131932

M. A. D. CONTRACT # AF-36(600)-947 - Well #6

DRAW DOWN TEST WITH 150 HP GAS ENGINE DRIVEN - 10 STAGE - 8 HC

POMONA PUMP SET AT 488' OAL USING 480' - 4½ x 5" OD COL - 483' AIR LINE

SEPTEMBER 23 - WEDNESDAY

REMARKS	TIME MIN.	CAPACITY METER CPM	8" ORIFICE IN	GPM	PUMPING LEVEL GAGE PSI	ACT FT	PUMP SPEED RPM	IMP SET FACES
Start					190	43		
	9:45	560	15-27	600-800	154	127	2400	9
	10:15	550	16-24	620-760	144	150	2350-2450	9
			Steady					
	10:30	560	20	695	134	175	2300	9
	10:35	600	Steady 24½	770 ave	130	183	2601	9
	10:45	600	11-17	580	100	252	2600	
Shut Down	11:00	not taken	10-16	560	92	270	2400 - 2600	9
Sept. 24 Thursday								
Start	10:05	575	20-29	767	150	143	2600 - 2700	9
	10:30	shut down to adj. governor						
	11:00	640	8-14	440-580	95	264	2600	9
	11:30	580	9-16	465-620	100	252	2400	9
	12:00	575	7-14	410-580	105	241	2350	9
	12:30	545	6-13	380-560	100	252		9
	1:00	540	6-12	380-540	95	264	2400	9
	1:30	535	3-12	? -540	93	269		
	2:00	545	3-12	? -540	90	275	2400	9
	2:30	540	2-16	?-620	86	284	2400	9
	3:00	540	2-16		82	292	2400	9
	3:30	540	2-16		85	288	2400	9
	4:00	540	2-16		82	292		9
	4:30	545	2-16		80	298		9
	5:00	545	3-19		80	298		9
	6:00	550	3-19		75	310	2500	9
	7:00	550	too much		75	310	2500	9
	8:00	550	air		75	310	2500	9
	9:00	550			75	310	2500	9
	10:00	550			65	333	2500	9
	11:00	550			65	333	2500	9
	12:00	broke fan belt at 11:45					2500	9

M.A.D. CONTRACT AF-36(600)-947 Well #6

DRAW DOWN TEST 10 STAGE - 8 HC - 480 FT. 4½ Col.

SEPTEMBER 25, 1953

REMARKS	TIME MIN.	CAPACITY METER GPM	6" ORIFICE IN	GPM	PUMPING GAGE PSI	LEVEL ACT. FT.	PUMP SPEED RPM	D/P SET FACE
	10:50				195	34'		
	10:55	560	30½	680	160	113'	2900	9
	11:15	560	33	715	145	148	3000	
Started to fluctuate	11:30	560	30-33	670-710	139	164	2900	
	12:00	560	28-36	650-735	115	219	2800	
Very Bad	12:10	?	25-45	610-820	91	273	2800	
"	12:15	?	25-49	610-85	87	283	2800	
"	12:30	?	24-49	600-850	80	299	2800	
Shut Down								
				CHECK POINT #4				
	12:45	280	6-11	300-400		176	1800	9
Shut Down Reset Impeller								
Steady	1:00	360	15½	482	170	93	1800	6
	1:30	360	14	460	170	93	1800	6
	2:00	360	13	442	165	101	1800	6
	2:30	360	12½	433	165	101	1800	6
	3:00	360	12	425	162	108	1800	6
Check Pt.#4	(3:30	360	14½	460	160	113	1800	6
	(4:00	360	14	460	158	117	1800	6

NOTE: That at 123 Psi or 200 ft. depth - pumping level is in the 8" hole, and at 220 ft. the flow becomes unsteady until at 265 ft. it varies from 600 to 800 GPM

M. A. D. CONTRACT # AF-36(600)-947 - Well #6

DRAW DOWN TEST OCTOBER 2, 1953

USING 150 HP GAS ENGINE-POMONA PUMP-10 STAGE-8 HC WITH 180 FT. $4\frac{1}{2}$ x 1

COLUMN AND SHAFT - 188 FT. OAL - 189 FT. AIRLINE

REMARKS	TIME MIN.	CAPACITY METER GPM	6" ORIFICE IN	GPM	PUMPING LEVEL DIRECT GAGE FT.	PUMP SPEED RPM	IMP. SET FACES
					30		
Start	8:30	530	29	660	95	2100	6
	9:00	520	27-28	640	76	"	"
	9:30	520	24-29	630	90	"	"
	10:00	500	25	610	111	"	"
	10:30	500	19-26	580	124	"	"
	11:00	500	16-22	520	132	"	"
	11:30	500	15-23	505	140	"	"
	12:00	460	12-28	475	145	"	"
	12:30	460	12-24	505	150	"	"
	1:00	460	14-24	520	151	"	"
Jumpy flow	1:30	460	12-24	425-600	152	"	"
	2:00	460	13-24	440-600	155	"	"
Stopped Pumping	2:30	450	13-25	440-600	155	"	"

NOTE: Flow fluctuated greatly from high point of 25" (600 GPM) to quick drop to 450 GPM and right back to 600 GPM

OLMSTED AIR FORCE BASE

WELL DATA

27 May 1954

HISTORY OF NO. 7 WELL

No. 7 well was drilled 12 November 1943 to a depth of 450' and cased dry to 100' between a 10" casing and a 14" hole, the 30' of 14" hole was cased first, the static level was 42' and produced 225 g.p.m. with a 20 h.p. pump set at 140'. This well is located in the exhaust stack of No. 9 cell building No. 29 Test Block No. 1 purpose of this location was to provide cooling water for the test block. The increased demand for cooling water in the test cells exceeded the capacity of the cooling tank and circulating pump, the pump from the No. 7 was connected to their distribution Main and then cooling water supplied from the distribution main, pump was connected to the distribution Main in 1951 and no changes to date. The pump is a 20 h.p. Pomona pump set at 140' 10 stge bowl assembly 4½" column and producing 140 g.p.m. against a 103' head.

Draw-down for wells No. 1 through No. 8 during open flow test pumping of No. 7 Well.

DD WELL No. 1	DD WELL No. 2	DD WELL No. 3	DD WELL No. 4	DD WELL No. 5	DD WELL No. 6	DD WELL No. 7	DD WELL No. 8
26'	92'	13'	81'	24'	11'	0'	88'
						48'	
30'	96'	11'	81'	24'	11'	69'	86'
						73'	
34'	97'	10'	82'	26'	11'	75'	87'
						76'	
39'	103'	11'	84'	29'	12'	77'	88'
						77'	
42'	104'	9'	85'	29'	14'	79'	87'
						81'	
46'	108'	13'	86'	30'	20'	79'	82'
STATIC WATER LEVEL							
94'	108'	109'	44'	40'	44'	15'	66'
PUMPING - LEVEL							
120'	202'	122'	125'	64'	55'	15'	154'
						63'	
124'	204'	120'	125'	64'	55'	84'	152'
						88'	
128'	205'	119'	126'	66'	55'	90	153'
						91'	
133'	211'	120'	128'	69'	56'	92'	154'
						92'	
136'	212'	118'	129'	69'	58'	96'	153'
						94'	
140'	216'	122'	130'	70'	64'	94'	148'
						94'	

Results of open flow test for No. 7 Well

TIME	GPM	STATIC LEVEL	PUMPING LEVEL	DD	HEAD IN FT
10:00	235	15			
10:30	225		63"	48'	0
11:00	225		84'	69'	
11:30	220		88'	73'	
12:00	220		90'	75'	
12:30	220		91'	76'	
1:00	220		92'	77'	
1:30	215		92'	77'	
2:00	215		94'	79'	
2:30	215		96'	81'	
3:00	215		94'	79'	
3:30	215		94'	79'	
4:00	215		94'	79'	

REMARKS: 20 H.P. Pump set at 140' 4½" column 10 stage bowl assembly.
Pomona Pump-Westinghouse Motor 220 V AC installed November 1943.
Temperature of water 58°F.

HISTORY OF NO. 8 WELL

No. 8 well was drilled May 1944 to a depth of 452' and cased dry to 100' between an 8" casing and a 12" hole. First 30' of 12" hole was cased with steel casing. Static water level was 12' and produced 240 g. p. m. will was equipped with an American Marsh Pump set at 140', 20 h.p. motor. In 1951 head shaft broke and pump was pulled cleaned and reinstalled. In November of 1953 pump was pulled to install 20 h. p. motor from No. 6 well. The pump was dirty, column was clogged, scale on the outside of Column was ⅜" thick, inside of bowl assembly was 90% closed. 16' of dirt was in the bottom of the well. November 1953 a 20 h. p. Pomona Pump set at 200' from No. 6 well was installed in this well and is producing 130 g.p.m. with a 39' draw down pumping against a 300' head. Pump Data. The 20 h.p. Pomona Pump 200' of 4½ column and shaft 11 stage bowl assembly. ¼" air line.

Test Pumping of No. 8 Well with 150 H.P. Gas Engine 10 Stage 8 H.C. Pomona Pump set 440' CDX1 Column and Shaft Air Line 440' ó x 5' orfice. (Cont.)

TIME	GPM	PSI	SL	FL	RPM	IMPELLER SETTING
REDUCED SPEED TO 1500 and raised impellers to 24 notches.						
1:00	125	45		338'		
1:30	113	40		348'		
2:00	116	40		348'		
Increased RPM						
2:30	110	50		325'	1800	24
3:00	110	50		325'	1800	24
3:30	110	50		325'	1800	24
4:00	110	50		325'	1800	24
4:30	110	50		325'	1800	24
5:00	110	50		325'	1800	24
5:30	110	50		325'	1800	24
6:00	110	50		325'	1800	24
6:30	110	50		325'	1800	24
7:00	110	50		325'	1800	24
7:30	110	50		325'	1800	24
8:00	110	50		325'	1800	24
8:30	110	50		325'	1800	24
9:00	110	50		325'	1800	24

TEMPERATURE: 55°F.

9:00 A.M following day GPm and Pumping Level remained constant.

Test pumping was performed by Kohl Bros. under contract for rehabilitation of Wells 2-6-and8.

Test Pumping of No. 8 Well with 150 H.P. Gas Engine 10 Stage 8 H.C. Pomona Pump set 440' CDXI Column and Shaft Air Line 440' 6 x 5' orfice.

TIME	GPM	PSI	SL	PL	RPM	DP SETTING
9:00	600	173	15'	43'	2500	18 notches
9:02	300	55		314'	2500	
9:04	200	10		417'	2500	
9:05	100	5		429'	2500	
CHANGED ORFICE WITH 4" X 3"						
10:00	500	172		45'	2100	
10:10	410	60		302'	2100	
10:11	245	30		271'	2100	
10:12	220	16		412'	2100	
10:15	160	12		413'	2100	
10:18		5		420'	2100	
REDUCED SPEED						
10:22	325	80		256'	1800	18 notches
10:25	150	45		337'	1800	
10:30	150	45		337'	1800	
10:35	150	45		337'	1800	
10:40	140	45		337'	1800	
10:45	168	50		325'	1800	
10:50	168	45		337'	1800	
11:00	168	50		325'	1800	
11:15	140	55		314'	1800	
11:30	155	45		337'	1800	
12:00	156	40		348'	1800	
12:30	145	40		348'	1800	
12:45	118	30		371'	1800	

M. A. D. CONTRACT # AF 36(600)53-123 WELL #9

TESTED WITH-150HP-FORD V-8 ENGINE #1900 DRIVEING 10-STAGE 8"/MP

POMONA PUMP SET AT 448' O.A.L. WITH 440' 6" I.D. x H CASING & 441' -AIRLINE

	TIME	IN"	CAPACITY GPM	PSI	PUMPING LEVEL ACT-FT	PUMP RPM	IMPE SET
Feb 23-54; 6 x 5 Orofice Preliminary Test Only							
Start	2:35 pm	25	610	180	26	2500	15
	2:40	10	400	50	325	2300	15
	2:45	9	370	27	381	2200	15
	2:48	8	350	5	430	2500	15 P. 2
	2:50	8	350	0	441	2500	15s
Feb 24-54 6 x 4 Orofice	8:50 am					2800	15
	8:52	40	400	0	441	2700	15
	8:55	22	300	12	414	2500	15
	9:00	23	305	16	404	2300	15
	9:05	23	305	15	406	2400	15
	9:07	32-14	305	10	418	2400	15
	9:10	34-10	305	10	418	2400	15
	9:15	34-14	312	10	418	2400	15
	9:30	34-14	312	10	400	2350	15
6-HR-Test	Reduced Speed to steady flow						
	9:40	22	300	18	400	2300	15
	10:00	22	300	17	402	2300	15
	11:00	22	300	17	402	2300	15
	12:00	22	300	17	402	2300	15
	1:00 pm	22	300	17	402	2300	15
	2:00	22	300	17	402	2300	15
	3:00	22	300	17	402	2300	15
	Reduced speed to get 50% Drawdown Pt. at 215 FT.98-P.S.I						
	3:00 pm	21	240	70	290	1900	15
	3:05	21	210	80	257	1800	15
	3:15	20	280	80	257	2000	15
	3:30	15	268	84	247	1900	15
24-hr-test	4:00	18	268	84	247	1900	15
	4:30	18	268	84	247	1900	15
Changed to 4" Pipe	5:00	40	265	100	211	1800	15
3" Orofice	5:15	39	262	100	211	1800	15

M. A. D. CONTRACT # AF 36(600) 53-123 WELL #9

TESTED WITH 150 HP - FORD V-8 ENGINE # 1900 DRIVEING 10-STAGE 8"/MP

POMONA PUMP SET AT 448' O.A.L. WITH 440'6" I.D. x H. CASING & 441' AIRLINE

	TIME	IN	CAPACITY GPM	PSI	PUMPING LEVEL ACT-FT	PUMP RPM	IMPEL SET
4" Pipe 3" Orofice	5:30	42	270	100	211	1800	15
	6:00	42	270	100	211	1800	15
	7:00	"	"	"	"	"	"
	8:00	"	"	"	"	"	"
	9:00	"	"	"	"	"	"
	10:00	"	"	"	"	"	"
	11:00	"	"	"	"	"	"
	12:00	"	"	"	"	"	"
Feb 25 1954	1:00 am	"	"	"	"	"	"
	2:00	"	"	"	"	"	"
	3:00	"	"	"	"	"	"
	4:00	"	"	"	"	"	"
	5:00	"	"	"	"	"	"
	6:00	"	"	"	"	"	"
	7:00	"	"	"	"	"	"
	8:00	"	"	"	"	"	"
	9:00	"	"	"	"	"	"
	10:00	"	"	"	"	"	"
	11:00	"	"	"	"	"	"
	12:00	"	"	"	"	"	"
Finished 24 hr Test	1:00 pm	"	"	"	"	"	"
	2:00 pm	"	"	"	"	"	"
	3:00	"	"	"	"	"	"
	Reduced Speed to get 25% of Drawdown - P.T. at 120' - 139-P.S.I.						
4" x 3"- Orofice	3:00	27	218	140	118	1450	15
	4:00	27	218	140	118	1450	15
6" Pipe 4" Orofice	Increased speed to get 75% of Drawdown - P.T. at - 310' - 57 P.S.I.						
	4:15	22	300	57	310	2100	
	5:15	22	300	57	310	2100	

OLMSTED AIR FORCE BASE

Middletown, Pa.

Analyses by Geological Survey, United States Department of the Interior
(parts per million)

	Lab.#10928	Lab #10930
Date of collection	Dec.29,1953	Feb. 26, 1954
Silica (SiO_2)	16	20
Iron (Fe), dissolved 1/	.05	.01
Iron (Fe), total		
Manganese (Mn), dissolved 1/		
Manganese (Mn), total		
Calcium (Ca)	129	73
Magnesium (Mg)	29	20
Sodium (Na) * Calc.	2.6	2.0
Potassium (K)		
Bicarbonate (HCO_3)	264	150
Carbonate (CO_3)	.0	.0
Sulfate (SO_4)	207	109
Chloride (Cl)	9.5	6.5
Fluoride (F)	.1	.2
Nitrate (NO_3)	1.6	28
Dissolved solids		
Sum		
" Residue on evaporation at 180°C	560	356
Hardness as $CaCO_3$	441	264
Non-carbonate	285	141
Specific Conductance (micromhos at 25°C)	822	523
pH	7.1	7.9
Color	10	5
Temp. at time of sampling °F	52	54

1/ In solution at time of analysis

Lab. No. 10928 - New well #9 in process of being drilled. Fifty feet deep (50') at time of sampling.

