United States Department of Agriculture
Commodity Credit Corporation
P.O. Box 2415
Washington, D.C. 20013



June 12, 1989

Honorable Mary Applebee
Mayor
City of Waverly
Waverly, Nebraska 68462

Dear Mayor Applebee:

This letter's purpose is to provide you with an update of the Waverly groundwater cleanup project (expedited response), including testing results from samples recently collected during the quarterly monitoring effort.

In September 1988, the United States Department of Agriculture Commodity Credit Corporation (CCC) assumed responsibility for the Waverly Expedited Response Action (ERA) from the United States Environmental Protection Agency (US EPA). Responsibilities include daily operation and management, and periodic evaluation of the groundwater cleanup progress.

CCC has contracted with Argonne National Laboratory (ANL) Office of Environmental Management and Surveys to provide technical support for these activities. ANL personnel have visited the Waverly ERA site regularly since October 1988, to collect and analyze groundwater and soil gas samples necessary to evaluate the effectiveness and efficiency of ongoing cleanup efforts.

We will continue to inform you of the results of the ERA quarterly sampling activities as US EPA had, but will report this information in a revised format. Results from samples collected during each quarter are tabulated and discussed in Quarterly Reports (enclosed). To assist you in interpreting the data, the appropriate environmental quality standard(s) and/or performance criteria are also enclosed as a reference.

These comprehensive reports, which contain a complete data summary and discuss the cleanup progress, are prepared for US EPA four times a year. US EPA will place these Quarterly Reports in the library as part of the project's administrative record.

If you have any questions regarding the interpretation of the data presented in the Quarterly Reports, please contact me at 202/475-5490.

Sincerely,

James V. Hansen

James V. Hansen
Secretary
Commodity Credit Corporation

Enclosures: as stated

cc: Gary Kepko, US EPA
Jack Daniel, NDOH
Richard Schlenker, NDEC

# Waverly, Nebraska
# Expedited Response Action

## First Quarter Report FY'89

## Reporting Period: October, November, and December, 1988

Prepared for

Commodity Credit Corporation
Agricultural Stabilization and Conservation Service
United States Department of Agriculture

by

Office of Environmental Management and Surveys
Energy and Environmental Systems Division
Argonne National Laboratory

April 20, 1989

# INTRODUCTION

US EPA Region VII initiated an Expedited Response Action (ERA) at a former grain facility site in Waverly, Nebraska, for the treatment of carbon tetrachloride and chloroform contaminated soil and groundwater. The ERA involves a vapor extraction system (VES) to remove source contamination from the subsoils, and an extraction well and air stripping system to pump and treat contaminated groundwater. The Commodity Credit Corporation (CCC) of the United States Department of Agriculture (USDA) assumed full responsibility in September, 1988, for continued cleanup operations at the site including management, operations, and monitoring of the ERA. Argonne National Laboratory (ANL) is currently under contract with CCC to provide site management and compliance monitoring services for the Waverly ERA. US EPA continues to oversee CCC and ANL activities at the site.

As required by the compliance agreement between US EPA and the CCC, quarterly reports are prepared to review CCC's activities at the site during the past quarter, and to evaluate the Waverly ERA progress. The report contains five sections:

# 1.0 ACCOMPLISHMENTS AND ACTIVITIES

## 1.1 General Site Management

- CCC began investigating alternative water supply options for the residents serviced by an affected well. Options include providing commercial carbon-filtered water units or arranging for city water hook-ups.

- A monitoring and compliance sampling schedule was developed and is presented in Table 1.

- ANL received and reviewed the existing Waverly ERA Sampling Plan (previously used by Jacobs Engineering). No major deviations from the existing plan were suggested. However, new sample handling procedures were used during ANL sampling events (November and December).

- Format for monthly compliance reports was developed and the compliance reporting process was initiated in November. November and December NPDES permits were completed and returned monthly to Nebraska Department of Environmental Control (NDEC).

- Procured sampling equipment (SKC personal sampling pumps, Mini-buck calibrator, vials, charcoal sorbent tubes, etc.). Assembled and briefed sampling team members.

- Analytical work was scheduled and performed by ANL Analytical Chemistry Laboratory (ACL). Water analysis for carbon tetrachloride and chloroform met US EPA CLP standards for volatile organics analysis. Charcoal sorbent tubes were used to collect air samples which were analyzed according to NIOSH method #1003. The air sample collection and analytical methods were those used by US EPA during previous air sampling events. Monthly samples (air emissions and air stripper surface water discharge) are expected to have a data turn around time of two to three weeks; quarterly results are expected within four to six weeks of sample collection.

## 1.2 Field and Sampling Events

- All required quarterly samples were collected for USDA by Jacobs Engineering on October 25-26, 1988, with oversight by ANL. City of Waverly personnel assisted with the public supply wells (PSWs) sampling. Quarterly results are presented in Section 5.0.

- Monthly compliance samples were collected on October 25-26 (during quarterly sampling), November 21, and December 14, 1988. Samples were collected by Sequoyah, Inc. personnel (with direct oversight by ANL), and by ANL personnel. Neither US EPA nor their oversight representatives were present during November or December monthly sampling events. Results are presented in Sections 4.0 and 5.0.

# Monitoring and Compliance Sampling Schedule

| SAMPLE TYPE | ANALYSIS (1) | 88 NOV | DEC | 89 JAN | | FEB | MAR | APR | | MAY | JUN | JUL | | AUG | SEP | OCT | | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (*) | (*) | (*) BATCH #1 | BATCH #2 | | | BATCH #1 | BATCH #2 | | | BATCH #1 | BATCH #2 | | | BATCH #1 | BATCH #2 | | |
| WATER SAMPLES (2) | | | | | | | | | | | | | | | | | | | |
| GROUNDWATER MONITORING WELLS | CCL4, CHCL3 | | | 12 | | | | 12 | | | | 12 | | | | 12 | | | |
| RESIDENTIAL WELLS | CCL4, CHCL3 | | | | 2 | | | | 2 | | | | 2 | | | | 2 | | |
| PUBLIC WELLS | CCL4, CHCL3 | | | | 5 | | | | 5 | | | | 5 | | | | 5 | | |
| AIR STRIPPING INFLUENT, EFFLUENT, MID-STREAM (1) | CCL4, CHCL3 | 3 | 3 | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | 3 | 3 |
| QC SAMPLES (FIELD BLANKS, DUPLICATES) (4) | CCL4, CHCL3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| SUB-TOTAL | | 5 | 5 | 14 | 12 | 5 | 5 | 14 | 12 | 5 | 5 | 14 | 12 | 5 | 5 | 14 | 12 | 5 | 5 |
| MATRIX SPIKE AND DUPLICATE (LAB SAMPLES) (5) | CCL4, CHCL3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| TOTAL WATER | | 7 | 7 | 30 | | 7 | 7 | 30 | | 7 | 7 | 30 | | 7 | 7 | 30 | | 7 | 7 |
| AIR SAMPLES (6) | | | | | | | | | | | | | | | | | | | |
| CHARCOAL TUBE AIR SAMPLES: | | | | | | | | | | | | | | | | | | | |
| SOIL GAS SAMPLES | CCL4, CHCL3 | | | 15 | | | | 15 | | | | 15 | | | | 15 | | | |
| VES DISCHARGE (3) | CCL4, CHCL3 | 1 | 1 | | 1 | 1 | 1 | | 1 | 1 | 1 | | 1 | 1 | 1 | | 1 | 1 | 1 |
| VES INDIVIDUAL SAMPLES | CCL4, CHCL3 | | | | 10 | | | | 10 | | | | 10 | | | | 10 | | |
| AMBIENT AIR | CCL4, CHCL3 | | | | 4 | | | | 4 | | | | 4 | | | | 4 | | |
| QC SAMPLES (FIELD BLANKS AND DUPLICATES) | CCL4, CHCL3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| SUB-TOTAL | | 3 | 3 | 17 | 17 | 3 | 3 | 17 | 17 | 3 | 3 | 17 | 17 | 3 | 3 | 17 | 17 | 3 | 3 |
| MATRIX SPIKE AND DUPLICATE (LAB SAMPLES) | CCL4, CHCL3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| TOTAL AIR SAMPLES | | 5 | 5 | 36 | | 5 | 5 | 36 | | 5 | 5 | 36 | | 5 | 5 | 36 | | 5 | 5 |

NOTES:
*) TENTATIVE SCHEDULE WHEN LAB MAY EXPECT TO RECEIVE SAMPLES: NOV 22, 1988; DEC 15, 1988; JAN 19,1989
1) ANALYSIS WILL BE PERFORMED AT THE ARGONNE NATIONAL LABORATORY ANALYTICAL CHEMISTRY LABORATORY.
WATER ANALYSIS WILL FOLLOW STANDARD EPA CLP PROCEDURES FOR VOLATILE ORGANIC ANALYSIS.
CHARCOAL TUBE ANALYSIS WILL USE NIOSH METHOD #1003 FROM NIOSH MANUAL OF ANALYTICAL METHODS, 3RD EDITION. (SAME METHOD USED BY EPA REGION 7 CRL)
2) ONE (1) WATER SAMPLE IS COMPRISED OF FOUR (4) VOA VIALS @ 40 ml.
3) MONTHLY AIR STRIPPING WATER SAMPLES AND VES DISCHARGE SAMPLES WILL HAVE TWO WEEK TURN AROUND TIME FOR RESULTS
4) QUALITY CONTROL FIELD SAMPLES WILL BE TAKEN AT ONE BLANK AND ONE DUPLICATE PER 10 SAMPLES
5) MATRIX SPIKE AND DUPLICATE SAMPLES WILL BE MADE UP IN LAB @ 2 PER BATCH OF 20 SAMPLES
6) ONE (1) AIR SAMPLE IS COMPRISED OF TWO (2) CHARCOAL SAMPLING TUBE.

**Table 1 Monitoring and Compliance Sampling Schedule**

- Site-specific sample identification number scheme was developed and implemented during November sampling event.

- Two new field sampling logbooks (for Air Stripping and Vapor Extraction systems) were developed and implemented. Two new operations and maintenance (O&M) daily logbooks (Air Stripping and Vapor Extraction systems) were also developed and implemented.

- ANL provided training to Sequoyah, Inc. personnel (O&M contractor for the ERA) in monthly sample collection, documentation, and shipping procedures.

- A supplies trailer was delivered to the ERA process building for ANL use during field sampling activities.

## 1.3 Meetings

- No meetings were held.

# 2.0 PLANNED ACTIVITIES

## 2.1 General Site Management

- October quarterly data to be evaluated by ANL and USDA.
- Quarterly sampling notification letters to be sent to City of Waverly and Lancaster County officials and to Waverly residents. This quarter's October letters to be sent by US EPA. Future notification letters, beginning with January data, to be prepared and sent by USDA.
- Second quarter NPDES reports will be submitted together to NDEC prior to April 28, 1989 reporting deadline. Monthly compliance reports to be submitted to USDA at end of quarter unless out of compliance.
- Hydrogeologic study to be initiated in January, 1989. Study purpose is to site additional groundwater monitoring wells, and to evaluate the need for an additional groundwater extraction well.

