SOLID WASTE
(CORRESPONDENCE)

NAME: Floyd - Mitchell Co. SLF

TOWN:

FAC. #: 66-SDP-1-73P

DATE: 1991-1994

~~L. Haage, EPD~~

66-SOR-1-73P

Correct

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

August 19, 1994

Ms. Betty McCarthy, Chairperson
Floyd-Mitchell County Solid Waste Management Agency
Box 32
Osage, IA 50461

Dear Ms. McCarthy:

The Department of Natural Resources' Waste Management Assistance Division (WMAD) has reviewed the July 22, 1994 document submitted in response to its June 3, 1994 comment letter pertaining to the Subsequent Solid Waste Comprehensive Plan, Part I for the Floyd-Mitchell County Solid Waste Management Agency. The only deficiency noted in the response submittal was the absence of the requested letters of cooperation from the City of North Washington in Chickasaw County and the City of Leroy in Mower County, Minnesota. These documents must be submitted before the subsequent plan may be considered for approval.

In reference to this point, the July 22, 1994 response mentions that letters from these two cities were submitted with the December 15, 1992 subsequent plan. The only letters found in the Floyd-Mitchell County Solid Waste Management Agency's comprehensive plan file from these two cities was a letter from North Washington at the time Chickasaw County was amended into the planning area. As noted in the previous comment letter, Subparagraph 101.5(4)"a", Iowa Administrative Code, stipulates that all out-of-state localities using a sanitary landfill in Iowa are subject to the same comprehensive planning rules as Iowa localities. The City of Leroy's letter should include a statement of acknowledgment and agreement with this provision. Please submit these letters to WMAD by October 3, 1994.

If you have any questions or comments regarding this letter, or comprehensive planning in general, please contact me at 515/281-8382.

Sincerely,

Brian Tormey

Brian Tormey
Environmental Specialist
Waste Management Assistance Division

cc: Lavoy Haage, Environmental Protection Division, DNR
Cindy Turkle, Turkle-Clark Environmental Consulting

66-SDP-1-73P
correspondence

***** FLOYD-MITCHELL SOLID WASTE AGENCY *****
PO Box 32
Osage, Iowa 50461

August 18,1994

W.M. Jinkinson
Field Office #2
2300 15th St. SW
Box 1443
Mason City, IA 50401

Dear Mr. Jinkinson:

The Floyd-Mitchell County Sanitary Landfill is in receipt of the inspection report conducted by Curt Krieger on 7/29/94. The required action of upgrading the cover over the southwest corner and east face adjacent to the west slope is in the process of being accomplished.

Sincerely,

Betty McCarthy, chair
Floyd-Mitchell Solid Waste Agency

cc: Patricia Schwarz
Gene Mayer
Bob Roethler

06-SDP-1-73P
Comesp

OK per DWL 7/21/94

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

NOTICE OF INTENT TO PERFORM A RISK ASSESSMENT OF A SANITARY LANDFILL

Facility Name Floyd-Mitchell County Sanitary Landfill
Permit No. 66-SDP-1-73P
Mailing Address PO Box 32
Osage, IA 50461
Name and Title of Responsible Party Betty McCarthy, Chair
Mailing Address (if different from above) Route 5, Box 50
Osage, IA 50461

A risk assessment for the above facility will be performed by (*name of person or firm)* Midwest Environmental Consulting utilizing the U. S. EPA risk assessment guidance for superfund sites. The results of the assessment will be submitted to the Department of Natural Resources not later than June 30, 1995 If the risk assessment indicates that a current or potential threat to environmental health does not exist such that an exposed individual has no greater than one in one million risk of developing cancer and for non carcinogens a hazard index of less than one, we will request an exemption from the requirement to install leachate control systems for those cells that received wastes prior to July 1, 1992. If the assessment does not show compliance with the criteria referred to above, we will submit a schedule for the installation of a leachate control system, said schedule will be submitted to the Department of Natural Resources not later than not later than June 30, 1995

Signature of Responsible Party Betty McCarthy
Title Chair - Floyd - Mitchell Solid Waste Management Agency
Date August 2, 1994

Rick Yoerger, P.E. will be conducting the risk assessment.

leach1.doc

IOWA

RECORD COPY
File Name 66-SDP-1-73P
Sender's Initials Corresp

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

July 21, 1994

Betty McCarthy, Chairperson
Floyd-Mitchell Solid Waste Agency
P.O. Box 32
Osage, IA 50461

RE: Floyd-Mitchell County Sanitary Landfill
Permit #66-SDP-1-73P
Risk Assessment Documentation

Dear Betty:

The Department received your June 27, 1994 letter advising that your agency intends to conduct a Risk Assessment (RA), as allowed by SF 2300, and that Midwest Environmental Consulting has been engaged for this activity.

We find your notification acceptable and it has been placed in the referenced project file. However, for uniformity, it is requested that you complete and the resubmit your notification on the enclosed "Notice of Intent to Perform a Risk Assessment" form. Please note that the results of the assessment must be submitted to the Department by not later than June 30, 1995.

We are also enclosing for your use, a copy of the Department's guidance letter pertaining to risk assessments of June 30, 1994 and included certification forms to confirm RA results and your leachate control exemption request, as appropriate, that are to be completed and submitted once the RA has been completed. This guidance information was provided to all landfill agencies and was not available to you at the time of your RA intent letter notification.

If you have any questions, please call me at 515/281-6807 or Patricia Schwarz at 8899.

Sincerely,

Francis L. Hallada, P.E.
Environmental Engineer
Solid Waste Section

FLH\fh\floyd.rac

Enclosure

cc: DNR Field Office 2

Patricia Schwarz, DNR

66-SDP-1-73P
correspondence

****** FLOYD-MITCHELL SOLID WASTE AGENCY ******

P.O. BOX 32

Osage, Iowa 50461

June 27, 1994

Patricia G. Schwarz
Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand
Des Moines, IA. 50319

Dear Patricia:

The Floyd-Mitchell Soild Waste Agency will be doing a "Risk Assessment" as allowed by SF 2300. The Risk Assessment will be done by the firm that has been engaged by the Agency, Midwest Environmental Consulting. Rick Yoerger will be the engineer in charge of the assessment.

Sincerely,

Betty McCarthy

Betty McCarthy, Chair
F-M Soild Waste Agency

cc: Rick Yoerger
Doc Halada

[redacted]

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

66-SDP-1-73P P.S.
correspondence

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

June 3, 1994

Ms. Betty McCarthy, Chairperson
Floyd-Mitchell County Solid Waste Management Agency
Box 32
Osage, IA 50461

Dear Ms. McCarthy:

The Department of Natural Resources' Waste Management Assistance Division (WMAD) has reviewed the revised March, 1994 Subsequent Solid Waste Comprehensive Plan, Part I, submitted to WMAD on April 20, 1994 in response to its September 19, 1993 comment letter, for the Floyd-Mitchell County Solid Waste Management Agency. The following points must be addressed before the subsequent plan may be considered for approval.

Public Involvement & Education

In the plan's implementation plan and schedule, the Agency recognizes the need for developing regional education programs and strategies addressing household hazardous materials, source reduction and recycling. At present, some recycling education is being conducted in a portion of the planning area by Comprehensive Systems. Page 1 of the plan indicates that Tables 1 through 4 list the local governments that are "formal members of the Agency". On page 3, it is indicated that Chickasaw County and the cities therein are not members of the 28E Agency, and, among the communities listed in Table 4, only Elma is an "official" 28E member. Regarding this point and the proposed educational programs and recycling coordinator's activities, will these be available throughout the planning area or only for the residents and businesses in the 28E members' jurisdictions? If the non-28E members' contracts exclude educational services, how will these activities be implemented in those portions of the planning area?

Public Participation

As required by the Guidelines For Solid Waste Comprehensive Plans, Part I, please explain the opportunities that are provided for ongoing public participation in the planning and implementation phases of the plan. For example, does the Agency hold periodic public meetings? How do local governments inform and solicit comments from residents regarding planning and program options? Please refer to page 10 of the Guidelines for further details.

WALLACE STATE OFFICE BUILDING / DES MOINES, IOWA 50319 / 515-281-5145 / TDD 515-242-5967 / FAX 515-281-8895

Letters of Cooperation

As requested in the previous comment letter, please submit a letter of cooperation from the City of North Washington in Chickasaw County. In addition, the revised subsequent plan indicates that the City of Leroy in Mower County, Minnesota, is now using the Floyd-Mitchell County Sanitary Landfill, and a letter of cooperation from this city must also be included in your response submittal. Please note that according to Subparagraph 101.5(4)"a", Iowa Administrative Code, all out-of-state localities using a sanitary landfill in Iowa are subject to the same comprehensive planning rules as Iowa localities. The City of Leroy's letter should include a statement of acknowledgment and agreement with this provision.

Goal Progress Evaluation/Waste Abatement Table

Tonnage Figures:

1.) Based on the information provided in the revised subsequent plan, WMAD concurs with the adjustments that have been applied to the landfill figures indicated in Tables 6 and 9, and which are reflected in the tonnages shown in Table 10. The final adjusted landfill tonnages in Table 10 will be used for goal progress evaluation. These adjustments correspond to the information described in Tables 6 (scale-based conversion factor), 7 (sink hole clean-up program) and 8 (foundry sand tonnages used for daily cover) of the subsequent plan document.

2.) In what appears to be an oversight, the 1992 tonnage used in Table 9 is the "IDNR Method" number shown in Table 6 and not the corresponding "Revised With Scale" figure, as used for the other years in Table 9. Accordingly, the adjusted 1992 landfill tonnage used in Table 10 is also incorrect. Please include these revisions in your response.

3.) For future reference, in the next waste abatement table submittal, the baseline per capita solid waste generation rate used for determining goal progress in 1994 and subsequent years may have to be adjusted to reflect the 1993 closure of the White-New Idea plant in Charles City, as indicated on page 18 of the plan. Closure of a major industrial waste generator cannot be used to demonstrate progress toward the waste reduction and recycling goals. Prior to submitting your next table, please contact WMAD to discuss this matter.

Population Figures:

1.) Population figures used to complete the solid waste abatement table should be based on the most current census information available. Other sources may be accepted provided the plan clearly indicates how these numbers were derived and justifies their accuracy over the existing census data. The population for the years 1991 through 1993 in the tables included in this submittal assume that the population decrease observed between 1980 and 1990 is continuing at the same rate of decline. With the availability of the 1992 updated census information, which indicates a slightly higher population for the planning area than that shown in the subsequent plan, and since other revisions to the submitted tables are required, you may wish to consider using this information. For future submittals, please use the latest census estimates.

2.) The total population figures for Mitchell County in 1980 (12,688) and 1990 (11,262), as shown in Table 2 of the subsequent plan, do not agree with the census figures from the State Data Center (12,329 and 10,928 for 1980 and 1990, respectively). Please verify your figures.

3.) Based on the landfill starting dates shown in Tables 2 and 3, and the population summary in Table 5, the population figures used in the solid waste abatement tables must be revised as follows:

--remove Riceville's population from the 1988 through 1990 planning area totals;
--add Fredricksburg's and Nashua's populations to the 1988 through 1990 planning area totals.

One final point concerns the discussion of yard waste management in Chickasaw County on page 14 of the subsequent plan. In referring to five cities in that county, the plan states, "Yard waste is collected by each city and either land applied.....or burned at a City-owned site." According to Department's Administrative Rules regarding open burning {Section 567--23.2(455B)}, a local government can operate a burning site for trees and tree trimmings that have not originated on the premises, but, barring more stringent local regulations, open burning of yard waste is restricted to the premises from which it originates. Please identify the nature of the waste being burned at these municipal sites. These cities should be advised of the aforementioned state restrictions. If you have further questions on this matter, please contact Doug Campbell with the Air Quality Section of the Department's Environmental Protection Division at 515/281-8930.

The information, letters and revised waste abatement tables requested herein must be submitted to this Division by July 18, 1994.

If you have any questions or comments regarding this letter, or comprehensive planning in general, please contact me at 515/281-8382 or Reza Khosravi at 515/281-8645.

Sincerely,

Brian Tormey

Brian Tormey
Environmental Specialist
Waste Management Assistance Division

cc: Lavoy Haage, Environmental Protection Division, DNR
Cindy Turkle, Turkle-Clark Environmental Consulting

MIDWEST ENVIRONMENTAL CONSULTING

Rick Yoerger P.E.
2441 Cimarron Drive
Marion IA 52302-9792
(319) 377-0334

May 27, 1994

Patricia G. Schwarz
Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand Avenue
Des Moines, IA 50319

Re: Floyd-Mitchell County Sanitary Landfill
Submittal of Development and Operational Plan
and Closure/Postclosure Plan
Permit No. 66-SDP-1-73P

Dear Patricia:

Enclosed for your review and approval are one copy each of the referenced plans. Additional copies will be send at your request.

If there are any questions, please call.

Sincerely,

Rick Yoerger

Rick Yoerger P.E.

enclosures

cc Betty McCarthy

66-SDP-1-73P
Correspondence

MIDWEST ENVIRONMENTAL CONSULTING

Rick Yoerger P.E.
2441 Cimarron Drive
Marion IA 52302-9792
(319) 377-0334

May 27, 1994

Patricia G. Schwarz
Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand Avenue
Des Moines, IA 50319

Re: Floyd-Mitchell County Sanitary Landfill
Supporting Information for the Leachate Control Plan
Permit No. 66-SDP-1-73P

Dear Patricia:

Supporting information is provided for the following:

- 7 day storage volume. A discussion is included in the revised text for Appendix A, Leachate Collection System Design. This text will replace the existing text in Appendix A.

- Tank support. Plan Sheet 9 has been modified to show how the holding tank will be installed. The Leachate Control Plan will be updated accordingly.

- Accommodating vertical expansion. Vertical expansion is addressed on Plan Sheet 35 of the Development and Operational Plan, May, 1994.

- System performance goals. Discussed in the revised text for Appendix A.

- Leachate characterization and treatment agreement. At this time, these items have not been formally addressed. There has been informal discussion of transporting the leachate to the Charles City POTW. Also, the Agency may elect the risk assessment approach. It is our understanding this approach will extend the date for treatment (if needed) until December, 1994 or later. This decision needs to be made by July 1, 1994.

Patricia, if this is acceptable, I will send you three updated copies of the Leachate Control Plan.

Sincerely,

Rick Yoerger

Rick Yoerger, P.E.

enclosures

cc Betty McCarthy

Leachate Collection System Design

Background

The proposed leachate collection system design consists of six collection trench wells, eight 36-inch diameter collection wells and a storage tank with loadout facility. The collection trench wells are designed to be installed with a backhoe. LW-1 through LW-6 are designed as collection trench wells. LW-1 is located along the west boundary where the base of the landfill slopes from south to north. Also, this location is the toe of the vertical expansion which extends from west to the east. Collection trench LW-1 will be approximately 18 feet deep. LW-2, LW-3 and LW-4 are located directly east of the vertical expansion. These collection trenches will also be approximately 18 feet deep. The depth of the refuse in the area of LW-5 and LW-6 is approximately 16 feet. Because of the lesser depth, a continuous collection trench is proposed with extraction wells located at uniform spacing. The remaining wells, LW-7 through LW-14, are designed as 36-inch diameter collection wells. LW-7, LW-8, LW-9 and LW-10 are located in the older area of the landfill which has a depth of approximately 25 feet. This quadrant of the landfill slopes to the southeast. LW-11, LW-12 and LW-13 are located on the eastern side of the landfill along the north boundary. They will serve as piezometers to determine the depth of refuse, leachate elevation and base elevation of the landfill. If leachate is present, LW-11, LW-12 and LW-13 will be converted to extraction wells. LW-14 is located in the northwest corner of the landfill. This area appears to be the low point on the landfill's west side.

The base of the eastern half of the landfill slopes to the southeast corner of the site. An earthen berm is in place along the eastern and southern boundaries of this area. It is reasonable to assume this berm is creating a "bath tub" effect. LW-5 through LW-10 should effectively reduce the leachate level in this "bath tub." The base of the western half of the landfill appears to slope to the north with a low point in the northwest corner. LW-14 is located in this low point. LW-1 through LW-4 will also help reduce leachate levels in the landfill's western half.

Discussion

The greatest buildup of leachate is in the eastern half of the landfill. Therefore, LW-5 through LW-10 should initially generate the majority of the leachate collected. Collection trench LW-5 and LW-6 should effectively intercept any leachate migrating from northwest to southeast. LW-7 through LW-10 will be used to dewater the "bath tub" which has a maximum leachate depth of approximately 25 feet.

LW-14 is located in the low point in the western half of the landfill. The depth of leachate at LW-14 is approximately 10 feet. By contrast, LW-14 may not produce significant volumes of leachate.

LW-1 through LW-4 are designed as collection trench wells. This design creates a significantly greater cross section for leachate collection as compared to conventional 36-inch diameter wells. As a result, this design should be more effective at leachate collection. The depth of leachate in the area of these trench wells is approximately 15 feet.

Little is known about the landfill in the area of proposed LW-11 through LW-13. The decision on how these wells will be used will be made after they are installed, data collected and evaluated.

After the collection trench wells and 36-inch diameter wells are constructed, an interim report will be prepared for the DNR summarizing the information learned. Any changes/modifications will be proposed at that time.

After construction is completed and prior to start-up, the DNR will be notified. A project summary report will be prepared after construction and start-up are completed.

Leachate Extraction

The volume of leachate saturated refuse in the landfill is approximately 22 million cubic feet (43 acres x 43,560 ft^2/acre x 12 foot leachate depth = 22 million cubic feet). Assuming an effective porosity of 5.5%[1], the extractable leachate volume would be 1.2 million cubic feet or 9 million gallons of leachate. If this volume of leachate could be extracted in two years, the average pumping rate would be approximately 12,000 gallons per day.

In addition to the existing leachate "pool", leachate will be generated through out the active life and post closure period of the landfill. During the active life of the landfill the HELP Model suggests an additional 1.1 million gallons per year[2] of leachate generation. This equates to 3,200 gallons per day.

If the 3,200 gallons per day estimated by the HELP Model is added to the first year extraction estimate of 12,000 gallons per day, the first year total daily extraction rate could reach 15,200 gallons per day. This would require a seven day storage capacity of 106,000 gallons. These assumptions imply 1) all of the existing leachate can be extracted within two years, 2) the HELP Model is accurate and 3) every gallon of leachate generated on the 43 acre landfill area will flow to the proposed collection wells. These assumptions may be misleading. Perhaps it would be more appropriate to use a "walk before you run" approach for leachate collection and storage design. In one year there will be data available from operating leachate collection systems in Iowa. However, until this data becomes available, perhaps a more realistic design approach would be to use **operating** data from leachate collection systems from similar sized landfills in surrounding states such as Wisconsin. As an example, the Outagamie County, Wisconsin landfill recovers 100 to 120 gallons per day of leachate per extraction well. The landfills at La Crosse, and Eau Clair, Wisconsin show similar performance. If the more conservative

volume of 100 gallons per day per extraction well is used, a 10,000 gallon storage tank will provide seven days storage assuming 14 wells are installed (100 gallons per day per well x 14 wells x 7 days = 9,800 gallons). If the proposed wells effectively remove the leachate, additional storage capacity can be easily installed.

Based on these assumptions, the first phase of the leachate collection system will be designed with a 10,000 gallon storage tank. The effectiveness of the collection system and seven day storage requirements will be reevaluated after six months of operation. The need for additional storage capacity will be addressed at that time

The Future

After six months of operation, the effectiveness of the system will be evaluated. The effectiveness will be based on the volumes and concentrations of leachate removed and the reduction of leachate levels within the landfill. The existing leachate piezometers will be used to determine leachate level reductions.

The effectiveness of this system will be the basis for determining how the system should be expanded. As an example, if LW-2, LW-3 and LW-4 are effective at reducing leachate levels, similar wells could be located between these wells and LW-5 and LW-6. Also, if LW-11 through LW-14 are effective at reducing leachate levels in areas with deeper fill, additional wells could be located along the north boundary of the landfill. If this system performs satisfactorily, an expansion could be designed and installed as early as construction season 1995.

What to expect after six months of operation. Assuming an extraction well has a radius of influence of 100 feet, the depth of leachate equals 12 feet and the effective porosity of the refuse is 5.5%, the extractable volume of leachate in a 200 foot diameter by 12 feet high "cylinder" of refuse is 129,000 gallons.

$$(\frac{3.14}{4} \times 200 \times 200 \times 12 \times 7.48 \times 0.055 = 129,180)$$

The pumping rate to remove this volume of leachate in one year would be 353 gallons per day. However, assuming a radius of influence of 100 feet implies the depth of the leachate at the 100 foot distance from the well will be 12 feet. Also, an extraction well will create a cone of influence. Attempts could be made to calculate the volume of this cone but it would be reasonable to assume the volume will be considerably less than the volume of the "cylinder". As a result, only a percentage of the 353 gallons per day can be extracted. (This is the logic for the 100 gallons per day per extraction well estimate) As a result, an estimate (guess) of the reduction in leachate level (cone of depression) after six months of continuous pumping, at a distance of 35 feet from the extraction well, would be 2 - 4 feet.

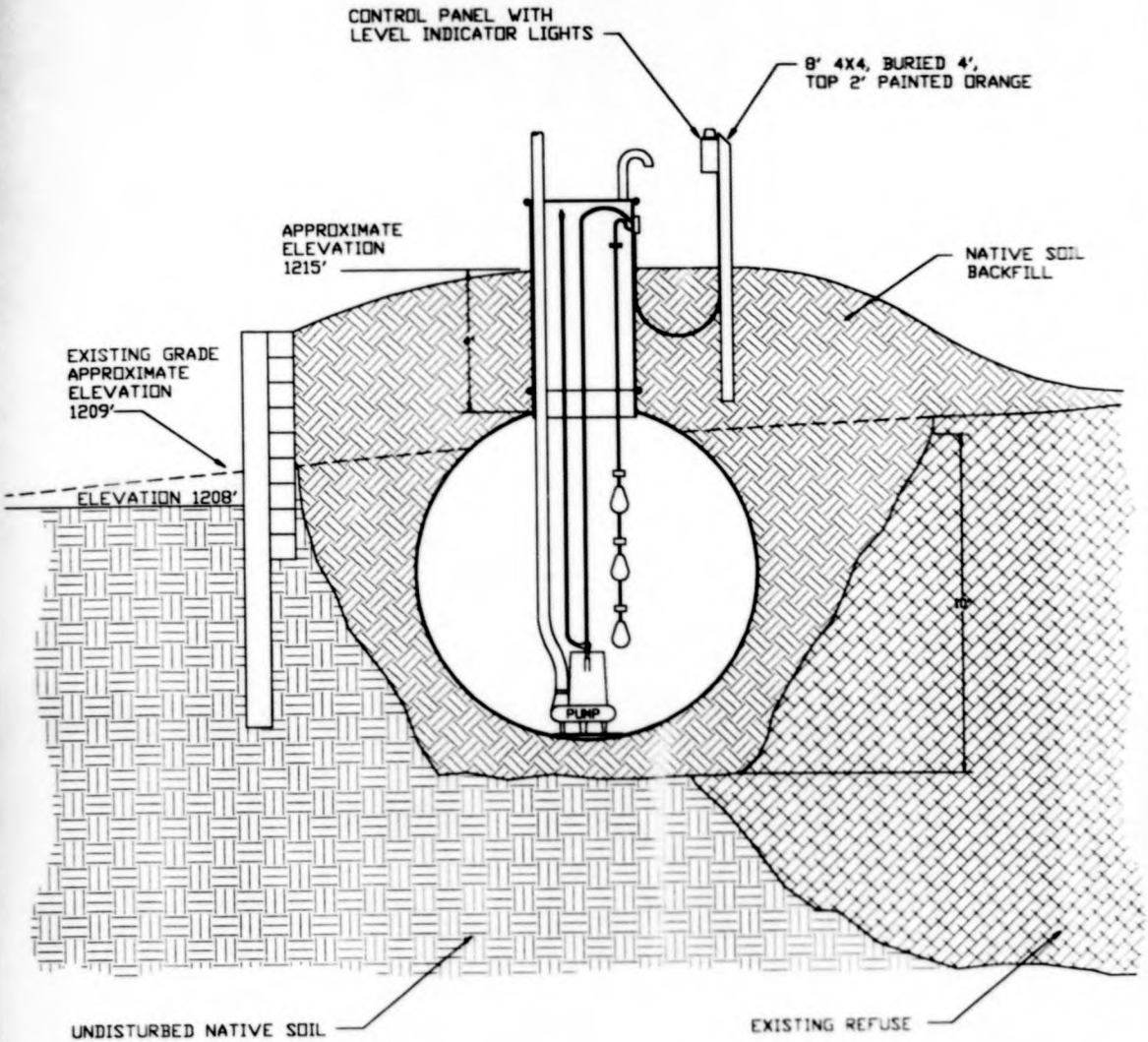
The following schedule is proposed for monitoring the performance of the leachate control system on an ongoing basis:

Activity	Frequency
Record leachate piezometer levels	Monthly
Total leachate volumes transported to POTW	Monthly
Interim reporting to DNR	Every six months (include with semiannual inspection report)
Impact on monitoring wells	Yearly (part of AWQR)

---

[1] From the report "Leachate Control Plan, South Dallas County Sanitary Landfill, February 1993" prepared by Green Environmental Services, Inc.

[2] Appendix D, Development and Operational Plan, Floyd/Mitchell Sanitary Landfill, May, 1994.



NOTE:
CROSS-SECTION TAKEN THROUGH TANK LOOKING NORTH

DRAWN DRA/RY	PROJECT FLOYD/MITCHELL CO. SANITARY LANDFILL	MIDWEST ENVIRONMENTAL CONSULTING
DATE MAY 1994		
SHEET 9	TITLE HOLDING TANK	

Shirley Doc

66-SDP-1-73P correspondence

MIDWEST ENVIRONMENTAL CONSULTING

Rick Yoerger P.E.
2441 Cimarron Drive
Marion IA 52302-9792
(319) 377-0334

See notes

March 22, 1994

Patricia G. Schwarz
Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand Avenue
Des Moines, IA 50319

Re: Floyd-Mitchell County Sanitary Landfill
Permit No 66-SDP-1-73P
Annual Water-Quality Report

Dear Patricia:

Enclosed for your review and information is one copy of the AWQR, dated March, 1994. As discussed in the report summary, there is evidence of leachate contamination in some of he monitoring wells, but non of the concentrations exceeds their respective maximum-contaminant or action levels. The recommendations section includes a proposed sampling schedule for 1994.

If there are any questions, please call.

Sincerely,

Rick Yoerger

Rick Yoerger P.E.

cc Betty McCarthy

MIDWEST
ENVIRONMENTAL
CONSULTING

Rick Yoerger P.E.
2441 Cimarron Drive
Marion IA 52302-9792
(319) 377-0334

Supporting Documentation
for

Annual Water-Quality Report
Number 3

Floyd-Mitchell County, Iowa,
Sanitary Landfill

March, 1994

CERTIFICATION

I hereby certify that this Report was prepared by me or under my direct supervision and that I am a duly registered Professional Engineer under the laws of the State of Iowa, and that I am competent to prepare this document.

Rick Yoerger

Rick Yoerger, P.E.

Date: 3/16/94 Iowa Registration No. 8580

Registration Expiration Date: December 31, 1994

Paul C. Franks

Paul C. Franks
Certified Professional Geologist
AIPG Certificate No. 8426

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SUMMARY

This third annual water-quality report for the Floyd-Mitchell County, Iowa, Sanitary Landfill is an evaluation of both quarterly and semiannual sampling done in 1993 and prior years. Nine monitor wells were sampled in 1993. Two are bedrock wells screened in Devonian limestone. Small concentrations of benzene and TOX were reported once for different 1993 samples from the upgradient bedrock well (MW-10), but none of the other analytical data point to leachate contamination of the groundwater intercepted by the well. Exceptionally high reports for arsenic, cadmium, magnesium, zinc, and specific conductivity indicate that the groundwater intercepted by the downgradient bedrock well (MW-1) has been contaminated by leachate from the landfill. None of the concentrations, however, exceeds their respective maximum-contaminant or action levels.