Lab. No. 10930 - Drilled well (new)- Composite sample -

M A D Contract #AF-36 (600) 53-933 - Well #10

Tested with 150 HP Ford V-8 Engine Driven - 10 Stage 8 IC
Pomona Pump Set at 448 ft. with 440 ft.* 4½" O.D. x 1 Col & shaft
Maximum yield Test #1 (6 hrs) 440 Ft. Air-Line

Oct. 21, 1953	Time	Capacity 6x5 Orifice in	Capacity GPM	Pumping Lev gauge PSI	Pumping Lev Act FT	Pump Cond. Speed RPM	Pump Cond. Set I.P	Remarks
Start	10:55	30	670	128	146	2500	15	55°F
	11:00	23	585	100	210	2500	15	
	11:15	22-18	550	85	244	2500	15	
	11:30	25-18	575	80	256	2500	15	
	11:45	27-15	562	80	256	2500	15	
	12:00 N	27-15	560	80	256	2500	15	52°F
	12:30	27-15	560	78	261	2500	15	Clearing u
	1:00	27-15	560	78	261	2500	15	slightly c
			Lower Impellers 3 Notches					
	1:10	35	725	125	153	2700	12	
	1:15	24	600	85	244	2600	12	
	1:18	22	575	85	244	2500	12	
	1:20	26-18 22	575	80	256	2500	12	
	1:30	26-18 22	575	78	260	2500	12	
	1:45	28-16	575	75	267	2600	12	
	1:50	28-16	575	76	270	2600	12	
	1:55	22	575	78	260	2500	12	
			Lower Impellers 3 Notches					
	1:58	31	680	120	164	2600	9	
	2:00	28	645	100	210	2550	9	
	2:15	27-17 22	575	80	256	2500	9	
	2:30	28-16	575	80	256	2500	9	
	3:00	28-16	575	85	244	2400	9	
	3:30	28-16	575	75	267	2600	9	
	4:00	28-16	575	80	256	2500	9	
	4:30	28-16	575	70	279	2600	9	
	5:00	28-16	575	80	256	2500	9	
	5:30	28-16	575	80	256	2500	9	
	6:00	28-16	575	75	267	2600	9	
	6:30	28-15	575	70	279	2600	9	
	7:00	28-16	575	70	279	2600	9	

AR300214

*Note: Pumped Max. cap possible due to high friction loss in 4½ col.

M A D Contract #AF-36(600)53-933 Well #10

Tested with 150 HP Ford V-8 Engine Driven 10 Stage - 8" EC
Pomona Pump set at 448 ft. with 440 ft. of 6"x1" I.D.Col. & Shaft
Maximum yield test #2 (3 hrs) Air line 446 ft.

March 22, 1954	Time	Capacity 6x5 Orifice In	GPM		Pumping-Lev. Gauge PSI	Act FT.	Pump Cond. Speed RPM	Set Imp.	Remarks
Start	10:35				180	31	2900	15	
	10:40	33	710		130	146	2900	15	
	10:45	29	660		95	226	2850	15	
	10:50	17-32	610		72	282	2850	15	Galloping -Air- ?
	11:00	20-30	610		70	285	2850	15	
	11:00			Ave.	160	78	2850	12	
	11:05	25-33	610-705	660	90	240	2850	12	
	11:15	20-36	550-735	645	72	282	2850	12	
	11:30	20-28	550-650	600	69	287	2850	12	
	11:30			Ave.	140	144	2900	9	
	11:35	28	645		85	271	2800	9	Loses speed 2750 RPM
	11:40	20-36	550-735	645	72	282	2750	9	
	11:45	18-36	520-735	634	69	287	2800	9	Air ?
	11:50	20-30	550-670	610	64	299	2900	9	
	11:55	20-30	550-670	610	63	300	2900	9	
Stopped	12:00	20-30	550-670	610	63	300	2900	9	

Mar.23,1954	Time	Capacity 12" weir box In	GPM		Pumping Lev. Gauge PSI	Act FT.	Pump Cond. Speed RPM	Set Impl	Remarks
Start	8:30			Ave					
	9:00	7-8	739-814	740	55	330	3000	9	Held speed
	10:00	7-8	739-814	740	55	330	3000	9	steady
	11:00	7-8	739-814	740	55	330	3000	9	Blew fluciat.
	12:00	7-8	739-814	740	55	330	3000	9	rapidly in we box
Stopped	12:15	Blew head gasket			Had to shut down				

OLMSTED AIR FORCE BASE

Middletown, Pa.

Analyses by Geological Survey, United States Department of the Interior.
(Parts per million)

Date of collection	Lab. No. 10282 9-23-53	Lab. No. 10283 9-21-53
Silica (SiO_2)	20	17
Iron (Fe)	.04	.04
Calcium (Ca)	59	59
Magnesium (Mg)	11	11
(Sodium (Na))= (Potassium (K)) Calc.	5.5	12
Bicarbonate (HCO_3)	179	193
Sulfate (SO_4)	40	41
Chloride (Cl)	10	9.0
Fluoride (F)	.0	.0
Nitrate (NO_3)	2.5	1.4
Dissolved solids	255	290
Total hardness as $CaCO_3$	192	192
Specific conductance (Kx105 at 25° C)	435	475
PH	7.9	7.3

10282 - Well #10, in process of being drilled, Middletown, Pa., Dauphin County. Composite sample. D.O. 5.8 ppm; CO_2 20 ppm; Temp. 65°F.

10283 - Well #10, in process of being drilled. Collected at 55'. D.O. 5.6 ppm; CO_2 15 ppm; Temp. 63°F.

APPENDIX D-2

RECORDS DATA FOR WELLS IN THE

OLMSTED AFB AREA

EXPLANATION OF SYMBOLS

Well location: The number that is assigned to identify the well. It is prefixed by a two-letter abbreviation of the county. Da signifies Dauphin county. The lat-long is the coordinates in degrees and minutes of the southeast corner of a 1-minute quadrangle within which the well is located.

Use: A, air conditioning; C, commercial; H, domestic; I, irrigation; N, industrial; P, public supply; T, institution; u, unused.

Topographic setting: H, hilltop; S, hillside; V, valley.

Aquifer: Trg, Gettysburg Formation; Trd, Triassic diabase.

Lithology: db, diabase; sh, shale; shss, shale and sandstone; ss, sandstone.

Static water level: Depth--F, flowing, +, above land surface; date--month/last two digits of year.

Reported yield: gpm, gallons per minute.

Specific capacity: gpm/ft, gallons per minute per foot of drawdown.

Hardness: gpg, grains per gallon.

Specific conductance: Deg C, degrees Celsius.

Table 3-4. Records Data for Wells in the Olmsted Air Force Base Area (Continued)

Location Lat-Long	Owner	Driller	Date completed	Use	Altitude of land surface (feet)	Topographic setting	Aquifer/ lithology	Total depth below land surface (feet)
				DAUPHIN COUNTY				
4012-7544	Fruehauf Corp.	D. W. Sunday	1958	U	385	S	Trg/ss	700
4012-7644	do.	do.	1958	U	385	S	Trg/ss	345
4012-7644	do.	Harrisburg's Kohl Bros.	1958	U	385	S	Trg/ss	300
4011-7644	Harrisburg Intl. Airport	do.	1941	P	320	V	Trg/shss	629
4011-7644	do.	do.	1941	P	320	V	Trg/shss	450
4011-7644	do.	do.	1941	P	320	V	Trg/shss	450
4011-7644	do.	do.	1941	P	320	V	Trg/shss	459
4011-7644	do.	do.	1917	P	320	V	Trg/shss	776
4011-7646	do.	do.	1943	P	305	V	Trg/shss	500
4011-7645	do.	do.	1943	U	305	V	Trg/shss	450
4011-7645	do	do	1944	U	305	V	Trg/shss	452
4011-7645	do.	do.	1954	P	305	V	Trg/shss	451
4011-7645	do.	do.	1953	U	305	V	Trg/shss	450
4011-7645	do.	do.	1955	P	305	V	Trg/shss	603
4011-7645	do.	do.	1955	P	305	V	Trg/shss	600
4011-7645	do.	do.	1955	P	305	V	Trg/shss	800
4011-7645	do.	do.	1955	P	305	V	Trg/shss	800
4012-7644	Gulf Oil Corp.	do.	1950	C	380	S	Trg/ss	206
4012-7644	do.	do.	1950	C	380	S	Trg/ss	214
4012-7644	do.	do.	1950	U	405	S	Trg/ss	203
4011-7644	Odd fellows Home of Pa.	---	1929	T	340	V	Trg/shss	195
4011-7644	do.	---	1924	T	355	S	Trg/shss	250
4011-7643	Middletown Munic. Water Auth.	Harrisburg's Kohl Bros.	1957	P	301	V	Trg/shss	800
4010-7643	Londonberry Twp.	do.	1963	C	520	H	Trd/db	81
4011-7643	Middletown Munic. Water auth.	do.	1957	P	325	V	Trg/shsss	500
4012-7646	Pennsy Supply	---	---	U	305	V	Trg/shss	700
4012-7646	Dauphin Consolidated Water Co.	Harrisburg's Kohl Bros.	1956	P	301	V	Trg/shss	878
4012-7644	Lutheran Tressler Service	do.	1958	U	420	H	Trg/ss	550
4012-7644	do.	do.	1959	U	420	H	Trg/ss	447
4011-7643	Glen-Gery Corp.	do.	1953	U	300	V	Trg/shss	211
4011-7643	Middletown Munic. Water Auth.	---	1932	P	300	V	Trg/shss	450
4011-7643	Middletown Ice & Coal Co.	---	---	N	310	V	Trg/shss	300
4010-7643	Barnegat Light	---	---	U	300	V	Trg/shss	80
4012-7646	Pennsy Supply	---	---	U	---	V	Trg/shss	500
4011-7646	Harrisburg Intl. Airport	---	---	U	310	V	Trg/shss	120
4011-7646	do.	---	---	U	310	V	Trg/shss	225
4012-7645	Gerald Yingst	Harrisburg's Kohl Bros.	1975	C	305	V	Trg/sh	120
4011-7644	Metropolitan Edison Co.	do.	1957	U	305	V	Trg/shss	244
4011-7643	Elks Theater	do.	1940	A	315	V	Trg/shss	308
4011-7644	Pembrook Candy Co.	do.	1948	U	320	V	Trg/shss	250
4011-7643	Middletown Area Sch. Dist.	do.	1961	I	335	S	Trg/shss	300
4011-7643	Glen-Gery Corp.	do.	1946	U	298	V	Trg/shss	300
4010-7643	Barnegat Light	do.	1945	U	305	V	Trg/shss	590
4010-7643	do.	do.	1943	U	300	V	Trg/shss	500
4012-7643	Am. Legion Post 594	do.	1950	A	360	S	Trg/shss	512
4012-7643	do.	do.	1950	U	360	S	Trg/shss	500
4010-7643	Harry Brickman	do.	1975	H	320	S	Trg/ss	80
4011-7642	Robert Rowland	Myers Bros. Drlg. Cont.	1964	H	460	H	Trg/ss	275
4012-7644	Middletown Munic. Water Auth.	William Stothoff Co.	1977	P	410	H	Trg/ss	815

Table 3-4. Records Data for Wells in the Olmsted Air Force Base Area (Continued)

Location Lat-Long	Casing Depth (feet)	Casing Diameter (inches)	Depth(s) to water-bearing zone(s) (feet)	Static water level Depth below Land surface (feet)	Static water level Date measured (mo./yr)	Reported yield (gpm)	Specific capacity (gpm/ft)	Hardness (gpg)	Specific conductance (micromhos at 25 c)	pH	Well number
4012-7544	---	8	---	20	1958	135	0.33	---	---	---	Da- 77
4012-7644	60	---	---	31	1958	66	0.42	---	---	---	78
4012-7644	---	6	---	97	1958	66	.61	---	---	---	79
4011-7644	100	10	---	94	7/43	250	7.1	---	---	---	80
4011-7644	104	10	---	108	---	290	2.3	---	---	---	81
4011-7644	100	10	---	109	11/51	190	7.9	---	---	---	82
4011-7644	100	10	---	44	10/41	140	1.8	---	---	---	83
4011-7644	250	8	---	40	5/43	185	6.6	---	---	---	84
4011-7646	40	12	---	42	5/43	340	16	---	---	---	85
4011-7645	100	10	---	3	4/43	225	1.4	---	---	---	86
4011-7645	---	8	---	66	5/44	130	.38	---	---	---	87
4011-7645	101	10	---	26	2/75	270	1.5	---	---	---	88
4011-7645	102	10	---	31	3/54	775	2.6	---	---	---	89
4011-7645	75	10	125;235;288; 425;520	30	9/55	660	6.6	---	---	---	90
4011-7645	76	10	---	25	8/55	540	18	---	---	---	91
4011-7645	76	10	---	18	2/56	485	2.7	---	---	---	92
4011-7645	75	10	100;185;230; 535;625;651	16	11/55	758	4.6	---	---	---	93
4012-7644	38	6	---	2	7/50	85	0.72	7	360	7.5	94
4012-7644	47	6	---	27	7/50	70	.62	7	360	7.5	95
4012-7644	42	6	---	26	6/50	85	.74	9	---	7.6	96
4011-7644	---	---	---	---	---	85	---	---	---	---	97
4011-7644	---	---	---	---	---	30	---	---	---	---	98
4011-7643	48	10	68;312;318	18	11/57	500	2.4	15	---	7.6	99
	17	6	48;78	45	8/63	18	---	---	---	---	382
4010-7643	100	8	82;95;120;240; 320	50	7/57	182	1.5	11	385	---	386
4011-7643	---	10	---	20	---	450	3.7	---	---	---	402
4012-7646	30	10	---	22	1956	265	.72	14	---	7.4	404
4012-7646	---	6	---	50	7/58	82	0.31	13	---	6.5	427
4012-7644	---	6	---	---	---	---	---	---	---	---	428
4012-7644	18	6	96;150;173	50	11/53	100	2.0	---	---	---	430
4011-7643	---	8	---	16	1934	600	6.7	18	---	7.3	455
4011-7643	---	6	---	47	10/75	80	---	16	780	---	461
4011-7643	---	6	---	20	---	60	---	---	---	---	463
4010-7643	---	8	---	20	---	200	---	---	---	---	464
4012-7646	---	6	---	20	---	250	---	---	---	---	465
4011-7646	---	6	---	20	---	200	67	---	---	---	466
4011-7646	50	6	---	20	8/75	40	.40	---	---	---	497
4012-7645	20	6	---	---	---	220	---	---	---	---	498
4011-7644	20	8	---	25	11/40	200	6.7	---	---	---	499
4011-7643	27	6	---	20	9/48	100	10	---	---	---	500
4011-7644	40	6	85;285	45	1/61	73	.95	---	---	---	501
4011-7643	16	---	---	48	---	---	---	---	---	---	502
4011-7643	39	8	---	15	---	110	---	---	---	---	503
4010-7643	25	---	---	30	---	100	---	---	---	---	504
4010-7643	50	8	---	31	3/50	126	.84	---	---	---	508
4012-7643	50	8	---	---	---	---	---	---	---	---	509
4012-7643	49	6	55;73	45	8/75	30	.86	5	250	---	512
4010-7643	17	6	---	---	---	1	---	7	350	---	521
4011-7642	50	10	54;166;432;	58	2/77	176	1.0	14	550	---	530
4012-7644											

TABLE D-3. ANALYTICAL DATA FOR WELLS AT OLMSTED AFB (WOOD, 1980) (CONTINUED)