## 2.2 Field and Sampling Events

- Soil gas monitoring well (SGMW) sampling technique to be slightly modified by introducing multi-port flow adjusters. Procedure will allow all SGMWs per cluster to be sampled simultaneously using just one pump. Technique is expected to decrease total sampling collection time by making available two additional low flow sampling pumps per SGMW cluster.
- Develop remaining four field sampling logbooks (Domestic Water Supply, Ambient Air, Soil Gas Monitoring Wells, and Groundwater Monitoring Wells) for the collection of quarterly samples.
- Second quarter FY'89 sampling events are scheduled to occur on:

| | |
|---|---|
| January 16-18..... | Quarterly Sampling |
| February 16..... | Monthly Sampling |
| March 14..... | Monthly Sampling |

## 2.3 Meetings

- No meetings planned.

# 3.0 SYSTEM OPERATION AND PERFORMANCE

## 3.1 Groundwater Extraction Well

- The groundwater extraction well (GWEX) operated at an average groundwater removal rate of 0.1748 million gallons per day (MGD) during November and December. (October daily operations logs were sent to Jacobs Engineering and not received by ANL). Assuming the average removal rate in October was similar to the following months, a total of 15.03 MG were removed and treated during this reporting period (86 days).

- The GWEX well did not operate from October 27 to November 1, 1988, due to a pump failure. The pump motor was replaced by a licensed well contractor (Layne Western) and the system resumed normal operations on November 1, 1988.

- No equipment repairs or operational modifications are planned for the groundwater extraction well system.

## 3.2 Air Stripper System

- Air stripping system operated normally except during the period from October 27 to November 1 when the system did not operate due to GWEX pump problems.

- Removal efficiencies for both carbon tetrachloride and chloroform ranged from >99.1% to 100%, (shown in Section 5.0, Table 4). Monthly effluent samples (treated discharge) consistently indicated nondetectable contaminant levels.

- The air stripping towers' automatic level control systems have had occasional problems with precipitation (assumed to be calcium deposits) that clog the level control probes and cause the system to abnormally cycle on and off. As a result, the system was shut down for short periods (half an hour) to facilitate probe cleaning.

- Besides the probe and tower cleaning, no equipment repairs or system operations modifications are planned.

## 3.3 Vapor Extraction System

- The VES system operated normally during the quarter. VES air discharge emission rates were 0.0186 g/sec in November, and 0.0155 g/sec in December.

- Although no VES equipment or system failures were experienced, the system did not operate from October 27 to November 1 due to the GWEX pump failure.

- No repairs or operations modifications are planned.

# 4.0 COMPLIANCE STATUS

## 4.1 Monthly Compliance

- Sequoyah, Inc. collected monthly compliance samples with oversight by Jacobs Engineering personnel during the quarterly sampling event. Compliance samples were analyzed and reported by Jacobs Engineering.

- Sequoyah, Inc. and ANL collected monthly samples in November and December (according to Section 1.0, Table 1) to demonstrate compliance with assigned action levels for combined air emissions and for air stripper discharge to surface water. These levels were met for the reporting period. NPDES reports for each reporting period were submitted to the NDEC by the 28th of the month following sample collection. November and December compliance sampling results are summarized in the following Monthly Compliance Reports, Tables 2 and 3.

## 4.2 Performance Criteria Progress

- Contaminant levels continue to decline and action levels are being approached or have already been met indicating ERA progress toward site cleanup.

- All SGMWs and VES wells met action levels for combined $CCl_4$ and $CHCl_3$ gas concentrations (6.5 $\mu g/m^3$). Contaminant levels in all wells except SGMWs 4B and 4C were below analytical detection limits. Combined soil gas concentrations were 0.227 $\mu g/m^3$ and 0.223 $\mu g/m^3$ in SGMWs 4B and 4C respectively.

- Action levels for ambient air in the adjacent county building basement were met. All sample data reflected nondetectable contaminant concentrations.

- Groundwater monitoring wells were sampled to determine compliance with performance criteria action levels of 5.0 $\mu g/L$ for $CCl_4$ and 3.8 $\mu g/L$ for $CHCl_3$. GWMWs 1A, 2A, 4A, and 5B exceeded the action level for $CCl_4$. MW-2A and MW-5B exceeded the criteria for $CHCl_3$. All other GWMWs met the performance criteria for both analytes.

- Monitoring and compliance data summaries are presented in Section 5.0.

# November Monthly Environmental Compliance Report

## MONTHLY ENVIRONMENTAL COMPLIANCE REPORT
## WAVERLY, NEBRASKA

Sampling Date: November 21, 1988
Analysis Date(s): November 22-December 4, 1988

### RESULTS SUMMARY

| Sample Location | Carbon tetrachloride | Chloroform | Combined | pH |
|---|---|---|---|---|
| Air Stripper Influent (µg/l) | 417 | 14 | - | - |
| Air Stripper Midstream (µg/l) | 7 | ND | - | - |
| Air Stripper Effluent (µg/l) (1) | ND | ND | - | 7.88 |
| Air Stripper Air Emissions (g/sec) (2) | 0.0032 | 0.0001 | 0.0033 | - |
| VES Discharge Emissions (g/sec) | 0.0186 | ND | 0.0186 | - |
| Total Air Emissions (g/sec) (1,2,3) | 0.0218 | 0.0001 | 0.0219 | - |

**Notes:**
(1) Required Monitoring/Compliance Point.
(2) Calculated value.
(3) Total Air Emissions (g/sec) = Air Stripper Emissions (g/sec) + VES Discharge Emissions (g/sec).
ND indicates the measurement was below the analytical detection limit.

### COMPLIANCE SUMMARY

| Monitoring/Compliance Point | Carbon tetrachloride | Chloroform | Combined | pH |
|---|---|---|---|---|
| **Air Stripper Effluent** | | | | |
| Action Level (NPDES) (µg/l) | 6.95 | 5.0 | - | 6<pH<9 |
| Measured Value ( µg/l) | ND | ND | - | 7.88 |
| **Total Air Emissions** | | | | |
| Action Level (g/sec) | - | - | 0.147 | - |
| Measured Value (g/sec) (1) | 0.0218 | 0.0001 | 0.0219 | - |

**Notes:**
(1) Total Air Emissions (g/sec) = Air Stripper Emissions (g/sec) + VES Discharge Emissions (g/sec).
ND indicates the measurement was below the analytical detection limit.

**Table 2 November Monthly Environmental Compliance Report**

# December Monthly Environmental Compliance Report

## MONTHLY ENVIRONMENTAL COMPLIANCE REPORT
## WAVERLY, NEBRASKA

Sampling Date: December 14, 1988
Analysis Date(s): December 20, 1988

### RESULTS SUMMARY

| Sample Location | Carbon tetrachloride | Chloroform | Combined | pH |
|---|---|---|---|---|
| Air Stripper Influent (µg/l) | 340 | 12 | - | - |
| Air Stripper Midstream (µg/l) | 6 | ND | - | - |
| Air Stripper Effluent (µg/l) (1) | ND | ND | - | 6.92 |
| Air Stripper Air Emissions (g/sec) (2) | 0.0026 | 0.0001 | 0.0027 | - |
| VES Discharge Air Emissions (g/sec) | 0.0155 | ND | 0.0155 | - |
| Total Air Emissions (g/sec) (1,2,3) | 0.0181 | 0.0001 | 0.0182 | - |

**Notes:**
(1) Required Monitoring/Compliance Point.
(2) Calculated value.
(3) Total Air Emissions (g/sec) = Air Stripper Emissions (g/sec) + VES Discharge Emissions (g/sec).
ND indicates the measurement was below the analytical detection limit.

### COMPLIANCE SUMMARY

| Monitoring/Compliance Point | Carbon tetrachloride | Chloroform | Combined | pH |
|---|---|---|---|---|
| **Air Stripper Effluent** | | | | |
| Action Level (NPDES) (µg/l) | 6.95 | 5.0 | - | 6<pH<9 |
| Measured Value ( µg/l) | ND | ND | - | 6.92 |
| **Total Air Emissions** | | | | |
| Action Level (g/sec) | - | - | 0.147 | - |
| Measured Value (g/sec) (1) | 0.0181 | 0.0001 | 0.0182 | - |

**Notes:**
(1) Total Air Emissions (g/sec) = Air Stripper Emissions (g/sec) + VES Discharge Emissions (g/sec).
ND indicates the measurement was below the analytical detection limit.

**Table 3 December Monthly Environmental Compliance Report**

# 5.0 MONITORING DATA SUMMARY

- Quarterly and monthly samples were collected according to the schedule outlined in Section 1.0, Table 1. All samples were collected without deviation from sampling plan protocols.

- Quarterly samples were collected, analyzed, and reported by Jacobs Engineering. Sequoyah, Inc. collected October monthly compliance samples under Jacobs' oversight. All analyses exceeded the prescribed holding times. No additional comments can be made concerning October data quality.

- November and December samples were collected by Sequoyah, Inc. under ANL oversight, and subsequently analyzed and reported by ANL. Water samples were analyzed by methods meeting standard CLP criteria. Air samples were analyzed according to NIOSH method #1003. All sample holding times were met (2 weeks for both air and water) with the exception of the November air samples which were delayed during analytical method startup.

- Trend analysis and conclusions based on interpretation of past data relative to recent data must be made cautiously since data reporting is not consistent between contractors.

## 5.1 Treatment System

- GWEX influent contaminant concentrations continue to decline. Removal efficiencies are similar to those reported in the past. Table 4 summarizes influent and effluent contaminant concentrations, and air stripping system efficiencies.

- Air stripping influent concentrations ranged from 340 µg/L to 800 µg/L for $CCl_4$, and from 12 to 23 µg/L for $CHCl_3$. Effluent concentrations for both analytes ranged from not detected (ND) to 0.2 µg/L, well below analytical detection limits. Removal efficiencies ranged from >99.9% to 100% (ND effluent concentrations were treated as zero in mass balance percent removal equation).

- Combined CC14 and CHC13 air emissions from the VES and air stripping system continued to be well below the action level (0.147 g/sec), meeting prescribed performance criteria. Combined air emission rates were 0.0219 g/sec in November, and 0.0182 g/sec in December. Emissions are summarized in Table 5.

## 5.2 Soil Gases and Ambient Air

- Soil gas levels (for both analytes) in all VES wells, VES discharge, and all SGMWs were below detection limits with the exception of SGMWs 4B and 4C.

