	2	-	-	-	-	10 G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VANADIUM	NA	80	73	-	-	300 C	73	100	92	-	-	92	87	92	90	-	-	72	92	50	66 E	-	-
ZINC	5000	283	-	20	-	1000 C	-	106	92	123	30	86	-	-	-	27	21	-	-	28	-	110	10 JB

Notes:
1 primary USEPA MCL(s) standards
2 secondary USEPA MCL(s) standards
3 USEPA action level
NA - Parameter is listed as "-" in USEPA MCL(s) standards
NL - parameter is not listed in USEPA MCL(s) standards
B parameter detected in blank
D - sample diluted for analysis
J estimated value
E - dissolved metals value exceeds total metals value
C - see data package report narrative for laboratory observation
bracketed - exceeds primary or secondary USEPA MCL(s) or USEPA action levels

AR300807

Table 5

Comparison of Prefiltration Domestic Well Analytical Data
August 1995 and June 1996

SAMPLE NAME	DW-006B	DW-006B	DW-015B	DW-015B	DW-016B	DW-016B	DW-023B	DW-023B	DW-033B	DW-033B	DW-036B	DW-036B	DW-044B	DW-044B
SAMPLE DATE	8/28/95	6/21/96	9/5/95	6/27/96	8/29/95	6/19/96	8/29/95	6/26/96	8/28/95	6/25/96	8/29/95	6/25/96	8/28/95	6/19/96
1,1,1-TRICHLOROETHANE	--	--	1.5	2	5.8	5 J	0.8 J	--	--	--	24.2 C	10	--	--
1,1,2-TRICHLOROETHANE	0.7 J	7 J	--	--	--	--	--	--	--	--	0.6 J	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	0.3 J	--	0.05 J	--
1,1-DICHLOROETHENE	--	--	0.5 J	8 J	1.4	3	0.1 J	--	--	--	7.2	3	--	--
1,2-DIBROMO-3-CHLOROPROPANE	--	--	--	--	--	1 K	--	--	--	--	--	--	--	1 K
1,2-DICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-BUTANONE	--	5 K	--	5 K	--	5 K	--	5 K	--	5 K	--	5 K	--	5 K
2-HEXANONE	--	5 K	--	--	--	5 K	--	--	--	--	--	--	--	5 K
ACETONE	--	5 K	--	5 K	--	2 J	--	5 K	--	5 K	--	5 K	--	5 K
CARBON DISULFIDE	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CHLOROFORM	0.1 B	--	0.06 J	--	0.06 J	--	0.09 J	--	0.2 B	--	0.6 J	--	0.5 J	--
CIS-1,2-DICHLOROETHENE	14.6	14	--	--	--	--	1.3	--	--	--	20.3 C	2	--	--
METHYLENE CHLORIDE	--	--	--	--	--	--	--	--	--	6 B	--	--	--	--
TETRACHLOROETHENE	5.2	5	0.08 J	--	--	--	0.4 J	--	--	--	10.7	4	0.4 J	--
TOLUENE	0.03 J	--	--	--	--	--	--	--	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	0.6 J	--	--	--	--	--	--	--	--	--	0.4 J	--	--	--
TRICHLOROETHENE	29.1 C	34 D	0.2 J	7 J	--	--	0.8 J	--	--	--	56.5 C	36 D	0.1 J	--
TRICHLOROFLUOROMETHANE	0.6 J	--	--	--	0.06 J	--	--	--	--	--	0.06 J	--	--	--
XYLENE (TOTAL)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL VOCs	50.83	53.7	2.32	3.5	7.32	10	3.49	0	0	0	120.86	55	1.05	0

SAMPLE NAME	DW-052B	DW-052B	DW-052B	DW-052B	DW-056B	DW-056B	DW-056B	DW-056B	DW-057B	DW-057B	DW-065B	DW-065BD	DW-065B	DW-067B	DW-067B
SAMPLE DATE	8/28/95	6/19/96	8/28/95	6/26/96	9/5/95	6/26/96	8/28/95	6/21/96	8/29/95	6/24/96	8/29/95	8/29/95	6/20/96	8/28/95	6/26/96
1,1,1-TRICHLOROETHANE	0.1 J	--	--	--	--	--	--	--	--	--	0.2 J	0.2 J	--	0.4 J	--
1,1,2-TRICHLOROETHANE	--	--	--	--	--	--	--	--	0.5 J	--	--	--	--	--	--
1,1-DICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	--	--	--	--	--	--	--	--	--	--	--	--	--	0.09 J	--
1,2-DIBROMO-3-CHLOROPROPANE	--	1 K	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-DICHLOROETHANE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-BUTANONE	--	5 K	--	5 K	--	5 K	--	5 K	--	5 K	--	--	5 K	--	5 K
2-HEXANONE	--	5 K	--	--	--	--	--	5 K	--	--	--	--	5 K	--	--
ACETONE	--	5 K	--	5 K	--	6 B	--	5 K	--	5 K	--	--	5 K	--	13 B
CARBON DISULFIDE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CHLOROFORM	0.3 J	--	--	--	--	--	0.3 J	--	0.08 J	--	0.09 J	--	--	--	--
CIS-1,2-DICHLOROETHENE	--	--	--	--	2.8	4 J	0.7 J	9 J	11	9	--	--	--	0.5 J	--
METHYLENE CHLORIDE	--	--	--	--	--	--	--	--	--	9 B	--	--	6 B	--	3 B
TETRACHLOROETHENE	--	--	--	--	1.3	--	0.2 J	--	3.4	3	15.1	16	5	--	--
TOLUENE	--	--	--	--	--	--	--	--	0.04 J	--	--	--	--	--	--
TRANS-1,2-DICHLOROETHENE	--	--	--	--	--	--	--	--	0.2 J	--	--	--	--	--	--
TRICHLOROETHENE	--	--	--	--	7.4	2	1.5	3	21 J	23	9	9.1	7 J	14.7	7
TRICHLOROFLUOROMETHANE	--	--	--	--	0.2 J	--	0.06 J	--	0.7 J	--	--	--	--	--	--
XYLENE (TOTAL)	--	--	--	--	--	--	--	--	--	--	--	--	5 J	--	--
TOTAL VOCs	0.4	0	0	0	11.7	2.6	2.76	3.9	36.92	35	24.39	25.3	6.2	15.69	7

