DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 49TH FIGHTER WING (ACC)
HOLLOMAN AIR FORCE BASE, NEW MEXICO

0 6 OCT 1998

MEMORANDUM FOR US EPA REGION VI (6H-CS)
Attn Mr. Gene Keepper
First Interstate Bank Tower
1445 Ross Avenue
Dallas Texas 75202-2733

FROM: 49 CES/CEV
550 Tabosa Ave
Holloman AFB NM 88330-8458

SUBJECT: Compliance Agreement Quarterly Report and 1998 Groundwater Sampling Report

1. Pursuant to the requirements set forth in Section X--REPORTING AND EXTENSIONS section of the Compliance Agreement signed on 20 December 1988, we hereby submit the 39th Quarterly Progress Report. Also attached is the 1998 Sampling Report for the Sewage Lagoons Long-term Groundwater Monitoring Program. Due to an oversight, sufficient copies were not available for distribution when the submittal was first received in June.

2. No specific tasks directly related to the FFCA were completed during the quarter. However, the final closure report is in preparation and will be completed next quarter. Within 60 days of completion of the final closure report, a real estate plat will be prepared indicating the site location and associated restrictions. The final groundwater sampling event is scheduled for January 1999.

3. The attached 1998 sampling report contains the results of annual monitoring using procedures described in the Long-term Monitoring Plan for the Sewage Lagoons (Radian, April 1995). Please note that reports have been submitted for 1995, 1996 and 1998; there is no 1997 report. Samples for 1995 and 1996 were collected in the fall of those years. A different contracting mechanism was used to conduct subsequent samples and it was not possible to collect the samples originally scheduled for fall of 1997 until January 1998. The results from this sampling event, which was conducted approximately one month after the completion of the lagoons closure construction project, shows that concentrations of metals and organochlorine pesticides remain below alternate concentration limits established in the Long-term Monitoring Plan.

4. Documentation of the above is available upon request from the 49 CES/CEV office at Holloman AFB. If you have any questions or comments, contact Dr. Fred M. Fisher at (505) 475-3931.

HOWARD E. MOFFITT
Deputy Base Civil Engineer

Attachment:
1998 Sampling Report

cc: w/ Atch
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Headquarters, Air Combat Command
Langley Air Force Base,
Virginia

Draft Final

1998 Sampling Report

Sewage Lagoons Long-term Groundwater Monitoring Program

June 1998

49th FIGHTER WING

49 CES/CEV
Holloman Air Force Base,
New Mexico

REPORT DOCUMENTATION PAGE	*Form Approved OMB No. 0704-0188*

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This report summarizes the results associated with the long term groundwater monitoring program at the sewage lagoons at Holloman AFB.

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Draft Final

1998 Sampling Report

Sewage Lagoons Long-term Groundwater Monitoring Program

June 1998

1998 SAMPLING REPORT
SEWAGE LAGOONS LONG-TERM GROUNDWATER MONITORING PROGRAM

HOLLOMAN AIR FORCE BASE, NM

DRAFT FINAL

Prepared for:

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Holloman Air Force Base, NM

and

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June 1998

TABLE OF CONTENTS

Page

1.0 Field Operations 1

2.0 Analytical Results 1

2.1 QA/QC Summary 1
2.2 Results Summary 1

3.0 Trends 4

4.0 Recommendations 4

Appendix A: Analytical Results
Appendix B: Groundwater Sampling Logs
Appendix C: Chain-of-Custody Forms

LIST OF FIGURES

Page

1 LTM Detection Monitoring Network....2

2 Potentiometric Groundwater Surface Map (January 1998)....3

LIST OF TABLES

1 Historical Program Sampling Event Summary....5

1998 SAMPLING REPORT

Ten wells were sampled for organochlorine pesticides and metals during the 1998 long-term monitoring (LTM) sampling event at the Holloman Air Force Base (AFB) sewage lagoons. The analytical results of this sampling were compiled and compared with established alternate concentration levels (ACLs) for each analyte (see Appendix A of this document for analytical results and ACLs). No analyte was detected at levels above its respective ACL in any sample. As a result, it is recommended that LTM continue as a requirement of closure, with the next event scheduled for January 1999. The following paragraphs discuss the activities, results, and conclusions of the 1998 LTM sampling.

1.0 Field Operations

Groundwater samples were collected during January 1998 from each of the 10 wells in the sewage lagoons groundwater monitoring network (shown in Figure 1). Samples, including quality assurance (QA) and quality control (QC), were collected following the procedures outlined in the *Long-term Monitoring Plan* (Radian, 1995) and analyzed for organochlorine pesticides and metals as specified in the *Program Overview,* Part I of this document. Following the sampling, a synoptic water level survey of wells in the vicinity of the lagoons and lakes was conducted; the resulting groundwater potentiometric surface map is presented in Figure 2.

This is the first round of sampling since Ponds A through F have been backfilled and closed in December 1997. Effluent from the wastewater treatment plant flows either into Pond G or the constructed wetland area (Figure 2). Water is allocated primarily based on wildlife management objectives. Figure 2 illustrates that the direction of groundwater flow in the vicinity of the former lagoons has not changed significantly because of these construction activities.

2.0 Analytical Results

The following paragraphs contain a summary of the QA/QC evaluation of the analyses and a discussion of the analytical results of this sampling round.

2.1 QA/QC Summary

The QC programs and corrective actions detailed in the *Quality Assurance Project Plan (QAPP)* were followed. The *QAPP* is presented as Appendix B of the *Long-term Monitoring Plan* (Radian, 1995). A second revision to the *QAPP* was performed in July 1997. These revisions document updated analytical procedures for both pesticide and metals analysis. Additional details of the project QA/QC program and the revisions are documented in the *QAPP*.

Overall, QA/QC data associated with this program indicate that measurement data are acceptable and defensible. Endrin Aldehyde in MW-06 was the only analyte "B-flagged" to indicate that similar concentrations of this analyte appeared to be present in its associated method blank. However, this blank detection was below the *QAPP*-specified method detection limit and ACL, and therefore, does not affect the reported analytical result interpretation. The QA/QC data indicate that the QC mechanisms were effective in ensuring measurement data reliability within the expected limits of sampling and analytical error. The *QAPP* measurement objectives were met.

2.2 Results Summary

All samples were analyzed for organochlorine pesticides and metals by the methods listed in Table 1. Analytical results were compared with the ACLs for each analyte (see Appendix A for analytical results and ACLs). All metal and organochlorine pesticide analytical results from the 1998 LTM event were detected well below their respective ACLs.