Well or spring number	Lithology	Date of sample (yr-mo-day)	Dissolved silica (SiO_2) (mg/l)	Dissolved iron (Fe) (µg/l)	Dissolved manganese (Mn) (µg/l)	Dissolved calcium (Ca) (mg/l)	Dissolved magnesium (Mg) (mg/l)	Dissolved sodium (Na) (mg/l)	Dissolved sodium plus potassium (mg/l)	Dissolved potassium (K) (mg/l)	Bicarbonate (HCO_3) (mg/l)	Dissolved sulfate (SO_4) (mg/l)	Dissolved chloride (Cl) (mg/l)	Dissolved fluoride (F) (mg/l)	Dissolved nitrate (N) (mg/l)	Dissolved nitrite (N) (mg/l)	Dissolved ammonia plus organic nitrogen (N) (mg/l)	Dissolved organic nitrogen (N) (mg/l)	Dissolved orthophosphate phosphorus (P) (mg/l)	Dissolved solids (residue at 180°C) (mg/l)	Dissolved solids (sum of constituents) (mg/l)	Hardness (Ca, Mg) (mg/l)	Noncarbonate hardness (mg/l)	Specific conductance (micromhos)	pH
82 Shss		53-01-16	25	120	—	98	14	11	—	1.4	162	126	10	0	5.0	—	—	—	—	406	387	300	170	604	7.3
		55-06-05	—	40	—	86	9.7	10	—	1.3	192	83	13	.0	5.0	—	—	—	—	410	—	260	97	539	7.6
		54-09-21	25	—	—	91	11	—	6.7	—	159	102	26	0	3.8	—	—	—	—	396	—	270	140	587	8.2
		55-05-19	26	—	—	87	9.9	—	8.9	—	182[a]	86	14	0	5.2	—	—	—	—	367	—	260	110	536	8.4
		56-05-07	28	0	0	92	15	—	7.1	—	195	101	14	.0	6.1	—	—	—	—	195	—	290	130	586	7.7
		57-06-11	30	80	50	69	7.5	—	9.0	—	173	43	8.8	.1	6.3	—	—	—	—	290	—	200	200	429	7.2
		58-07-22	26	80	0	80	7.9	—	8.5	—	185	63	10	.0	5.4	—	—	—	—	333	—	230	81	495	7.3
		59-06-23	12	40	0	75	4.3	—	17	—	190	50	8.8	2	5.6	—	—	—	—	317	—	210	49	463	7.9
		60-06-14	28	60	0	68	6.1	9.7	—	1.2	182	33	9.5	0	6.8	—	—	—	—	278	275	200	46	420	7.4
		61-07-21	30	20	50	84	[illegible]	12	—	1.0	192	72	12	1	6.1	—	—	—	—	359	343	250	93	508	7.3
		62-07-19	28	10	30	62	19	9.4	—	1.0	195	58	11	0	1.4	—	—	—	—	324	291	230	73	502	7.1
		63-08-23	26	60	20	90	10	11	—	2	206	80	14	0	4.5	-	—	-	--	370	337	640	470	552	7.1
		64-08-11	25	80	0	88	12	11	—	.5	205	82	12	.0	5.9	—	—	—	—	377	358	270	100	564	7.1
		65-07-26	25	20	0	104	16	15	—	.2	193	149	19	1	4.5	--	—	—	--	479	443	330	170	679	7.1
		66-06-0	27	100	0	78	8.8	9.6	--	9	194	49	11	0	6.6	—	—	—	—	311	309	230	72	466	7.3
		67-07-12	23	70	0	94	13	14	--	9	200	102	18	0	3.6	—	—	—	—	415	379	290	120	577	7.3
83 Shss		53-01-16	17	130	—	95	26	11	—	1.6	150	198	7.0	0	2.7	—	—	—	—	478	442	340	220	670	7.6
		53-06-05	—	40	—	90	24	11	—	1.6	172	177	9.0	.0	3.6	—	—	—	—	520	—	320	180	654	7.9
		54-09-21	22	40	—	75	23	—	24	—	135	188	12	0	3.2	—	—	—	—	470	—	280	170	668	8.1
		55-05-19	25	—	—	75	20	—	11	—	158	134	10	0	3.2	—	—	—	--	400	—	270	140	565	7.8
		56-05-07	23	20	20	84	25	—	5.1	—	170[a]	156	6.7	.0	3.4	-	—	—	—	413	—	310	170	599	8.3
		57-06-11	28	100	10	56	15	—	10	—	144	80	5.8	.1	3.6	—	—	—	—	296	—	200	83	437	7.2
		58-07-23	24	70	20	69	17	—	4.8	—	154	103	6.2	1	2.9	--	—	—	—	372	—	240	120	497	6.6
		59-06-23	27	40	10	48	13	—	3.2	—	135	47	4.8	.1	3.8	—	—	—	—	259	—	170	63	371	7.6
		60-06-14	26	120	0	44	13	5.8	—	1.1	148[a]	40	5.4	.1	3.2	--	—	—	—	230	223	160	42	350	8.4
		61-07-21	24	50	70	52	14	9.0	—	1.0	143	59	6.4	.0	4.3	-	—	-	—	271	255	190	70	390	7.3
		62-07-19	24	50	0	77	17	8.4	--	1.2	154	101	7.8	.0	2.9	—	—	—	—	362	340	260	110	527	7.5
		63-08-23	23	160	70	80	23	10	—	.2	180	138	8.6	.0	3.8	—	—	—	—	399	389	290	150	584	7.4
		64-08-11	19	170	0	83	18	9.1	—	.2	201	102	10	.1	2.9	-	—	-	—	405	353	280	120	577	7.7
		65-07-27	22	0	0	85	24	13	—	.3	188	154	8.4	.0	3.3		—	—	—	475	413	310	160	616	7.2
		66-08-11	23	40	0	80	19	8.7	—	1.2	203	91	12	0	2.9	-	—	—	—	371	351	280	110	539	7.2
		67-07-12	21	70	0	94	24	15	—	1.3	187	126	13	.0	2.7	-	—	—	—	514	451	330	180	661	7.0
84 Shss		53-01-16	27	120	—	260	37	40	—	2.5	118	671	27	.1	6.1	--	—	—	—	1240	1150	800	710	1500	9
		53-06-05	—	50	—	270	37	47	—	1.9	140	708	36	1	7.0	—	—	—	—	1340	—	830	710	1550	7.9
		54-09-21	27	—	—	254	41	—	61	—	113	730	38	1	7.9	-	—	-	—	1460	—	800	710	1690	8.0
		55-05-19	27	—	—	183	27	-	30	—	118	461	15	.2	3.8	—	—	—	—	857	—	570	470	1110	7.8
		55-05-23	17	—	—	60	12	—	14	—	152[a]	79	11	.0	1.8	-	—	—	—	290	—	200	75	435	8.3
		56-05-10	28	30	20	176	45	—	1.4	—	164	434	16	1	5.0	-	—	—	—	820	—	630	490	1120	8.0
		57-06-18	31	670	90	79	11	—	14	--	166	104	7.7	1	4.5	--	—	-	—	347	—	240	110	510	7.3
		58-07-25	29	260	30	154	18	—	27	—	166	137	8.8	.3	4.5	-	—	—	—	676	—	460	320	901	7.6
		59-06-22	30	60	10	104	11	—	14	—	171	157	9.0	0	5.0	—	—	—	—	453	—	310	160	637	7.5
		60-06-13	28	60	10	133	13	18	—	1.7	170	234	11	1	5.4	--	—	—	—	563	547	390	250	764	7.7
		61-07-19	28	30	50	71	11	13	—	1.0	170	71	11	1	5.6	—	—	--	—	325	315	220	83	475	7.3

APPENDIX D-3

ANALYTICAL DATA FOR WELLS AT

OLMSTED AFB

TABLE D-3. ANALYTICAL DATA FOR WELLS AT OLMSTED AFB (WOOD, 1980)

Well or spring number	Lithology	Date of sample (yr-mo-day)	Dissolved silica (SiO_2) (mg/l)	Dissolved iron (Fe) (µg/l)	Dissolved manganese (Mn) (µg/l)	Dissolved calcium (Ca) (mg/l)	Dissolved magnesium (Mg) (mg/l)	Dissolved sodium (Na) (mg/l)	Dissolved sodium plus potassium (mg/l)	Dissolved potassium (K) (mg/l)	Bicarbonate (HCO_3) (mg/l)	Dissolved sulfate (SO_4) (mg/l)	Dissolved chloride (Cl) (mg/l)	Dissolved fluoride (F) (mg/l)	Dissolved nitrate (N) (mg/l)	Dissolved nitrite (N) (mg/l)	Dissolved ammonia nitrogen (N) (mg/l)	Dissolved organic nitrogen (N) (mg/l)	Dissolved orthophosphorus (P) (mg/l)	Dissolved solids (residue at 180°C) (mg/l)	Dissolved solids (sum of constituents) (mg/l)	Hardness (Ca, Mg) (mg/l)	Noncarbonate hardness (mg/l)	Specific conductance (micromhos)	pH
Da	79 Sa	59 06 25	22	50	20	46	4.4	--	7.4	--	100	26	2.6	1	1.2				—	182	-	130	26	289	7.5
		60 06 21	21	50	0	45	1.2	6.0		1.6	118	22	4.2	1	5.0		-	-	—	183	183	130	29	280	8.2
		61 07 19	200	50	50	46	3.4	6.8		1.2	135	21	5.8	1	4.3		—	-	—	201	190	130	35	277	7.0
		62 07 12	24	60	30	46	8.0	6.1		1.2	127	41	4.1	0	1.1		—	—	—	207	198	150	44	324	6.9
		63 08 22	19	40	0	46	2.9	5.3		1.0	118	21	5.6	0	4.5		—	—	—	182	179	130	33	286	7.0
		64 08 11	17	240	0	48	2.4	5.9		.8	117	23	7.2	0	5.2		-	-	—	196	185	130	34	306	6.9
		65-08-03	19	0	0	48	4.9	7.0	--	.2	118	26	8.2	.0	5.4		-	-	—	208	195	130	43	314	7.1
		66-08-12	22	100	0	52	6.5	6.4		1.2	130	32	9.6	.1	5.6		-	-	—	197	219	160	90	333	7.5
		67-07-13	17	60	0	54	3.8	6.5	--	1.0	122	28	12	.0	3.8		-	-	—	225	199	150	50	317	6.9
	80 Shs	53 01 16	25	140	—	104	20	13	--	1.4	166	176	11	.0	3.2		-	-	—	476	446	340	210	688	7.7
		53 06-05		10	—	103	18	14		1.5	188	165	16	.0	3.6		-	-	—	510	--	330	180	669	7.8
		54 09 21	25		—	105	22		6.5	--	152	198	14	.0	4.5		-	-	—	537	-	350	230	769	7.8
		55 05 19	23		—	83	19		26		181	155	14	.0	3.6		-	-	—	448	--	290	140	645	7.8
		56-05-07	26	90	20	85	32	--	6.4	--	188	162	14	0	4.3		--	--	—	450	--	340	190	675	7.9
		57 06 11	31	70	100	85	16	--	14	--	177	125	12	.1	4.3		-	-	—	398	-	280	130	578	7.0
		58 07 23	29	80	0	82	18	--	15	--	188	120	12	.0	4.1		-	--	—	394	--	280	130	577	7.2
		60 06 13	31	120	20	88	42	12		1.9	197	100	13	.0	5.6		-	-	—	422	380	290	130	560	7.9
		61 07 20	28	60	50	78	14	12		1.0	186	81	13	.0	5.0		-	--	—	359	341	250	100	515	7.1
		62 07 18	24	20	20	92	24	12		1.2	199	149	12	0	1.5		-	—	--	454	419	330	170	644	7.0
		63 08 27	26	120	0	98	17	12		.8	204	140	14	.0	3.4		-	—	—	437	423	320	150	640	7.0
		64 08 12	24	70	0	128	20	16		.5	189	213	17	.0	3.2		-	—	—	604	526	400	250	807	6.9
		65-07-26	25	20	0	124	28	17		.6	195	259	20	.2	3.2		-	—	—	653	584	430	270	856	6.8
	81 Shs	53 01 16	24	130	—	76	18	7.0	—	1.3	165	90	8.0	0	4.3		-		—	337	325	260	130	532	7.9
		53 06 05		80	—	75	16	10		1.5	188	89	10	2	4.3		-		—	410		250	99	526	7.9
		54 09 21	24		—	81	20		8.0		160	122	15	0	1.8				—	419	--	290	150	618	8.0
		55 05 19	25			83	21		18		188[a]	135	16	.0	4.1				—	418	--	290	140	611	8.4
		56 05 07	26	30	20	75	21		25		189	88	11	.0	4.7				—	358	341	270	120	529	8.2
		57 06 11	30	90	10	91	15	-	9.9	-	180	80	9.8	1	4.1				—	344	--	240	91	495	7.3
		58 07 22	26	30	0	86	17	--	7.6	--	182	95	9.0	0	4.3				—	349	--	260	110	520	7.6
		59 06 21	28	60	0	65	14		10	-	178	67	7.9	2	4.1				—	338		220	74	462	7.3
		60 06 15	27	70	0	69	15	9.7	--	1.6	182	74	10	.0	5.0				—	319	318	230	85	482	7.6
		62 07 18	27	50	0	90	19	10		1.2	192	122	11	.0	4.1				—	436	396	300	140	593	7.4
		63 08 23	27	20	40	86	19	10		.5	216[a]	108	11	0	3.8				—	407	371	290	120	593	8.5
		64 08 13	24	80	0	88	20	9.6		1.0	210	113	10	.0	1.4				-	423	384	300	130	616	7.0
		65 07 26	25	0	0	91	21	12		1.3	217	130	12	.0	4.1				—	482	416	310	140	638	7.1
		66 08 10	24	110	0	102	22	12		1.2	226	141	17	0	2.9				—	494	445	350	160	666	7.2
		67 07 13	23	70	0	86	17	13		1.0	210	101	18	0	1.4				-	420	380	290	110	585	7.0

TABLE D-3. ANALYTICAL DATA FOR WELLS AT OLMSTED AFB (WOOD, 1980) (CONTINUED)