AR300848

Table 6 TCE-Related Compounds for Soil Gas Samples
EPA Method Modified 8240
1,2-Dichlorethane
1,1-Dichlorethane
trans-1,2-Dichloroethene
cis-1,2-Dichloroethene
1,1-Dichloroethene
Tetrachloroethene
1,1,1-Trichloroethane
Trichloroethene

Table 7

Chemicals of Potential Concern for Human Health Evaluation
Malvern TCE

Soil

Surface Soil

UST Area
Bis(2-ethyl hexyl)phthalate
Arsenic
Beryllium
Iron
Manganese

SE of Distillation Building
Arsenic
Beryllium
Chromium
Iron
Manganese
Thallium

AST Area
Benzo(b)fluoranthene
Benzo(a)pyrene
Aluminum
Beryllium
Iron
Manganese

FDA Excavated Area
Aluminum
Arsenic
Beryllium
Cadmium
Chromium
Iron
Thallium

Area South of Garage
None

FDA Mounded Area
Benzo(a)pyrene
Aluminum
Beryllium
Cadmium
Iron
Manganese
Thallium

Subsurface Soil

UST Area
Tetrachloroethene
Trichloroethene
Arsenic
Iron
Manganese

SE of Distillation Building
Arsenic
Iron
Manganese

AST Area
Iron
Manganese

FDA Mounded Area
1,2-Dichloroethene (total)
Tetrachloroethene
Trichloroethene
Arsenic
Iron
Manganese

Groundwater (Offsite Residential Wells)

Current Scenario

Well DW-02
Chloroform

DW-07
Chloroform

DW-46
1,1-Dichloroethene

DW-66
1,1-Dichloroethene

Future Scenario

DW-036
Chloroform
1,1-Dichloroethene
cis-1,2-Dichloroethene
Tetrachloroethene
1,1,2-Trichloroethane
Trichloroethene

DW-041
Chloroform
1,1-Dichloroethene

DW-041 (continued)
cis-1,2-Dichloroethene
Tetrachloroethene
1,1,1-Trichloroethane
Trichloroethene

DW-058
cis-1,2-Dichloroethene
Tetrachloroethene
Trichloroethene

Groundwater (Industrial - monitoring wells)[a]

Former Disposal Area
Carbon Tetrachloride
Chloroform
1,2-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
Tetrachloroethene
1,1,1-Trichloroethane
Trichloroethene
Vinyl Chloride

Main Plant Area
Carbon Tetrachloride
Chloroform
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
Tetrachloroethene
1,1,2,2-Tetrachloroethane
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Vinyl Chloride
Naphthalene

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Iron
Manganese
Nickel
Thallium
Vanadium

