WORK PLAN

FINAL GROUNDWATER MONITORING AND CLOSURE OF MONITORING WELLS

FORT DES MOINES

DES MOINES, IOWA

Project Number 007-03-269-01-001

P.O. Number DAKF11-01-F-0269

Prepared for:

U.S. Army Forces Command (BRACO)

Fort McPherson

Atlanta, Georgia

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June 2003

FIGURES & TABLES

ATTACHMENTS

1.0 INTRODUCTION

J.M. Waller Associates, Inc. (JMWA) was retained by United States Army Headquarters, Forces Command (FORSCOM, now BRACO) to provide professional consulting services and technical management under a General Services Administration contract serviced by the Army Atlanta Contracting Center (AACC). This work will support FORSCOM with the necessary and outstanding environmental actions needed to facilitate the completion of Base Realignment and Closure (BRAC) activity at Fort Des Moines (FDM) Site, in Des Moines, Iowa. JMWA received formal notice to proceed from FORSCOM on 16 October 2001, through the issuance of Requisition Number MIPR1M-KEL0-0079.

The Work Plan was developed in accordance with the *Scope of Work (SOW) for Groundwater Monitoring, Evaluation and Reporting, and Closure of Monitoring Wells, Fort Des Moines, IA.* The purpose of this Work Plan is to describe the technical approach and schedule required for monitoring well sampling and closure efforts of monitoring wells at FDM. Actions to be undertaken at FDM as part of this Scope of Work (SOW) include:

(1) The collection and analysis of groundwater samples from 9 existing monitoring wells (MW-1, MW-10, MW-11, MW-14, MW-17, MW-18, MW-19S, MW99-4, and MW99-5).

(2) The proper abandonment of 29 groundwater monitoring wells (both BRAC and FUDS wells) in accordance with closure requirements under Iowa Administrative Code (IAC) 567.

(3) Preparation of a report, to document the above activities and interfacing with FORSCOM and the regulators, as necessary.

1.1 Site Information

FDM is situated within the Des Moines city limits in southern Polk County, Iowa. FDM is located one mile east of the Des Moines Municipal Airport along the south side of Army Post Road. The site location coordinates are NE 1/4, Section 33, T78N, R24N, of the Des Moines SE, Iowa, 7.5-Minute United States Geological Survey (USGS) Topographic Quadrangle Map (1976). The Universal Transverse Mercator (UTM) central site coordinates are 93° 37′ 9″ west longitude, 41° 31′ 12″ north latitude.

Both the BRAC and FUDS parcels of FDM are bordered to the north by a commercial/residential area and to the south by the Blank Park Zoo. The BRAC property is bordered on the east by Fort Des Moines Park and the active U.S. Army Reserve Center and on the west by FUDS property, which is now Blank Park. The FUDS parcel is bounded by 9th Street to the west and the BRAC property to the east. Figure 1-1 illustrates some of the neighboring properties, some of the site features, and the layout of the buildings at FDM.

The excised BRAC parcel consists of 53.28 acres and represents the major portion of a former U.S. Army cavalry post that was originally established on 640 aces of land donated in 1903. The FUDS parcel was previously excised as part of property transfers that have totaled approximately 557 acres. All of the excised property is now used for commercial, residential, and recreational purposes. A 30.02-acre parcel of the installation is still occupied and used by the U.S. Army Reserve Center.

2.0 SCOPE OF SERVICES FOR FORT DES MOINES

The services to be provided by JMWA will include groundwater sampling, monitoring well abandonment, and reporting and client interfacing.

2.1 Task 1 – Groundwater Sampling and Analysis

An additional round of groundwater samples will be collected for the following reasons: (1) to provide current data, since the last sampling event was August 2000, (2) to identify whether contamination is low enough to allow JMWA and its contractor to abandon the wells without posing unacceptable health risks to the workers. Nine (9) groundwater wells will be sampled using procedures acceptable to IDNR and FORSCOM. Details of the proposed groundwater sampling are described in Section 3.0 of this document. JMWA will coordinate the disposal of Investigative Derived Waste as described in Section 6.0

2.2 Task 2 – Monitoring Well Abandonment

Twenty-nine (29) monitoring wells, no longer needed for the environmental actions at the site, will be abandoned following the procedures and guidelines required by Iowa Administrative Code (IAC) 567. Details of the methodology to be used for this Task are described in Section 4.0 of this document.

2.3 Task 3 – Data Reporting and Client Interfacing

JMWA will prepare a report of the analytical results from the groundwater samples. Also, during the course of the project, it is anticipated that JMWA professionals will need to attend both informal and formal meetings with FORSCOM and IDNR or EPA. Details of the work to be completed under this Task are described in Section 5.0 of this document.

The Project Schedule for Fort Des Moines in Table 1-1 presents the anticipated project schedule for work at FDM. This schedule includes the range of dates to complete the expected tasks.

3.0 GROUNDWATER SAMPLING AND ANALYSIS EVENT

Due to the presence of historical contamination and to indicate to what extent contamination has decreased, a one time sampling event is proposed for the following 9 monitoring wells: MW-1, MW-10, MW-11, MW-14, MW-17, MW-18, MW-19S, MW99-4, and MW99-5. All samples shall be collected per IDNR and EPA guidance.

3.1 Groundwater Sample and Analysis Procedures

Groundwater samples will be collected from all nine monitoring wells and analyzed for volatile organics by EPA 8260B and pesticides by EPA 8081. JMWA will collect samples as per IDNR guidance documents and BRACO approval. The proposed method will include collecting water level measurements; well purging; measurement of appropriate water quality field parameters; groundwater sample collection; and quality control; shipping, and laboratory analysis.

3.1.1 Well Purging and Measurement of Field Parameters

Prior to collection of groundwater samples from the nine monitoring wells at FDM, the depth of the water table in each well will be gauged and recorded, then the volume of the water column calculated. All data will be entered into a bound field journal. Each well will be purged using a low-flow diaphragm or peristaltic pump or by hand bailers until three well volumes have been removed or the well is purged dry. Groundwater field parameters (pH, specific conductance, temperature, and dissolved oxygen) shall be recorded after each well volume is purged. Down-hole sampling equipment, which may come into contact with the groundwater, will be decontaminated before each immersion into the monitoring well. Decontamination procedures are described in section 3.1.4. All purge water will be collected and stored in 55-gallon drums and sampled to determine whether it is hazardous or non-hazardous. All necessary quality control samples including duplicates, field blank, trip blank, and lab matrix blank samples will be collected. Approximately 13 samples will be collected in all.

