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NSA MID SOUTH
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CORRECTIVE ACTION PLAN TANK SYSTEM 106 AND 107 NAVAL HOSPITAL BUILDING H-100 MILLINGTON SUPPACT TN
12/11/1992
ENSAFE/ALLEN & HOSHALL

00448

(12)

Corrective Action Plan
Tank Systems 106 and 107
Naval Hospital, Building H-100
Naval Air Station Memphis
Millington, Tennessee

Prepared for:

Department of the Navy
Southern Division
Naval Facilities Engineering command
Charleston, South Carolina

CONTRACT N62467-89-D-0318
CTO-040

Prepared by:

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(901) 383-9115

December 11, 1992

---EMPLOYEE--- CODE	NAME	DESCRIPTION	STT	DATE	HOURS TYPE	HOURS	-----LABOR------- RATE	AMOUNT	CD	-------BILLING------ RATE	AMOUNT	BILLED RATE
	11 - 101 ACTIVITY/COORDINATION											
	07 - TASK ORDER MANAGER											
BJJ	J. J. BENNETT		B	04/30/92	REG	1.000	24.04	24.04	M	45.44	45.44	24.04
	TOTAL TASK ORDER MANAGER					1.000	24.04	24.04		45.44	45.44	
	10 - SENIOR SCIENTIST											
ALM	L. M. ANDERSON		B	04/30/92	REG	1.000	18.27	18.27	M	34.53	34.53	18.27
	TOTAL SENIOR SCIENTIST					1.000	18.27	18.27		34.53	34.53	
	TOTAL 101 ACTIVITY/COORDINATION					2.000	21.16	42.31		39.98	79.97	
	12 - 102 EIC CORD/UPDATES											
	07 - TASK ORDER MANAGER											
ALM	L. M. ANDERSON		B	04/30/92	REG	1.000	18.27	18.27	M	35.13	35.13	18.27
ALM	L. M. ANDERSON		B	05/30/92	REG	2.000	18.27	36.54	M	36.54	73.08	18.27
ALM	L. M. ANDERSON		B	06/20/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
ALM	L. M. ANDERSON		B	07/04/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
ALM	L. M. ANDERSON		B	07/04/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
ALM	L. M. ANDERSON		B	07/11/92	REG	3.000	20.19	60.57	M	40.38	121.14	20.19
ALM	L. M. ANDERSON		B	07/18/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
ALM	L. M. ANDERSON		B	08/29/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
ALM	L. M. ANDERSON		B	09/19/92	REG	2.000	20.19	40.38	M	40.38	80.76	20.19
ALM	L. M. ANDERSON		B	10/10/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
ALM	L. M. ANDERSON		B	11/07/92	REG	1.500	20.19	30.29	M	40.38	60.57	20.19
ALM	L. M. ANDERSON		B	11/14/92	REG	0.500	20.19	10.10	M	40.38	20.19	20.19
ALM	L. M. ANDERSON		B	12/05/92	REG	0.500	21.15	10.58	M	42.30	21.15	21.15
ALM	L. M. ANDERSON		B	11/14/92	REG	-0.500	20.19	-10.10	0	40.38	-20.19	20.19
ALM	L. M. ANDERSON		B	11/14/92	REG	0.500	21.15	10.58	0	42.30	21.15	21.15
ALM	L. M. ANDERSON		B	12/12/92	REG	1.000	21.15	21.15	M	42.30	42.30	21.15
ALM	L. M. ANDERSON		B	01/16/93	REG	0.500	21.15	10.58	M	42.30	21.15	21.15
ALM	L. M. ANDERSON		B	02/06/93	REG	1.000	21.15	21.15	M	42.30	42.30	21.15
ALM	L. M. ANDERSON		B	02/13/93	REG	2.500	21.15	52.88	M	42.30	105.75	21.15
ALM	L. M. ANDERSON		B	02/27/93	REG	0.500	21.15	10.58	M	42.30	21.15	21.15
ALM	L. M. ANDERSON		B	04/03/93	REG	0.500	21.15	10.58	M	42.30	21.15	21.15
	TOTAL TASK ORDER MANAGER					22.500	20.23	455.23		40.40	909.06	
	TOTAL 102 EIC CORD/UPDATES					22.500	20.23	455.23		40.40	909.06	
	13 - 103 TDEC COORDINATION											
	07 - TASK ORDER MANAGER											
ALM	L. M. ANDERSON		S	08/21/93	REG	7.000	21.15	148.05	M	42.30	296.10	0.00
	TOTAL TASK ORDER MANAGER					7.000	21.15	148.05		42.30	296.10	
	15 - ENGR/ARCH											
SJE	J. E. STEDMAN		B	10/03/92	REG	2.000	15.87	31.74	M	31.74	63.48	15.87
SJE	J. E. STEDMAN		S	08/21/93	REG	5.000	17.55	87.75	M	35.10	175.50	0.00
	TOTAL ENGR/ARCH					7.000	17.07	119.49		34.14	238.98	
	TOTAL 103 TDEC COORDINATION					14.000	19.11	267.54		38.22	535.08	

---EMPLOYEE--- CODE	NAME	DESCRIPTION	STT	DATE	HOURS TYPE	HOURS	-----LABOR------- RATE	AMOUNT	CD	-------BILLING------ RATE	AMOUNT	BILLED RATE
	14 - 104 LAB SUBCONTRACT											
	07 - TASK ORDER MANAGER											
ALM	L. M. ANDERSON		B	09/05/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
	TOTAL TASK ORDER MANAGER					1.000	20.19	20.19		40.38	40.38	
	10 - SENIOR SCIENTIST											
ALM	L. M. ANDERSON		B	04/30/92	REG	1.000	18.27	18.27	M	34.53	34.53	18.27
ALM	L. M. ANDERSON		B	05/30/92	REG	1.000	18.27	18.27	M	36.54	36.54	18.27
	TOTAL SENIOR SCIENTIST					2.000	18.27	36.54		35.54	71.07	
	11 - SCIENTIST, CHEMIST											
CJR	J. R. CORNELIUS		B	04/30/92	REG	2.500	11.54	28.85	M	21.81	54.53	11.54
SRP	R. P. SMITH		B	06/27/92	REG	1.000	12.50	12.50	M	25.00	25.00	12.50
	TOTAL SCIENTIST, CHEMIST					3.500	11.81	41.35		22.72	79.53	
	TOTAL 104 LAB SUBCONTRACT					6.500	15.09	98.08		29.38	190.98	
	15 - 105 DRILLING SUBCONTRACT											
	10 - SENIOR SCIENTIST											
ALM	L. M. ANDERSON		B	04/30/92	REG	2.000	18.27	36.54	M	34.53	69.06	18.27
ALM	L. M. ANDERSON		B	04/30/92	REG	2.000	18.27	36.54	M	34.53	69.06	18.27
ALM	L. M. ANDERSON		B	04/30/92	REG	3.000	18.27	54.81	M	34.53	103.59	18.27
	TOTAL SENIOR SCIENTIST					7.000	18.27	127.89		34.53	241.71	
	11 - SCIENTIST, CHEMIST											
CJR	J. R. CORNELIUS		B	03/31/92	REG	1.000	11.54	11.54	M	21.58	21.58	11.54
CJR	J. R. CORNELIUS		B	04/30/92	REG	2.000	11.54	23.08	M	21.81	43.62	11.54
MJR	J. R. MATTHEWS		B	04/30/92	REG	2.000	15.87	31.74	M	29.99	59.99	15.87
	TOTAL SCIENTIST, CHEMIST					5.000	13.27	66.36		25.04	125.19	
	TOTAL 105 DRILLING SUBCONTRACT					12.000	16.19	194.25		30.58	366.90	
	16 - 106 SURVEYING SUBCONTRACT											
	07 - TASK ORDER MANAGER											
ALM	L. M. ANDERSON		B	06/06/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
	TOTAL TASK ORDER MANAGER					1.000	20.19	20.19		40.38	40.38	
	10 - SENIOR SCIENTIST											
ALM	L. M. ANDERSON		B	04/30/92	REG	2.000	18.27	36.54	M	32.61	65.22	18.27
ALM	L. M. ANDERSON		B	07/04/92	REG	2.000	20.19	40.38	M	40.38	80.76	20.19
	TOTAL SENIOR SCIENTIST					4.000	19.23	76.92		36.50	145.98	
	11 - SCIENTIST, CHEMIST											
CJR	J. R. CORNELIUS		B	03/31/92	REG	1.000	11.54	11.54	M	21.58	21.58	11.54
CJR	J. R. CORNELIUS		B	04/30/92	REG	2.000	11.54	23.08	M	21.81	43.62	11.54
SRP	R. P. SMITH		B	06/20/92	REG	1.000	12.50	12.50	M	25.00	25.00	12.50
TGL	G. L. TEMPLE		B	06/06/92	REG	2.000	15.87	31.74	M	31.74	63.48	15.87
	TOTAL SCIENTIST, CHEMIST					6.000	13.14	78.86		25.61	153.68	

---EMPLOYEE--- CODE	NAME	DESCRIPTION	STT	DATE	HOURS TYPE	HOURS	-----LABOR------- RATE	AMOUNT	CD	-------BILLING------ RATE	AMOUNT	BILLED RATE
	TOTAL 106 SURVEYING SUBCONTRACT					11.000	16.00	175.97		30.91	340.04	
	17 - 107 SPOILS/FLUIDS DISPOSL											
	10 - SENIOR SCIENTIST											
ALM	L. M. ANDERSON		B	08/22/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
ALM	L. M. ANDERSON		B	08/29/92	REG	2.000	20.19	40.38	M	40.38	80.76	20.19
ALM	L. M. ANDERSON		B	09/19/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
	TOTAL SENIOR SCIENTIST					4.000	20.19	80.76		40.38	161.52	
	11 - SCIENTIST, CHEMIST											
TGL	G. L. TEMPLE		B	09/19/92	REG	1.000	15.87	15.87	M	31.74	31.74	15.87
	TOTAL SCIENTIST, CHEMIST					1.000	15.87	15.87		31.74	31.74	
	TOTAL 107 SPOILS/FLUIDS DISPOSL					5.000	19.33	96.63		38.65	193.26	
	18 - 108 DRAFT POA PREPARATION											
	08 - HEALTH & SAFETY MANAGER											
BJH	J. H. BOROWSKI		B	03/31/92	REG	1.000	22.59	22.59	M	42.24	42.24	22.59
	TOTAL HEALTH & SAFETY MANAGER					1.000	22.59	22.59		42.24	42.24	
	10 - SENIOR SCIENTIST											
ALM	L. M. ANDERSON		B	03/31/92	REG	3.000	18.27	54.81	M	34.16	102.49	18.27
ALM	L. M. ANDERSON		B	03/31/92	REG	6.000	18.27	109.62	M	34.16	204.99	18.27
ALM	L. M. ANDERSON		B	03/31/92	REG	7.000	18.27	127.89	M	34.16	239.15	18.27
ALM	L. M. ANDERSON		B	03/31/92	REG	14.000	18.27	255.78	M	34.16	478.31	18.27
BHH	H. H. BEIRO		B	03/31/92	REG	4.000	24.04	96.16	M	44.95	179.82	24.04
	TOTAL SENIOR SCIENTIST					34.000	18.95	644.26		35.43	1204.77	
	11 - SCIENTIST, CHEMIST											
MJR	J. R. MATTHEWS		B	03/31/92	REG	9.000	15.87	142.83	M	29.68	267.09	15.87
MJR	J. R. MATTHEWS		B	03/31/92	REG	28.000	15.87	444.36	M	29.68	830.95	15.87
MJR	J. R. MATTHEWS		B	03/31/92	REG	6.000	15.87	95.22	M	29.68	178.06	15.87
MPC	P. C. MASON		B	03/31/92	REG	4.000	12.02	48.08	M	22.48	89.91	12.02
MPC	P. C. MASON		B	03/31/92	REG	8.000	12.02	96.16	M	22.48	179.82	12.02
	TOTAL SCIENTIST, CHEMIST					55.000	15.03	826.65		28.11	1545.84	
	16 - DRAFTSMAN/CAD OP SR											
LTL	LTL		B	03/31/92	REG	3.000	9.52	28.56	M	17.80	53.41	9.52
LTL	LTL		B	03/31/92	REG	2.000	9.52	19.04	M	17.80	35.60	9.52
LTL	LTL		B	03/31/92	REG	6.000	9.52	57.12	M	17.80	106.81	9.52
LTL	LTL		B	05/30/92	REG	0.500	9.52	4.76	M	19.04	9.52	9.52
	TOTAL DRAFTSMAN/CAD OP SR					11.500	9.52	109.48		17.86	205.35	
	17 - DRAFTSMAN											
TJC	J. C. TRIPLETT		B	03/31/92	REG	1.000	9.00	9.00	M	16.83	16.83	9.00
	TOTAL DRAFTSMAN					1.000	9.00	9.00		16.83	16.83	

---EMPLOYEE--- CODE	NAME	DESCRIPTION	STT	DATE	HOURS TYPE	HOURS	-----LABOR------- RATE	AMOUNT	CD	-------BILLING------ RATE	AMOUNT	BILLED RATE
18 - OTHER, TECHNICAL EDITOR												
KMC	M. C. KING		B	03/31/92	REG	3.000	12.02	36.06	M	22.48	67.43	12.02
TOTAL OTHER, TECHNICAL EDITOR						3.000	12.02	36.06		22.48	67.43	
26 - OTHER, WORD PROCESSOR												
HLF	L. F. HUNTER		B	03/31/92	REG	5.000	9.62	48.10	M	17.99	89.95	9.62
TOTAL OTHER, WORD PROCESSOR						5.000	9.62	48.10		17.99	89.95	
TOTAL 108 DRAFT POA PREPARATION						110.500	15.35	1696.14		28.71	3172.40	
19 - 109 FINAL POA PREPARATION												
10 - SENIOR SCIENTIST												
ALM	L. M. ANDERSON		B	04/30/92	REG	7.000	18.27	127.89	M	34.53	241.71	18.27
ALM	L. M. ANDERSON		B	04/30/92	REG	8.000	18.27	146.16	M	34.53	276.24	18.27
ALM	L. M. ANDERSON		B	07/18/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
TOTAL SENIOR SCIENTIST						16.000	18.39	294.24		34.90	558.33	
11 - SCIENTIST, CHEMIST												
TGL	G. L. TEMPLE		B	03/31/92	REG	13.000	15.87	206.31	M	29.68	385.80	15.87
MJR	J. R. MATTHEWS		B	04/30/92	REG	10.000	15.87	158.70	M	29.99	299.94	15.87
TOTAL SCIENTIST, CHEMIST						23.000	15.87	365.01		29.81	685.74	
16 - DRAFTSMAN/CAD OP SR												
LTL	LTL		B	06/06/92	REG	0.500	9.52	4.76	M	19.04	9.52	9.52
TOTAL DRAFTSMAN/CAD OP SR						0.500	9.52	4.76		19.04	9.52	
18 - OTHER, TECHNICAL EDITOR												
KMC	M. C. KING		B	04/30/92	REG	8.000	12.02	96.16	M	22.72	181.74	12.02
KMC	M. C. KING		B	04/30/92	REG	3.000	12.02	36.06	M	22.72	68.15	12.02
KMC	M. C. KING		B	07/18/92	REG	1.000	12.02	12.02	M	24.04	24.04	12.02
TOTAL OTHER, TECHNICAL EDITOR						12.000	12.02	144.24		22.83	273.94	
26 - OTHER, WORD PROCESSOR												
GAD	GAD		B	04/30/92	REG	6.000	9.14	54.84	M	17.27	103.65	9.14
HLF	L. F. HUNTER		B	04/30/92	REG	7.000	9.62	67.34	M	18.18	127.27	9.62
TOTAL OTHER, WORD PROCESSOR						13.000	9.40	122.18		17.76	230.92	
TOTAL 109 FINAL POA PREPARATION						64.500	14.43	930.43		27.26	1758.45	
10 - 110 START-UP MEETING												
07 - TASK ORDER MANAGER												
ALM	L. M. ANDERSON		B	05/30/92	REG	3.000	18.27	54.81	M	36.54	109.62	18.27
TOTAL TASK ORDER MANAGER						3.000	18.27	54.81		36.54	109.62	
TOTAL 110 START-UP MEETING						3.000	18.27	54.81		36.54	109.62	