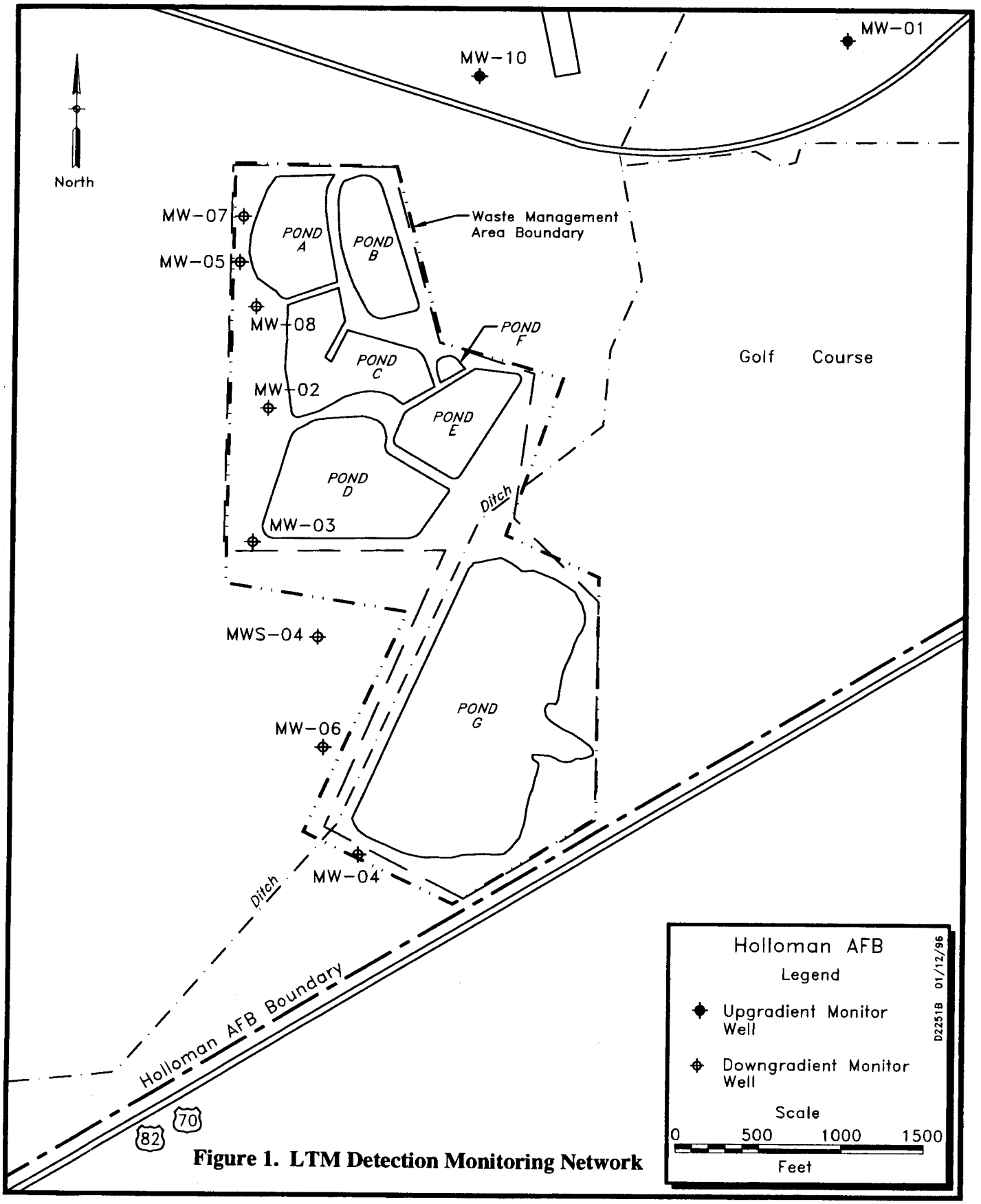

Figure 1. LTM Detection Monitoring Network

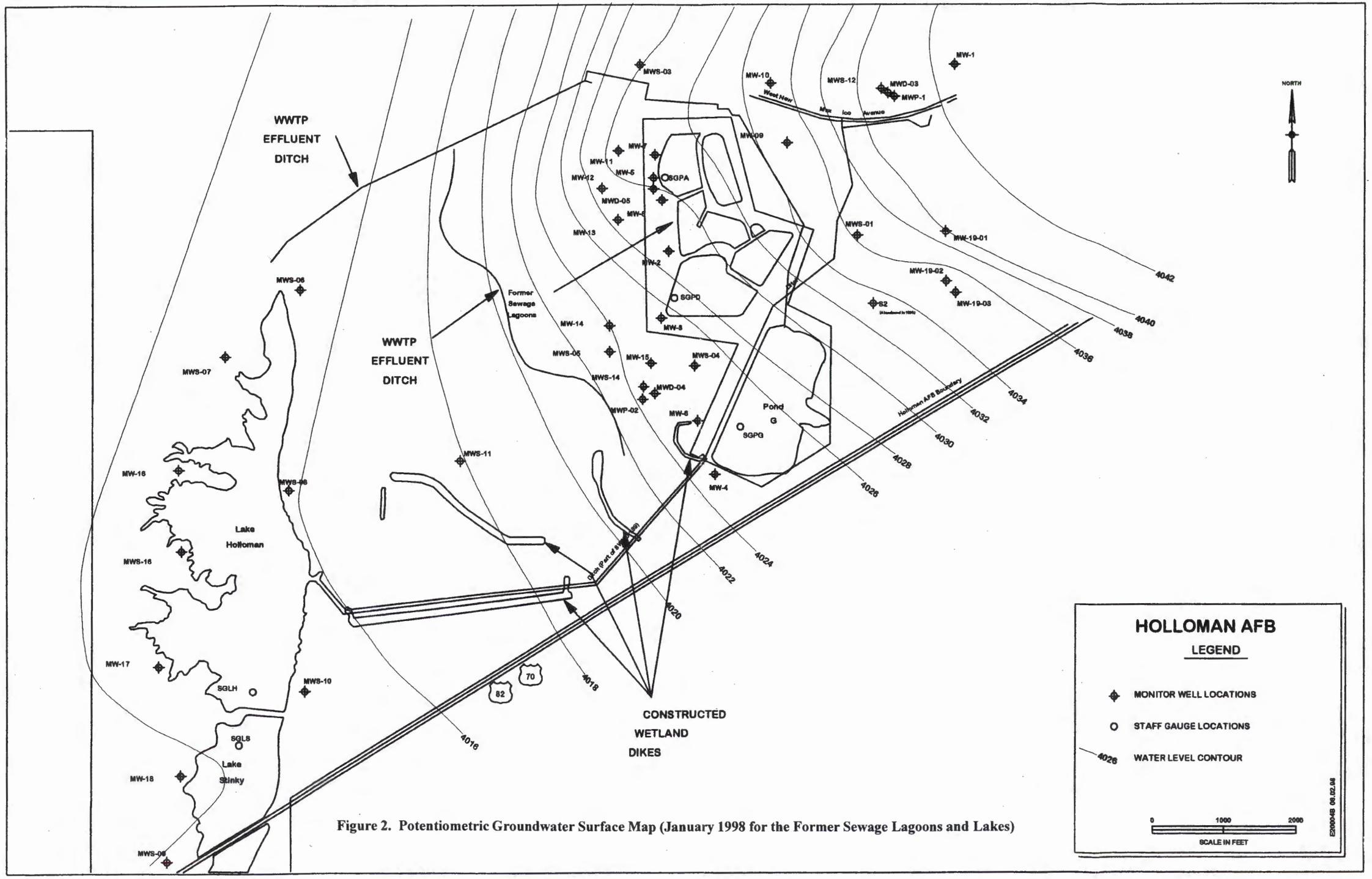

Figure 2. Potentiometric Groundwater Surface Map (January 1998 for the Former Sewage Lagoons and Lakes)

No pesticides were detected above the risk-based ACL calculated for each constituent. Furthermore, of the organochlorine pesticides, 4,4'DDE, chlordane, endosulfan sulfate, endrin, and toxaphene were not detected in any sample above detection limits. All other organochlorine pesticides were detected above detection limits at various locations but at concentrations well below the ACLs. Wells MW-02, MW-03 and MW-08 are located immediately downgradient of the former sewage lagoons, and most of the detected pesticides were found at these locations. Although MW-04, MW-05, and MW-07 are located immediately downgradient of the former sewage lagoons, no pesticides were detected at these locations.

No pesticides were detected at MW-06 and only one analyte, beta-BHC, was detected at MWS-04. These two wells are located farther downgradient than the other wells sampled, indicating that pesticide levels either diminish entirely or at least decrease rapidly with distance downgradient of the sewage lagoons. All pesticides were detected below detection limits in upgradient wells MW-01 and MW-10.

No metals were detected above the respective ACLs in this sampling event. Lead and zinc were not detected in any sample. All other metals were detected above detection limits at one or more locations. Similar concentrations were detected in upgradient wells (MW-01 and MW-10) and downgradient wells thus indicating that metals are naturally occurring at these levels.

3.0 Trends

Although the 1998 event is only the third of many sampling rounds, a basic trend can be observed within the LTM monitoring well network. In general, all monitoring wells have shown a decrease in total detected pesticides from 1995 to 1998. Pesticide levels have remained well below ACLs for all analytes in each LTM network well. The highest levels of pesticides are found in the wells closest to the sewage lagoons. MW-02, MW-03, MW-04, MW-05, MW-07, and MW-08 are all located immediately downgradient of the former sewage lagoons. MW-02, MW-03, and MW-08 contain the highest number of detected pesticides from 1995 to 1998. MW-07 and MW-04 have shown a steady decrease in detected pesticides and no pesticides were detected in either of these wells in 1998. 4,4'-DDE was detected in MW-05 in 1996, otherwise no pesticides have been detected in this downgradient well. The overall decrease in pesticide levels in these wells, located immediately downgradient of the sewage lagoons, can be attributed to natural attenuation.