3.1.2 Groundwater Sample Collection, Delivery to Laboratory, and Quality Control

JMWA will contact the laboratory and arrange for all sample bottles, shipping containers, a trip blank sample for quality control and chain-of-custody forms and seals to be available. Following well purging and the documentation of field parameters, samples will be collected using one-time use disposable bailers. The sampler will don new nitrile gloves for each monitoring well sampled. These steps will minimize the potential for cross contamination between the wells. The VOA samples will be collected first by gently filling the sample vials from the bailer taking c are to minimize any agitation, until a convex meniscus is visible. The sample will then be capped. There should be no air bubbles in samples submitted to the laboratory. The pesticide samples will then be collected by filling two 1 liter amber glass jars. The samples shall be placed inside a plastic baggie and immediately placed on ice inside the shipping container. In addition to the groundwater samples, which will be collected from each well, a field duplicate will be collected from MW-17 and an MS/MSD for quality control will be collected from a well to be determined.

JMWA personnel will record each sample and assign a unique and an easily understandable serial identification number. JMWA will record this information in the field journal along with daily weather conditions, instrument readings, sampling methodology, sample description, field parameters, and chain of custody information. Any deviation from this Work Plan, due to field conditions will be noted and explained.

Each sample will be numbered and labeled in indelible ink with the following information:

- Project Name
- Date and Time
- Sample Number {location and date combined, i.e. MW1-7-03 for monitoring well 1 sampled on July 2003}
- Samplers initials
- Preservatives
- Analytical Method

Each sample will be placed in a separate resealable plastic bag and packed on-site in ice, which will be used to keep the sample at or below 4 Celsius until the samples arrive at the laboratory. Samples shall be packed as well as is reasonably possible to prevent breakage. The completed chain-of-custody documentation will be placed inside a resealable plastic bag and taped to the inside lid of the shipping container. Custody seals will be signed, dated and placed on the outside of the shipping container. Removal or tearing of these seals would indicate possible sample tampering. JMWA will ensure the fieldwork schedule allows for delivery of the samples to the lab at the completion of sampling activities.

3.1.3 Laboratory Analysis

The laboratory to perform the analytical services will be Prism Laboratories Inc., a USACE certified lab, located in Charlotte, NC. Groundwater sample results are due from the laboratory in 2 weeks (standard turnaround time). The samples will be analyzed by EPA Method 8260B for Volatile Organic Compounds (VOCs), and EPA Method 8081 for Pesticides. Laboratory data sheets and quality control sample data will be presented in the final report.

3.1.4 Decontamination Procedures

The following procedure will be utilized to decontaminate all equipment that will come into contact with the groundwater. The equipment will be washed with a solution of potable water and Alconox, or equivalent laboratory-grade detergent. Then the equipment will be rinsed with copious quantities of potable water followed by rinsing

three additional times with ASTM Type II Reagent-Grade Water. The equipment will be air dried on clean aluminum foil elevated at least two feet above ground. If the sampling device shall not be used immediately after being decontaminated, it will be wrapped in oil-free aluminum foil, or placed it in a closed stainless steel, glass, or Teflon® container.

4.0 WELL ABANDONMENT ACTIVITIES

JMWA will direct the abandonment of twenty-nine monitoring wells at FDM. This work will be completed in accordance with the Iowa Administrative Code 567, and the site specific Health and Safety Plan. The wells to be closed are MW-1 through MW-14, MW-14D, MW-17, MW-18, MW-18E, MW-18W, MW-19S, MW-19D, MW-20, MW-21, MW-96-1 through MW-99-6. These include all the known monitoring wells on and adjacent to the site, including all wells on both the BRAC and FUDS properties. The monitoring wells are constructed of Schedule 40 PVC, twenty-three of them are 4" ID and six of them are 2" ID. The majority of the well depths range from approximately 20 - 31 feet below ground surface (bgs) with two deeper wells at 45 and 49 feet bgs. The locations of these monitoring wells are shown on Figure 1-1, Site Layout. Well construction logs for most monitoring well are located in Attachment A, Well Construction Logs.

4.1 Technical Approach for Well Abandonment

The removal and closure of monitoring wells will be performed in accordance with the following:

- Iowa Administrative Code (IAC) 567 Chapter 39: Requirements for Properly Plugging Abandoned Wells

Work tasks will generally consist of performing a pre-abandonment monitoring well inspection and the well abandonment phase.

4.2 Pre-Abandonment Well Inspection

JMWA will conduct a pre-abandonment monitoring well review in order to evaluate current site conditions and verify existing well construction data (e.g., accessibility, well diameter, above or below-ground casing termination, total depth, etc.). This information will be used to ensure that JMWA selects the proper equipment to successfully complete the project. This will help ensure that the exact location and accessibility of each well is known. The well inspection will be conducted prior to the groundwater sampling event.

4.3 Well Abandonment Phase

JMWA will retain the services of a certified Iowa drilling contractor to perform well abandonment procedures in accordance with IAC 567 Chapter 39. Based on the definitions in this chapter, the site wells are considered "Class 2" wells. These regulations require that the monitoring wells be abandoned by placing sealant material (neat cement or bentonite grout) from the well bottom up to four feet below the ground surface. The sealant material shall be placed by tremie pipe below the groundwater table.

Outer casing pipe and any curbing, frost pit or surface structure that extends through the ground surface shall be removed to a depth of four feet bgs. The well location should be capped by neat cement, sand cement grout, or concrete from four feet bgs to the ground surface. This surface cap shall be slightly higher than the surrounding ground surface to ensure that runoff is directed away from the sealed well. Following a 24 hour period, all monitoring wells plugged on the previous day will be revisited, whereupon any settling of well plugging sealants that has occurred will be backfilled with additional capping materials.

JMWA will inspect the work site and ensure that all solid debris associated with well abandonment activities is staged for non-hazardous removal before the property is vacated by the drilling company and its equipment.

JMWA will complete an Iowa Well Abandonment Form as required by IDNR for each of the twenty-nine monitoring wells to be abandoned. This form will reference coordinates and abandonment procedures for each well. This information will be submitted to the IDNR Contaminated Sites Section, and will be included in a final letter report to BRACO.

5.0 REPORTING, MEETINGS, AND CLIENT INTERACTION

The following section describes the preparation of the reports and the meetings anticipated for the proper coordination of this work.

5.1 Reporting

A Final report will be prepared to include the results of the sampling and analytical activities, to include all field activities and documentation, sampling and QC results. The sampling results will be summarized in tabular format to depict the current level of contamination compared to the MCLs adapted by IDNR. Sampling results from this event will be compared with results from previous sampling results to determine any decreasing trend in contaminant concentrations, and comparison with water level information to identify any possible correlation with water table elevations. All monitoring well abandonment activities will be included in the report, as well as the appropriate IDNR well abandonment forms.

5.2 Meetings

JMWA will attend meetings with the State or EPA on behalf of FORSCOM, as necessary. At present, we anticipate JMWA will need to prepare for and attend a minimum of four meetings throughout the course of this project. It is anticipated that in order to collect previous sampling results and site history, there may be numerous conversations with previous contractors, UAACE, and regulators and approximately five trips for data collection and meetings.

6.0 INVESTIGATIVE DERIVED WASTE DISPOSAL

JMWA will coordinate the disposal of investigative derived waste (IDW). IDW is any solid or liquid waste products that are created by environmental work at the site. It is anticipated that both solid and liquid wastes will be produced by the activities required under the SOW.