filename: COPCSUM.XLS
worksheet: COPCLIST

Table 8 1 of 3
Toxicity Information
Malvern TCE Site

Chemical Name	Chronic Oral RfD (mg/kg-day)	Source	Uncertainty/ Modifying Factors	Subchronic Oral RfD (mg/kg-day)	Source	Chronic Inhal RfD (mg/kg-day)	Source	Uncertainty/ Modifying Factors	Subchronic Inhal RfD (mg/kg-day)	Source	Weight-of-Evidence Class	Source	Oral CSF (mg/kg-day)⁻¹	Source	Inhal CSF (mg/kg-day)⁻¹	Source
Volatile Organic Compounds																
Benzene	3.00E-03	E	3000/	3.00E-03	E	1.71E-03	E		NA		A	I	2.90E-02	I	2.90E-02	I
2-Butanone	6.00E-01	I	3000/1	2.00E+00	H	2.86E-01	I	1000/3	NA		D	I	NA		NA	
Carbon disulfide	1.00E-01	I	100/1	1.00E-01	H	2.00E-01	I	30/1	2.00E-01	H	NA		NA		NA	
Carbon tetrachloride	7.00E-04	I	1000/1	2.00E-03	E	5.71E-04	E		NA		B2	I	1.30E-01	I	5.25E-02	I
Chlorobenzene	2.00E-02	I	1000/1	NA		5.71E-03	A	10000/	5.71E-02		D	I	NA		NA	
Chloroethane	4.00E-01	E		NA		2.85E+00	I	300/1	2.86E+00	H	B	DW	NA		NA	
Chloroform	1.00E-02	I	1000/1	1.00E-02	H	NA			NA		B2	I	6.10E-03	I	8.05E-02	I
1,4-Dichlorobutane	NA			NA		NA			NA		NA		NA		NA	
1,1-Dichloroethane	1.00E-02	E	10000/	1.00E+00	H	1.43E-01	A	100/	1.43E+00	A	C	I	NA		NA	
1,2-Dichloroethane	3.00E-02	E		NA		2.86E-03	E		NA		B2	I	9.10E-02	I	9.10E-02	I
1,1-Dichloroethene	9.00E-03	I	1000/1	9.00E-03	H	NA			NA		C	I	6.00E-01	I	1.75E-01	I
1,2-Dichloroethene, total	9.00E-03	H	1000/	9.00E-03	H	NA			NA		D	I	NA		NA	
1,2-Dichloroethene, cis	1.00E-02	H	3000/	1.00E-01	H	NA			NA		D	I	NA		NA	
1,2-Dichloroethene, trans	2.00E-02	I	1000/1	2.00E-01	H	NA			NA		D	DW	NA		NA	
1,3-Dichloropropene, trans	3.00E-04	I	10000/1	3.00E-03	H	5.71E-03	I	30/1	5.70E-03		B2	I	1.75E-01	H	1.30E-01	H
Ethylbenzene	1.00E-01	I	1000/1	1.00E-01	E	2.86E-01	I	300/1	NA		D	I	NA		NA	
Methylene chloride	6.00E-02	I	100/1	6.00E-02	H94	8.57E-01	H94	100/	8.57E-01	H94	B2	I	7.50E-03	I	1.64E-03	I
4-Methylphenol	5.00E-03	H	1000/	5.00E-03	H	NA			NA		C	I	NA		NA	
1,1,1,2-Tetrachloroethane	3.00E-02	I	3000/	3.00E-02	H	NA			NA		C	I	2.60E-02	I	2.59E-02	I
1,1,2,2-Tetrachloroethane	NA			NA		NA			NA		C	I	2.00E-01	I	2.03E-01	I
Tetrachloroethene	1.00E-02	I	1000/1	1.00E-01	H	NA			NA		C-B2	E	5.20E-02	E	2.03E-03	E
Toluene	2.00E-01	I	1000/1	2.00E+00	H	1.14E-01	I	1000/1	NA		D	I	NA		NA	
1,2,4-Trichlorobenzene	1.00E-02	I	1000/1	1.00E-02	H	5.71E-02	H	300/1	5.70E-01	H	D	DW	NA		NA	
1,1,1-Trichloroethane	3.50E-02	E		2.00E-01	E	2.86E-01	W		NA		D	I	NA		NA	
1,1,2-Trichloroethane	4.00E-03	I	1000/1	4.00E-02	H	NA			NA		C	I	5.70E-02	I	5.60E-02	I
Trichloroethene	6.00E-03	E		NA		NA			NA		C-B2	E	1.10E-02	W	6.00E-03	E
Trichlorofluoromethane	3.00E-01	I	1000/1	7.00E-01	H	2.00E-01	H	10000/	2.00E+00	H	NA		NA		NA	
1,2,4-Trimethylbenzene	5.00E-02	E		1.00E-02	H	NA			NA		NA		NA		NA	
Vinyl chloride	NA			NA		NA			NA		A	H	1.90E+00	H	3.00E-01	H
Xylene, mixture	2.00E+00	I	100/1	4.00E-01		NA			NA		D	I	NA		NA	
o-Xylene	2.00E+00	H	100/	NA		2.00E-01	W		NA		D		NA		NA	
m-Xylene	2.00E+00	H	100/	7.00E-02	E	2.00E-01	W		NA		D		NA		NA	
p-Xylene	NA			3.00E-01	E	8.57E-02	W		NA		D		NA		NA	
Semivolatile Organic Compounds																
Acenaphthene	6.00E-02	I	3000/1	6.00E-01	H	NA			NA		NA		NA		NA	
Acenaphthylene	NA			NA		NA			NA		NA		NA		NA	
Anthracene	3.00E-01	I	3000/1	3.00E+00	H	NA			NA		D	I	NA		NA	
Benzo(a)anthracene	NA			NA		NA			NA		B2	I	7.30E-01	U	6.10E-01	E
Benzo(b)fluoranthene	NA			NA		NA			NA		B2	I	7.30E-01	U	6.10E-01	E
Benzo(k)fluoranthene	NA			NA		NA			NA		B2	I	7.30E-02	U	6.10E-02	E
Benzo(g,h,i)perylene	NA			NA		NA			NA		D	I	NA		NA	
Benzo(a)pyrene	NA			NA		NA			NA		B2	I	7.30E+00	I	6.10E+00	W
Bis(2-ethylhexyl)phthalate	2.00E-02	I	1000/1	2.00E-02	E	NA			NA		B2	I	1.40E-02	I	NA	
Butyl benzyl phthalate	2.00E-01	I	1000/1	2.00E+00	H	NA			NA		C	I	NA		NA	
Carbazole	NA			NA		NA			NA		B2	H	2.00E-02	H	NA	
Chrysene	NA			NA		NA			NA		B2	I	7.30E-03	U	6.10E-03	E