Air Stripper Efficiency Data

| QUARTER | MONTH | CARBON TETRACHLORIDE | | |
|---|---|---|---|---|
| | | INFLUENT µg/l | EFFLUENT µg/l | REMOVAL % |
| I - 89 (1) | December | 340 | ND | 100 |
| | November | 417 | ND | 100 |
| | October | [800] | [0.2 (2)] | [>99.9] |
| IV - 88 | September | [-] | [-] | [-] |
| | August | [430] | [<1.0] | [>99.7] |
| | July | [990] | [<1.0] | [>99.9] |
| III - 88 | June | [740] | [<5.0] | [>99.3] |
| | May | [840] | [<1.0] | [>99.8] |
| | April | [1400] | [<1.1] | [>99.9] |
| II - 88 | March | [2100] | [1.2] | [>99.9] |
| | February | [2600] | [1.5] | [>99.9] |
| | January | [-] | [-] | [-] |

| QUARTER | MONTH | CHLOROFORM | | |
|---|---|---|---|---|
| | | INFLUENT µg/l | EFFLUENT µg/l | REMOVAL % |
| I - 89 (1) | December | 12 | ND | 100 |
| | November | 14 | ND | 100 |
| | October | [23] | [>0.2] | [>99.1] |
| IV - 88 | September | [-] | [-] | [-] |
| | August | [20] | [>1.0] | [>95.0] |
| | July | [20] | [>1.0] | [>95.0] |
| III - 88 | June | [16] | [<5.0] | [>68.8] |
| | May | [27] | [>1.0] | [>96.3] |
| | April | [25] | [>1.0] | [>96.3] |
| II - 88 | March | [39.5] | [>1.5] | [>96.2] |
| | February | [28.4] | [>0.9] | [>96.8] |
| | January | [-] | [-] | [-] |

Note 1: Argonne National Laboratory (ANL) was contracted by the CCC to assume site management and field sampling responsibilities during first quarter of FY89. Data prior to November, 1988, was generated from US EPA contractor activities.
Note 2: Value is the average of investigative and replicate sample data.
[ ] Indicates sample data was not generated by ANL. Data quality is not known.

**Table 4 Air Stripper Efficiency Data**

Treatment System Emission Rates

| QUARTER | MONTH | COMBINED AIR EMISSIONS (1) | | |
|---|---|---|---|---|
| | | AIR STRIPPER g/s | VES g/s | TOTAL g/s |
| I - 89 (2) | December | 0.0027 | 0.0155 | 0.0182 |
| | November | 0.0033 | 0.0186 | 0.0219 |
| | October | [ - ] | [ - ] | [ - ] |
| IV - 88 | September | [ - ] | [ - ] | [ - ] |
| | August | [ - ] | [ - ] | [ - ] |
| | July | [0.011] | [0.0038] | [0.0148] |
| III - 88 | June | [ - ] | [ - ] | [ - ] |
| | May | [0.0087] | [0.002] | [0.0107] |
| | April | [0.014] | [0.028] | [0.042] |
| II - 88 | March | [0.0171] | [0.0134] | [0.0305] |
| | February | [0.0236] | [0.0165] | [0.0401] |
| | January | [ - ] | [ - ] | [ - ] |

Note 1: Emissions based on total of combined carbon tetrachloride and chloroform emissions.
Note 2: Argonne National Laboratory (ANL) was contracted by the CCC to assume site management and field sampling responsibilities during first quarter of FY89. Data prior to November, 1988, was generated from US EPA contractor activities.
[ ] Indicates sample data was not generated by ANL. Data quality is not known.

**Table 5 Treatment System Emission Rates**

- Ambient air concentrations of both analytes were also below detection limits for samples collected in the basement of the adjacent county maintenance building.

- Table 6 presents the soil gas (SGMW and VES) and ambient air monitoring results.

### 5.3 Groundwater

- Groundwater monitoring data (including public supply wells, residential wells, and monitoring wells) are presented in Table 7.

- $CCl_4$ levels continued to decline in wells MW-1A, MW-2A, MW-3A, MW-4A and MW-5B. October MW-1A sample results were 7.3 µg/L compared to 1200 µg/L one year ago. During the same time, MW-2A declined from 800 µg/L to 18 µg/L, MW-3A from 48 µg/L to 1.7 µg/L, MW-4A from 74 µg/L to 5.4 µg/L, and MW-5B from 260 µg/L to 66 µg/L.

- $CHCl_3$ levels also continued to decline in wells MW-1A, MW-2A, MW-3A, MW-4A and MW-5B. October MW-1A sample results were 0.9 µg/L compared to 110 µg/L one year ago. During the same time, MW-2A declined from 44 µg/L to 11 µg/L, MW-3A from 20 µg/L to 0.8 µg/L, MW-4A from 20 µg/L to 2.4 µg/L, and MW-5B from 20 µg/L to 5.5 µg/L.

- As in past sampling events, neither $CCl_4$ nor $CHCl_3$ were detected in samples from upgradient monitoring wells 7A and 8A.

- Inconsistencies were noted in the October data reported for the Hedrick south residential well sample. Several conflicting $CCl_4$ sample concentrations were reported between the data summary and the analytical case narrative (120 µg/L in data summary, and 115 and 28 µg/L in the case narrative). The two extremes of the reported data values are included in the data summary, Table 7. Data should be verified by US EPA.

- Evidence of contamination continues to be absent from Hedrick north residential well samples.

- $CCl_4$ was reportedly detected in PSWs 3, 4, and 5, and $CHCl_3$ in PSWs 3 and 5. Measured $CCl_4$ levels were 2.4 µg/L in PSW 3, 0.2 µg/L in PSW 4, and 21 µg/L in PSW 5. $CHCl_3$ in PSWs 3 and 5 were 0.4 and 0.3 µg/L respectively. Laboratory cross contamination is suspected to have caused the low level (<1.0 µg/L) contaminant concentrations in PSWs 3, 4, and 5. ANL has initiated supplemental PSW sample collection (in March and May) to reconcile these inconsistencies.

Soil Gases and Ambient Air Monitoring Data

| SAMPLE | CARBON TETRACHLORIDE mg/m^3 | | | |
|---|---|---|---|---|
| | 1988 | | | |
| | Oct | Jun | Feb | Feb |
| SGMW-1A | [ND] | [<.69] | [7.1] | [1.06] |
| SGMW-1B | [ND] | [<.65] | [<0.44] | [<0.60] |
| SGMW-1C | [ND] | [<.67] | [<0.66] | [39.7] |
| SGMW-2A | [ND] | [32.68] | [<0.60] | [<0.65] |
| SGMW-2B | [ND] | [2.68] | [<0.60] | [<0.66] |
| SGMW-2C | [ND] | [<.678] | [<0.60] | [12.1] |
| SGMW-3A | [ND] | [<.66] | [<0.71] | [<0.65] |
| SGMW-3B | [ND] | [2.61] | [<0.71] | [5011] |
| SGMW-3C | [ND] | [<.66] | [<0.71] | [244.6] |
| SGMW-4A | [ND (2)] | [5.32] | [85.1] | [<0.65] |
| SGMW-4B | [102 (2)] | [79.3] | [<0.71] | [<0.62] |
| SGMW-4C | [103 (2)] | [74.2] | [3.39] | [72.9] |
| SGMW-5A | [ND] | [0.66] | [<0.09] | [<0.59] |
| SGMW-5B | [ND] | [6.06] | [<0.9] | [<0.58] |
| SGMW-5C | [ND] | [2.61] | [<0.9] | [<0.60] |
| VES-1 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-2 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-3 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-4 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-7 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-8 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-9 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-10 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-11 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-12 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-Discharge | [ND] | [ - ] | [ - ] | [ - ] |
| Co. Bldg E | [ND] | [ - ] | [ - ] | [ - ] |
| Co. Bldg NW | [ND] | [ - ] | [ - ] | [ - ] |
| Co. Bldg SW | [ND] | [ - ] | [ - ] | [ - ] |

Note 1: Argonne National Laboratory (ANL) was contracted by the CCC to assume site management and field sampling responsibilities during first quarter FY89. Data prior to November, 1988, was generated from US EPA contractor activities.

Note 2: Value is the average of investigative and replicate sample data.

[ ] Indicates sample data was not generated by ANL. Data quality is not known.

**Table 6 Soil Gases and Ambient Air Monitoring Data**

Soil Gases and Ambient Air Monitoring Data

| SAMPLE | CHLOROFORM mg/m^3 | | | |
|---|---|---|---|---|
| | 1988 | | | |
| | Oct | Jun | Feb | Feb |
| SGMW-1A | [ND] | [<.69] | [1.32] | [<1.21] |
| SGMW-1B | [ND] | [<.65] | [<0.88] | [<1.19] |
| SGMW-1C | [ND] | [<.67] | [<1.32] | [5.45] |
| SGMW-2A | [ND] | [ - ] | [<1.2] | [<1.30] |
| SGMW-2B | [ND] | [13.1] | [<1.2] | [<1.32] |
| SGMW-2C | [ND] | [<.678] | [<1.2] | [<1.29] |
| SGMW-3A | [ND] | [<.66] | [<1.42] | [<1.30] |
| SGMW-3B | [ND] | [<.65] | [<1.42] | [42] |
| SGMW-3C | [ND] | [<.66] | [<1.42] | [2.77] |
| SGMW-4A | [ND(2)] | [1.33] | [4.3] | [<1.30] |
| SGMW-4B | [125 (2)] | [8.57] | [<1.42] | [<1.28] |
| SGMW-4C | [120 (2)] | [7.92] | [<1.42] | [3.15] |
| SGMW-5A | [ND] | [<.66] | [<1.7] | [<1.18] |
| SGMW-5B | [ND] | [4.04] | [<1.7] | [<1.16] |
| SGMW-5C | [ND] | [<.65] | [<1.7] | [<1.21] |
| VES-1 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-2 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-3 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-4 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-7 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-8 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-9 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-10 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-11 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-12 | [ND] | [ - ] | [ - ] | [ - ] |
| VES-Discharge | [ND] | [ - ] | [ - ] | [ - ] |
| Co. Bldg E | [ND] | [ - ] | [ - ] | [ - ] |
| Co. Bldg NW | [ND] | [ - ] | [ - ] | [ - ] |
| Co. Bldg SW | [ND] | [ - ] | [ - ] | [ - ] |

Note 1: Argonne National Laboratory (ANL) was contracted by the CCC to assume site management and field sampling responsibilities during first quarter FY89. Data prior to November, 1988, was generated from US EPA contractor activities.

Note 2: Value is the average of investigative and replicate sample data.

[ ] Indicates sample data was not generated by ANL. Data quality is not known.