The presence of pesticides in MW-06 and MWS-04, which are located farther downgradient than the above-mentioned wells, has been infrequent or nonexistent from 1995 to 1998. Isodrin (1995) has been the only analyte detected in MW-06. beta-BHC (1998) has been the only analyte detected in MWS-04. Again, these two wells are located farther downgradient than the other wells sampled, indicating that pesticide levels either diminish entirely or at least decrease rapidly with distance downgradient of the sewage lagoons. No pesticides have been observed in either upgradient well MW-01 or MW-10 in the three sampling rounds. Because metals occur naturally at the levels detected from 1995 to 1998, trend analysis was not considered.

4.0 Recommendations

All analytes were detected well below the respective ACLs during the 1998 LTM event at the sewage lagoons. Following the data evaluation guidelines presented in the *Program Overview*, the resulting recommendation is that detection monitoring continue as necessary with the next LTM sampling event scheduled for January 1999.

Table 1 presents the results of this LTM event, and will be used to summarize results and conclusions of future sampling events as they occur.

Table 1
Historical Program Sampling Event Summary

Sampling Event #	Activity/Stage	Date	Contractor	Wells Sampled	Analyses	Constituents > ACL	Result
1	Round 1 LTM Sampling/ Detection monitoring	Sept/Oct 1995	Radian Corporation	MW-01 MW-02 MW-03 MW-04 MW-05 MW-06 MW-07 MW-08 MW-10 MWS-04	Organochlorine pesticides (SW 8081) Metals (SW 6010) Antimony (SW 7041) Arsenic (SW 7060) Lead (SW 7421) Mercury (SW 7471) Selenium (SW 7740) Thallium (SW 7841)	None	Continue detection monitoring with next scheduled LTM sampling event (Fall 1996).
2	Round 2 LTM Sampling/ Detection monitoring	August 1996	Radian International LLC*	MW-01 MW-02 MW-03 MW-04 MW-05 MW-06 MW-07 MW-08 MW-10 MWS-04	Organochlorine pesticides (SW 8081) Metals (SW 6010) Antimony (SW 7041) Arsenic (SW 7060) Lead (SW 7421) Mercury (SW 7471) Selenium (SW 7740) Thallium (SW 7841)	None	Continue detection monitoring with next scheduled LTM sampling event (Fall 1996).
3	Round 3 LTM Sampling/ Detection monitoring	January 1998	Radian International LLC	MW-01 MW-02 MW-03 MW-04 MW-05 MW-06 MW-07 MW-08 MW-10 MWS-04	Organochlorine pesticides (SW 8081) Metals (SW 6010)** Mercury (SW 7471)	None	Continue detection monitoring with next scheduled LTM sampling event (January 1999).