Table 8
Toxicity Information
Malvern TCE Site

Chemical Name	Chronic Oral RfD (mg/kg-day)	Source	Uncertainty/ Modifying Factors	Subchronic Oral RfD (mg/kg-day)	Source	Chronic Inhal RfD (mg/kg-day)	Source	Uncertainty/ Modifying Factors	Subchronic Inhal RfD (mg/kg-day)	Source	Weight-of-Evidence Class	Source	Oral CSF (mg/kg-day)$^{-1}$	Source	Inhal CSF (mg/kg-day)$^{-1}$	Source
Dibenzofuran	4.00E-03	E		NA		NA			NA		D	I	NA		NA	
Di-n-butylphthalate	1.00E-01	I	1000/1	1.00E+00	H	NA			NA		D	I	NA		NA	
1,2-Dichlorobenzene	9.00E-02	I	1000/1	NA		4.00E-02	A	1000	4.00E-01	A	D	I	NA		NA	
1,4-Dichlorobenzene	2.00E-01	E		NA		2.29E-01	I		7.14E-01	H	C	H	2.40E-02	H	NA	
Di(2-ethylhexyl)adipate	6.00E-01	I	300/1	NA		NA			NA		C	I	1.20E-03	I	NA	
Diethyl phthalate	8.00E-01	I	1000/1	8.00E+00	H	NA			NA		D	I	NA		NA	
Dimethyl phthalate	1.00E+01	H94	100/	1.00E+01	H94	NA			NA		D	I	NA		NA	
Fluoranthene	4.00E-02	I	3000/1	4.00E-01	H	NA			NA		D	I	NA		NA	
Fluorene	4.00E-02	I	3000/1	4.00E-01	H	NA			NA		D	I	NA		NA	
Indeno(1,2,3-cd)pyrene	NA			NA		NA			NA		B2	I	7.30E-01	U	6.10E-01	E
2-Methylnaphthalene	NA			NA		NA			NA		NA		NA		NA	
2-Methylphenol	5.00E-02	I	1000/1	5.00E-01	H	NA			NA		C	I	NA		NA	
4-Methylphenol	5.00E-03	H	1000/	5.00E-03	H	NA			NA		C	I	NA		NA	
Naphthalene	4.00E-02	P1		NA		NA			NA		D	I	NA		NA	
Phenanthrene	NA			NA		NA			NA		D	I	NA		NA	
Pyrene	3.00E-02	I	3000/1	3.00E-01	H	NA			NA		D	I	NA		NA	
Inorganic Analytes																
Aluminum	1.00E+00	E		NA		NA			NA		NA		NA		NA	
Antimony	4.00E-04	I	1000/1	4.00E-04	H	NA			NA		D	DW	NA		NA	
Arsenic	3.00E-04	I	3/1	3.00E-04	H	NA			NA		A	I	1.50E+00	I	1.51E+01	I
Barium	7.00E-02	I	3/1	7.00E-02	H	1.43E-04	A		NA		D	DW	NA		NA	
Beryllium	5.00E-03	I	100/1	5.00E-03	H	NA			NA		B2	I	4.30E+00	I	8.40E+00	I
Cadmium (carcinogenicity)	NA			NA		NA			NA		B1	I	NA		6.30E+00	I
Cadmium (food)	1.00E-03	I	10/1	NA		NA			NA		B1	I	NA		NA	
Cadmium (water)	5.00E-04	I	10/1	NA		5.71E-05	W		NA		B1	I	NA		NA	
Calcium	NA			NA		NA			NA		NA		NA		NA	
Chromium (hexavalent)	5.00E-03	I	500/1	2.00E-02	H	NA			NA		A	I	NA		4.20E+01	I
Chromium (trivalent)	1.00E+00	I	100/10	1.00E+00	H	5.71E-07	W		NA		D	DW	NA		NA	
Cobalt	6.00E-02	E		NA		NA			NA		NA		NA		NA	
Copper	4.00E-02	E		4.00E-02	H	NA			NA		D	I	NA		NA	
Cyanide	2.00E-02	I	100/1	2.00E-02	H	NA			NA		D	I	NA		NA	
Iron	3.00E-01	E		NA		NA			NA		NA		NA		NA	
Lead	NA			NA		NA			NA		B2	I	NA		NA	
Magnesium	NA			NA		NA			NA		NA		NA		NA	
Manganese	2.40E-02	I		NA		1.43E-05	I	1000/1	NA		D	I	NA		NA	
Mercury	3.00E-04	H94	1000/	3.00E-04	H94	8.57E-06	I	30/1	8.57E-05	H	D	I	NA		NA	
Molybdenum	5.00E-03	I	30/1	NA		NA			NA		D	DW	NA		NA	
Nickel	2.00E-02	I	100/3	2.00E-02	H	NA			NA		D	DW	NA		NA	
Potassium	NA			NA		NA			NA		NA		NA		NA	
Selenium	5.00E-03	I	3/1	5.00E-03	H	NA			NA		D	I	NA		NA	
Silver	5.00E-03	I	3/1	5.00E-03	H	NA			NA		D	I	NA		NA	
Sodium	NA			NA		NA			NA		NA		NA		NA	
Thallium (I) chloride	8.00E-05	I	300/1	8.00E-04	H	NA			NA		D	I	NA		NA	
Vanadium	7.00E-03	H	100	7.00E-03	H	NA			NA		D	DW	NA		NA	
Zinc	3.00E-01	I	3/1	3.00E-01	H	NA			NA		D	I	NA		NA	

A - Health Effects Assessment Summary Table 2 (HEAST) Alternate Methods
DW - Drinking Water Regulations and Health Advisories, February 1996

Table 8 3 of 3
Toxicity Information
Malvern TCE Site

Chemical Name	Chronic Oral RfD (mg/kg-day)	Source	Uncertainty/ Modifying Factors	Subchronic Oral RfD (mg/kg-day)	Source	Chronic Inhal RfD (mg/kg-day)	Source	Uncertainty/ Modifying Factors	Subchronic Inhal RfD (mg/kg-day)	Source	Weight-of-Evidence Class	Source	Oral CSF (mg/kg-day)[-1]	Source	Inhal CSF (mg/kg-day)[-1]	Source

E - EPA - NCEA provisional value, Superfund Technical Support Center
H - Health Effects Assessment Summary Tables (HEAST), FY1995
H94 - Health Effects Assessment Summary Tables (HEAST), FY1994
I - Integrated Risk Information System (IRIS), accessed online, September 1996
NA - Not available or not applicable
P1 - Provisional RfD: Memo from Joan Dollarhide to Debbie Siebers EPA Region V.
U - Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, ECAO, OHEA, EPA/600/R-93/089, July 1993
W - Withdrawn

AR300938

Table 9

Summary of Maximum Current Groundwater Risks to Residential Well Users
Malvern TCE

		Noncancer		Cancer
Well	**Pathway**	**Child**	**Adult**	**Age-adjusted**
Well DW-02	Inhalation			2.9E-06
	Ingestion	0.0077	0.0033	1.1E-07
	Dermal*	0.0023		1.2E-08
	Total	**0.0100**	**0.0033**	**3.0E-06**
Well DW-07	Inhalation			2.4E-06
	Ingestion	0.0064	0.0027	9.1E-08
	Dermal*	0.0019		1.0E-08
	Total	**0.0083**	**0.0027**	**2.5E-06**
Well DW-046	Inhalation			6.5E-06
	Ingestion	0.0078	0.0033	9.9E-06
	Dermal*	0.0003		1.3E-07
	Total	**0.0081**	**0.0033**	**1.6E-05**
Well DW-066	Inhalation			2.9E-06
	Ingestion	0.0036	0.0015	4.5E-06
	Dermal*	0.0001		6.1E-08
	Total	**0.0037**	**0.0015**	**7.5E-06**

* Dermal exposure is for the child only. The adult pathway is considered to be a minor contributor.