Well or spring number	Lithology	Date of sample (yr-mo-day)	Dissolved silica (SiO_2) (mg/l)	Dissolved iron (Fe) (µg/l)	Dissolved manganese (Mn) (µg/l)	Dissolved calcium (Ca) (mg/l)	Dissolved magnesium (Mg) (mg/l)	Dissolved sodium (Na) (mg/l)	Dissolved sodium plus potassium (mg/l)	Dissolved potassium (K) (mg/l)	Bicarbonate (HCO_3) (mg/l)	Dissolved sulfate (SO_4) (mg/l)	Dissolved chloride (Cl) (mg/l)	Dissolved fluoride (F) (mg/l)	Dissolved nitrate (N) (mg/l)	Dissolved nitrite (N) (mg/l)	Dissolved ammonia nitrogen (N) (mg/l)	Dissolved organic nitrogen (N) (mg/l)	Dissolved orthophosphorus (P) (mg/l)	Dissolved solids (residue at 180° C) (mg/l)	Dissolved solids (sum of constituents) (mg/l)	Hardness (Ca, Mg) (mg/l)	Noncarbonate hardness (mg/l)	Specific conductance (micromhos)	pH
Da-	84 Shss	62-07-18	24	20	20	204	68	41	—	1.6	149	632	28	.0	3.2	—	—	—	—	1270	1090	790	670	1470	7.3
		63-08-23	28	0	50	262	32	39	—	.8	158	640	24	.2	7.7	—	—	—	—	1220	1140	790	660	1460	7.3
		64-08-13	26	210	0	268	42	44	—	.8	149	686	28	.1	7.9	—	—	—	—	1320	1200	840	720	1530	7.5
		65-07-29	28	20	0	292	38	50	—	.2	143	810	36	.2	8.8	—	—	—	—	1450	1360	890	770	1650	7.5
		66-08-17	23	80	0	175	20	26	—	1.2	171	378	12	.1	1.4	—	—	—	—	788	726	520	380	976	7.6
		67-07-12	22	90	0	162	17	28	—	1.2	179	347	15	.0	3.2	—	—	—	—	758	695	480	330	936	7.4
	85 Shss	53-01-16	18	—	—	71	24	15	—	1.3	145	147	7.0	0	3.2	—	—	—	—	384	369	280	160	577	7.7
		53-06-05	—	80	—	68	22	16	—	1.5	172	129	8.5	0	3.2	—	—	—	—	450	—	260	120	560	7.9
		54-01-12	14	—	—	60	13	—	5.7	—	122	72	9.0	.2	7.7	—	—	—	—	270	—	200	100	418	7.9
		54-09-21	19	—	—	56	13	—	6.2	—	122	79	11	0	2.5	—	—	—	—	298	—	190	93	449	8.1
		55-05-23	17	—	—	60	12	—	14	—	152[a]	79	11	0	1.7	—	—	—	—	290	—	200	75	435	[illegible]
		56-05-09	21	0	20	61	14	—	4.7	—	148	73	9.0	1	2.7	—	—	—	—	278	—	210	89	430	7.9
		57-06-12	18	80	0	71	4.0	—	25	—	148	101	8.4	.1	2.5	—	—	—	—	314	—	190	72	475	7.7
		58-07-25	15	220	0	118	17	—	16	—	145	274	10	.1	1.5	—	—	—	—	554	—	370	270	720	7.2
		59-06-23	14	50	20	212	27	—	27	—	106	567	12	2	.86	—	—	—	—	960	—	640	550	1180	7.1
		60-06-16	17	110	0	177	26	18	—	8.8	130	466	13	.1	1.2	—	—	—	—	809	795	550	440	1040	8.2
		61-07-25	15	130	50	228	25	18	—	9.4	118	573	14	.0	1.3	—	—	—	—	1020	946	680	480	1210	6.8
		62-07-19	13	30	10	320	32	24	—	26	86	890	12	1	.16	—	—	—	—	1440	1360	930	860	1620	7.0
		63-08-23	16	110	0	276	27	22	—	22	124	702	14	.1	1.2	—	—	—	—	1340	1150	800	700	1470	7.0
		64-08-18	13	80	0	128	20	16	—	8.5	152	267	16	1	2.3	—	—	—	—	615	554	400	280	834	6.9
		65-07-30	14	20	0	256	31	17	—	14	128	688	16	2	.86	—	—	—	—	1190	1100	770	660	1410	6.9
		66-08-12	20	270	0	220	27	18	—	14	147	516	17	.2	1.7	—	—	—	—	968	912	660	540	1150	7.0
		67-07-16	13	130	0	102	15	15	—	5.9	158	179	18	0	3.9	—	—	—	—	476	439	320	190	660	6.8
	86 Shss	53-01-16	21	—	—	87	17	10	—	1.5	198	91	9.0	0	3.4	—	—	—	—	370	351	290	130	580	7.3
		53-06-05	—	280	—	90	16	11	—	1.6	236	92	12	.0	3.2	—	—	—	—	407	—	290	97	586	8.0
		54-09-21	22	—	—	79	15	—	20	—	239	77	10	.0	2.9	—	—	—	—	380	—	260	61	574	8.2
	87 Shss	53-01-16	20	—	—	66	11	7.9	—	1.4	169	46	9.0	0	1.4	—	—	—	—	270	251	210	78	433	7.5
		53-06-05	—	590	—	66	10	10	—	1.6	196	50	10	0	2.2	—	—	—	—	350	—	210	45	431	7.6
		54-09-21	21	—	—	57	12	—	3.2	—	164	42	11	0	1.4	—	—	—	—	301	—	190	57	429	7.9
		55-05-23	22	—	—	62	15	—	7.9	—	192	52	12	.2	1.1	—	—	—	—	292	—	220	59	450	8.0
		56-08-11	18	2400	320	62	14	—	8.3	—	164	75	7.3	1	2.1	—	—	—	—	297	—	210	78	431	8.1
		57-06-20	23	5900	1200	58	11	—	9.7	—	180	45	5.6	1	2.0	—	—	—	—	266	—	190	42	403	7.8
		58-07-24	21	1600	90	53	12	—	7.8	—	172	41	5.5	1	1.8	—	—	—	—	268	—	180	41	390	7.8
	88 Shss	53-12-29	16	—	—	129	29	—	2.6	—	264	207	9.5	1	.16	—	—	—	—	560	—	440	230	822	7.1
		54-02-26	20	—	—	73	20		3.0	—	150	109	6.5	2	6.1	—	—	—	—	356	—	270	140	523	7.9
		55-05-23	17	—	—	77	20	—	6.4	—	172	122	11	0	1.3				—	350	—	280	110	553	8.2
		56-05-09	17	60	30	81	18	—	12	—	204	115	7.0	0	1.7				—	368	—	290	110	556	8.0
		57-06-12	22	150	70	98	22	—	15	—	210	172	7.5	1	1.7				—	462	—	340	160	652	7.1
		58-07-22	20	80	30	154	31	—	23	—	218	345	9.5	1	2.5				—	727	—	510	330	980	8.0
		59-06-23	20	90	20	188	34	—	28		180	485	9.2	2	1.1	—	—	—	—	905	—	610	460	1160	7.0
		60-06-16	19	60	0	204	34	19		18	190	514	12	1	1.6	—	—	—	—	951	921	650	490	1200	8.2
		61-07-25	23	50	40	86	23	13		6.0	200	153	9.8	1	1.3	—	—	—	—	462	418	310	150	623	7.6
		62-07-17	18	30	10	192	33	17	—	18	190	478	12	0	.23		—	—	—	921	861	620	460	1160	7.2
		63-08-27	17	120	0	186	33	19	—	20	170	460	11	1	1.9				—	890	838	600	460	1140	7.4
		64-08-18	17	0	0	96	27	14	—	6.4	210	170	11	0	2.7				—	470	457	350	180	691	7.3

TABLE D-3. ANALYTICAL DATA FOR WELLS AT OLMSTED AFB (WOOD, 1980) (CONTINUED)

Well or spring number	Lithology	Date of sample (yr mo-day)	Dissolved silica (SiO_2) (mg/l)	Dissolved iron (Fe) (µg/l)	Dissolved manganese (Mn) (µg/l)	Dissolved calcium (Ca) (mg/l)	Dissolved magnesium (Mg) (mg/l)	Dissolved sodium (Na) (mg/l)	Dissolved potassium (K) (mg/l)	Bicarbonate (HCO_3) (mg/l)	Dissolved sulfate (SO_4) (mg/l)	Dissolved chloride (Cl) (mg/l)	Dissolved fluoride (F) (mg/l)	Dissolved nitrate (N) (mg/l)	Dissolved arsenic (As) (µg/l)	Dissolved ammonia nitrogen (N) (mg/l)	Dissolved organic nitrogen (N) (mg/l)	Dissolved orthophosphorus (P) (mg/l)	Dissolved solids (residue at 180° C) (mg/l)	Dissolved solids (sum of constituents) (mg/l)	Hardness (Ca, Mg) (mg/l)	Noncarbonate hardness (mg/l)	Specific conductance (micromhos)	pH
Da-	88 Shss	65-07-30	17	0	60	209	33	14	-	34	372	508	14	1	1.4	—	—	—	—	951	891	640	490	1260	8.1
		66-06-16	21	60	0	98	27	14	--	7.0	134	194	11	0	1.5	—	-	—	—	497	474	360	205	689	7.5
		67-07-16	16	70	—	98	24	15	-	5.3	205	171	14	0	2.7	--	—	—	—	505	457	340	180	676	7.4
	89 Shss	53-09-21	17	—	—	53	11	—	12	—	196	41	9.0	0	32	—	-	—	—	290	—	190	30	475	7.3
		53-09-23	20	—	—	51	11	—	5.5	—	179	30	10	.0	5*	—	—	—	—	255	—	190	46	435	7.9
		56-05-11	25	200	630	45	9.9	—	4.6	—	146	26	7.0	0	4.5	—	—	—	—	286	—	150	33	317	7.9
		57-06-20	28	—	--	54	8.5	—	1.8	—	163	24	11	.1	3.1	—	—	—	—	237	—	170	36	370	6.9
		58-07-24	25	230	20	53	11	—	5.3	—	170	22	11	.1	2.9	—	—	—	—	240	—	180	38	378	7.5
	90 Shss	55-04-15	15	--	—	31	15	—	23	—	100	69	14	.2	29	—	—	—	—	214	—	120	41	322	8.2
		57-06-13	24	120	50	71	14	—	10	—	189	75	9.8	.1	2.5	—	—	—	—	320	—	240	80	477	7.2
		58-07-22	21	70	0	86	21	—	7.6	—	181	135	12	.0	3.2	—	—	—	—	468	—	300	150	595	7.6
		59-06-22	24	60	10	116	28	—	13	—	204	236	11	.0	1.4	—	—	—	—	568	—	410	240	787	7.1
		60-06-17	23	30	0	118	23	13	—	1.6	189	231	14	.0	2.2	—	—	—	—	531	526	390	230	784	8.0
		61-07-24	23	60	50	147	31	16	—	2.0	208	321	14	.0	2.3	—	—	—	—	711	667	500	320	922	7.3
		62-07-18	21	30	0	152	34	19	—	2.2	218	328	14	.0	1.2	—	—	—	—	732	683	520	340	934	7.4
		63-08-27	21	140	0	158	36	18	—	2.2	222	358	12	.1	1.4	—	—	—	—	775	721	540	360	1010	7.1
		64-08-17	18	410	0	112	29	14	—	1.5	260	166	18	.0	2.0	—	—	—	—	523	496	400	190	765	7.1
		65-07-28	21	70	—	188	39	14	—	3.0	214	450	19	.0	1.6	—	—	—	—	893	847	630	460	1150	7.7
		66-08-17	21	70	0	155	32	16	—	2.8	225	312	20	.1	1.7	—	—	—	—	742	677	520	330	928	7.3
		67-07-14	18	980	0	110	22	16	—	1.8	275	122	28	.0	1.5	—	—	—	—	515	461	370	140	713	7.1
	91 Shss	55-04-15	14	—	—	67	14	—	14	—	169	87	12	.0	2.5	—	—	—	—	309	—	230	86	465	7.8
		57-06-13	20	310	10	71	11	—	13	—	158	95	9.2	.0	2.5	—	—	—	—	318	—	220	93	476	6.8
		58-07-23	16	60	0	66	13	—	10	—	126	111	12	.0	1.3	—	—	—	—	317	—	220	120	463	7.7
		59-06-22	18	40	0	98	15	—	15	—	133	199	13	.0	1.2	—	—	—	—	454	—	310	200	642	6.8
		60-07-06	16	470	0	114	18	14	—	3.6	118	261	14	.1	1.1	—	—	—	—	524	504	360	260	729	7.2
		61-07-18	17	60	70	122	20	14	—	4.5	152	255	15	.0	1.6	—	—	—	—	582	530	390	260	762	7.3
		62-07-23	18	190	10	156	26	16	—	9.5	173	364	13	.0	.34	--	—	—	—	742	689	500	360	957	7.2
		63-08-22	16	310	40	172	25	17	—	7.0	186	358	15	.1	1.8	—	—	—	—	769	710	530	380	1020	7.1
		64-08-18	15	70	0	96	15	14	—	2.4	198	127	22	.0	1.6	—	—	—	—	433	396	300	140	641	7.0
		65-07-28	18	20	20	148	32	19	—	7.0	205	335	16	.1	1.5	—	—	—	—	744	683	500	330	977	7.1
		66-08-16	18	90	0	135	22	15	—	6.0	216	244	16	.1	2.0	—	—	—	—	606	571	430	250	810	7.3
		67-07-18	16	70	0	94	15	15	—	2.0	214	101	22	.0	2.7	—	—	—	—	414	382	300	120	603	6.9
	92 Shss	55-06-06	20	—	—	43	14	—	35	—	221	42	10	.3	45	—	—	—	—	285	—	170	0	452	7.8
		56-02-08	15	--	—	200	16	—	22	—	84	529	4.5	.2	2.1	—	—	—	—	926	—	570	900	1110	7.1
		57-06-13	26	1200	490	40	9.0	—	5.8	—	118	31	4.6	.1	1.8	—	—	—	—	200	—	140	40	295	6.3
		58-07-28	26	1400	0	44	11	—	9.7	—	128	46	4.8	.0	4.5	—	—	—	—	224	—	160	50	338	7.4
	93 Shss	55-06-06	12	—	—	51	15	—	13	—	194	45	7.5	.1	11	—	—	—	—	257	—	190	30	395	8.1
		57-06-18	24	380	20	101	15	—	9.7	—	196	156	5.8	.1	79	--	—	—	—	425	—	310	150	604	7.8
		58-07-25	22	160	110	162	27	—	31	—	201	396	6.5	.1	23	—	—	—	—	792	—	520	350	1000	8.0
		59-06-22	22	40	60	107	17	—	18	—	204	189	5.7	.2	1.2	--	--	—	—	483	—	340	170	680	7.6
		60-06-17	21	50	20	122	17	20	--	4.5	167	265	8.5	0	29	--	—	—	—	548	544	380	240	811	8.0
		61-07-18	22	110	40	141	19	21	--	7.2	206	375	10	.0	1.1	—	—	—	—	632	602	410	260	844	7.4
		63-08-22	12	110	0	128	24	19	--	8.4	204	274	9.8	.1	.91	—	—	—	—	630	600	420	250	869	7.2
		64-08-18	17	140	100	132	22	19	--	6.0	223	255	11	0	1.1	—	—	—	—	598	577	420	240	832	7.2
		65-07-30	18	20	80	124	24	19	-	7.0	205	269	11	0	86	—	—	—	—	611	577	410	240	833	7.1
		66-08-11	20	90	400	135	21	17	-	7.6	221	256	13	.1	84	—	-	—	—	599	584	420	240	803	7.4
		67-07-14	17	130	0	126	20	20	-	5.6	212	[illegible]	[illegible]	0	1.2	—	—	—	—	608	556	400	210	790	[illegible]

TABLE D-3. ANALYTICAL DATA FOR WELLS AT OLMSTED AFB (WOOD, 1980) (CONTINUED)

Well or spring number	Lithology	Date of sample (yr-mo-day)	Dissolved silica (SiO_2) (mg/l)	Dissolved iron (Fe) (µg/l)	Dissolved manganese (Mn) (µg/l)	Dissolved calcium (Ca) (mg/l)	Dissolved magnesium (Mg) (mg/l)	Dissolved sodium (Na) (mg/l)	Dissolved sodium plus potassium (mg/l)	Dissolved potassium (K) (mg/l)	Bicarbonate (HCO_3) (mg/l)	Dissolved sulfate (SO_4) (mg/l)	Dissolved chloride (Cl) (mg/l)	Dissolved fluoride (F) (mg/l)	Dissolved nitrate (N) (mg/l)	Dissolved nitrite (N) (mg/l)	Dissolved ammonia nitrogen (N) (mg/l)	Dissolved organic nitrogen (N) (mg/l)	Dissolved orthophosphorus (P) (mg/l)	Dissolved solids (residue at 180° C) (mg/l)	Dissolved solids (sum of constituents) (mg/l)	Hardness (Ca, Mg) (mg/l)	Noncarbonate hardness (mg/l)	Specific conductance (micromhos)	pH
386	Shss	58-07-28	27	360	0	47	9.7	—	9.4	—	200	4.6	2.5	0	1.5	—	—	—	—	203	—	160	0	334	7.6
		59-06-24	26	40	30	44	12	—	12	—	186	17	4.4	.1	2.5	—	—	—	—	220	—	160	7	346	7.3
		60-06-21	26	80	0	47	12	9.2	—	1.0	194[a]	19	4.6	0	2.9		—	—	—	220	226	170	7	353	8.5
		61-07-18	25	110	120	50	13	9.9	—	8	183	22	5.1	0	2.9		—	—	—	235	230	170	17	370	7.7
		62-07-17	22	280	20	52	11	8.3	—	.9	188	26	6.2	0	.81		—	—	—	238	223	180	21	365	7.6
		63-08-22	21	0	20	53	11	9.8	—	2	184	27	9.6	0	2.9		—	—	—	238	235	180	27	373	7.5
		64-08-11	21	180	0	50	14	9.0	-	2	190	25	7.0	0	2.3		—	—	—	239	230	180	24	383	7.4
		65-08-03	21	210	0	50	14	9.8	—	3	184	30	7.7	.2	2.5		—	—	—	256	235	180	32	395	7.5
		66-08-12	21	50	0	55	12	9.4	—	8	187	31	10	.0	2.3		—	—	—	248	242	190	33	385	7.7