The seven water table wells are screened in Pleistocene glacial till. The analytical results for the upgradient water-table well (MW-9) show no evidence that the groundwater intercepted by the well has been contaminated by leachate from the landfill. The samples from the other water-table wells, however, point to varying degrees of leachate contamination. The analytical results for the water-table wells also show that magnesium concentrations >30 mg/l can be useful indicators of leachate contamination. Therefore, in addition to the routine semiannual sampling proposed for most of the wells in 1994, monitoring for magnesium is recommended for some of them.

STATE OF IOWA

DEPARTMENT OF GENERAL SERVICES

Records Management Division
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SUMMARY

This third annual water-quality report for the Floyd-Mitchell County, Iowa, Sanitary Landfill is an evaluation of both quarterly and semiannual sampling done in 1993 and prior years. Nine monitor wells were sampled in 1993. Two are bedrock wells screened in Devonian limestone. Small concentrations of benzene and TOX were reported once for different 1993 samples from the upgradient bedrock well (MW-10), but none of the other analytical data point to leachate contamination of the groundwater intercepted by the well. Exception reports for arsenic, cadmium, magnesium, zinc, and specific conductivity indicate that the groundwater intercepted by the downgradient bedrock well (MW-1) has been contaminated by leachate from the landfill. None of the concentrations, however, exceeds their respective maximum-contaminant or action levels.

The seven water-table wells are screened in Pleistocene glacial till. The analytical results for the upgradient water-table well (MW-9) show no evidence that the groundwater intercepted by the well has been contaminated by leachate from the landfill. The samples from the other water-table wells, however, point to varying degrees of leachate contamination. The analytical results for the water-table wells also show that magnesium concentrations >30 mg/l can be useful indicators of leachate contamination. Therefore, in addition to the routine semiannual sampling proposed for most of the wells in 1994, monitoring for magnesium is recommended for some of them.

INTRODUCTION

This is the third annual water-quality report for the Floyd-Mitchell County Sanitary Landfill. The site occupies about 115 acres in N 1/2 NE 1/4 and NE 1/4 NW 1/4 sec. 12, T. 97 N., R. 15 W., southeastern Mitchell County, Iowa (Figure 1). Figure 2 shows the general area of landfilling, about 45 acres (Rust Environment & Infrastructure, 1993), and the locations of monitor wells and groundwater piezometers, as well as water-table contours drawn by Terracon Environmental (1990a) using water-level measurements made on 5/2/90. Landfilling, which is done under Iowa Department of Natural Resources (IDNR) Permit No. 66-SDP-1-73P, was started in 1973.

Household and municipal waste from Floyd and Mitchell counties are the chief refuse materials, but the permit also provides for the acceptance of asbestos and petroleum-contaminated soil. According to the permit, the landfill also has received waste from Fleetguard Manufacturing in Winnebago County, construction-and-demolition debris from Butler County, and core sand from a Shell Rock, Iowa, industry. The thickness of refuse and cover material ranges widely from cell to cell The thickness of the waste pile and cover materials may be as little as 10 ft near the east end of Trench Number 4 whereas it may approximate 35 ft near the west Area end of Fill No. 3. Leachate seemingly is mounded in Area Fill No. 3 (Midwest Environmental Consulting, 1994).

The landfill was developed chiefly by excavating trenches in pre-Illinoisan glacial till (Terracon Environmental, 1990a). MW-1 penetrated 78 ft of glacial till before reaching bedrock. The shallow parts of the till section are brown to brownish gray whereas the deeper parts are gray. The brown colors indicate that the upper part of the till is weathered and oxidized. Some 2 to 5 ft of brown clay overlying the glacial till in many places may be Wisconsinan loess (Terracon Environmental, 1990). The shallow bedrock is limestone that now is assigned to the Cedar Valley Group (Devonian) of Day and Bunker (1992). The limestones and dolomites of the Cedar Valley Group constitute important aquifers in Mitchell County (Libra et al., 1984; Iowa Groundwater Association, 1990). Where the aquifers are deeply buried beneath glacial deposits, as they are at the Floyd-Mitchell County Landfill, groundwater generally has not been impacted by nitrates and pesticides (Libra et al., 1984).

The original monitoring system plan was proposed by Terracon Environmental (1990b) but it was modified in 1991 so that MW-4, MW-5, and MW-6 were omitted from the sampling program. At the same time, wells that had been installed prior to the hydrogeologic investigation (Terracon Environmental, 1990a) were renumbered (Terracon Environmental, 1991a). Actual sampling was started in 1990 and included MW-2, MW-4, MW-5, MW-6, and MW-7 (Figure 2). MW-1, MW-3, and MW-7 were added to the sampling program in 1991. With the discovery in 1992 that the groundwater intercepted by the then upgradient water-table wells MW-4 and MW-5 had been impacted by landfill leachate (Brice, Petrides, Donohue, 1992), MW-9 and MW-10 were installed and added to the sampling program in 1993. MW-9 is the new upgradient water-table well whereas MW-10 is the up-

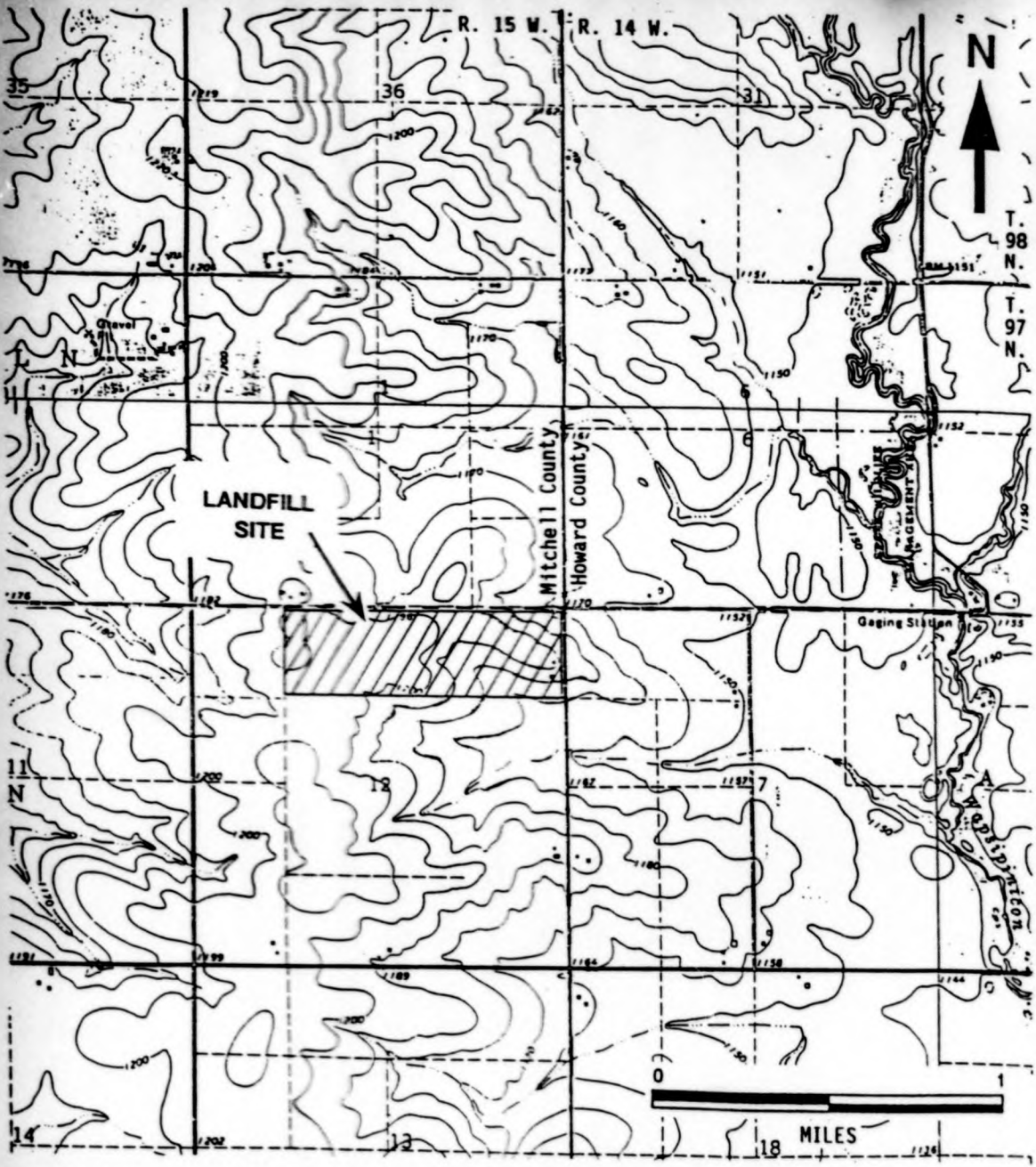

Figure 1.— Map showing location of Floyd-Mitchell County Sanitary Landfill. Adapted from Terracon Environmental, 1990, and U.S. Geological Survey Riceville 7.5-minute quadrangle.

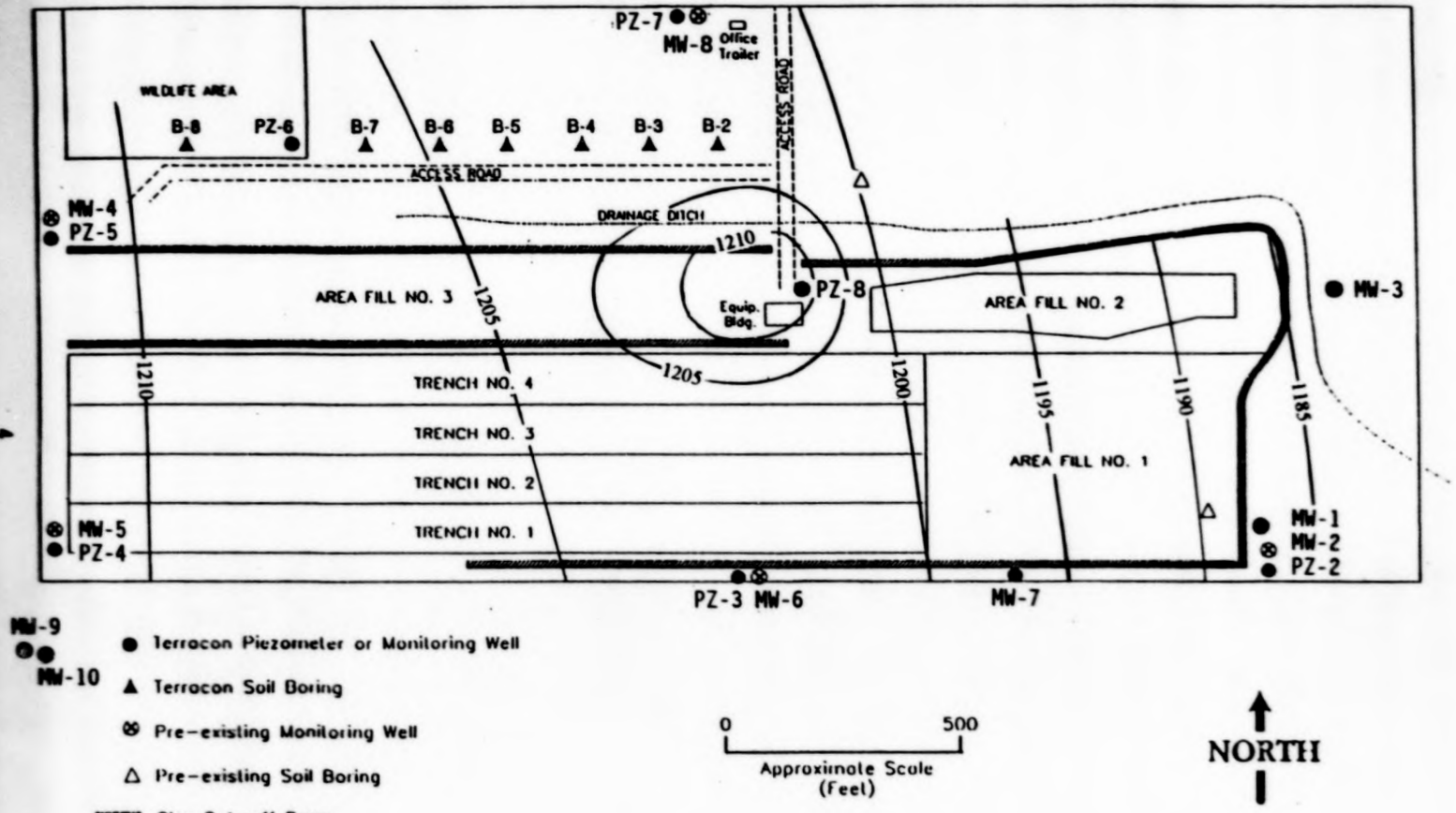

Figure 2.-- Map of Floyd-Mitchell County Sanitary Landfill showing water-table contours (5-ft contour interval) and locations of borings, monitor wells, piezometers, and leachate piezometers. Water levels measured on May 2, 1990. Adapted from Terracon Environmental, 1990.

gradient counterpart to bedrock well MW-1. Rust Environment & Infrastructure of Waterloo, Iowa, did the sampling prior to December, 1993, and National Environmental Testing, Inc., of Waterloo, Iowa, did the analytical work. Midwest Environmental Consulting of Marion, Iowa, did the December, 1993, sampling and Keystone Laboratories of Newton, Iowa, did the analytical work.

Water-level and well-depth measurements, which bear on the integrity of the monitor wells, are not considered in this report. They will be addressed in the fourth annual water quality report. The results of the analytical work are discussed in the pages that follow.

RESULTS

General

The results of the chemical analyses of groundwater samples for list-d -e, and -f elements, compounds, and solution properties (567 IAC 103.2(4)) are summarized well-by-well in Appendix 1. Appendix 2 contains exception reports that were generated by comparing control limits computed for MW-9 and MW-10, the upgradient or background wells, with the analytical results for their corresponding downgradient wells. The control limit = the mean value ($\overline{X}$) of the concentration of a particular element or compound, or the mean value of a solution property, plus two standard deviations ($\overline{X}+2s_x$). In contrast to the upper control limits computed for the other analytical results, both upper ($\overline{X}+2s_x$) and lower ($\overline{X}-2s_x$) control limits were computed for pH. Tables 1 and 2 summarize the frequency of exception reports generated for each well for which the analytical results exceeded the control limits computed for the background wells (MW-9 and MW-10). Bar graphs comparing the analytical results for each well with the mean values and control limits computed for the background wells are in Appendix 3. Table 3 lists the ions, compounds, and solution properties analyzed for and gives their U.S. EPA (1993) maximum contaminant levels (MCL's) or IDNR action levels.

Standard deviations were computed using a variation of the small-sample equation:

$$s_x = \sqrt{\frac{\sum (x_i - \overline{X})^2}{(n-1)}}$$

Less-than symbols (<) preceding mean and standard-deviation values in the tables and graphs in Appendices 1 through 3 indicate that the computations involved at least one chemical concentration or value that was at or below the detection limit for that constituent or solution property.

Table 1.-- Frequency of exception reports and maximum concentrations for shallow groundwater samples. MW-9 is background well.

	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-9	Statistical Limit
Arsenic, dissolved [mg/l]	1 0.009			1 0.016	1 0.009	1 0.008		<0.0050
Barium, dissolved [mg/l]								<0.7916
Cadmium, dissolved [mg/l]	1 <0.005		1 <0.005	1 <0.005	1 <0.005			<0.0010
Chromium, total dissolved [mg/l]								<0.056
Copper, dissolved [mg/l]								<0.068
Iron, dissolved [mg/l]	4 14.2			1 0.32	6 12.			<0.164
Lead, dissolved [mg/l]								<0.0050
Magnesium, dissolved [mg/l]	8 72			4 46.4	9 89.	4 46		31.72
Mercury, dissolved [mg/l]	2 0.0027	1 0.0006	1 0.0011	1 0.0038	2 0.002			<0.00050
Zinc, dissolved [mg/l]	1 0.07		1 0.07	1 0.07	3 0.09			<0.060
Chloride [mg/l]	8 35			8 200	8 50			<14.6
Ammonia nitrogen [mg/l]								<1.7
Chemical oxygen demand [mg/l]	3 18		2 100	2 32	2 45			<14.6
Benzene [ug/l]			1 <2	1 <2	2 1.6			<1.0
1,4-Dichlorobenzene [ug/l]			1 <2	1 <2				<1.0
Carbon tetrachloride [ug/l]			1 <2	1 <2				<1.6
1,2-Dichloroethane [ug/l]			1 <2	1 <2				<1.55
1,1,1-Trichloroethane [ug/l]			1 <2	1 <2				<1.0
1,1-Dichloroethylene [ug/l]			1 <2	1 <2				<1.0
Trichloroethylene [ug/l]			1 <2	1 <2				<1.0

NRL 0.00002
MRL 0.005
MCL 0.05 ✓

MRL/MCL 0.002

NRL 1.0

NRL 0.3 µg/L

OK see pg 27

OK see pg 27

See pg 29-- did not test to 0.3 or at least 0.5 MDL

Table 2.-- Frequency of exception reports and maximum concentrations for groundwater samples from bedrock wells. MW-10 is background well.

	MW-1	MW-10	Statistical Limit
Arsenic, dissolved [mg/l]	5 0.018		<0.0050
Barium, dissolved [mg/l]			<0.7571
Cadmium, dissolved [mg/l]	1 0.002		<0.0010
Chromium, total dissolved [mg/l]			<0.044
Copper, dissolved [mg/l]			<0.066
Iron, dissolved [mg/l]	1 2.1		<0.820
Lead, dissolved [mg/l]			<0.0050
Magnesium, dissolved [mg/l]	4 37		29.93
Mercury, dissolved [mg/l]			<0.00050
Zinc, dissolved [mg/l]	2 0.08		<0.066
Chloride [mg/l]			<20.0
Ammonia nitrogen [mg/l]	8 3.4		2.1
Chemical oxygen demand [mg/l]	1 <14.		<12.3
Benzene [ug/l]	1 <5		<1.7
1,4-Dichlorobenzene [ug/l]	1 <5		<1.0
Carbon tetrachloride [ug/l]	1 <5		<1.6
1,2-Dichloroethane [ug/l]	1 <5		<1.49
1,1,1-Trichloroethane [ug/l]	1 <5		<1.0
1,1-Dichloroethylene [ug/l]	1 <5		<1.0
Trichloroethylene [ug/l]	1 <5		<1.0
Phenols [mg/l]	1 <0.1		<0.01
Total organic halogen [mg/l Cl-]	1 0.03		<0.029
Temperature (field) [deg F]	2 50.6		47.95
Mean-2SD / Mean+2SD pH (field) [pH]			6.123 8.217
Specific conductance (field) [umhos/cm]	8 930		634.9

Table 3.-- U.S. EPA (1993) maximum contaminant levels and IDNR groundwater action levels.

Arsenic, dissolved	0.05 mg/l
Barium, dissolved	2.0 mg/l
Cadmium, dissolved	0.005 mg/l
Chromium, total, dissolved	0.1 mg/l
Copper, dissolved	1.3 mg/l
Iron, dissolved	0.3 mg/l
Lead, dissolved	0.015 mg/l
Magnesium, dissolved	None given
Mercury, dissolved	0.002 mg/l
Zinc, dissolved	5.0 mg/l
Chloride	250 mg/l
Nitrogen, Ammoniacal	30 mg/l
Chemical Oxygen Demand	Compare to background
Benzene	5.0 µg/l
1,4-Dichlorobenzene (Para)	75 µg/l
Carbon Tetrachloride	5.0 µg/l
1,2-Dichloroethane	5.0 µg/l
1,1,1-Trichloroethane	200.0 µg/l
1,1-Dichloroethylene (ethene)	7.0 µg/l
Trichloroethylene (ethene)	5.0 µg/l
Phenols	4.0 mg/l
Total Organic Halogens	None given
pH	6.5 - 8.5
Specific conductivity	None given

Analytical Results

General

In the pages that follow, the analytical results for the two upgradient or background wells (MW-9 and MW-10) are reviewed first. Then the analytical results for the downgradient wells are evaluated. A total of 147 exception reports was generated from the data for the downgradient wells. Twenty seven of the exception reports, however, are statistical artifacts produced by changes in detection limits (Tables 1 and 2). Eight of them are for organic compounds in MW-1 samples; seven are for organic compounds in MW-4 samples; and seven are for organic compounds in MW-6 samples. In addition, the single MW-1 exception report for chemical oxygen demand (COD) is a statistical artifact, as are the single cadmium exception reports for MW-2, MW-4, MW-5, and MW-6.

No MW-9 background statistics were computed for phenols, total organic halogens (TOX), temperature, pH, and specific conductivity because each of them was measured only once in 1993. Consequently, no exception reports were generated for those compounds and solution properties. Nor are they listed in Table 1. Because the data for phenols, TOX, pH, and specific conductivity can be useful guides to leachate contamination of groundwater, the data for each these substances or solution properties will be reviewed in the pages that follow.

Upgradient Wells

MW-9.— MW-9, the shallow upgradient well, is in a two-well cluster with MW-10, the deep upgradient well. The cluster is south of MW-4 and MW-5 near the southwest corner of the landfill (Figure 2). The well is screened from 20.0 to 30.0 ft across unoxidized glacial till. Because the well was newly installed on 6/4/93, and because it was dry on 6/9/93, the well was sampled only twice in 1993 (Appendix 1) No MW-9 exception reports were generated from the analytical results (Table 1). None of the data in Appendix 1 points to leachate contamination of the groundwater intercepted by MW-9.

Among the metals and semimetals analyzed for, only barium, magnesium, and zinc were found in concentrations greater than the detection limits (Appendix 1). Evaluation of the MW-9 barium data is made complicated because the analytical detection limit for the first-round sample (0.50 mg/l) was greater than the concentration reported for the second-round sample (0.181 mg/l). The 0.181-mg/l concentration probably does not indicate leachate contamination of MW-9 water. The chief commercial source of barium is the mineral barite ($BaSO_4$). The mineral is used widely in drilling fluids, as a filler in rubber, paint, and plastic, in the manufacture of glass, and as a source of barium salts for the chemical industry (U.S. Bureau of mines, 1980). The wide use of barium compounds means that the element can be present in landfill leachate. One of two leachate samples from the Floyd-Mitchell County Landfill contained 9.8 mg/l barium (Rust Environment & Infrastructure, 1993). The concentration reported for the second sample was below the detection

limit (0.50 mg/l). Barium is a minor dissolved metal in most groundwater.

According to Hem (1985), the abundance of barium in much groundwater probably is controlled by the small solubility of barite, which is a common accessory mineral in many carbonate terranes. The resulting barium concentrations would be in the range 0.014 to 0.14 mg/l. Where barium concentrations are regulated by carbonate-bicarbonate equilibria and the greater solubility of barium carbonate, as they probably are in most Iowa glacial drift, concentrations of barium >0.14 mg/l are to be expected. Even so, the measured MW-9 barium concentration is close to Hem's common range and is well below the IDNR action level (Table 2).

The magnesium concentrations reported for the two MW-9 samples are close to 30 mg/l (Appendix 1) and do not point to leachate contamination of MW-9 waters. Magnesium metal is widely used in light-weight alloys. Magnesium compounds are used extensively in the manufacture of refractories and in the chemical and pharmaceutical industries; they also are used in fertilizers and animal feeds (U.S. Bureau of Mines, 1980). The wide use of magnesium compounds implies that the element can be a major constituent of landfill leachate. Of the two samples of leachate collected from the Floyd-Mitchell Landfill by Rust Environment & Infrastructure (1993), one contained 29 mg/l magnesium whereas the other contained 260 mg/l.

According to Kross et al. (1990), magnesium concentrations in groundwater samples from wells in their eastern Iowa region, which includes not only Mitchell County, but also other areas dominated by limestone and dolomite bedrock and the glacial deposits that underlie the Iowan Surface (Prior, 1991), had a mean of 39.9 mg/l and ranged from <0.1 to 177 mg/l. The magnesium concentrations reported for the MW-9 samples are below the eastern Iowa mean. As yet, U.S. EPA (1993) has established no maximum-contaminant or health-advisory levels for magnesium in drinking water (Table 3). The MW-9 concentrations may be consistent with those to be expected in glacial till, a significant part of was derived from the abrasion of carbonate bedrock, but they also are within the range (22 to 40 mg/l) reported by Hem (1985, Table 16) for groundwater flowing through carbonate rocks composed chiefly of dolomite ($CaMg(CO_3)_2$). Future monitoring of MW-9 waters for magnesium, therefore, may be warranted if the concentrations detected during the ongoing quarterly sampling of the well are close to or rise above the current values.

Measurable concentrations of zinc (0.039 mg/l) were reported for the second-round sample from MW-9, but the zinc data are difficult to evaluate because of the large detection limit (0.50 mg/l) of the first-round sample (Appendix 1). The chief commercial source of zinc is the mineral sphalerite (ZnS). Zinc metal finds wide use in galvanized metals and in a variety of alloys (U.S. Bureau of Mines, 1980). Zinc oxide is used extensively in the rubber industry, as a pigment in paints, and as a wood preservative. A variety of other zinc compounds find wide use in industry. The numerous uses of zinc and zinc compounds imply that dissolved zinc should be a measurable constituent in most landfill leachate. One of the two leachate samples collected from the

landfill by Rust Environment & Infrastructure (1993) contained 0.150 mg/l zinc. The concentration reported for the second sample was below the detection limit (0.050 mg/l). Zinc may or may not be a useful indicator of leachate-contaminated groundwater at the Floyd-Mitchell County Landfill.

Sphalerite is a common, if minor, accessory mineral in limestones and dolomites. Moreover, Mitchell County is not far from the former, important Upper Mississippi Valley zinc and lead mining district that spanned parts of Wisconsin, Illinois, and Iowa (Heyl, 1968). Sphalerite probably is, therefore, a trace constituent in much glacial till in eastern Iowa and, locally, could lead to small, but detectable, amounts of zinc in otherwise uncontaminated groundwater. According to Hem (1985), the concentrations of zinc in natural waters are in the range 0.005 to 0.045 mg/l except where the waters have been impacted by mine drainage or other sources of contamination. Hem's common range for natural waters spans the 0.039-mg/l zinc concentration of the MW-9 sample. The reported concentration also is well below the MCL (Table 3). The zinc data probably do not reflect leachate contamination of the MW-9 water, but the answer will also lie in continued monitoring for the metal.

No chloride ion was detected in the two samples from MW-9; nor was the chemical oxygen demand (COD) measurable. Detectable ammoniacal nitrogen, however, was reported for the first-round sample from MW-9 Appendix 1). The concentration (0.25 mg/l) is well below the IDNR MCL of 30 mg/l and the 0.92-mg/l mean reported for eastern Iowa well water (Kross et al., 1990). In light of the sampling date (8/5/93), the concentration may be consistent with the application of ammonia-based fertilizers on nearby farmland.

None of the organic compounds analyzed for was found in either of the MW-9 samples (Appendix 1). Nor were phenols or TOX detected in the single sample that was analyzed for them.

Only one MW-9 pH measurement was made (Appendix 1). The value (7.33 pH units) is nearly neutral and does not point to contamination of the well water.

The single MW-9 specific-conductivity measurement (679 μmhos/cm, Appendix 1) does not point to leachate contamination of the well water. According to Hem (1985), specific-conductivity values of natural surface and ground waters range widely from values as small as 50 μmhos/cm to values as great as 50,000 μmhos/cm or more (sea water). Natural brines may have specific-conductivity values approaching 225,000 μmhos/cm. Hem (1985) pointed out that specific conductivity can be used to estimate the concentration of total dissolved solids (TDS) in natural waters even if the dominant dissolved species are not known. The estimates hinge on the relationship:

$$S = KA$$

where S is the concentration of dissolved solids in mg/l, K is the specific conductivity in μmhos/cm, and A is a variable ranging from about 0.55 to 0.75 for most natural waters.