Summary of Maximum Future Groundwater Risks to Residential Well Users
Malvern TCE

		Noncancer		Cancer
Well	**Pathway**	**Child**	**Adult**	**Age-adjusted**
Well DW-036	Inhalation			5.5E-05
	Ingestion	0.86	0.37	8.3E-05
	Dermal*	0.40		5.3E-06
	Total	**1.3**	**0.37**	**1.4E-04**
Well DW-041	Inhalation	0.021	0.0083	1.5E-04
	Ingestion	2.2	0.95	2.1E-04
	Dermal*	1.1		1.5E-05
	Total	**3.3**	**0.96**	**3.7E-04**
Well DW-058	Inhalation			1.1E-05
	Ingestion	0.95	0.41	1.6E-05
	Dermal*	0.43		3.7E-06
	Total	**1.4**	**0.41**	**3.1E-05**

* Dermal exposure is for the child only. The adult pathway is considered to be a minor contributor.

filename:SRISKS.XLS
worksheet:dw-curr

12/26/96
11:28 AM

Table 10
Summary of Risks by Receptor and Pathway
Malvern TCE

Media	Pathway	Future Onsite Resident			Trespasser				Industrial			
		Noncancer		Cancer	Noncancer		Cancer		Noncancer		Cancer	
		Child	Adult	Age-adjusted	Youth	Adult	Youth	Adult	Site Worker	Construction Worker	Site Worker	Construction Worker
Groundwater												
Former Disposal Area	Inhalation	17	6.8	5.8E-04	NA	NA	NA	NA	NA	NA	NA	NA
	Ingestion	35	15	1.8E-03	NA	NA	NA	NA	5.4	NA	4.1E-04	NA
	Dermal	9.7	NA	1.2E-04	NA	NA	NA	NA	NA	NA	NA	NA
	Total	62	22	2.5E-03					5.4		4.1E-04	
Main Plant Area	Inhalation	440	180	1.6E-02	NA	NA	NA	NA	NA	NA	NA	NA
	Ingestion	930	400	4.7E-02	NA	NA	NA	NA	140	NA	1.1E-02	NA
	Dermal	270	NA	3.2E-03	NA	NA	NA	NA	NA	NA	NA	NA
	Total	1600	580	6.6E-02					140		1.1E-02	
Soil												
Underground Storage Tanks	Inhalation	0.083	0.030	1.8E-08	0.00077	0.00073	1.2E-10	3.2E-10	0.021	0.021	7.7E-09	6.2E-07
	Ingestion	3.2	0.34	2.7E-05	0.044	0.025	7.2E-07	1.1E-06	0.12	1.2	4.5E-06	1.8E-06
	Dermal	0.78	0.24	2.6E-05	0.022	0.018	5.8E-07	1.3E-06	0.096	0.11	5.8E-06	3.7E-07
	Total	4.0	0.61	5.3E-05	0.067	0.044	1.3E-06	2.4E-06	0.24	1.3	1.0E-05	2.8E-06
Area SE of Distillation Building	Inhalation	0.14	0.051	5.9E-07	0.0013	0.0013	4.1E-09	1.1E-08	0.036	0.0050	2.6E-07	2.0E-10
	Ingestion	2.3	0.25	2.6E-05	0.032	0.018	4.7E-07	7.3E-07	0.089	0.51	2.9E-06	6.4E-07
	Dermal	0.61	0.19	2.1E-05	0.017	0.014	4.8E-07	1.1E-06	0.075	0.049	4.9E-06	1.4E-07
	Total	3.1	0.49	4.8E-05	0.051	0.034	9.6E-07	1.8E-06	0.20	0.57	8.1E-06	7.7E-07
Above Ground Storage Area	Inhalation	<0.0001	<0.0001	8.7E-10	<0.0001	<0.0001	0.0E+00	0.0E+00	0.012	0.010	5.7E-10	NA
	Ingestion	1.9	0.20	1.2E-05	0.027	0.015	2.1E-07	3.3E-07	0.073	0.58	1.3E-06	NA
	Dermal	0.38	0.12	1.9E-05	0.011	0.0088	0.0E+00	0.0E+00	0.047	0.039	4.3E-06	NA
	Total	2.3	0.32	3.0E-05	0.037	0.024	2.1E-07	3.3E-07	0.13	0.63	5.6E-06	
FDA Excavated Area	Inhalation	0.034	0.012	2.2E-07	0.00032	0.00030	1.5E-09	3.9E-09	0.0087	NA	9.4E-08	NA
	Ingestion	3.1	0.34	2.9E-05	0.044	0.025	5.1E-07	8.0E-07	0.12	NA	3.2E-06	NA
	Dermal	0.80	0.25	2.4E-05	0.022	0.019	5.5E-07	1.3E-06	0.099	NA	5.6E-06	NA
	Total	4.0	0.60	5.3E-05	0.066	0.044	1.1E-06	2.1E-06	0.23		8.9E-06	
FDA Mounded Area	Inhalation	0.023	0.0080	8.7E-09	0.00021	0.00020	6.1E-11	1.6E-10	0.0057	0.0059	3.8E-09	2.7E-07
	Ingestion	2.1	0.23	8.3E-06	0.029	0.017	1.5E-07	2.3E-07	0.081	0.69	9.3E-07	1.3E-06
	Dermal	0.42	0.13	7.1E-06	0.012	0.0097	1.6E-07	3.7E-07	0.052	0.070	1.6E-06	2.7E-07
	Total	2.5	0.36	1.5E-05	0.041	0.027	3.1E-07	6.0E-07	0.14	0.76	2.6E-06	1.8E-06

NA - Not applicable
Offsite groundwater risks summarized on Table 6-7 for the current scenario and Table 6-8 for the future scenario.