---EMPLOYEE--- CODE	NAME	DESCRIPTION	STT	DATE	HOURS TYPE	HOURS	LABOR RATE	LABOR AMOUNT	BILLING CD	BILLING RATE	BILLING AMOUNT	BILLED RATE
	21 - 111 MON.WELL/SOIL BORINGS											
	07 - TASK ORDER MANAGER											
ALM	L. M. ANDERSON		B	05/30/92	REG	4.000	18.27	73.08	M	36.54	146.16	18.27
	TOTAL TASK ORDER MANAGER					4.000	18.27	73.08		36.54	146.16	
	10 - SENIOR SCIENTIST											
ALM	L. M. ANDERSON		B	05/30/92	REG	2.000	18.27	36.54	M	36.54	73.08	18.27
	TOTAL SENIOR SCIENTIST					2.000	18.27	36.54		36.54	73.08	
	11 - SCIENTIST, CHEMIST											
KAC	A. C. KIM		B	05/30/92	REG	4.000	12.50	50.00	M	25.00	100.00	12.50
MJR	J. R. MATTHEWS		B	05/30/92	REG	6.000	15.87	95.22	M	31.74	190.44	15.87
MJR	J. R. MATTHEWS		B	05/30/92	REG	4.000	15.87	63.48	M	31.74	126.96	15.87
MJR	J. R. MATTHEWS		B	05/30/92	REG	36.000	15.87	571.32	M	31.74	1142.64	15.87
MJR	J. R. MATTHEWS		B	05/30/92	REG	10.000	15.87	158.70	M	31.74	317.40	15.87
TGL	G. L. TEMPLE		B	05/30/92	REG	2.000	15.87	31.74	M	31.74	63.48	15.87
TGL	G. L. TEMPLE		B	05/30/92	REG	3.000	15.87	47.61	M	31.74	95.22	15.87
TGL	G. L. TEMPLE		B	05/30/92	REG	11.000	15.87	174.57	M	31.74	349.14	15.87
TGL	G. L. TEMPLE		B	05/30/92	REG	9.000	15.87	142.83	M	31.74	285.66	15.87
TGL	G. L. TEMPLE		B	05/30/92	REG	3.000	15.87	47.61	M	31.74	95.22	15.87
MJR	J. R. MATTHEWS		B	05/30/92	REG	26.000	15.87	412.62	M	31.74	825.24	15.87
PGT	G. T. PIERCE		B	05/30/92	REG	4.500	12.98	58.41	M	25.96	116.82	12.98
TGL	G. L. TEMPLE		B	05/30/92	REG	20.000	15.87	317.40	M	31.74	634.80	15.87
TGL	G. L. TEMPLE		B	06/06/92	REG	3.000	15.87	47.61	M	31.74	95.22	15.87
CJR	J. R. CORNELIUS		B	07/04/92	REG	2.000	12.02	24.04	M	23.08	46.16	11.54
MJR	J. R. MATTHEWS		B	07/04/92	REG	2.000	15.87	31.74	M	31.74	63.48	15.87
BBJ	B. J. BRANTLEY		B	07/11/92	REG	5.500	16.10	88.55	M	32.20	177.10	16.10
MJR	J. R. MATTHEWS		B	07/11/92	REG	3.000	15.87	47.61	M	31.74	95.22	15.87
MJR	J. R. MATTHEWS		B	07/11/92	REG	9.000	15.87	142.83	M	31.74	285.66	15.87
MJR	J. R. MATTHEWS		B	07/11/92	REG	16.000	15.87	253.92	M	31.74	507.84	15.87
TGL	G. L. TEMPLE		B	08/22/92	REG	2.000	15.87	31.74	M	31.74	63.48	15.87
	TOTAL SCIENTIST, CHEMIST					181.000	15.69	2839.55		31.37	5677.18	
	21 - FIELD TECHNICIAN											
SAJ	A. J. SMITH		B	07/25/92	REG	1.000	9.00	9.00	M	18.00	18.00	9.00
	TOTAL FIELD TECHNICIAN					1.000	9.00	9.00		18.00	18.00	
	TOTAL 111 MON.WELL/SOIL BORINGS					188.000	15.73	2958.17		31.46	5914.42	
	22 - 112 GROUNDWATER SAMPLING											
	07 - TASK ORDER MANAGER											
ALM	L. M. ANDERSON		B	05/30/92	REG	5.000	20.19	100.95	M	40.38	201.90	20.19
	TOTAL TASK ORDER MANAGER					5.000	20.19	100.95		40.38	201.90	
	10 - SENIOR SCIENTIST											
ALM	L. M. ANDERSON		B	06/06/92	REG	2.000	20.19	40.38	M	40.38	80.76	20.19
	TOTAL SENIOR SCIENTIST					2.000	20.19	40.38		40.38	80.76	

---EMPLOYEE--- CODE	NAME	DESCRIPTION	STT	DATE	HOURS TYPE	HOURS	-----LABOR------- RATE	AMOUNT	CD	-------BILLING------ RATE	AMOUNT	BILLED RATE
	11 - SCIENTIST, CHEMIST											
PGT	G. T. PIERCE		B	05/30/92	REG	6.000	12.98	77.88	M	25.96	155.76	12.98
TGL	G. L. TEMPLE		B	05/30/92	REG	4.000	15.87	63.48	M	31.74	126.96	15.87
TGL	G. L. TEMPLE		B	06/06/92	REG	3.000	15.87	47.61	M	31.74	95.22	15.87
CJR	J. R. CORNELIUS		B	06/27/92	REG	3.000	12.02	36.06	M	23.08	69.24	11.54
TGL	G. L. TEMPLE		B	08/29/92	REG	10.000	15.87	158.70	M	31.74	317.40	15.87
	TOTAL SCIENTIST, CHEMIST					26.000	14.76	383.73		29.41	764.58	
	TOTAL 112 GROUNDWATER SAMPLING					33.000	15.91	525.06		31.73	1047.24	
	24 - 114 WATER USE SURVEY											
	07 - TASK ORDER MANAGER											
ALM	L. M. ANDERSON		B	05/30/92	REG	1.000	18.27	18.27	M	36.54	36.54	18.27
ALM	L. M. ANDERSON		B	07/11/92	REG	2.000	20.19	40.38	M	40.38	80.76	20.19
	TOTAL TASK ORDER MANAGER					3.000	19.55	58.65		39.10	117.30	
	10 - SENIOR SCIENTIST											
ALM	L. M. ANDERSON		B	07/18/92	REG	2.000	20.19	40.38	M	40.38	80.76	20.19
	TOTAL SENIOR SCIENTIST					2.000	20.19	40.38		40.38	80.76	
	11 - SCIENTIST, CHEMIST											
TGL	G. L. TEMPLE		B	05/30/92	REG	5.000	15.87	79.35	M	31.74	158.70	15.87
TGL	G. L. TEMPLE		B	05/30/92	REG	4.000	15.87	63.48	M	31.74	126.96	15.87
TGL	G. L. TEMPLE		B	07/18/92	REG	1.000	15.87	15.87	M	31.74	31.74	15.87
	TOTAL SCIENTIST, CHEMIST					10.000	15.87	158.70		31.74	317.40	
	TOTAL 114 WATER USE SURVEY					15.000	17.18	257.73		34.36	515.46	
	25 - 115 LAB ANALYSIS											
	07 - TASK ORDER MANAGER											
ALM	L. M. ANDERSON		B	07/04/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
	TOTAL TASK ORDER MANAGER					1.000	20.19	20.19		40.38	40.38	
	11 - SCIENTIST, CHEMIST											
KAC	A. C. KIM		B	06/06/92	REG	0.500	13.00	6.50	M	26.00	13.00	13.00
TGL	G. L. TEMPLE		B	08/29/92	REG	1.000	15.87	15.87	M	31.74	31.74	15.87
	TOTAL SCIENTIST, CHEMIST					1.500	14.91	22.37		29.83	44.74	
	TOTAL 115 LAB ANALYSIS					2.500	17.02	42.56		34.05	85.12	
	26 - 116 DRAFT EAR REPORT											
	02 - PROJECT ASSISTANT											
DMC	M. C. DHORITY		B	07/11/92	REG	8.500	11.54	98.09	M	23.08	196.18	11.54
	TOTAL PROJECT ASSISTANT					8.500	11.54	98.09		23.08	196.18	

---EMPLOYEE--- CODE	NAME	DESCRIPTION	STT	DATE	HOURS TYPE	HOURS	-----LABOR------- RATE	AMOUNT	CD	-------BILLING------ RATE	AMOUNT	BILLED RATE
07 - TASK ORDER MANAGER												
ALM	L. M. ANDERSON		B	07/25/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
TOTAL TASK ORDER MANAGER						1.000	20.19	20.19		40.38	40.38	
10 - SENIOR SCIENTIST												
ALM	L. M. ANDERSON		B	08/01/92	REG	1.000	20.19	20.19	M	40.38	40.38	20.19
ALM	L. M. ANDERSON		B	08/08/92	REG	7.000	20.19	141.33	M	40.38	282.66	20.19
ALM	L. M. ANDERSON		B	08/22/92	REG	2.000	20.19	40.38	M	40.38	80.76	20.19
TOTAL SENIOR SCIENTIST						10.000	20.19	201.90		40.38	403.80	
11 - SCIENTIST, CHEMIST												
MJR	J. R. MATTHEWS		B	06/06/92	REG	8.000	15.87	126.96	M	31.74	253.92	15.87
MJR	J. R. MATTHEWS		B	06/06/92	REG	10.000	15.87	158.70	M	31.74	317.40	15.87
MJR	J. R. MATTHEWS		B	06/20/92	REG	4.000	15.87	63.48	M	31.74	126.96	15.87
MJR	J. R. MATTHEWS		B	06/20/92	REG	3.000	15.87	47.61	M	31.74	95.22	15.87
CJR	J. R. CORNELIUS		B	06/27/92	REG	11.000	12.02	132.22	M	23.08	253.88	11.54
CJR	J. R. CORNELIUS		B	07/04/92	REG	9.500	12.02	114.19	M	23.08	219.26	11.54
MJR	J. R. MATTHEWS		B	06/27/92	REG	16.000	15.87	253.92	M	31.74	507.84	15.87
MJR	J. R. MATTHEWS		B	07/04/92	REG	6.000	15.87	95.22	M	31.74	190.44	15.87
DMC	M. C. DHORITY		B	07/18/92	REG	20.500	11.54	236.57	M	23.08	473.14	11.54
FSJ	S. J. FARMER		B	07/25/92	REG	6.000	13.13	78.78	M	26.26	157.56	13.13
MJR	J. R. MATTHEWS		B	07/18/92	REG	16.000	15.87	253.92	M	31.74	507.84	15.87
MJR	J. R. MATTHEWS		B	07/25/92	REG	31.000	15.87	491.97	M	31.74	983.94	15.87
MPC	P. C. MASON		B	07/25/92	REG	5.500	12.50	68.75	M	25.00	137.50	12.50
DMC	M. C. DHORITY		B	08/08/92	REG	10.000	11.54	115.40	M	23.08	230.80	11.54
MJR	J. R. MATTHEWS		B	08/08/92	REG	35.000	15.87	555.45	M	31.74	1110.90	15.87
MJR	J. R. MATTHEWS		B	08/22/92	REG	0.500	15.87	7.94	M	31.74	15.87	15.87
MPC	P. C. MASON		B	08/08/92	REG	1.000	12.50	12.50	M	25.00	25.00	12.50
MJR	J. R. MATTHEWS		B	08/01/92	REG	20.000	15.87	317.40	M	31.74	634.80	15.87
TOTAL SCIENTIST, CHEMIST						213.000	14.70	3130.98		29.31	6242.27	
15 - ENGR/ARCH												
SJE	J. E. STEDMAN		B	08/22/92	REG	4.500	15.87	71.41	M	31.74	142.83	15.87
SJE	J. E. STEDMAN		B	08/29/92	REG	13.500	15.87	214.25	M	31.74	428.49	15.87
TOTAL ENGR/ARCH						18.000	15.87	285.66		31.74	571.32	
17 - DRAFTSMAN												
WC	C. WILKINS		B	07/11/92	REG	6.500	8.94	58.11	M	17.88	116.22	8.94
WC	C. WILKINS		B	08/01/92	REG	8.500	8.94	75.99	M	17.88	151.98	8.94
WC	C. WILKINS		B	08/15/92	REG	22.500	8.94	201.15	M	17.88	402.30	8.94
WC	C. WILKINS		B	08/08/92	REG	2.000	8.94	17.88	M	17.88	35.76	8.94
WC	C. WILKINS		B	09/11/92	REG	4.000	8.94	35.76	M	17.88	71.52	8.94
TOTAL DRAFTSMAN						43.500	8.94	388.89		17.88	777.78	
18 - OTHER, TECHNICAL EDITOR												
KMC	M. C. KING		B	08/08/92	REG	3.000	12.02	36.06	M	24.04	72.12	12.02
TOTAL OTHER, TECHNICAL EDITOR						3.000	12.02	36.06		24.04	72.12	

---EMPLOYEE--- CODE	NAME	DESCRIPTION	STT	DATE	HOURS TYPE	HOURS	-----LABOR------- RATE	AMOUNT	CD	-------BILLING------ RATE	AMOUNT	BILLED RATE
	24 - ENVIRON PROTECTION SPEC											
SPV	P. V. STODDARD		B	08/08/92	REG	1.500	31.25	46.88	M	62.50	93.75	31.25
	TOTAL ENVIRON PROTECTION SPEC					1.500	31.25	46.88		62.50	93.75	
	26 - OTHER, WORD PROCESSOR											
RDM	D. M. RAY		B	05/30/92	REG	5.000	10.34	51.70	M	20.68	103.40	10.34
HLF	L. F. HUNTER		B	08/29/92	REG	2.500	10.10	25.25	M	20.20	50.50	10.10
	TOTAL OTHER, WORD PROCESSOR					7.500	10.26	76.95		20.52	153.90	
	TOTAL 116 DRAFT EAR REPORT					306.000	14.01	4285.59		27.95	8551.50	
	27 - 117 FINAL EAR REPORT											
	07 - TASK ORDER MANAGER											
ALM	L. M. ANDERSON		B	09/12/92	REG	4.000	20.19	80.76	M	40.38	161.52	20.19
	TOTAL TASK ORDER MANAGER					4.000	20.19	80.76		40.38	161.52	
	10 - SENIOR SCIENTIST											
ALM	L. M. ANDERSON		B	08/29/92	REG	2.000	20.19	40.38	M	40.38	80.76	20.19
	TOTAL SENIOR SCIENTIST					2.000	20.19	40.38		40.38	80.76	
	11 - SCIENTIST, CHEMIST											
CJR	J. R. CORNELIUS		B	08/29/92	REG	5.500	12.02	66.11	M	24.04	132.22	12.02
RSS	S. S. RYAN		B	09/12/92	REG	10.500	15.87	166.64	M	31.74	333.27	15.87
	TOTAL SCIENTIST, CHEMIST					16.000	14.55	232.75		29.09	465.49	
	15 - ENGR/ARCH											
SJE	J. E. STEDMAN		B	09/05/92	REG	21.000	15.87	333.27	O	31.74	666.54	15.87
SJE	J. E. STEDMAN		B	09/12/92	REG	30.000	15.87	476.10	O	31.74	952.20	15.87
	TOTAL ENGR/ARCH					51.000	15.87	809.37		31.74	1618.74	
	16 - DRAFTSMAN/CAD OP SR											
GEO	E. O. GRIGGS		B	09/12/92	REG	1.000	12.74	12.74	M	25.48	25.48	12.74
	TOTAL DRAFTSMAN/CAD OP SR					1.000	12.74	12.74		25.48	25.48	
	17 - DRAFTSMAN											
WC	C. WILKINS		B	09/12/92	REG	14.000	8.94	125.16	M	17.88	250.32	8.94
	TOTAL DRAFTSMAN					14.000	8.94	125.16		17.88	250.32	
	18 - OTHER, TECHNICAL EDITOR											
KMC	M. C. KING		B	09/12/92	REG	3.000	12.02	36.06	M	24.04	72.12	12.02
	TOTAL OTHER, TECHNICAL EDITOR					3.000	12.02	36.06		24.04	72.12	
	26 - OTHER, WORD PROCESSOR											
HLF	L. F. HUNTER		B	09/12/92	REG	1.500	10.10	15.15	M	20.20	30.30	10.10
PAM	A. M. PERRINE		B	09/12/92	REG	11.000	9.23	101.53	M	18.46	203.06	9.23
SSM	S. M. STEGALL		B	09/12/92	REG	5.000	8.75	43.75	M	17.50	87.50	8.75
TMJ	TMJ		B	09/19/92	REG	1.000	7.00	7.00	M	14.00	14.00	7.00
	TOTAL OTHER, WORD PROCESSOR					18.500	9.05	167.43		18.10	334.86	
	TOTAL 117 FINAL EAR REPORT					109.500	13.74	1504.65		27.48	3009.29	