Using Hem's relationship, the TDS concentration represented by the specific-conductivity value reported for the MW-9 sample may be in the range 373 to 509 mg/l. Most likely, however, the concentration is near the small end of the range inasmuch as values of A close to 0.75 are characteristic of natural waters rich in sulfate. IDNR has not established action levels for specific conductivity although U.S. EPA (1993) has established a secondary MCL of 500 mg/l for TDS. The probable MW-9 value is well below that MCL.

MW-10.— MW-10 is the deep upgradient well that is clustered with MW-9 near the southwest corner of the landfill (Figure 2). The well is screened from 132.5 to 142.5 ft in weathered limestone of the Cedar Valley Group. The well was completed on 6/4/93 and it was sampled three times in 1993 (Appendix 1). No exception reports were generated among the MW-10 analytical results (Table 2). Small concentrations of benzene and TOX reported in Appendix 1, however, may point to leachate contamination of the well water. On the other hand, the analytical results may be in error inasmuch as (1) none of the other data suggests leachate contamination of MW-10 waters and (2) samples from the shallow well in the two-well cluster showed no evidence of leachate contamination.

Among the metals and semimetals analyzed for, only barium, dissolved iron, and magnesium were reported in concentrations that exceeded detection limits (Appendix 1). The barium data from the first two sampling rounds cannot be evaluated because of the large detection limit (0.50 mg/l), but the concentrations clearly are below the MCL (Table 3). The third-round sample concentration (0.187 mg/l) is similar to that reported for the same sampling round for MW-9. As is true for that sample, the concentration is close to Hem's expected range (0.014 to 0.14 mg/l) and probably does not suggest leachate contamination of MW-10 groundwater.

Dissolved-iron concentrations ranged from below the 0.10-mg/l detection limit to 0.58 mg/l in the MW-10 sample collected on 8/5/93 (Appendix 1). Even though some of the concentrations are greater than the safe-drinking-water secondary standard of 0.3 mg/l (Table 3), they probably do not point to leachate contamination of MW-10 water. The concentrations are below the 1- to 10-mg/l range commonly found in nearly neutral groundwaters (Hem, 1985). Continued monitoring of the well for iron, however, would be in order.

The MW-10 magnesium concentrations reported in Appendix 1 (19 to 23.5 mg/l) are below the eastern Iowa well water mean of 39.9 mg/l (Kross et al., 1990) and do not indicate leachate contamination of the water intercepted by MW-10.

MW-10 chloride-ion concentrations ranged widely from <5.0 to 15 mg/l. What accounts for the range is not known, but the values are below or close to the mean chloride-ion concentration of 14.4 mg/l

reported for well water in eastern Iowa by Kross et al. (1990). The data do not suggest leachate contamination of MW-10 water.

The MW-10 ammoniacal nitrogen concentrations listed in Appendix 1 (1.5 to 1.9 mg/l) are greater than the eastern Iowa well-water mean of 0.92 mg/l but they are within the eastern Iowa range from <0.1 to 11.0 mg/l (Kross et. al, 1990). Kross et al. (1990) pointed out that concentrations of ammoniacal nitrogen tend to be highest in groundwater samples from shallow wells contaminated by manure, feedlots, or fertilizers, or by seepage from septic systems. High concentrations can also be found in deep well water owing to the reduction of dissolved nitrate or nitrogen-bearing organic compounds. Inasmuch as samples from MW-9, the shallow well in the cluster, had even smaller concentrations of ammoniacal nitrogen, the data probably do not point to leachate contamination of MW-10 groundwater even though two leachate samples from the landfill contained from 9.0 to 55 mg/l (Rust Environment & Infrastructure, 1993). The MW-10 concentrations, which are below the MCL (Table 3), more likely reflect reduction of nitrates or nitrogen-bearing organic compounds with depth.

MW-10 COD values are difficult to evaluate owing to changing detection limits (Appendix 1). They range from <5.0 through 6.6 to <10 mg/l. The COD values, however, are small enough that they do not point to leachate contamination of the well water.

Except for benzene, none of the several organic compounds analyzed for were detected in the MW-10 samples (Appendix 1). A concentration of 1.5 µg/l benzene was reported for the third-round sample from MW-10. The reported concentration is close to the detection limit and could be in error. On the other hand, if the concentration is valid, it may point to leachate contamination of the groundwater intercepted by MW-10. No meaningful data are available on the concentration of benzene in the landfill leachate (Rust Environment & Infrastructure, 1993). Two leachate samples were analyzed for benzene, but none was detected. The detection limit for one sample was 5.0 µg/l, that for the other sample was 100 µg/l. Continued monitoring of MW-10 for benzene will be done during the next round of list-d, -e, and -f sampling.

A concentration of 0.02 mg/l Cl^- TOX also was reported for the second-round sample from MW-10. The concentration is greater than the state-wide water-well mean of 12.4 µg/l Cl^- reported by Kross et al. (1990) for wells >50 ft deep. As is true for benzene, the TOX concentration conceivably may point to leachate contamination of the well. TOX values reported for two leahcate samples from the landfill were 0.332 and 1.40 mg/l Cl^-. Continued monitoring for TOX also is recommended.

Only two, nearly neutral pH values (6.8 and 7.54 pH units) were recorded for the MW-10 samples (Appendix 1). The pH data seemingly do not suggest leachate contamination of MW-10 water even though the first pH reading seems low for groundwater equilibrated with limestone. What accounts for the low pH reading is not known.

Only two specific-conductivity measurements of MW-10 groundwater were made (570 and 499 µmhos/cm, Appendix 1). Hem's (1985) relationship suggests that the data may be consistent with TDS concentrations in the range 274 to 423 mg/l. The small concentrations of dissolved metals, including magnesium, reported for MW-10 waters imply that the actual TDS values are near the low end of the estimated range and below the U.S. EPA (1993) secondary MCL of 500 mg/l. The TDS values do not point to leachate contamination of MW-10 groundwater.

Downgradient Wells and Exception Reports

A total of 120 valid exception reports was generated using MW-9 and MW-10 as background wells (Appendix 2 and Tables 1 and 2). Most of the reports (Tables 1 and 2) were generated from the data for MW-1, MW-2, and MW-6. In the paragraphs that follow, the exception reports will be evaluated well-by-well. Because no MW-9 background statistics were generated for phenols, TOX, pH, and specific conductivity, those compounds and solution properties will also be reviewed for each of the wells downgradient from MW-9. Among the wells reviewed below, the data for MW-3 and MW-4 show least evidence that the groundwater intercepted by the wells has been impacted by landfill leachate.

MW-1.— MW-1 is the deep downgradient well. It is in a three-well cluster with MW-2 and PZ-2 at the southeast corner of the landfill (Figure 2). The well is screened from 85.0 to 95.0 ft across light-gray limestone in the Cedar Valley Group (Terracon Environmental, 1990a). MW-10 is the corresponding upgradient well. A total of 41 exception reports was generated from the MW-1 data, but nine of them are statistical artifacts produced by changes in analytical detection limits (Table 1 and Appendix 1).

Exception reports for arsenic, cadmium, and zinc, combined with relatively large specific-conductivity measurements, raise the possibility that the groundwater intercepted by MW-1 has been contaminated by landfill leachate. The idea, however, is surprising because of the depth of the well. The limestone in which the well is screened seems to be separated from the bottom of the landfill by about 65 ft of unoxidized glacial till (Terracon Environmental, 1990a, and Midwest Environmental Consulting, 1994). On the other hand, the exception reports entail some of the same elements found in samples from MW-2, the shallow well in the cluster.

The five MW-1 arsenic exception reports (0.006 to 0.018 mg/l) imply that the well water has been contaminated by landfill leachate even though the concentrations are below the MCL (Table 3). According to Hem (1985), arsenic concentrations generally are below detection limits in most natural waters except where mining and smelting activities, where weathering of unusual concentrations of arsenide minerals, or where the use or disposal of pesticides have released the element to streams and groundwater. One of the two samples of landfill leachate collected by Rust Environment & Infrastructure (1993) contained 0.0200 mg/l arsenic. The concentration reported for the other leachate sample was below the

0.0050-mg/l detection limit. Even so, the data show that the leachate does contain small amounts of arsenic that could have contaminated MW-1 groundwater. Continued monintoring for arsenic is proposed because it may be a useful indicator of the contamination of MW-1 groundwater.

One cadmium exception report (0.002 mg/l) was generated from the MW-1 data (Table 2). The other values are below the detection limit (Appendix 2). The exception-report concentration is below the MCL (Table 3), but it may point to leahcate contamination of MW-1 water. The wide use of cadmium metal and cadmium compounds means that it can be a constituent of landfill leachate. Commercial cadmium is a byproduct of zinc smelting operations. The metal is used as a plating on steel and other metals because of its resistance to corrosion and because it can be soldered (U.S. Bureau of Mines, 1980). In combination with nickel, silver, and mercury, the metal is used in the manufacture of long-life and rechargeable batteries. Cadmium compounds are used as pigments in paint, printing ink, and plastics. They also are used as stabilizers in PVC plastics and in fluorescent and video tubes (Hem, 1985). Dissolved cadmium is highly toxic and accumulates in the kidneys (Bates, 1994).

The concentration of cadmium in natural waters is small owing to the small solubility of the element. The median concentration in U.S. surface waters is near 1 µg/l, but that in most groundwater may be even smaller owing coprecipitation with manganese oxide or adsorption on mineral surfaces (Hem, 1985). The small concentration reported for the fourth-round sample from MW-1 may be consistent with the small concentration (0.0010 mg/l) reported for a leachate sample from the landfill by Rust Environment & Infrastructure (1993).

One exception report for dissolved iron (2.1 mg/l) also was produced from the MW-1 analyses (Table 2 and Appendix 2). The concentrations for the other MW-1 samples ranged from <0.1 to 0.367 mg/l (Appendix 1), but most were below the 0.3-mg/l MCL (Table 3). Even though one leachate sample collected by Rust Environment & Infrastructure (1993) contained 1200 mg/l dissolved iron, the MW-1 iron values may or may not reflect leachate contamination of MW-1 groundwater. Even the exception-report concentration is within the 1- to 10-mg/l range commonly found in nearly neutral groundwaters (Hem, 1985).

Four exception reports for magnesium were generated from the MW-1 data (Table 2). The exception report concentrations range from 30 to 37 mg/l. The data may accord with limited leachate contamination of MW-1 waters inasmuch as one leachate sample from the landfill contained 260 mg/l magnesium (Rust Environment & Infrastructure, 1993) and the MW-1 concentrations are within the 22- to 40-mg/l range reported by Hem (1985, Table 16) for groundwater flowing through carbonate rocks composed chiefly of dolomite ($CaMg(CO_3)_2$). On the other hand, the concentrations are below the eastern Iowa well-water mean of 39.9 mg/l (Kross et al., 1990). The concentrations also are below those that affect taste and health (Safe Drinking Water Committee, 1977). U.S. EPA (1993) has promulgated no MCL for magnesium as yet (Table 3). Continued moni-

toring of MW-1 for magnesium, however, may aid in tracking the contamination history of groundwater intercepted by the well.

Table 2 records two MW-1 exception reports for zinc. The exception report concentrations (0.07 and 0.08 mg/l, Appendix 2) are greater than Hem's (1985) common range for natural waters (0.005 to 0.045 mg/l). The concentrations are consistent with leachate contamination of the water intercepted by MW-1 inasmuch as one sample of leachate collected from the landfill by Rust Environment & Infrastructure (1993) contained 0.150 mg/l zinc. The exception-report concentrations, however, are well below the MCL (Table 3).

Eight exception reports for ammoniacal nitrogen also were generated from the MW-1 data (Table 1). They represent all eight sampling rounds for the well. The concentrations (2.2 to 3.4 mg/l, Appendices 1 and 2) are greater than the eastern Iowa well-water mean of 0.92 mg/l but they are within the eastern Iowa range from <0.1 to 11.0 mg/l reported by Kross et. al (1990). The extent to which the MW-1 data reflect leachate contamination of the well water or reduction of nitrate or nitrogen-bearing organic compounds with depth (Kross et al., 1990) is problematic. None of the concentrations exceeds the MCL (Table 3).

As was noted in the general review of the analytical results, the single COD exception report is a statistical artifact produced by a change in detection limits. The same is true for the exception reports for the several organic compounds.

Table 2, however, shows a single exception report for TOX (0.03 mg/l Cl^-) for the sample collected on 4/15/92 (Appendices 1 and 2). All other TOX values are below the detection limit. The concentration is greater than the state-wide water-well mean of 12.4 µg/l Cl^- reported by Kross et al. (1990) for wells >50 ft deep, but it is much smaller than the MCL (Table 3). Concentrations of 0.332 and 1.40 mg/l Cl^- were reported for the two samples of leachate collected by Rust Environment and Infrastructure (1993). The single TOX exception report may or may not point to leachate contamination of MW-1 water, but Libra et al. (1984) noted that aquifers that are deeply buried beneath glacial drift in Floyd and Mitchell counties generally have not been impacted by pesticides or herbicides

No pH exception reports were generated from the MW-1 data. The pH values in Appendix 1 (7.02 to 7.43 pH units) probably are consistent with a well screened near the top of a carbonate aquifer and do not point to leachate contamination of the well water.

Table 2 records eight exception reports for MW-1 specific-conductivity measurements. The measurements span all eight sampling rounds and range from 690 to 930 µmhos/cm. Hem's (1985) relationship indicates that the corresponding TDS concentrations may be near the low end of the range from 380 to 698 mg/l. Only the 930-µmhos/cm measurement likely represents a TDS concentration that exceeds the secondary MCL of 500 mg/l (Table 2). The MW-1 specific-conductivity values are

consistently greater than those reported to date for MW-10 and may point to leachate contamination of the well water.

MW-2.— MW-2 is a shallow, water-table well in a three-well cluster with MW-1 and PZ-2 near the southeast corner of Area Fill No. 1 (Figure 2). The well predates the work by Terracon Environmental and formerly was designated as MW-10 (Terracon Environmental, 1990b, 1991a). Measurements of well depth (about 32 ft) imply that the well is screened across unoxidized glacial till. MW-9 is the background well. The well was sampled a total of nine times from 1990 to 1993.

A total of 28 exception reports was generated from the MW-2 data (Table 1): one each for arsenic, cadmium, and zinc; two for mercury; three for COD; four for dissolved iron; and eight each for magnesium and chloride ion. The single cadmium exception report, however, is a statistical artifact produced by changes in detection limits. Even so, the exception reports and recognition of appreciable tetrahydrofuran in two samples are a strong indicator that the well water has been contaminated by landfill leachate.

The single MW-2 exception report for arsenic (0.009 mg/l, Table 1) is for the sample collected on 12/10/93 (Appendix 2). All other concentrations listed in Appendix 1 are below the detection limit. According to Hem (1985), arsenic concentrations generally are below detection limits in most natural waters except where mining and smelting activities, where weathering of unusual concentrations of arsenide minerals, or where the use or disposal of pesticides have released the element to streams and groundwater. Even though the exception-report concentration is below the MCL (Table 3), it does accord with leachate contamination of the groundwater intercepted by MW-2.

The four MW-2 exception reports for dissolved iron (Table 1) are for concentrations in the range 0.4 to 13.2 mg/l (Appendix 2). Other iron concentrations reported for MW-2 samples are below the detection limit (Appendix 1). The exception-report iron values are greater than secondary MCL of 0.3 mg/l. Even though most of the exception-report concentrations are below or within 1- to 10-mg/l concentration range that it is common in much groundwater (Hem, 1985), the data accord with leachate contamination of the groundwater intercepted by MW-2 inasmuch as the concentrations generally have increased with time.

The eight MW-2 exception reports for magnesium (60 to 72 mg/l, Table 1 and Appendix 2) span each time that the element was analyzed for (Appendix 1). The concentrations are greater than the eastern Iowa well-water mean of 39.9 mg/l (Kross et al., 1990). They also are greater than the 22- to 40-mg/l range reported by Hem (1985, Table 16) for groundwater flowing through carbonate rocks composed chiefly of dolomite ($CaMg(CO_3)_2$). Even though the MW-2 concentrations are less than those that affect taste and health (Safe Drinking Water Committee, 1977), the data point to leachate contamination of the groundwater intercepted by MW-2. As yet, U.S. EPA (1993) has promulgated no MCL for magnesium (Table 3). Continued monitoring for magnesium is recommended.

The two mercury exception reports (0.0006 and 0.0027 mg/l, Table 1 and Appendix 2) also suggest that MW-2 waters have been contaminated by landfill leachate even though no mercury was detected in the two samples of landfill leachate collected by Rust Environment & Infrastructure (1993). The 0.0006-mg/l concentration reported for the sample collected on 10/11/90, however, is barely greater than the detection limit (0.0005 mg/l, Appendix 1) whereas the concentration reported for the sample collected on 1/18/91 is above the MCL (0.002 mg/l, Table 3). Concentrations reported for the six sampling rounds since 1/18/91, however, have been below the detection limit and the metal probably can be dropped from the MW-2 sampling program.

Table 1 also lists one exception report for zinc (0.07 mg/l). The other data in Appendix 1 ranges from <0.050 and 0.045 mg/l to 0.06 mg/l. Nearly all of the reported concentrations are barely greater than the detection limit. The 0.06- and 0.07-mg/l concentrations, however, are greater than Hem's (1985) common range for natural waters (0.005 to 0.045 mg/l). They may point to leachate contamination of MW-2 well water inasmuch as one leachate sample from the landfill contained 0.150 mg/l zinc (Rust Environment and Infrastructure, 1993). The zinc concentrations, however, are well below the MCL (Table 3).

Eight chloride-ion exception reports were generated from the MW-2 data (Table 1). The exception-report concentrations (16. to 35 mg/l, Appendices 1 and 2), however, have declined with time and the concentration reported for the last sampling round was below the detection limit. The exception-report concentrations are greater than the mean chloride-ion concentration of 14.4 mg/l reported for well water in eastern Iowa by Kross et al. (1990), but they are below the IDNR MCL of 250 mg/l. The data accord with limited, if declining, leachate contamination of MW-2 waters inasmuch as the two leachate samples collected by Rust Environment & Infrastructure contained 29 and 400 mg/l chloride ion.

Three MW-2 exception reports for COD (15 to 18 mg/l, Appendix 2) are listed in Table 1. Other values are in the range <5 to 10 mg/l and the data show no consistent pattern. The COD of groundwater depends not only on the concentration of dissolved organic compounds, but also on the concentrations of reduced inorganic species, as Fe^{2+}, HS^-, NH_4^+, and the like (Hem, 1985). In the absence of other analytical data, the COD results cannot be evaluated, but the small values seemingly do not point to extensive leachate contamination of MW-2 waters.

None of the several organic compounds analyzed for was detected in the MW-2 samples. TOX concentrations of 0.02 and 0.03 mg/l Cl^-, however, were reported for the first- and sixth-round samples from MW-2 (Appendix 1). Other TOX concentrations were below the 0.01-mg/l-Cl^- detection limit. The measurable TOX concentrations equal or are below the Iowa statewide mean of 30.1 µg/l Cl^- for wells <50 ft deep (Kross et al., 1990). The data on the organic compounds and TOX do not point to leachate contamination of MW-2 waters. The small TOX values could reflect the application of pesticides and herbicides on nearby farmland.

MW-2 pH measurements ranged from 6.83 to 7.5 pH units (Appendix 1). Most of the measurements were nearly neutral and no consistent pattern is seen in the pH data. The pH measurements do not point to leachate contamination of MW-2 groundwater.

The MW-2 specific-conductivity values in Appendix 1 range from 1670 to 2060 µmhos/cm. The values clearly are greater than the single measurement (679 µmhos/cm) reported for MW-9 and point to leachate contamination of MW-2 waters. The graph in Appendix 3 also shows that the MW-2 specific-conductivity values are greater than those from any other of the wells. Hem's (1985) relationship implies that the MW-2 measurements correspond to TDS concentrations in the range 919 to 1545 mg/l. The actual TDS values probably are near the low end of the range. They would exceed the U.S. EPA (1993) MCL of 500 mg/l.

The highly flammable organic compound tetrahydrofuran was identified in two samples from MW-2 (Appendix 1). The estimated concentrations (1500 and 844 mg/l0) seemingly are indicators of leachate contamination of MW-2 groundwater.

MW-3.— MW-3 is a shallow, water-table well east of Area Fill No. 2 (Figure 2). MW-3 is screened from 5.0 to 20.0 ft across both oxidized and unoxidized glacial till (Terracon Environmental, 1991b). MW-9 is the background well. The well was sampled eight times and only one exception report for mercury was produced from the data (Table 1).

Among the metals and semimetals analyzed for, only magnesium, mercury, and zinc were found in concentrations greater than the detection limits. The MW-3 magnesium concentrations (13 to 24 mg/l, Appendix 1) are well below both the eastern Iowa well-water mean of 39.9 mg/l (Kross et al., 1990) and the concentrations reported for MW-9 samples (30 and 30.9 mg/l, Appendix 1). The magnesium data do not point to leachate contamination of MW-3 waters.

The mercury exception report (0.0006 mg/l, Table 1) is for a sample collected on 1/20/92. The other four mercury analyses were below the 0.0005 mg/l detection limits. The exception-report concentration is barely greater than the detection limit and may or may not point to leachate contamination of MW-3 waters. None of the other data for the well clearly points to leachate contamination of the groundwater intercepted by MW-3 (Appendix 1).

The MW-3 zinc concentrations in Appendix 1 (<0.05 to 0.06 mg/l) either are below or barely exceed the detection limit. The 0.06-mg/l concentrations, which were reported for the first two sampling rounds, are greater than (Hem's, 1985) common range for zinc in natural waters (0.005 to 0.045 mg/l). If the 0.06-mg/l concentrations are valid, they may point to early leachate contamination of MW-3 waters. The below-detection-limit concentrations reported for later sampling rounds, however, suggest that the quality of water intercepted by MW-3 has improved with time. On the other hand, the zinc data may reflect the inherent variability of groundwater in glacial tills in Iowa.

Among the several organic compounds analyzed for, none was found in concentrations greater than the detection limit. Four samples, however, had measurable concentrations of TOX (0.01 to 0.02 mg/l Cl^-, Appendix 1). The concentrations barely exceed the detection limit and may or may not point to leachate contamination of MW-3 waters. The TOX concentrations are below the Iowa statewide mean of 30.1 µg/l Cl^- for water wells <50 ft deep (Kross et al., 1990). They could reflect the application of pesticides or herbicides on nearby farmland.

The MW-3 pH values in Appendix 1 range from 6.45 to 7.43 pH units. Except for the 6.45-value reported for the first sampling round, all of the other MW-3 measurements meet the safe-drinking-water standard of 6.5 to 8.5 pH units (U.S. EPA, 1993, Table 3). Except, perhaps, for the first-round value, none of the pH measurements suggests leachate contamination of the well water. What accounts for the low first-round pH is problematic.

The MW-3 specific-conductivity measurements ranged from 580 to 870 µmhos/cm (Appendix 1). The numbers compare favorably with the single MW-9 measurement of 679 µmhos/cm. Hem's (1985) relationship indicates that the MW-3 data may be consistent with TDS concentrations in the range 319 to 653 mg/l. The actual concentrations probably are toward the low end of the range. It is unlikely that any of the inferred TDS concentrations would exceed the U.S. EPA (1993) secondary MCL of 500 mg/l. The specific-conductivity data do not point to leachate contamination of MW-3 well water.

MW-4.— MW-4 is the shallow well in a two-well cluster with PZ-5 along the western waste boundary (Figure 2). MW-4 is one of the wells that was installed prior to the work by Terracon Environmental (1990a) and it formerly was designated MW-12 (Terracon Environmental, 1991a). The measured depth of the well (32 to 33 ft) implies that it is screened across unoxidized glacial till. MW-9 is the background well for MW-4, which originally was specified as one of the upgradient wells (Terracon Environmental, 1990b).

MW-4 was sampled a total of nine times (Appendix 1). Only twelve exception reports were generated from the MW-4 data (Table 1). Nine of the exception reports, however, are statistical artifacts controlled by changes in detection limits (the one generated for cadmium and those generated for the organic compounds). The remaining three exception reports are: one each for mercury and zinc and two for COD. The exception reports and early reports of phenols may mean that MW-4 waters were contaminated by leachate during its early sampling history, but that the quality of groundwater intercepted by the well has improved with time.

Among the metals and semimetals analyzed for, only dissolved iron, magnesium, mercury, and zinc had concentrations greater than the detection limits (Appendix 1). Only one sample had iron concentrations that were greater than the detection limits (Appendix 1). The concentration was small (0.12 mg/l) and is below the MCL (Table 3). The MW-4 magnesium concentrations listed in Appendix 1 range from 18 to 25 mg/l. They are smaller than those listed for MW-9 and are smaller than the eastern

Iowa well-water mean of 39.9 mg/l (Kross et al., 1990). Neither the iron or the magnesium suggest leachate contamination of MW-4 water.

The single mercury exception report (0.0011 mg/l, Table 1) is for a sample collected on 1/18/91 (Appendix 2). Other values listed in Appendix 1 are all below the 0.0005-mg/l detection limit. The reported concentration is about twice as large as the detection limit. Inasmuch as Hem (1985) reported that the concentrations of mercury in natural waters generally are below detection limits, the exception report may be an indicator of leachate contamination of MW-4 waters.

The single MW-4 exception report for zinc (0.07 mg/l, Table 1) is the only value that exceeds the 0.05-mg/l detection limit (Appendix 1). The concentration may also point to leachate contamination of MW-4 waters. The 0.07-mg/l concentration is greater than Hem's (1985) common range for natural waters (0.005 to 0.045 mg/l). The concentration, however is below the MCL (Table 3).

Table 1 lists two exception reports for COD. The concentrations (100 and 20 mg/l) are for the first two sampling rounds (Appendices 1 and 2). All other values listed in Appendix 1 are below the detection limit. The data suggest that the well water may have been contaminated by leachate early in the sampling history, but that the quality of the well water later improved.

The first-round sample from MW-4 had a phenol concentration of 0.051 mg/l that is well above the detection limit. Provided that the reported concentration is not spurious, it could be an indicator of early leachate contamination of MW-4 waters. All subsequent phenol concentrations, however, are below the detection limits and the first-round concentration is well below the MCL (Table 3)..

The first-round TOX analysis (0.02 mg/l Cl^-) also was greater than the 0.01-mg/l-Cl^- detection limit, but all subsequent concentrations are below the detection limit. The data may or may not point to early leachate contamination of MW-4 waters. The TOX concentration is below the Iowa statewide mean of 30.1 µg/l Cl^- for water wells <30 ft deep (Kross et al., 1990). The TOX value could reflect the application of pesticides or herbicides on nearby farmland.

The MW-4 pH values in Appendix 1 range from 6.8 to 7.48 pH units. All of the MW-4 measurements meet the safe-drinking-water standard of 6.5 to 8.5 pH units (U.S. EPA, 1993; Table 3). None of the pH measurements is suggestive of leachate contamination of MW-4 groundwater.

MW-4 specific-conductivity measurements (550 to 680 µmhos/cm, Appendix 1) do not point to leachate contamination of MW-4 water. Hem's (1985) approximate relationship suggests that the specific-conductivity values may be consistent with TDS concentrations in the range 307 to 510 mg/l. Actual TDS concentrations probably are toward the low end of the range and would below the U.S. EPA (1993) secondary MCL of 500 mg/l. The specific-conductivity data do not suggest leachate contamination of MW-4 well water.