AR300950

Table 11
Summary of Risks Across Pathways
Malvern TCE

Pathway	Future Onsite Resident			Trespasser				Industrial			
	Noncancer		Cancer	Noncancer		Cancer		Noncancer		Cancer	
	Child	Adult	Age-adjusted	Youth	Adult	Youth	Adult	Site Worker	Construction Worker	Site Worker	Construction Worker
FDA Area											
Groundwater - FDA	62	22	2.5E-03	NA	NA	NA	NA	5.4	NA	4.1E-04	NA
Soil - FDA Excavated Area	4.0	0.60	5.3E-05	0.066	0.044	1.1E-06	2.1E-06	0.23	NA	8.9E-06	NA
Soil - FDA Mounded Area	2.5	0.36	1.5E-05	0.041	0.027	3.1E-07	6.0E-07	0.14	0.76	2.6E-06	1.8E-06
Total FDA Area	**69**	**23**	**2.5E-03**	**0.11**	**0.070**	**1.4E-06**	**2.7E-06**	**5.7**	**0.76**	**4.2E-04**	**1.8E-06**
MPA Area											
Groundwater - MPA	1600	580	6.6E-02	NA	NA	NA	NA	140	NA	1.1E-02	NA
Soil - UST Area	4.0	0.61	5.3E-05	0.067	0.044	1.3E-06	2.4E-06	0.24	1.3	1.0E-05	2.8E-06
Soil - Distillation Building	3.1	0.49	4.8E-05	0.051	0.034	9.6E-07	1.8E-06	0.20	0.57	8.1E-06	7.7E-07
Soil - AST Area	2.3	0.32	3.0E-05	0.037	0.024	2.1E-07	3.3E-07	0.13	0.63	5.6E-06	NA
Total MPA Area	**1600**	**580**	**6.6E-02**	**0.15**	**0.10**	**2.5E-06**	**4.6E-06**	**140**	**2.5**	**1.1E-02**	**3.5E-06**

The future onsite residential groundwater risks are based on monitoring well data.

AR300954

TABLE 12 - SUMMARY OF ALTERNATIVES

Water Supply

WS-G-3a:	Public Water Supply
WS-G-3b:	Well Head Treatment

Main Plant Area Soils

MPA S-1:	No Action
MPA S-2:	Institutional Controls
MPA S-3:	Capping
MPA S-4:	InSitu Soil Vapor Extraction

Main Plant Area Groundwater

MPA-G-1:	No Action
MPA-G-2:	Institutional Controls
MPA-G-4:	Natural Attenuation
MPA-G-5:	Groundwater Collection, Treatment & Discharge
MPA-G-6:	Groundwater Collection, Treatment of Source Area & Discharge

Former Disposal Area Soils

FDA-S-1:	No Action
FDA-S-2:	Institutional Controls
FDA-S-3:	Capping
FDA-S-4:	Excavation, Off-Site Thermal Treatment, Disposal at a Subtitle C Landfill
FDA-S-5:	Excavation, ExSitu Volatilization, & Reuse as Backfill
FDA-S-6:	Excavation, On-Site Thermal Treatment, and Reuse as Backfill
FDA-S-7:	InSitu Soil Vapor Extraction
FDA-S-8:	Excavation, Consolidation of Soils at the Main Plant

Former Disposal Area Groundwater

FDA-G-1:	No Action
FDA-G-2:	Institutional Controls
FDA-G-4:	Natural Attenuation
FDA-G-5:	Groundwater Collection, Treatment, and Discharge
FDA-G-6:	Groundwater Collection, Treatment (Single Well), and Discharge

Table 13
Malvern TCE Site - Identification of ARARs
Water Supply Remedy

Requirement	Type	Citation
The water supply provided shall achieve MCLs	Chemical	The Safe Drinking Water Act 42 U.S.C. §§ 300(f)-300(j), and 40 CFR §141
The installation of the water line shall avoid, minimize and mitigate impacts on floodplains and wetlands.	Location	Executive Order No. 11988 and 40 CFR Part 6, Appendix A (regarding avoidance, minimization, and mitigation of impacts on floodplains) and Executive Order No. 11990 and 40 CFR Part 6, Appendix A (regarding avoidance, minimization, and mitigation of wetlands
Existing Residential wells shall be abandoned	Action	Pennsylvania Safe Drinking Water Act, 25 Pa Code Section 109.62 and consistent with PADEPs Public Water Supply Manual, part II, Section 3.3.5.11 and Chester County Health Department Rules and Regulations Chapter 500.
Management of the spent carbon filters shall be in accordance with the substantive requirements of hazardous waste regulations.	Action	25 Pa. Code Chapter 262 Subparts A (relating to hazardous waste determination and identification numbers), B (relating to manifesting requirements for off-site shipments of spent carbon or other hazardous waste); and C (relating to pretransport requirements); 25 Pa. Code Chapter 264, Subparts B-D, I (in the event that hazardous waste is managed, treated, or stored in tanks), and 40 CFR 268 Subpart C, Section 268.30, and Subpart E (regarding prohibitions on storage of hazardous waste).