* On 1 January 1996 Radian Corporation and Dow Environmental merged to form Radian International LLC.
** As of 1998, antimony, arsenic, lead, selenium, and thallium will be analyzed by method SW 6010.

APPENDIX A

Analytical Results

Table A-1
1998 LTM Organochlorine Pesticide Results

Analyte	ACL	Background Monitor Wells				Downgradient Monitor Wells					
		MW-01		MW-10		MW-02		MW-03		MW-04	
Organochlorine Pesticides-SW8081 (µg/L)											
4,4'-DDD	30	ND	(0.00380)	ND	(0.00372)	ND	(0.00376)	ND	(0.00372)	ND	(0.0186)
4,4'-DDE	20	ND	(0.00178)	ND	(0.00172)	ND	(0.00176)	ND	(0.00174)	ND	(0.00871)
4,4'-DDT	10	ND	(0.00336)	ND	(0.00329)	ND	(0.00376)	<DL	(0.00372)	ND	(0.0165)
Aldrin	50	ND	(0.00796)	ND	(0.00107)	<DL	(0.00788)	<DL	(0.00781)	ND	(0.00533)
Chlordane	40	ND	(0.0221)	ND	(0.0217)	ND	(0.0219)	ND	(0.0217)	ND	(0.109)
Dieldrin	6	<DL	(0.00463)	ND	(0.00433)	0.00819	(0.00437)	<DL	(0.00433)	ND	(0.0217)
Endosulfan I	232000	ND	(0.00183)	ND	(0.00180)	ND	(0.00184)	ND	(0.00180)	ND	(0.00900)
Endosulfan II	226000	ND	(0.00157)	ND	(0.00154)	ND	(0.00156)	ND	(0.00154)	ND	(0.00771)
Endosulfan Sulfate	16000	ND	(0.00414)	ND	(0.00406)	ND	(0.00410)	ND	(0.00406)	ND	(0.0203)
Endrin	1000	ND	(0.00607)	ND	(0.00595)	ND	(0.00601)	ND	(0.00595)	ND	(0.0298)
Endrin Aldehyde	20	ND	(0.00144)	ND	(0.00141)	ND	(0.00213)	0.0138	(0.00211)	ND	(0.0106)
Heptachlor	40	ND	(0.00182)	ND	(0.00179)	<DL	(0.00181)	ND	(0.00179)	ND	(0.00895)
Heptachlor epoxide	20	ND	(0.00111)	<DL	(0.000928)	ND	(0.00110)	0.0327	(0.000928)	<DL	(0.00543)
Isodrin	NA	ND	(0.00191)	ND	(0.00188)	0.00727	(0.00189)	ND	(0.00208)	ND	(0.00938)
Methoxychlor	15000	ND	(0.0186)	ND	(0.0183)	0.00261	(0.0185)	ND	(0.0209)	ND	(0.0914)
Toxaphene	120	ND	(0.0505)	ND	(0.0495)	ND	(0.0500)	ND	(0.0495)	ND	(0.248)
alpha-BHC	20	ND	(0.00155)	ND	(0.00152)	<DL	(0.00247)	ND	(0.00152)	ND	(0.00762)
beta-BHC	70	ND	(0.000970)	ND	(0.000952)	ND	(0.000961)	ND	(0.000952)	ND	(0.00476)
delta-BHC	1640	ND	(0.000922)	ND	(0.000818)	ND	(0.000913)	0.00119	(0.000818)	ND	(0.00452)
gamma-BHC	350	ND	(0.00335)	ND	(0.00328)	ND	(0.00332)	ND	(0.00328)	ND	(0.0120)

Table A-1
(Continued)

Analyte	ACL	Background Monitor Wells				Downgradient Monitor Wells					
		MW-05		MW-06		MW-07		MW-08		MWS-04	
Organochlorine Pesticides-SW8081 (µg/L)											
4,4'-DDD	30	ND	(0.0184)	ND	(0.00387)	ND	(0.0188)	ND	(0.00393)	<DL	(0.00380)
4,4'-DDE	20	0.0208	(0.0863)	ND	(0.00179)	0.0141	(0.00880)	ND	(0.00179)	ND	(0.00178)
4,4'-DDT	10	ND	(0.0163)	ND	(0.00342)	ND	(0.0166)	ND	(0.00383)	ND	(0.00336)
Aldrin	50	ND	(0.00528)	ND	(0.00111)	ND	(0.00538)	<DL	(0.00804)	<DL	(0.00796)
Chlordane	40	ND	(0.108)	ND	(0.0226)	ND	(0.110)	ND	(0.0223)	ND	(0.0221)
Dieldrin	6	ND	(0.0215)	<DL	(0.00472)	<DL	(0.0229)	<DL	(0.00446)	ND	(0.00442)
Endosulfan I	232000	ND	(0.00891)	ND	(0.00187)	ND	(0.00909)	ND	(0.00185)	<DL	(0.00183)
Endosulfan II	226000	ND	(0.00764)	ND	(0.00160)	ND	(0.00779)	ND	(0.00159)	ND	(0.00157)
Endosulfan Sulfate	16000	ND	(0.0201)	ND	(0.00423)	ND	(0.0205)	ND	(0.00418)	ND	(0.00414)
Endrin	1000	ND	(0.0295)	ND	(0.00619)	ND	(0.00300)	ND	(0.00613)	ND	(0.00607)
Endrin Aldehyde	20	ND	(0.0105)	0.00362	(0.00220)	ND	(0.0107)	ND	(0.00218)	<DL	(0.00144)
Heptachlor	40	ND	(0.00887)	ND	(0.00186)	ND	(0.00904)	<DL	(0.00184)	ND	(0.00182)
Heptachlor epoxide	20	<DL	(0.00538)	ND	(0.00965)	ND	(0.00548)	0.0131	(0.000955)	ND	(0.00111)
Isodrin	NA	ND	(0.0103)	<DL	(0.00216)	ND	(0.0105)	0.108	(0.00193)	ND	(0.00212)
Methoxychlor	15000	<DL	(0.0103)	ND	(0.0190)	ND	(0.0923)	ND	(0.0215)	ND	(0.0186)
Toxaphene	120	ND	(0.245)	ND	(0.0515)	ND	(0.250)	ND	(0.0510)	ND	(0.0505)
alpha-BHC	20	ND	(0.00755)	ND	(0.00158)	ND	(0.00769)	ND	(0.00157)	ND	(0.00155)
beta-BHC	70	<DL	(0.00472)	ND	(0.000990)	ND	(0.00481)	ND	(0.000980)	0.00831	(0.000970)
delta-BHC	1640	ND	(0.00448)	ND	(0.000851)	ND	(0.00457)	ND	(0.000842)	ND	(0.000834)
gamma-BHC	350	ND	(0.0163)	ND	(0.00342)	ND	(0.0166)	ND	(0.00338)	<DL	(0.00245)

Notes:

<DL = Detected below detection limit.
NA = No EPA toxicity value currently available for Isodrin.
ND = Not detected.
( ) = Detection limit.