MW-5.— MW-5, which formerly was identified as MW-13, is in a two-well cluster with PZ-4 near the southwest corner of the landfill (Figure 2). Measured depths of the well (about 31 ft) imply that MW-5 is screened primarily across unoxidized glacial till, but that the upper part of the screened interval may span oxidized glacial till. MW-9 is the background well for MW-5, which originally was specified as an upgradient well (Terracon Environmental, 1990b).

MW-5 was sampled nine times. Twenty six exception reports were generated from the data (Table 1), but nine of them are statistical artifacts produced by changes in detection limits: the one exception report for cadmium and the eight exception reports for organic compounds. The remaining 18 exception reports are: one each for arsenic, dissolved iron, mercury, and zinc; two for COD; four for magnesium; and eight for chloride ion. The exception reports for arsenic, magnesium, and chloride ion, together with some of the specific-conductivity measurements, indicate that the MW-5 groundwater has been contaminated by leachate from the landfill. The chloride data imply that the degree of contamination has declined with time, but the data for magnesium and specific conductivity contradict the idea. The changing concentrations may reflect changes in the composition of the leachate mingling with the groundwater intercepted by MW-5.

The single MW-5 exception report for arsenic (0.016 mg/l, Table 1) is for the 4/15/92 sample (Appendix 2). All other concentrations listed in Appendix 1 are below the 0.005-mg/l detection limit. Even so, the exception-report concentration is great enough that it probably is not spurious. According to Hem (1985), arsenic concentrations generally are below detection limits in most natural waters except where mining and smelting activities, where weathering of unusual concentrations of arsenide minerals, or where the use or disposal of pesticides have released the element to streams and groundwater. One of the two samples of landfill leachate collected by Rust Environment & Infrastructure (1993) contained 0.0200 mg/l arsenic. The arsenic exception report implies that MW-5 water has been contaminated by leachate.

The single MW-5 exception report for dissolved iron (0.32 mg/l, Table 1) barely is greater than the MCL (Table 3). It is from the first round of sampling (Appendix 2) and all other iron values listed in Appendix 1 are below the detection limits or are much smaller (0.032 mg/l). In light of the 1- to 10-mg/l range that is common in groundwater of nearly neutral pH (Hem, 1985), the iron data, in contrast to the data for arsenic, seemingly do not point to leachate contamination of MW-5 groundwater.

Table 1 lists four exception reports for magnesium. The exception-report concentrations (34 to 46.4 mg/l, Appendix 2) straddle the eastern Iowa well-water mean of 39.9 mg/l (Kross et al., 1990). Other MW-5 magnesium concentrations (21 to 29 mg/l) are well below the mean (Appendix 1). Inasmuch as the exception report concentrations are appreciably greater than those reported for MW-9 (30 and 30.9 mg/l), they accord with leachate contamination of the groundwater intercepted by MW-5 even though the distribution of large concentrations in time is irregular.

The two leachate samples collected from the landfill by Rust Environment and Infrastructure (1993) had concentrations of 29 and 260 mg/l. Continued monitoring of the well for magnesium may be in order even though the concentrations are well below those that might affect health (Safe Drinking Water Committee, 1977)

The single exception report for mercury (0.0038 mg/l, Table 1) is for the second-round sample (Appendices 1 and 2). Even though all of the other mercury concentrations are below the detection limit, the exception-report concentration does point to leachate contamination of MW-5 groundwater (1) because the concentration is appreciably greater than the 0.0005-mg/l detection limit, (2) because the concentration of mercury in most natural waters generally is below the detection limit (Hem, 1985), and (3) because the concentration exceeds the MCL (Table 3). Continued monitoring for mercury, however, may not be necessary because the concentrations reported for the last seven rounds of sampling have been below the detection limit.

A single MW-5 exception report for zinc (0.07 mg/l) was generated from the analytical results (Table 1). Other zinc concentrations are at or below the detection limits (0.05 and 0.03 mg/l, Appendix 1). The exception report also points to leachate contamination of MW-4 waters inasmuch as the 0.07-mg/l concentration is greater than Hem's (1985) common range for natural waters (0.005 to 0.045 mg/l). The concentration, however, is below the MCL (Table 3).

Eight chloride-ion exception reports were generated from the MW-5 data (Table 1). Two leachate samples from the landfill contained 29 and 400 mg/l chloride ion (Rust Environment and Infrastructure, 1993). The exception-report concentrations (23 to 200 mg/l, Appendix 3) are greater than 14.4-mg/l mean for well-water in eastern Iowa (Kross et al., 1990) and point to leachate contamination of the groundwater intercepted by MW-5. The chloride-ion concentrations not only are below the MCL (Table 2), but they also have decreased with time (Appendix 1). Indeed, the concentration reported for the last round of sampling was below the detection limit (Appendix 1). The data may point to decreasing degrees of contamination or a change in the composition of the leachate mingling with the groundwater.

Table 1 records two MW-5 exception reports for COD (both 32 mg/l, Appendix 2). The exception reports were generated for the first two rounds of sampling. Other COD values are ≤8 mg/l. The exception-report concentrations may indicate early contamination of MW-5 waters, but the other concentrations, as is true for the chloride-ion data, point to decreasing degrees of contamination or to a change in the composition of the leachate impacting the well water.

None of the organic compounds analyzed for was detected in the MW-5 samples, but varying concentrations of TOX were reported (Appendix 1). The concentrations in Appendix 1 range from <0.01 to 0.06 mg/l Cl^-, but they generally are larger than those reported for samples from the other wells (graph in Appendix 3). The TOX data also accord with leachate contamination of MW-5 waters, but what part of the concentrations stems

from the use of pesticides and herbicides on nearby farmland is problematic.

The MW-5 pH values are nearly neutral (6.84 to 7.4 pH units, Appendix 1) and are within the IDNR acceptable range (Table 3). The specific-conductivity measurements in Appendix 1 range from 640 to 1210 µmhos/cm and show no consistent pattern with time. Hem's (1985) relationship suggests that the specific-conductivity values correspond to TDS concentrations in the range 352 to 908 mg/l. Most of the likely TDS concentrations probably are near the low end of the range, but some of the large specific-conductivity measurements (those >900 µmhos/cm) may have corresponding TDS values greater than the U.S. EPA (1993) 500-mg/l secondary MCL. Although the pH measurements do not necessarily point to leachate contamination of MW-5 waters, some of the specific-conductivity measurements do.

MW-6.— This shallow, water-table well that is in a two-well cluster with PZ-3 along the southern waste boundary (Figure 2). It is about half way between MW-1 and MW-5. The well, which formerly was designated MW-9, was installed before the start of the hydrogeologic investigation by Terracon Environmental (1991a). Depth measurements (32 to 33 ft) imply that MW-6 is screened across unoxidized glacial till. MW-9 is the background well.

MW-6 was sampled nine times. A total of 34 exception reports was generated for the samples. The single exception report for cadmium, however, is a statistical artifact produced by changes in detection limits, as is one of the exception reports for zinc. The 32 remaining exception reports are: one for arsenic; two each for mercury, zinc, COD, and benzene; six for dissolved iron; eight for chloride ion; and nine for magnesium. Among the downgradient wells, the data for MW-6 offer the strongest evidence that groundwater has been contaminated by leachate from the landfill.

As for MW-5, the single MW-6 exception report for arsenic (0.009 mg/l, Table 1) is for the 4/15/92 sample (Appendix 2). All other concentrations listed in Appendix 1 are at or below the 0.005-mg/l detection limit. The exception-report concentration is large enough that it probably is not spurious. Even though it is below the MCL (Table 3), the concentration implies that MW-6 waters have been contaminated by leachate. According to Hem (1985), arsenic concentrations generally are below detection limits in most natural waters except where mining and smelting activities, where weathering of unusual concentrations of arsenide minerals, or where the use or disposal of pesticides have released the element to streams and groundwater. One of the two samples of landfill leachate collected by Rust Environment & Infrastructure (1993) contained 0.0200 mg/l arsenic. Inasmuch as the three samples collected after 4/15/92 had below-detection-limit arsenic concentrations, continued monitoring of MW-6 for arsenic may not be necessary.

The six exception reports for dissolved iron (1.4 to 12. mg/l, Table 1 and Appendix 2) are strong indicators of leachate contamination of MW-6 waters even though most of the exception-report concentrations

are within Hem's (1985) common groundwater range of 1 to 10 mg/l for groundwater of nearly neutral pH. The other concentrations reported for MW-6 samples are below the detection limit, but those data are for three of the 1990 and 1991 sampling rounds (Appendix 1). The data in Appendix 1 show an irregular increase with time and all of the exception-report concentrations exceed the secondary MCL (Table 3).

Table 1 records nine magnesium exception reports (48 to 89 mg/l) that span all nine sampling rounds and indicate leachate contamination of MW-6 waters. The concentrations, which show an irregular increase with time (Appendix 1), are all greater than the eastern Iowa well-water mean of 39.9 mg/l (Kross et al., 1990). The concentrations also are greater than the concentration of one of the two leachate samples (29 and 260 mg/l) collected from the landfill by Rust Environment and Infrastructure (1993), but they are below the concentrations that affect either health or taste (Safe Drinking Water Committee, 1977). Continued monitoring of the well for magnesium is recommended because magnesium seems to be a relatively reliable indicator of leachate contamination at the landfill.

The two MW-6 exception reports for mercury (0.002 and 0.0014 mg/l, Appendix 2) are for the second and fourth sampling rounds. Even though all of the other mercury concentrations were below the detection limit (Appendix 1), the exception-report concentrations point to leachate contamination of MW-6 groundwater (1) because the concentrations are appreciably greater than the 0.0005-mg/l detection limit and (2) because the concentration of mercury in most natural waters generally is below the detection limit (Hem, 1985). Even though the first of the two exception-report concentrations is at the MCL (0.002 mg/l, Table 3), continued monitoring for mercury may not be necessary because the concentrations reported for the last five rounds of sampling have been below the detection limit (Appendix 1).

The three exception reports for zinc (Table 1) also point to leachate contamination of MW-6 waters. The exception-report concentrations include one that is a statistical artifact (<0.07 mg/l Appendices 1 and 2). The other exception-report concentrations (0.08 and 0.09 mg/l) exceed Hem's (1985) common range for natural waters (0.005 to 0.045 mg/l) as does the 0.06-mg/l concentration reported for the fifth round sample (Appendix 1). The zinc data point to leachate contamination of MW-6 waters, but the concentrations reported for the four sampling rounds are below the detection limits.

Eight exception reports for chloride ion were generated from the MW-6 data (Table 1). Even though the exception-report concentrations (18 to 50 mg/l, Appendix 2) generally are smaller than those reported for MW-5 samples (Appendix 1), the chloride-ion data are strong indicators of leachate contamination of MW-6 well water. The concentrations, however, do not exceed the MCL and dropped sharply to below the detection limit in 1993 (Appendix 1).

Two exception reports for COD (21 and 45 mg/l, Table 1 and Appendix 2) were generated from the analytical results for the first two rounds of sampling. Other COD values are range from 8.1 and <10 to 14 mg/l.

The exception-report values probably reflect leachate contamination of MW-6 groundwater. In light of the generally reducing nature of groundwater, the later measurements may not signify leachate contamination of MW-6 water.

The two benzene exception reports listed in Table 1 also point to leachate contamination of MW-6 waters. The exception-report concentrations (1.3 and 1.6 µg/l, Appendix 2) are strong indicators of leachate contamination even though they are below the MCL (Table 3). The benzene concentrations reported for the other six samples are below the detection limits. Benzene is a toxic compound and carcinogen (Lewis, 1993) that is an important constituent in gasoline and formerly was used widely as a solvent. Benzene, therefore, is a common constituent in landfill leachate.

No benzene was detected in the two leachate samples collected by Rust Environment & Infrastructure (1993). The lack of detection may hinge partly on detection limits: the analytical detection limit reported for one sample was 5.0 µg/l whereas that for the second sample was 100 µg/l. The second detection limit could have masked appreciable concentrations of benzene. Because the benzene concentrations reported for the MW-6 samples collected since 1/18/91 were all below the 1-µg/l detection limit, the compound probably can be dropped from the sampling program.

A phenol concentration of 0.33 mg/l was reported for the first-round sample from MW-6 (Appendix 1). None, however, was detected in subsequent samples. In contrast, the above-detection-limit TOX concentrations listed in Appendix 1 (0.02 to 0.04 mg/l Cl^-) span seven sampling rounds. Provided that the data do not reflect the application of pesticides and herbicides on nearby farmland, the TOX concentrations also point to leachate contamination of MW-6 groundwater. TOX concentrations reported for the two leachate samples collected by Rust Environment & Infrastructure (1993) are 0.332 and 1.40 mg/l Cl^-. Continued monitoring of MW-6 for TOX is in order.

The pH values in Appendix 1 are from all nine sampling rounds and range from 6.73 to 7.88 pH units. The 7.88 value may be suspect because it is appreciably greater than the other measurements. Even so, all of the pH values are within the U.S. EPA (1993) acceptable drinking water range (Table 3) and none of the pH data indicates that MW-6 waters have been contaminated by landfill leachate.

The specific-conductivity values for the MW-6 groundwater samples (1,400 to 2,080 µmhos/cm, Appendix 1) seemingly are strong indicators that the groundwater has been contaminated by landfill leachate. The bar graphs in Appendix 3 show that MW-6 specific-conductivity values are appreciably greater than those for samples from the other wells except for MW-2 and MW-7. Hem's (1985) relationship suggests that MW-6 values may be consistent with TDS concentrations in the range from 770 to 1560 mg/l. Even though the actual TDS concentrations probably are near the

low end of the range, they would be greater than the U.S. EPA (1993) secondary MCL for TDS (500 mg/l).

The hazardous (Lewis, 1993) organic compound cis-1,2-dichloroethylene was analyzed for twice in 1991 (Appendix 1). Concentrations of 2.2 and 3.2 µg/l were found. Concentrations of 5.4 and 439 mg/l cis-1,2-dichloroethylene were reported for the two leachate samples collected by Rust Environment & Infrastructure (1993). Even though the compound has only limited industrial use (Driscoll, 1986), its presence in the two groundwater samples supports other data indicating that the groundwater intercepted by MW-6 has been contaminated by leachate.

MW-7.— MW-7 is a shallow downgradient well that is located along the south boundary of Fill Area No. 1. It is screened from 5.0 to 20.0 ft across both oxidized and unoxidized glacial till (Terracon Environmental, 1991b). The upgradient well is MW-9. MW-7 was sampled eight times (Appendix 1), but only five exception reports were generated from the analytical results: one for arsenic and four for magnesium. The data, however, indicate that MW-7 waters have been impacted by landfill leachate, but that the degree of contamination was limited.

The single arsenic exception report (0.008 mg/l, Table 1) is for the second-round sample (Appendix 2). All other arsenic concentrations are below the detection limit (Appendix 1). The arsenic exception report probably is an indicator of leachate contamination of MW-7 waters inasmuch as arsenic concentrations in natural waters generally are below detection limits (Hem, 1985) and one of the two samples of landfill leachate collected by Rust Environment & Infrastructure (1993) contained 0.0200 mg/l arsenic. The exception-report concentration, however, is below the MCL (Table 3).

The four magnesium exception reports (Table 1) were generated for all four samples that were analyzed for the metal (Appendix 1). The concentrations (36 to 46 mg/l) straddle the eastern Iowa well-water mean of 39.9 mg/l (Kross et al., 1990) and point to limited leachate contamination of the groundwater intercepted by MW-7. The concentrations also are greater than the concentration of one two leachate samples (29 and 260 mg/l) collected from the landfill by Rust Environment and Infrastructure (1993), but they are below the concentrations that affect either health or taste (Safe Drinking Water Committee, 1977). Because magnesium concentrations >30 mg/l (graph in Appendix 3) seem to be relatively reliable indicators of leachate contamination at the Floyd-Mitchell landfill, renewed monitoring of MW-7 for magnesium may be appropriate, especially when none of the organic compounds analyzed for or TOX was detected in MW-7 samples.

MW-7 pH measurements ranged from 6.85 to 8.48 pH units (Appendix 1). The 8.48-pH reading seems anomalous when the other measurements were ≤7.30 pH units. What accounts for the 8.48 high, however, is problematic. The pH data seemingly do not reflect leachate contamination of MW-7 waters and, except for the 8.48 reading, are well within the safe-drinking-water range (Table 3).

The MW-7 specific-conductivity values (1090 to 1660 µmhos/cm, Appendix 1) are strong indicators that the well water has been contaminated by landfill leachate inasmuch as the graph in Appendix 3 shows that the MW-7 specific-conductivity measurements were greater than those for all of the other wells except MW-2 and MW-6. Hem's (1985) relationship suggests that the MW-7 specific-conductivity values accord with TDS concentrations in the range 600 to 1162 mg/l. The likely TDS values probably are near the low end of the range, but they are greater than the U.S. EPA secondary MCL of 500 mg/l.

RECOMMENDATIONS

The data at hand warrant continued monitoring of all of the wells monitored during the prior years of sampling at the Floyd-Mitchell County Sanitary Landfill. Two rounds of quarterly sampling (list d, e, and f, 567 IAC 103.2(4)) of MW-9 and one round of quarterly sampling of MW-10 need to be completed before they are phased into the semiannual sampling programs (Table 4).

Routine semiannual and annual sampling (list e and f) is proposed for MW-1 through MW-7 in 1994 (Table 4). Analyzing the samples from MW-1, MW-2, MW-5, MW-6, and MW-7 for magnesium is recommended because concentrations of the element >30 mg/l seem to be useful indicators that groundwater has been contaminated by leachate from the landfill. Sampling for arsenic also is proposed for MW-1 because small concentrations of arsenic have been detected in all samples previously analyzed for metals and semimetals. Similarly, continued sampling of MW-6 for TOX is recommended. If magnesium concentrations in the 1994 semiannual samples from a given well consistently are less than 30 mg/l, the element could be dropped from the analytical program. Similarly, if the arsenic concentrations in both of the 1994 samples from MW-1 fall below detection limits, arsenic could be dropped from the analytical program.

Table 4.-- Proposed 1994 sampling schedule for Delaware County Sanitary Landfill.

MONITOR WELL	QUARTERS			
	First	Second	Third	Fourth
MW-1	e Arsenic Magnesium		e and f Arsenic Magnesium	
MW-2	e Magnesium		e and f Magnesium	
MW-3	e		e and f	
MW-4	e		e and f	
MW-5	d, e ,f Magnesium		e and f Magnesium	
MW-6	e Magnesium TOX		e and f Magnesium	
MW-7	e Magneisum		e and f Magnesium	
MW-9	d and e	d and e	e and f	
MW-10	d, e, f		e and f	

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APPENDIX 1

TABULATION OF ANALYTICAL DATA

Floyd-Mitchell SLF

Contains 9 Monitoring Wells
Upgradient Wells are MW-10 and MW-9

Monitoring Well: MW-1

Parameter	Unit	Sampling Dates							
		10/11/90	1/18/91	4/23/91	7/2/91	10/1/91	1/20/92	4/15/92	10/20/92
Arsenic, dissolved	mg/l	—	—	0.008	0.006	0.018	0.007	—	—
Barium, dissolved	mg/l	—	—	<0.5	<0.5	<0.5	<0.5	—	—
Cadmium, dissolved	mg/l	—	—	<0.001	<0.001	<0.001	0.002	—	—
Chromium, total dissolved	mg/l	—	—	<0.002	<0.002	0.009	<0.002	—	—
Copper, dissolved	mg/l	—	—	<0.005	<0.005	<0.05	<0.05	—	—
Iron, dissolved	mg/l	—	—	0.1	<0.1	<0.1	0.2	<0.1	<0.1
Lead, dissolved	mg/l	—	—	<0.005	<0.005	<0.005	<0.005	—	—
Magnesium, dissolved	mg/l	—	—	30	34	28	37	—	—
Mercury, dissolved	mg/l	—	—	<0.0005	<0.0005	<0.0005	<0.0005	—	—
Zinc, dissolved	mg/l	—	—	0.06	0.07	0.08	<0.05	—	—
Chloride	mg/l	—	—	<5	<5	<5	<5	<5	<5
Ammonia nitrogen	mg/l	—	—	2.2	2.7	2.8	2.4	3.4	2.5
Chemical oxygen demand	mg/l	—	—	<5	<5	<5	7	5.1	8
Benzene	ug/l	—	—	<5	<1	<1	<1	—	—
1,4-Dichlorobenzene	ug/l	—	—	<5	<1	<1	<1	—	—
Carbon tetrachloride	ug/l	—	—	<5	<1	<1	<1	—	—
1,2-Dichloroethane	ug/l	—	—	<5	<1	<1	<1	—	—
1,1,1-Trichloroethane	ug/l	—	—	<5	<1	<1	<1	—	—
1,1-Dichloroethylene	ug/l	—	—	<5	<1	<1	<1	—	—
Trichloroethylene	ug/l	—	—	<5	<1	<1	1	—	—
Phenols	mg/l	—	—	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total organic halogen	mg/l Cl-	—	—	<0.01	<0.01	<0.01	<0.01	0.03	<0.01
Temperature (field)	deg F	—	—	—	—	—	—	—	—
pH (field)	pH	—	—	7.39	7.41	7.25	7.32	7.02	7.42
Specific conductance (field)	umhos/cm	—	—	870	890	900	690	890	850

Monitoring Well: MW-1 (continued)

Parameter	Unit	Sampling Dates				Statistical Analysis			
		5/14/93	6/9/93	8/5/93	12/10/93	MEAN	2 * SD	Mean Plus 2 * SD	Mean Minus 2 * SD
Arsenic, dissolved	mg/l	0.0147	—	—	—	0.0107	0.0106	0.0213	
Barium, dissolved	mg/l	<0.50	—	—	—	<0.5000	<0.0000	<0.5000	
Cadmium, dissolved	mg/l	<0.0010	—	—	—	<0.0012	<0.0009	<0.0021	
Chromium, total dissolved	mg/l	<0.0020	—	—	—	<0.003	<0.006	<0.010	
Copper, dissolved	mg/l	<0.050	—	—	—	<0.032	<0.049	<0.081	
Iron, dissolved	mg/l	2.1	—	—	0.367	<0.396	<1.390	<1.786	
Lead, dissolved	mg/l	<0.0050	—	—	—	<0.0050	<0.0000	<0.0050	
Magnesium, dissolved	mg/l	36.	—	—	—	33.00000	7.74597	40.74597	
Mercury, dissolved	mg/l	<0.0005	—	—	—	<0.0005	<0.0000	<0.0005	
Zinc, dissolved	mg/l	<0.050	—	—	—	<0.062	<0.026	<0.088	
Chloride	mg/l	<5.0	—	—	<10.	<5.6	<3.5	<9.2	
Ammonia nitrogen	mg/l	2.3	—	—	2.4	2.6	0.8	3.4	
Chemical oxygen demand	mg/l	5.4	—	—	<14.	<6.8	<6.2	<13.0	
Benzene	ug/l	—	—	—	—	<2.0	<4.0	<6.0	
1,4-Dichlorobenzene	ug/l	—	—	—	—	<2.0	<4.0	<6.0	
Carbon tetrachloride	ug/l	—	—	—	—	<2.0	<4.0	<6.0	
1,2-Dichloroethane	ug/l	—	—	—	—	<2.00	<4.00	<6.00	
1,1,1-Trichloroethane	ug/l	—	—	—	—	<2.0	<4.0	<6.0	
1,1-Dichloroethylene	ug/l	—	—	—	—	<2.0	<4.0	<6.0	
Trichloroethylene	ug/l	—	—	—	—	<2.0	<4.0	<6.0	
Phenols	mg/l	—	—	—	<0.1	<0.02	<0.07	<0.09	
Total organic halogen	mg/l Cl-	—	—	—	<0.01	<0.013	<0.015	<0.028	
Temperature (field)	deg F	50.0	—	—	50.6	50.30	0.85	51.15	
pH (field)	pH	7.40	—	—	7.43	7.330	0.278	7.608	7.052
Specific conductance (field)	umhos/cm	930	—	—	833	856.6	147.4	1004.1	

Monitoring Well: MW-2

Parameter	Unit	Sampling Dates							
		10/11/90	1/18/91	4/23/91	7/2/91	10/1/91	1/28/92	4/15/92	10/20/92
Arsenic, dissolved	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	—	<0.005	—
Barium, dissolved	mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	—	<0.5	—
Cadmium, dissolved	mg/l	<0.005	<0.001	<0.001	<0.001	<0.001	—	<0.001	—
Chromium, total dissolved	mg/l	<0.005	<0.001	<0.002	<0.002	<0.002	—	<0.002	—
Copper, dissolved	mg/l	<0.005	<0.005	<0.005	<0.005	<0.05	—	<0.05	—
Iron, dissolved	mg/l	<0.1	<0.1	0.4	<0.1	0.97	—	<0.1	<0.1
Lead, dissolved	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	—	<0.005	—
Magnesium, dissolved	mg/l	72	66	64	67	66	—	71	—
Mercury, dissolved	mg/l	0.0006	0.0027	<0.0005	<0.0005	<0.0005	—	<0.0005	—
Zinc, dissolved	mg/l	0.06	<0.05	0.06	0.07	0.06	—	<0.05	—
Chloride	mg/l	30	35	28	24	26	—	20	20
Ammonia nitrogen	mg/l	0.6	<0.5	<0.5	<0.5	0.6	—	0.3	0.45
Chemical oxygen demand	mg/l	18	15	10	7.8	5	—	<5	16
Benzene	ug/l	<1	<1	<1	<1	<1	—	<1	<1
1,4-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1	—	<1	<1
Carbon tetrachloride	ug/l	<1	<1	<1	<1	<1	—	<1	<1
1,2-Dichloroethane	ug/l	<1	<1	<1	<1	<1	—	<1	<1
1,1,1-Trichloroethane	ug/l	<1	<1	<1	<1	<1	—	<1	<1
1,1-Dichloroethylene	ug/l	<1	<1	<1	<1	<1	—	<1	<1
Trichloroethylene	ug/l	<1	<1	<1	<1	<1	—	<1	<1
Phenols	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	—	<0.005	<0.005
Total organic halogen	mg/l Cl-	0.02	<0.01	<0.01	<0.01	<0.01	—	0.03	<0.01
Temperature (field)	deg F	—	—	—	—	—	—	—	—
pH (field)	pH	6.9	7.5	7.06	6.89	6.9	—	6.83	7.14
Specific conductance (field)	umhos/cm	1900	2000	2060	2170	1970	—	1980	1820
Tetrahydrofuran	ug/l	—	—	1500*	844*	—	—	—	—

* Estimated concentration

Monitoring Well: MW-2 (continued)