---EMPLOYEE--- CODE	NAME	DESCRIPTION	STT	DATE	HOURS TYPE	HOURS	LABOR RATE	LABOR AMOUNT	CD	BILLING RATE	BILLING AMOUNT	BILLED RATE
	28 - 118 DRAFT REPORT											
	10 - SENIOR SCIENTIST											
ALM	L. M. ANDERSON		B	08/22/92	REG	6.000	20.19	121.14	M	40.38	242.28	20.19
	TOTAL SENIOR SCIENTIST					6.000	20.19	121.14		40.38	242.28	
	11 - SCIENTIST, CHEMIST											
RSS	S. S. RYAN		B	10/17/92	REG	1.500	15.87	23.81	M	31.74	47.61	15.87
BJJ	J. J. BENNETT		B	10/24/92	REG	6.000	24.04	144.24	M	48.08	288.48	20.00
	TOTAL SCIENTIST, CHEMIST					7.500	22.41	168.05		44.81	336.09	
	14 - ENGR/ARCH, SR											
WCA	C. A. WISE		B	10/10/92	REG	1.000	26.44	26.44	M	52.88	52.88	26.44
	TOTAL ENGR/ARCH, SR					1.000	26.44	26.44		52.88	52.88	
	15 - ENGR/ARCH											
SJE	J. E. STEDMAN		B	08/22/92	REG	12.500	15.87	198.38	M	31.74	396.75	15.87
MMA	MMA		B	10/03/92	REG	1.000	15.87	15.87	M	31.74	31.74	15.87
SJE	J. E. STEDMAN		B	10/01/92	REG	2.500	15.87	39.68	M	31.74	79.35	15.87
SJE	J. E. STEDMAN		B	10/03/92	REG	10.500	15.87	166.64	M	31.74	333.27	15.87
SJE	J. E. STEDMAN		B	10/10/92	REG	8.500	15.87	134.90	M	31.74	269.79	15.87
BTP	T. P. BLAHNIK		B	10/17/92	REG	6.000	16.31	97.86	M	32.62	195.72	16.31
SJE	J. E. STEDMAN		B	10/17/92	REG	26.000	15.87	412.62	M	31.74	825.24	15.87
AMR	M. R. ATKEISON		B	10/24/92	REG	3.000	17.45	52.35	M	34.90	104.70	17.45
SJE	J. E. STEDMAN		B	10/24/92	REG	6.000	15.87	95.22	M	31.74	190.44	15.87
	TOTAL ENGR/ARCH					76.000	15.97	1213.50		31.93	2427.00	
	17 - DRAFTSMAN											
WC	C. WILKINS		B	10/17/92	REG	1.000	8.94	8.94	M	17.88	17.88	8.94
WC	C. WILKINS		B	10/24/92	REG	4.000	8.94	35.76	M	17.88	71.52	8.94
	TOTAL DRAFTSMAN					5.000	8.94	44.70		17.88	89.40	
	24 - ENVIRON PROTECTION SPEC											
SPV	P. V. STODDARD		B	08/22/92	REG	1.000	31.25	31.25	M	62.50	62.50	31.25
	TOTAL ENVIRON PROTECTION SPEC					1.000	31.25	31.25		62.50	62.50	
	TOTAL 118 DRAFT REPORT					96.500	16.63	1605.07		33.27	3210.15	
	29 - 119 FINAL CAP REPORT											
	07 - TASK ORDER MANAGER											
ALM	L. M. ANDERSON		B	11/28/92	REG	1.500	21.15	31.73	M	42.30	63.45	21.15
ALM	L. M. ANDERSON		B	12/05/92	REG	4.500	21.15	95.18	M	42.30	190.35	21.15
ALM	L. M. ANDERSON		S	08/14/93	REG	0.500	21.15	10.58	M	42.30	21.15	0.00
	TOTAL TASK ORDER MANAGER					6.500	21.15	137.48		42.30	274.95	
	15 - ENGR/ARCH											
SJE	J. E. STEDMAN		B	11/21/92	REG	3.000	15.87	47.61	M	31.74	95.22	15.87
SJE	J. E. STEDMAN		B	11/28/92	REG	12.000	16.59	199.08	M	33.18	398.16	16.59
SJE	J. E. STEDMAN		B	12/05/92	REG	14.000	16.59	232.26	M	33.18	464.52	16.59
	TOTAL ENGR/ARCH					29.000	16.52	478.95		33.03	957.90	

---EMPLOYEE--- CODE	NAME	DESCRIPTION	STT	DATE	HOURS TYPE	HOURS	-----LABOR------- RATE	AMOUNT	CD	-------BILLING------ RATE	AMOUNT	BILLED RATE
18 - OTHER, TECHNICAL EDITOR												
KMC	M. C. KING		B	12/05/92	REG	1.000	12.02	12.02	M	24.04	24.04	12.02
TOTAL OTHER, TECHNICAL EDITOR						1.000	12.02	12.02		24.04	24.04	
26 - OTHER, WORD PROCESSOR												
PAM	A. M. PERRINE		B	12/05/92	REG	7.500	9.23	69.23	M	18.46	138.45	9.23
TOTAL OTHER, WORD PROCESSOR						7.500	9.23	69.23		18.46	138.45	
TOTAL 119 FINAL CAP REPORT						44.000	15.86	697.67		31.71	1395.34	
TOTAL LABOR						1045.500	15.20	15887.89		30.02	31384.28	

-----VENDOR----- CODE	NAME	DESCRIPTION	STT	DATE	COST	---BILLING--- CODE	AMOUNT	SUBTASK
B - Other Direct Expenses								
01 - EQUIPMENT								
ENSAFE	Environmental & Safety	915	B	09/30/92	73.61	1	73.61	21
TOTAL EQUIPMENT					73.61		73.61	
02 - PRINTING								
ENSAFE	Environmental & Safety	1073-KINKOS	B	08/28/92	16.08	1	16.08	26
KINKOS	KINKO'S INC.	131997	B	09/30/92	10.20	1	10.20	27
KINKOS	KINKO'S INC.	132529	B	11/10/92	6.98	1	6.98	28
ENSAFE	Environmental & Safety	0124 KINKOS 012993	B	02/10/93	20.39	1	20.39	29
TOTAL PRINTING					53.65		53.65	
03 - FREIGHT								
FEDEX	FEDERAL EXPRESS		B	04/31/92	92.50	1	92.50	11
FEDEX	FEDERAL EXPRESS		B	05/31/92	62.50	0	62.50	10
FEDEX	FEDERAL EXPRESS	151407854	B	09/30/92	38.95	1	38.95	21
FEDEX	FEDERAL EXPRESS	151407854	B	09/30/92	75.23	1	75.23	21
FEDEX	FEDERAL EXPRESS	477040246	B	09/30/92	68.46	1	68.46	22
ENSAFE	Environmental & Safety	9028	B	09/30/92	38.14	1	38.14	26
ENSAFE	Environmental & Safety	915	B	09/30/92	50.43	1	50.43	21
ENSAFE	Environmental & Safety	915	B	09/30/92	98.15	1	98.15	21
ENSAFE	Environmental & Safety	915	B	09/30/92	98.81	1	98.81	21
ENSAFE	Environmental & Safety	915	B	09/30/92	33.25	1	33.25	22
ENSAFE	Environmental & Safety	915	B	09/30/92	30.50	1	30.50	21
FEDEX	FEDERAL EXPRESS	477628354	B	10/15/92	18.75	1	18.75	27
FEDEX	FEDERAL EXPRESS	477628354	B	10/15/92	18.75	1	18.75	27
FEDEX	FEDERAL EXPRESS	477628354	B	10/15/92	36.36	1	36.36	27
FEDEX	FEDERAL EXPRESS	481140631	B	12/15/92	16.75	1	16.75	28
ENSAFE	Environmental & Safety	0124 FED EX 012993	B	02/10/93	55.94	1	55.94	29
FEDEX	FEDERAL EXPRESS	491119914 030593	B	03/10/93	8.99	1	8.99	12
TOTAL FREIGHT					842.46		842.46	
05 - TELEPHONE								
LDDS	LDDS		B	05/31/92	9.39	1	9.39	11
LDDS	LDDS		B	05/31/92	0.67	1	0.67	11
LDDS	LDDS		B	06/07/92	2.99	1	2.99	11
ENSAFE	Environmental & Safety	832	B	07/31/92	1.81	1	1.81	21
LDDS	LDDS	941	B	09/30/92	0.64	0	0.64	26
LDDS	LDDS	926	B	09/30/92	0.84	0	0.84	26
ENSAFE	Environmental & Safety	915	B	09/30/92	3.67	1	3.67	21
LDDS	LDDS		B	07/17/92	2.50	0	2.50	26
LDDS	LDDS		B	08/19/92	0.87	0	0.87	26
LDDS	LDDS		B	09/16/92	3.67	0	3.67	26
LDDS	LDDS	908	B	01/25/93	0.41	0	0.41	11
ENSAFE	Environmental & Safety	11048 LDDS 112792	B	02/10/93	0.14	1	0.14	11
ENSAFE	Environmental & Safety	0150 LDDS 121992	B	03/26/93	2.75	0	2.75	12
TOTAL TELEPHONE					30.35		30.35	

VENDOR CODE	VENDOR NAME	DESCRIPTION	STT	DATE	COST	BILLING CODE	BILLING AMOUNT	SUBTASK
06 - ALL OTHER								
ENSAFE	Environmental & Safety	1073-BARLOW	B	08/28/92	8.00	1	8.00	26
TOTAL ALL OTHER					8.00		8.00	
07 - TECHNICAL SUPPLIES								
MATTHE	J.R. MATTHEWS		B	05/31/92	3.38	1	3.38	21
MEMDRM	MEMPHIS DRUM		B	05/31/92	310.00	1	310.00	21
HAZCO	HAZCO SERVICES, INC		B	05/31/92	208.37	1	208.37	22
SHELBY	SHELBY COUNTY GOVERNMENT		B	05/31/92	50.00	1	50.00	24
GRAING	GRAINGER		B	06/07/92	16.61	1	16.61	22
PACE	PACE INC		B	06/07/92	101.30	1	101.30	21
MEMDRM	MEMPHIS DRUM		B	06/07/92	35.90	1	35.90	17
MEMCON	MEMPHIS CONCRETE CUTTING	M11042	B	07/31/92	330.00	1	330.00	21
ENSAFE	Environmental & Safety	832	B	07/31/92	2.93	1	2.93	21
ENSAFE	Environmental & Safety	832	B	07/31/92	12.88	1	12.88	21
ENSAFE	Environmental & Safety	1073-PACE	B	08/28/92	101.30	1	101.30	21
ENSAFE	Environmental & Safety	1073-FOX	B	08/28/92	4.17	1	4.17	28
ENSAFE	Environmental & Safety	1073-CAMPBELL	B	08/28/92	16.50	1	16.50	26
CAMPBE	CAMPBELL BLUE PRINT & SUP	10216	B	09/30/92	21.37	1	21.37	27
ENSAFE	Environmental & Safety	915	B	09/30/92	10.75	1	10.75	21
ENSAFE	Environmental & Safety	915	B	09/30/92	8.39	1	8.39	21
SHELBY	SHELBY COUNTY GOVERNMENT	NASMEM2M1	B	09/30/92	25.00	1	25.00	24
FOX	FOX PHOTO	5313053 080992	B	05/17/93	5.56	1	5.56	28
PACE	PACE INC	70-001236	B	07/15/93	-101.30	0	-101.30	21
TOTAL TECHNICAL SUPPLIES					1163.11		1163.11	
08 - SUBCONTRACTS								
MEMCON	MEMPHIS CONCRETE CUTTING		B	05/31/92	455.00	1	455.00	21
MEMCON	MEMPHIS CONCRETE CUTTING		B	06/07/92	255.00	1	255.00	21
COMPUC	Compuchem Laboratories		B	06/07/92	70.00	1	70.00	21
COMPUC	Compuchem Laboratories		B	06/07/92	35.00	1	35.00	22
COMPUC	Compuchem Laboratories		B	06/07/92	4420.00	1	4420.00	25
PSI	PSI	956531	B	07/31/92	6540.00	1	6540.00	21
COMPUC	Compuchem Laboratories	149998	B	07/31/92	70.00	1	70.00	25
COMPUC	Compuchem Laboratories	149978	B	07/31/92	260.00	1	260.00	25
PERSON	JACKSON PERSON & ASSOC.	920295	B	07/31/92	2520.00	1	2520.00	16
SPECAS	SPECIALIZED ASSAYS ENV.	31740	B	07/31/92	250.00	1	250.00	24
COMPUC	Compuchem Laboratories	186798	B	09/30/92	2340.00	1	2340.00	25
COMPUC	Compuchem Laboratories	189738	B	11/10/92	130.00	1	130.00	25
COMPUC	Compuchem Laboratories	191728	B	11/25/92	650.00	1	650.00	25
PSI	PSI	160909	B	11/25/92	250.00	1	250.00	21
TOTAL SUBCONTRACTS					18245.00		18245.00	
13 - GROUND								
ANDERS	L. M. ANDERSON		B	03/13/92	10.00	1	10.00	18
MATTHE	J.R. MATTHEWS		B	05/31/92	72.50	1	72.50	21
ENSAFE	Environmental & Safety	832	B	07/31/92	12.00	1	12.00	21
ENSAFE	Environmental & Safety	832	B	07/31/92	32.00	1	32.00	21
ENSAFE	Environmental & Safety	832	B	07/31/92	7.00	1	7.00	21
ENSAFE	Environmental & Safety	9028	B	09/30/92	20.20	1	20.20	22
ENSAFE	Environmental & Safety	9028	B	09/30/92	7.50	1	7.50	28

-----VENDOR-----						---BILLING---		SUBTASK
CODE	NAME	DESCRIPTION	STT	DATE	COST	CODE	AMOUNT	
ENSAFE	Environmental & Safety	915	B	09/30/92	19.35	1	19.35	22
ENSAFE	Environmental & Safety	915	B	09/30/92	61.00	1	61.00	21
ENSAFE	Environmental & Safety	11112-Stedman	B	11/25/92	7.50	1	7.50	28
TOTAL GROUND					249.05		249.05	
TOTAL Other Direct Expenses					20665.23		20665.23	
TOTAL OTHER DIRECT EXPENSES					20665.23		20665.23	

TOTAL PROJECT COST AMOUNT 36,553.12
TOTAL PROJECT BILLING AMOUNT 52,049.51

EnSafe / Allen & Hoshall
a joint venture for professional services

5720 Summer Trees Dr. Suite 8 Memphis, TN 38134
(901) 383-9115 Fax (901) 383-1743

December 11, 1992

Commanding Officer
SOUTHNAVFACENGCOM
ATTN: Wanda Ferris (Code 0232WF)
2155 Eagle Drive, P.O. Box 10068
Charleston, SC 29411-0068

RE: Final Corrective Action Plan - Naval Hospital UST site; Naval Air Station Memphis, Millington, Tennessee; Contract N62467-89-D-0318 Comprehensive Long-Term Environmental Action Navy (CLEAN); CTO-040

Dear Sir:

EnSafe/Allen & Hoshall is pleased to submit five copies of the Final Corrective Action Plan (CAP) for the Naval Hospital (Building 100) UST site at NAS Memphis. Also enclosed are written responses to SOUTHDIV comments on the Draft CAP. As requested, two copies of the CAP have also been forwarded to Mrs. Tonya Barker at NAS Memphis.

If you have any questions, please contact me or John Stedman at (901) 372-7962.

Sincerely,

Lawson M. Anderson
Task Order Manager

Enclosure

cc: Tonya Barker, NAS Memphis
John Karlyk, EIC

Table of Contents

1.0 INTRODUCTION 1

2.0 CORRECTIVE ACTION PLAN (CAP) 18
- 2.1 Corrective Actions Considered 18
- 2.2 Corrective Actions Chosen 24
- 2.3 Corrective Action Plan Costs 26
- 2.4 Proposed Implementation Schedule 27
- 2.5 Monitoring 27

3.0 SIGNATURE PAGE 29

Figures

Figure 1-1 Site Location Map 4
Figure 1-2 Site Layout 5
Figure 1-3 Cross Section A-A' 7
Figure 1-4 Cross Section B-B' 8
Figure 1-5 Piezometric Map (6/30/92) 10
Figure 1-6 Piezometric Map (7/31/92) 11
Figure 1-7 Piezometric Map (9/3/92) 12
Figure 1-8 Soil Contamination Plume Map 13
Figure 1-9 Vertical Extent of Soil Contamination 15
Figure 1-10 Levels of Groundwater Contamination 17

Tables

Table 2-1 Costs for No Action Option 26

Appendices

Appendix A Photographs
Appendix B Cost Estimates
Appendix C Carbon Adsorption Unit Specifications

1.0 INTRODUCTION

The following is a corrective action plan (CAP) for underground storage tank (UST) systems 106 and 107 at the Naval Hospital, Building H-100 of the Naval Air Station Memphis (NASMEM) in Millington, Tennessee. The CAP was prepared following completion of the Environmental Assessment Report (EAR) submitted to the Navy September 18, 1992 by EnSafe/Allen & Hoshall.

In the following sections, the CAP summarizes the EAR's findings, general information concerning the evaluated corrective action options, and detailed specifications and costs for the chosen corrective action.

Summary of EAR Findings

The EAR was completed in accordance with the Environmental Assessment Plan (EAP) prepared by EnSafe/Allen & Hoshall (E/A&H) according to Tennessee Department of Environment and Conservation (TDEC) guidance. The findings are presented below.

Site History — A release of No. 2 fuel oil at the Naval Hospital, Building H-100 was reported on June 7, 1991 to the Tennessee Department of the Environment and Conservation (TDEC) after fuel oil was seen seeping from an expansion joint near the area where the tank system piping intersected the building. Following notification of the release, a limited investigation was completed by NASMEM personnel to determine the point of release. The tops of the USTs and all pipe fittings were unearthed for visual inspection. Soil at the building-piping juncture was noted to have a strong petroleum odor.

Results of a tightness test, completed on June 13, 1991, by CTC Industrial Services Inc. of Memphis, Tennessee, indicated the tanks were within acceptable tightness limits. The tightness of the system piping, however, was outside acceptable limits, indicating a leak. The supply and

return lines were replaced with above-ground lines. The original lines are still in place. No further releases have been reported.

The quantity and duration of the release is unknown. Apparently, the system only leaked during operation. Comments from area employees indicated fuel oil had been leaking for a number of years prior to the reported release.

The EAP was developed by E/A&H and implemented to produce data of technical quality to assess the current site conditions and included tasks necessary to determine the presence of contamination and the appropriate corrective action. The EAP was prepared and implemented in accordance with the TDEC UST Guidelines and the appropriate Naval Energy and Environmental Support Activity (NEESA) requirements.