6.1 Solid Waste

Solid Waste debris will be created by well sampling and abandonment activities. Sampling activities may generate used bailers, tubing from purging, and possible PPE. Well abandonment activities may generate surface casing, concrete from well pads and bollards, if present. These materials are expected to be non-hazardous and will be disposed of as trash. Concrete and bollards from the well pads will be staged on-site.

6.2 Liquid Waste

Groundwater from well purging activities will be collected in 55-gallon drums at the wellhead. This water will be tested for VOCs by EPA 8260B and pesticides by EPA 8081. Purge water that exceeds hazardous waste criteria will be removed from the site by a licensed Pennsylvania hazardous waste disposal company. Purge water that is non-hazardous will be disposed of on-site.

7.0 SCHEDULE

Closure of FDM Monitoring Wells Schedule

Prepare Work Plan for Abandonment of Monitoring Wells	Nov 1, 2001 – Jan 31, 2002
Collect Data on previous FDM Investigations	Sept 1, 2002 – Nov. 30, 2003
Prepare Summary of FDM Investigation and Evaluation of Closure Activities	Dec 1, 2002 – Feb 28, 2003
Submit request to Iowa for Closure of monitoring wells	May 2, 2003
Review closure request by regulators	May 2 – June 2, 2003
Coordinate site access and set up lab for upcoming sampling	June 9 – June 27
Inspect and sample 9 monitoring wells	July 7 – July 11
Obtain results from lab and procure contractor to abandon monitoring wells	July 21 – Aug 1
Abandon 29 monitoring wells	Aug 4 – 8
Prepare well closure report	Aug 11 – 29, 2003

8.0 REFERENCES

Final Project Technical Report EI/RA/AA, Fort Des Moines, IA, Four volumes, prepared for U.S. Army Environmental Center by Versar, July 6, 1995.

Quarterly Sampling Report of Monitoring Wells at Fort Des Moines Facility, OHM Remediation Services Corp., January 7, 1997.

Interpretation of Data – Fort Des Moines, IA, Project 16187, OHM Remediation Services Corp., September 3, 1997.

Maximum Contaminant Levels and Health Advisory Levels, Iowa Drinking Water Supply Program Annual Compliance Report, 1997.

Environmental Protection (Section 567), Chapter 137, Iowa Administrative Code, November 18, 1998.

Groundwater Sample Results

Concentrations in ug/L

Fort Des Moines, Iowa

WELL/DATE		MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1
CONSTITUENT	Action Level (ug/L)	Mar 91	Jul 91	Dec 91	Oct 92	Feb 93	Jun 96	Sep 96	Jan 97	Jun 97	Jul 03
		VERSAR					OHM				JMWA
VOCs											
Cis-1,2 Dichloroethene	70[a]	ND	NA	<5	<5	<5	ND	ND	ND	ND	ND
1,1-Dichloroethene	7	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
1,2-Dichloroethane	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND
m-xylene	N/A	NA	NA	<1	<1	<1	NA	NA	NA	NA	NA
Acetone	4,000[b]	ND	ND	<8	<8	<8	ND	ND	ND	ND	ND
Benzene	5[a]	ND	ND	<1	<1	<1	ND	ND	ND	ND	ND
Carbon tetrachloride	5[a]	ND	ND	<1	<1	<1	ND	ND	ND	ND	ND
Methylene chloride	5[d]	ND	ND	<1	<1	<1	ND	ND	ND	ND	ND
Chlorobenzene	100[a]	ND	ND	1.44	<1	<1	ND	ND	ND	ND	ND
Chloroform	100[a]	ND	ND	<1	<1	<1	ND	ND	ND	ND	ND
Dichlorobenzene (total)	75[a]	NA	NA	14.67	12.5	5.5	ND	ND	1.05	2.00	ND
Ethylbenzene	700[a]	ND	ND	<1	<1	<1	ND	ND	ND	ND	ND
Tetrachloroethene	5[a]	ND	ND	5.93	1.9	0.93	ND	ND	ND	ND	1.9
Toluene	1,000[a]	ND	ND	<1	<1	<1	ND	ND	ND	ND	ND
Trichloroethene	5[a]	17	10	14	2.1	1	ND	ND	ND	ND	ND
Xylenes (total)	10,000[a]	ND	ND	<2	<2	<2	ND	ND	ND	ND	ND
Pesticides											
Aldrin	2[c]	.233	NA	0.197	0.368	0.44	0.226	0.3	0.26	0.25	ND
Alpha-BHC	0.028	>0.24	NA	4.87	6.95 E	2.2	0.034	0.6	0.242	0.69	0.12
Alpha-Chlordane	2[a]	>0.24	NA	NA	NA	NA	0.825	1	0.86	1.2	
Alpha-Endosulfan	2[b]	<.00856	NA	<0.025	0.0249	0.0241	ND	ND	0.942	ND	
Beta-BHC	0.097	>.243	NA	0.819	5.42 E	0.483	0.199	0.3	0.211	0.37	0.40
Beta-Endosulfan	2[b]	<.012	NA	<0.077	<.0077	<.0077	ND	ND	ND	ND	
Chlordane	2[a]	NA	NA	<0.312	<.0312	<.0312	3.1	9	7.45	9.3	3.32 J
Delta-BHC	0.21	>.24	NA	4.33	1.25 E	2.5	0.382	0.8	0.488	0.97	0.61
Dieldrin	2[c]	6.83	NA	1.15	1.26 E	13	5.1	8	7.1	8.1	4.34
Endrin	2[a]	.0826	NA	0.204	0.155	0.174	0.186	0.2	0.158	0.11	ND
Endrin Ketone	NA	<.0282	NA	ND	0.0681	0.0948	0.079	0.06	0.2	0.051	NA
Endosulfan Sulfate	N/A	<.02	NA	ND	0.0254	0.036	ND	ND	ND	0.033	ND
Gamma Chlordane	2[a]	>.24	NA	NA	NA	NA	0.738	1	ND	1.1	ND
Heptachlor	0.4[a]	<.0631	NA	.107	0.0587	0.0403	ND	0.04	ND	ND	ND
Heptachlor epoxide	0.2[a]	<.006	NA	<.063	0.0278	0.0244	ND	ND	ND	ND	ND
Isodrin	N/A	NA	NA	0.0964	0.0318	0.0374	ND	ND	ND	ND	NA