Table A-2
1998 LTM Metals Results

Analyte	ACL	Background Monitor Wells				Downgradient Monitor Wells					
		MW-01		MW-10		MW-02		MW-03		MW-04	
Metals-SW6010 (mg/L)											
Aluminum	NA	ND	(0.00529)	.270	(0.114)	0.0470	(0.0285)	ND	(0.0285)	ND	(0.0285)
Antimony	2	ND	(0.00313)	0.164	(0.0828)	ND	(0.0207)	ND	(0.0207)	ND	(0.00207)
Arsenic	1	0.00881	(0.00175)	0.103	(0.0429)	0.0442	(0.0107)	ND	(0.0107)	ND	(0.0107)
Barium	6720	0.0458	(0.000118)	0.0506	(0.00338)	0.0198	(0.000845)	0.0147	(0.000845)	0.0158	(0.000845)
Beryllium	0.43	0.000800	(0.000171)	0.0118	(0.00388)	0.00885	(0.000970)	0.00635	(0.000970)	0.00375	(0.000970)
Cadmium	3	ND	(0.000191)	0.0138	(0.00342)	0.00135	(0.000855)	0.00210	(0.000855)	0.000950	(0.000855)
Chromium	2580	0.00199	(0.000348)	0.138	(0.0159)	ND	(0.00397)	0.0986	(0.00397)	ND	(0.00397)
Cobalt	310	0.00236	(0.000513)	0.0652	(0.0116)	0.00880	(0.00290)	0.00990	(0.00290)	0.00985	(0.00290)
Copper	191	ND	(0.00155)	ND	(0.0299)	ND	(0.00747)	ND	(0.00747)	ND	(0.00747)
Iron	NA	1.10	(0.0155)	1.38	(0.237)	0.588	(0.0591)	1.51	(0.0591)	0.606	(0.0591)
Lead	4.13×10^6	ND	(0.00182)	ND	(0.0267)	ND	(0.00666)	ND	(0.00666)	ND	(0.00666)
Magnesium	NA	2700	(0.0800)	3930	(0.0816)	268	(0.0204)	441	(0.0204)	861	(0.0204)
Manganese	26	ND	(0.0000850)	ND	(0.00280)	0.479	(0.000700)	2.91	(0.000700)	1.15	(0.000700)
Nickel	258	0.107	(0.000638)	0.138	(0.0115)	0.0206	(0.00286)	0.279	(0.00286)	0.0320	(0.00286)
Potassium	NA	118	(0.0348)	126	(0.836)	21.3	(0.209)	30.9	(0.209)	71.4	(0.209)
Selenium	26	0.00649	(0.00171)	ND	(0.0442)	ND	(0.0110)	ND	(0.0110)	ND	(0.0110)
Silver	26	ND	(0.000537)	0.0158	(0.0113)	ND	(0.00283)	ND	(0.00283)	ND	(0.00283)
Sodium	NA	6050	(1.75)	10600	(3.09)	602	(0.774)	936	(0.774)	2030	(0.774)
Thallium	8	ND	(0.00281)	0.141	(0.0425)	ND	(0.0106)	0.0157	(0.0106)	ND	(0.0106)
Vanadium	36	0.0944	(0.000523)	0.0360	(0.0144)	ND	(0.00360)	ND	(0.00360)	ND	(0.00360)
Zinc	2480	ND	(0.00169)	ND	(0.0278)	ND	(0.00696)	ND	(0.00696)	ND	(0.00696)
Mercury-SW7471 (mg/L)											
Mercury	2	ND	(0.0000570)	ND	(0.0000570)	ND	(0.0000570)	0.000100	(0.0000570)	ND	(0.0000570)

Table A-2
(Continued)

Analyte	ACL	Background Monitor Wells				Downgradient Monitor Wells					
		MW-05		MW-06		MW-07		MW-08		MWS-04	
Metals-SW6010 (mg/L)											
Aluminum	NA	ND	(0.0285)	ND	(0.114)	ND	(0.0285)	ND	(0.00529)	0.243	(0.114)
Antimony	2	ND	(0.00207)	ND	(0.0828)	ND	(0.0207)	ND	(0.00313)	0.105	(0.0828)
Arsenic	1	0.0259	(0.0107)	0.0736	(0.0429)	0.0154	(0.0107)	0.00262	(0.00175)	00878	(0.0429)
Barium	6720	0.0138	(0.000845)	0.0428	(0.00338)	0.0297	(0.000845)	0.0180	(0.000118)	0.0264	(0.00338)
Beryllium	0.43	0.00185	(0.000970)	0.0158	(0.00388)	0.00205	(0.000970)	0.000950	(0.000171)	ND	(0.00388)
Cadmium	3	ND	(0.000855)	0.0154	(0.00342)	0.00190	(0.000855)	ND	(0.000191)	ND	(0.00342)
Chromium	2580	ND	(0.00397)	0.0374	(0.0159)	ND	(0.00397)	ND	(0.000348)	0.0394	(0.0159)
Cobalt	310	ND	(0.00290)	0.0438	(0.0116)	0.00830	(0.00290)	0.0126	(0.000513)	0.0278	(0.0116)
Copper	191	ND	(0.00747)	ND	(0.0299)	ND	(0.00747)	ND	(0.00155)	ND	(0.0299)
Iron	NA	0.0996	(0.0591)	1.14	(0.237)	0.910	(0.0591)	0.126	(0.0155)	ND	(0.237)
Lead	4.13×10^6	ND	(0.00666)	ND	(0.0267)	ND	(0.00666)	ND	(0.00182)	ND	(0.0267)
Magnesium	26	526	(0.0204)	6510	(0.0816)	428	(0.0204)	422	(0.00400)	2890	(0.0816)
Manganese	36	2.69	(0.000700)	0.628	(0.00280)	1.79	(0.000700)	0.732	(0.0000850)	ND	(0.00280)
Nickel	258	0.0229	(0.00286)	0.128	(0.0115)	0.0254	(0.00286)	0.0467	(0.000638)	0.0628	(0.0115)
Potassium	NA	20.7	(0.209)	368	(0.836)	23.0	(0.209)	50.9	(0.0348)	167	(0.836)
Selenium	NA	ND	(0.0110)	ND	(0.0442)	ND	(0.0110)	0.00246	(0.00171)	ND	(0.0442)
Silver	26	ND	(0.00283)	ND	(0.0113)	0.00470	(0.00283)	ND	(0.000537)	ND	(0.0113)
Sodium	NA	1510	(0.774)	16400	(3.09)	1020	(0.774)	1070	(0.876)	7860	(3.09)
Thallium	8	ND	(0.0106)	0.0462	(0.0425)	0.0162	(0.0106)	ND	(0.00281)	ND	(0.0425)
Vanadium	36	ND	(0.00360)	0.0170	(0.0144)	0.00375	(0.00360)	0.0590	(0.000523)	ND	(0.0144)
Zinc	2480	ND	(0.00696)	ND	(0.0278)	ND	(0.00696)	ND	(0.00169)	ND	(0.0278)
Mercury-SW7471 (mg/L)											
Mercury	2	ND	(0.0000570)	ND	(0.0000570)	ND	(0.0000570)	ND	(0.0000570)	ND	(0.0000570)