Soil and groundwater samples were collected and analyzed for Diesel Range Organic (DRO) compounds to assess the extent of contamination. Initial results indicate that soils and groundwater in the area of the boiler room, the suspected release area, have been impacted. To a more limited extent, soils and groundwater in the area of USTs have also been impacted.

Much of the soil contamination seems to be limited to the sand sub-base beneath the building foundation. This fill, located beneath the concrete boiler room floor, was found to range in thickness from 1.0 feet to 2.5 feet. However, it is possible that the fill extends to greater depths around building supports. Vertical migration of petroleum contaminants in the soil is apparently restricted by a natural clay layer encountered just below the sand sub-base. Falling-head analysis indicates that the vertical permeabilities of this clay material ranged between 5.02×10^{-8} and 6.26×10^{-9} cm/sec.

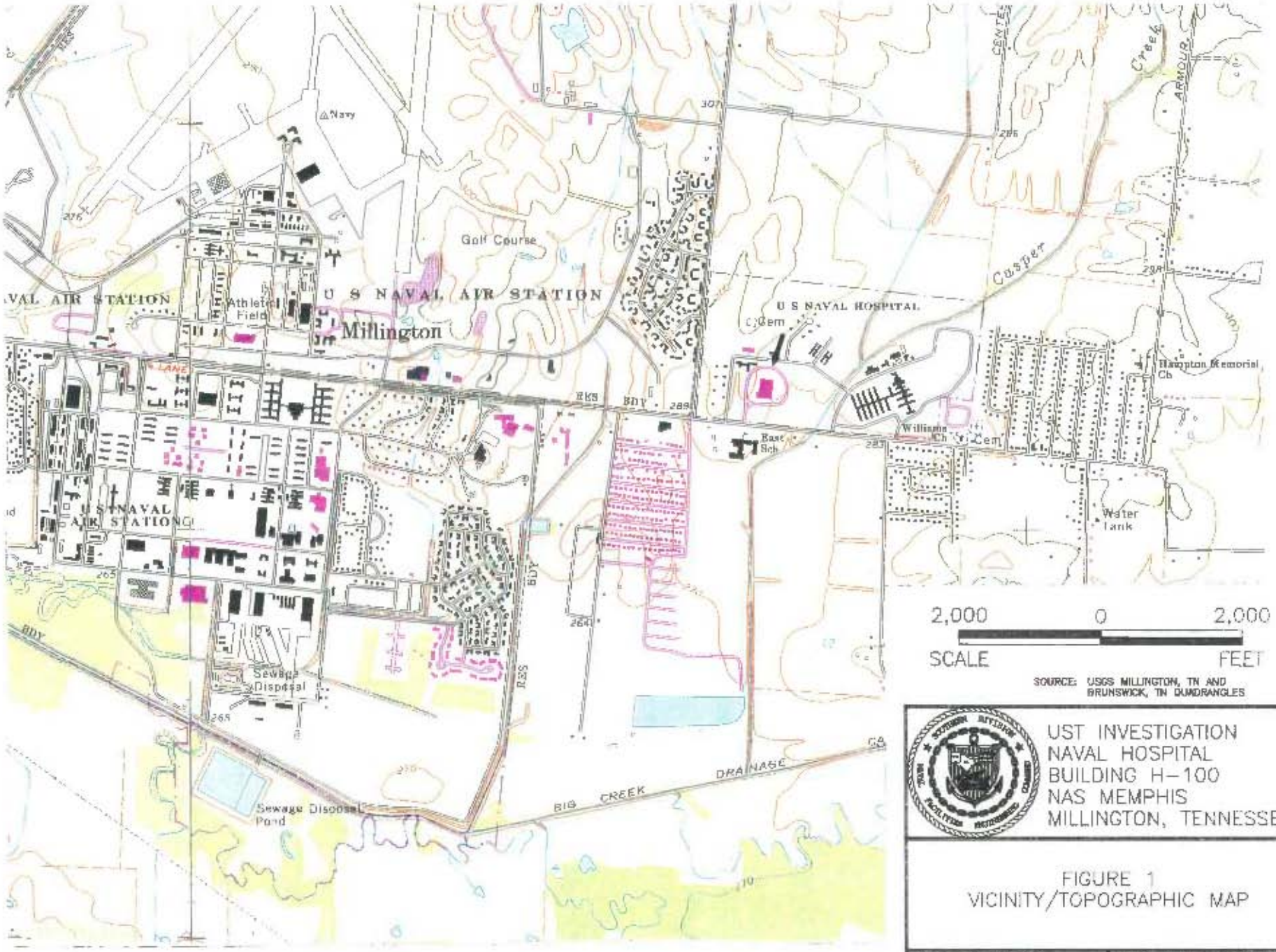
Groundwater impacts in the area of the boiler room may have been caused by the migration of petroleum contaminants along building supports. There are several structural footings installed in this area which could have provided a conduit for petroleum contaminant migration.

It is unclear at this time whether the low-level soil and groundwater contamination in the vicinity of the USTs are related to contamination in the area of the boiler room or to a small release (spill) at the tank pit. Continued monitoring of groundwater monitoring well MW-2, located at the southern edge of the tank pit and downgradient of the boiler room, may help in this determination.

Site Location and Layout — The release occurred at the Naval Hospital, Building H-100, NASMEM, located in the east portion of the base (Figure 1-1). USTs 106 and 107, used to store No. 2 fuel oil as a backup fuel source for the hospital boiler system, are located east of the building, adjacent to the cooling tower (Figure 1-2).

Product was transported from the USTs to the boiler system by gravity flow via two supply lines. Excess and unused oil was returned to the USTs via two return lines by an electric pump. The return lines contained product only during operation of the system. The supply and return lines were routed around the footing of the cooling tower, buried a few feet below the surface.

Surface area drainage is to the south and southeast and is controlled by the parking lot and a storm drainage system. The area between the tanks and Building H-100 slopes steeply toward the building, as indicated by the elevation difference between wellheads MW-2 (286.13) and MW-4 (278.61). A culvert receives stormwater runoff from this low area. Runoff is directed to the southeast via the drainage system and discharged into an earthen ditch. Shallow groundwater at the site may be influenced by the south-southeasterly sloping topography.



SOURCE: USGS MILLINGTON, TN AND BRUNSWICK, TN QUADRANGLES

UST INVESTIGATION
NAVAL HOSPITAL
BUILDING H-100
NAS MEMPHIS
MILLINGTON, TENNESSEE

FIGURE 1
VICINITY/TOPOGRAPHIC MAP

DATE: 09/15/92 | DWG NAME: 026NSUST

The slope between the tanks and the building is almost entirely covered with concrete (for slope control) and with components of the building support systems (cooling tower, circulation pumps, etc.), (Figure 1-2). The area is congested with overhead and underground electrical conduits and piping (for example, sewer lines, natural gas lines), which restricted available sampling points for both soil and groundwater.

Site Geology — Boring log data indicate that the shallow soil profile (0 to 26 feet) consists of a silty clay with increasing amounts of silt with depth. The soil lithology varies slightly with depth ranging from an orange-brown silty clay with moderate amounts of organics, to a brown and gray mottled clay, to a saturated brown silty clay-clayey silt.

Figures 1-3 and 1-4 are cross sections generated from soil boring data. Lithologic changes are subtle, both laterally and vertically. The profile is dominated by clays ranging from organic silty clays to inorganic clayey silt.

Soil permeabilities of the unsaturated zone and shallow aquifer are very low. Physical soil testing indicates that the unsaturated silt and clay have vertical permeabilities on the order of 10^{-9} to 10^{-8} cm/sec. For further information regarding regional geology, please refer to Section D.1 of the EAR.

Site Hydrogeology — Site soil boring and well logs indicate the uppermost geologic unit (loess) is composed of soft to medium stiff, clay and silty clay. Groundwater occurs under partially confined conditions along the more silty zones. Saturated soils were typically encountered 8 to 12 feet below ground surface (bgs). Water levels were noted to be higher in completed monitoring wells.

Well logs and soil boring logs indicate moist soils were first encountered 6 to 10 feet bgs. Well logs indicate a 1 to 4 foot thick saturated zone beginning at 6 to 12 feet bgs (MW-4 logs indicate this saturated zone from 10 to 11 feet). Subsequent to installation, groundwater levels in each well rose significantly above these saturated zones. This rise in the groundwater indicates confined or semi-confined conditions may exist in the saturated zone.

Water level data from June 30, 1992, indicated that groundwater flowed in a convergent east and southeast pattern, whereas July 31, 1992, and September 9, 1992, data indicated a general southeast flow. Flow gradients were calculated from the prepared piezometric maps by measuring the change in groundwater elevation denoted by the isopleths with horizontal distance.

Horizontal groundwater flow direction is depicted by the potentiometric maps presented in Figures 1-5, 1-6, and 1-7. The data used in developing these maps were collected on June 30, July 31, and September 3, 1992. Groundwater flow gradient was found to be approximately 0.020. The groundwater flow rate was calculated using the average flow gradient and estimated horizontal permeability and porosity of the water-bearing soil. Horizontal permeability was assumed to be one order of magnitude greater than the laboratory-reported vertical permeabilities for the site soils. Porosity for a clay and silt medium was assumed at 0.40. Hence, groundwater flow is very slow, on the order of 10^{-2} ft/year.

Nature and Extent of Contamination: Soils — Figure 1-8 indicates the horizontal extent and magnitude of contamination. The boundaries of the mapped plume indicate the limited extent of the contamination. Vertical migration of the contaminants is apparently restricted by the natural clay layer. Lateral movement of contaminants may be restricted by the building substructures.

The fuel oil contamination appears to be retained along the sandy sub-base beneath the building foundation. This hypothesis is supported by comparing analytical data and lithologic data. Review of the analytical data indicates a trend of dramatically decreasing concentration with increasing depth. The detected levels of DRO compounds drop significantly below the interface of the sandy sub-base and the native clays. The vertical extent of soil contamination is shown in Figure 1-9.

Based on the laboratory reported soil permeabilities, boring log data, the non-drinking water supply groundwater classification, and the limited extent of contamination, the soil cleanup levels should be 1000 mg/kg total petroleum hydrocarbons.

Nature and Extent of Contamination: Groundwater — Laboratory analysis detected DRO compounds in groundwater samples collected from monitoring wells MW-2 and MW-4. DRO compounds were not detected in groundwater samples collected from MW-1 or MW-3.

DRO compounds were detected in a groundwater sample collected on June 4, 1992, from monitoring well MW-2 at 210 μg/l. A subsequent sample collected on September 3,1992, from this monitoring well did not reveal DRO compounds above detection limits.

Analysis of a groundwater sample collected from monitoring well MW-4 on June 4, 1992, detected diesel at 5500 μg/l. An additional sample collected from monitoring well MW-4 on September 3, 1992, revealed a DRO concentration of 58,000 μg/l. Monitoring well MW-4 was installed at the suspected point of release. The concentration of diesel fuel detected indicates impact to the water table aquifer; however, analytical data indicate that the extent of groundwater contamination is limited.

2.0 CORRECTIVE ACTION PLAN (CAP)

This CAP will provide general information concerning the corrective actions that were evaluated and the detailed specifications and costs for the corrective action options which were chosen. This section of the CAP was completed upon review of the contaminant plumes.

2.1 Corrective Actions Considered

2.1.1 Soil Corrective Action

As discussed above, soils that exceed State action levels for TPH are limited to the sandy sub-base of the building foundation. Three technologically feasible and reliable corrective actions were considered to address petroleum contaminated soils to applicable cleanup levels.

Options For Soil Corrective Actions:

- No Action
- Bioremediation
- Excavation and Disposal

No Action — In this scenario, the petroleum-contaminated soils will not be actively remediated. Contaminated soils that exceed TDEC-action levels are restricted to the sandy sub-base beneath the concrete boiler room floor. This sub-base, as discussed before, was found to range in thickness from 1.0 feet to 2.5 feet. This contaminated material should not pose a threat to human health and the environment because of the reasons outlined below.

Why Material Is Not Considered A Threat:

- Location of material is not accessible to the public.
- Groundwater is located approximately 7.5 feet below this contaminated material and is separated by a natural clay zone, therefore this material should not act as a continuous source of groundwater contamination.
- No vapors have been reported in nearby structures and utilities.

Bioremediation — In-situ bioremediation was one option considered for soil remediation. Some advantages of this technology are outlined below.

Bioremediation Advantages:

- Minimal disturbance to the site.
- Onsite destruction of contaminants.
- Continued treatment after shutdown of the project.

Although there are several advantages of in-situ bioremediation there are equally as many disadvantages. Some disadvantages of this technology are listed below.

Bioremediation Disadvantages:

- Bacteria require sufficient oxygen and nutrients to survive. Plumbing to supply these compounds to the subsurface would be very difficult to install because of the confined and congested boiler room area.
- Bacteria require correct environmental conditions, which are difficult to control.
- Time consuming and often expensive bench-scale and pilot studies are required to determine if bioremediation would be effective under site specific conditions.

Because of the limited access to contaminated soils that are located beneath the building foundation, it would be extremely difficult to supply sufficient oxygen and nutrients to sustain adequate bacteria growth. Photographs presented in Appendix A illustrate the confined and congested area of the hospital boiler room. Environmental conditions such as temperature would also be difficult to control because of this limited access. In-situ bioremediation would require bench-scale and pilot studies to determine if bacteria can live and grow under site specific conditions. These studies will require technical and financial resources that would be lost if studies indicate unfavorable results.

Costs associated with implementing this corrective action would be approximately $67,000. Installation costs would be approximately $37,000 and are outlined in Appendix B. The remaining costs would be for monitoring the system for the life of the project which is estimated to be 18 months. Monitoring costs are outlined in the bioremediation estimate in Appendix B.

Excavation and Disposal — The third option evaluated to remediate petroleum contaminated soils was to excavate the contaminated fill material and subsequently dispose of the material.

Using results obtained from the environmental assessment, it is estimated that 100 cubic yards of contaminated fill material is located beneath the boiler room floor. As with the bioremediation option, the congested boiler room would make it extremely difficult and expensive to implement this corrective action. Assuming that no boiler room equipment would have to be relocated or removed to excavate the contaminated fill material, cost for implementing this corrective action would be approximately $40,000. This cost would include saw cutting of concrete for excavation trenches, excavating, soil disposal, backfilling and compacting, and resurfacing. The estimate also assumes contaminated material are at levels which would allow disposal in a local sanitary landfill, and unit cost for transportation and disposal is $30 per cubic yard. The analytical samples required for disposal would be $500 per sample. A cost estimate for implementing this corrective action is included in Appendix B.

Excavation and Disposal Advantages:

- Elimination of all contaminated soils at this site would reduce the potential for further impacts associated with these soils.
- Does not require monitoring or maintenance of a system, thus eliminating these costs.

Excavation and Disposal Disadvantages:

- Difficulty in implementing corrective action due to confined and congested work area.
- Risks of damaging the building foundation and supports with the removal of fill material.
- Excessive cost due to confined and congestive work area.

2.1.2 Groundwater Corrective Actions

As was depicted in Figure 1-10, groundwater contamination is limited to the area east of the boiler room. The limited nature of the groundwater plume at the site is logical based on the extremely low permeabilities of aquifer soils. A more detailed discussion of the results from this groundwater monitoring program can be found in the EAR.

Three technologically feasible and reliable corrective action options were considered to address petroleum-contaminated groundwater to the applicable cleanup levels previously mentioned.

Options for Groundwater Corrective Actions:

- No Action
- Activated Carbon Adsorption (Pump and Treat)
- Groundwater Recovery with Direct Discharge to the publicly owned treatment works (POTW)

No Action — In this scenario, the petroleum-contaminated groundwater will not be actively remediated. The contaminated groundwater plume would continue to move in the direction of groundwater flow. Because the soil permeability in the area of the release is very low, the migration of contaminants would be minimal. As mentioned before, the calculated groundwater flow rate in the area of the release is approximately 10^{-2} ft/year.

Onsite wells will be monitored to ensure that no offsite groundwater migration occurs at levels above TDEC groundwater cleanup levels. Monitoring costs for this option are discussed in

Section 2.3. If monitoring wells MW1, MW2, and MW3 show contamination above the TDEC cleanup levels, groundwater remediation with one of the two treatment options discussed below will be implemented to prevent further contaminant migration.

Activated Carbon Adsorption — For this option, groundwater will be recovered, treated, and subsequently discharged via one of the options outlined below. The removal of groundwater will be accomplished with the use of groundwater recovery wells. Because of the isolated area, only one recovery well should be needed. For purposes of designing the treatment system, an estimated flowrate of 5 gpm will be used. According to the aquifer characteristics, an assumed flowrate of 5 gpm is high. However, assuming a higher flowrate will produce a conservative design. If a flowrate less than 5 gpm is observed, the unit's efficiency will be longer due to smaller organic loadings. Before the pump and treat system is implemented, an aquifer yield test will be performed to ensure proper system design.

The treated water will be discharged to the city of Millington's POTW. The CAP proposes to discharge the treated groundwater to the POTW upon approval from the Public Works offices at NAS Memphis and the city of Millington. If approval is denied, disposal of treated groundwater may be achieved onsite to surface water (NPDES permit required).

Carbon adsorption is a process in which granular activated carbon, from lignite, bituminous coal, lignin, or petroleum product, is used to remove organic compounds from contaminated water. The contaminated water flows through a packed column of granular activated carbon where the organic compounds are removed by physical or chemical adsorption. Physical adsorption works by forming molecular condensation in the capillaries of the solid, whereas chemical adsorption requires formation of a monomolecular layer of the contaminant on the surface through forces of residual valence of the surface molecules.