WELL/DATE		MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1
CONSTITUENT	Action Level (ug/L)	Mar 91	Jul 91	Dec 91	Oct 92	Feb 93	Jun 96	Sep 96	Jan 97	Jun 97	Jul 03
Lindane	0.2[a]	>.24	NA	2.49	6.08 E	0.416	0.04	0.06	0.083	0.075	0.09
Methoxychlor	40[a]	<.267	NA	<0.75	<0.075	0.128	ND	ND	ND	ND	ND
DDD	0.729	.627	NA	1.12	0.45	0.92	ND	0.9	0.548	0.47	ND
DDE	0.514	<.0946	NA	0.189	0.105	0.0991	0.152	ND	ND	ND	ND
DDT	0.35	.122	NA	<0.025	0.267	0.24	0.167	ND	ND	0.18	ND
Herbicides											
2,4,5-T	100[a]	NA	NA	0.306	NA	<0.16	ND	ND	ND	ND	NA
2,4,5-TP	50[a]	NA	NA	<0.095	NA	<0.095	ND	ND	ND	ND	NA
2,4-D	70[a]	NA	NA	1.35	NA	<0.263	ND	ND	1.21	0.20	NA

Notes: NA = Not Analyzed
ND = Not Detected
a = MCL
b = RFI (RCRA Facility Investigation) – Health-Based Criteria for Carcinogens and Systemic Toxicants, Tables 8-6 & 8-7, May 1989.
c = HAL – Lifetime Health Advisory Level for a Contaminant, State of Iowa
d = NRL – Negligible Risk Level for Carcinogens, State of Iowa
e = RCRA Corrective Action Levels, Appendices A-C of 40 CFR 264-521, July 27, 1990.
j = estimated

Groundwater Sample Results
Concentrations in ug/L
Fort Des Moines, Iowa

WELL/DATE							MW-10	MW-10	MW-10	MW-10	MW-10
CONSTITUENT	Action Level (ug/L)						Jun 96	Sep 96	Jan 97	Jun 97	Jul 03
		VERSAR					OHM				JMWA
VOCs											
Cis-1,2 Dichloroethene	70[a]						NA	NA	NA	ND	ND
1,1-Dichloroethene	7						ND	ND	ND	ND	ND
1,2-Dichloroethane	5						NA	NA	NA	NA	NA
m-xylene	N/A						NA	NA	NA	NA	NA
Acetone	4,000[b]						NA	NA	NA	ND	ND
Benzene	5[a]						ND	ND	ND	ND	ND
Carbon tetrachloride	5[a]						ND	ND	ND	ND	ND
Methylene chloride	5[d]						ND	ND	ND	ND	ND
Chlorobenzene	100[a]						ND	ND	ND	ND	ND
Chloroform	100[a]						ND	ND	ND	ND	ND
Dichlorobenzene (total)	75[a]						ND	ND	ND	ND	ND
Ethylbenzene	700[a]						ND	ND	ND	ND	ND
Tetrachloroethene	5[a]						ND	5	4.84	2	ND
Toluene	1,000[a]						ND	ND	1.2	ND	ND
Trichloroethene	5[a]						ND	ND	ND	ND	ND
Xylenes (total)	10,000[a]						ND	ND	ND	ND	ND
Pesticides											
Aldrin	2[c]						ND	ND	ND	ND	ND
Alpha-BHC	0.028						0.042	0.1	0.102	0.030	ND
Alpha-Chlordane	2[a]						0.035	0.02	ND	ND	NA
Alpha-Endosulfan	2[b]						ND	ND	ND	ND	ND
Beta-BHC	0.097						0.445	0.8	0.979	0.460	0.27
Beta-Endosulfan	2[b]						ND	ND	ND	ND	ND
Chlordane	2[a]						0.379	0.6	ND	0.220	ND
Delta-BHC	0.21						0.834	2	2.87	1.000	0.16
Dieldrin	2[c]						0.285	0.6	0.831	0.260	ND
Endrin	2[a]						0.017	0.02	ND	ND	ND
Endrin Ketone	NA						0.017	0.02	ND	ND	NA
Endosulfan Sulfate	N/A						0.043	0.1	0.072	0.230	ND
Gamma Chlordane	2[a]						0.018	0.03	0.012	ND	NA
Heptachlor	0.4[a]						ND	ND	ND	ND	ND

WELL/DATE							MW-10	MW-10	MW-10	MW-10	MW-10
CONSTITUENT	Action Level (ug/L)						Jun 96	Sep 96	Jan 97	Jun 97	Jul 03
Heptachlor epoxide	0.2[a]						0.013	ND	ND	ND	ND
Isodrin	N/A						ND	NR	ND	ND	NA
Lindane	0.2[a]						ND	ND	ND	ND	ND
Methoxychlor	40[a]						ND	ND	ND	ND	ND
DDD	0.729						0.035	ND	ND	ND	ND
DDE	0.514						0.03	ND	ND	ND	ND
DDT	0.35						0.023	ND	ND	ND	ND
Herbicides											
2,4,5-T	100[a]						ND	ND	ND	ND	NA
2,4,5-TP	50[a]						ND	ND	ND	ND	NA
2,4-D	70[a]						ND	ND	ND	ND	NA

Notes: NA = Not Analyzed
ND = Not Detected
a = MCL
b = RFI (RCRA Facility Investigation) – Health-Based Criteria for Carcinogens and Systemic Toxicants, Tables 8-6 & 8-7, May 1989.
c = HAL – Lifetime Health Advisory Level for a Contaminant, State of Iowa
d = NRL – Negligible Risk Level for Carcinogens, State of Iowa
e = RCRA Corrective Action Levels, Appendices A-C of 40 CFR 264-521, July 27, 1990.
j = estimated

Groundwater Sample Results

Concentrations in ug/L

Fort Des Moines, Iowa

WELL/DATE					MW-11	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11
CONSTITUENT	Action Level (ug/L)				Oct 92	Feb 93	Jun 96	Sep 96	Jan 97	Jun 97	Jul 03
		VERSAR					OHM				JMWA
VOCs											
Cis-1,2 Dichloroethene	70[a]				NA	NA	ND	ND	ND	ND	ND
1,1-Dichloroethene	7				NA	NA	ND	ND	ND	ND	ND
1,2-Dichloroethane	5				NA	NA	NA	NA	NA	NA	ND
m-xylene	N/A				NA	NA	NA	NA	NA	NA	NA
Acetone	4,000[b]				NA	NA	NA	NA	NA	ND	ND
Benzene	5[a]				NA	NA	ND	ND	ND	ND	ND
Carbon tetrachloride	5[a]				NA	NA	ND	ND	ND	ND	ND
Methylene chloride	5[d]				NA	NA	ND	ND	ND	ND	ND
Chlorobenzene	100[a]				NA	NA	ND	ND	ND	ND	ND
Chloroform	100[a]				NA	NA	ND	ND	ND	ND	ND
Dichlorobenzene (total)	75[a]				NA	NA	ND	ND	ND	ND	ND
Ethylbenzene	700[a]				NA	NA	ND	ND	ND	ND	ND
Tetrachloroethene	5[a]				NA	NA	ND	3	1.75	5	3.6
Toluene	1,000[a]				NA	NA	ND	ND	ND	ND	ND
Trichloroethene	5[a]				NA	NA	1.29	ND	ND	ND	ND
Xylenes (total)	10,000[a]				NA	NA	ND	ND	ND	ND	ND
Pesticides											
Aldrin	2[c]				NA	NA	ND	ND	ND	ND	ND
Alpha-BHC	0.028				NA	NA	ND	ND	ND	ND	ND
Alpha-Chlordane	2[a]				NA	NA	ND	0.06	ND	0.035	NA
Alpha-Endosulfan	2[b]				NA	NA	ND	ND	ND	ND	ND
Beta-BHC	0.097				NA	NA	ND	0.6	0.552	0.69	0.97
Beta-Endosulfan	2[b]				NA	NA	ND	ND	ND	ND	ND
Chlordane	2[a]				NA	NA	ND	ND	ND	ND	ND
Delta-BHC	0.21				NA	NA	ND	0.6	0.587	0.91	0.85
Dieldrin	2[c]				NA	NA	ND	ND	0.134	0.29	ND
Endrin	2[a]				NA	NA	ND	ND	ND	ND	ND
Endrin Ketone	NA				NA	NA	ND	ND	ND	ND	NA
Endosulfan Sulfate	N/A				NA	NA	ND	ND	ND	ND	ND
Gamma Chlordane	2[a]				NA	NA	ND	ND	ND	ND	NA
Heptachlor	0.4[a]				NA	NA	ND	ND	ND	ND	ND