Parameter	Unit	Sampling Dates				Statistical Analysis			
		5/14/93	6/9/93	8/5/93	12/10/93	MEAN	2 * SD	Mean Plus 2 * SD	Mean Minus 2 * SD
Arsenic, dissolved	mg/l	<0.0050	—	—	0.009	<0.0055	<0.0028	<0.0083	
Barium, dissolved	mg/l	<0.50	—	—	0.022	<0.4403	<0.3380	<0.7782	
Cadmium, dissolved	mg/l	<0.0010	—	—	<0.001	<0.0015	<0.0028	<0.0043	
Chromium, total dissolved	mg/l	<0.0020	—	—	<0.03	<0.006	<0.020	<0.025	
Copper, dissolved	mg/l	<0.050	—	—	<0.03	<0.025	<0.045	<0.070	
Iron, dissolved	mg/l	1.3	—	—	14.2	<1.930	<9.245	<11.175	
Lead, dissolved	mg/l	<0.0050	—	—	<0.005	<0.0050	<0.0000	<0.0050	
Magnesium, dissolved	mg/l	60.	—	—	67.3	66.66250	7.56604	74.22854	
Mercury, dissolved	mg/l	<0.0005	—	—	<0.0005	<0.0008	<0.0015	<0.0023	
Zinc, dissolved	mg/l	<0.050	—	—	0.045	<0.056	<0.016	<0.072	
Chloride	mg/l	16.	—	—	<10.	<23.2	<15.2	<38.4	
Ammonia nitrogen	mg/l	0.28	—	—	<1.	<0.5	<0.4	<0.9	
Chemical oxygen demand	mg/l	8.1	—	—	<10.	<10.5	<9.5	<20.1	
Benzene	ug/l	—	—	—	<1.	<1.0	<0.0	<1.0	
1,4-Dichlorobenzene	ug/l	—	—	—	<1.	<1.0	<0.0	<1.0	
Carbon tetrachloride	ug/l	—	—	—	<0.3	<0.9	<0.5	<1.4	
1,2-Dichloroethane	ug/l	—	—	—	<0.4	<0.93	<0.42	<1.35	
1,1,1-Trichloroethane	ug/l	—	—	—	<1.	<1.0	<0.0	<1.0	
1,1-Dichloroethylene	ug/l	—	—	—	<1.	<1.0	<0.0	<1.0	
Trichloroethylene	ug/l	—	—	—	<1.	<1.0	<0.0	<1.0	
Phenols	mg/l	—	—	—	<0.1	<0.02	<0.07	<0.08	
Total organic halogen	mg/l Cl-	—	—	—	<0.01	<0.014	<0.015	<0.029	
Temperature (field)	deg F	46.4	—	—	51.6	49.00	7.35	56.35	
pH (field)	pH	7.10	—	—	7.01	7.037	0.408	7.444	6.629
Specific conductance (field)	umhos/cm	1930	—	—	1670	1944.4	284.8	2229.2	
Tetrahydrofuran	ug/l	—	—	—	—	1172.00	927.72	2099.72	

Monitoring Well: MW-3

Parameter	Unit	Sampling Dates							
		10/11/90	1/18/91	4/23/91 *	7/2/91	10/1/91	1/20/92	4/15/92	10/20/92
Arsenic, dissolved	mg/l	—	—	<0.005	<0.005	<0.005	<0.005	—	<0.005
Barium, dissolved	mg/l	—	—	<0.5	<0.5	<0.5	<0.5	—	<0.5
Cadmium, dissolved	mg/l	—	—	<0.001	<0.001	<0.001	<0.001	—	<0.001
Chromium, total dissolved	mg/l	—	—	<0.002	<0.002	0.009	<0.002	—	<0.002
Copper, dissolved	mg/l	—	—	<0.005	<0.005	<0.05	<0.05	—	<0.05
Iron, dissolved	mg/l	—	—	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead, dissolved	mg/l	—	—	<0.005	<0.005	<0.005	<0.005	—	<0.005
Magnesium, dissolved	mg/l	—	—	18	18	20	24	—	13
Mercury, dissolved	mg/l	—	—	<0.0005	<0.0005	<0.0005	0.0006	—	<0.0005
Zinc, dissolved	mg/l	—	—	0.06	0.06	<0.05	<0.05	—	<0.05
Chloride	mg/l	—	—	9	8	9	7	5.9	7
Ammonia nitrogen	mg/l	—	—	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2
Chemical oxygen demand	mg/l	—	—	7.4	<5	<5	<5	<5	11
Benzene	ug/l	—	—	<1	<1	<1	<1	—	—
1,4-Dichlorobenzene	ug/l	—	—	<1	<1	<1	<1	—	—
Carbon tetrachloride	ug/l	—	—	<1	<1	<1	<1	—	—
1,2-Dichloroethane	ug/l	—	—	<1	<1	<1	<1	—	—
1,1,1-Trichloroethane	ug/l	—	—	<1	<1	<1	<1	—	—
1,1-Dichloroethylene	ug/l	—	—	<1	<1	<1	<1	—	—
Trichloroethylene	ug/l	—	—	<1	<1	<1	<1	—	—
Phenols	mg/l	—	—	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total organic halogen	mg/l Cl-	—	—	0.02	<0.01	<0.01	0.02	0.01	<0.01
Temperature (field)	deg F	—	—	—	—	—	—	—	—
pH (field)	pH	—	—	6.45	7.38	6.8	7.23	7.43	6.91
Specific conductance (field)	umhos/cm	—	—	660	640	720	580	730	780

* Actually sampled 4/30/91

Monitoring Well: MW-3 (continued)

Parameter	Unit	Sampling Dates				Statistical Analysis		
		5/14/93	6/9/93	8/5/93	12/10/93	MEAN	2 * SD	Mean Plus 2 * SD
Arsenic, dissolved	mg/l	---	---	---	---	<0.0050	<0.0000	<0.0050
Barium, dissolved	mg/l	---	---	---	---	<0.5000	<0.0000	<0.5000
Cadmium, dissolved	mg/l	---	---	---	---	<0.0010	<0.0000	<0.0010
Chromium, total dissolved	mg/l	---	---	---	---	<0.003	<0.006	<0.010
Copper, dissolved	mg/l	---	---	---	---	<0.032	<0.049	<0.081
Iron, dissolved	mg/l	<0.10	---	---	<0.03	<0.091	<0.049	<0.141
Lead, dissolved	mg/l	---	---	---	---	<0.0050	<0.0000	<0.0050
Magnesium, dissolved	mg/l	---	---	---	---	18.60000	7.94984	26.54984
Mercury, dissolved	mg/l	---	---	---	---	<0.00052	<0.00008	<0.0006
Zinc, dissolved	mg/l	---	---	---	---	<0.054	<0.011	<0.065
Chloride	mg/l	<5.0	---	---	<10.	<7.6	<3.4	<11.0
Ammonia nitrogen	mg/l	<0.20	---	---	<1.	<0.5	<0.5	<1.0
Chemical oxygen demand	mg/l	5.4	---	---	<10.	<6.7	<5.0	<11.7
Benzene	ug/l	---	---	---	---	<1.0	<0.0	<1.0
1,4-Dichlorobenzene	ug/l	---	---	---	---	<1.0	<0.0	<1.0
Carbon tetrachloride	ug/l	---	---	---	---	<1.0	<0.0	<1.0
1,2-Dichloroethane	ug/l	---	---	---	---	<1.00	<0.00	<1.00
1,1,1-Trichloroethane	ug/l	---	---	---	---	<1.0	<0.0	<1.0
1,1-Dichloroethylene	ug/l	---	---	---	---	<1.0	<0.0	<1.0
Trichloroethylene	ug/l	---	---	---	---	<1.0	<0.0	<1.0
Phenols	mg/l	---	---	---	<0.1	<0.02	<0.07	<0.09
Total organic halogen	mg/l Cl-	---	---	---	0.01	<0.013	<0.010	<0.023
Temperature (field)	deg F	48.2	---	---	46.3	47.25	2.69	49.94
pH (field)	pH	6.90	---	---	7.06	7.020	0.652	7.672
Specific conductance (field)	umhos/cm	870	---	---	786	720.8	185.4	906.1

Monitoring Well: MW-4

Parameter	Unit	Sampling Dates							
		10/11/90	1/18/91	4/23/91	7/2/91	10/1/91	1/20/92	4/15/92	10/20/92
Arsenic, dissolved	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	—	—	<0.005
Barium, dissolved	mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	—	—	<0.5
Cadmium, dissolved	mg/l	<0.005	<0.001	<0.001	<0.001	<0.001	—	—	<0.001
Chromium, total dissolved	mg/l	<0.005	<0.001	<0.002	<0.002	<0.002	—	—	0.005
Copper, dissolved	mg/l	<0.005	<0.005	0.01	<0.005	<0.05	—	—	<0.05
Iron, dissolved	mg/l	<0.1	0.12	<0.1	<0.1	<0.1	—	<0.1	<0.1
Lead, dissolved	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	—	—	<0.005
Magnesium, dissolved	mg/l	22	18	18	20	22	—	—	26
Mercury, dissolved	mg/l	<0.0005	0.0011	<0.0005	<0.0005	<0.0005	—	—	<0.0005
Zinc, dissolved	mg/l	0.05	<0.05	0.05	0.07	<0.05	—	—	<0.05
Chloride	mg/l	6	4	<5	<5	<5	—	<5	<5
Ammonia nitrogen	mg/l	<0.5	<0.5	0.52	<0.5	<0.5	—	<0.2	<0.2
Chemical oxygen demand	mg/l	100	20	<5	<5	<5	—	<5	<5
Benzene	ug/l	<1	<1	<2	<1	<1	—	—	<1
1,4-Dichlorobenzene	ug/l	<1	<1	<2	<1	<1	—	—	<1
Carbon tetrachloride	ug/l	<1	<1	<2	<1	<1	—	—	<1
1,2-Dichloroethane	ug/l	<1	<1	<2	<1	<1	—	—	<1
1,1,1-Trichloroethane	ug/l	<1	<1	<2	<1	<1	—	—	<1
1,1-Dichloroethylene	ug/l	<1	<1	<2	<1	<1	—	—	<1
Trichloroethylene	ug/l	<1	<1	<2	<1	<1	—	—	<1
Phenols	mg/l	0.051	<0.005	<0.005	<0.005	<0.005	—	<0.005	<0.005
Total organic halogen	mg/l Cl-	0.02	<0.01	<0.01	<0.01	<0.01	—	<0.01	<0.01
Temperature (field)	deg F	—	—	—	—	—	—	—	—
pH (field)	pH	7.05	7.26	6.85	7.41	6.8	—	7.48	7.37
Specific conductance (field)	umhos/cm	600	620	550	600	620	—	630	620

Monitoring Well: MW-4 (continued)

Parameter	Unit	Sampling Dates				Statistical Analysis			
		5/14/93	6/9/93	8/5/93	12/10/93	MEAN	2 * SD	Mean Plus 2 * SD	Mean Minus 2 * SD
Arsenic, dissolved	mg/l	<0.0050	—	—	—	<0.0050	<0.0000	<0.0050	
Barium, dissolved	mg/l	<0.50	—	—	—	<0.5000	<0.0000	<0.5000	
Cadmium, dissolved	mg/l	<0.0010	—	—	—	<0.0016	<0.0030	<0.0046	
Chromium, total dissolved	mg/l	<0.0020	—	—	—	<0.003	<0.003	<0.006	
Copper, dissolved	mg/l	<0.050	—	—	—	<0.025	<0.047	<0.072	
Iron, dissolved	mg/l	<0.10	—	—	<0.03	<0.094	<0.050	<0.145	
Lead, dissolved	mg/l	<0.0050	—	—	—	<0.0050	<0.0000	<0.0050	
Magnesium, dissolved	mg/l	25.	—	—	—	21.57143	6.30948	27.88091	
Mercury, dissolved	mg/l	<0.0005	—	—	—	<0.00059	<0.00044	<0.0010	
Zinc, dissolved	mg/l	<0.050	—	—	—	<0.053	<0.015	<0.068	
Chloride	mg/l	5.3	—	—	<10.	<5.6	<3.5	<9.1	
Ammonia nitrogen	mg/l	<0.20	—	—	<1.	<0.5	<0.5	<1.0	
Chemical oxygen demand	mg/l	<5.0	—	—	<10.	<17.8	<62.5	<80.2	
Benzene	ug/l	—	—	—	—	<1.2	<0.8	<2.0	
1,4-Dichlorobenzene	ug/l	—	—	—	—	<1.2	<0.8	<2.0	
Carbon tetrachloride	ug/l	—	—	—	—	<1.2	<0.8	<2.0	
1,2-Dichloroethane	ug/l	—	—	—	—	<1.17	<0.82	<1.98	
1,1,1-Trichloroethane	ug/l	—	—	—	—	<1.2	<0.8	<2.0	
1,1-Dichloroethylene	ug/l	—	—	—	—	<1.2	<0.8	<2.0	
Trichloroethylene	ug/l	—	—	—	—	<1.2	<0.8	<2.0	
Phenols	mg/l	—	—	—	<0.1	<0.02	<0.07	<0.09	
Total organic halogen	mg/l Cl-	—	—	—	<0.01	<0.011	<0.007	<0.018	
Temperature (field)	deg F	46.4	—	—	52.8	49.60	9.05	58.65	
pH (field)	pH	7.35	—	—	7.30	7.208	0.496	7.704	6.712
Specific conductance (field)	umhos/cm	680	—	—	598	613.1	68.8	681.9	

Monitoring Well: MW-5

Parameter	Unit	Sampling Dates							
		10/11/90	1/18/91	4/23/91	7/2/91	10/1/91 *	1/20/92	4/15/92	10/29/92 **
Arsenic, dissolved	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	—	0.016	<0.005
Barium, dissolved	mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	—	<0.5	<0.5
Cadmium, dissolved	mg/l	<0.005	<0.001	<0.001	<0.001	<0.001	—	<0.001	<0.001
Chromium, total dissolved	mg/l	<0.005	<0.001	0.005	<0.002	<0.002	—	<0.002	<0.002
Copper, dissolved	mg/l	<0.005	<0.005	<0.005	<0.005	<0.05	—	<0.05	<0.05
Iron, dissolved	mg/l	0.32	<0.1	<0.1	<0.1	<0.1	—	<0.1	<0.1
Lead, dissolved	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	—	<0.005	<0.005
Magnesium, dissolved	mg/l	38	36	21	29	25	—	22	34
Mercury, dissolved	mg/l	<0.0005	0.0038	<0.0005	<0.0005	<0.0005	—	<0.0005	<0.0005
Zinc, dissolved	mg/l	0.05	0.05	0.05	0.07	<0.05	—	<0.05	<0.05
Chloride	mg/l	190	200	90	110	130	—	48	89
Ammonia nitrogen	mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	—	<0.2	<0.2
Chemical oxygen demand	mg/l	32	32	5.1	7.8	<5	—	<5	8
Benzene	ug/l	<1	<1	<2	<1	<1	—	<1	<1
1,4-Dichlorobenzene	ug/l	<1	<1	<2	<1	<1	—	<1	<1
Carbon tetrachloride	ug/l	<1	<1	<2	<1	<1	—	<1	<1
1,2-Dichloroethane	ug/l	<1	<1	<2	<1	<1	—	<1	<1
1,1,1-Trichloroethane	ug/l	<1	<1	<2	<1	<1	—	<1	<1
1,1-Dichloroethylene	ug/l	<1	<1	<2	<1	<1	—	<1	<1
Trichloroethylene	ug/l	<1	<1	<2	<1	<1	—	<1	<1
Phenols	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	—	<0.005	<0.005
Total organic halogen	mg/l Cl-	0.05	0.04	0.032	<0.01	0.03	—	0.02	0.04
Temperature (field)	deg F	—	—	—	—	—	—	—	—
pH (field)	pH	6.95	6.97	7.18	7.28	6.84	—	7.4	7.39
Specific conductance (field)	umhos/cm	940	1210	650	880	970	—	640	860

* Actually collected on 10/2/91

** Actually collected on 10/19/92

Monitoring Well: MW-5 (continued)

Parameter	Unit	Sampling Dates				Statistical Analysis			
		5/14/93	6/9/93	8/5/93	12/10/93	MEAN	2 * SD	Mean Plus 2 * SD	Mean Minus 2 * SD
Arsenic, dissolved	mg/l	<0.0050	—	—	<0.005	<0.0062	<0.0073	<0.0136	
Barium, dissolved	mg/l	<0.50	—	—	0.289	<0.4766	<0.1407	<0.6172	
Cadmium, dissolved	mg/l	<0.0010	—	—	<0.001	<0.0014	<0.0027	<0.0041	
Chromium, total dissolved	mg/l	<0.0020	—	—	<0.03	<0.006	<0.018	<0.024	
Copper, dissolved	mg/l	<0.050	—	—	<0.03	<0.028	<0.045	<0.073	
Iron, dissolved	mg/l	<0.10	—	—	0.032	<0.117	<0.159	<0.276	
Lead, dissolved	mg/l	<0.0050	—	—	<0.005	<0.0050	<0.0000	<0.0050	
Magnesium, dissolved	mg/l	27.	—	—	46.4	30.93333	16.69012	47.62345	
Mercury, dissolved	mg/l	<0.0005	—	—	<0.0005	<0.00087	<0.0022	<0.0031	
Zinc, dissolved	mg/l	<0.050	—	—	<0.03	<0.050	<0.020	<0.070	
Chloride	mg/l	23.	—	—	<10.	<98.9	<134.2	<233.1	
Ammonia nitrogen	mg/l	<0.20	—	—	<1.	<0.5	<0.5	<1.0	
Chemical oxygen demand	mg/l	5.4	—	—	<10.	<12.3	<22.7	<34.9	
Benzene	ug/l	—	—	—	<1.	<1.1	<0.7	<1.8	
1,4-Dichlorobenzene	ug/l	—	—	—	<1.	<1.1	<0.7	<1.8	
Carbon tetrachloride	ug/l	—	—	—	<0.3	<1.0	<0.9	<2.0	
1,2-Dichloroethane	ug/l	—	—	—	<0.4	<1.05	<0.88	<1.93	
1,1,1-Trichloroethane	ug/l	—	—	—	<1.	<1.1	<0.7	<1.8	
1,1-Dichloroethylene	ug/l	—	—	—	<1.	<1.1	<0.7	<1.8	
Trichloroethylene	ug/l	—	—	—	<1.	<1.1	<0.7	<1.8	
Phenols	mg/l	—	—	—	<0.1	<0.02	<0.07	<0.08	
Total organic halogen	mg/l Cl-	—	—	—	0.06	<0.035	<0.032	<0.067	
Temperature (field)	deg F	46.4	—	—	52.7	49.55	8.91	58.46	
pH (field)	pH	7.20	—	—	7.11	7.147	0.394	7.541	6.753
Specific conductance (field)	umhos/cm	750	—	—	988	876.4	360.5	1237.0	

Monitoring Well: MW-6

Parameter	Unit	Sampling Dates							
		10/11/90	1/18/91	4/23/91	7/2/91	10/1/91	1/20/92	4/15/92	10/20/92 *
Arsenic, dissolved	mg/l	0.005	<0.005	<0.005	0.005	<0.005	—	0.009	<0.005
Barium, dissolved	mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	—	<0.5	<0.5
Cadmium, dissolved	mg/l	<0.005	<0.001	<0.001	<0.001	<0.001	—	<0.001	<0.001
Chromium, total dissolved	mg/l	<0.005	<0.001	0.003	<0.002	<0.002	—	<0.002	0.002
Copper, dissolved	mg/l	<0.005	<0.005	<0.005	<0.005	<0.05	—	<0.05	<0.05
Iron, dissolved	mg/l	<0.1	4.3	<0.1	<0.1	1.3	—	1.5	1.4
Lead, dissolved	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	—	<0.005	<0.005
Magnesium, dissolved	mg/l	59	48	58	67	59	—	83	84
Mercury, dissolved	mg/l	<0.0005	0.002	<0.0005	0.0014	<0.0005	—	<0.0005	<0.0005
Zinc, dissolved	mg/l	0.09	<0.05	<0.07	0.08	0.06	—	<0.05	<0.05
Chloride	mg/l	38	50	27	27	30	—	19	23
Ammonia nitrogen	mg/l	1.2	0.6	0.51	<0.5	0.8	—	1.4	0.5
Chemical oxygen demand	mg/l	21	45	10	13	14	—	13	14
Benzene	ug/l	1.3	1.6	<1	<1	<1	—	<1	<1
1,4-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1	—	<1	<1
Carbon tetrachloride	ug/l	<1	<1	<1	<1	<1	—	<1	<1
1,2-Dichloroethane	ug/l	<1	<1	<1	<1	<1	—	<1	<1
1,1,1-Trichloroethane	ug/l	<1	<1	<1	<1	<1	—	<1	<1
1,1-Dichloroethylene	ug/l	<1	<1	<1	<1	<1	—	<1	<1
Trichloroethylene	ug/l	<1	<1	<1	<1	<1	—	<1	<1
Phenols	mg/l	0.33	<0.005	<0.005	<0.005	<0.005	—	<0.005	<0.005
Total organic halogen	mg/l Cl-	0.04	0.03	0.032	<0.01	0.03	—	0.02	0.02
Temperature (field)	deg F	—	—	—	—	—	—	—	—
pH (field)	pH	6.75	7.25	7.18	6.8	6.73	—	7.88	6.98
Specific conductance (field)	umhos/cm	1400	1580	1680	1910	1850	—	2080	1910
CIS-1,2-Dichloroethylene	ug/l	—	—	2.2	3.2	—	—	—	—

* Actually collected on 10/19/92

Monitoring Well: MW-6 (continued)

Parameter	Unit	5/14/93	6/9/93	8/5/93	12/10/93	Statistical Analysis MEAN	2 * SD	Mean Plus 2 * SD	Mean Minus 2 * SD
Arsenic, dissolved	mg/l	<0.0050	—	—	<0.005	<0.0054	<0.0027	<0.0081	
Barium, dissolved	mg/l	<0.50	—	—	0.024	<0.4471	<0.3173	<0.7644	
Cadmium, dissolved	mg/l	<0.0010	—	—	<0.001	<0.0014	<0.0027	<0.0041	
Chromium, total dissolved	mg/l	<0.0020	—	—	<0.03	<0.005	<0.019	<0.024	
Copper, dissolved	mg/l	<0.050	—	—	<0.03	<0.028	<0.045	<0.073	
Iron, dissolved	mg/l	12.	—	—	10.1	<3.433	<9.065	<12.498	
Lead, dissolved	mg/l	<0.0050	—	—	<0.005	<0.0050	<0.0000	<0.0050	
Magnesium, dissolved	mg/l	89.	—	—	88.1	70.56667	31.06220	101.62886	
Mercury, dissolved	mg/l	<0.0005	—	—	<0.0005	<0.00077	<0.0011	<0.0019	
Zinc, dissolved	mg/l	<0.050	—	—	<0.03	<0.059	<0.037	<0.096	
Chloride	mg/l	18.	—	—	<10.	<26.9	<23.5	<50.4	
Ammonia nitrogen	mg/l	0.30	—	—	<1.	<0.8	<0.7	<1.5	
Chemical oxygen demand	mg/l	8.1	—	—	<10.	<16.5	<22.6	<39.1	
Benzene	ug/l	—	—	—	<1.	<1.1	<0.4	<1.6	
1,4-Dichlorobenzene	ug/l	—	—	—	<1.	<1.0	<0.0	<1.0	
Carbon tetrachloride	ug/l	—	—	—	<0.3	<0.9	<0.5	<1.4	
1,2-Dichloroethane	ug/l	—	—	—	<0.4	<0.93	<0.42	<1.35	
1,1,1-Trichloroethane	ug/l	—	—	—	<1.	<1.0	<0.0	<1.0	
1,1-Dichloroethylene	ug/l	—	—	—	<1.	<1.0	<0.0	<1.0	
Trichloroethylene	ug/l	—	—	—	<1.	<1.0	<0.0	<1.0	
Phenols	mg/l	—	—	—	<0.1	<0.06	<0.23	<0.29	
Total organic halogen	mg/l Cl-	—	—	—	0.03	<0.027	<0.019	<0.045	
Temperature (field)	deg F	48.2	—	—	53.1	50.65	6.93	57.58	
pH (field)	pH	7.00	—	—	6.97	7.060	0.712	7.772	6.348
Specific conductance (field)	umhos/cm	2000	—	—	1728	1793.1	431.7	2224.8	
CIS-1,2-Dichloroethylene	ug/l	—	—	—	—	2.70	1.41	4.11	

Monitoring Well: MW-7

Parameter	Unit	Sampling Dates							
		10/11/90	1/18/91	4/23/91	7/2/91	10/1/91	1/20/92	4/15/92	10/20/92 *
Arsenic, dissolved	mg/l	—	—	<0.005	0.008	<0.005	<0.005	—	—
Barium, dissolved	mg/l	—	—	<0.5	<0.5	<0.5	<0.5	—	—
Cadmium, dissolved	mg/l	—	—	<0.001	<0.001	<0.001	<0.001	—	—
Chromium, total dissolved	mg/l	—	—	0.004	<0.002	<0.002	<0.002	—	—
Copper, dissolved	mg/l	—	—	<0.005	<0.005	<0.05	<0.05	—	—
Iron, dissolved	mg/l	—	—	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead, dissolved	mg/l	—	—	<0.005	<0.005	<0.005	<0.005	—	—
Magnesium, dissolved	mg/l	—	—	38	40	36	46	—	—
Mercury, dissolved	mg/l	—	—	<0.0005	<0.0005	<0.0005	<0.0005	—	—
Zinc, dissolved	mg/l	—	—	0.06	0.05	<0.05	<0.05	—	—
Chloride	mg/l	—	—	8	5	6	<5	<5	6
Ammonia nitrogen	mg/l	—	—	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2
Chemical oxygen demand	mg/l	—	—	5.1	<5	<5	<5	5.1	5
Benzene	ug/l	—	—	<1	<1	<1	<1	—	—
1,4-Dichlorobenzene	ug/l	—	—	<1	<1	<1	<1	—	—
Carbon tetrachloride	ug/l	—	—	<1	<1	<1	<1	—	—
1,2-Dichloroethane	ug/l	—	—	<1	<1	<1	<1	—	—
1,1,1-Trichloroethane	ug/l	—	—	<1	<1	<1	<1	—	—
1,1-Dichloroethylene	ug/l	—	—	<1	<1	<1	<1	—	—
Trichloroethylene	ug/l	—	—	<1	<1	<1	<1	—	—
Phenols	mg/l	—	—	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total organic halogen	mg/l Cl-	—	—	<0.01	<0.01	<0.01	0.01	<0.01	<0.01
Temperature (field)	deg F	—	—	—	—	—	—	—	—
pH (field)	pH	—	—	7.22	7.18	6.85	7.09	8.48	7.29
Specific conductance (field)	umhos/cm	—	—	1290	1310	1320	1090	1420	1380

* Actually sampled on 10/19/92

Monitoring Well: MW-7 (continued)

Parameter	Unit	Sampling Dates				Statistical Analysis			
		5/14/93	6/9/93	8/5/93	12/10/93	MEAN	2 * SD	Mean Plus 2 * SD	Mean Minus 2 * SD
Arsenic, dissolved	mg/l	—	—	—	—	<0.0058	<0.0030	<0.0087	
Barium, dissolved	mg/l	—	—	—	—	<0.5000	<0.0000	<0.5000	
Cadmium, dissolved	mg/l	—	—	—	—	<0.0010	<0.0000	<0.0010	
Chromium, total dissolved	mg/l	—	—	—	—	<0.003	<0.002	<0.005	
Copper, dissolved	mg/l	—	—	—	—	<0.028	<0.052	<0.079	
Iron, dissolved	mg/l	<0.10	—	—	<0.03	<0.091	<0.049	<0.141	
Lead, dissolved	mg/l	—	—	—	—	<0.0050	<0.0000	<0.0050	
Magnesium, dissolved	mg/l	—	—	—	—	40.00000	8.64099	48.64099	
Mercury, dissolved	mg/l	—	—	—	—	<0.0005	<0.0000	<0.0005	
Zinc, dissolved	mg/l	—	—	—	—	<0.053	<0.010	<0.062	
Chloride	mg/l	<5.0	—	—	<10.	<6.3	<3.7	<9.9	
Ammonia nitrogen	mg/l	<0.20	—	—	<1.	<0.5	<0.5	<1.0	
Chemical oxygen demand	mg/l	<5.0	—	—	<10.	<5.7	<3.5	<9.2	
Benzene	ug/l	—	—	—	—	<1.0	<0.0	<1.0	
1,4-Dichlorobenzene	ug/l	—	—	—	—	<1.0	<0.0	<1.0	
Carbon tetrachloride	ug/l	—	—	—	—	<1.0	<0.0	<1.0	
1,2-Dichloroethane	ug/l	—	—	—	—	<1.00	<0.00	<1.00	
1,1,1-Trichloroethane	ug/l	—	—	—	—	<1.0	<0.0	<1.0	
1,1-Dichloroethylene	ug/l	—	—	—	—	<1.0	<0.0	<1.0	
Trichloroethylene	ug/l	—	—	—	—	<1.0	<0.0	<1.0	
Phenols	mg/l	—	—	—	<0.1	<0.02	<0.07	<0.09	
Total organic halogen	mg/l Cl-	—	—	—	<0.01	<0.010	<0.000	<0.010	
Temperature (field)	deg F	48.2	—	—	54.3	51.25	8.63	59.88	
pH (field)	pH	7.30	—	—	7.14	7.319	0.981	8.299	6.338
Specific conductance (field)	umhos/cm	1660	—	—	1593	1382.9	359.4	1742.2	