Carbon adsorption treats contaminated liquid and vapor-phase volatile organics effectively and reliably. In addition, the process of retrieving the groundwater retards the migration of contaminants.

Advantages of Carbon Adsorption:

- System is readily available and implementable.
- Capital cost is less or comparable to other organic removal systems.

Disadvantages of Carbon Adsorption:

- Materials handling of spent carbon.
- Inorganic plugging of filters (iron and manganese).
- Suspended solid plugging of filters.
- High organic concentrations depleting the carbon source quickly, thus increasing the material handling and carbon regeneration costs.

Cost — The criteria used to design and estimate the cost of implementation are listed below.

Design Criteria:

Q = 5 gpm
Influent DRO = 5500 ppb
Effluent DRO = 50 ppb

The estimated capital cost for the carbon adsorption treatment system is $20,000. This cost includes two PC 3 carbon adsorbers, surge tank, equipment freight, replacement carbon, two pumps, piping and electrical, engineering labor, and well installation. The operation and maintenance cost for carbon adsorption is approximately $5000/year which is based upon utility, carbon regeneration, and monitoring costs for five years. Costs associated with implementing

this corrective action are outlined in Appendix B. Appendix C presents the specifications for the carbon adsorption unit.

Groundwater Recovery with Direct Discharge to the POTW — Groundwater will be recovered through the use of a single groundwater recovery well as discussed in the previous section. Because of the relatively low flow volume (<5.0 gpm) expected during pumping, it may be possible to obtain a sanitary sewer discharge permit not requiring pretreatment. If a discharge permit can be obtained, the water will be discharged directly to the sanitary sewer. If a discharge permit can be obtained only if the contaminated groundwater is treated prior to discharge, a treatment system such as the carbon adsorption previously discussed must be employed. The advantages of this option are no groundwater treatment and the prevention of further groundwater migration. The disadvantages are capital costs and operation and maintenance costs associated with the pumping system.

The estimated capital cost for the groundwater recovery system is approximately $10,000. This cost includes the groundwater recovery well installation, one groundwater recovery pump, piping and electrical, and engineering labor. The operation and maintenance cost for the system is approximately $2,500/year, based upon labor and utility costs and groundwater monitoring for five years. Costs associated with implementing this corrective action are outlined in Appendix B.

2.2 Corrective Actions Chosen

2.2.1 Soil Corrective Action

Since contaminated soils are restricted to the sandy engineered fill beneath the building foundation and pose no threat to human health and the environment, the corrective action chosen is no action. Further contamination of groundwater from contaminated soils is unlikely because of the reasons outlined below.

Why Further Contamination Is Unlikely:

- The source of the release (piping leak) has been eliminated; therefore, the extent of soil contamination will not increase.
- Contaminated soils are located beneath the building foundation; therefore, it is unlikely that rain water will percolate through the soils spreading contamination.
- Groundwater was encountered at approximately 10-11 feet bgs well below the contaminated soil zone of 1-2 feet bgs.

Additionally, this contaminated fill should pose no threat to human health and the environment because of reasons discussed in Section 2.1.1. As discussed above, limited accessibility to contaminated soils for implementing other corrective actions is another reason this corrective action was chosen.

2.2.2 Groundwater Corrective Action

No action with followup groundwater monitoring is the corrective action chosen to address groundwater contamination. As previously discussed, the soil permeability is very low, and the contaminated groundwater plume should not travel an appreciable distance over time. The direction of groundwater flow is to the southeast toward Casper Creek. This creek is approximately 500 feet from the area of concern. Due to low groundwater flow velocities, the plume will take an estimated 5×10^4 years to reach the creek from the existing contaminated areas. During this time, natural attenuation of the contaminants will also occur, thereby decreasing the size of the contaminant plume. Also, while the no action scenario does not actively remediate the contaminated groundwater, it is a feasible approach because the contaminants are not exposed directly to humans and wildlife, thus diminishing any potential harm to human health or the environment.

Another reason that the no action option appears to be more feasible than pump and treat is the impermeable soil in this area. The tight soils will minimize the pump and treat system's ability

to achieve substantial and continuous flow rates, rendering the system inefficient. Although no active remediation is occurring in the no action option, monitoring should detect offsite contaminant migration if it occurs. As mentioned before, if monitoring of monitoring wells MW1, MW2, and MW3 reveal contamination above TDEC cleanup levels, one of the alternative corrective actions will be implemented.

2.3 Corrective Action Plan Costs

The cost for groundwater monitoring is the only cost associated with the no action option. The monitoring will be in accordance with the monitoring schedule presented in Section 2.5.

The cost is outlined in Table 2-1 below. The analytical cost is based upon $100/sample for TPH (DRO) and performing the sampling and analysis in accordance with NEESA Level C protocol. This assumes four QA/QC samples will be required with the groundwater samples per sampling event. The labor cost is based upon two geologists performing the sampling and utilizing 12 total labor hours each at $35.00/hour per event. Four Teflon bailers at $150/bailer will be purchased and dedicated to the four monitoring wells. Within Table 2-1, the outlined labor costs include labor required to complete and submit status reports. The estimated labor cost for completion and submission of status reports was based upon 40 hours at $35.00 per hour.

Table 2-1
Costs for No Action Option

Item	Monitoring Year				
	1'	2''	3''	4''	5''
Analytical	$1600	$800	$800	$800	$800
Labor	$4480	$2240	$2240	$2240	$2240
Shipping	$200	$100	$100	$100	$100
Bailers	$600	--	--	--	--
Subtotal	$6880	$3140	$3140	$3140	$3140
Total (1-5)	**$19,440**				

Notes:
' - Two Sampling Events for Year 1.
'' - One Sampling Event for Years 2-5.
-- - Purchase of Bailers (First Year Only).

2.4 Proposed Implementation Schedule

The proposed implementation schedule is discussed in Section 2.5

2.5 Monitoring

The four monitoring wells at the site will be monitored for additional migration of contaminants. Groundwater samples will be analyzed for the TDEC-required parameter of TPH (DRO). In accordance with TDEC guidance, this groundwater monitoring program will be implemented within 60 days from the time the TDEC approves this CAP. Groundwater samples from each of these wells will be taken semi-annually for one year and annually for the next four years. These samples will be collected during the first one-third of the reporting period. The analytical results from the monitoring and a status report of the conditions at the site will be submitted within 15 days of the end of the reporting period. Included in these status reports will be a potentiometric map showing current groundwater flow conditions and a discussion of any problems which have been encountered.

If the results of the groundwater monitoring indicate that appreciable migration of contaminants is occurring (to be determined by the TDEC), either the pump-and-discharge or the pump-and-treat-option will be employed. If migration is not detected from monitoring, the results will be evaluated and a determination of discontinuing monitoring will be requested from TDEC after the five-year period.

3.0 SIGNATURE PAGE

I, the undersigned, do hereby affirm that the information contained in this report is accurate and correct to the best of my knowledge and belief.

Joseph Matthews	12/11/92	1112
Name and Title	Date	License Number

Signature

ANTHONY R. LADD	12/11/92	20,057
Name and Title	Date	License Number

Signature

APPENDIX A

PHOTOGRAPHS

Subject: NAS Memphis Naval Hospital
View: North wall of boiler room and boiler 3 looking east

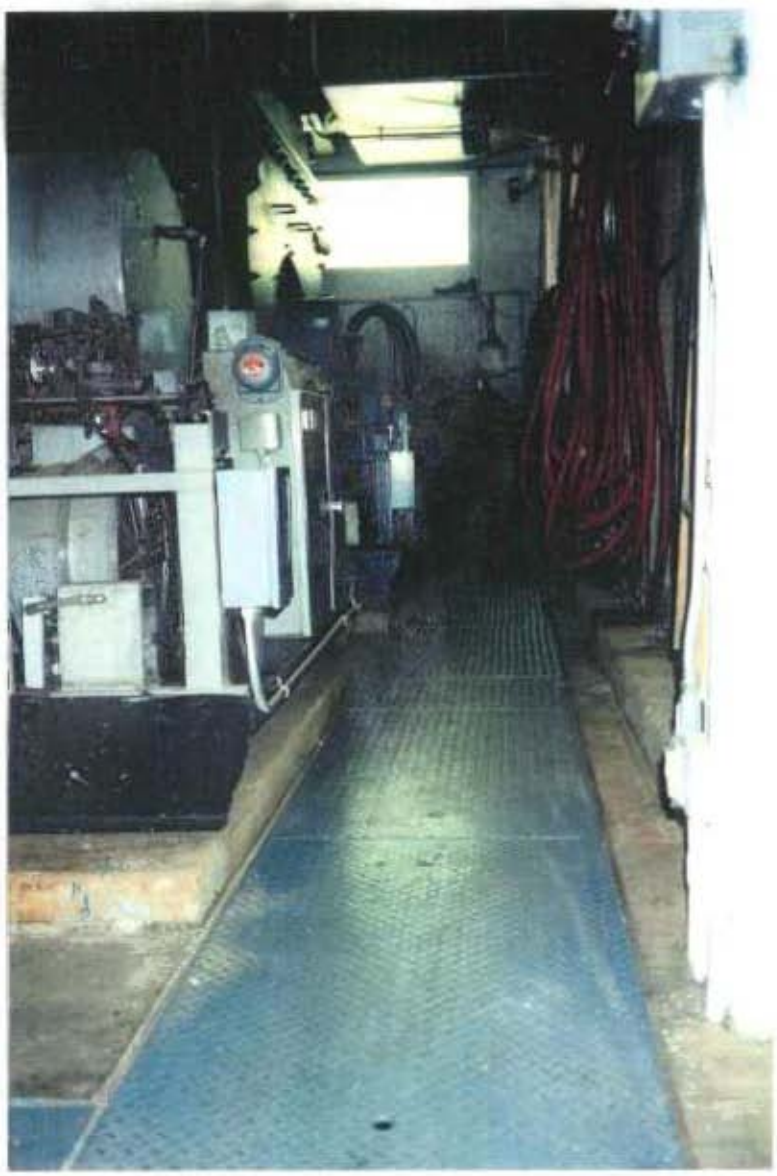
Subject: NAS Memphis Naval Hospital
View: North wall of boiler room looking west

Subject: NAS Memphis Naval Hospital
View: Outside east wall of boiler room and MW-4 looking south

Subject: NAS Memphis Naval Hospital
View: Outside east wall of boiler room looking north

Subject: NAS Memphis Naval Hospital
View: Area between boiler 2 and boiler 3 looking west

Subject: NAS Memphis Naval Hospital
View: SW corner of room located north of the boiler room



Subject: NAS Memphis Naval Hospital
View: East wall of boiler room looking north

APPENDIX B

COST ESTIMATES

Cost Estimate
NAS Memphis Naval Hospital
Bioremediation of Contaminated Soils

Bench Scale & Pilot Studies	$8,000.00
Saw Cutting 175 feet @ $8/ft	1,400.00
Injection & Recovery Trench & Slurry Walls Installation 120 hrs. @ $95/hr	11,400.00
Plumbing	2,500.00
Pumps, Air Compressor, Mixing Tanks, etc.	6,000.00
Resurfacing (assuming 6" concrete w/rebar & dowels) 175 ft. @ $4/ft.	700.00
Soil Disposal — Transporation & Landfill Charges 50 yds^3 @ $30/$yd^3$ — Laboratory 1 sample @ $500.00	 1,500.00 500.00
Materials (Plastic Sheeting, Barricades, Treatment Compound)	1,500.00
Subtotal	33,500.00
Monitoring Cost (assuming 18 months - 10 hrs/week @ $35/hr) Supplies & Equipment	25,200.00 2,000.00
Subtotal	27,200.00
Total	$60,700.00
10% Contingency	6,070.00
PROJECT TOTAL	$66,770.00

Cost Estimate
NAS Memphis Naval Hospital
Excavation and Disposal of Contaminated Soils

Saw Cutting - 250 feet @ $8/ft	$2,000.00
Excavation	
— Dump Truck 160 Hours @ $40/hr.	6,400.00
— Small Backhoe or Bobcat 160 hrs @ $40/hr	6,400.00
— Construction Supervisor 160 hrs @ $30/hr	4,800.00
— 4 unskilled laborers 160 hrs. @ $15/hr. each	9,600.00
Backfilling & Compacting 100 yd^3 @ $8 per yd^3	800.00
Resurfacing (assuming 6" concrete w/rebar & dowels) 250 sq. ft @ $4 per sq. ft	1,000.00
Soil Disposal	
— Laboratory 4 samples at $500/sample	2,000.00
— Transportation & Landfill Charges 100 yds^3 @ 30/yds^3	3,000.00
Materials (Plastic Sheeting, Barricades, etc.)	500.00
Subtotal	36,500.00
10% Contingency	3,650.00
TOTAL	$40,150.00

Cost Estimate
NAS Memphis Naval Hospital
Groundwater Pump and Discharge to POTW

Well Installation	$1700
Grundfos Pump	$1100
Junction Box	$1100
Labor 120 hrs * $35/hr	$4200
Piping and Electrical	$2250
	$10,350

Operation and Maintenance

60 hrs/year * $35/hr =	$2100
Electricity	$400
	$2500 /yr

Cost Estimate
NAS Memphis Naval Hospital
Costs for No Action Option as Outlined in Table 2-1

Year 1

Analytical

$100/TPH (DRO)Sample 2 Sampling Events * (4 Samples + 4 QA/QC Samples each event) =		$1600

Labor

Field activities (2 geologists @ 12 hrs. each/event) 2 events * 24 labor hours * $35/hr =	$1680	
Report Preparation 2 reports * 40 labor hours * $35/hr =	$2800	
		$4480
Shipping 2 events * $100/event =		$200
Bailers 4 bailers * 150 each =		$600
Total year 1 =		$6,880

Years 2-5

Analytical — $100/sample * (4 samples + 4 QA/QC Samples) =		$800

Labor

Field Activites (2 geol. * $35/hr. @ 12 hrs. each) =	$840	
Report Preparation (1 report * 40 labor hrs. *$35/hr =	$1400	
		$2240
Shipping		$100
Total Years 2-5 = $3140/yr =		$12,560

Cost Estimate
NAS Memphis Naval Hospital
Carbon Adsorption

Two PC 3	$4000	
Well Installation	$1700	
Grundfos Pump	$1100	
Junction Box	$1100	
Labor 120 hrs * $35/hr	$4200	
Piping and Electrical	$6000	
Carbon Equipment	$500	
Concrete Equipment Pad	$1000	
	$19,600	~ $20,000

Operation and Maintenance

Three carbon Regenerations per year	$3000	/yr
Electrical Costs	$2000	/yr
	$5000	/yr

APPENDIX C

CARBON ADSORPTION UNIT SPECIFICATIONS

CARBONAIR

To: Mr. John Steadman

October 23, 1992
Proposal Number: 202463-A

Carbonair PC 3 Carbon Adsorber

Equipment Description

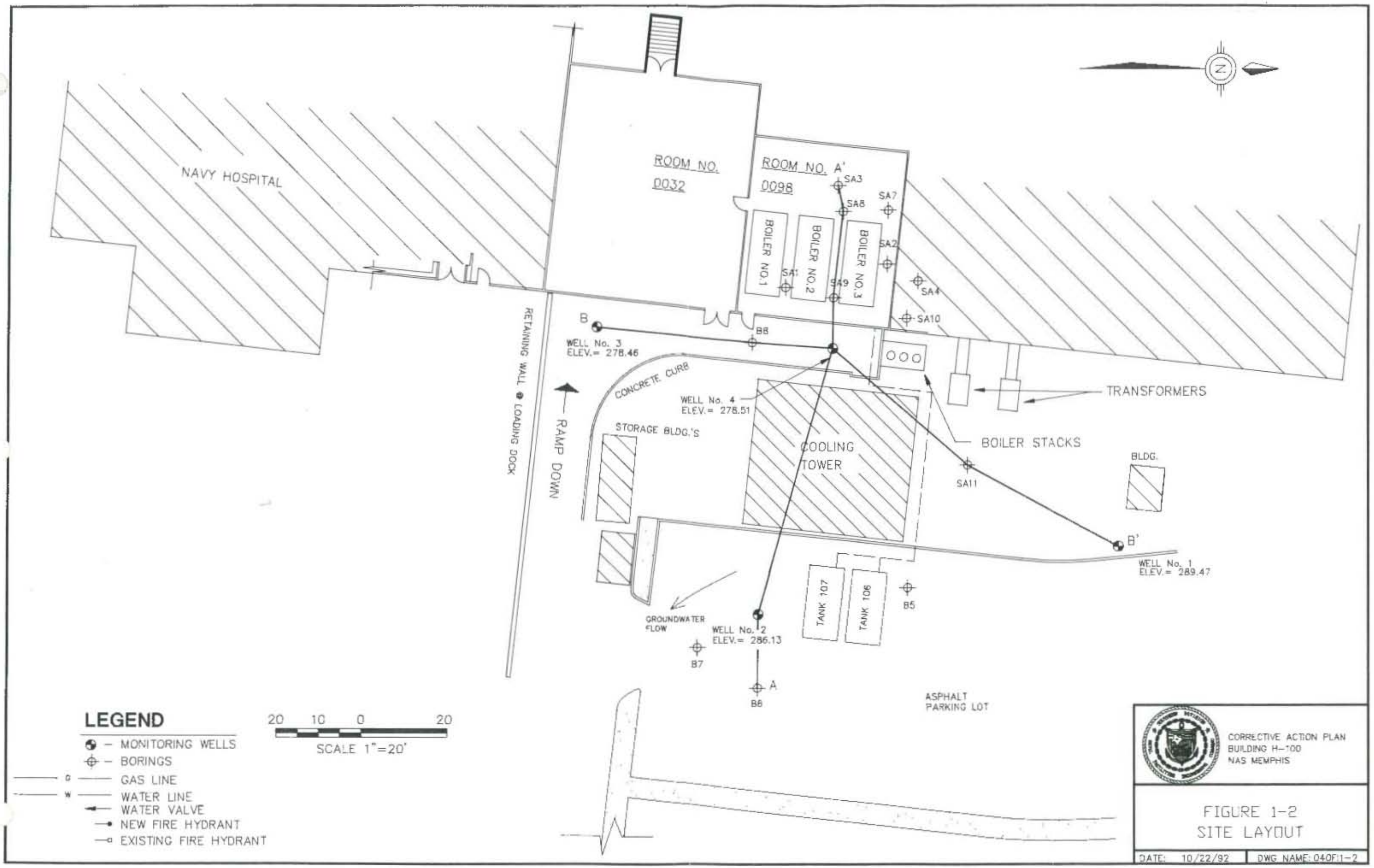
- Two (2) Carbonair PC 3 Liquid Phase Carbon Adsorbers operated in series
- Each vessel: 22" dia. x 54" tall
- Fiberglass-reinforced plastic with PVC internals
- 250 pounds of react carbon each vessel
- 1.0" influent and effluent connections
- Quick connect, hose, sample/gauge kits
- skid mounted