**Table 6 Soil Gases and Ambient Air Monitoring Data (Con't)**

Groundwater Monitoring Data

| SAMPLE | CHLOROFORM µg/L | | | | |
|---|---|---|---|---|---|
| | 1988 | | | 1987 | |
| | Oct | Jun | Jan | Oct | Aug |
| MW-1A | [0.9 (2)] | [ND] | [190] | [110] | [140] |
| MW-1B | [1.1] | [30] | [ND] | [ND] | [ND] |
| MW-1C | [1] | [ND] | [ND] | [ND] | [ND] |
| MW-2A | [11] | [20] | [43] | [44] | [ND] |
| MW-3A | [0.8] | [8] | [8] | [20] | [ND] |
| MW-4A | [2.4] | [-] | [23] | [20] | [ND] |
| MW-4B | [0.5] | [ND] | [ND] | [ND] | [ND] |
| MW-5A | [0.1] | [ND] | [-] | [ND] | [-] |
| MW-5B | [5.5] | [10] | [ND] | [20] | [-] |
| MW-5D | [0.2] | [ND] | [ND] | [ND] | [-] |
| MW-7A | [ND] | [ND] | [ND] | [ND] | [-] |
| MW-8A | [ND] | [ND] | [49] | [ND] | [-] |
| Hedrick No. | [ND] | [ND] | [ND] | [ND] | [-] |
| Hedrick So. | [20] | [12] | [8.9] | [4] | [-] |
| PSW-1 | [ND] | [ND] | [ND] | [ND] | [-] |
| PSW-2 | [ND] | [ND] | [ND] | [ND] | [-] |
| PSW-3 | [0.4] | [ND] | [ND] | [ND] | [-] |
| PSW-4 | [ND] | [ND] | [ND] | [ND] | [-] |
| PSW-5 | [0.3] | [ND] | [ND] | [ND] | [-] |

Note 1: Argonne National Laboratory (ANL) was contracted by the CCC to assume site management and field sampling responsibilities during first quarter FY89. Data prior to November, 1988, was generated from US EPA contractors.

Note 2: Value is the average of investigative and replicate sample data.

[ ] Indicates sample data was not generated by ANL. Data quality is not known.

**Table 7 Groundwater Monitoring Data (Con't)**

Groundwater Monitoring Data

| SAMPLE | CARBON TETRACHLORIDE µg/L | | | | |
|---|---|---|---|---|---|
| | 1988 | | | 1987 | |
| | Oct | Jun | Jan | Oct | Aug |
| MW-1A | [7.3 (2)] | [6] | [2800] | [1200] | [2000] |
| MW-1B | [0.2] | [10] | [ND] | [ND] | [ND] |
| MW-1C | [0.2] | [ND] | [ND] | [ND] | [ND] |
| MW-2A | [18] | [110] | [690] | [800] | [620] |
| MW-3A | [1.7] | [25] | [80] | [48] | [74] |
| MW-4A | [5.4] | [8] | [76] | [74] | [76] |
| MW-4B | [1] | [ND] | [ND] | [1] | [ND] |
| MW-5A | [0.8] | [ND] | [-] | [2] | [-] |
| MW-5B | [66] | [230] | [ND] | [260] | [-] |
| MW-5D | [0.4] | [9] | [ND] | [ND] | [-] |
| MW-7A | [ND] | [ND] | [ND] | [ND] | [-] |
| MW-8A | [ND] | [ND] | [900] | [ND] | [-] |
| Hedrick No. | [ND] | [ND] | [ND] | [ND] | [-] |
| Hedrick So. | [28/120 (3)] | [59] | [34] | [14] | [-] |
| PSW-1 | [ND] | [ND] | [ND] | [ND] | [-] |
| PSW-2 | [ND] | [ND] | [ND] | [ND] | [-] |
| PSW-3 | [2.4] | [8] | [ND] | [9] | [-] |
| PSW-4 | [0.2] | [ND] | [ND] | [ND] | [-] |
| PSW-5 | [21] | [ND] | [ND] | [ND] | [-] |

Note 1: Argonne National Laboratory (ANL) was contracted by the CCC to assume site management and field sampling responsibilities during first quarter FY89. Data prior to November, 1988, was generated from US EPA contractors.
Note 2: Value is the average of investigative and replicate sample data.
Note 3: Both data points are reported because of the extreme value difference.
[ ] Indicates sample data was not generated by ANL. Data quality is not known.

**Table 7 Groundwater Monitoring Data**

# Waverly, Nebraska
# Expedited Response Action

## Second Quarter Report FY'89

## Reporting Period: January, February, and March, 1989

Prepared for

Commodity Credit Corporation
Agricultural Stabilization and Conservation Service
United States Department of Agriculture

by

Office of Environmental Management and Surveys
Energy and Environmental Systems Division
Argonne National Laboratory

April 20, 1989

# INTRODUCTION

US EPA Region VII initiated an Expedited Response Action (ERA) at a former grain facility site in Waverly, Nebraska, for the treatment of carbon tetrachloride and chloroform contaminated soil and groundwater. The ERA involves a vapor extraction system (VES) to remove source contamination from the subsoils, and an extraction well and air stripping system to pump and treat contaminated groundwater. The Commodity Credit Corporation (CCC) of the United States Department of Agriculture (USDA) assumed full responsibility in September, 1988, for continued cleanup operations at the site including management, operations, and monitoring of the ERA. Argonne National Laboratory (ANL) is currently under contract with CCC to provide site management and compliance monitoring services for the Waverly ERA. US EPA continues to oversee CCC and ANL activities at the site.

As required by the compliance agreement between US EPA and the CCC, quarterly reports are prepared to review CCC's activities at the site during the past quarter, and to evaluate the Waverly ERA progress. The report contains five sections:

# 1.0 ACCOMPLISHMENTS AND ACTIVITIES

## 1.1 General Site Management

- ERA progress toward overall site cleanup is demonstrated by the continued decline in contaminant levels in groundwater monitoring wells and soil gas wells. As of January sampling, all soil gas monitoring wells and VES wells have met the compliance action levels, and only one on-site groundwater monitoring well (MW-5B) continues to show contamination above action levels.

- CCC has continued to pursue alternative water supply options for the residents serviced by an affected well. Sequoyah, Inc. is preparing cost estimates for city water hook-ups.

- The monitoring and compliance sampling schedule was revised and is presented in Table 1.

- October quarterly data was received from Jacobs Engineering Group and reviewed by ANL and USDA.

- Drafts of January quarterly sampling notification letters (for City of Waverly and Lancaster County officials and Waverly residents) were prepared by ANL and sent to USDA for review and comment.

- ANL initiated verification of previously used air stripper and VES emission calculation formulas and identified potential errors in previous calculations. ANL currently working with Jacobs Engineering to reconcile potential formulaic and calculative errors.

- Air stripper and VES emissions compliance worksheets were developed to assist in air emissions compliance calculations and to provide a record of compliance determinations.

- Quarterly analytical work was scheduled and performed by ANL Analytical Chemistry Laboratory (ACL). Water analysis for carbon tetrachloride and chloroform met US EPA CLP standards for volatile organics analysis (VOA). Charcoal sorbent tubes were used to collect air samples which were analyzed according to NIOSH method #1003. The air sample collection and analytical methods were those used by US EPA during previous air sampling events. Monthly samples (air emissions and air stripper surface water discharge) are expected to have a data turn around time of two to three weeks; quarterly results are expected within four to six weeks of sample collection.

- A hydrogeologic study of the Waverly site was initiated in January. Objectives of the study are to: 1) review and evaluate existing hydrogeological data; and 2) develop numerical groundwater flow and contaminant transport models. The models will be used to delineate theoretically the contaminant plume, to identify ideal and alternative locations for new monitoring wells, and to evaluate the need for a second groundwater extraction well. As a long term goal, the model may also be used to assist in

## Revised Monitoring and Compliance Sampling Schedule

| SAMPLE TYPE | ANALYSES | MONTHLY* | QUARTERLY* | |
|---|---|---|---|---|
| | | | BATCH #1 | BATCH #2 |
| **WATER SAMPLES (1)** | | | | |
| GROUNDWATER MONITORING WELLS | CCl4, CHCl3 | - | 3 | 9 |
| RESIDENTIAL WELLS | CCl4, CHCl3 | - | - | 2 |
| PUBLIC WELLS | CCl4, CHCl3 | - | 5 | - |
| AIR STRIPPING INFLUENT, EFFLUENT, MID-STREAM (2) | CCl4, CHCl3 | 3 | 3 | - |
| FIELD SAMPLES: | | 3 | 11 | 11 |
| REPLICATE (FIELD QC) (3) | CCl4, CHCl3 | 1 | 1 | 1 |
| BLANK (FIELD QC) (3) | CCl4, CHCl3 | 1 | 1 | 1 |
| SUB-TOTAL: | | 5 | 13 | 13 |
| MATRIX SPIKE (LAB QC) (4) | CCl4, CHCl3 | 1 | 1 | 1 |
| DUPLICATE (LAB QC) (4) | CCl4, CHCl3 | 1 | 1 | 1 |
| **TOTAL WATER SAMPLES:** | | 7 | 15 | 15 |
| **AIR SAMPLES (5)** | | | | |
| SOIL GAS SAMPLES | CCl4, CHCl3 | - | 9 | 6 |
| VES DISCHARGE (2) | CCl4, CHCl3 | 1 | 1 | - |
| VES INDIVIDUAL SAMPLES | CCl4, CHCl3 | - | 5 | 5 |
| AMBIENT AIR (County Bldg. Basement & Process Bldg.) | CCl4, CHCl3 | - | - | 4 |
| FIELD SAMPLES: | | 1 | 15 | 15 |
| REPLICATE (FIELD QC) (3) | CCl4, CHCl3 | 1 | 1 | 1 |
| BLANK (FIELD QC) (3) | CCl4, CHCl3 | 1 | 1 | 1 |
| SUB-TOTAL: | | 3 | 17 | 17 |
| MATRIX SPIKE (LAB QC) (4) | CCl4, CHCl3 | 1 | 1 | 1 |
| DUPLICATE (LAB QC) (4) | CCl4, CHCl3 | 1 | 1 | 1 |
| **TOTAL AIR SAMPLES:** | | 5 | 19 | 19 |

NOTES:

*) Tentative sampling schedule: Jan 16-18 (Quarterly), Feb 16 (Monthly), and Mar 15 (Monthly), 1989.
1) One water sample is comprised of four VOA vials (@ 40 ml ea.).
2) Monthly compliance samples have 2-3 week turn around time for results.
3) Two field QC samples (one replicate and one blank) will be collected for every 10 investigative samples.
4) Lab QC samples consist of one matrix spike and one duplicate per batch of 20 field samples.
5) One air sample is comprised of one charcoal sorbent sampling tube.

**Table 1 Revised Monitoring and Compliance Sampling Schedule**

contaminant plume monitoring and aquifer remediation. Activities to date include the collection and review of local hydrogeologic data, descriptive analysis of areal groundwater flow, conceptual analysis of contaminant transport, and preliminary development of a mathematical groundwater flow model. Initial study results are expected in mid- to late- April.

- Monitoring well locks were changed. New keys are kept in locked ERA process building.

- ANL currently working with air stripping tower manufacture to develop cleaning procedure.

- As previously suggested by Jacobs Engineering, alternative air sampling protocols were considered (i.e., changing from charcoal sorbent tubes to Tenax traps). Current sampling flow rates and ACL analytical method detection limits were determined to be sufficient to demonstrate compliance with action levels. No change in air sampling protocols was deemed necessary at this time.