Notes:

<DL = Detected below detection limit.
NA = No EPA toxicity value currently available for Selenium.
ND = Not detected.
( ) = Detection limit.

APPENDIX B

Groundwater Sampling Logs

IRP GROUNDWATER SAMPLING LOG

SHEET 1 OF 1

PROJECT HAFB Sewage Lagoons LTM		SAMPLER GTM/EJA	
INSTALLATION ID HAFB	**WELL ID** MW-01	**LOG DATE** 1-9-98	**LOG TIME** 1045
PERFORMED BY RAD	SATURATED THICKNESS 8.07	WELL VOLUME ($\pi(\frac{r}{12})^2 h * 7.48$) 5.27	
WATER LEVEL INITIAL 9.73 FINAL —	**TOTAL DEPTH** INITIAL 17.8 FINAL 17.8	AMOUNT TO PURGE 5.27 gal/well vol x3 = 15.8 gal.	

PURGE METHOD: Low Flow purge via QED pneumatic bladder pump

Time (LOGTIME)	Cum. Volume (gal)	Water Quality Temp. (F)	pH	Cond.	Turb.	Water Level	Comments
1028	3	62.9	5.67	>20k*	—	—	*Exceeds conductivity
1037	10	63.4	5.83	>20k	—	—	range on meter
1045	18	65.0	5.75	>20k	—	—	(20,000 us/cm)
							Temp reading a little
							high due to sun
							on instrument
Final Measurements							

SAMPLING METHOD

Sample ID	(MATRIX)	Preservative	Analysis	Sample Type Code (SACode)	Comments
98-MW-01-01	W	HNO_3	Metals/ Organochlorine Pesticides		MS/MSD also
98-MW-01-01-QC	"	"	"		Duplicate Sample

F4062 4.20.4

IRP GROUNDWATER SAMPLING LOG

SHEET 1 OF 1

PROJECT HAFB Sewage Lagoons LTM		SAMPLER GTM	
INSTALLATION ID HAFB	**WELL ID** MW-02	**LOG DATE** 1-7-98	**LOG TIME** 1710
PERFORMED BY RAD	SATURATED THICKNESS 6.49	WELL VOLUME $(\pi(\frac{r}{12})^2 h * 7.48)$ 1.56 (well casing volume)	

WATER LEVEL INITIAL	FINAL	**TOTAL DEPTH** INITIAL	FINAL	AMOUNT TO PURGE (gallons)
10.84	—	17.33	17.33	4.67 (3 well casing volumes)

PURGE METHOD: Low flow purge via QED pneumatic bladder pump

Time (LOGTIME)	Cum. Volume (gal)	Water Quality Temp.	pH	Cond.	Turb.	Water Level	Comments
1647	2	60.2	7.55	5380	—	—	
1657	8	60.5	7.58	5500	—	—	
1705	14	59.2	7.54	5470	—	—	
Final Measurements							

SAMPLING METHOD

Sample ID	(MATRIX)	Preservative	Analysis	Sample Type Code (SACode)	Comments
98-MW-02-01 98-MW-02-01QC	GW	HNO_3	Metals/ Organochlorine Pesticides		

F4062 4.20.4

IRP GROUNDWATER SAMPLING LOG

SHEET 1 OF 1

PROJECT HAFB Sewage Lagoons CTM		SAMPLER GTM/ESA	
INSTALLATION ID HAFB	**WELL ID** MW-03	**LOG DATE** 1-8-97	**LOG TIME** 1050
PERFORMED BY RAD	SATURATED THICKNESS 5.17	WELL VOLUME ($\pi(\frac{r}{12})^2 h * 7.48$) 1.24 gal (well casing vol.)	
WATER LEVEL INITIAL 12.03 FINAL —	**TOTAL DEPTH** INITIAL ~~17.05~~ 17.2 FINAL 17.2	AMOUNT TO PURGE 3.72 gal	

PURGE METHOD: Low Flow purge via QED pneumatic bladder pump

Time (LOGTIME)	Cum. Volume (gal)	Water Quality Temp.	pH	Cond.	Turb.	Water Level	Comments
1013	3	60.9	6.53	8990	—	—	
1025	8	61.9	6.37	8920	—	—	
1037	13	59.8	6.31	8540	—	—	
Final Measurements							

SAMPLING METHOD

Sample ID	(MATRIX)	Preservative	Analysis	Sample Type Code (SACode)	Comments
98-MW-03-01	GW	HNO_3	Metals/ Organochlorine Pesticides		

F4082 4.20.4

IRP GROUNDWATER SAMPLING LOG

SHEET 1 OF 1

PROJECT HAFB Sewage Lagoons LTM		SAMPLER GTM/EJA	
INSTALLATION ID HAFB	**WELL ID** MW-04	**LOG DATE** 1-8-97	**LOG TIME** 1130
PERFORMED BY RAD	SATURATED THICKNESS 11.41	WELL VOLUME $(\pi(\frac{r}{12})^2 h * 7.48)$ 2.74	