Technical Specifications

Critical compound	Benzene
Influent concentration	1375 ppb
Effluent concentration	ND
Critical compound	TPH (Assume naphthalene
Influent concentration	4125 ppb
Effluent concentration	ND
Cross-sectional area	2.4 ft²
Liquid flow rate	5 gpm
Empty bed contact time	24.0 minutes
Yearly carbon usage	1,303 pounds
Expected bed life	70 days

Accepted for Purchaser:

_____
(Name/Title)
Date: _____



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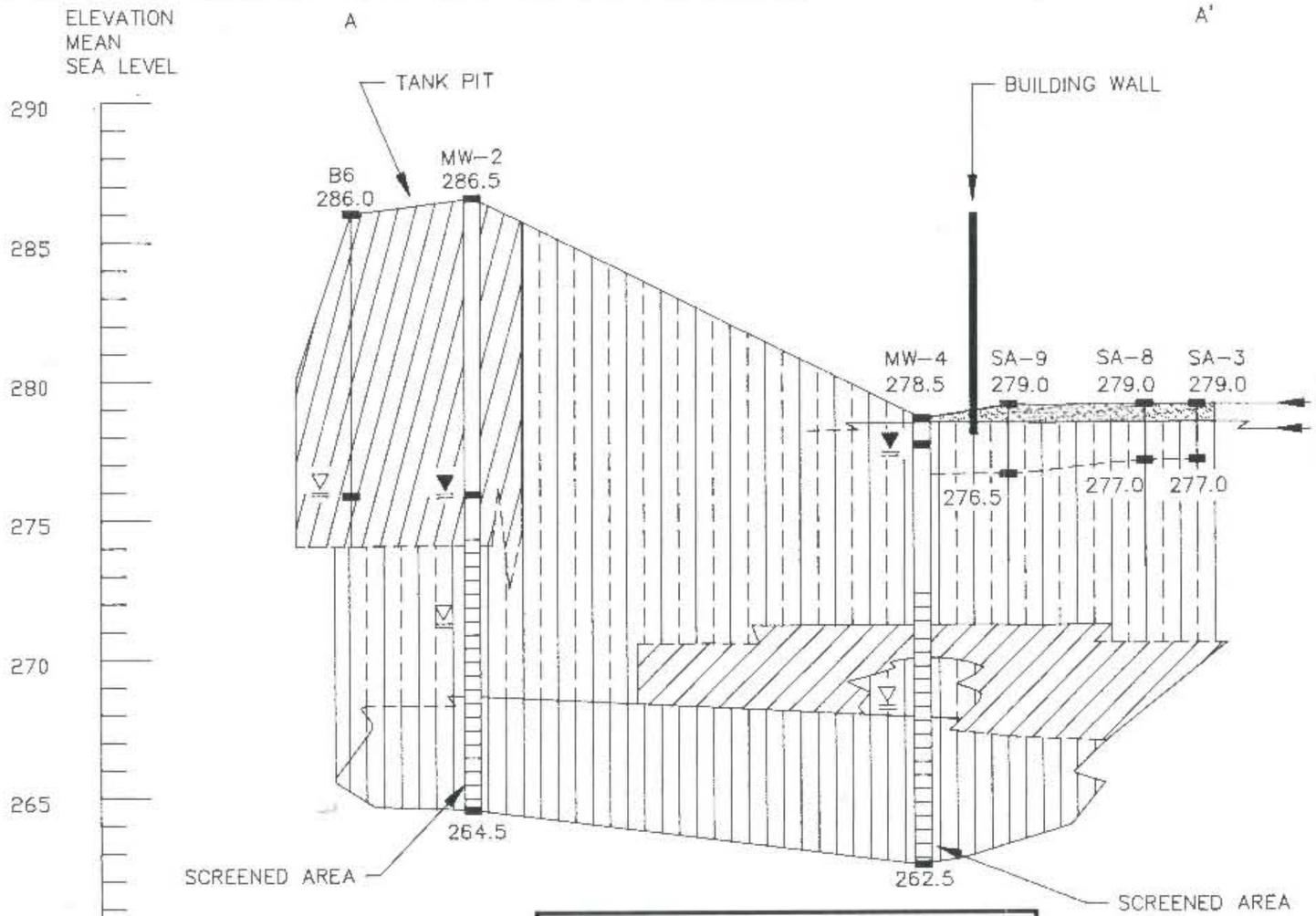

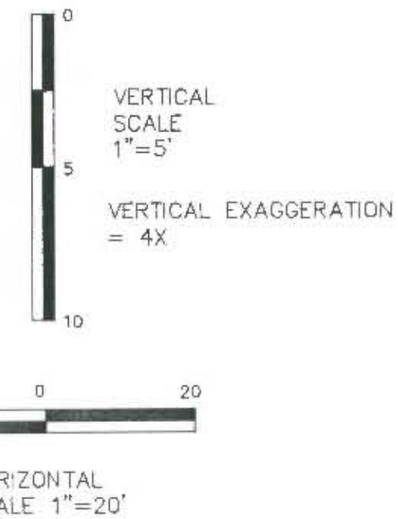

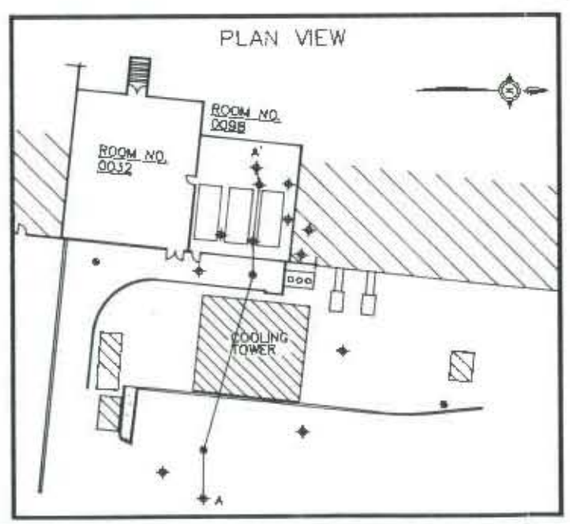

LEGEND

- PIEZOMETRIC SURFACE (07/31/92)
- DEPTH AT WHICH GROUNDWATER WAS INITIALLY ENCOUNTERED
- SC-CLAYEY SAND CLAY-SAND MIXTURE
- OL-SILTY CLAY W/ORGANICS
- CL-INORGANIC SILTY CLAY
- ML-INORGANIC CLAYEY SILT
- SW-WELL GRADED SAND

CORRECTIVE ACTION PLAN
BUILDING H-100
NAS MEMPHIS

FIGURE 1-3
CROSS SECTION
A-A'

DATE:10/22/92 | DWG NAME: 040FI1-3

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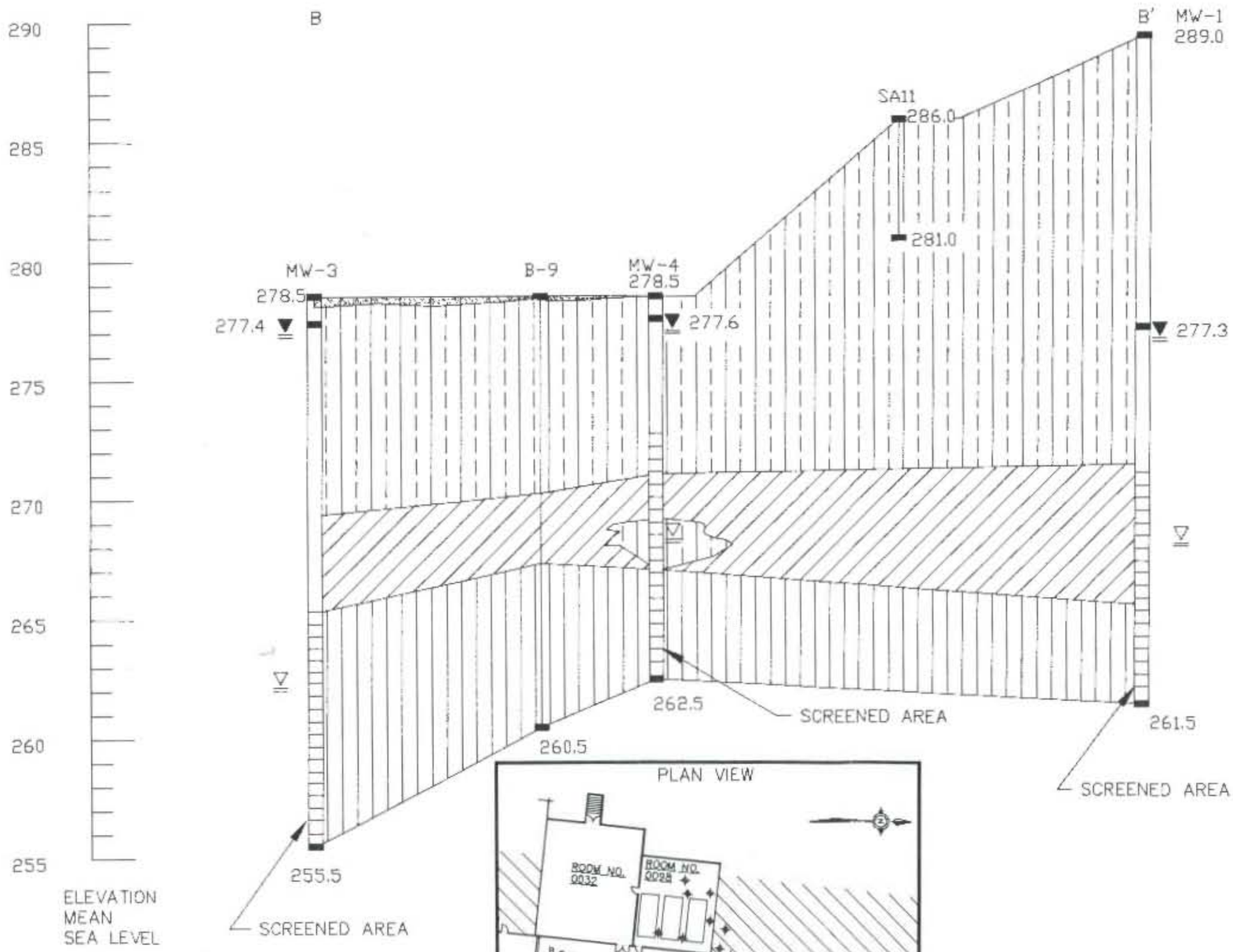
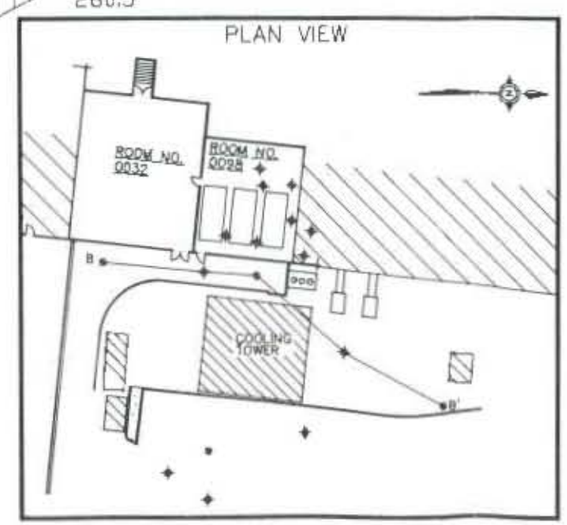
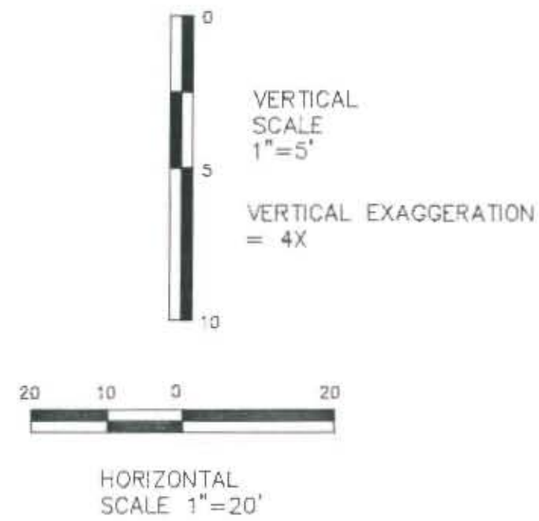






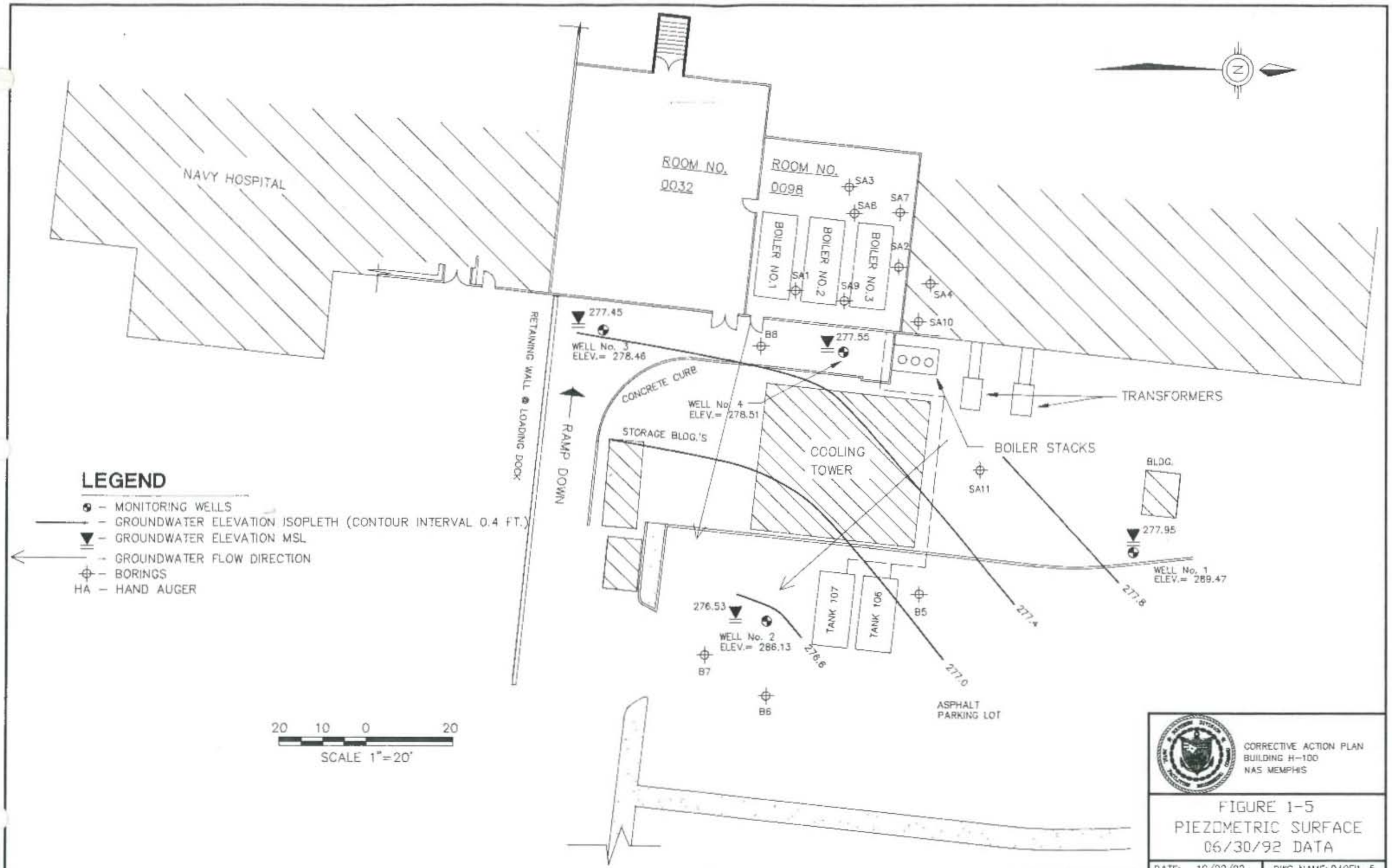
LEGEND

- PIEZOMETRIC SURFACE (07/31/92)
- DEPTH AT WHICH GROUNDWATER WAS INITIALLY ENCOUNTERED
- SW-WELL GRADED SAND
- OL-SILTY CLAY W/ORGANICS
- CL-INORGANIC SILTY CLAY
- ML-INORGANIC CLAYEY SILT