Monitoring Well: MW-9

Parameter	Unit	Sampling Dates 6/9/93 ***	8/5/93	12/10/93	Statistical Analysis MEAN	2 * SD	Mean Plus 2 * SD	Mean Minus 2 * SD
Arsenic, dissolved	mg/l	—	<0.0050	<0.005	<0.0050	<0.0000	<0.0050	
Barium, dissolved	mg/l	—	<0.50	0.181	<0.3405	<0.4511	<0.7916	
Cadmium, dissolved	mg/l	—	<0.0010	<0.001	<0.0010	<0.0000	<0.0010	
Chromium, total dissolved	mg/l	—	<0.0020	<0.03	<0.016	<0.040	<0.056	
Copper, dissolved	mg/l	—	<0.050	<0.03	<0.040	<0.028	<0.068	
Iron, dissolved	mg/l	—	<0.10	<0.03	<0.065	<0.099	<0.164	
Lead, dissolved	mg/l	—	<0.0050	<0.005	<0.0050	<0.0000	<0.0050	
Magnesium, dissolved	mg/l	—	30	30.9	30.45000	1.27279	31.72279	
Mercury, dissolved	mg/l	—	<0.0005	<0.0005	<0.0005	<0.0000	<0.0005	
Zinc, dissolved	mg/l	—	<0.050	0.039	<0.045	<0.016	<0.060	
Chloride	mg/l	—	<5.0	<10.	<7.5	<7.1	<14.6	
Ammonia nitrogen	mg/l	—	0.25	<1.	<0.6	<1.1	<1.7	
Chemical oxygen demand	mg/l	—	<5.0	<10.	<7.5	<7.1	<14.6	
Benzene	ug/l	—	<1.0	<1.	<1.0	<0.0	<1.0	
1,4-Dichlorobenzene	ug/l	—	<1.0	<1.	<1.0	<0.0	<1.0	
Carbon tetrachloride	ug/l	—	<1.0	<0.3	<0.7	<1.0	<1.6	
1,2-Dichloroethane	ug/l	—	<1.0	<0.4	<0.70	<0.85	<1.55	
1,1,1-Trichloroethane	ug/l	—	<1.0	<1.	<1.0	<0.0	<1.0	
1,1-Dichloroethylene	ug/l	—	<1.0	<1.	<1.0	<0.0	<1.0	
Trichloroethylene	ug/l	—	<1.0	<1.	<1.0	<0.0	<1.0	
Phenols	mg/l	—	<0.005	—				
Total organic halogen	mg/l Cl-	—	<0.01	—				
Temperature (field)	deg F	—	—	45.2				
pH (field)	pH	—	—	7.33				
Specific conductance (field)	umhos/cm	—	—	679				

*** Dry on 6/9/93

Monitoring Well: MW-10

Parameter	Unit	Sampling Dates			Statistical Analysis			
		6/9/93	8/5/93	12/10/93	MEAN	2 * SD	Mean Plus 2 * SD	Mean Minus 2 * SD
Arsenic, dissolved	mg/l	<0.0050	<0.0050	<0.005	<0.0050	<0.0000	<0.0050	
Barium, dissolved	mg/l	<0.50	<0.50	0.187	<0.3957	<0.3614	<0.7571	
Cadmium, dissolved	mg/l	<0.0010	<0.0010	<0.001	<0.0010	<0.0000	<0.0010	
Chromium, total dissolved	mg/l	<0.0020	<0.0020	<0.03	<0.011	<0.032	<0.044	
Copper, dissolved	mg/l	<0.050	<0.050	<0.03	<0.043	<0.023	<0.066	
Iron, dissolved	mg/l	<0.10	0.58	0.339	<0.340	<0.480	<0.820	
Lead, dissolved	mg/l	<0.0050	<0.0050	<0.005	<0.0050	<0.0000	<0.0050	
Magnesium, dissolved	mg/l	19	26	23.5	22.83333	7.09460	29.92793	
Mercury, dissolved	mg/l	<0.0005	<0.0005	<0.0005	<0.0005	<0.0000	<0.0005	
Zinc, dissolved	mg/l	<0.050	<0.050	<0.03	<0.043	<0.023	<0.066	
Chloride	mg/l	15.	<5.0	<10.	<10.0	<10.0	<20.0	
Ammonia nitrogen	mg/l	1.6	1.5	1.9	1.7	0.4	2.1	
Chemical oxygen demand	mg/l	6.6	<5.0	<10.	<7.2	<5.1	<12.3	
Benzene	ug/l	<1.0	<1.0	1.5	<1.2	<0.6	<1.7	
1,4-Dichlorobenzene	ug/l	<1.0	<1.0	<1.	<1.0	<0.0	<1.0	
Carbon tetrachloride	ug/l	<1.0	<1.0	<0.3	<0.8	<0.8	<1.6	
1,2-Dichloroethane	ug/l	<1.0	<1.0	<0.4	<0.80	<0.69	<1.49	
1,1,1-Trichloroethane	ug/l	<1.0	<1.0	<1.	<1.0	<0.0	<1.0	
1,1-Dichloroethylene	ug/l	<1.0	<1.0	<1.	<1.0	<0.0	<1.0	
Trichloroethylene	ug/l	<1.0	<1.0	<1.	<1.0	<0.0	<1.0	
Phenols	mg/l	<0.005	<0.005	—	<0.01	<0.00	<0.01	
Total organic halogen	mg/l Cl-	<0.01	0.02	—	<0.015	<0.014	<0.029	
Temperature (field)	deg F	46.4	—	44.7	45.55	2.40	47.95	
pH (field)	pH	6.80	—	7.54	7.170	1.047	8.217	6.123
Specific conductance (field)	umhos/cm	570	—	499	534.5	100.4	634.9	

APPENDIX 2

EXCEPTION REP0RTS

Exception Report

Monitoring Well: MW-1

April 23, 1991

Parameter	Unit	Concent.	Background Well, MW-10 MEAN	2 * SD	Mean+2SD	Mean-2SD
Arsenic, dissolved	mg/l	0.008	<0.0050	<0.0000	<0.0050	
Magnesium, dissolved	mg/l	30	22.83333	7.09460	29.92793	
Ammonia nitrogen	mg/l	2.2	1.7	0.4	2.1	
Benzene	ug/l	<5	<1.2	<0.6	<1.7	
1,4-Dichlorobenzene	ug/l	<5	<1.0	<0.0	<1.0	
Carbon tetrachloride	ug/l	<5	<0.8	<0.8	<1.6	
1,2-Dichloroethane	ug/l	<5	<0.80	<0.69	<1.49	
1,1,1-Trichloroethane	ug/l	<5	<1.0	<0.0	<1.0	
1,1-Dichloroethylene	ug/l	<5	<1.0	<0.0	<1.0	
Trichloroethylene	ug/l	<5	<1.0	<0.0	<1.0	
Specific conductance (field)	umhos/cm	870	534.5	100.4	634.9	

July 2, 1991

Parameter	Unit	Concent.	Background Well, MW-10 MEAN	2 * SD	Mean+2SD	Mean-2SD
Arsenic, dissolved	mg/l	0.006	<0.0050	<0.0000	<0.0050	
Magnesium, dissolved	mg/l	34	22.83333	7.09460	29.92793	
Zinc, dissolved	mg/l	0.07	<0.043	<0.023	<0.066	
Ammonia nitrogen	mg/l	2.7	1.7	0.4	2.1	
Specific conductance (field)	umhos/cm	890	534.5	100.4	634.9	

October 1, 1991

Parameter	Unit	Concent.	Background Well, MW-10 MEAN	2 * SD	Mean+2SD	Mean-2SD
Arsenic, dissolved	mg/l	0.018	<0.0050	<0.0000	<0.0050	
Zinc, dissolved	mg/l	0.08	<0.043	<0.023	<0.066	
Ammonia nitrogen	mg/l	2.8	1.7	0.4	2.1	
Specific conductance (field)	umhos/cm	900	534.5	100.4	634.9	

January 20, 1992

Parameter	Unit	Concent.	Background Well, MW-10 MEAN	2 * SD	Mean+2SD	Mean-2SD
Arsenic, dissolved	mg/l	0.007	<0.0050	<0.0000	<0.0050	
Cadmium, dissolved	mg/l	0.002	<0.0010	<0.0000	<0.0010	
Magnesium, dissolved	mg/l	37	22.83333	7.09460	29.92793	
Ammonia nitrogen	mg/l	2.4	1.7	0.4	2.1	
Specific conductance (field)	umhos/cm	690	534.5	100.4	634.9	

April 15, 1992

Parameter	Unit	Concent.	Background Well, MW-10 MEAN	2 * SD	Mean+2SD	Mean-2SD
Ammonia nitrogen	mg/l	3.4	1.7	0.4	2.1	
Total organic halogen	mg/l Cl-	0.03	<0.015	<0.014	<0.029	
Specific conductance (field)	umhos/cm	890	534.5	100.4	634.9	

October 20, 1992

Parameter	Unit	Concent.	Background Well, MW-10 MEAN	2 * SD	Mean+2SD	Mean-2SD
Ammonia nitrogen	mg/l	2.5	1.7	0.4	2.1	
Specific conductance (field)	umhos/cm	850	534.5	100.4	634.9	

May 14, 1993

Parameter	Unit	Concent.	Background Well, MW-10 MEAN	2 * SD	Mean+2SD	Mean-2SD
Arsenic, dissolved	mg/l	0.0147	<0.0050	<0.0000	<0.0050	
Iron, dissolved	mg/l	2.1	<0.340	<0.480	<0.820	
Magnesium, dissolved	mg/l	36.	22.83333	7.09460	29.92793	
Ammonia nitrogen	mg/l	2.3	1.7	0.4	2.1	
Temperature (field)	deg F	50.0	45.55	2.40	47.95	
Specific conductance (field)	umhos/cm	930	534.5	100.4	634.9	

December 10, 1993

Parameter	Unit	Concent.	Background Well, MW-10 MEAN	2 * SD	Mean+2SD	Mean-2SD
Ammonia nitrogen	mg/l	2.4	1.7	0.4	2.1	
Chemical oxygen demand	mg/l	<14.	<7.2	<5.1	<12.3	
Phenols	mg/l	<0.1	<0.01	<0.00	<0.01	
Temperature (field)	deg F	50.6	45.55	2.40	47.95	
Specific conductance (field)	umhos/cm	833	534.5	100.4	634.9	

Exception Report

Monitoring Well: MW-2

October 11, 1990

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Cadmium, dissolved	mg/l	<0.005	<0.0010	<0.0000	<0.0010	
Magnesium, dissolved	mg/l	72	30.45000	1.27279	31.72279	
Mercury, dissolved	mg/l	0.0006	<0.00	<0.00	<0.00	
Chloride	mg/l	30	<7.5	<7.1	<14.6	
Chemical oxygen demand	mg/l	18	<7.5	<7.1	<14.6	

January 18, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Magnesium, dissolved	mg/l	66	30.45000	1.27279	31.72279	
Mercury, dissolved	mg/l	0.0027	<0.00	<0.00	<0.00	
Chloride	mg/l	35	<7.5	<7.1	<14.6	
Chemical oxygen demand	mg/l	15	<7.5	<7.1	<14.6	

April 23, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Iron, dissolved	mg/l	0.4	<0.065	<0.099	<0.164	
Magnesium, dissolved	mg/l	64	30.45000	1.27279	31.72279	
Chloride	mg/l	28	<7.5	<7.1	<14.6	

July 2, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Magnesium, dissolved	mg/l	67	30.45000	1.27279	31.72279	
Zinc, dissolved	mg/l	0.07	<0.045	<0.016	<0.060	
Chloride	mg/l	24	<7.5	<7.1	<14.6	

October 1, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Iron, dissolved	mg/l	0.97	<0.065	<0.099	<0.164	
Magnesium, dissolved	mg/l	66	30.45000	1.27279	31.72279	
Chloride	mg/l	26	<7.5	<7.1	<14.6	

April 15, 1992

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Magnesium, dissolved	mg/l	71	30.45000	1.27279	31.72279	
Chloride	mg/l	20	<7.5	<7.1	<14.6	

October 20, 1992

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Chloride	mg/l	20	<7.5	<7.1	<14.6	
Chemical oxygen demand	mg/l	16	<7.5	<7.1	<14.6	

May 14, 1993

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Iron, dissolved	mg/l	1.3	<0.065	<0.099	<0.164	
Magnesium, dissolved	mg/l	60.	30.45000	1.27279	31.72279	
Chloride	mg/l	16.	<7.5	<7.1	<14.6	

December 10, 1993

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Arsenic, dissolved	mg/l	0.009	<0.0050	<0.0000	<0.0050	
Iron, dissolved	mg/l	14.2	<0.065	<0.099	<0.164	
Magnesium, dissolved	mg/l	67.3	30.45000	1.27279	31.72279	

Monitoring Well: MW-3

January 20, 1992

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Mercury, dissolved	mg/l	0.0006	<0.00	<0.00	<0.00	

Monitoring Well: MW-4

October 11, 1990

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Cadmium, dissolved	mg/l	<0.005	<0.0010	<0.0000	<0.0010	
Chemical oxygen demand	mg/l	100	<7.5	<7.1	<14.6	

January 18, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Mercury, dissolved	mg/l	0.0011	<0.00	<0.00	<0.00	
Chemical oxygen demand	mg/l	20	<7.5	<7.1	<14.6	

April 23, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Benzene	ug/l	<2	<1.0	<0.0	<1.0	
1,4-Dichlorobenzene	ug/l	<2	<1.0	<0.0	<1.0	
Carbon tetrachloride	ug/l	<2	<0.7	<1.0	<1.6	
1,2-Dichloroethane	ug/l	<2	<0.70	<0.85	<1.55	
1,1,1-Trichloroethane	ug/l	<2	<1.0	<0.0	<1.0	
1,1-Dichloroethylene	ug/l	<2	<1.0	<0.0	<1.0	
Trichloroethylene	ug/l	<2	<1.0	<0.0	<1.0	

July 2, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Zinc, dissolved	mg/l	0.07	<0.045	<0.016	<0.060	

Monitoring Well: MW-5

October 11, 1990

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Cadmium, dissolved	mg/l	<0.005	<0.0010	<0.0000	<0.0010	
Iron, dissolved	mg/l	0.32	<0.065	<0.099	<0.164	
Magnesium, dissolved	mg/l	38	30.45000	1.27279	31.72279	
Chloride	mg/l	190	<7.5	<7.1	<14.6	
Chemical oxygen demand	mg/l	32	<7.5	<7.1	<14.6	

January 18, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Magnesium, dissolved	mg/l	36	30.45000	1.27279	31.72279	
Mercury, dissolved	mg/l	0.0038	<0.00	<0.00	<0.00	
Chloride	mg/l	200	<7.5	<7.1	<14.6	
Chemical oxygen demand	mg/l	32	<7.5	<7.1	<14.6	

April 23, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Chloride	mg/l	90	<7.5	<7.1	<14.6	
Benzene	ug/l	<2	<1.0	<0.0	<1.0	
1,4-Dichlorobenzene	ug/l	<2	<1.0	<0.0	<1.0	
Carbon tetrachloride	ug/l	<2	<0.7	<1.0	<1.6	
1,2-Dichloroethane	ug/l	<2	<0.70	<0.85	<1.55	
1,1,1-Trichloroethane	ug/l	<2	<1.0	<0.0	<1.0	
1,1-Dichloroethylene	ug/l	<2	<1.0	<0.0	<1.0	
Trichloroethylene	ug/l	<2	<1.0	<0.0	<1.0	

July 2, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Zinc, dissolved	mg/l	0.07	<0.045	<0.016	<0.060	
Chloride	mg/l	110	<7.5	<7.1	<14.6	

October 1, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Chloride	mg/l	130	<7.5	<7.1	<14.6	

April 15, 1992

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Arsenic, dissolved	mg/l	0.016	<0.0050	<0.0000	<0.0050	
Chloride	mg/l	48	<7.5	<7.1	<14.6	

October 20, 1992

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Magnesium, dissolved	mg/l	34	30.45000	1.27279	31.72279	
Chloride	mg/l	89	<7.5	<7.1	<14.6	

May 14, 1993

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Chloride	mg/l	23.	<7.5	<7.1	<14.6	

December 10, 1993

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Magnesium, dissolved	mg/l	46.4	30.45000	1.27279	31.72279	

Monitoring Well: MW-6

October 11, 1990

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Cadmium, dissolved	mg/l	<0.005	<0.0010	<0.0000	<0.0010	
Magnesium, dissolved	mg/l	59	30.45000	1.27279	31.72279	
Zinc, dissolved	mg/l	0.09	<0.045	<0.016	<0.060	
Chloride	mg/l	38	<7.5	<7.1	<14.6	
Chemical oxygen demand	mg/l	21	<7.5	<7.1	<14.6	
Benzene	ug/l	1.3	<1.0	<0.0	<1.0	

January 18, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Iron, dissolved	mg/l	4.3	<0.065	<0.099	<0.164	
Magnesium, dissolved	mg/l	48	30.45000	1.27279	31.72279	
Mercury, dissolved	mg/l	0.002	<0.00	<0.00	<0.00	
Chloride	mg/l	50	<7.5	<7.1	<14.6	
Chemical oxygen demand	mg/l	45	<7.5	<7.1	<14.6	
Benzene	ug/l	1.6	<1.0	<0.0	<1.0	

April 23, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Magnesium, dissolved	mg/l	58	30.45000	1.27279	31.72279	
Zinc, dissolved	mg/l	<0.07	<0.045	<0.016	<0.060	
Chloride	mg/l	27	<7.5	<7.1	<14.6	

July 2, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Magnesium, dissolved	mg/l	67	30.45000	1.27279	31.72279	
Mercury, dissolved	mg/l	0.0014	<0.00	<0.00	<0.00	
Zinc, dissolved	mg/l	0.08	<0.045	<0.016	<0.060	
Chloride	mg/l	27	<7.5	<7.1	<14.6	

October 1, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Iron, dissolved	mg/l	1.3	<0.065	<0.099	<0.164	
Magnesium, dissolved	mg/l	59	30.45000	1.27279	31.72279	
Chloride	mg/l	30	<7.5	<7.1	<14.6	

April 15, 1992

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Arsenic, dissolved	mg/l	0.009	<0.0050	<0.0000	<0.0050	
Iron, dissolved	mg/l	1.5	<0.065	<0.099	<0.164	
Magnesium, dissolved	mg/l	83	30.45000	1.27279	31.72279	
Chloride	mg/l	19	<7.5	<7.1	<14.6	

October 20, 1992

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Iron, dissolved	mg/l	1.4	<0.065	<0.099	<0.164	
Magnesium, dissolved	mg/l	84	30.45000	1.27279	31.72279	
Chloride	mg/l	23	<7.5	<7.1	<14.6	

May 14, 1993

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Iron, dissolved	mg/l	12.	<0.065	<0.099	<0.164	
Magnesium, dissolved	mg/l	89.	30.45000	1.27279	31.72279	
Chloride	mg/l	18.	<7.5	<7.1	<14.6	

December 10, 1993

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Iron, dissolved	mg/l	10.1	<0.065	<0.099	<0.164	
Magnesium, dissolved	mg/l	88.1	30.45000	1.27279	31.72279	

Monitoring Well: MW-7

April 23, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Magnesium, dissolved	mg/l	38	30.45000	1.27279	31.72279	

July 2, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Arsenic, dissolved	mg/l	0.008	<0.0050	<0.0000	<0.0050	
Magnesium, dissolved	mg/l	40	30.45000	1.27279	31.72279	

October 1, 1991

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Magnesium, dissolved	mg/l	36	30.45000	1.27279	31.72279	

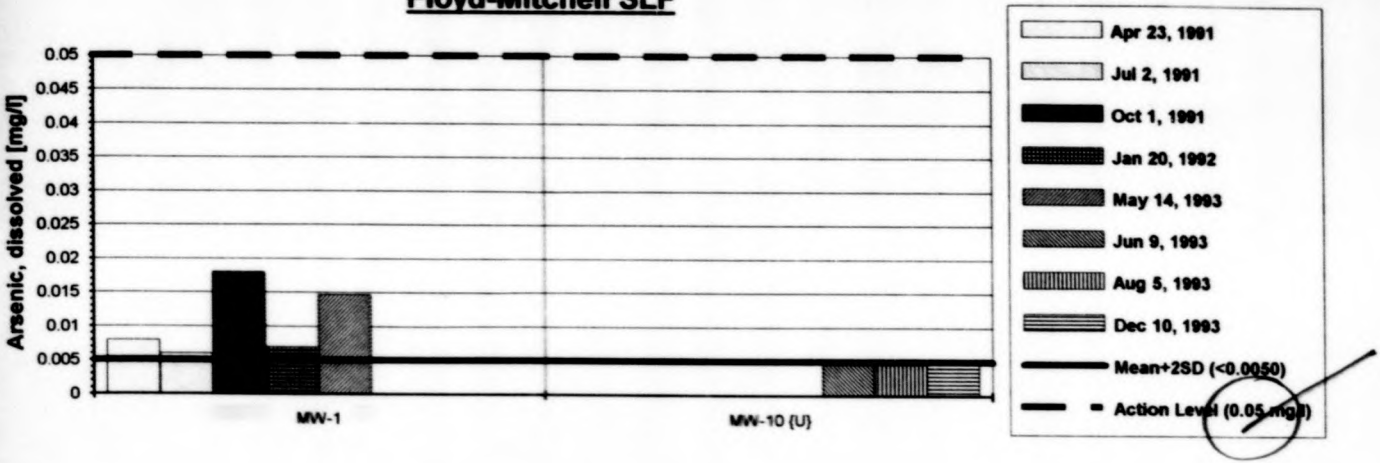
January 20, 1992

Parameter	Unit	Concent.	Background Well, MW-9 MEAN	2 * SD	Mean+2SD	Mean-2SD
Magnesium, dissolved	mg/l	46	30.45000	1.27279	31.72279	

APPENDIX 3

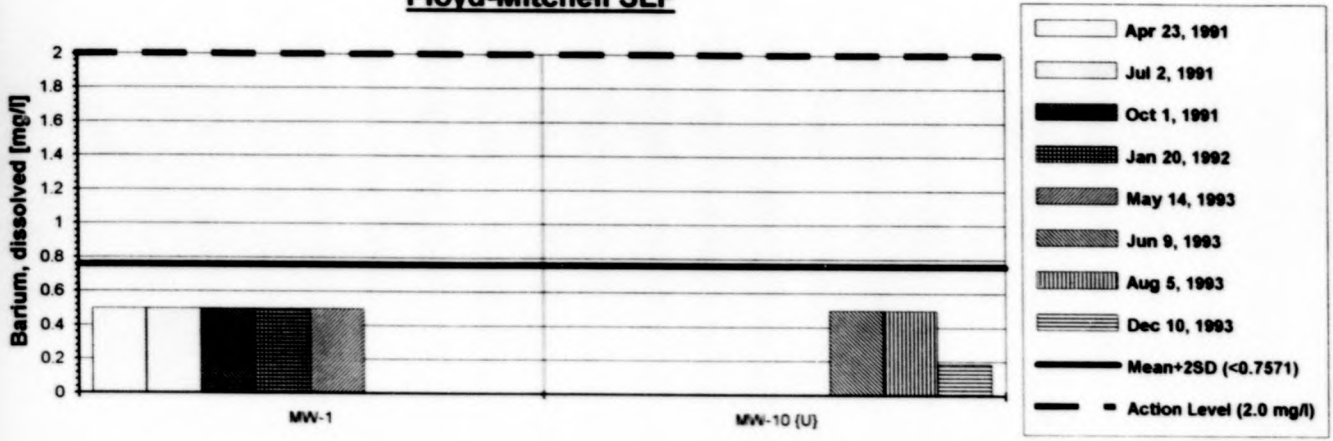
GRAPHS OF ANALYTICAL DATA

Floyd-Mitchell SLF



0.02 5/94

Floyd-Mitchell SLF



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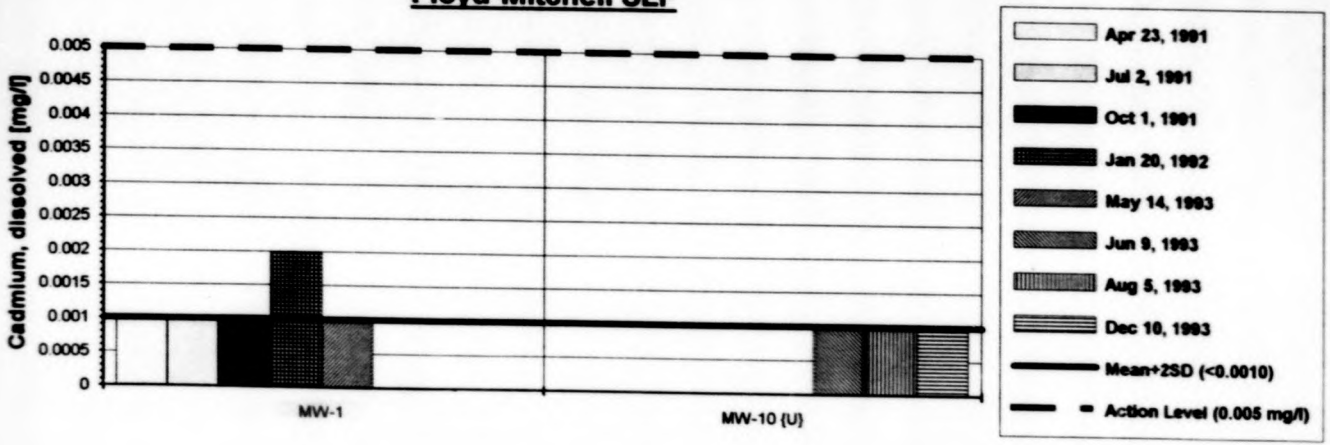

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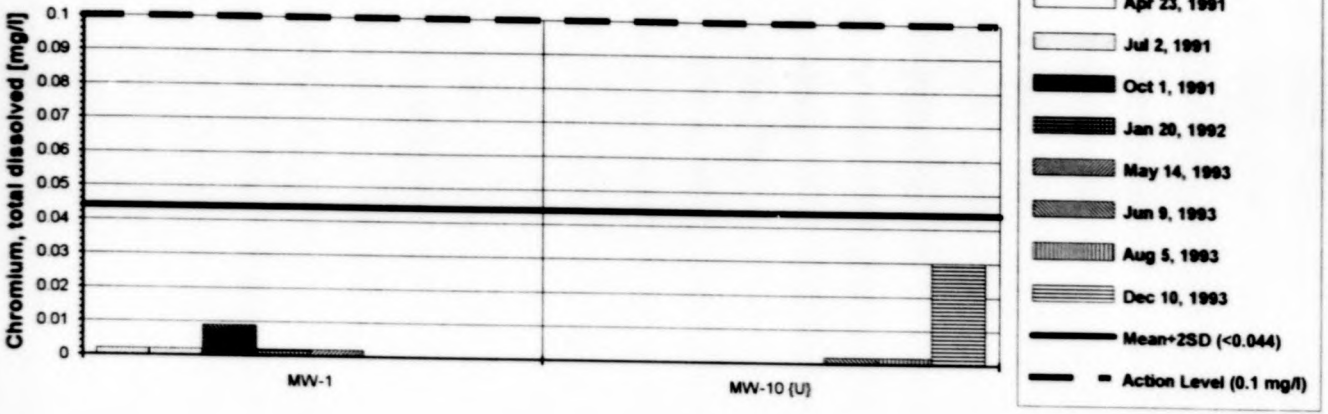