Table 13 Malvern TCE Site - Identification of ARARs Main Plant Area Soils Remedy		
Fugitive dust emissions generated during remedial activities will be controlled	Action	Fugitive dust regulations I the federally approved State Implementation Plan (SIP) for the Commonwealth of Pennsylvania, 25 PA Code §§ 123.1 - 123.2, and the National Ambient Air Quality Standards for Particulate matter I 40 CFR §§ 50.6 and PA Code §§ 131.2 and 131.3
Quonset Hut debris shall be decontaminated in accordance with the Hazardous Debris Rule and properly disposed or reused.	Action	Hazardous Debris Rule 40 CFR 268.45
USTs shall be decontaminated in accordance with the Hazardous Debris Rule and properly disposed or reused.	Action	Hazardous Debris Rule 40 CFR 268.45
The Main Building (including Loading Dock and Chemical Laboratory) shall be closed in accordance with Federal and PA Hazardous Waste Regulations.	Action	25 Pa Code § 265.110 through 265.119, 265.442(7);40 C.F.R §§ 264.110 through 264.120, 264.178, 270.14(b)(13)
Wastewater generated during decontamination activities shall be properly managed.	Action	PA Hazardous Waste Regulation

Table 13
Malvern TCE Site Identification of ARARs
Main Plant Area Groundwater Remedy

Requirements	Type	Citation
Any new wells installed must be drilled in accordance with Pennsylvania Water Well Drillers regulations.	Action	25 Pa. Code Chapter 107. These regulations are established pursuant to the Water Well Drillers License Act, 32 P.S.§ 645.1 et seq.
The treated groundwater effluent shall be reinjected in accordance OSWER Directive #9234.1-06.	Action	"Applicability of Land Disposal Restrictions to RCRA and CERCLA Groundwater Treatment Reinjection", OSWER Directive #9234.1-06.
The installation of the extraction and treatment system shall avoid, minimize and mitigate impacts to wetlands.	Location	Executive Order No. 11988 and 40 CFR Part 6, Appendix A (regarding avoidance, minimization and mitigation of impacts on floodplains) and Executive Order No. 11990 and 40 CFR Part 6, A (regarding avoidance, minimization and mitigation of impacts on floodplains) and Executive Order No. 11990 and 40 CFR Part 6, Appendix A (regarding avoidance, minimization, and mitigation of wetlands
Existing pumping and/or monitoring wells which serve no useful purpose shall be properly plugged and abandoned.	Action	PADEP's Public Water Supply Manual, Part II, Section 3.3.5.11 and Chester County Health Department Rules and Regulations Chapter 500, in order to eliminate the possibility of these wells acting as a conduit for future groundwater contamination.
Air Emissions from Superfund Site shall be controlled.	To Be Considered	OWSER Directive #9355.0-28, Control of Air Emissions from Superfund Air Strippers at Superfund Ground Water Sites.
Air Emissions will also comply State and Federal Requirements	Action	40 CFR §§ 264.1030 - 264.1063 (Air Emissions Standards for Equipment Leaks). Air emissions of Vinyl Chloride will comply with 40 CFR Parts 61.60 - 61.69, National Emission Standards for Hazardous Air Pollutants (NESHAPS). 42 U.S.C §§7401 et seq. are applicable and must be met for the discharge of contaminants to the air. Air permitting and emissions ARARs are outlined in 25 PA Code §§ 121.1 - 121.3, 121.7, 123.1, 123.2, 123.31, 123.41, 127.1, 127.11, 127.12 and 131.1 - 131.4. 25 PA Code § 127.12 requires all new air emission sources to achieve minimum attainable emissions using the best available technology ("BAT"). In addition, the PADEP air permitting guidelines for remediation projects require all air striping and vapor extraction units to include emission control equipment.

Table 13
Malvern TCE Site Identification of ARARs
Main Plant Area Groundwater Remedy

Management of the spent carbon filters shall be in accordance with the substantive requirements of hazardous waste regulations.	Action	25 Pa. Code Chapter 262 Subparts A (relating to hazardous waste determination and identification numbers), B relating to manifesting requirements for off site shipments of spent carbon or other hazardous wastes); 25 Pa Code Chapter 263 (relating to transporters of hazardous wastes): and with respect to the operations at eh the Site generally, with the substantive requirements of 25 Pa Code Chapter 264, Subparts B-D, I (in the event that hazardous water generated as part of the remedy is managed in containers), 25 Pa. Code Chapter 264, Subpart J (in the event that hazardous waste is managed in containers), 25 Pa. Code Chapter 264, Subpart C, Section 268.30 and Subpart E (regarding prohibitions on storage of hazardous waste).
Fugitive dust emissions generated during remedial activities will be controlled in order to comply with federal and state air regulations.	Action	Fugitive dust regulations in the federally-approved State Implementation Plan (SIP) for the Commonwealth of Pennsylvania, 25 PA Code §§ 123.1 - 123.2 and the national Ambient Air Quality Standards for Particulate Matter 40 CFR §§ 50.6 and PA Code §§ 131.2 and 131.3
Extraction and Discharge of groundwater shall be in accordance with the substantive requirements of the Delaware River Basin Commission.	Location	(18 CFR Part 430) are applicable; These regulations establish requirements for the extraction and discharge of ground water within the Delaware River Basin.
The groundwater shall be restored to MCLs.	Chemcial	The Safe Drinking Water Act 42 U.S.C. §§ 300(f)-300(j), and 40 CFR §141

Table 13
Malvern TCE Site Identification of ARARs
Former Disposal Area/Mounded Area (FDA/MA) Soils Remedy