CORRECTIVE ACTION PLAN
BUILDING H-100
NAS MEMPHIS

FIGURE 1-4
CROSS SECTION
B-B'

DATE:10/22/92 | DWG NAME: 040F1-4



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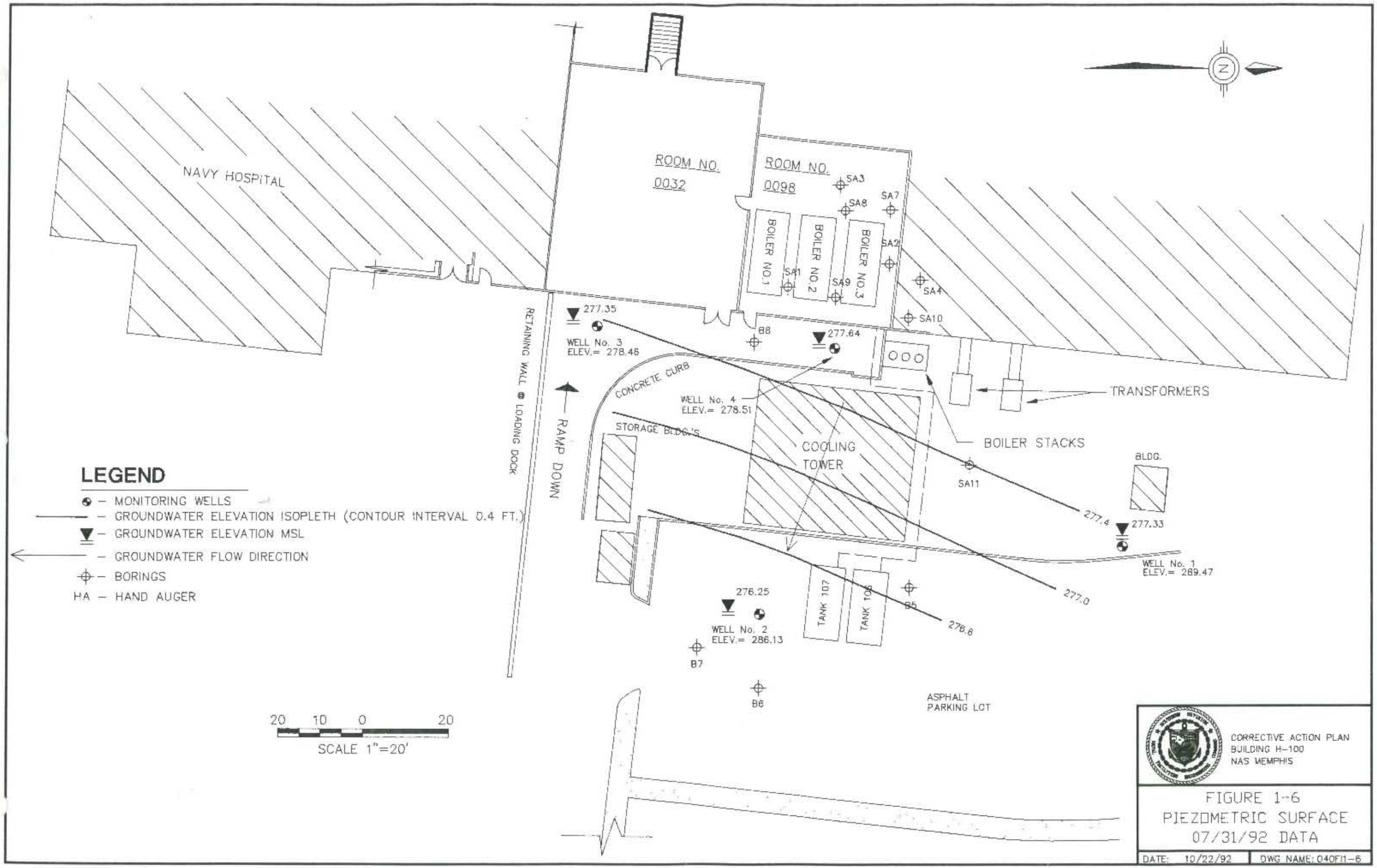


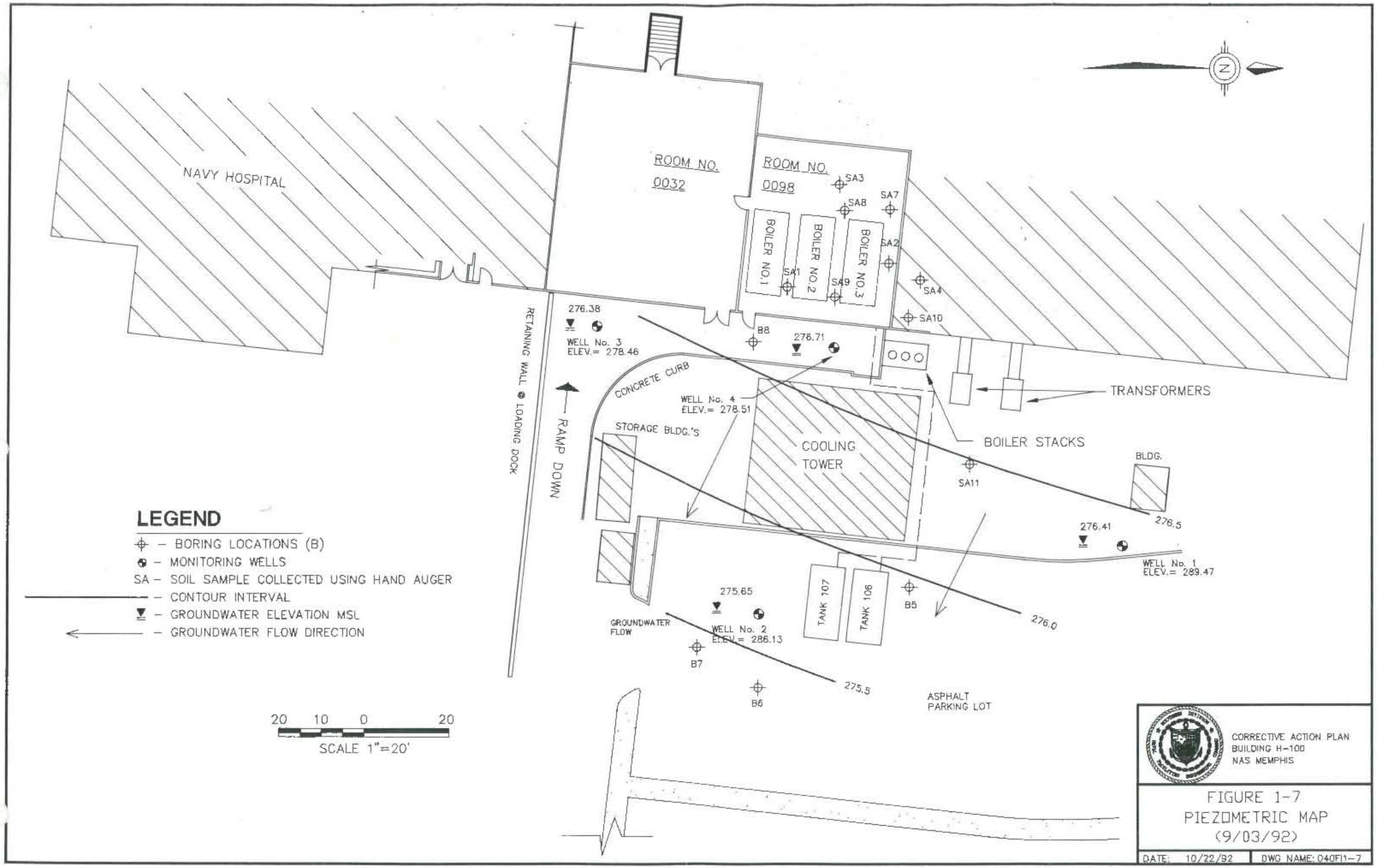
LEGEND

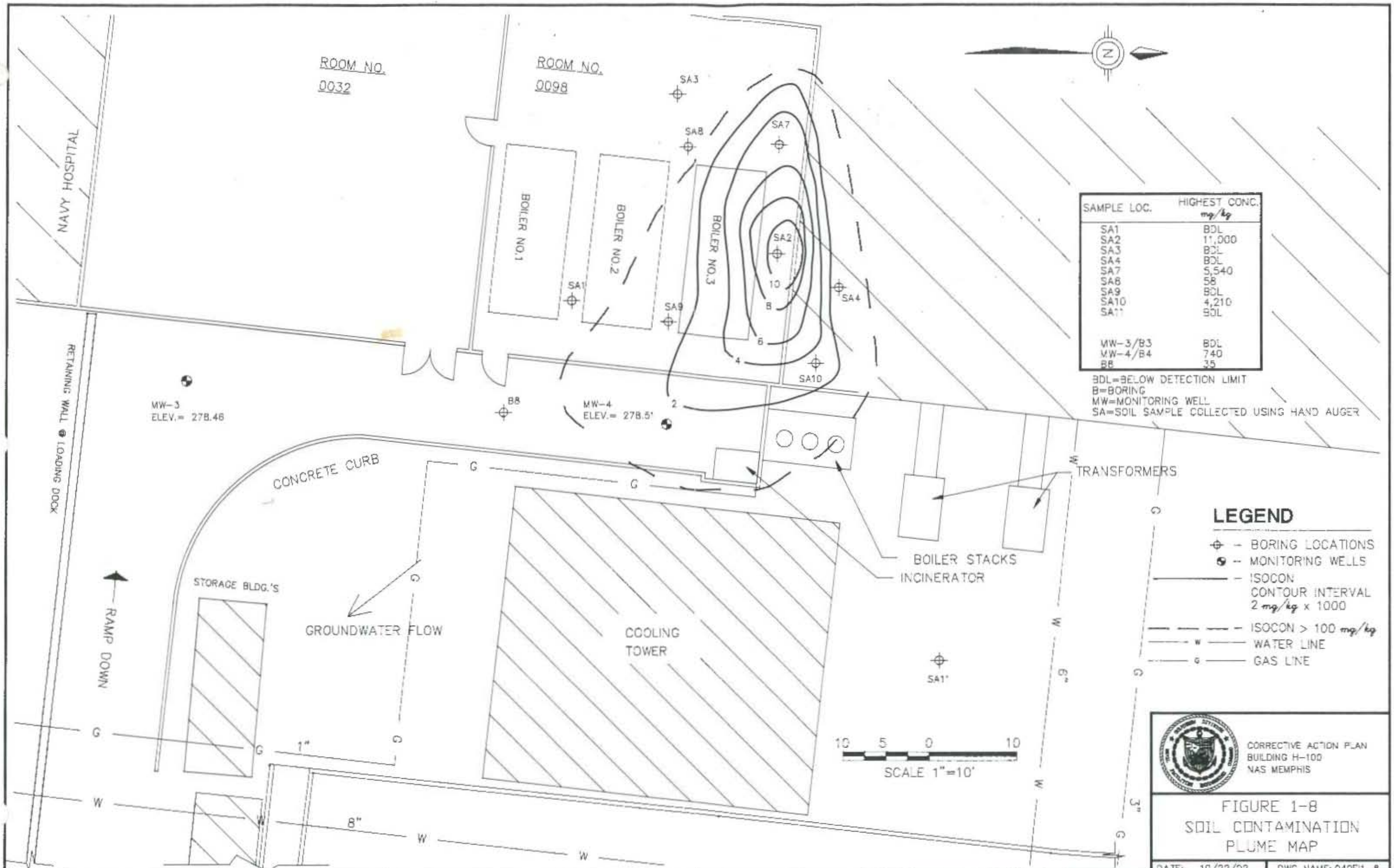
- ◉ – MONITORING WELLS
- —— – GROUNDWATER ELEVATION ISOPLETH (CONTOUR INTERVAL 0.4 FT.)
- ▼ – GROUNDWATER ELEVATION MSL
- ← – GROUNDWATER FLOW DIRECTION
- ⊕ – BORINGS
- HA – HAND AUGER