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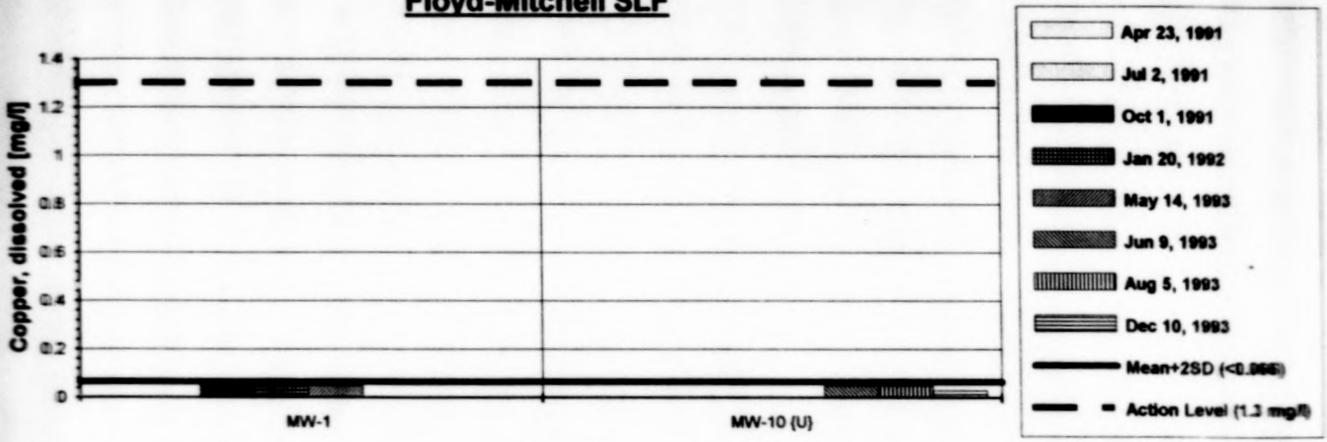

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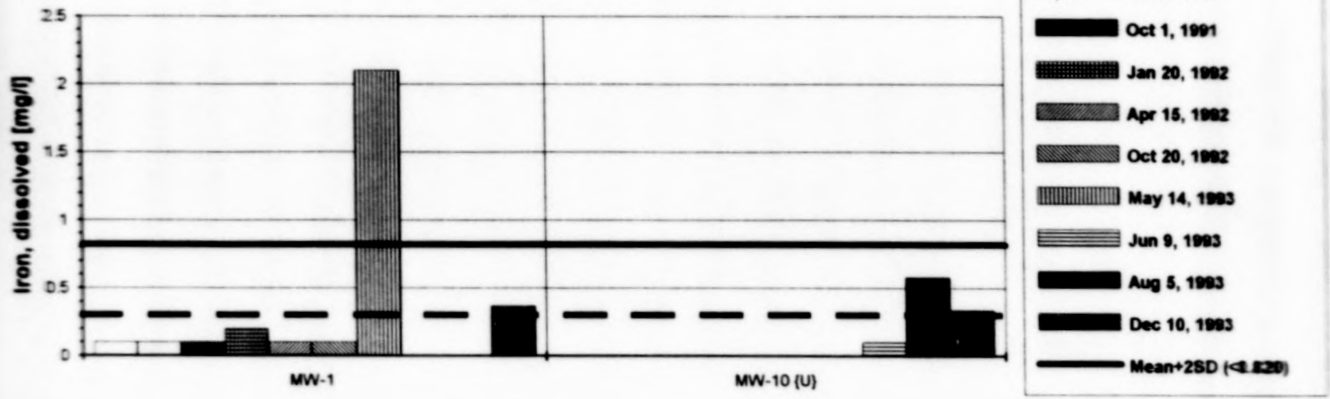

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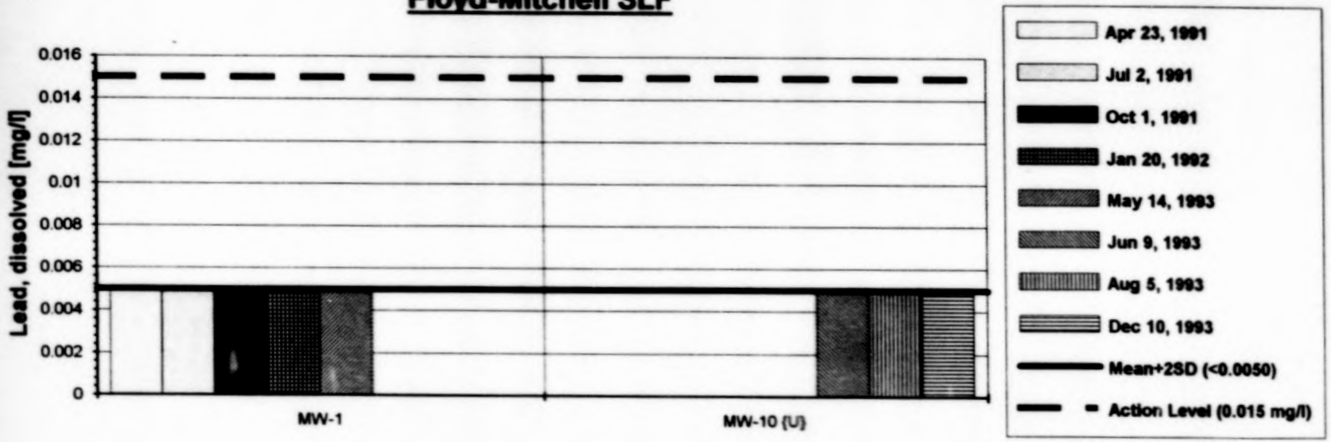

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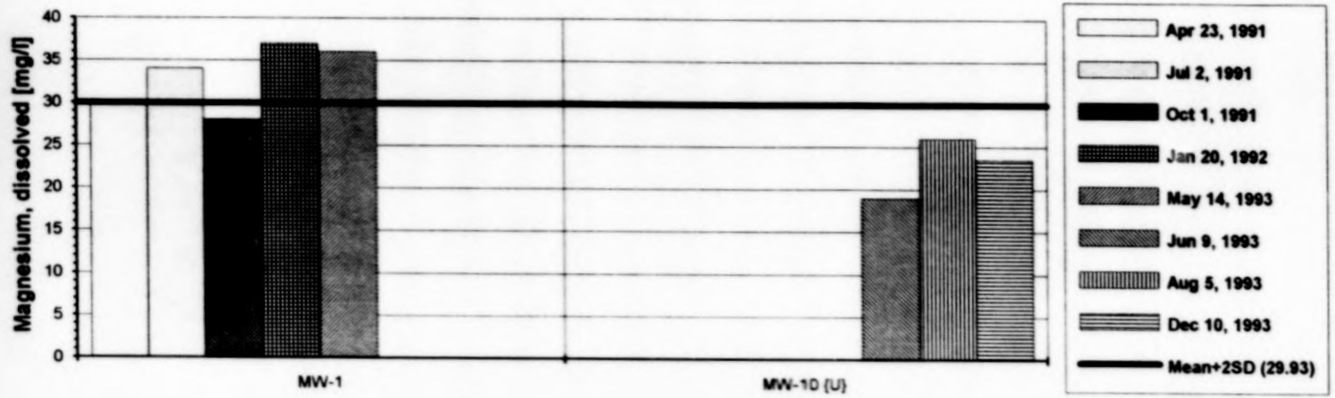

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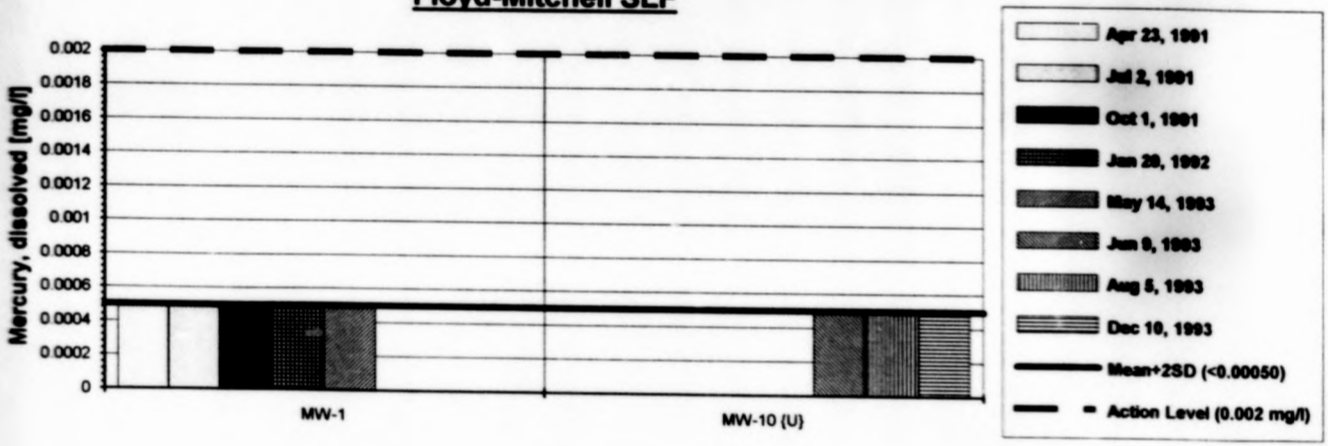

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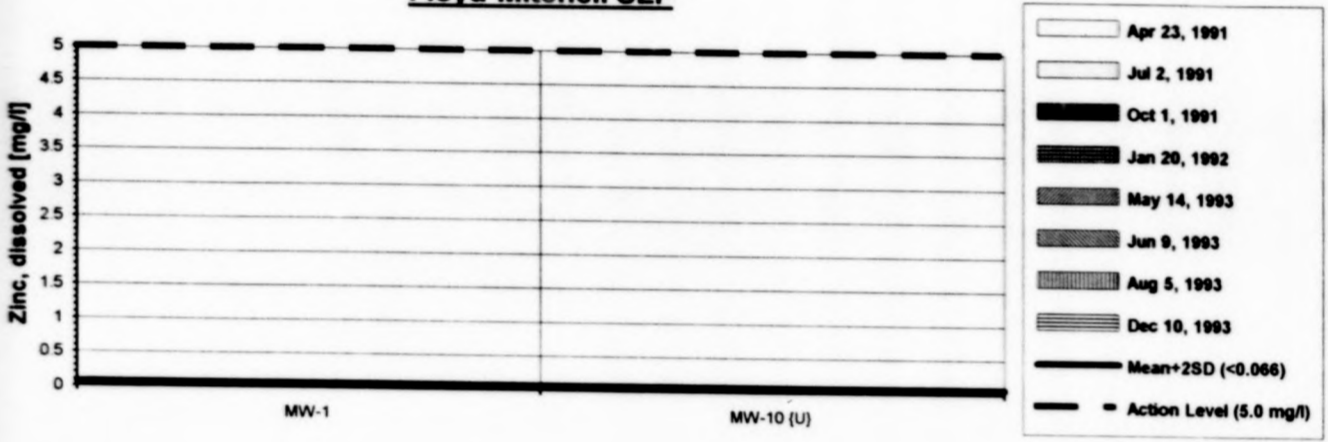
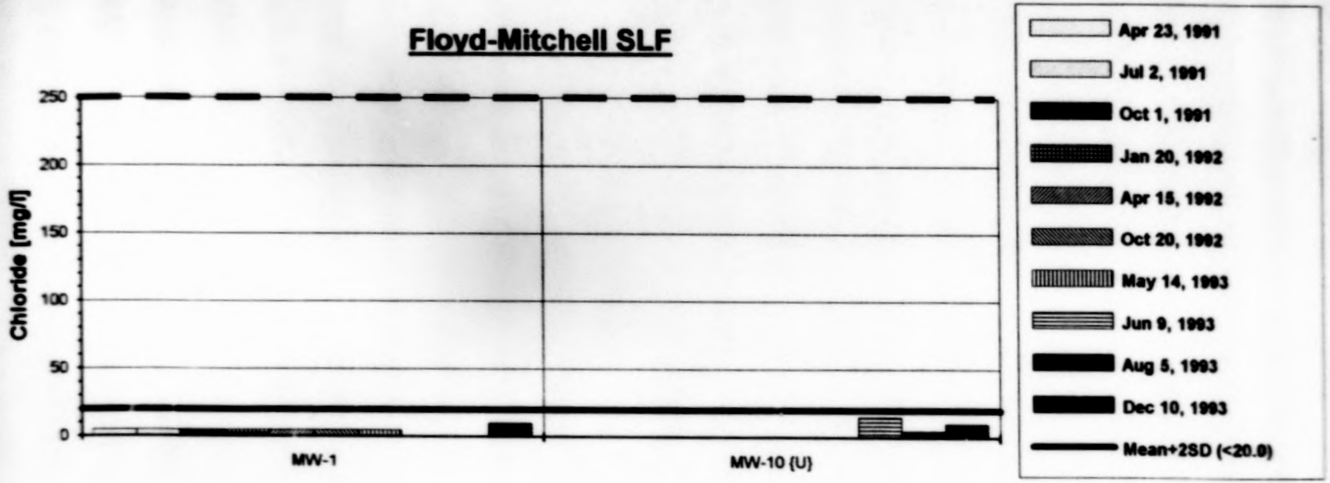
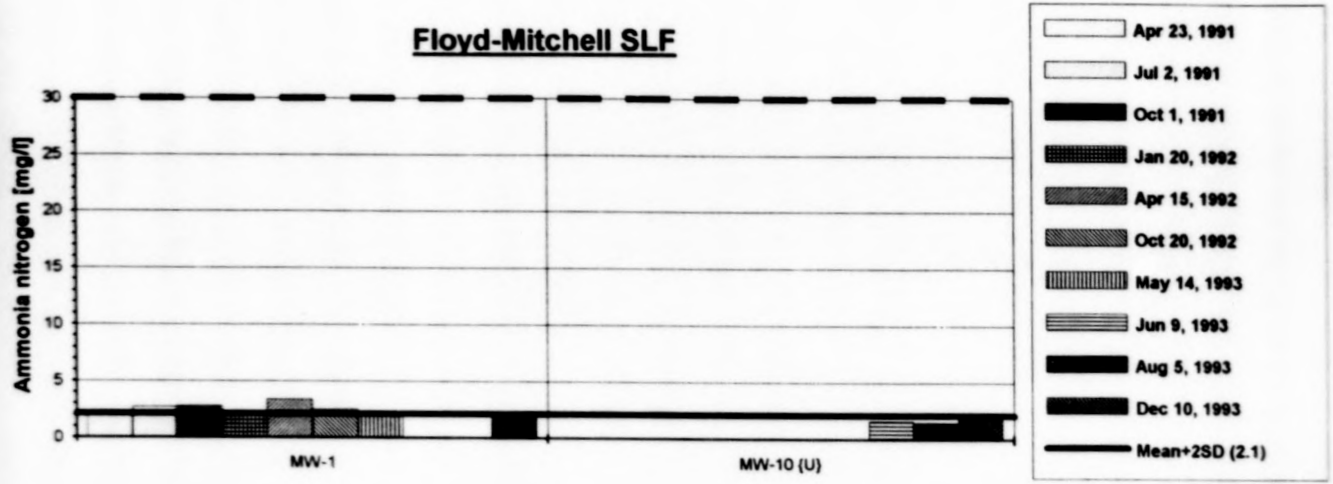
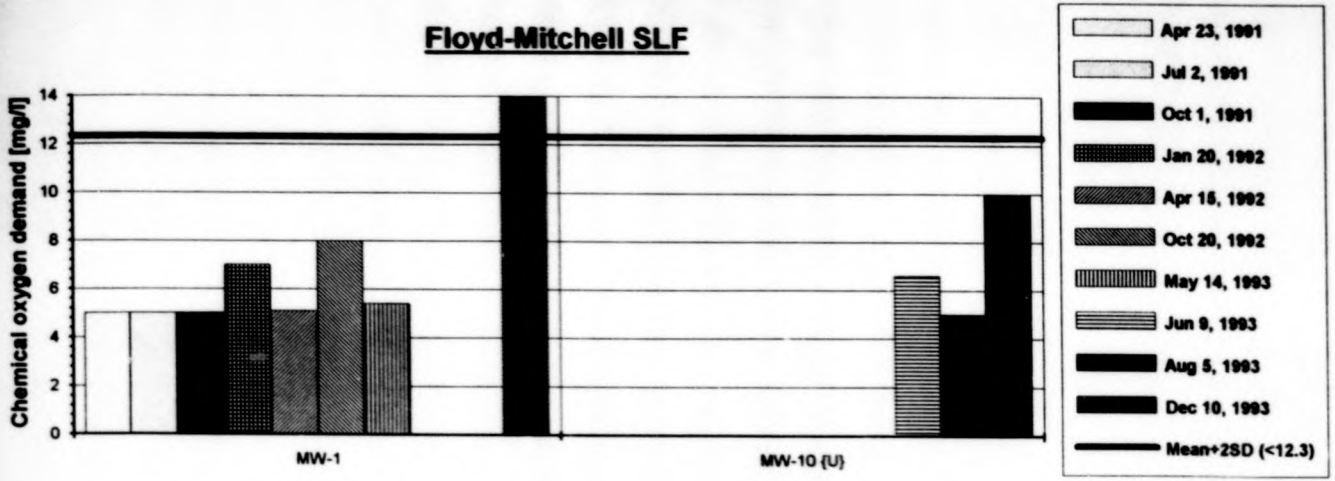



Floyd-Mitchell SLF
Chloride [mg/l]
250
200
150
100
50
0
MW-1
MW-10 (U)
Apr 23, 1991
Jul 2, 1991
Oct 1, 1991
Jan 20, 1992
Apr 15, 1992
Oct 20, 1992
May 14, 1993
Jun 9, 1993
Aug 5, 1993
Dec 10, 1993
Mean+2SD (<20.0)


Floyd-Mitchell SLF
Ammonia nitrogen [mg/l]
30
25
20
15
10
5
0
MW-1
MW-10 (U)
Apr 23, 1991
Jul 2, 1991
Oct 1, 1991
Jan 20, 1992
Apr 15, 1992
Oct 20, 1992
May 14, 1993
Jun 9, 1993
Aug 5, 1993
Dec 10, 1993
Mean+2SD (2.1)

Floyd-Mitchell SLF



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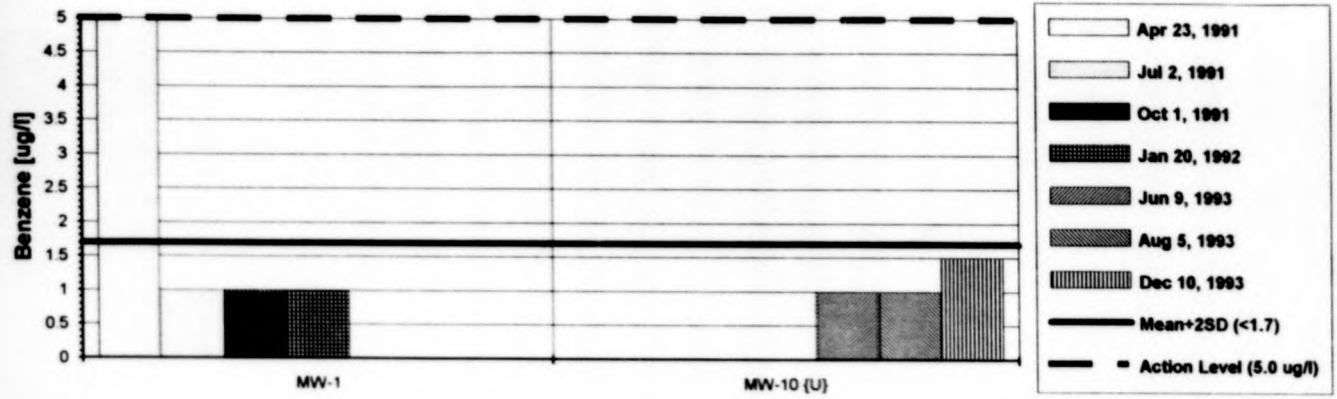

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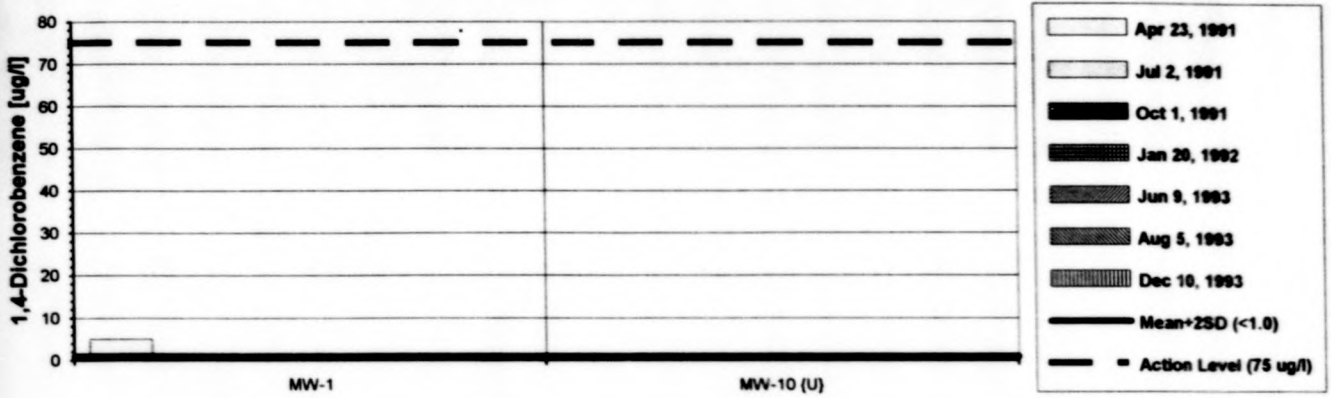

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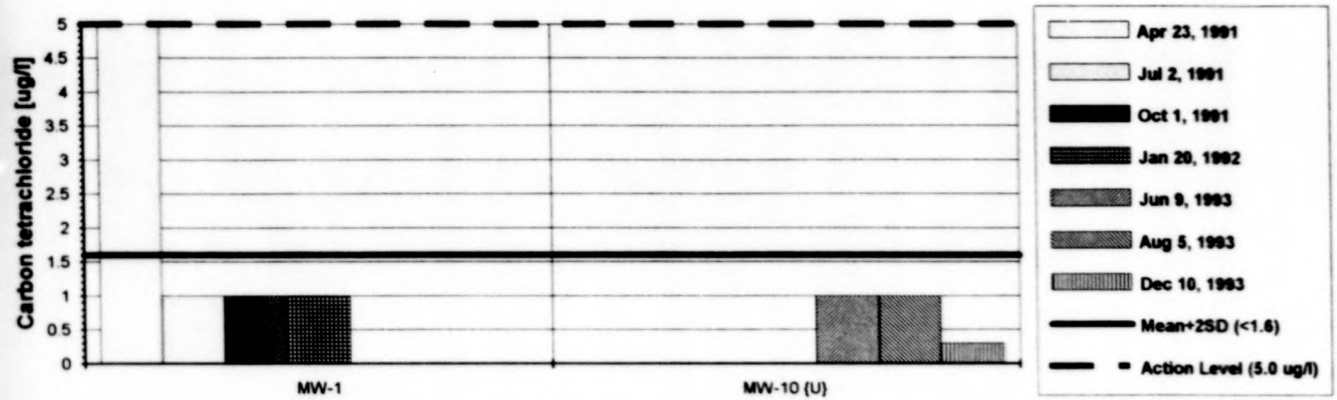

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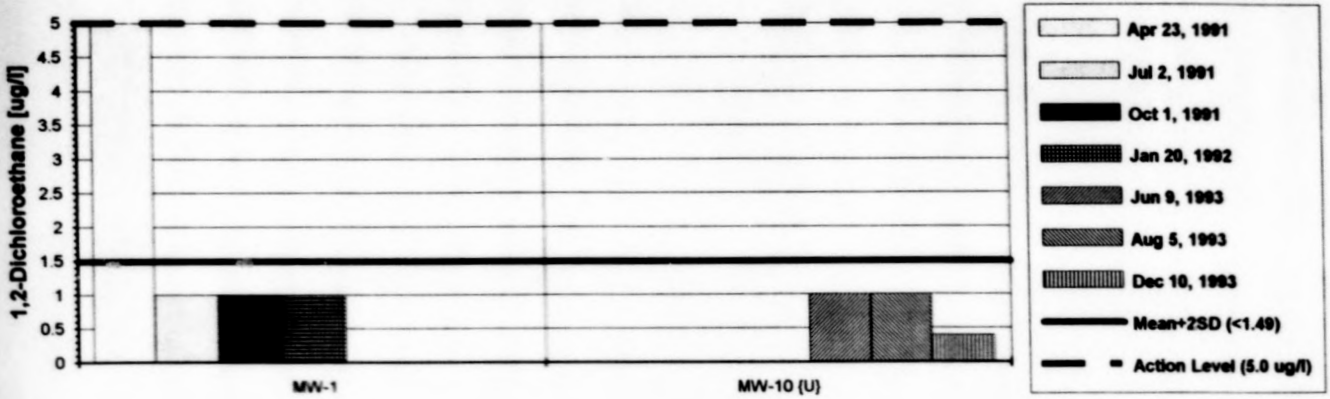

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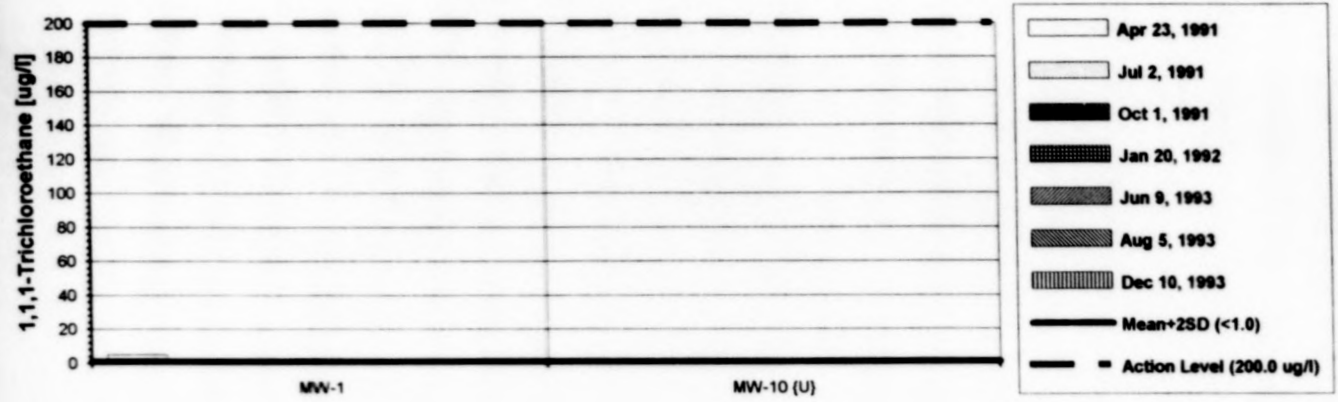