APPENDIX D-4

ANALYTICAL DATA FOR WELLS

IN DIABASE

TABLE D-4. ANALYTICAL DATA FOR WELLS IN DIABASE (WOOD, 1980)

Well or spring number	Date of sample (yr-mo-day)	Dissolved silica (SiO_2) (mg/l)	Dissolved iron (Fe) (µg/l)	Dissolved manganese (Mn) (µg/l)	Dissolved calcium (Ca) (mg/l)	Dissolved magnesium (Mg) (mg/l)	Dissolved sodium (Na) (mg/l)	Dissolved potassium (K) (mg/l)	Bicarbonate (HCO_3) (mg/l)	Dissolved sulfate (SO_4) (mg/l)	Dissolved chloride (Cl) (mg/l)	Dissolved fluoride (F) (mg/l)	Dissolved nitrate (N) (mg/l)	Dissolved nitrite (N) (mg/l)	Dissolved ammonia nitrogen (N) (mg/l)	Dissolved organic nitrogen (N) (mg/l)	Dissolved orthophosphorus (P) (mg/l)	Dissolved solids (residue at 180°C) (mg/l)	Dissolved solids (sum of constituents) (mg/l)	Hardness (Ca, Mg (mg/l)	Noncarbonate hardness (mg/l)	Specific conductance (micromhos)	pH
Ad- 290	25-10-29	36	170	–	53	27	1.7[a]	–	155	59	13	–	11	–	–	–	–	333	–	240	120	–	–
377	76-11-17	51	90	20	30	18	4.5	0.4	128	44	4.4	0.1	1.1	0.01	0.01	0.02	0.01	215	221	150	44	300	6.4
Be 1212	76 05 1.	25	30	0	19	7.5	4.9	.1	56	36	4.1	.1	.16	.01	.02	.00	.01	132	129	78	33	–	6.2
Cle- 2321	75 05 01	19	110	30	60	7.0	2.8	1	145	17	3.6	.0	.18	.00	.03	.00	.00	102	84	54	17	130	6.0
Da 101	63 01-11	–	–	–	38	18	–	–	150	38	–	–	–	–	–	–	–	288	+	170	46	361	7.3
* 193	65-09-29	43	140	0	30	13	51	.3	99	45	6.5	.0	1.9	–	–	–	–	225	246	130	47	283	6.8
	66 08 12	40	170	0	34	15	4.8	6	101	52	6.7	.1	2.5	–	–	–	–	227	214	150	64	300	7 0
	67-07-13	36	260	0	37	16	5.8	.4	106	61	7.0	.0	3.2	–	–	–	–	268	230	160	71	330	6.8
525	76 05-13	38	10	0	44	23	5 6	.5	153	42	26	.0	4.6	.01	.01	.00	.02	298	276	200	79	--	6.5
I n 1324	26 05 12	45	110	10	22	10	2.9	.1	86	30	2.3	.0	.24	.01	.01	.04	.01	162	156	96	26	–	6 1
Lb- 206	59 10-13	42	410	30	33	9.9	9.2	.7	101	35	7.2	.1	2.7	–	–	–	–	205	199	120	40	275	6.7
1230	59-10-12	36	60	0	71	28	14	8	95	64	39	.1	33	–	–	–	–	423	446	290	220	676	6.5
Yo Sp 14	27-11 02	25	40	–	29	19	9.1	1.6	132	46	7.0	–	1.4	–	–	–	–	222	206	150	42	–	–
Yo 207	61 02 23	9.8	210	150	49	21	19	18	82	73	29	.0	27	–	–	–	–	–	380	210	140	594	6.4
550	68-03 29	36	20	0	40	18	33	4 3	170	62	25	3	2 0	–	–	–	.03	319	303	170	35	480	8.1
552	68 04 05	37	1900	70	37	22	7.9	1.1	186	28	14	.0	.02	–	–	–	.03	239	246	180	30	373	8.1
553	68 04 05	44	0	0	30	17	6.3	.9	142	27	7.5	0	14	–	–	–	.00	210	203	150	28	295	7,9
554	68 04 05	21	190	10	46	13	6.7	1 8	161	42	3.0	.1	.68	–	–	–	.03	231	217	170	36	341	7 9
555	68 04 05	7.9	1400	90	36	24	8.6	5 4	190	23	20	.0	.36	–	–	–	.00	230	222	190	33	407	8.1
556	68 04 05	22	180	60	82	25	13	15	322	60	22	.0	.61	–	–	–	.00	404	404	310	44	640	8.1
735	68 04 25	37	0	10	40	9.8	5.5	2.3	125	33	4.8	.0	2 5	–	–	–	.00	220	205	140	38	305	7.6
737	68 04-25	22	20	10	19	8.5	8 0	.5	58	37	5.5	0	2.3	–	–	–	.00	159	139	82	35	214	7.2
738	68 04-25	23	0	10	48	17	7.0	5.2	136	60	9.0	.0	5.0	–	–	–	.03	282	258	190	78	411	7.7
740	68 04 25	45	110	20	38	18	15	4 0	89	48	26	.4	11	–	–	–	.03	313	289	170	96	430	7.3
742	68 04-25	39	0	0	40	20	8.0	3.5	110	57	14	.0	8 4	–	–	–	.00	298	273	180	92	407	7.4
817	25 11-02	24	200	–	5.5	4.3	6.8	1 3	49	4.6	5.0	.	.34	.	–	–	–	83	78	31	0	–	–
834	68 07-02	–	–	–	344	–	18	8	72	–	1180	–	–		–	–	–	–	–	–	–	3680	8.0
	69-03-24	13	150	10	365	210	50	1 3	62	19	1260	.0	2 3		.	.	–	2130	1960	1800	1700	4080	6.9
835	69-11-11	49	.	-	105	55	9.1	.8	56	20	315	0	4 5		–	–	–	746	601	490	440	1200	7.8
1015	76-11-16	49	50	0	25	14	7 1	7	116	31	3 6	.1	2 1	.00	01	0 4	.01	190	197	120	25	260	6.2

[a] Sodium plus potassium as sodium.

*Londonderry Township Well at Sunset Golf Course.

APPENDIX D-5

WELL LOCATION MAP AND SUMMARY TABLES OF PA DER

WELL SAMPLING ANALYSIS RESULTS -

SUNSET GOLF COURSE AREA

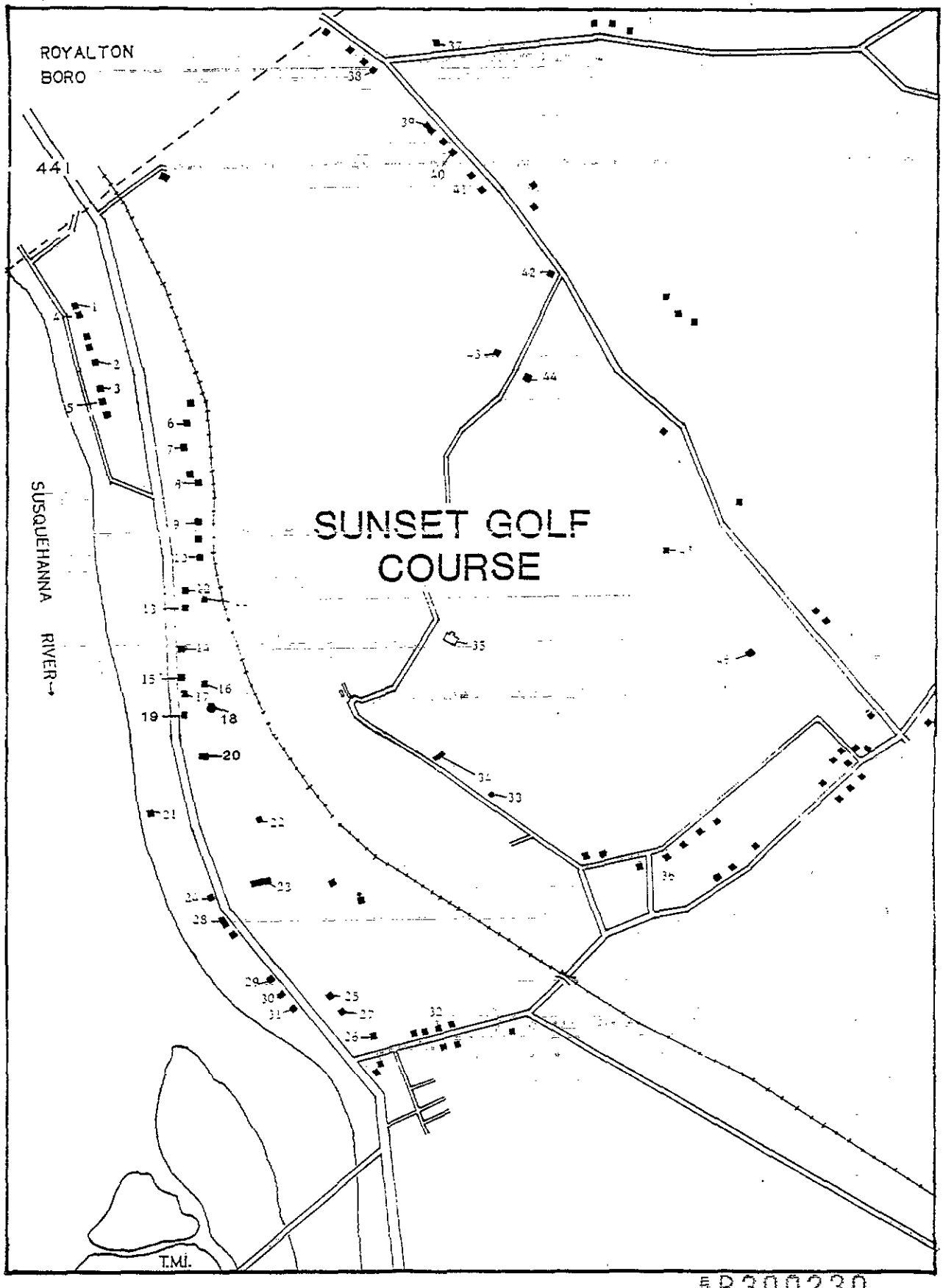

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Figure D-5. Locations of Wells at Sunset Golf Course

TABLE D-5 A

WELL INVENTORY SUNSET GOLF COURSE (PA DER, 1983)

Well Number	Owner	Address (Middletown, PA 17057)
1	Dave Grazbill	1742 Water Street
2	William Linnane	1818 Water Street
3	Warren Peiffer	1830 Water Street
4	Romayne Stephens	1736 Water Street
5	Earl Kreisen	1842 Water Street
6	John Peyser	1836 River Road
7	Robert Deimler	1846 River Road
8	Manz Shope	1872 River Road
9	George Rudz	1912 River Road
10	Stewart Deimler	1936 River Road
11	Art Genzelz	1954 River Road
12	Robert Yost	1960 River Road
13	Judd Blankenship	1978 River Road
14	Alec Matincheck	2040 River Road
15	Wanda Hipple	2042 River Road
16	Romayne Kohn	2078 River Road
17	Dennis Stum	2136 River Road
18	Walter Deimler	2126 River Road
19	Debbie Arehart	2118 River Road
20	Richard Costic	2112 River Road
21	Tri-Countz Boat Club	2100 Block River Road
22	Louise Hartlesill	2306 River Road
23	Central Penn Air Service	2300 Block River Road
24	Barbara Averz	2372 River Road
25	Sam McLenegan	2478 River Road
26	Bucklock General Stone	2365 Geyer Church Road
27	Louise Hartlesill	River Road
28	R.G. Baumbach	2305 River Road
29	Carl Krodel	2441 River Road
30	Julie Edelman	2459 River Road
31	Joe Roberts	2483 River Road
32	Robert Kerns	2329 Geyer Church Road

TABLE D-5A

WELL INVENTORY SUNSET GOLF COURSE PA DER (CONTINUED)

Well Number	Owner	Address (Middletown, PA 17057)
33	Ball Park Well*	Sunset Drive
34	Maintenance Shed*	Sunset Drive
35	Pro-Shop Restaurant*	Sunset Drive
36	Bruce Roe	1960 Light Avenue
37	Ted Kihn	1218 Foxanna Road
38	Marlin Hahn	1059 Hillsdale Road
39	Kenneth Reigle	1123 Hillsdale Road
40	John Dnistranskz	1147 Hillsdale Road
41	Jane Spitten	1171 Hillsdale Road
42	Henry Frank	1253 Hillsdale Road
43	Paul Ruhten	1265 Hillsdale Road
44	Anna Maye Strayen	1277 Hillsdale Road
45	Dale Weaver	1448 Hillsdale Road
46	Forrest Valentine Jr.	1441 Hillsdale Road

* Well located on golf course property

TABLE D-5B

WATER QUALITY ANALYSIS OF WELLS AT SUNSET GOLF COURSE (PA DER, 1983)

Well Number	Concentration (mg/l) 1,1,1-TCE	TCE	PCE	Chloroethane	1,1-Dichlorothene	1,2-Dichloroethane	Chlorobenzene	Dichloromethane
1	2	0	0					
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					
7	0	0	0					
8	0	0	0					
9	0	7	0			9.3		
10	0	8	0					
11	0	5.2	0			13		
12	0	73	0	22	4	480	17	2
13	0	36	0	3		440 (est)		
14	0	52	0	5	1	550		
15	0	26	0	3		420 (est)		
16	0	25	0					
17	0	43	0	3	1	410		
18	0	100	0	21	3	630	12	
19	0	38	0	4.4		430 (est)		
20	0	36	0			38		
21	0	0	0					
22	0	0	0					
23	0	0	0					

TABLE D-5B

WATER QUALITY ANALYSIS OF WELLS AT SUNSET GOLF COURSE (PA DER, 1983) (CONTINUED)

Well Number	Concentration (mg/l) 1,1,1-TCE	TCE	PCE	Chloroethane	1,1-Dichlorothene	1,2-Dichloroethane	Chlorobenzene	Dichloromethane
24	0	0	0					
25	0	0	0					
26	0	0	0					
27	0	0	0					
28	0	0	<1(?)					
29	0	0	0					
30	0	0	0					
31	0	0	0					
32	0	0	0					
33	0	0	0					
34	2.6	0	0					
35	0	0	0					
36	0	0	0					
37	0	0	0					
38	0	0	0					
39	0	0	0					
40	0	0	0					
41	0	0	0					
42	0	0	0					
43	0	2	0					
44	0	2.6	0					
45	0	0	0					
46	0	0	0					

APPENDIX E

MASTER LIST OF CURRENT INDUSTRIAL SHOPS

TABLE E-1

MASTER LIST OF INDUSTRIAL SHOPS

Building #	Present Day Use
26	HQ-Air National Guard
28	Stambaugh & Minnit Man
30	Garage
31	G.S.A.
32	T.C.C.
33	Storage Garage-Librandi Machine Shop
36	Auto Maintenance Shop
94	Sewage Treatment & Disposal Plant
108	International Re-Fueling Co.
125	York Piece & Dye
126	Penn.-DOT Maintenance Shop
133	Penn. Commuters
134	Air National Guard
136	Stambaugh's Olivetti Corp. of America
142	Piece & Dye
148	Heartz & Avis Wash-A-Car
217	HIA Main Terminal & Finger
244	Storage-Piece & Dye
256	Stambaugh Air Service
258	Wert Bookbinding
267	Industrial Waste & Disposal Plant
327	A.N.G. Maintenance Shop
414	Industrial Waste & Treatment Plant
678	Fruehauf Truck Manufacturing Co.
679	Fruehauf Truck Manufacturing Co.