WATER LEVEL INITIAL	FINAL	**TOTAL DEPTH** INITIAL	FINAL	AMOUNT TO PURGE
5.81	—	17.22	17.22	8.21

PURGE METHOD: Low Flow Purge via QED pneumatic bladder pump

Time (LOGTIME)	Cum. Volume (gal)	Water Quality Temp.	pH	Cond.	Turb.	Water Level	Comments
1113	2	59.7	6.24	14,910	—	—	
1119	8	61.8	6.54	15,700	—	—	
1125	16	62.3	6.74	15,800	—	—	
Final Measurements							

SAMPLING METHOD

Sample ID	(MATRIX)	Preservative	Analysis	Sample Type Code (SACode)	Comments
98-MW-04-01	GW	HNO_3	Metals/ Organochlorine Pesticides		

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IRP GROUNDWATER SAMPLING LOG

SHEET 1 OF 1

PROJECT HAFB Sewage Lagoons LTM		SAMPLER GTM	
INSTALLATION ID HAFB	**WELL ID** MW-05	**LOG DATE** 1-7-98	**LOG TIME** 1610
PERFORMED BY RAD	SATURATED THICKNESS 8.21	WELL VOLUME $(\pi(\frac{r}{12})^2 h * 7.48)$ 1.97 (well casing vol.)	
WATER LEVEL INITIAL 9.13 FINAL —	**TOTAL DEPTH** INITIAL 17.34 FINAL 17.34	AMOUNT TO PURGE x3 = 5.91 gal – well casing volumes	

PURGE METHOD: Low flow purge via QED pneumatic bladder pump

Time (LOGTIME)	Cum. Volume (gal)	Water Quality Temp.	pH	Cond.	Turb.	Water Level	Comments
1551	2	57.6	7.66	9800	—	—	
1559	8	55.5	7.55	9740	—	—	
1607	15	53.9	7.41	9330	—	—	
Final Measurements							

SAMPLING METHOD

Sample ID	(MATRIX)	Preservative	Analysis	Sample Type Code (SACode)	Comments
98-MW-05-01	GW	HNO_3	metals/ organochlorine pesticides		MS/MSD collected → 3 1L Ambers → 1 L Poly w/ HNO_3

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IRP GROUNDWATER SAMPLING LOG

SHEET 1 OF 1

PROJECT HAFB Sewage Lagoons LTM			SAMPLER GTM/EJA
INSTALLATION ID HAFB	**WELL ID** mw-06	**LOG DATE** 1-8-98	**LOG TIME** 850
PERFORMED BY RAD	SATURATED THICKNESS 11.51	WELL VOLUME ($\pi(\frac{r}{12})^2 h * 7.48$) 2.76 (well casing vol.)	
WATER LEVEL INITIAL 6.18 FINAL	**TOTAL DEPTH** INITIAL 17.69 FINAL 17.69	AMOUNT TO PURGE 8.29 gal	

PURGE METHOD: Low flow purge via QED pneumatic bladder pump

Time (LOGTIME)	Cum. Volume (gal)	Water Quality Temp.	pH	Cond.	Turb.	Water Level	Comments
825	1	54.9	5.83	>20k	–	–	
832	4	54.4	5.84	>20k	–	–	
841	11	55.6	5.90	>20K	–	–	
850	17	55.9	5.91	>20K	–	–	
Final Measurements							

SAMPLING METHOD

Sample ID	(MATRIX)	Preservative	Analysis	Sample Type Code (SACode)	Comments
98-mw-06-01	GW	HNO_3	metals/ Organochlorine Pesticides		

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IRP GROUNDWATER SAMPLING LOG

SHEET 1 OF 1

PROJECT HAFB Sewage Lagoons LTM		SAMPLER GTM	
INSTALLATION ID HAFB	**WELL ID** MW-07	**LOG DATE** 1-7-98	**LOG TIME** 1545
PERFORMED BY RAD	SATURATED THICKNESS 8.62	WELL VOLUME $(\pi(\frac{r}{12})^2 h * 7.48)$ 2.07 gall	
WATER LEVEL INITIAL 8.67 FINAL	**TOTAL DEPTH** INITIAL 17.29 FINAL 17.29	AMOUNT TO PURGE x 3 well casing volumes = 6.2	

PURGE METHOD: Low flow purge via QED pneumatic bladder pump

Time (LOGTIME)	Cum. Volume (gal)	Water Quality Temp.	pH	Cond.	Turb.	Water Level	Comments
1452	2	60.0	7.57	8800	–	–	– compressor ran out of
1535	7	53.5	7.71	7970	–	–	gas – leaves to fill up
1540	13	54.2	7.36	7850	–	–	
Final Measurements							

SAMPLING METHOD

Sample ID	(MATRIX)	Preservative	Analysis	Sample Type Code (SACode)	Comments
98-mw-07-01	GW	HNO_3	metals/ Organochlorine Pesticides		

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IRP GROUNDWATER SAMPLING LOG

SHEET 1 OF 1

PROJECT HAFB Sewage Lagoons LTM		SAMPLER GTM/EJA	
INSTALLATION ID HAFB	**WELL ID** MW-08	**LOG DATE** 1-9-98	**LOG TIME** 1115
PERFORMED BY RAD	SATURATED THICKNESS 6.29	WELL VOLUME ($\pi(\frac{r}{12})^2 h * 7.48$) 1.52 gal (well casing vol.)	
WATER LEVEL INITIAL 11.01 FINAL	**TOTAL DEPTH** INITIAL 17.30 FINAL 17.30	AMOUNT TO PURGE x3 = 4.56	
PURGE METHOD: Low flow purge via QED pneumatic bladder pump			

Time (LOGTIME)	Cum. Volume (gal)	Water Quality Temp.	pH	Cond.	Turb.	Water Level	Comments
1058	3	61.4	5.76	8350	–	–	
1107	8	62.0	5.77	8540	–	–	
1111	13.5	62.4	5.81	8670	–	–	
Final Measurements							

SAMPLING METHOD

Sample ID	(MATRIX)	Preservative	Analysis	Sample Type Code (SACode)	Comments
98-MW-08-01	GW	HNO_3	metals / Organochlorine Pesticides		

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IRP GROUNDWATER SAMPLING LOG

SHEET 1 OF 1

PROJECT		SAMPLER	
HAFB Sewage Lagoons CTM		EJA/GTM	
INSTALLATION ID	**WELL ID**	**LOG DATE**	**LOG TIME**
HAFB	MW-10	1-7-98	1435
PERFORMED BY	SATURATED THICKNESS	WELL VOLUME ($\pi(\frac{r}{12})^2 h * 7.48$)	
RAD	13.71	13.71 x .163 = 2.23 gal	