## 1.2 Field and Sampling Events

- Quarterly samples were collected for USDA by ANL on January 16-18, 1989 with US EPA oversight by Jacobs Engineering personnel. All required samples were collected with the exception of groundwater from MW-5D. City of Waverly personnel assisted with the public supply wells (PSWs) sampling. Quarterly sampling results are presented in Section 5.0.

- Monthly compliance samples were collected on January 16-18 (during quarterly sampling), February 17, and March 15, 1989. Samples were collected by Sequoyah, Inc. personnel under direct oversight by ANL personnel. Neither US EPA personnel nor their oversight representatives were present during February or March sampling events. Results are presented in Sections 4.0 and 5.0.

- Due to inconsistencies between October and January quarterly data, additional potable water samples were collected March 14 (during monthly sampling event). PSWs 3, 4, and 5 were sampled with assistance from Waverly water department personnel. An attempt was also made to sample the Hedrick south residential well.

- ANL adopted the existing Waverly ERA Sampling Plan (previously used by Jacobs Engineering) for use during this quarter's sampling events. New sample handling protocols were used during all ANL sampling events.

- Four new field sampling logbooks (Domestic Water Supply, Ambient Air, Soil Gas Monitoring Wells, and Groundwater Monitoring Wells) were developed and implemented during quarterly sampling in January.

- Three guidance documents were prepared to supplement Sequoyah, Inc.'s sample collection training.

- Soil gas monitoring well (SGMW) sampling technique was modified by introducing multi-port flow adjusters. Procedure allowed all three SGMWs in each cluster to be sampled simultaneously using just one pump. Technique increases collection efficiency by making available two additional low flow sampling pumps per SGMW cluster.

## 1.3 Meetings

- No meetings were held.

# 2.0 PLANNED ACTIVITIES

## 2.1 General Site Management

- Evaluate sampling frequency requirements for individual groundwater monitoring wells and domestic supply wells (public and residential) based on results of January and April quarterly sampling. Performance criteria requires only annual sampling of monitoring wells (groundwater, public and residential) that are below action levels. The following wells may be proposed for change to annual sampling frequency: all on-site wells except MW-2A, all off-site wells except MW-5B, and all public supply and domestic wells except Hedrick south.

- Finalize newly formatted quarterly sampling notification letters and then report January results to City of Waverly and Lancaster County officials and to Waverly residents.

- Second quarter NPDES Discharge Monitoring Reports (DMRs) will be submitted to the Nebraska Department of Environmental Control (NDEC) prior to April 28, 1989, the quarterly reporting deadline. First quarter FY'89 monthly compliance reports will be recalculated based on formulaic corrections and re-submitted to USDA.

- Hydrogeologic study preliminary findings to be available late April.

- Complete discussion with Jacobs Engineering personnel concerning changes in air sampling protocols.

- The dedicated pump in MW-5D will be pulled during the April quarterly sampling event to determine why it could not be sampled in January. An attempt will be made to replace necessary parts and sample the well.

- After the April sampling event, air stripping towers will be cleaned as recommended by the manufacturer to remove deposits that may be interfering with water level probes and system controls. Cleaning procedure involves circulating an acidic solution through the stripping towers (closed, continuous circulation) and neutralizing the solution prior to discharge.

- A preventative maintenance program (procedures and schedule) for the ERA mechanical systems will be developed and implemented.

## 2.2 Field and Sampling Events

- Supplemental potable water supply samples will be collected from PSWs 3, 4, and 5, and from the Hedrick south residence during the May monthly sampling event to reconcile previous data inconsistencies.

- Third quarter FY'89 sampling events are tentatively scheduled to occur on:

| | |
|---|---|
| April 10-12 ..... | Quarterly Sampling |
| May 15 ..... | Monthly Sampling (plus supplemental water samples) |
| June 12 ..... | Monthly Sampling |

## 2.3 Meetings

- Quarterly meeting will be scheduled.

# 3.0 SYSTEM OPERATION AND PERFORMANCE

## 3.1 Groundwater Extraction Well

- The groundwater extraction well (GWEX) operated at an average groundwater removal rate of 0.1636 million gallons per day (MGD) during the past quarter. A total of 13.74 MG were removed and treated during this reporting period (84 days).
- The GWEX did not operate from February 2-4, 13-14, and on March 6 due to problems with the air stripping system.
- No equipment repairs or operational modifications are planned for the extraction well system.

## 3.2 Air Stripper System

- Air stripping system operated normally except during the periods of February 2-4, 13-14, and March 6. The process building furnace malfunctioned and caused the air stripping unit to freeze on February 2. The furnace was repaired, and the system restarted on February 4th. The system shut down on February 13th; after probes were cleaned and fuses replaced, the system was restarted on the 14th. The system was shut down temporarily on March 6th while blown fuses were replaced.
- Removal efficiencies for both carbon tetrachloride and chloroform ranged from >99.8% to 100%, (shown in Section 5.0, Table 5). Monthly effluent samples (treated discharge) consistently indicated nondetectable contaminant levels.
- The air stripping towers automatic level control systems have had occasional problems with precipitation (assumed to be calcium deposits) that clog the level control probes and cause the system to abnormally cycle on and off. As a result, the system was periodically shut down for short periods (half an hour) to facilitate probe cleaning. A full tower cleaning is being planned to remedy this problem.
- Besides the probe and tower cleaning, no equipment repairs or system operations modifications are planned.

## 3.3 Vapor Extraction System

- The VES system operated normally. Based on nondetectable contaminant levels in the sampled discharge gas, VES discharge emission rates were 0.0 g/sec throughout the quarter (summarized in Section 5.0, Table 6).
- Although no VES equipment or system failures were experienced, the system did not operate on February 2-4, and 13-14 due to problems with the air stripper system.
- No repairs or operations modifications are planned.

# 4.0 COMPLIANCE STATUS

## 4.1 Monthly Compliance

- Sequoyah, Inc. with ANL oversight collected monthly samples in January, February, and March (according to Section 1.0, Table 1) to demonstrate compliance with assigned action levels for combined air emissions and for air stripper discharge to surface water. These levels were met for the reporting period. NPDES reports for each reporting period have been completed, and will be submitted to the NDEC by April 28th. The compliance sampling results are summarized in the following Monthly Compliance Reports, Tables 2, 3, and 4.

## 4.2 Performance Criteria Progress

- Contaminant levels continue to decline and performance criteria action levels are being approached or have already been met indicating ERA progress toward site cleanup.

- All SGMWs and VES wells met action levels for combined $CCl_4$ and $CHCl_3$ gas concentrations (6.5 $\mu g/m^3$). Contaminant levels in all wells except SGMWs 1B, 1C, 3B, 4A, 4B, and 4C were below analytical detection limits. Contaminant concentrations in SGMWs 4B and 4C were considerably lower than the October sample data.

- Action levels for ambient air in the adjacent county building basement were met. All sample data continued to reflect nondetectable contaminant concentrations.

- Groundwater monitoring wells were sampled to determine compliance with performance criteria action levels of 5.0 $\mu g/L$ for $CCl_4$ and 3.8 $\mu g/L$ for $CHCl_3$. Only MW-5B exceeded the action level for $CCl_4$. It did not exceed the criteria for $CHCl_3$. All other GWMWs met the performance criteria for both analytes.

- Monitoring and compliance data summaries are presented in Section 5.0.

# January Monthly Environmental Compliance Report

## MONTHLY ENVIRONMENTAL COMPLIANCE REPORT
## WAVERLY, NEBRASKA

Sampling Date: January 16, 1989
Analysis Date(s): January 18-19, 1989

### RESULTS SUMMARY

| Sample Location | Carbon tetrachloride | Chloroform | Combined | pH |
|---|---|---|---|---|
| Air Stripper Influent (µg/l) | 350 | 13 | - | - |
| Air Stripper Midstream (µg/l) | 5 | ND | - | - |
| Air Stripper Effluent (µg/l) (1) | 0.5 | ND | - | 7.25 |
| Air Stripper Air Emisslons (g/sec) (2) | 0.0024 | 0.0001 | 0.0025 | - |
| VES Discharge Air Emissions (g/sec) | ND | ND | 0 | - |
| Total Air Emissions (g/sec) (1,2,3) | 0.0024 | 0.0001 | 0.0025 | - |

**Notes:**
(1) Required Monitoring/Compliance Point.
(2) Calculated value.
(3) Total Air Emissions (g/sec) = Air Stripper Emissions (g/sec) + VES Discharge Emissions (g/sec).
ND Indicates the measurement was below the analytical detection limit.

### COMPLIANCE SUMMARY

| Monitoring/Compliance Point | Carbon tetrachloride | Chloroform | Combined | pH |
|---|---|---|---|---|
| **Air Stripper Effluent** | - | | | |
| Action Level (NPDES) (µg/l) | 6.95 | 5.0 | - | 6<pH<9 |
| Measured Value ( µg/l) | 0.5 | ND | - | 7.25 |
| **Total Air Emissions** | | | | |
| Action Level (g/sec) | - | - | 0.147 | - |
| Measured Value (g/sec) (1) | 0.0024 | 0.0001 | 0.0025 | - |

**Notes:**
(1) Total Air Emissions (g/sec) = Air Stripper Emissions (g/sec) + VES Discharge Emissions (g/sec).
ND indicates the measurement was below the analytical detection limit.

## Table 2 January Monthly Environmental Compliance Report

# February Monthly Environmental Compliance Report

## MONTHLY ENVIRONMENTAL COMPLIANCE REPORT
## WAVERLY, NEBRASKA

Sampling Date: February 16, 1989
Analysis Date(s): February 17, 1989

### RESULTS SUMMARY

| Sample Location | Carbon tetrachloride | Chloroform | Combined | pH |
|---|---|---|---|---|
| Air Stripper Influent (µg/l) | 400 | 11 | - | - |
| Air Stripper Midstream (µg/l) | 4 | ND | - | - |
| Air Stripper Effluent (µg/l) (1) | ND | ND | - | 6.51 |
| Air Stripper Air Emissions (g/sec) (2) | 0.003 | 0.0001 | 0.0031 | - |
| VES Discharge Air Emissions (g/sec) | ND | ND | 0 | - |
| Total Air Emissions (g/sec) (1,2,3) | 0.003 | 0.0001 | 0.0031 | - |

Notes:
(1) Required Monitoring/Compliance Point.
(2) Calculated value.
(3) Total Air Emissions (g/sec) = Air Stripper Emissions (g/sec) + VES Discharge Emissions (g/sec).
ND indicates the measurement was below the analytical detection limit.