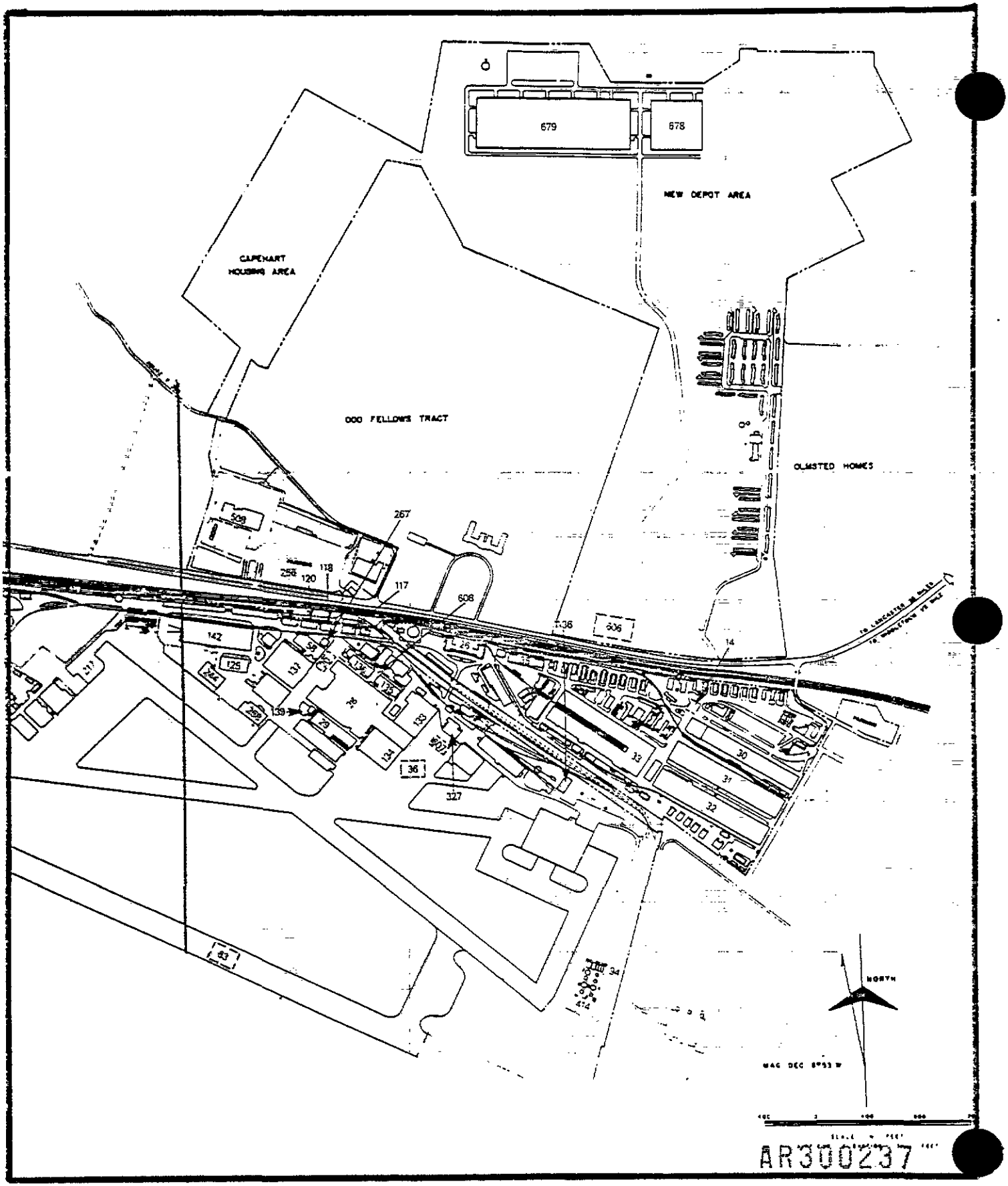

Figure E-1. Location of Present Industrial-Type Tenant Organizations

APPENDIX F

REFERENCES

APPENDIX F

REFERENCES

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APPENDIX G

USAF HAZARD ASSESSMENT RATING METHODOLOGY

APPENDIX G

USAF INSTALLATION RESTORATION PROGRAM HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

The Department of Defense (DOD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DOD facilities. One of the actions required under this program is to:

> "develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts." (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with representatives from USAF Occupational Environmental Health Laboratory (OEHL), Air Force Engineering Services Center (AFESC), Engineering-Science (ES) and CH_2M Hill. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, o. January 26 and 27, 1982, representatives of USAF OEHL, AFESC, various major commands, Engineering Science, and CH_2M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of IRP.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DOD program needs.

The model uses data readily obtained during the Record Search portion (Phase I) of the IRP. Scoring judgments and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: the possible receptors of the contamination, the waste and its characteristics, potential pathways for waste contaminant migration, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant and adding the weighted scores to obtain a total category score.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned and for direct evidence 100 points are assigned. If no evidence is found, the highest score among three possible routes is used. These routes are surface water migration, flooding, and ground-water migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Sites at which there is no containment are not reduced in score. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste managment practices category factor to the sum of the scores for the other three categories.

HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART

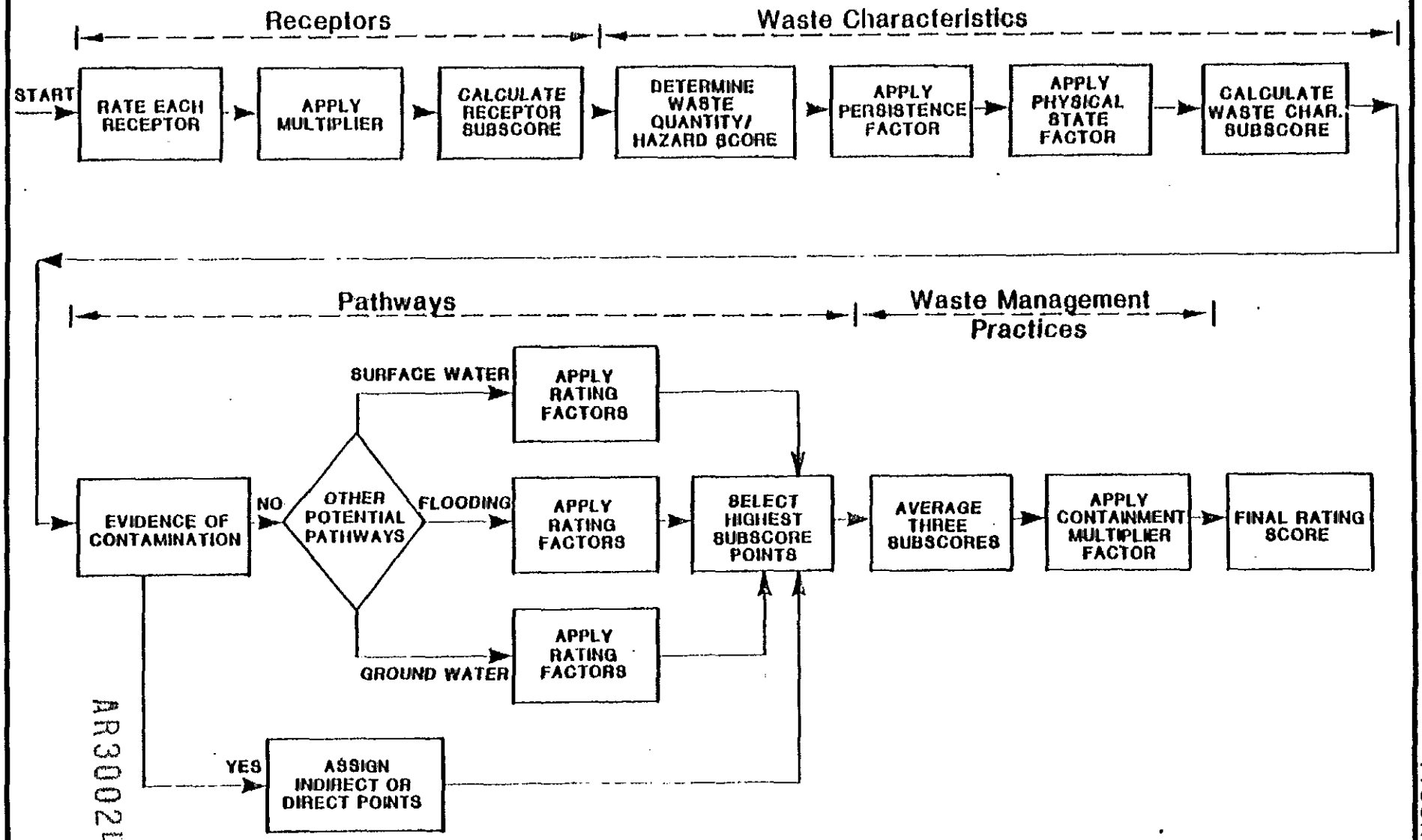

FIGURE 1

FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE _____

LOCATION _____

DATE OF OPERATION OR OCCURRENCE _____

OWNER/OPERATOR _____

COMMENTS/DESCRIPTION _____

SITE RATED BY _____

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to reservation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	_____	_____

Receptors subscore (100 X factor score subtotal/maximum score subtotal) _____

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) _____
2. Confidence level (C = confirmed, S = suspected) _____
3. Hazard rating (H = high, M = medium, L = low) _____

Factor Subscore A (from 20 to 100 based on factor score matrix) _____

B. Apply persistance factor
Factor Subscore A X Persistance Factor = Subscore B

_____ X _____ = _____

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

_____ X _____ = _____

AR300245

FIGURE 2 (Continued)

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore _____

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals	_____	_____

Subscore (100 X factor score subtotal/maximum score subtotal) _____

2. Flooding

Subscore (100 x factor score/3) _____

3. Ground-water migration

Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals	_____	_____

Subscore (100 x factor score subtotal/maximum score subtotal) _____

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore _____

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors _____
Waste Characteristics _____
Pathways _____

Total _____ divided by 3 = _____

Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

_____ X _____ = _____

TABLE 1

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1 - 25	26 - 100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1 mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1 mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination.	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands.	10
F. Water quality/use *designation of nearest* surface water body	Agricultural or industrial use.	Recreation, propagation and management of fish and wildlife.	Shellfish propagation and harvesting.	Potable water supplies	6
G. Ground-Water use of uppermost aquifer	Not used, other sources readily available.	Commercial, industrial, or irrigation, very limited other water sources.	Drinking water, municipal water available.	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available.	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1 - 50	51 - 1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1 - 50	51 - 1,000	Greater than 1, 000	6

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (<5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (>20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records.
- o Knowledge of types and quantities of wastes generated by shops and other areas on base.
- o Based on the above, a determination of the types and quantities of waste disposed of at the site.

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records.
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site.

A-3 Hazard Rating

Hazard Category	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

TABLE (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	H	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:
Confidence Level
- o Confirmed confidence levels (C) can be added
- o Suspected confidence levels (S) can be added
- o Confirmed confidence levels cannot be added with suspected confidence levels

Waste Hazard Rating
- o Wastes with the same hazard rating can be added
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCH + SCH = LCH if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCH designation (60 points). By adding the quantities of each waste, the designation may change to LCH (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the *source* of contamination is the site being evaluated.

Indirect evidence might be from visual observation (*i.e.*, leachate), vegetation stress, sludge deposits, presence of taste and *odors* in drinking water, or reported discharges that cannot be directly confirmed as resulting from the *site*, but the site is greatly suspected of being a source of contamination.

B-1 POTENTIAL FOR SURFACE WATER CONTAMINATION

Rating Factor	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and *storm* sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	6
Net precipitation	Less than -10 in.	-10 to + 5 in.	+5 to +20 in.	Greater than +20 in.	6
Surface erosion	None	*Slight*	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1 year 24-hr *rainfall*	<1.0 inch	1.0-2.0 inches	2.1-3.0 inches	>3.0 inches	8
B-2 POTENTIAL FOR FLOODING					
Floodplain	Beyond 100-year floodplain	In 25-year floodplain	In 10-year floodplain	Floods annually	1
B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION					
Depth to ground water	Greater than 500 ft	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of *site* greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below *mean* ground-water level	8
Direct access to ground water (through faults, *fractures*, faulty well casings, subsidence fissures, etc.)	No evidence of risk	Low risk	Moderate *risk*	High risk	8

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. WASTE MANAGEMENT PRACTICES FACTOR

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1 or III-B-3, then leave blank for calculation of factor score and maximum possible score.

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE: Lisa Lake Disposal Site
LOCATION: Town of Highspire
DATE OF OPERATION OR OCCURRENCE: 1956-1963
OWNER/OPERATOR: Private
COMMENTS/DESCRIPTION: Olmsted AFB Disposal Site
SITE RATED BY: JRB Associates

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	111	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal): 62

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large): L
2. Confidence level (C = confirmed, S = suspected): C
3. Hazard rating (H = high, M = medium, L = low): H

Factor Subscore A (from 20 to 100 based on factor score matrix): 100

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

100 x 1.0 = 100

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

100 x 1.0 = 100

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	74	108

Subscore (100 X factor score subtotal/maximum score subtotal) 69

2. Flooding	1	1	1	3

Subscore (100 x factor score/3) 33

3. Ground-water migration

Depth to ground water	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	2	3	16	24
Subsurface flows	3	8	24	24
Direct access to ground water	3	8	24	24
		Subtotals	100	114

Subscore (100 x factor score subtotal/maximum score subtotal) 88

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 88

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	62
Waste Characteristics	100
Pathways	88
Total 250 divided by 3 =	83

Gross Total Score

AR300253

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

83 x 1.0 = 83

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE: Fire Training Pit

LOCATION: Olmsted AFB

DATE OF OPERATION OR OCCURRENCE: 1940 - Present

OWNER/OPERATOR: Olmsted AFB & PA DOT

COMMENTS/DESCRIPTION:

SITE RATED BY: JRB Associates

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	2	6	12	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	99	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal): 55

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large): L
2. Confidence level (C = confirmed, S = suspected): C
3. Hazard rating (H = high, M = medium, L = low): H

Factor Subscore A (from 20 to 100 based on factor score matrix): 100

B. Apply persistance factor
Factor Subscore A X Persistence Factor = Subscore B

100 x 0.8 = 80

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

AR300254

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals		

Subscore (100 X factor score subtotal/maximum score subtotal)

2. Flooding	3	1	3	3

Subscore (100 x factor score/3) 100

3. Ground-water migration

Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals		

Subscore (100 x factor score subtotal/maximum score subtotal)

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	55
Waste Characteristics	~~80~~
Pathways	100
Total 235 divided by 3 =	78

Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

78 X 1.0 = 78

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE: Sunset Golf Course Disposal Site

LOCATION: Olmsted AFB

DATE OF OPERATION OR OCCURRENCE: 1956 - mid 1960's

OWNER/OPERATOR: Olmsted AFB

COMMENTS/DESCRIPTION:

SITE RATED BY: JRB Associates

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	116	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal): 64

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large): L
2. Confidence level (C = confirmed, S = suspected): S
3. Hazard rating (H = high, M = medium, L = low): H

Factor Subscore A (from 20 to 100 based on factor score matrix): 70

B. Apply persistance factor
Factor Subscore A X Persistence Factor = Subscore B

70 x 1.0 = 70

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

70 x 1.0 = 70

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 100

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals		

Subscore (100 X factor score subtotal/maximum score subtotal)

2. Flooding

		1		

Subscore (100 x factor score/3)

3. Ground-water migration

Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals		

Subscore (100 x factor score subtotal/maximum score subtotal)

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	64
Waste Characteristics	70
Pathways	100
Total 234 divided by 3 =	78

Gross Total Score

AR300257

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

78 x 1.0 = 78

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE: Incinerator/Landfill Disposal Site
LOCATION: Olmsted AFB
DATE OF OPERATION OR OCCURRENCE: 1940-1956
OWNER/OPERATOR: Olmsted AFB
COMMENTS/DESCRIPTION:
SITE RATED BY: JRB Associates

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	108	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal): 60

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large): L
2. Confidence level (C = confirmed, S = suspected): S
3. Hazard rating (H = high, M = medium, L = low): H

Factor Subscore A (from 20 to 100 based on factor score matrix): 70

B. Apply persistance factor
Factor Subscore A X Persistence Factor = Subscore B

70 x 1.0 = 70

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

70 x 1.0 = 70

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 100

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals		

Subscore (100 X factor score subtotal/maximum score subtotal)