WELL/DATE					MW-11	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11
CONSTITUENT	Action Level (ug/L)				Oct 92	Feb 93	Jun 96	Sep 96	Jan 97	Jun 97	Jul 03
Heptachlor epoxide	0.2[a]				NA	NA	ND	ND	ND	ND	ND
Isodrin	N/A				NA	NA	ND	ND	ND	ND	NA
Lindane	0.2[a]				NA	NA	ND	0.24	0.212	0.29	ND
Methoxychlor	40[a]				NA	NA	ND	ND	ND	ND	ND
DDD	0.729				NA	NA	ND	ND	ND	ND	ND
DDE	0.514				NA	NA	ND	ND	ND	ND	ND
DDT	0.35				NA	NA	ND	ND	ND	ND	ND
Herbicides											
2,4,5-T	100[a]				NA	NA	ND	ND	ND	ND	NA
2,4,5-TP	50[a]				NA	NA	ND	ND	ND	ND	NA
2,4-D	70[a]				NA	NA	ND	ND	ND	0.2	NA

Notes: NA = Not Analyzed
ND = Not Detected
a = MCL
b = RFI (RCRA Facility Investigation) – Health-Based Criteria for Carcinogens and Systemic Toxicants, Tables 8-6 & 8-7, May 1989.
c = HAL – Lifetime Health Advisory Level for a Contaminant, State of Iowa
d = NRL – Negligible Risk Level for Carcinogens, State of Iowa
e = RCRA Corrective Action Levels, Appendices A-C of 40 CFR 264-521, July 27, 1990.
j = estimated

Groundwater Sample Results
Concentrations in ug/L
Fort Des Moines, Iowa

WELL/DATE				MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14
CONSTITUENT	Action Level (ug/L)			Dec 91	Oct 92	Feb 93	Jun 96	Sep 96	Jan 97	Jun 97	Jul 03
		VERSAR					OHM				JMWA
VOCs											
Cis-1,2 Dichloroethene	70[a]					<5	ND	ND	ND	ND	ND
1,1-Dichloroethene	7					NA	ND	ND	ND	ND	ND
1,2-Dichloroethane	5					NA	NA	NA	NA	NA	ND
m-xylene	N/A					<1	NA	NA	NA	NA	NA
Acetone	4,000[b]					<8	NA	NA	NA	ND	ND
Benzene	5[a]					<1	ND	ND	ND	ND	ND
Carbon tetrachloride	5[a]					<1	ND	ND	ND	ND	ND
Methylene chloride	5[d]					<1	ND	ND	ND	ND	ND
Chlorobenzene	100[a]					<1	ND	ND	ND	ND	ND
Chloroform	100[a]					<1	ND	ND	ND	ND	ND
Dichlorobenzene (total)	75[a]					<2	ND	ND	ND	ND	ND
Ethylbenzene	700[a]					<1	ND	ND	ND	ND	ND
Tetrachloroethene	5[a]					<1	ND	ND	ND	ND	ND
Toluene	1,000[a]					<1	ND	ND	ND	ND	ND
Trichloroethene	5[a]					<1	ND	ND	ND	ND	ND
Xylenes (total)	10,000[a]					<2	ND	ND	ND	ND	ND
Pesticides											
Aldrin	2[c]					<0.0074	ND	ND	ND	ND	ND
Alpha-BHC	0.028					<0.0025	ND	ND	ND	ND	ND
Alpha-Chlordane	2[a]					NA	ND	ND	ND	ND	NA
Alpha-Endosulfan	2[b]					<0.0025	ND	ND	ND	ND	ND
Beta-BHC	0.097					<0.0099	ND	ND	ND	ND	ND
Beta-Endosulfan	2[b]					<0.0077	ND	ND	ND	ND	ND
Chlordane	2[a]					<0.0312	ND	ND	ND	ND	ND
Delta-BHC	0.21					<0.0034	ND	ND	ND	ND	NA
Dieldrin	2[c]					<0.0074	ND	ND	ND	ND	ND
Endrin	2[a]					<0.0176	ND	ND	ND	ND	ND
Endrin Ketone	NA					ND	ND	ND	ND	ND	NA
Endosulfan Sulfate	N/A					ND	ND	ND	ND	ND	ND
Gamma Chlordane	2[a]					NA	ND	ND	ND	ND	NA
Heptachlor	0.4[a]					<0.0025	ND	ND	ND	ND	ND

WELL/DATE				MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14	MW-14
CONSTITUENT	Action Level (ug/L)			Dec 91	Oct 92	Feb 93	Jun 96	Sep 96	Jan 97	Jun 97	Jul 03
Heptachlor epoxide	0.2[a]					<0.0063	ND	ND	ND	ND	ND
Isodrin	N/A					<0.0025	ND	ND	ND	ND	NA
Lindane	0.2[a]					<0.0025	ND	ND	ND	ND	ND
Methoxychlor	40[a]					<0.075	ND	ND	ND	ND	ND
DDD	0.729					<0.0081	ND	ND	ND	ND	ND
DDE	0.514					<0.0039	ND	ND	ND	ND	ND
DDT	0.35					<0.0025	ND	ND	ND	ND	ND
Herbicides											
2,4,5-T	100[a]					<0.16	ND	ND	ND	ND	NA
2,4,5-TP	50[a]					<0.095	ND	ND	ND	ND	NA
2,4-D	70[a]					<0.263	ND	ND	ND	ND	NA

Notes: NA = Not Analyzed
ND = Not Detected
a = MCL
b = RFI (RCRA Facility Investigation) – Health-Based Criteria for Carcinogens and Systemic Toxicants, Tables 8-6 & 8-7, May 1989.
c = HAL – Lifetime Health Advisory Level for a Contaminant, State of Iowa
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j = estimated