### COMPLIANCE SUMMARY

| Monitoring/Compliance Point | Carbon tetrachloride - | Chloroform | Combined | pH |
|---|---|---|---|---|
| **Air Stripper Effluent** | | | | |
| Action Level (NPDES) (µg/l) | 6.95 | 5.0 | - | 6<pH<9 |
| Measured Value ( µg/l) | ND | ND | - | 6.51 |
| **Total Air Emissions** | | | | |
| Action Level (g/sec) | - | - | 0.147 | - |
| Measured Value (g/sec) (1) | 0.003 | 0.0001 | 0.0031 | - |

Notes:
(1) Total Air Emissions (g/sec) = Air Stripper Emissions (g/sec) + VES Discharge Emissions (g/sec).
ND indicates the measurement was below the analytical detection limit.

**Table 3 February Monthly Environmental Compliance Report**

# March Monthly Environmental Compliance Report

## MONTHLY ENVIRONMENTAL COMPLIANCE REPORT
## WAVERLY, NEBRASKA

Sampling Date: March 14, 1989
Analysis Date(s): March 15, 1989

### RESULTS SUMMARY

| Sample Location | Carbon tetrachloride | Chloroform | Combined | pH |
|---|---|---|---|---|
| Air Stripper Influent (µg/l) | 400 | 13 | - | - |
| Air Stripper Midstream (µg/l) | 5 | ND | - | - |
| Air Stripper Effluent (µg/l) (1) | ND | ND | - | 6.92 5<pH<6 (4) |
| Air Stripper Air Emissions (g/sec) (2) | 0.0028 | 0.0001 | 0.0029 | - |
| VES Discharge Air Emissions (g/sec) | ND | ND | 0 | - |
| Total Air Emissions (g/sec) (1,2,3) | 0.0028 | 0.0001 | 0.0029 | - |

**Notes:**
(1) Required Monitoring/Compliance Point.
(2) Calculated value.
(3) Total Air Emissions (g/sec) = Air Stripper Emissions (g/sec) + VES Discharge Emissions (g/sec).
(4) Direct pH reading not available. Range reading obtained with pH paper.
ND indicates the measurement was below the analytical detection limit.

### COMPLIANCE SUMMARY

| Monitoring/Compliance Point | Carbon tetrachloride | Chloroform | Combined | pH |
|---|---|---|---|---|
| **Air Stripper Effluent** | | | | |
| Action Level (NPDES) (µg/l) | 6.95 | 5.0 | - | 6<pH<9 |
| Measured Value ( µg/l) | ND | ND | - | 5<pH<6 |
| **Total Air Emissions** | | | | |
| Action Level (g/sec) | - | - | 0.147 | - |
| Measured Value (g/sec) (1) | 0.0028 | 0.0001 | 0.0029 | - |

**Notes:**
(1) Total Air Emissions (g/sec) = Air Stripper Emissions (g/sec) + VES Discharge Emissions (g/sec).
ND indicates the measurement was below the analytical detection limit.

**Table 4 March Monthly Environmental Compliance Report**

# 5.0 MONITORING DATA SUMMARY

- Quarterly and monthly samples were collected according to the schedule outlined in Section 1.0, Table 1. All samples were collected without deviation from sampling plan protocols.

- Quarterly samples were collected, analyzed, and reported by ANL. Monthly samples, collected by Sequoyah, Inc. under ANL oversight, were subsequently analyzed and reported by ANL. Water samples were analyzed by methods meeting standard CLP criteria. Air samples were analyzed according to NIOSH method #1003. All sample holding times were met (2 weeks for both air and water).

- Trend analysis and conclusions based on interpretation of past data relative to recent data must be made cautiously since data reporting is not consistent between contractors.

## 5.1 Treatment System

- GWEX influent contaminant concentrations remained similar to last quarter concentrations. Removal efficiencies are similar to those reported in the past. Table 5 summarizes influent and effluent contaminant concentrations, and air stripping system efficiencies.

- Air stripping influent concentrations ranged from 350 µg/L to 400 µg/L for $CCl_4$, and from 11 to 13 µg/L for $CHCl_3$. Effluent concentrations for both analytes ranged from not detected (ND) to 0.5 µg/L, well below analytical detection limits. Removal efficiencies ranged from >99.8% to 100% (ND effluent concentrations were treated as zero in mass balance percent removal equation).

- Combined $CCl_4$ and $CHCl_3$ air emissions from VES and air stripping system continued to be well below the action level (0.147 g/sec), meeting prescribed performance criteria. Combined air emission rates ranged from 0.0025 g/sec to 0.0031 g/sec. Emission rates, based on monthly Compliance Reports, are summarized in Table 6.

## 5.2 Soil Gases and Ambient Air

- $CCl_4$ was detected in SGMWs 1C, 3B, 4A, 4B, and 4C. Concentrations ranged from 0.545 mg/m$^3$ to 49.51 mg/m$^3$.

- $CHCl_3$ was detected in SGMWs 1B, 1C, 4A, 4B, and 4C. Concentrations ranged from 1.51 mg/m$^3$ to 15.1 mg/m$^3$.

- Soil gas levels (for both analytes) in all VES wells, VES discharge, and all other SGMWs were below detection limits.

Air Stripper Efficiency Data

| QUARTER | MONTH | CARBON TETRACHLORIDE | | |
|---|---|---|---|---|
| | | INFLUENT µg/l | EFFLUENT µg/l | REMOVAL % |
| II - 89 | March | 400 | ND | 100 |
| | February | 400 | ND | 100 |
| | January | 350 | 0.5 (2) | >99.8 |
| I - 89 (1) | December | 340 | ND | 100 |
| | November | 417 | ND | 100 |
| | October | [800] | [0.2 (2)] | [>99.9] |
| IV - 88 | September | [-] | [-] | [-] |
| | August | [430] | [<1.0] | [>99.7] |
| | July | [990] | [<1.0] | [>99.9] |
| III - 88 | June | [740] | [<5.0] | [>99.3] |
| | May | [840] | [<1.0] | [>99.8] |
| | April | [1400] | [<1.1] | [>99.9] |
| II - 88 | March | [2100] | [1.2] | [>99.9] |
| | February | [2600] | [1.5] | [>99.9] |
| | January | [-] | [-] | [-] |

| QUARTER | MONTH | CHLOROFORM | | |
|---|---|---|---|---|
| | | INFLUENT µg/l | EFFLUENT µg/l | REMOVAL % |
| II - 89 | March | 13 | ND | 100 |
| | February | 11 | ND | 100 |
| | January | 13 | ND | 100 |
| I - 89 (1) | December | 12 | ND | 100 |
| | November | 14 | ND | 100 |
| | October | [23] | [>0.2] | [>99.1] |
| IV - 88 | September | [-] | [-] | [-] |
| | August | [20] | [>1.0] | [>95.0] |
| | July | [20] | [>1.0] | [>95.0] |
| III - 88 | June | [16] | [<5.0] | [>68.8] |
| | May | [27] | [>1.0] | [>96.3] |
| | April | [25] | [>1.0] | [>96.3] |
| II - 88 | March | [39.5] | [>1.5] | [>96.2] |
| | February | [28.4] | [>0.9] | [>96.8] |
| | January | [-] | [-] | [-] |

Note 1: Argonne National Laboratory (ANL) was contracted by the CCC to assume site management and field sampling responsibilities during first quarter of FY89. Data prior to November, 1988, was generated from US EPA contractor activities.
Note 2: Value is the average of investigative and replicate sample data.
[ ] Indicates sample data was not generated by ANL. Data quality is not known.

**Table 5 Air Stripper Efficiency Data**

Treatment System Emission Rates

| QUARTER | MONTH | COMBINED AIR EMISSIONS (1) | | |
|---|---|---|---|---|
| | | AIR STRIPPER g/s | VES g/s | TOTAL g/s |
| II - 89 | March | 0.0029 | ND | 0.0029 |
| | February | 0.0031 | ND | 0.0031 |
| | January | 0.0025 | ND | 0.0025 |
| I - 89 (2) | December | 0.0027 | 0.0155 | 0.0182 |
| | November | 0.0033 | 0.0186 | 0.0219 |
| | October | [ - ] | [ - ] | [ - ] |
| IV - 88 | September | [ - ] | [ - ] | [ - ] |
| | August | [ - ] | [ - ] | [ - ] |
| | July | [0.011] | [0.0038] | [0.0148] |
| III - 88 | June | [ - ] | [ - ] | [ - ] |
| | May | [0.0087] | [0.002] | [0.0107] |
| | April | [0.014] | [0.028] | [0.042] |
| II - 88 | March | [0.0171] | [0.0134] | [0.0305] |
| | February | [0.0236] | [0.0165] | [0.0401] |
| | January | [ - ] | [ - ] | [ - ] |

Note 1: Emissions based on total of combined carbon tetrachloride and chloroform emissions. Data summary based on Monthly Compliance Reports.

Note 2: Argonne National Laboratory (ANL) was contracted by the CCC to assume site management and field sampling responsibilities during first quarter of FY89. Data prior to November, 1988, was generated from US EPA contractor activities.

[ ] Indicates sample data was not generated by ANL. Data quality is not known.

**Table 6 Treatment System Emission Rates**

- Ambient air concentrations of both analytes were below detection limits for samples collected in the basement of the adjacent county maintenance building.

- Table 7 presents the soil gases (SGMW and VES) and ambient air monitoring results.

## 5.3 Groundwater

- Groundwater monitoring data (including public supply wells, residential wells, and monitoring wells) are presented in Table 8.

- $CCl_4$ levels continued to decline in wells MW-1A, MW-2A, MW-4A and MW-5B. January MW-1A sample results were 2 µg/L compared to 7.3 µg/L last quarter. During the same time, MW-2A declined from 18 µg/L to 3 µg/L, MW-4A from 5.4 µg/L to 2.0 µg/L, and MW-5B from 66 µg/L to 27 µg/L.

- $CHCl_3$ levels also continued to decline in wells MW-1A, MW-2A, MW-3A, MW-4A and MW-5B. Of these wells, MW-2A, MW-3A, MW-4A, and MW-5B continue to show contamination, but at levels ranging only from 1.0 µg/L to 3.5 µg/L.

- MW-5D could not be sampled in January due to a mechanical failure of the dedicated pump.

- As in the past sampling events, neither $CCl_4$ nor $CHCl_3$ were detected in samples from upgradient monitoring wells 7A and 8A.

- The January sample result from Hedrick south residential well appeared to confirm the lower of the data values reported in October. In addition to the April quarterly sampling event, this well will be sampled again during the May monthly sampling to assist in the interpretation of past conflicting data.

- Evidence of contamination continues to be absent from Hedrick north residential well samples.

- PSWs 3, 4, and 5 were sampled in January (scheduled) and in March (supplemental) to reconcile unusual data reported from October sampling event. Contaminants were not detected in either PSWs 4 or 5; sample data from PSW 3 showed 1µg/L CC14. These wells will be resampled in April (scheduled quarterly event) and in May (addition to monthly sampling event).