2. Flooding

		1		

Subscore (100 x factor score/3)

3. Ground-water migration

Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals		

Subscore (100 x factor score subtotal/maximum score subtotal)

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	60
Waste Characteristics	70
Pathways	100
Total 230 divided by 3 =	77

Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

77 X 1.0 = 77

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE: Fruehauf Area Disposal Site
LOCATION: Olmsted AFB
DATE OF OPERATION OR OCCURRENCE: Early 1950's - 1956, 1963-1964
OWNER/OPERATOR: Olmsted AFB
COMMENTS/DESCRIPTION:
SITE RATED BY: JRB Associates

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	120	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal): 67

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large): L
2. Confidence level (C = confirmed, S = suspected): S
3. Hazard rating (H = high, M = medium, L = low): H

Factor Subscore A (from 20 to 100 based on factor score matrix): 70

B. Apply persistance factor
Factor Subscore A X Persistance Factor = Subscore B

70 x 1.0 = 70

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

70 x 1.0 = 70

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proced to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	66	108

Subscore (100 X factor score subtotal/maximum score subtotal) 61

2. Flooding

Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	3	8	24	24
		Subtotals	76	114

Subscore (100 x factor score subtotal/maximum score subtotal) 67

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 67

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	67
Waste Characteristics	70
Pathways	67
Total 204 divided by 3 =	68

Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

68 x 1.0 = 68

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE: Meade Heights Fill Area
LOCATION: Olmsted AFB
DATE OF OPERATION OR OCCURRENCE: Late 1950's
OWNER/OPERATOR: Olmsted AFB
COMMENTS/DESCRIPTION:
SITE RATED BY: JRB Associates

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	111	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal): 62

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large): S
2. Confidence level (C = confirmed, S = suspected): S
3. Hazard rating (H = high, M = medium, L = low): L

Factor Subscore A (from 20 to 100 based on factor score matrix): 20

B. Apply persistance factor
Factor Subscore A X Persistance Factor = Subscore B

20 x 1.0 = 20

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

20 x 0.5 = 10

AR300262

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	74	108
Subscore (100 X factor score subtotal/maximum score subtotal)				69

2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0

3. Ground-water migration

Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	3	8	24	24
		Subtotals	76	114
Subscore (100 x factor score subtotal/maximum score subtotal)				67

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 69

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	62
Waste Characteristics	10
Pathways	69
Total 141 divided by 3 =	47
	Gross Total Score

B. Apply factor for waste containment from waste management practices

AR300263

Gross Total Score X Waste Management Practices Factor = Final Score

47 x 1.0 = 47

APPENDIX H

EPA HAZARD RANKING SYSTEM

Facility name: Lisa Lake Disposal Site

Location: Town of Highspire

EPA Region: III

Person(s) in charge of the facility:

Name of Reviewer: JRB Associates Date: 2/3/84

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Disposal site for Olmsted AFB from 1956-1963; wastes include drummed liquid wastes (degreasers, paint wastes, strippers), rubble, refuse; interviewee stated over 1000 drums disposed.

Scores: S_M = 45 (S_{gw} = 78 S_{sw} = 7 S_a = 0)

S_{FE} =

S_{DC} =

HRS COVER SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
[1] Observed Release	(0) 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line [1] is 0, the S_a = 0. Enter on line [5]. If line [1] is 45, then proceed to line [2].					
[2] Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
[3] Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
[4] Multiply [1] x [2] x [3]				35,100	
[5] Divide line [4] by 35,100 and multiply by 100		S_a =	0		

AIR ROUTE WORK SHEET

Surface Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	(0) 1 2 3	1	0	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3	1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)	2	6	6	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			11	15	
3 Containment	0 1 2 (3)	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 (5) 6 7 8	1	5	8	
Total Waste Characteristics Score			23	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			6	55	
6 If line 1 is 45, multiply 1 x 4 x 5. If line 1 is 0, multiply 2 x 3 x 4 x 5			4554	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{SW} =	7		

SURFACE WATER ROUTE WORK SHEET

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 (3)	2	6	6	
Net Precipitation	0 1 (2) 3	1	2	3	
Permeability of the Unsaturated Zone	0 1 (2) 3	1	2	3	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			13	15	
3 Containment	0 1 2 (3)	1	3	3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 (9) 12 15 18	1	9	18	
Hazardous Waste Quantity	(0) 1 2 3 4 5 6 7 8	1	1	8	
Total Waste Characteristics Score			10	26	
5 Targets					3.5
Ground Water Use	0 1 (2) 3	3	6	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 30 32 35 (40)	1	40	40	
Total Targets Score			46	49	
6 If line 1 is 45, multiply 1 x 4 x 5 / If line 1 is 0, multiply 2 x 3 x 4 x 5			17940	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} =	31		

GROUND WATER ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	78	6084
Surface Water Route Score (S_{sw})	7	49
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		6133
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		78
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		45

WORKSHEET FOR COMPUTING S_M

	s	s^2
Groundwater Route Score (S_{gw})	53	2809
Surface Water Route Score (S_{sw})	6	36
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		2845
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		53
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		31

WORKSHEET FOR COMPUTING S_M

Ground Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 **(45)**	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 **(18)**	1	18	18	
Hazardous Waste Quantity	0 1 2 **(3)** 4 5 6 7 8	1	3	8	
Total Waste Characteristics Score			21	26	
5 Targets					3.5
Ground Water Use	0 1 2 **(3)**	3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 30 32 **(35)** 40	1	35	40	
Total Targets Score			44	49	
6 If line 1 is 45, multiply 1 x 4 x 5 / If line 1 is 0, multiply 2 x 3 x 4 x 5			41580	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} =	73		

GROUND WATER ROUTE WORK SHEET

AR300271

Surface Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0)	45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.						
2 Route Characteristics						4.2
Facility Slope and Intervening Terrain	0 (1) 2 3		1	1	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3		1	2	3	
Distance to Nearest Surface Water	0 1 (2) 3		2	4	6	
Physical State	0 1 2 (3)		1	3	3	
Total Route Characteristics Score				10	15	
3 Containment	0 1 2 (3)		1	3	3	4.3
4 Waste Characteristics						4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)		1	18	18	
Hazardous Waste Quantity	0 1 (2) 3 4 5 6 7 8		1	2	8	
Total Waste Characteristics Score				20	26	
5 Targets						4.5
Surface Water Use	0 1 (2) 3		3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3		2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40		1	0	40	
Total Targets Score				6	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				3600	64,350	
7 Divide line 6 by 64,350 and multiply by 100			S_{SW} =	6		

SURFACE WATER ROUTE WORK SHEET

AR300272

Air Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0)	45	1	0	45	5.1
Date and Location:						
Sampling Protocol:						
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.						
2 Waste Characteristics						5.2
Reactivity and Incompatibility	0 1 2 3		1	1	3	
Toxicity	0 1 2 3		3	9	9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8		1	3	8	
	Total Waste Characteristics Score			13	20	
3 Targets						5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30		1	30	30	
Distance to Sensitive Environment	0 1 2 3		2	0	6	
Land Use	0 1 2 3		1	3	3	
	Total Targets Score			33	39	
4 Multiply 1 x 2 x 3					35,100	
5 Divide line 4 by 35,100 and multiply by 100			S_a =	0		

AIR ROUTE WORK SHEET

AR300273

Facility name: Fruehauf Area Disposal Site

Location: Olmsted AFB

EPA Region: III

Person(s) in charge of the facility:

Name of Reviewer: JRB Associates Date: 2/1/84

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Landfill used late 50's, early 60's; wastes include drummed liquids (degreasing solvents, paint sludges, etc), general refuse; construction rubble; landfill operation involved trenching, filling and backfill with earth.

Scores: S_M = 31 (S_{gw} = 53 S_{sw} = 6 S_a = 0)

S_{FE} =

S_{DC} =

HRS COVER SHEET

Facility name: Incinerator/Landfill Disposal Site

Location: Olmsted AFB

EPA Region: III

Person(s) in charge of the facility:

Name of Reviewer: JRB Associates Date: 2/1/84

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Landfill used up until 1956, when runway modifications began; wastes include all plant refuse, construction rubble, and drummed wastes; area included incinerator, fire-training pit and landfill; currently under south HIA runway.

Scores: S_M = 42 (S_{gw} = 72 S_{sw} = 6 S_a = 0)

S_{FE} =

S_{DC} =

HRS COVER SHEET

Air Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0)	45	1	0	45	5.1
Date and Location:						
Sampling Protocol:						
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.						
2 Waste Characteristics						5.2
Reactivity and Incompatibility	0 1 2 3		1		3	
Toxicity	0 1 2 3		3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8		1		8	
	Total Waste Characteristics Score				20	
3 Targets						5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30		1		30	
Distance to Sensitive Environment	0 1 2 3		2		6	
Land Use	0 1 2 3		1		3	
	Total Targets Score				39	
4 Multiply 1 x 2 x 3					35,100	
5 Divide line 4 by 35,100 and multiply by 100			S_a = 0			

AIR ROUTE WORK SHEET

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. *If observed release is given a value of 0, proceed to line 2.*					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	(0) 1 2 3	1	0	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3	1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)	2	6	6	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			11	15	
3 Containment	0 1 2 (3)	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 (2) 3 4 5 6 7 8	1	2	8	
Total Waste Characteristics Score			20	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 / 12 16 18 20 / 24 30 32 35 40	1	0	40	
Total Targets Score			6	55	
6 If line 1 is 45, multiply 1 x 4 x 5 *If line 1 is 0, multiply 2 x 3 x 4 x 5*			3960	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{sw} =	6		

SURFACE WATER ROUTE WORK SHEET

Ground Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0)	45	1	0	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.						
2 Route Characteristics						3.2
Depth to Aquifer of Concern	0 1 2 (3)		2	6	6	
Net Precipitation	0 1 (2) 3		1	2	3	
Permeability of the Unsaturated Zone	0 1 2 (3)		1	3	3	
Physical State	0 1 2 (3)		1	3	3	
Total Route Characteristics Score				14	15	
3 Containment	0 1 2 (3)		1	3	3	3.3
4 Waste Characteristics						3.4
Toxicity/Persistence	0 3 6 9 (12) 15 18		1	12	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 (8)		1	8	8	
Total Waste Characteristics Score				20	26	
5 Targets						3.5
Ground Water Use	0 1 2 (3)		3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 35 (40)		1	40	40	
Total Targets Score				49	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				41160	57,330	
7 Divide line 6 by 57,330 and multiply by 100			S_{gw} =	72		

GROUND WATER ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	72	5184
Surface Water Route Score (S_{sw})	6	36
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		5220
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		72
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		42

WORKSHEET FOR COMPUTING S_M

	S	S^2
Groundwater Route Score (S_{gw})	72	5184
Surface Water Route Score (S_{sw})	6	36
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		5220
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		72
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		42

WORKSHEET FOR COMPUTING S_M

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 (3)	2	6	6	
Net Precipitation	0 1 (2) 3	1	2	3	
Permeability of the Unsaturated Zone	0 1 2 (3)	1	3	3	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			14	15	
3 Containment	0 1 2 (3)	1	3	3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 (12) 15 18	1	12	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 (8)	1	8	8	
Total Waste Characteristics Score			20	26	
5 Targets					3.5
Ground Water Use	0 1 2 (3)	3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 30 32 35 (40)	1	40	40	
Total Targets Score			49	49	
6 If line 1 is 45, multiply 1 x 4 x 5 / If line 1 is 0, multiply 2 x 3 x 4 x 5			41160	57.330	
7 Divide line 6 by 57.330 and multiply by 100		S_{gw} =	72		

GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	(0) 1 2 3	1	0	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3	1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)	2	6	6	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			11	15	
3 Containment	0 1 2 (3)	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 (2) 3 4 5 6 7 8	1	2	8	
Total Waste Characteristics Score			20	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			6	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			3960	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{SW} =	6		

SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 / 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
4 Multiply 1 x 2 x 3				35,100	
5 Divide line 4 by 35,100 and multiply by 100		S_a =	0		

AIR ROUTE WORK SHEET

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	(0) 1 2 3	1	0	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3	1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)	2	6	6	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			11	15	
3 Containment	0 1 2 (3)	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 (5) 6 7 8	1	5	8	
Total Waste Characteristics Score			23	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 / 12 16 18 20 / 24 30 32 35 40	1	0	40	
Total Targets Score			6	55	
6 If line 1 is 45, multiply 1 x 4 x 5 / If line 1 is 0, multiply 2 x 3 x 4 x 5			4554	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{SW} =	7		

SURFACE WATER ROUTE WORK SHEET

AR300284

Ground Water Route Work Sheet						
	Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1	Observed Release	(0) 45	1	0	45	3.1
	If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2	Route Characteristics					3.2
	Depth to Aquifer of Concern	0 1 2 (3)	2	6	6	
	Net Precipitation	0 1 (2) 3	1	2	3	
	Permeability of the Unsaturated Zone	0 1 (2) 3	1	2	3	
	Physical State	0 1 2 (3)	1	3	3	
	Total Route Characteristics Score			13	15	
3	Containment	0 1 2 (3)	1	3	3	3.3
4	Waste Characteristics					3.4
	Toxicity/Persistence	0 3 6 (9) 12 15 18	1	9	18	
	Hazardous Waste Quantity	0 (1) 2 3 4 5 6 7 8	1	1	8	
	Total Waste Characteristics Score			10	26	
5	Targets					3.5
	Ground Water Use	0 1 (2) 3	3	6	9	
	Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 30 32 35 (40)	1	40	40	
	Total Targets Score			46	49	
6	If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			17940	57.330	
7	Divide line 6 by 57,330 and multiply by 100		S_{gw} =	31		

GROUND WATER ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	78	6084
Surface Water Route Score (S_{sw})	7	49
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		6133
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		78
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		45

WORKSHEET FOR COMPUTING S_M

	S	S^2
Groundwater Route Score (S_{gw})	53	2809
Surface Water Route Score (S_{sw})	6	36
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		2845
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		53
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		31

WORKSHEET FOR COMPUTING S_M

Ground Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 (45)	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 2 (3) 4 5 6 7 8	1	3	8	
Total Waste Characteristics Score			21	26	
5 Targets					3.5
Ground Water Use	0 1 2 (3)	3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 30 32 (35) 40	1	35	40	
Total Targets Score			44	49	
6 If line 1 is 45, multiply 1 x 4 x 5 / If line 1 is 0, multiply 2 x 3 x 4 x 5			41580	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} =	73		

GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0)	45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.						
2 Route Characteristics						4.2
Facility Slope and Intervening Terrain	0 (1) 2 3		1	1	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3		1	2	3	
Distance to Nearest Surface Water	0 1 (2) 3		2	4	6	
Physical State	0 1 2 (3)		1	3	3	
Total Route Characteristics Score				10	15	
3 Containment	0 1 2 (3)		1	3	3	4.3
4 Waste Characteristics						4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)		1	18	18	
Hazardous Waste Quantity	0 1 (2) 3 4 5 6 7 8		1	2	8	
Total Waste Characteristics Score				20	26	
5 Targets						4.5
Surface Water Use	0 1 (2) 3		3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3		2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40		1	0	40	
Total Targets Score				6	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				3600	64,350	
7 Divide line 6 by 64,350 and multiply by 100			S_{sw} =	6		

SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1	1	3	
Toxicity	0 1 2 3	3	9	9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	3	8	
	Total Waste Characteristics Score		13	20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1	30	30	
Distance to Sensitive Environment	0 1 2 3	2	0	6	
Land Use	0 1 2 3	1	3	3	
	Total Targets Score		33	39	
4 Multiply 1 x 2 x 3				35,100	
5 Divide line 4 by 35,100 and multiply by 100		S_a =	0		

AIR ROUTE WORK SHEET

AR300290

Facility name: Fruehauf Area Disposal Site

Location: Olmsted AFB

EPA Region: III

Person(s) in charge of the facility:

Name of Reviewer: JRB Associates Date: 2/1/84

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Landfill used late 50's, early 60's; wastes include drummed liquids (degreasing solvents, paint sludges, etc), general refuse; construction rubble; landfill operation involved trenching, filling and backfill with earth.