Groundwater Sample Results
Concentrations in ug/L
Fort Des Moines, Iowa

WELL/DATE		MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17
CONSTITUENT	Action Level (ug/L)	Oct 92	Feb 93	Jun 96	Sep 96	Jan 97	Jun 97	Dec 99	Mar 00	Jun 00	Aug 00	Jul 03
		VERSAR		OHM				CAPE				JMWA
VOCs												
Cis-1,2 Dichloroethene	70[a]	100	30	ND	ND	ND	ND	ND	8.6	13		6.3
1,1-Dichloroethene	7	NA	NA	ND	ND	ND	ND	ND	0.22 J	0.44 J		ND
1,2-Dichloroethane	5	NA	NA	NA	NA	NA	NA	ND	ND	ND		ND
m-xylene	N/A	<10	4.2	NA	NA	NA	NA	ND	1.4*	2.1*		NA
Acetone	4,000[b]	<80	<8	NA	NA	NA	ND	ND	ND	ND	3.4 J	ND
Benzene	5[a]	<10	2.1	ND	ND	11	ND	ND	3.4	5.8		2.5
Carbon tetrachloride	5[a]	<10	2.5	ND	ND	ND	ND	ND	ND	ND		ND
Methylene chloride	5[d]	<10	8.6	1.7	33	21	ND	1.4 J	0.75 J	ND		ND
Chlorobenzene	100[a]	<10	2.6	ND	ND	ND	ND	ND	6.9	9.5		6.7
Chloroform	100[a]	60	29	6.48	63	79.5	53	ND	ND	3.9		1.1
Dichlorobenzene (total)	75[a]	<10	<2	ND	ND	ND	ND	ND	17.4	23.5 J		17.1
Ethylbenzene	700[a]	<10	1.9	ND	ND	13.9	ND	ND	2.4	3.7		2.1
Tetrachloroethene	5[a]	500	200	54	300	276	230	ND	34	61		38
Toluene	1,000[a]	<10	1.4	ND	3	ND	ND	0.42 J	0.33 J	ND		ND
Trichloroethene	5[a]	200	85	19.6	115	111	91	ND	27	45		23
Xylenes (total)	10,000[a]	80	19	ND	74	111	60	ND	6.5	7.4		3.6
Pesticides												
Aldrin	2[c]	<0.007	<0.07	ND	ND	ND	ND	ND	0.013 J	ND	0.011 J	ND
Alpha-BHC	0.028	66.56 E	34	17.2	32	25.6	18	ND	0.74	0.91		1.37
Alpha-Chlordane	2[a]	NA	NA	ND	ND	ND	0.3	NA	NA	NA		NA
Alpha-Endosulfan	2[b]	0.031	<0.003	ND	ND	ND	ND	ND	0.14	0.030 J	0.035 J	ND
Beta-BHC	0.097	6	2.4	3	4	2.38	2.2	ND	0.060	0.91		ND
Beta-Endosulfan	2[b]	<0.008	<0.08	ND	ND	ND	ND	ND	0.0095 J	0.023 J	0.018 J	ND
Chlordane	2[a]	<0.031	<0.031	ND	ND	ND	ND	ND	ND	0.68 J	0.097 J	ND
Delta-BHC	0.21	25	8.9	8.74	12	6.94	5.6	ND	0.16	0.21		0.25
Dieldrin	2[c]	0.022	<0.074	0.263	ND	ND	ND		0.025 J	0.031 J		0.13
Endrin	2[a]	<0.018	<0.018	0.437	ND	ND	0.44	ND	ND	ND		ND
Endrin Ketone	NA	0.034	ND	0.351	ND	ND	ND	NA	NA	NA		NA
Endosulfan Sulfate	N/A	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND
Gamma Chlordane	2[a]	NA	NA	ND	ND	ND	ND	NA	NA	NA		NA
Heptachlor	0.4[a]	<0.003	<0.003	ND	33	ND	ND	ND	0.0065 J	ND	0.043 J	ND

WELL/DATE		MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17	MW-17
CONSTITUENT	Action Level (ug/L)	Oct 92	Feb 93	Jun 96	Sep 96	Jan 97	Jun 97	Dec 99	Mar 00	Jun 00	Aug 00	Jul 03
Heptachlor epoxide	0.2[a]	0.399 E	<0.063	ND	ND	ND	ND	ND	ND	0.017 J	0.013 J	ND
Isodrin	N/A	<0.003	<0.003	ND	ND	ND	ND	NA	NA	NA		NA
Lindane	0.2[a]	61.260 E	29	16.6	34	29.9	18	ND	0.41	0.47		0.77
Methoxychlor	40[a]	0.252	<0.75	ND	ND	ND	ND	ND	0.029 J	0.058 J	0.041	ND
DDD	0.729	<0.008	<0.08	ND	ND	ND	ND	ND	ND	ND		ND
DDE	0.514	0.060	0.048	ND	ND	ND	ND	ND	0.010 J	ND		ND
DDT	0.35	<0.003	<0.003	ND	ND	ND	ND	ND	ND	0.015 J		ND
Herbicides												
2,4,5-T	100[a]	NA	1.250	287	ND	97.7	1200	NA	NA	NA		NA
2,4,5-TP	50[a]	NA	0.337	ND	ND	ND	ND	NA	NA	NA		NA
2,4-D	70[a]	NA	2.76	176	8360	95.4	3900	NA	NA	NA		NA

Notes: NA = Not Analyzed
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j = estimated
*= m-xylene + p-xylene

Groundwater Sample Results
Concentrations in ug/L
Fort Des Moines, Iowa

WELL/DATE						MW-18W	MW-18W	MW-18W	MW-18W	MW-18W
CONSTITUENT	Action Level (ug/L)					Jun 96	Sep 96	Jan 97	Jun 97	Jul 03
		VERSAR				OHM				JMWA
VOCs										
Cis-1,2 Dichloroethene	70[a]					ND	ND	ND	ND	ND
1,1-Dichloroethene	7					ND	ND	ND	ND	ND
1,2-Dichloroethane	5					NA	NA	NA	NA	ND
m-xylene	N/A					NA	NA	NA	NA	NA
Acetone	4,000[b]					NA	NA	NA	ND	ND
Benzene	5[a]					ND	ND	ND	ND	ND
Carbon tetrachloride	5[a]					ND	ND	1.41	ND	ND
Methylene chloride	5[d]					ND	ND	ND	ND	ND
Chlorobenzene	100[a]					ND	ND	ND	ND	ND
Chloroform	100[a]					ND	ND	1.33	ND	ND
Dichlorobenzene (total)	75[a]					ND	ND	ND	ND	ND
Ethylbenzene	700[a]					ND	ND	ND	ND	ND
Tetrachloroethene	5[a]					ND	4	5.53	2	1.4
Toluene	1,000[a]					ND	ND	ND	ND	ND
Trichloroethene	5[a]					ND	ND	ND	ND	ND
Xylenes (total)	10,000[a]					ND	ND	ND	ND	ND
Pesticides										
Aldrin	2[c]					ND	ND	ND	ND	ND
Alpha-BHC	0.028					ND	ND	ND	ND	ND
Alpha-Chlordane	2[a]					ND	ND	ND	ND	NA
Alpha-Endosulfan	2[b]					ND	ND	ND	ND	ND
Beta-BHC	0.097					ND	ND	ND	ND	ND
Beta-Endosulfan	2[b]					ND	ND	ND	ND	ND
Chlordane	2[a]					ND	ND	ND	ND	ND
Delta-BHC	0.21					ND	ND	ND	ND	ND
Dieldrin	2[c]					0.015	ND	ND	ND	ND
Endrin	2[a]					ND	ND	ND	ND	ND
Endrin Ketone	NA					ND	ND	ND	ND	NA
Endosulfan Sulfate	N/A					ND	ND	ND	ND	ND
Gamma Chlordane	2[a]					ND	ND	ND	ND	NA