Soil Gases and Ambient Air Monitoring Data

1987

| SAMPLE | CARBON TETRACHLORIDE mg/m^3 | | | | |
|---|---|---|---|---|---|
| | 1989 (1) | 1988 | | | |
| | Jan | Oct | Jun | Feb | Feb |
| SGMW-1A | ND | [ND] | [<.69] | [7.1] | [1.06] |
| SGMW-1B | ND | [ND] | [<.65] | [<0.44] | [<0.60] |
| SGMW-1C | 3.185 | [ND] | [<.67] | [<0.66] | [39.7] |
| SGMW-2A | ND | [ND] | [32.68] | [<0.60] | [<0.65] |
| SGMW-2B | ND | [ND] | [2.68] | [<0.60] | [<0.66] |
| SGMW-2C | ND | [ND] | [<.678] | [<0.60] | [12.1] |
| SGMW-3A | ND | [ND] | [<.66] | [<0.71] | [<0.65] |
| SGMW-3B | 0.545 (2) | [ND] | [2.61] | [<0.71] | [5011] |
| SGMW-3C | ND | [ND] | [<.66] | [<0.71] | [244.6] |
| SGMW-4A | 2.166 | [ND (2)] | [5.32] | [85.1] | [<0.65] |
| SGMW-4B | 35.45 | [102 (2)] | [79.3] | [<0.71] | [<0.62] |
| SGMW-4C | 49.51 | [103 (2)] | [74.2] | [3.39] | [72.9] |
| SGMW-5A | ND | [ND] | [0.66] | [<0.09] | [<0.59] |
| SGMW-5B | ND | [ND] | [6.06] | [<0.9] | [<0.58] |
| SGMW-5C | ND | [ND] | [2.61] | [<0.9] | [<0.60] |
| VES-1 | ND | [ND] | [-] | [-] | [-] |
| VES-2 | ND | [ND] | [-] | [-] | [-] |
| VES-3 | ND | [ND] | [-] | [-] | [-] |
| VES-4 | ND | [ND] | [-] | [-] | [-] |
| VES-7 | ND | [ND] | [-] | [-] | [-] |
| VES-8 | ND | [ND] | [-] | [-] | [-] |
| VES-9 | ND | [ND] | [-] | [-] | [-] |
| VES-10 | ND | [ND] | [-] | [-] | [-] |
| VES-11 | ND | [ND] | [-] | [-] | [-] |
| VES-12 | ND | [ND] | [-] | [-] | [-] |
| VES-Discharge | ND | [ND] | [-] | [-] | [-] |
| Co. Bldg E | ND | [ND] | [-] | [-] | [-] |
| Co. Bldg NW | ND | [ND] | [-] | [-] | [-] |
| Co. Bldg SW | ND | [ND] | [-] | [-] | [-] |

Note 1: Argonne National Laboratory (ANL) was contracted by the CCC to assume site management and field sampling responsibilities during first quarter FY89. Data prior to November, 1988, was generated from US EPA contractor activities.

Note 2: Value is the average of investigative and replicate sample data.

[ ] Indicates sample data was not generated by ANL. Data quality is not known.

□ A + B ◇ C △ D
X E ▽ F

**Table 7 Soil Gases a ıg Data**

Soil Gases and Ambient Air Monitoring Data

| SAMPLE | CHLOROFORM mg/m^3 | | | | |
|---|---|---|---|---|---|
| | 1989 (1) | 1988 | | | |
| | Jan | Oct | Jun | Feb | Feb |
| SGMW-1A | ND | [ND] | [<.69] | [1.32] | [<1.21] |
| SGMW-1B | 1.792 | [ND] | [<.65] | [<0.88] | [<1.19] |
| SGMW-1C | 5.109 | [ND] | [<.67] | [<1.32] | [5.45] |
| SGMW-2A | ND | [ND] | [ - ] | [<1.2] | [<1.30] |
| SGMW-2B | ND | [ND] | [13.1] | [<1.2] | [<1.32] |
| SGMW-2C | ND | [ND] | [<.678] | [<1.2] | [<1.29] |
| SGMW-3A | ND | [ND] | [<.66] | [<1.42] | [<1.30] |
| SGMW-3B | ND | [ND] | [<.65] | [<1.42] | [42] |
| SGMW-3C | ND | [ND] | [<.66] | [<1.42] | [2.77] |
| SGMW-4A | 1.51 | [ND(2)] | [1.33] | [4.3] | [<1.30] |
| SGMW-4B | 15.1 | [125 (2)] | [8.57] | [<1.42] | [<1.28] |
| SGMW-4C | 14.33 | [120 (2) ] | [7.92] | [<1.42] | [3.15] |
| SGMW-5A | ND | [ND] | [<.66] | [<1.7] | [<1.18] |
| SGMW-5B | ND | [ND] | [4.04] | [<1.7] | [<1.16] |
| SGMW-5C | ND | [ND] | [<.65] | [<1.7] | [<1.21] |
| VES-1 | ND | [ND] | [ - ] | [ - ] | [ - ] |
| VES-2 | ND | [ND] | [ - ] | [ - ] | [ - ] |
| VES-3 | ND | [ND] | [ - ] | [ - ] | [ - ] |
| VES-4 | ND | [ND] | [ - ] | [ - ] | [ - ] |
| VES-7 | ND | [ND] | [ - ] | [ - ] | [ - ] |
| VES-8 | ND | [ND] | [ - ] | [ - ] | [ - ] |
| VES-9 | ND | [ND] | [ - ] | [ - ] | [ - ] |
| VES-10 | ND | [ND] | [ - ] | [ - ] | [ - ] |
| VES-11 | ND | [ND] | [ - ] | [ - ] | [ - ] |
| VES-12 | ND | [ND] | [ - ] | [ - ] | [ - ] |
| VES-Discharge | ND | [ND] | [ - ] | [ - ] | [ - ] |
| Co. Bldg E | ND | [ND] | [ - ] | [ - ] | [ - ] |
| Co. Bldg NW | ND | [ND] | [ - ] | [ - ] | [ - ] |
| Co. Bldg SW | ND | [ND] | [ - ] | [ - ] | [ - ] |

1987

*Note 1: Argonne National Laboratory (ANL) was contracted by the CCC to assume site management and field sampling responsibilities during first quarter FY89. Data prior to November, 1988, was generated from US EPA contractor activities.*

Note 2: Value is the average of investigative and replicate sample data.

[ ] Indicates sample data was not generated by ANL. Data quality is not known.

**Table 7 Soil Gases and Ambient Air Monitoring Data (Con't)**

Groundwater Monitoring Data

| SAMPLE | CARBON TETRACHLORIDE µg/L | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1989 (1) | | 1988 | | | 1987 | |
| | Mar | Jan | Oct | Jun | Jan | Oct | Aug |
| MW-1A | - | 2 | [7.3 (2)] | [6] | [2800] | [1200] | [2000] |
| MW-1B | - | ND | [0.2] | [10] | [ND] | [ND] | [ND] |
| MW-1C | - | ND | [0.2] | [ND] | [ND] | [ND] | [ND] |
| MW-2A | - | 3 | [18] | [110] | [690] | [800] | [620] |
| MW-3A | - | 1 | [1.7] | [25] | [80] | [48] | [74] |
| MW-4A | - | 2 | [5.4] | [8] | [76] | [74] | [76] |
| MW-4B | - | ND | [1] | [ND] | [ND] | [1] | [ND] |
| MW-5A | - | ND | [0.8] | [ND] | [-] | [2] | [-] |
| MW-5B | - | 27 (2) | [66] | [230] | [ND] | [260] | [-] |
| MW-5D | - | - | [0.4] | [9] | [ND] | [ND] | [-] |
| MW-7A | - | ND | [ND] | [ND] | [ND] | [ND] | [-] |
| MW-8A | - | ND | [ND] | [ND] | [900] | [ND] | [-] |
| Hedrick No. | - | ND | [ND] | [ND] | [ND] | [ND] | [-] |
| Hedrick So. | - | 31 | [28/120 (3)] | [59] | [34] | [14] | [-] |
| PSW-1 | - | ND | [ND] | [ND] | [ND] | [ND] | [-] |
| PSW-2 | - | ND | [ND] | [ND] | [ND] | [ND] | [-] |
| PSW-3 | 1 | ND | [2.4] | [8] | [ND] | [9] | [-] |
| PSW-4 | ND | ND | [0.2] | [ND] | [ND] | [ND] | [-] |
| PSW-5 | ND | ND (2) | [21] | [ND] | [ND] | [ND] | [-] |

Note 1: Argonne National Laboratory (ANL) was contracted by the CCC to assume site management and field sampling responsibilities during first quarter FY89. Data prior to November, 1988, was generated from US EPA contractor activities.
Note 2: Value is the average of investigative and replicate sample data.
Note 3: Both data points are reported because of the extreme value difference.
[ ] Indicates sample data was not generated by ANL. Data quality is not known.

**Table 8 Groundwater Monitoring Data**

Groundwater Monitoring Data

| SAMPLE | CHLOROFORM µg/L | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1989 (1) | | 1988 | | | 1987 | |
| | Mar | Jan | Oct | Jun | Jan | Oct | Aug |
| MW-1A | - | ND | [0.9 (2)] | [ND] | [190] | [110] | [140] |
| MW-1B | - | ND | [1.1] | [30] | [ND] | [ND] | [ND] |
| MW-1C | - | ND | [1] | [ND] | [ND] | [ND] | [ND] |
| MW-2A | - | 2 | [11] | [20] | [43] | [44] | [ND] |
| MW-3A | - | 1 | [0.8] | [8] | [8] | [20] | [ND] |
| MW-4A | - | 1 | [2.4] | [-] | [23] | [20] | [ND] |
| MW-4B | - | ND | [0.5] | [ND] | [ND] | [ND] | [ND] |
| MW-5A | - | ND | [0.1] | [ND] | [-] | [ND] | [-] |
| MW-5B | - | 3.5 (2) | [5.5] | [10] | [ND] | [20] | [-] |
| MW-5D | - | - | [0.2] | [ND] | [ND] | [ND] | [-] |
| MW-7A | - | ND | [ND] | [ND] | [ND] | [ND] | [-] |
| MW-8A | - | ND | [ND] | [ND] | [49] | [ND] | [-] |
| Hedrick No. | - | ND | [ND] | [ND] | [ND] | [ND] | [-] |
| Hedrick So. | - | 5 | [20] | [12] | [8.9] | [4] | [-] |
| PSW-1 | - | ND | [ND] | [ND] | [ND] | [ND] | [-] |
| PSW-2 | - | ND | [ND] | [ND] | [ND] | [ND] | [-] |
| PSW-3 | ND | ND | [0.4] | [ND] | [ND] | [ND] | [-] |
| PSW-4 | ND | ND | [ND] | [ND] | [ND] | [ND] | [-] |
| PSW-5 | ND | ND (2) | [0.3] | [ND] | [ND] | [ND] | [-] |

< 3.8 ug/l

< 3.8 ug/l

Note 1: Argonne National Laboratory (ANL) was contracted by the CCC to assume site management and field sampling responsibilities during first quarter FY89. Data prior to November, 1988, was generated from US EPA contractor activities.