WATER LEVEL	TOTAL DEPTH	AMOUNT TO PURGE
INITIAL 8.44 FINAL	INITIAL 22.15 FINAL 22.15	~6.7 gallons

PURGE METHOD: Low flow purge via QED pneumatic bladder pump

Time (LOGTIME)	Cum. Volume (gal)	Water Quality Temp. (F)	pH	Cond.	Turb.	Water Level	Comments
1414	1	61.9	6.47	—	—	—	Conductivity exceeds
1426	7	60.2	6.86	—	—	—	range >20,000 uS/cm
1434	12	61.6	7.06	—	—	—	
1435	Sampled						
Final Measurements							

SAMPLING METHOD

Sample ID	(MATRIX)	Preservative	Analysis	Sample Type Code (SACode)	Comments
98-MW-10-01	W	HNO_3	Metals / Organochlorine Pesticides		1 L Poly 1 L Amber glass

F4062 4.20.4

IRP GROUNDWATER SAMPLING LOG

SHEET 1 OF 1

PROJECT HAFB Sewage Lagoons LTM		SAMPLER GTM/EJA	
INSTALLATION ID HAFB	**WELL ID** MW5-04	**LOG DATE** 1-8-98	**LOG TIME** 812
PERFORMED BY RAD	SATURATED THICKNESS 4.62	WELL VOLUME $(\pi(\frac{r}{12})^2 h * 7.48)$ 0.75 gal	
WATER LEVEL INITIAL 9.63 FINAL	**TOTAL DEPTH** INITIAL 14.25 FINAL 14.25	AMOUNT TO PURGE x3 = 2.26 gal	

PURGE METHOD: Low flow purge via QED pneumatic bladder pump

Time (LOGTIME)	Cum. Volume (gal)	Water Quality Temp.	pH	Cond.	Turb.	Water Level	Comments
800	2	54.6	5.71	>20K	—	—	Cond exceeds range
809	4	55.9	5.80	>20K	—	—	pH affected by ambient
814	6	56.3	5.84	>20K	—	—	temperature (<25°F)
Final Measurements							

SAMPLING METHOD

Sample ID	(MATRIX)	Preservative	Analysis	Sample Type Code (SACode)	Comments
98-MW5-04-01	W	HNO_3	Metals/ Organochlorine Pesticides		

F4062 4.20.4

APPENDIX C

Chain-of-Custody Forms

RADIAN INTERNATIONAL LLC

Chain of Custody Record

PROJECT: Sewage Lagoons LTM

SITE: HAFB

PREPARED BY (Signature): [signature]

FIELD SAMPLE I.D.	SAMPLE MATRIX	DATE/TIME	MS/MSD	NO. OF CONTAINERS	SW8081	SW6010A, SW7470A	REMARKS
~~98-MW-01-01~~	~~water~~	~~1-7-98/1555~~		~~2~~	~~1~~	~~1~~	-1 L Polys preserved
98-MW-02-01	↓	1-7-98/1710		2	1	1	w/ HNO_3
~~98-MW-02-01QC~~		~~1-7-98/~~		~~2~~	~~1~~	~~1~~	
98-MW-03-01		1-8-98/1050		2	1	1	- all samples put in
98-MW-05-01	↓	1-7-98/1610		2	1	1	coolers at 4°C after
98-MW-04-01	↓	1-8-98/1130	↑ no MS/MSD	2	1	1	collection

REMARKS: Project # 640311

RELINQUISHED BY:	DATE	TIME
[signature]	1-8-98	1300

RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME

LAB USE ONLY

RECEIVED FOR LABORATORY BY:	DATE	TIME	AIRBILL NO.	OPENED BY:	DATE	TIME	TEMP°C	SEAL #	CONDITION

REMARKS:

IEG-4\FH\3-96-30337coc.FH5

RADIAN INTERNATIONAL LLC

Chain of Custody Record

Page 1 of 1

PROJECT: Sewage Lagoons LTM

SITE: HAFB

PREPARED BY (Signature): [signature]

FIELD SAMPLE I.D.	SAMPLE MATRIX	DATE/TIME	MS/MSD	NO. OF CONTAINERS	SW8081	SW6010A, SW7470A									REMARKS
~~98-MW-05-01~~	~~water~~	~~1-8-98/1450~~		~~2~~	~~1~~	~~1~~									- 1 L Polys preserved
98-MW-06-01		1-8-98/850		2	1	1									w/ HNO3
98-MW-07-01		1-7-98/1545		2	1	1									
~~98-MW-08-01~~		~~1-7-98/1650~~		~~2~~	~~1~~	~~1~~									- all samples put
98-MW-10-01		1-7-98/1435		2	1	1									in coolers at 4°C
98-MWS-04-01		1-8-98/812		2	1	1									after collection

REMARKS: Project # 640311

RELINQUISHED BY:	DATE	TIME
[signature]	1-8-98	1800

RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME

LAB USE ONLY

RECEIVED FOR LABORATORY BY:	DATE	TIME	AIRBILL NO.	OPENED BY:	DATE	TIME	TEMP°C	SEAL #	CONDITION

REMARKS:

IEG-4\FH13-96-30337coc.FH5

RADIAN INTERNATIONAL LLC

Chain of Custody Record

Page 1 of 1

PROJECT: HAFB Sewage Lagoons LTM

SITE: HAFB

PREPARED BY (Signature): Daniel T. Mills

FIELD SAMPLE I.D.	SAMPLE MATRIX	DATE/TIME	MS/MSD	NO. OF CONTAINERS	SW8081	SW6010A, SW7470A										REMARKS
98-MW-01-01	water	1-9-97 / 1045	Y	4	3	1										• 1 L Polys preserved
98-MW-01-01RP	↓	" / —		2	1	1										with HNO_3
98-MW-08-01	↓	" / 1115		2	1	1										
																• All samples put in
																coolers @ 4°C
																after collection

ANALYSES

REMARKS: Project # 640311

RELINQUISHED BY:	DATE	TIME
Daniel T. Mills	1-9-98	1500

RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME

LAB USE ONLY

RECEIVED FOR LABORATORY BY:	DATE	TIME	AIRBILL NO.	OPENED BY:	DATE	TIME	TEMP°C	SEAL #	CONDITION

REMARKS:

IEG-41FH13-96-30337coc.FH5