WELL/DATE						MW-18W	MW-18W	MW-18W	MW-18W	MW-18W
CONSTITUENT	Action Level (ug/L)					Jun 96	Sep 96	Jan 97	Jun 97	Jul 03
Heptachlor	0.4[a]					ND	ND	ND	ND	ND
Heptachlor epoxide	0.2[a]					ND	ND	ND	ND	ND
Isodrin	N/A					ND	ND	ND	ND	NA
Lindane	0.2[a]					ND	ND	ND	ND	ND
Methoxychlor	40[a]					ND	ND	ND	ND	ND
DDD	0.729					ND	ND	ND	ND	ND
DDE	0.514					ND	ND	ND	ND	ND
DDT	0.35					ND	ND	ND	ND	ND
Herbicides										
2,4,5-T	100[a]					ND	ND	ND	ND	NA
2,4,5-TP	50[a]					ND	ND	ND	ND	NA
2,4-D	70[a]					ND	4	ND	ND	NA

Notes: NA = Not Analyzed
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Groundwater Sample Results
Concentrations in ug/L
Fort Des Moines, Iowa

WELL/DATE		MW-19S	MW-19S	MW-19S	MW-19S	MW-19S	MW-19S	MW-19S	MW-19S	MW-19S	MW-19S	MW-19S
CONSTITUENT	Action Level (ug/L)	Oct 92	Feb 93	Jun 96	Sep 96	Jan 97	Jun 97	Dec 99	Mar 00	Jun 00	Aug 00	Jul 03
VOCs												
Cis-1,2 Dichloroethene	70[a]	<5	<5	ND	ND	ND	ND	ND	3.1	2.7	ND	3.2
1,1-Dichloroethene	7	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
m-xylene	N/A	<1	<1	NA	NA	NA	NA	ND	ND	ND	ND	NA
Acetone	4,000[b]	<8	<8	NA	NA	NA	ND	ND	ND	ND	ND	ND
Benzene	5[a]	<1	<1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	5[a]	2.6	2	ND	3	ND	ND	ND	1.0 J	0.78 J	ND	1.4
Methylene chloride	5[d]	<1	<1	ND	ND	2.46	ND	0.3 J	1.0 J	ND	ND	ND
Chlorobenzene	100[a]	<1	<1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	100[a]	17	13	1.16	9	3.02	10	ND	4.3	3.2	ND	4.7
Dichlorobenzene (total)	75[a]	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700[a]	<1	<1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5[a]	<1	<1	157	51	276	94	ND	ND	ND	ND	46
Toluene	1,000[a]	<1	<1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5[a]	3.3	2.8	ND	3	ND	3	ND	1.8 J	1.5	ND	1.8
Xylenes (total)	10,000[a]	<2	<2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pesticides												
Aldrin	2[c]	<0.0074	<0.0074	ND	ND	ND	ND	ND	ND	ND	ND	ND
Alpha-BHC	0.028	0.039	0.0278	0.023	0.02	ND	ND	ND	0.028 J	0.023 J	ND	ND
Alpha-Chlordane	2[a]	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA
Alpha-Endosulfan	2[b]	<0.0025	<0.0025	ND	ND	ND	ND	ND	ND	ND	ND	ND
Beta-BHC	0.097	0.151	0.127	0.177	0.2	0.035	ND	ND	0.13	0.12	ND	0.13
Beta-Endosulfan	2[b]	<0.0077	<0.0077	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlordane	2[a]	<0.0312	<0.0312	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delta-BHC	0.21	0.0718	0.0483	0.045	0.04	ND	0.028	ND	0.027 J	0.030 J	ND	ND
Dieldrin	2[c]	0.00871	0.0208	0.027	0.01	ND	0.059	ND	0.011 J	0.0092 J	0.014 J	ND
Endrin	2[a]	<0.0176	<0.0176	ND	ND	ND	ND	ND	ND	ND	ND	ND

WELL/DATE		MW-19S	MW-19S	MW-19S	MW-19S	MW-19S	MW-19S	MW-19S	MW-19S	MW-19S	MW-19S	MW-19S
CONSTITUENT	Action Level (ug/L)	Oct 92	Feb 93	Jun 96	Sep 96	Jan 97	Jun 97	Dec 99	Mar 00	Jun 00	Aug 00	Jul 03
Endrin Ketone	NA	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
Endosulfan Sulfate	N/A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Gamma Chlordane	2[a]	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA
Heptachlor	0.4[a]	<0.0025	<0.0025	ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	0.2[a]	<0.0063	<0.0063	ND	ND	ND	ND	ND	0.0075 J	ND	ND	ND
Isodrin	N/A	<0.0025	<0.0025	ND	ND	ND	ND	NA	NA	NA	NA	NA
Lindane	0.2[a]	0.0245	0.016	0.045	0.02	ND	0.015	ND	0.012 J	0.015 J	0.019 J	ND
Methoxychlor	40[a]	<0.075	<0.075	ND	ND	ND	ND	ND	ND	ND	ND	ND
DDD	0.729	<0.081	<0.081	ND	ND	ND	ND	ND	ND	ND	ND	ND
DDE	0.514	<0.0039	<0.0039	ND	ND	ND	ND	ND	ND	ND	ND	ND
DDT	0.35	<0.0025	<0.0025	ND	ND	ND	ND	ND	ND	ND	ND	ND
Herbicides												
2,4,5-T	100[a]	NA	<0.16	ND	ND	ND	0.1	NA	NA	NA	NA	NA
2,4,5-TP	50[a]	NA	<0.095	ND	ND	ND	ND	NA	NA	NA	NA	NA
2,4-D	70[a]	NA	<0.263	ND	0.500	ND	0.3	NA	NA	NA	NA	NA

Notes: NA = Not Analyzed
ND = Not Detected
a = MCL
b = RFI (RCRA Facility Investigation) – Health-Based Criteria for Carcinogens and Systemic Toxicants, Tables 8-6 & 8-7, May 1989.
c = HAL – Lifetime Health Advisory Level for a Contaminant, State of Iowa
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j = estimated