Requirements	Type	Citation
Any on-site landscaping will be in accordance with Federal Landscaping guidance.	To Be Considered	Office of the Federal Executive; Guidance for Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal landscaped Grounds, 60 Fed Reg 40837 (August 10, 1995) which is a "to be considered" (TBC) requirement
RCRA listed constituents are present in the soils, therefore, the remedy will be implemented consistent with the following substantive requirements, which are applicable to on-site activities.	Action	Pa. Code §§ 262.11 - 262.13 (relating to pretransport requirements); 25 Pa. Code § 262.34 (relating to pretransport requirements); 25 Pa. Code Chapter 263 (relating to transporters of hazardous wastes); and with respect to the operations at the Site generally, with the substantive requirements f 25 Pa. Code Chapter 264, Subparts B-D, I (in the event that hazardous waste generated as part of the remedy).
Sediment and erosion controls and temporary covers will be installed to protect exposed soil from the effects of weather consistent with PADEP's Bureau of Soil and Water Conservation Erosion and Sediment Pollution Control Manual.	To Be Considered	PADEP's Bureau of Soil and Water Conservation Erosion and Sediment Pollution Control Manual
Fugitive dust emissions generated during remedial activities will be controlled in order to comply with federal and state air regulations.	Action	Fugitive dust regulations in the federally-approved State Implementation Plan (SIP) for the Commonwealth of Pennsylvania, 25 PA Code §§ 123.1 - 123.2 and the National Ambient Air Quality Standards for Particulate matter in 40 CFR §§ 50.6

Requirements	Table 13 FDA/MA Groundwater Remedy ARARs Type	Citation
Installation of additional wells may be necessary and must be in accordance Water Well Drillers License Act.	Action	25 Pa. Code Chapter 107. These regulations are established pursuant to the Water well Drillers License Act, 32 P.S. § 645.1 et seq.
The groundwater shall be restored to MCLs.	Chemical	The Safe Drinking Water Act 42 U.S.C. §§ 300(f)-300(j), and 40 CFR §141.

TABLE 14
MALVERN TCE SUPERFUND SITE

RESIDENTIAL WELLS TO HOOK UP TO PUBLIC WATER

Well Number	Address
3	11 Hillbrook Circle
4	25 Hillbrook Circle
7	36 Hillbrook Circle
20	232 N. Phoenixville Pike
42	13 Hillbrook Circle
43	21 Hillbrook Circle
53	29 Hillbrook Circle
54	28 Hillbrook Circle
60	39 Hillbrook Circle
66	215 N. Phoenixville Pike
1	8 Hillbrook Circle
2	4 Hillbrook Circle
5	26 Hillbrook Circle
12	365 Conestoga Rd
30	330 Conestoga Rd
31	405 Conestoga Rd
32	411 Conestoga Rd
45	9 Hillbrook Circle
46	7 Hillbrook Circle
47	5 Hillbrook Circle
48	1 Hillbrook Circle
49	2 Hillbrook Circle
51	10 Hillbrook Circle
61	38 Hillbrook Circle
62	388 Conestoga Rd
63	386 Conestoga Rd
64	384 Conestoga Rd
69	3 Hillbrook Circle
70	211 N. Phoenixville Pike
71	409 Conestoga Rd
100	366 Conestoga Rd
200	407 Conestoga Rd
6	32 Hillbrook Circle
9	33 Hillbrook Circle
10	256 N. Phoenixville Pike
15	208 N. Phoenixville Pike
16	212 N. Phoenixville Pike
19	228 N. Phoenixville Pike
23	244 N. Phoenixville Pike
33	15 Hillbrook Circle
36	17 Hillbrook Circle
41	19 Hillbrook Circle
44	23 Hillbrook Circle
50A	6 Hillbrook Circle
52A	27 Hillbrook Circle
55A	30 Hillbrook Circle
56	31 Hillbrook Circle
57	34 Hillbrook Circle
58A	35 Hillbrook Circle
59A	37 Hillbrook Circle
65	248 N. Phoenixville Pike
67	410 Conestoga Rd

RESPONSIVENESS SUMMARY
FOR THE
PROPOSED REMEDIAL ACTION PLAN
FOR THE
MALVERN TCE SUPERFUND SITE
EAST WHITELAND TOWNSHIP, CHESTER COUNTY, PENNSYLVANIA

Public Comment Period
June 23, 1997, through September 2, 1997

Malvern TCE Superfund Site

Responsiveness Summary
for the
Proposed Remedial Action Plan

TABLE OF CONTENTS

Overview . . . . . .

Background . . . . . .

Part I: Summary of Commentors' Major Issues and Concerns During the Public Meeting

A. Operations at the Site . . . . . .
B. The Preferred Soil Alternatives . . . . . .
C. The Preferred groundwater Alternatives . . . . . .
D. The Preferred Water Supply Alternative . . . . . .
E. Bioremediation . . . . . .
F. Responsibilities of the PRPs . . . . . .
G. The Time Frame for the Remedial Action . . . . . .
H. The Site's Impact on the Surrounding Community . . . . . .
I. The Contamination . . . . . .

Part II: Summary of Commentors' Major Comments and Questions Received in Writing During the Public Comment Period

A. Comments of North Industrial Chemicals, Inc. . . . . .
B. Comments of East Whiteland Township . . . . . .
C. Comments of Environmental Resources Management (ERM) on behalf of the Malvern Site Study Group, a PRP group . . . . . .
D. Comments of David DeWitt on behalf of the Concerned Residents of East Whiteland Township . . . . . .
E. Comments of Fox, Rothschild, O'Brien & Frankel, LLP and Walter B. Satterthwaite Associates Inc. on behalf of the Malvern De Minimis PRP Group . .
F. Comments of United States Department of Interior . . . . . .
G. Comments of Mr. & Mrs. Charles Kocher . . . . . .
H. Comments of Pennsylvania Environmental Defense Foundation . . . . . .