Scores: S_M = 31 (S_{gw} = 53 S_{sw} = 6 S_a = 0)

S_{FE} =

S_{DC} =

HRS COVER SHEET

Facility name: Incinerator/Landfill Disposal Site

Location: Olmsted AFB

EPA Region: III

Person(s) in charge of the facility:

Name of Reviewer: JRB Associates Date: 2/1/84

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Landfill used up until 1956, when runway modifications began; wastes include all plant refuse, construction rubble, and drummed wastes; area included incinerator, fire-training pit and landfill; currently under south HIA runway.

Scores: S_M = 42 (S_{gw} = 72 S_{sw} = 6 S_a = 0)

S_{FE} =

S_{DC} =

HRS COVER SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
4 Multiply 1 x 2 x 3				35,100	
5 Divide line 4 by 35,100 and multiply by 100		S_a = 0			

AIR ROUTE WORK SHEET

Surface Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	(0) 1 2 3	1	0	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3	1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)	2	6	8	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			11	15	
3 Containment	0 1 2 (3)	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 (2) 3 4 5 6 7 8	1	2	8	
Total Waste Characteristics Score			20	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			6	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			3960	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{SW} =	6		

SURFACE WATER ROUTE WORK SHEET

Ground Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 (3)	2	6	6	
Net Precipitation	0 1 (2) 3	1	2	3	
Permeability of the Unsaturated Zone	0 1 2 (3)	1	3	3	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			14	15	
3 Containment	0 1 2 (3)	1	3	3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 (12) 15 18	1	12	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 (8)	1	8	8	
Total Waste Characteristics Score			20	26	
5 Targets					3.5
Ground Water Use	0 1 2 (3)	3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 30 32 35 (40)	1	40	40	
Total Targets Score			49	49	
6 If line 1 is 45, multiply 1 x 4 x 5. If line 1 is 0, multiply 2 x 3 x 4 x 5			41160	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} =	72		

GROUND WATER ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	72	5184
Surface Water Route Score (S_{sw})	6	36
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		5220
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		72
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		42

WORKSHEET FOR COMPUTING S_M

	S	S^2
Groundwater Route Score (S_{gw})	72	5184
Surface Water Route Score (S_{sw})	6	36
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		5220
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		72
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		42

WORKSHEET FOR COMPUTING S_M

Ground Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0)	45	1	0	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.						
2 Route Characteristics						3.2
Depth to Aquifer of Concern	0 1 2 (3)		2	6	6	
Net Precipitation	0 1 (2) 3		1	2	3	
Permeability of the Unsaturated Zone	0 1 2 (3)		1	3	3	
Physical State	0 1 2 (3)		1	3	3	
Total Route Characteristics Score				14	15	
3 Containment	0 1 2 (3)		1	3	3	3.3
4 Waste Characteristics						3.4
Toxicity/Persistence	0 3 6 9 (12) 15 18		1	12	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 (8)		1	8	8	
Total Waste Characteristics Score				20	26	
5 Targets						3.5
Ground Water Use	0 1 2 (3)		3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 35 (40)		1	40	40	
Total Targets Score				49	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				41160	57.330	
7 Divide line 6 by 57.330 and multiply by 100			S_{gw} =	72		

GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0)	45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.						
2 Route Characteristics						4.2
Facility Slope and Intervening Terrain	(0) 1 2 3		1	0	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3		1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)		2	6	6	
Physical State	0 1 2 (3)		1	3	3	
Total Route Characteristics Score				11	15	
3 Containment	0 1 2 (3)		1	3	3	4.3
4 Waste Characteristics						4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)		1	18	18	
Hazardous Waste Quantity	0 1 (2) 3 4 5 6 7 8		1	2	8	
Total Waste Characteristics Score				20	26	
5 Targets						4.5
Surface Water Use	0 1 (2) 3		3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3		2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40		1	0	40	
Total Targets Score				6	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				3960	64,350	
7 Divide line 6 by 64,350 and multiply by 100			S_{SW} =	6		

SURFACE WATER ROUTE WORK SHEET

Facility name: Fruehauf Area Disposal Site

Location: Olmsted AFB

EPA Region: III

Person(s) in charge of the facility:

Name of Reviewer: JRB Associates Date: 2/1/84

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Landfill used late 50's, early 60's; wastes include drummed liquids (degreasing solvents, paint sludges, etc), general refuse; construction rubble; landfill operation involved trenching, filling and backfill with earth.

Scores: S_M = 31 (S_{gw} = 53 S_{sw} = 6 S_a = 0)

S_{FE} =

S_{DC} =

HRS COVER SHEET

Facility name: Incinerator/Landfill Disposal Site

Location: Olmsted AFB

EPA Region: III

Person(s) in charge of the facility:

Name of Reviewer: JRB Associates Date: 2/1/84

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Landfill used up until 1956, when runway modifications began; wastes include all plant refuse, construction rubble, and drummed wastes; area included incinerator, fire-training pit and landfill; currently under south HIA runway.

Scores: S_M = 42 (S_{gw} = 72 S_{sw} = 6 S_a = 0)

S_{FE} =

S_{DC} =

HRS COVER SHEET

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 (1) 2 3	1	1	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3	1	2	3	
Distance to Nearest Surface Water	0 1 (2) 3	2	4	6	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			10	15	
3 Containment	0 1 2 (3)	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 (2) 3 4 5 6 7 8	1	2	8	
Total Waste Characteristics Score			20	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			6	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			3600	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{SW} =	6		

SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet						
	Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1	Observed Release	(0) 45	1	0	45	5.1
	Date and Location:					
	Sampling Protocol:					
	If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2	Waste Characteristics					5.2
	Reactivity and Incompatibility	0 1 (2) 3	1	1	3	
	Toxicity	0 1 2 3	3	9	9	
	Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	3	8	
		Total Waste Characteristics Score		13	20	
3	Targets					5.3
	Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1	30	30	
	Distance to Sensitive Environment	0 1 2 3	2	0	6	
	Land Use	0 1 2 3	1	3	3	
		Total Targets Score		33	39	
4	Multiply 1 x 2 x 3				35,100	
5	Divide line 4 by 35,100 and multiply by 100		S_a =	0		

AIR ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	53	2809
Surface Water Route Score (S_{sw})	6	36
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		2845
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		53
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		31

WORKSHEET FOR COMPUTING S_M

Ground Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0	(45)	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.						
2 Route Characteristics						3.2
Depth to Aquifer of Concern	0 1 2 3		2		6	
Net Precipitation	0 1 2 3		1		3	
Permeability of the Unsaturated Zone	0 1 2 3		1		3	
Physical State	0 1 2 3		1		3	
Total Route Characteristics Score					15	
3 Containment	0 1 2 3		1		3	3.3
4 Waste Characteristics						3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)		1	18	18	
Hazardous Waste Quantity	0 1 2 (3) 4 5 6 7 8		1	3	8	
Total Waste Characteristics Score				21	26	
5 Targets						3.5
Ground Water Use	0 1 2 (3)		3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 (35) 40		1	35	40	
Total Targets Score				44	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				41580	57,330	
7 Divide line 6 by 57,330 and multiply by 100			S_{gw} =	73		

GROUND WATER ROUTE WORK SHEET

Ground Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45		1	0	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.						
2 Route Characteristics						3.2
Depth to Aquifer of Concern	0 1 2 (3)		2	6	6	
Net Precipitation	0 1 (2) 3		1	2	3	
Permeability of the Unsaturated Zone	0 1 (2) 3		1	2	3	
Physical State	0 1 2 (3)		1	3	3	
Total Route Characteristics Score				13	15	
3 Containment	0 1 2 (3)		1	3	3	3.3
4 Waste Characteristics						3.4
Toxicity/Persistence	0 3 6 (9) 12 15 18		1	9	18	
Hazardous Waste Quantity	0 (1) 2 3 4 5 6 7 8		1	1	8	
Total Waste Characteristics Score				10	26	
5 Targets						3.5
Ground Water Use	0 1 (2) 3		3	6	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 35 (40)		1	40	40	
Total Targets Score				46	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				17940	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} =		31		

GROUND WATER ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	78	6084
Surface Water Route Score (S_{sw})	7	49
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		6133
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		78
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		45

WORKSHEET FOR COMPUTING S_M

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score				20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
Total Targets Score				39	
4 Multiply 1 x 2 x 3				35,100	
5 Divide line 4 by 35,100 and multiply by 100		S_a =	0		

AIR ROUTE WORK SHEET

Surface Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0)	45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.						
2 Route Characteristics						4.2
Facility Slope and Intervening Terrain	(0) 1 2 3		1	0	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3		1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)		2	6	6	
Physical State	0 1 2 (3)		1	3	3	
Total Route Characteristics Score				11	15	
3 Containment	0 1 2 (3)		1	3	3	4.3
4 Waste Characteristics						4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)		1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 (5) 6 7 8		1	5	8	
Total Waste Characteristics Score				23	26	
5 Targets						4.5
Surface Water Use	0 1 (2) 3		3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3		2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40		1	0	40	
Total Targets Score				6	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				4554	64,350	
7 Divide line 6 by 64,350 and multiply by 100			S_{SW} =	7		

SURFACE WATER ROUTE WORK SHEET

APPENDIX H

EPA HAZARD RANKING SYSTEM

Facility name: Lisa Lake Disposal Site

Location: Town of Highspire

EPA Region: III

Person(s) in charge of the facility:

Name of Reviewer: JRB Associates Date: 2/3/84

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Disposal site for Olmsted AFB from 1956-1963; wastes include drummed liquid wastes (degreasers, paint wastes, strippers), rubble, refuse; interviewee stated over 1000 drums disposed.

Scores: S_M = 45 (S_{gw} = 78 S_{sw} = 7 S_a = 0)

S_{FE} =

S_{DC} =

HRS COVER SHEET

Facility name: Lisa Lake Disposal Site

Location: Town of Highspire

EPA Region: III

Person(s) in charge of the facility:

Name of Reviewer: JRB Associates Date: 2/3/84

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Disposal site for Olmsted AFB from 1956-1963; wastes include drummed liquid wastes (degreasers, paint wastes, strippers), rubble, refuse; interviewee stated over 1000 drums disposed.

Scores: S_M = 45 (S_{gw} = 78 S_{sw} = 7 S_a = 0)

S_{FE} =

S_{DC} =

HRS COVER SHEET

Surface Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0)	45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.						
2 Route Characteristics						4.2
Facility Slope and Intervening Terrain	(0) 1 2 3		1	0	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3		1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)		2	6	6	
Physical State	0 1 2 (3)		1	3	3	
Total Route Characteristics Score				11	15	
3 Containment	0 1 2 (3)		1	3	3	4.3
4 Waste Characteristics						4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)		1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 (5) 6 7 8		1	5	8	
Total Waste Characteristics Score				23	26	
5 Targets						4.5
Surface Water Use	0 1 (2) 3		3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3		2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40		1	0	40	
Total Targets Score				6	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				4554	64,350	
7 Divide line 6 by 64,350 and multiply by 100			S_{SW} =	7		

SURFACE WATER ROUTE WORK SHEET

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 (3)	2	6	6	
Net Precipitation	0 1 (2) 3	1	2	3	
Permeability of the Unsaturated Zone	0 1 2 (3)	1	3	3	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			14	15	
3 Containment	0 1 2 (3)	1	3	3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 (5) 6 7 8	1	5	8	
Total Waste Characteristics Score			23	26	
5 Targets					3.5
Ground Water Use	0 1 (2) 3	3	6	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 30 32 35 (40)	1	40	40	
Total Targets Score			46	49	
6 If line 1 is 45, multiply 1 x 4 x 5 / If line 1 is 0, multiply 2 x 3 x 4 x 5			44436	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} =	78		

GROUND WATER ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	78	6084
Surface Water Route Score (S_{sw})	7	49
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		6133
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		78
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		45

WORKSHEET FOR COMPUTING S_M

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
4 Multiply 1 x 2 x 3				35,100	
5 Divide line 4 by 35,100 and multiply by 100		S_a =	0		

AIR ROUTE WORK SHEET

Ground Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 (45)	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 2 (3) 4 5 6 7 8	1	3	8	
Total Waste Characteristics Score			21	26	
5 Targets					3.5
Ground Water Use	0 1 2 (3)	3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 30 32 (35) 40	1	35	40	
Total Targets Score			44	49	
6 If line 1 is 45, multiply 1 x 4 x 5 / If line 1 is 0, multiply 2 x 3 x 4 x 5			41580	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} =	73		

GROUND WATER ROUTE WORK SHEET

Facility name: Sunset Golf Course Disposal Site

Location: Olmsted AFB

EPA Region: III

Person(s) in charge of the facility:

Name of Reviewer: JRB Associates Date: 2/1/84

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Landfill used 1956 - mid 1960's; wastes include drums, construction rubble, general refuse; hazardous materials include degreaser & stripping solvents, paint wastes; facility covers south and SW sides of hill.

Scores: S_M = 43 (S_{gw} = 73 S_{sw} = 9 S_a = 0)

S_{FE} =

S_{DC} =

HRS COVER SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1	1	3	
Toxicity	0 1 2 3	3	9	9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	3	8	
	Total Waste Characteristics Score		13	20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1	30	30	
Distance to Sensitive Environment	0 1 2 3	2	0	6	
Land Use	0 1 2 3	1	3	3	
	Total Targets Score		33	39	
4 Multiply 1 x 2 x 3				35,100	
5 Divide line 4 by 35,100 and multiply by 100		S_a =	0		

AIR ROUTE WORK SHEET

Surface Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 (45)	1	45	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 2 3	1		3	
1-yr. 24-hr. Rainfall	0 1 2 3	1		3	
Distance to Nearest Surface Water	0 1 2 3	2		6	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 2 (3) 4 5 6 7 8	1	3	8	
Total Waste Characteristics Score			21	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			6	55	
6 If line 1 is 45, multiply 1 x 4 x 5 / If line 1 is 0, multiply 2 x 3 x 4 x 5			5670	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{SW} =	9		

SURFACE WATER ROUTE WORK SHEET

AR300320

Facility name: Incinerator/Landfill Disposal Site

Location: Olmsted AFB

EPA Region: III

Person(s) in charge of the facility:

Name of Reviewer: JRB Associates Date: 2/1/84

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Landfill used up until 1956, when runway modifications began; wastes include all plant refuse, construction rubble, and drummed wastes; area included incinerator, fire-training pit and landfill; currently under south HIA runway.

Scores: S_M = 42 (S_{gw} = 72 S_{sw} = 6 S_a = 0)

S_{FE} =

S_{DC} =

HRS COVER SHEET

	S	S^2
Groundwater Route Score (S_{gw})	73	5329
Surface Water Route Score (S_{sw})	9	81
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		5410
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		74
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		43

WORKSHEET FOR COMPUTING S_M

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. *If observed release is given a value of 0, proceed to line 2.*					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	(0) 1 2 3	1	0	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3	1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)	2	6	6	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			11	15	
3 Containment	0 1 2 (3)	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 (2) 3 4 5 6 7 8	1	2	8	
Total Waste Characteristics Score			20	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			6	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			3960	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{SW} =	6		

SURFACE WATER ROUTE WORK SHEET

AR300323

Ground Water Route Work Sheet

	Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1	Observed Release	0 (45)	1	45	45	3.1
	If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2	Route Characteristics					3.2
	Depth to Aquifer of Concern	0 1 2 3	2		6	
	Net Precipitation	0 1 2 3	1		3	
	Permeability of the Unsaturated Zone	0 1 2 3	1		3	
	Physical State	0 1 2 3	1		3	
	Total Route Characteristics Score				15	
3	Containment	0 1 2 3	1		3	3.3
4	Waste Characteristics					3.4
	Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
	Hazardous Waste Quantity	0 1 (2) 3 4 5 6 7 8	1	2	8	
	Total Waste Characteristics Score			20	26	
5	Targets					3.5
	Ground Water Use	0 1 (2) 3	3	6	9	
	Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 30 32 35 (40)	1	40	40	
	Total Targets Score			46	49	
6	If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			41400	57,330	
7	Divide line 6 by 57,330 and multiply by 100		S_{gw} =	72		

GROUND WATER ROUTE WORK SHEET