Groundwater Sample Results
Concentrations in ug/L
Fort Des Moines, Iowa

WELL/DATE						MW 99-4	MW 99-4	MW 99-4	MW 99-4	MW 99-4
CONSTITUENTS	Action Level (ug/L)					Dec 99	Mar 00	Jun 00	Aug 00	Jul 03
		OHM				CAPE				JMWA
VOCs										
Cis-1,2 Dichloroethene	70[a]					ND	ND	28	ND	21
1,1-Dichloroethene	7					ND	ND	ND	ND	ND
1,2-Dichloroethane	5					ND	ND	ND	ND	ND
m-xylene	N/A					ND	ND	ND	ND	NA
Acetone	4,000[b]					ND	ND	ND	ND	ND
Benzene	5[a]					ND	ND	ND	ND	ND
Carbon tetrachloride	5[a]					ND	3.4 J	3.3	ND	3.9
Methylene chloride	5[d]					0.76 J	2.1 J	ND	ND	ND
Chlorobenzene	100[a]					ND	ND	ND	ND	ND
Chloroform	100[a]					ND	4.4	4.1	ND	4.1
Dichlorobenzene (total)	75[a]					ND	ND	ND	ND	ND
Ethylbenzene	700[a]					ND	ND	ND	ND	ND
Tetrachloroethene	5[a]					ND	ND	69	ND	65
Toluene	1,000[a]					ND	ND	ND	ND	ND
Trichloroethene	5[a]					ND	7.7	7.0	ND	8.0
Xylenes (total)	10,000[a]					ND	ND	ND	ND	ND
Pesticides										
Aldrin	2[c]					ND	ND	ND	ND	ND
Alpha-BHC	0.028					ND	0.34	0.39	ND	0.12
Alpha-Chlordane	2[a]					NA	NA	NA	NA	NA
Alpha-Endosulfan	2[b]					ND	ND	ND	0.0067 J	ND
Beta-BHC	0.097					ND	0.33	0.35	ND	0.36
Beta-Endosulfan	2[b]					ND	ND	ND	ND	ND
Chlordane	2[a]					ND	ND	ND	ND	ND
Delta-BHC	0.21						0.15	0.15		0.11
Dieldrin	2[c]					0.019 J	0.020 J	0.019 J	0.025 J	ND
Endrin	2[a]					ND	ND	ND	ND	ND
Endrin Ketone	NA					NA	NA	NA	NA	NA
Endosulfan Sulfate	N/A					ND	ND	ND	ND	ND

WELL/DATE						MW 99-4	MW 99-4	MW 99-4	MW 99-4	MW 99-4
CONSTITUENTS	Action Level (ug/L)					Dec 99	Mar 00	Jun 00	Aug 00	Jul 03
Gamma Chlordane	2[a]					NA	NA	NA	NA	NA
Heptachlor	0.4[a]					ND	ND	ND	ND	ND
Heptachlor epoxide	0.2[a]					ND	0.0064 J	0.011 J	0.0086 J	ND
Isodrin	N/A					NA	NA	NA	NA	NA
Lindane	0.2[a]					ND	0.084	0.089	ND	ND
Methoxychlor	40[a]					ND	ND	ND	ND	ND
DDD	0.729					ND	ND	ND	ND	ND
DDE	0.514					ND	0.0092 J	ND	0.014 J	ND
DDT	0.35					ND	ND	ND	ND	ND
Herbicides										
2,4,5-T	100[a]					NA	NA	NA	NA	NA
2,4,5-TP	50[a]					NA	NA	NA	NA	NA
2,4-D	70[a]					NA	NA	NA	NA	NA

Notes: NA = Not Analyzed
ND = Not Detected
a = MCL
b = RFI (RCRA Facility Investigation) – Health-Based Criteria for Carcinogens and Systemic Toxicants, Tables 8-6 & 8-7, May 1989.
c = HAL – Lifetime Health Advisory Level for a Contaminant, State of Iowa
d = NRL – Negligible Risk Level for Carcinogens, State of Iowa
e = RCRA Corrective Action Levels, Appendices A-C of 40 CFR 264-521, July 27, 1990.
j = estimated

Groundwater Sample Results
Concentrations in ug/L
Fort Des Moines, Iowa

WELL/DATE		MW 99-5	MW 99-5	MW 99-5	MW 99-5	MW 99-5	MW99-5	MW 99-5	MW 99-5	MW 99-5
CONSTITUENTS	Action Level (ug/L)	Jun 96	Sep 96	Jan 97	Jun 97	Dec 99	Mar 00	Jun 00	Aug 00	Jul 03
		OHM				CAPE				JMWA
VOCs										
Cis-1,2 Dichloroethene	70[a]					ND	5.0	4.6	ND	3.6
1,1-Dichloroethene	7					ND	ND	ND	ND	ND
1,2-Dichloroethane	5					ND	ND	ND	ND	ND
m-xylene	N/A					ND	ND	ND	ND	NA
Acetone	4,000[b]					ND	ND	ND	ND	ND
Benzene	5[a]					ND	ND	ND	ND	ND
Carbon tetrachloride	5[a]					ND	0.93 J	0.28 J	ND	1.2
Methylene chloride	5[d]					0.38 J	1.1 J	ND	ND	ND
Chlorobenzene	100[a]					ND	ND	ND	ND	2.0
Chloroform	100[a]					ND	1.8 J	0.66 J	ND	ND
Dichlorobenzene (total)	75[a]					ND	ND	ND	ND	ND
Ethylbenzene	700[a]					ND	ND	ND	ND	ND
Tetrachloroethene	5[a]					ND	ND	49	ND	59
Toluene	1,000[a]					ND	ND	ND	ND	ND
Trichloroethene	5[a]					ND	2.4	2.2	ND	2.4
Xylenes (total)	10,000[a]					ND	ND	ND	ND	ND
Pesticides										
Aldrin	2[c]					ND	ND	ND	ND	ND
Alpha-BHC	0.028					ND	0.10	0.092	ND	ND
Alpha-Chlordane	2[a]					NA	NA	NA	NA	NA
Alpha-Endosulfan	2[b]					ND	ND	ND	ND	ND
Beta-BHC	0.097					ND	0.15	0.12	ND	0.12
Beta-Endosulfan	2[b]					ND	ND	ND	ND	ND
Chlordane	2[a]					ND	ND	ND	ND	ND
Delta-BHC	0.21					ND	0.032 J	0.029 J	ND	ND
Dieldrin	2[c]					ND	0.0093 J	ND	ND	ND
Endrin	2[a]					ND	ND	ND	ND	ND
Endrin Ketone	NA					NA	NA	NA	NA	NA
Endosulfan Sulfate	N/A					ND	ND	ND	ND	ND
Gamma Chlordane	2[a]					NA	NA	NA	NA	NA