Note 2: Value is the average of investigative and replicate sample data.

[ ] Indicates sample data was not generated by ANL. Data quality is not known.

**Table 8 Groundwater Monitoring Data (Con't)**

# WAVERLY, NE MONITORING AND COMPLIANCE SAMPLE SUMMARY

| MONITORING/COMPLIANCE POINTS AND ACTION LEVELS (1) | SAMPLE TYPE/MEDIA (2) | COLLECTION POINT | INVESTIGATIVE SAMPLES (3) | COLLECTION FREQUENCY |
|---|---|---|---|---|
| **1.0 VES & Air Stripper Combined Air Emissions**<br><br>Action Level:<br>0.147g/s for total C(Cl)4+CH(Cl)3 | a. Air Stripper Influent / W | Extraction well discharge; prior to holding tank | 1 | monthly |
| | b. Air Stripper Effluent / W | Discharge from pump P5 | 1 | |
| | c. Air Stripper Midstream / W | Discharge from pump P4 | 1 | |
| | d. VES System Discharge / A | Discharge side of VES discharge separator/silencer | 1 | |
| **2.0 Air Stripper Discharge to Surface Water**<br><br>Action Levels:<br>6 ≤ pH ≤ 9<br>C(Cl)4 ≤ 6.95µg/L<br>CH(Cl)3 ≤ 5.0µg/L | a. Air Stripper Effluent / W | Same sample as #1b | 0<br>(same sample as #1b) | monthly |
| | b. Air Stripper Effluent / W<br>Field test grab sample for pH. | Grab sample from discharge of pump P5 | 1<br>(pH on grab sample. No lab analysis) | |
| **3.0 Ambient Air in Basement of County Maintenance Building**<br><br>Action Levels:<br>C(Cl)4 ≤ 6.5 mg/m^3<br>CH(Cl)3 ≤ 24 mg/m^3 | a. Ambient Air / A | Three independant locations in County Bldg Basement Offices | 3 | quarterly |
| **4.0 SGMW and VES Wells Combined Gas Levels**<br><br>Action Level:<br>6.5µg/m^3 for total C(Cl)4+CH(Cl)3 | a. Soil Gas Monitoring Wells / A | SGMW #1-5 (A,B,C) | 15 | quarterly |
| | b. VES Wells / A | VES Wells #1-4, 7-12 | 10 | |
| **5.0 Groundwater Wells**<br><br>Action Levels:<br>C(Cl)4 ≤ 5.0µg/L<br>CH(Cl)3 ≤ 3.8 µg/L | a. On Site Monitoring Wells / W | GWMW#1(A,B,C),2(A), 3(A), 4(A,B) | 7 | quarterly |
| | b. Off Site Monitoring Wells / W | GWMW# 5(A,B,D), 7(A), 8(A | 5 | |
| | c. City Public Supply Wells / W | PWS# 1,2,3,4,5 | 5 | |
| | d. Residential Wells / W | Hedrick north, Hedrick south | 2 | |

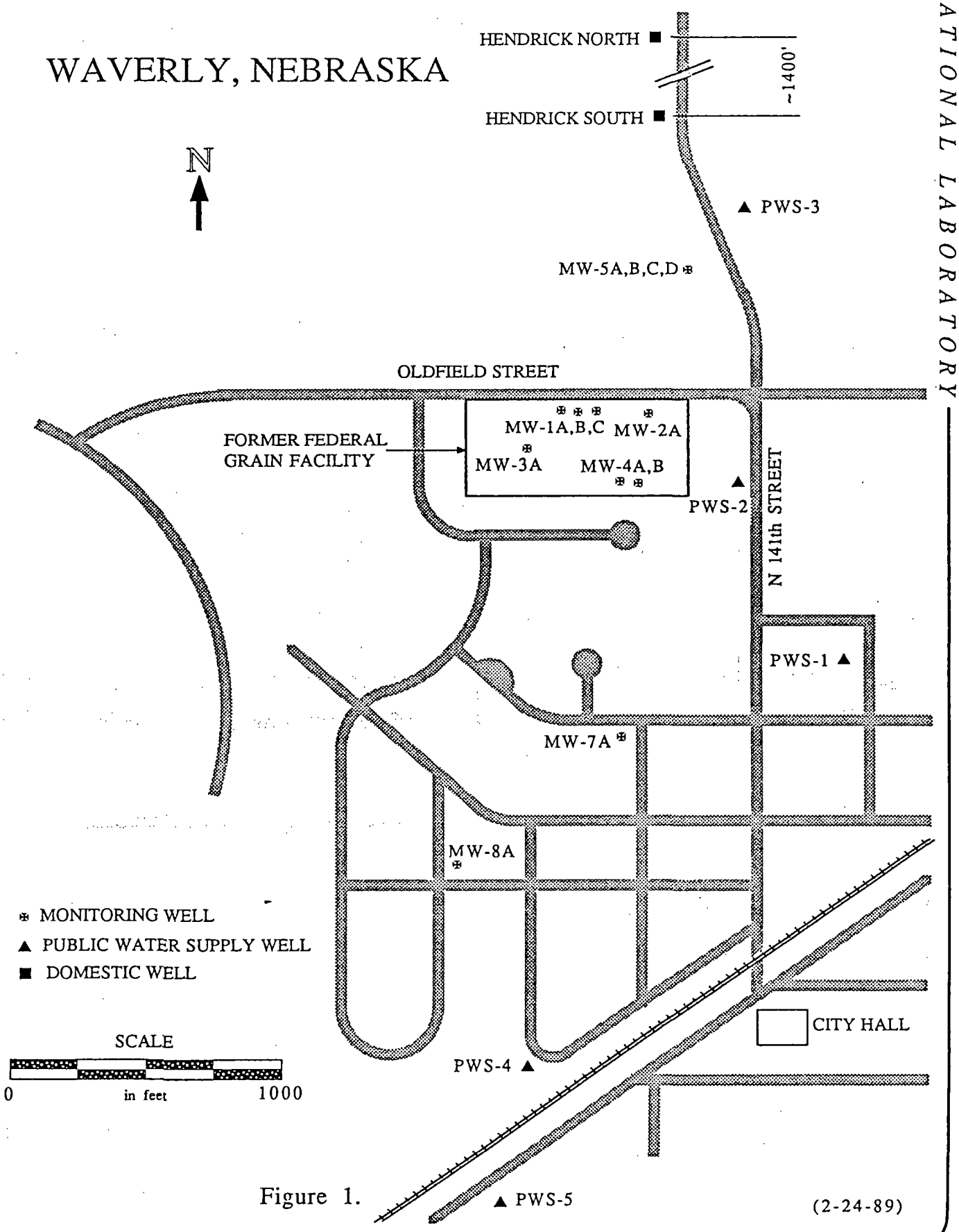
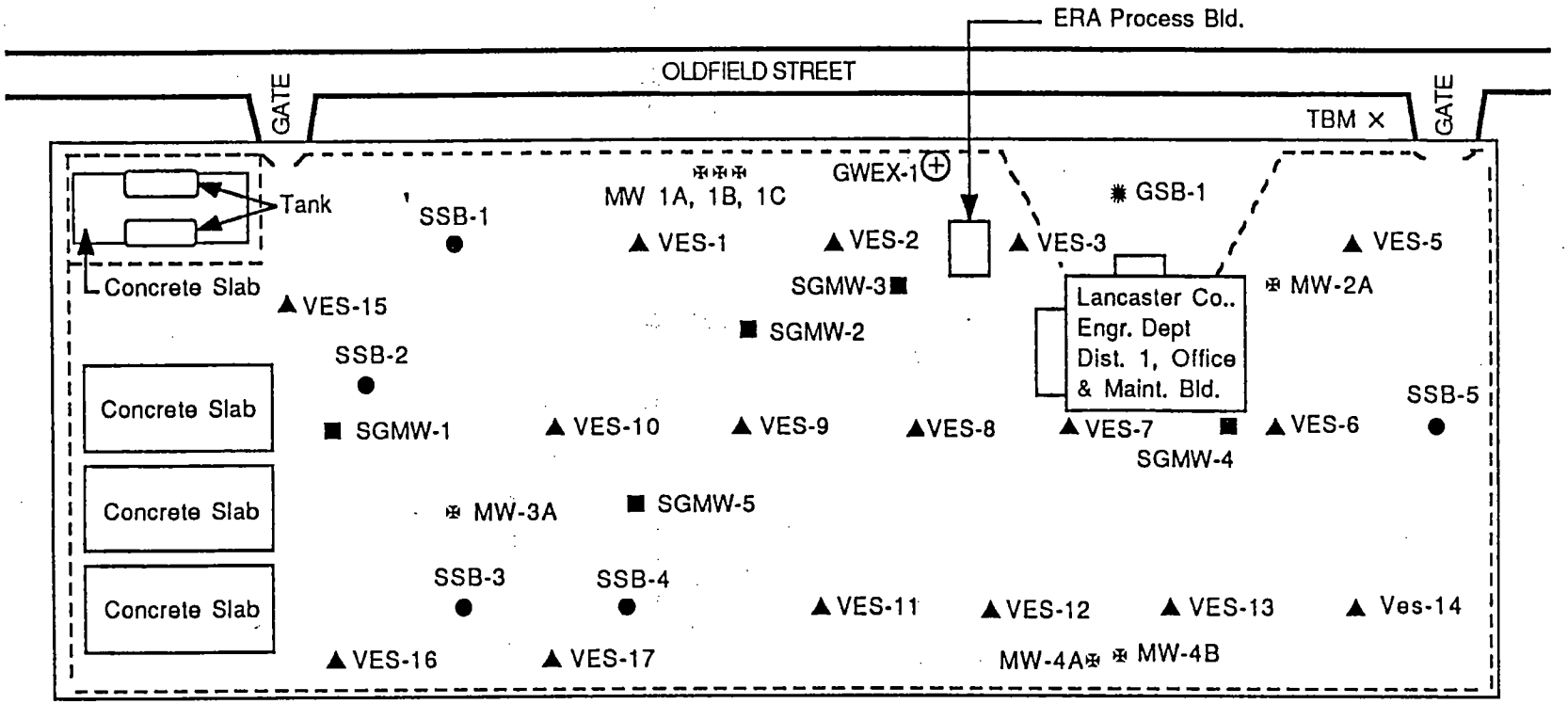



Figure 1.

(2-24-89)

# FORMER FEDERAL GRAIN FACILITY

WAVERLY, NEBRASKS




## LEGEND

SCALE feet

0 100'

- MONITORING WELL
- SHALLOW SOIL BORING
- VAPOR EXTRACTION SYSTEM WELL
- SOIL GAS MONITORING WELL
- × TEMPORARY BENCH MARK
- ⊕ GROUND WATER EXTRACTION WELL
- ✱ GEOTECHNICAL SOIL BORING
- ——— PROPERTY LINE
- - - - CHAIN LINK FENCE

N

Figure 2.

(2-16-89)