CORRECTIVE ACTION PLAN
BUILDING H-100
NAS MEMPHIS

FIGURE 1-6
PIEZOMETRIC SURFACE
07/31/92 DATA

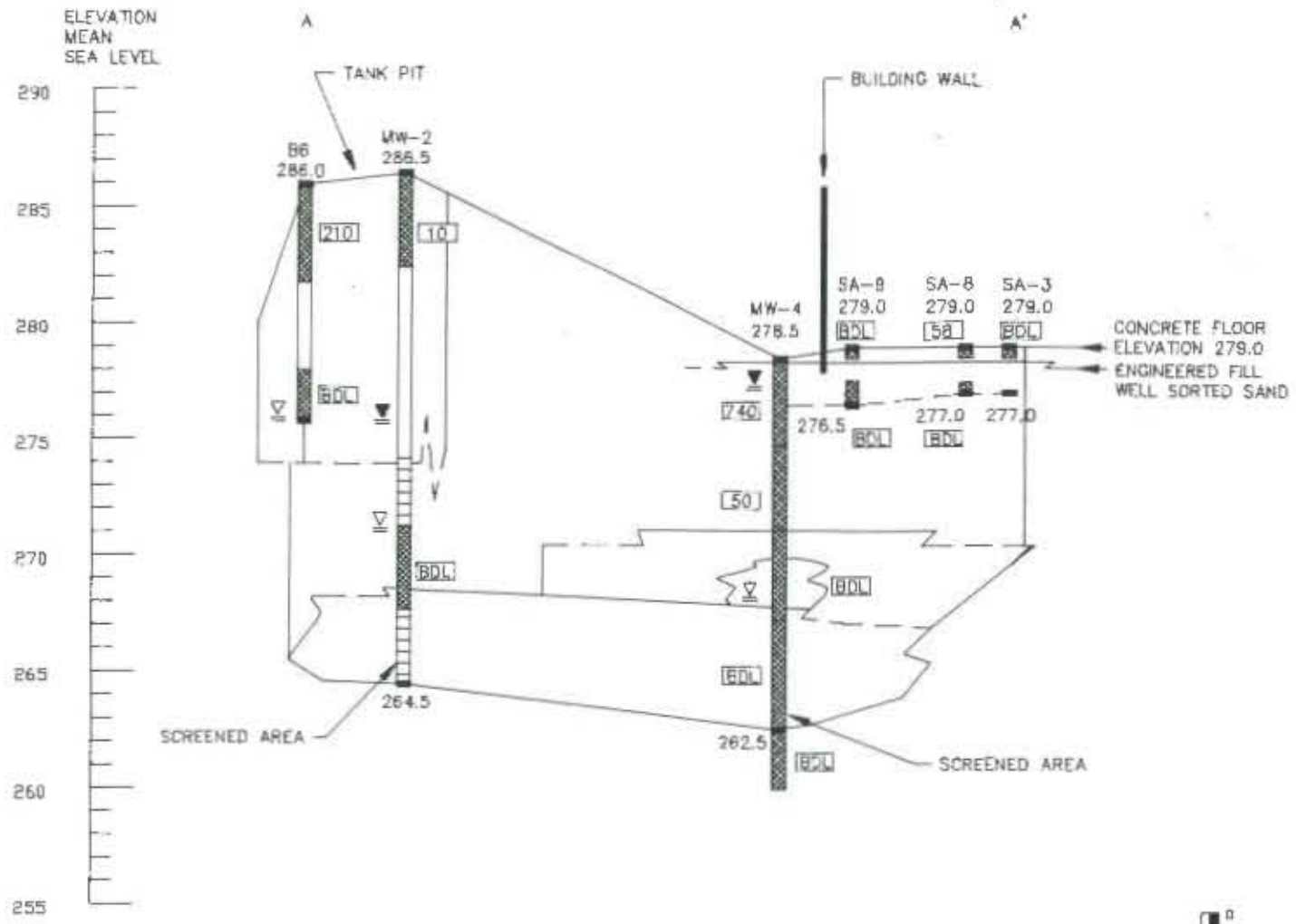
DATE: 10/22/92 | DWG NAME: 040F11-6

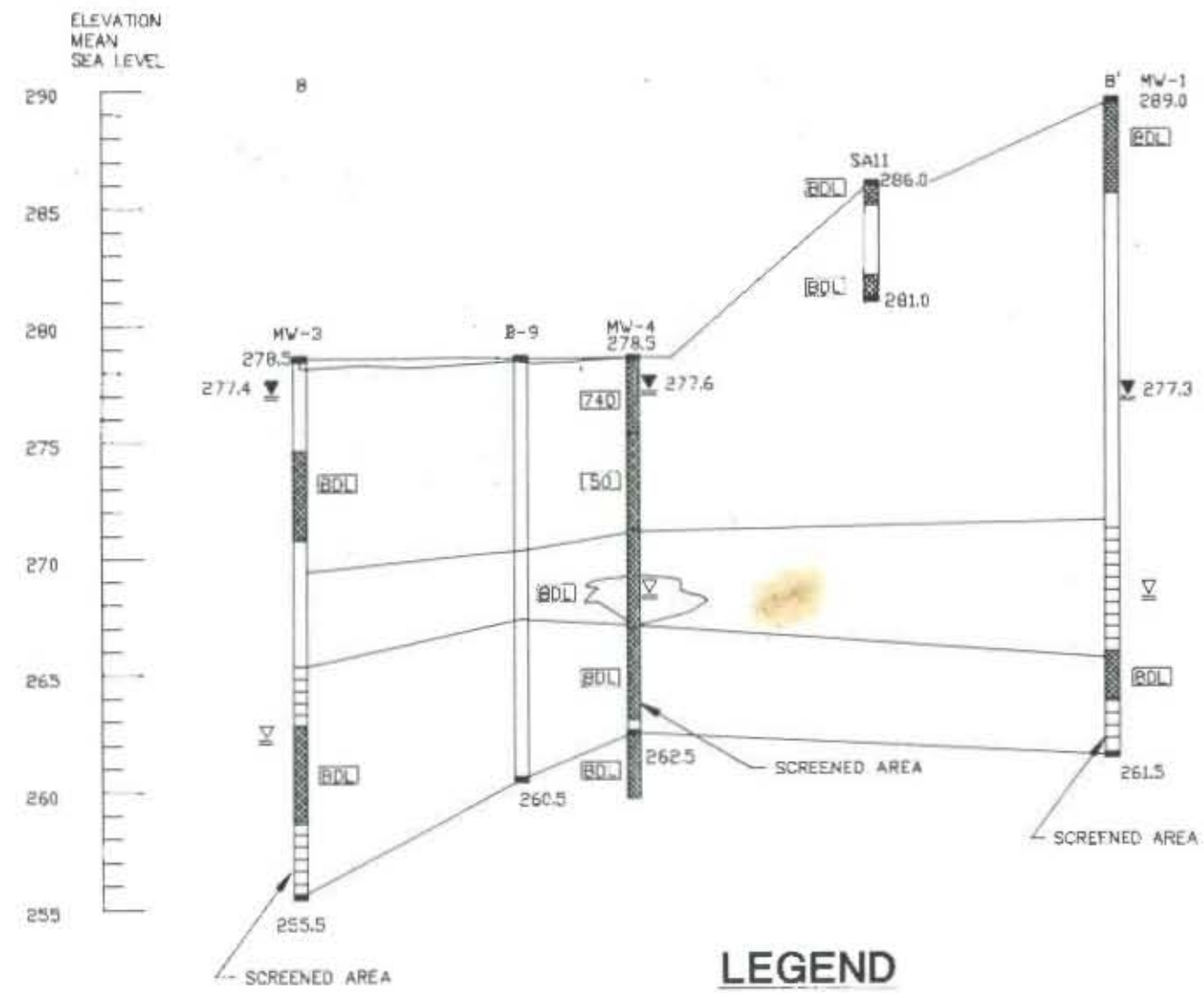

NAVY HOSPITAL
ROOM NO. 0032
ROOM NO. 0098
BOILER NO. 1
BOILER NO. 2
BOILER NO. 3
SA1
SA2
SA3
SA4
SA7
SA8
SA9
SA10
SA11
B8
B5
B6
B7
276.38
WELL No. 3
ELEV.= 278.46
276.71
WELL No. 4
ELEV.= 278.51
276.41
WELL No. 1
ELEV.= 289.47
275.65
WELL No. 2
ELEV.= 286.13
RETAINING WALL @ LOADING DOCK
RAMP DOWN
CONCRETE CURB
STORAGE BLDG.'S
COOLING TOWER
TRANSFORMERS
BOILER STACKS
BLDG.
TANK 107
TANK 106
GROUNDWATER FLOW
ASPHALT PARKING LOT
276.5
276.0
275.5
N
LEGEND
BORING LOCATIONS (B)
MONITORING WELLS
SA – SOIL SAMPLE COLLECTED USING HAND AUGER
CONTOUR INTERVAL
GROUNDWATER ELEVATION MSL
GROUNDWATER FLOW DIRECTION
20 10 0 20
SCALE 1"=20'
CORRECTIVE ACTION PLAN
BUILDING H-100
NAS MEMPHIS
FIGURE 1-7
PIEZOMETRIC MAP
(9/03/92)
DATE: 10/22/92
DWG NAME: 040FI1-7

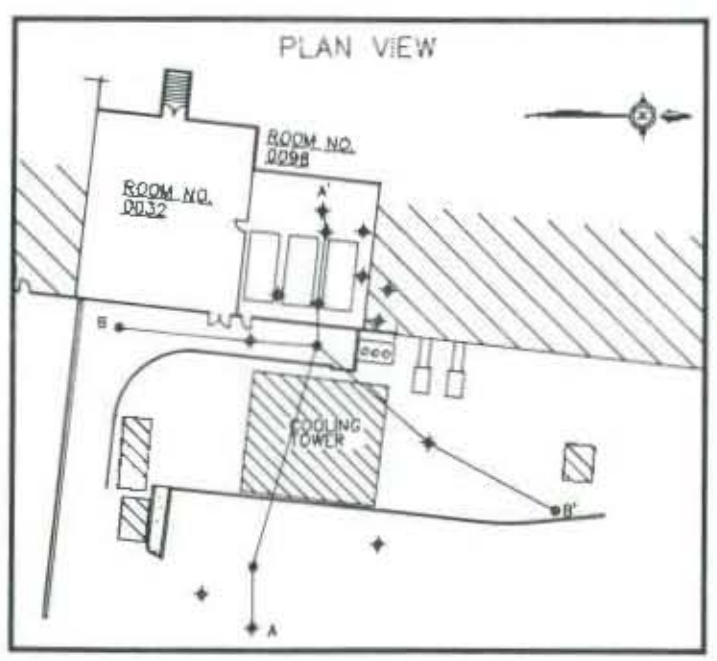


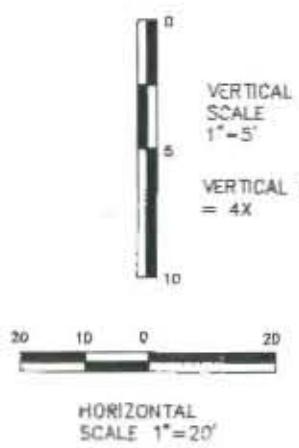
SAMPLE LOC.	HIGHEST CONC. mg/kg
SA1	BDL
SA2	11,000
SA3	BDL
SA4	BDL
SA7	5,540
SA8	58
SA9	BDL
SA10	4,210
SA11	BDL
MW-3/B3	BDL
MW-4/B4	740
B8	35

BDL=BELOW DETECTION LIMIT
B=BORING
MW=MONITORING WELL
SA=SOIL SAMPLE COLLECTED USING HAND AUGER









LEGEND

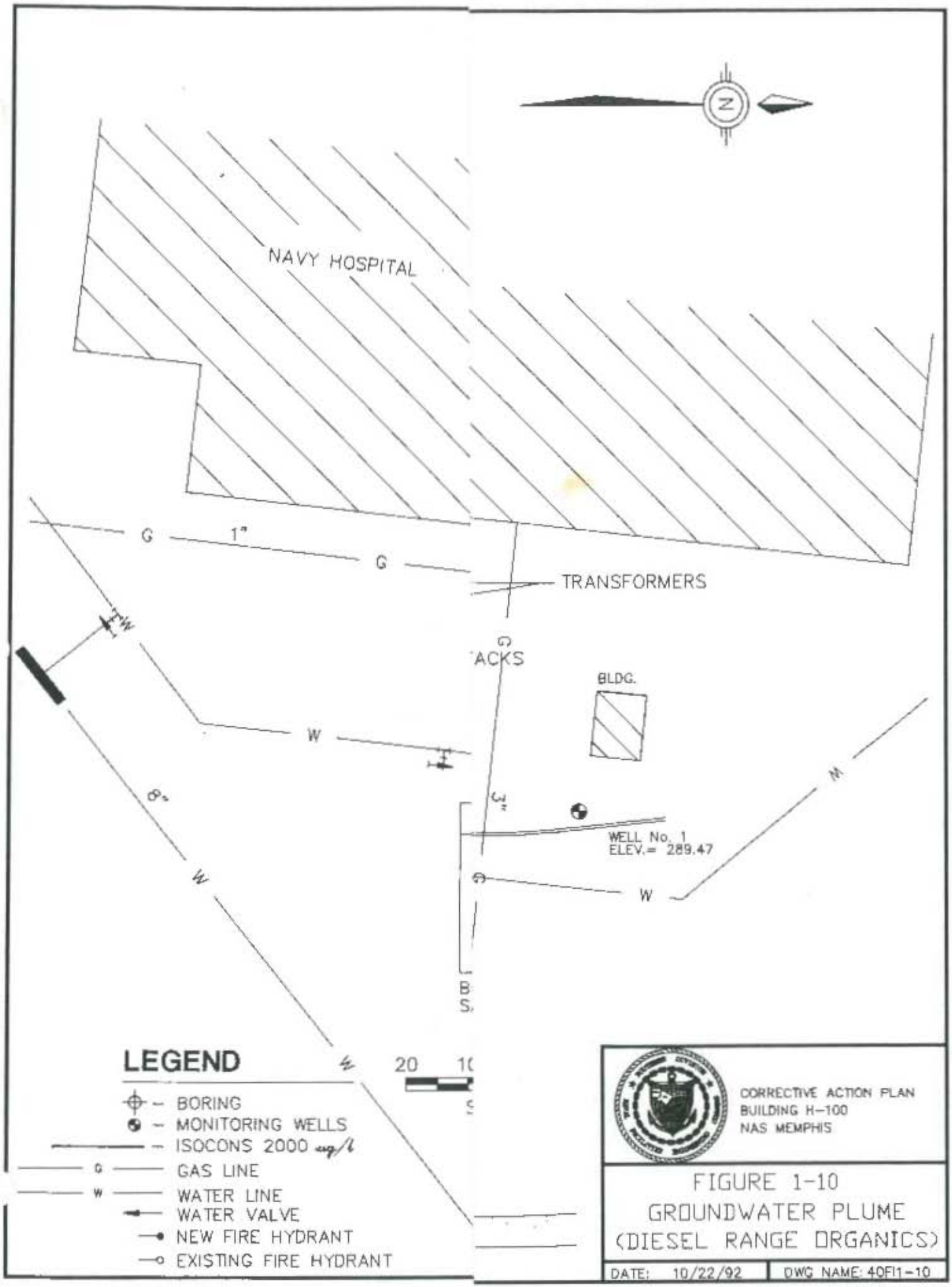
- PIEZOMETRIC SURFACE (07/31/92)
- DEPTH AT WHICH GROUNDWATER WAS INITIALLY ENCOUNTERED
- SAMPLE INTERVAL
- BDL BELOW DETECTION LIMITS
- 000 DIESEL RANGE ORGANICS CONCENTRATIONS IN PPM

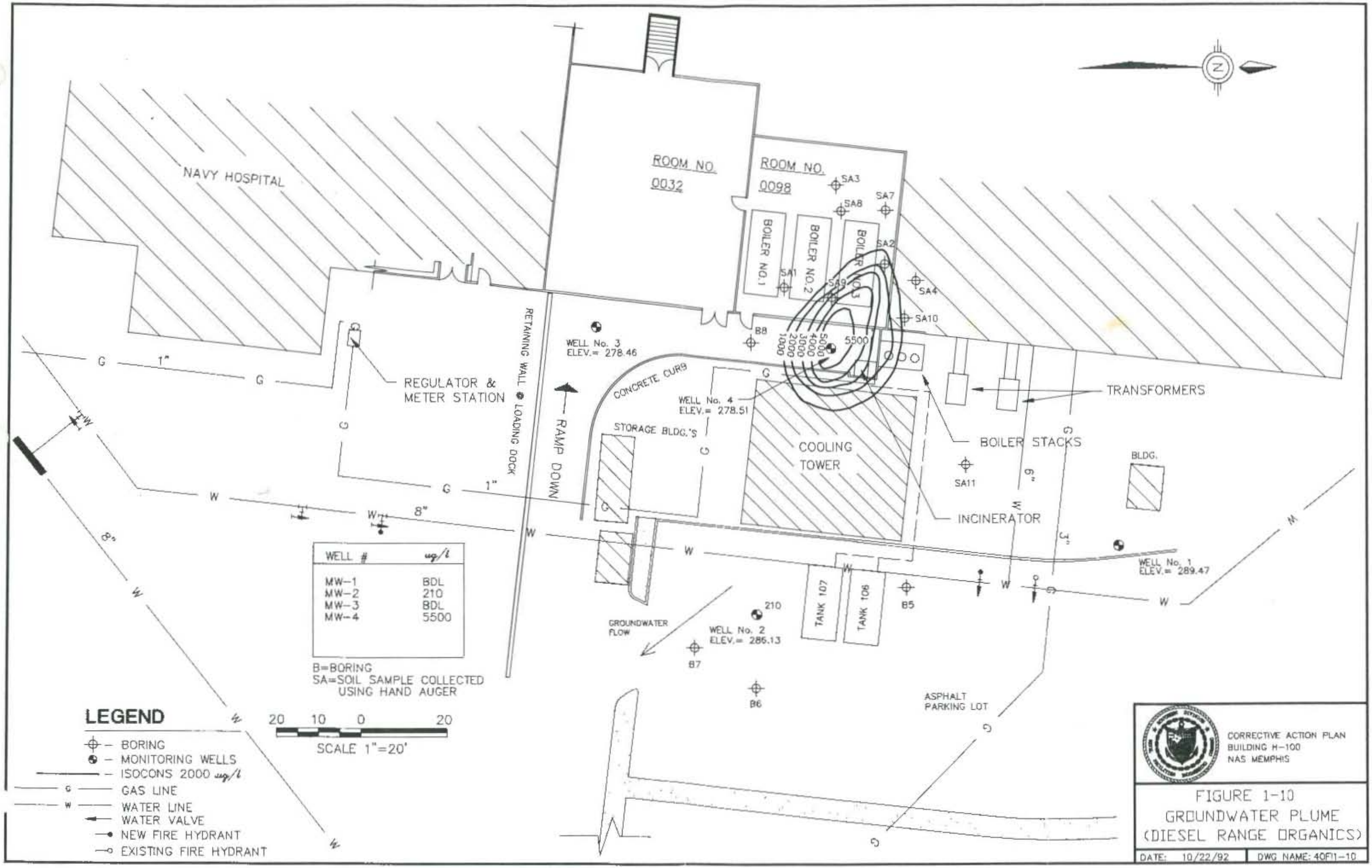
CORRECTIVE ACTION PLAN
BUILDING H-100
NAS MEMPHIS

FIGURE 1--9
VERTICAL EXTENT OF
SOIL CONTAMINATION

DATE:10/22/92 | DWG NAME:040F11-9

00448GGGB4Z


NAVY HOSPITAL
TRANSFORMERS
BLDG.
WELL No. 1
ELEV.= 289.47
LEGEND
BORING
MONITORING WELLS
ISOCONS 2000 ug/l
GAS LINE
WATER LINE
WATER VALVE
NEW FIRE HYDRANT
EXISTING FIRE HYDRANT
CORRECTIVE ACTION PLAN
BUILDING H-100
NAS MEMPHIS
FIGURE 1-10
GROUNDWATER PLUME
(DIESEL RANGE ORGANICS)
DATE: 10/22/92
DWG NAME: 40FI1-10


NAVY HOSPITAL
ROOM NO. 0032
ROOM NO. 0098
BOILER NO.1
BOILER NO.2
BOILER NO.3
SA1
SA2
SA3
SA4
SA7
SA8
SA9
SA10
SA11
B8
B5
B6
B7
5500
1000
2000
5000
4000
5000
WELL No. 3
ELEV.= 278.46
WELL No. 4
ELEV.= 278.51
WELL No. 1
ELEV.= 289.47
WELL No. 2
ELEV.= 286.13
210
CONCRETE CURB
STORAGE BLDG.'S
COOLING TOWER
BOILER STACKS
INCINERATOR
TRANSFORMERS
BLDG.
RETAINING WALL @ LOADING DOCK
RAMP DOWN
REGULATOR & METER STATION
TANK 107
TANK 108
GROUNDWATER FLOW
ASPHALT PARKING LOT
G
W
1"
8"
6"
WELL # ug/l
MW-1 BDL
MW-2 210
MW-3 BDL
MW-4 5500
B=BORING
SA=SOIL SAMPLE COLLECTED USING HAND AUGER
LEGEND
BORING
MONITORING WELLS
ISOCONS 2000 ug/l
GAS LINE
WATER LINE
WATER VALVE
NEW FIRE HYDRANT
EXISTING FIRE HYDRANT
20 10 0 20
SCALE 1"=20'
CORRECTIVE ACTION PLAN
BUILDING H-100
NAS MEMPHIS
FIGURE 1-10
GROUNDWATER PLUME
(DIESEL RANGE ORGANICS)
DATE: 10/22/92
DWG NAME: 40F11-10