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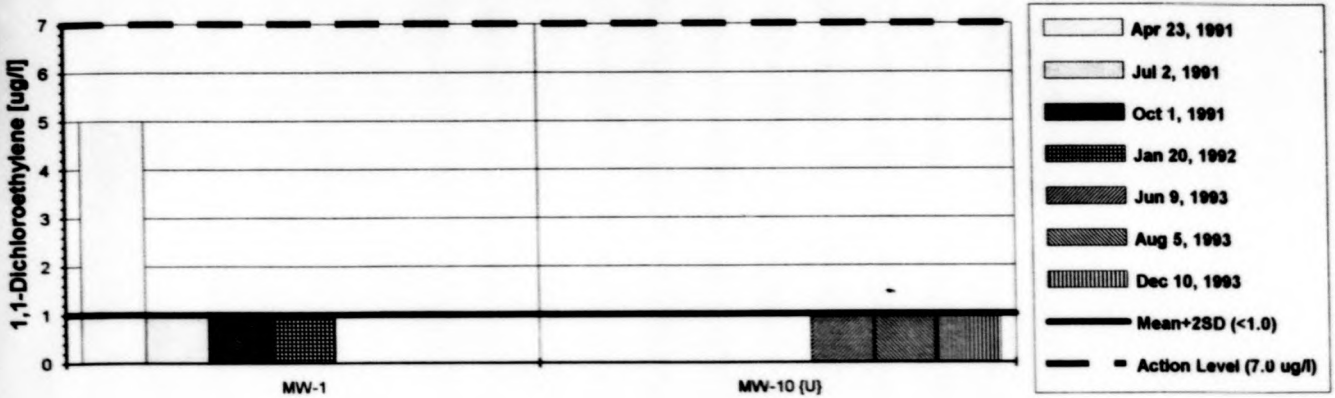

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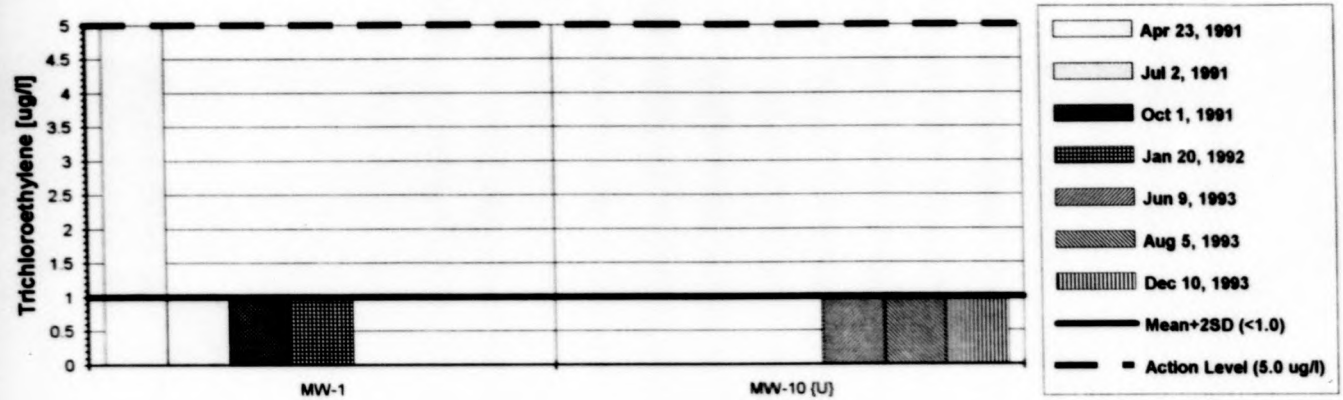
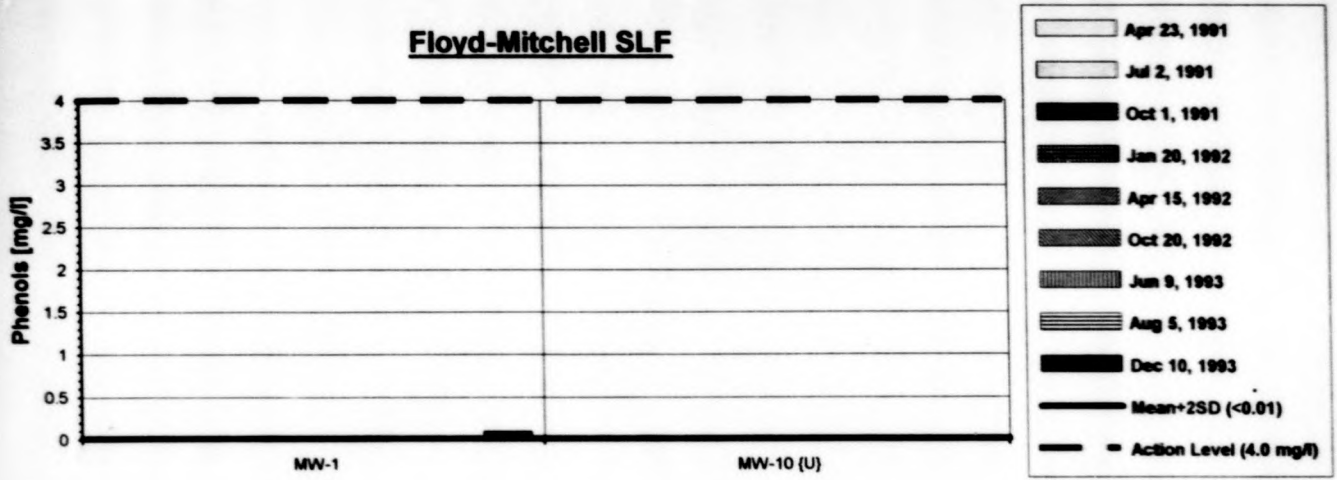
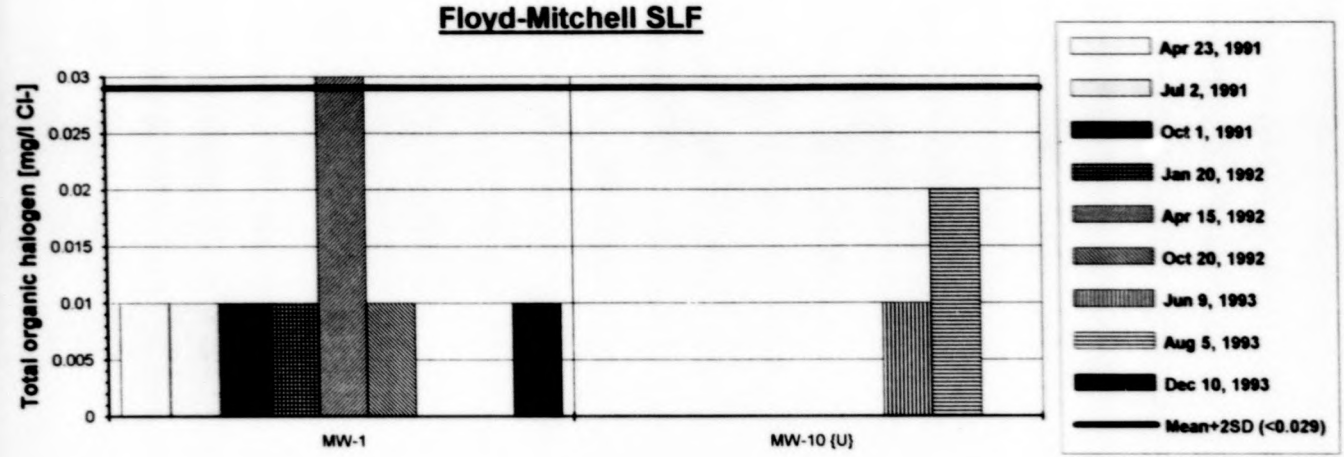
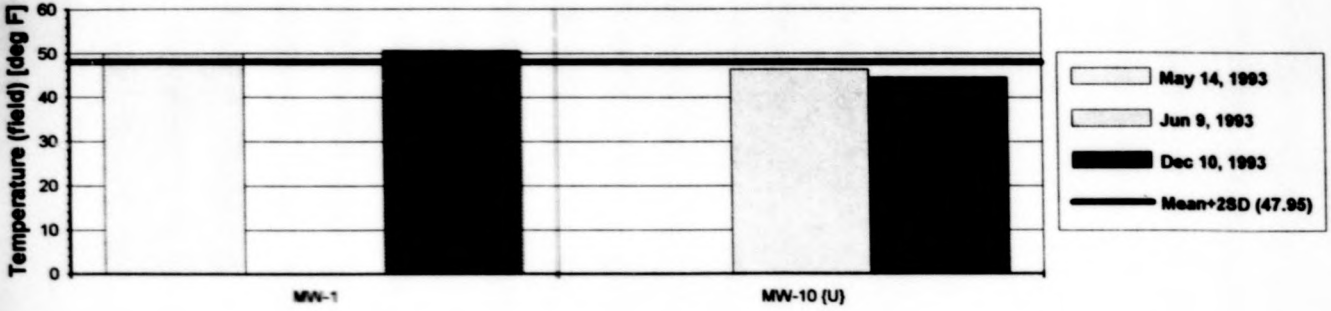



Floyd-Mitchell SLF
Phenols [mg/l]
4
3.5
3
2.5
2
1.5
1
0.5
0
MW-1
MW-10 (U)
Apr 23, 1991
Jul 2, 1991
Oct 1, 1991
Jan 20, 1992
Apr 15, 1992
Oct 20, 1992
Jun 9, 1993
Aug 5, 1993
Dec 10, 1993
Mean+2SD (<0.01)
Action Level (4.0 mg/l)


Floyd-Mitchell SLF
Total organic halogen [mg/l Cl-]
0.03
0.025
0.02
0.015
0.01
0.005
0
MW-1
MW-10 (U)
Apr 23, 1991
Jul 2, 1991
Oct 1, 1991
Jan 20, 1992
Apr 15, 1992
Oct 20, 1992
Jun 9, 1993
Aug 5, 1993
Dec 10, 1993
Mean+2SD (<0.029)

Floyd-Mitchell SLF



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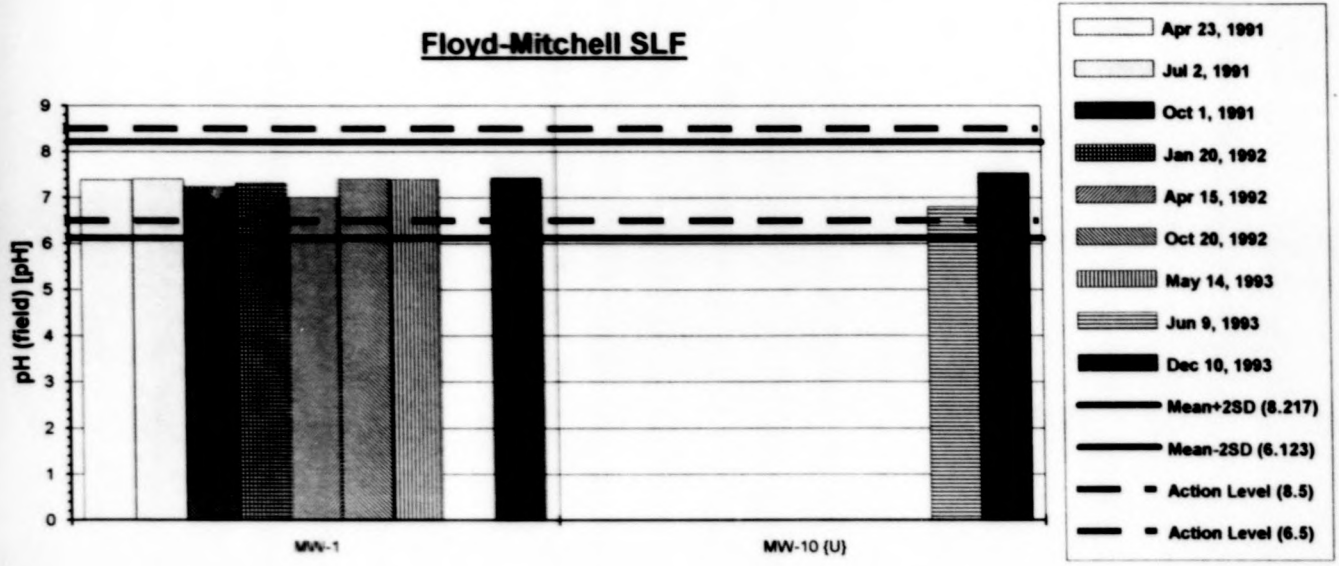

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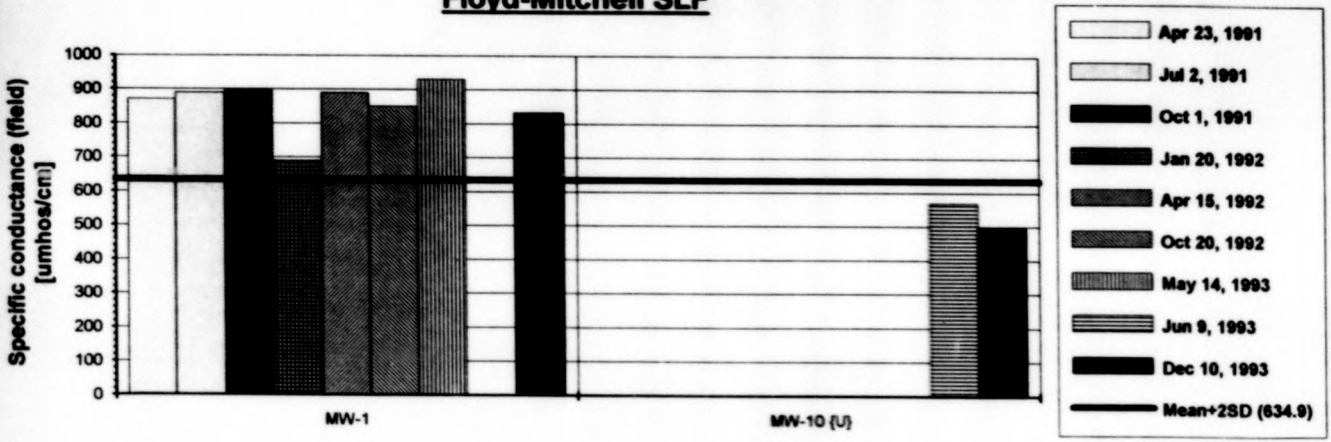

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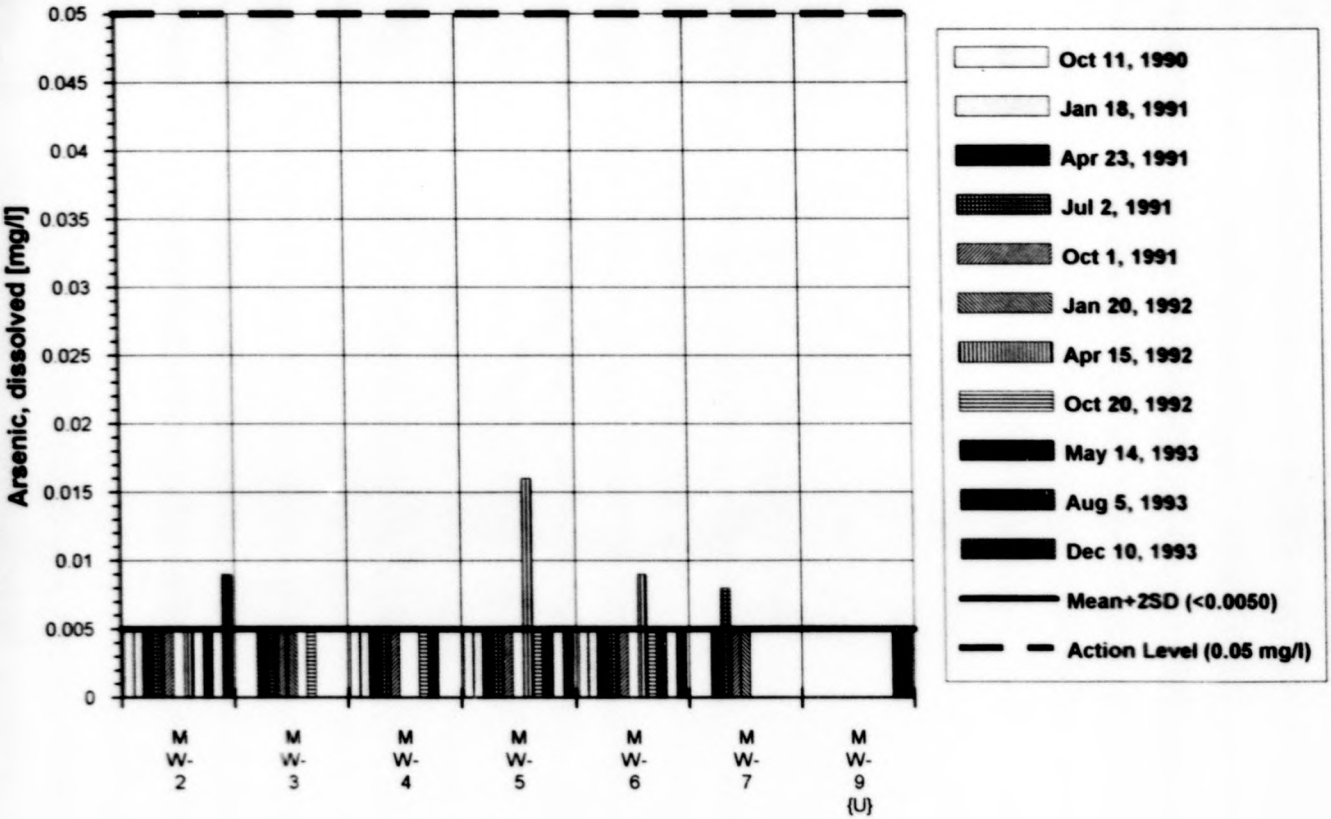

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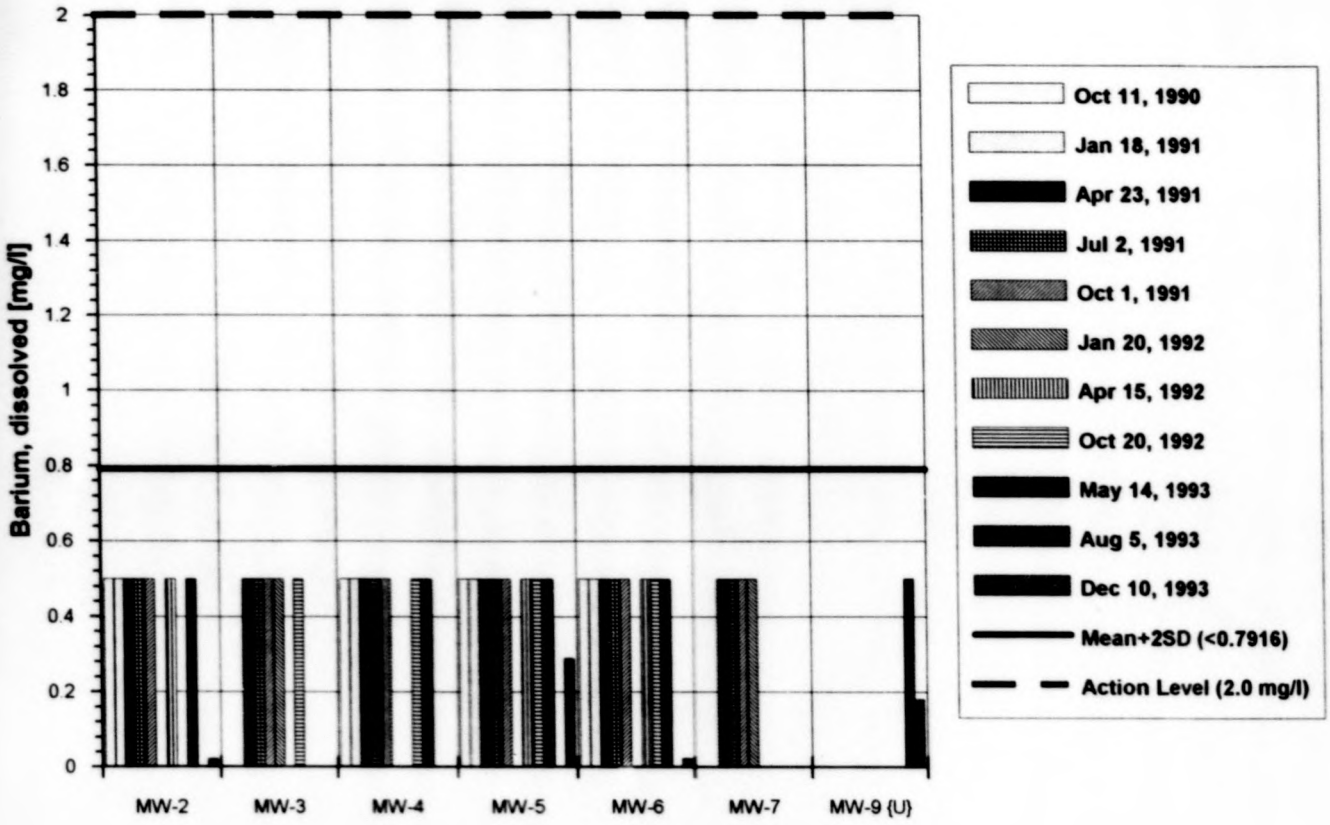

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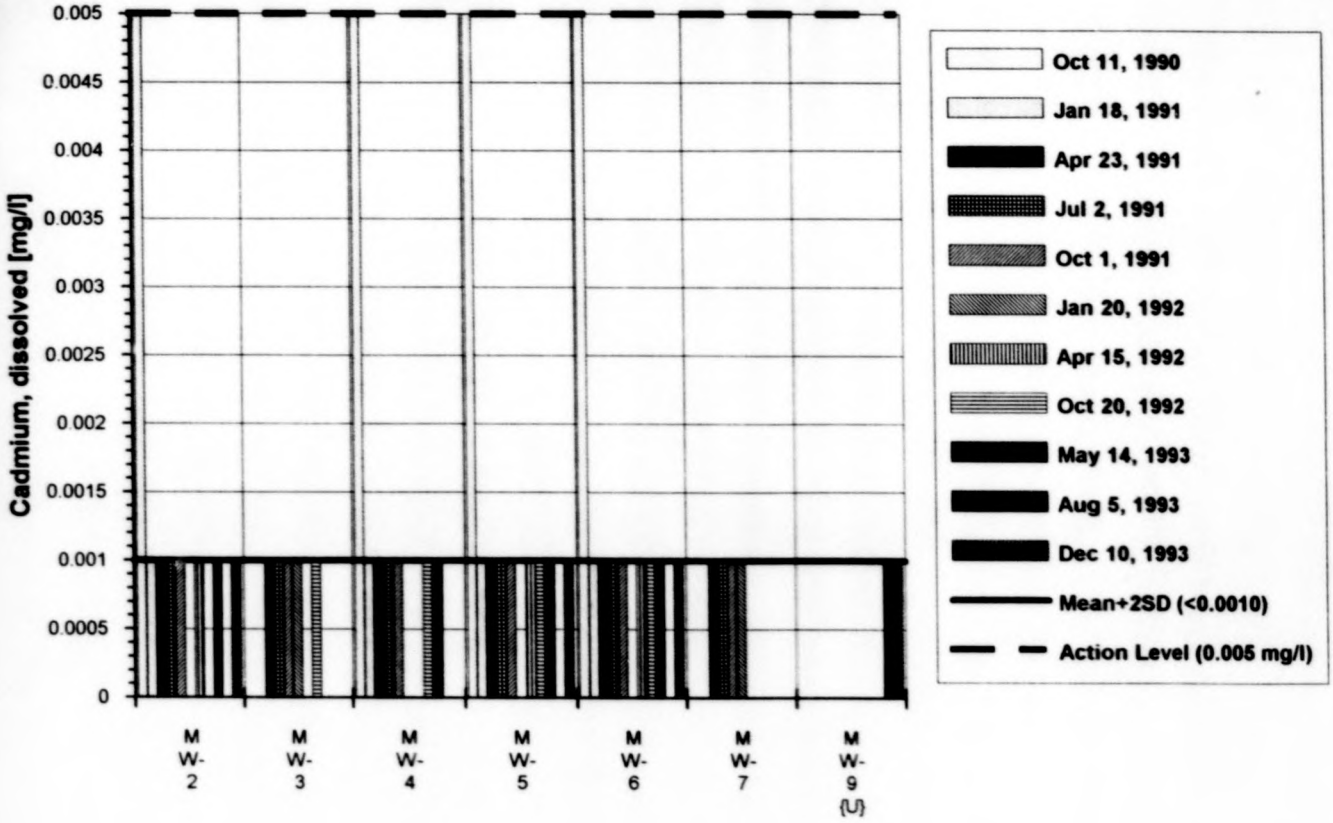

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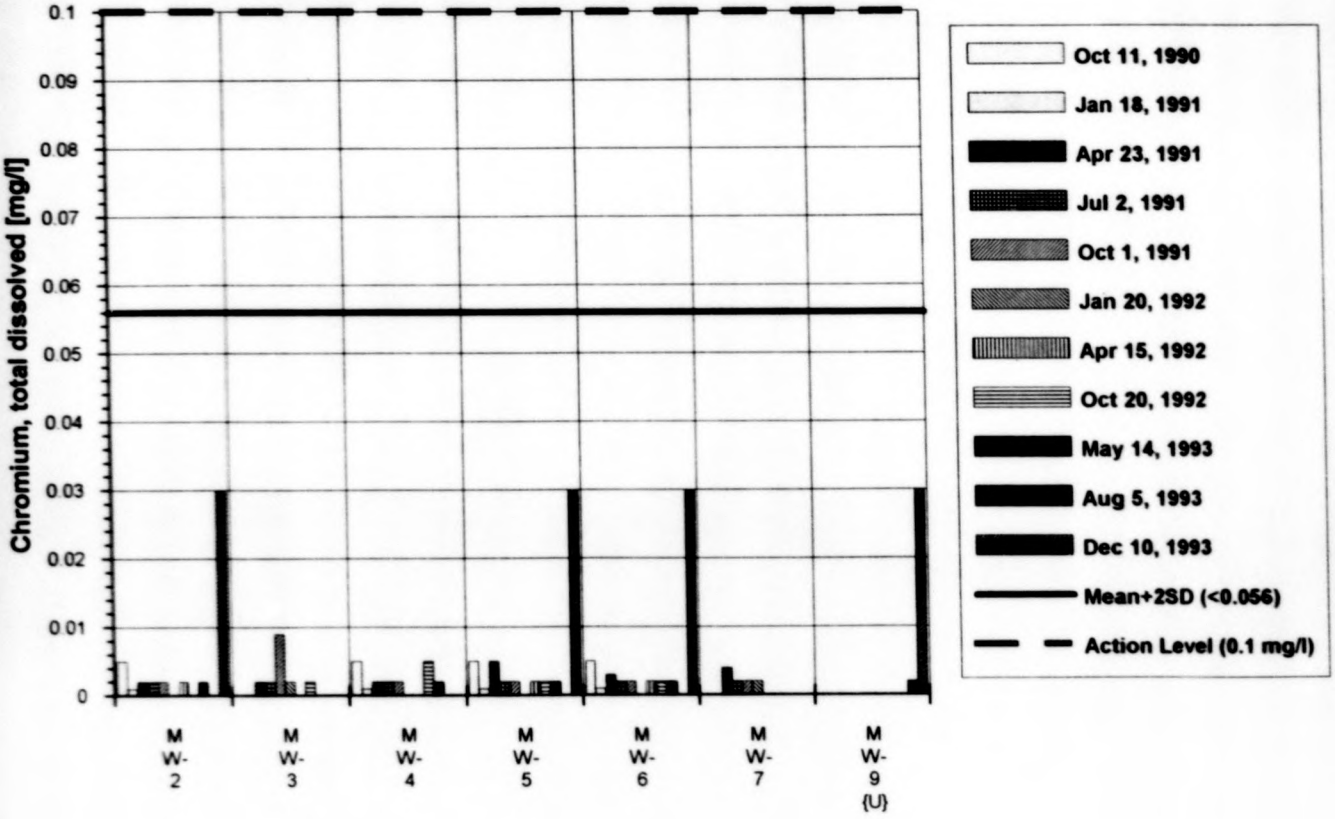

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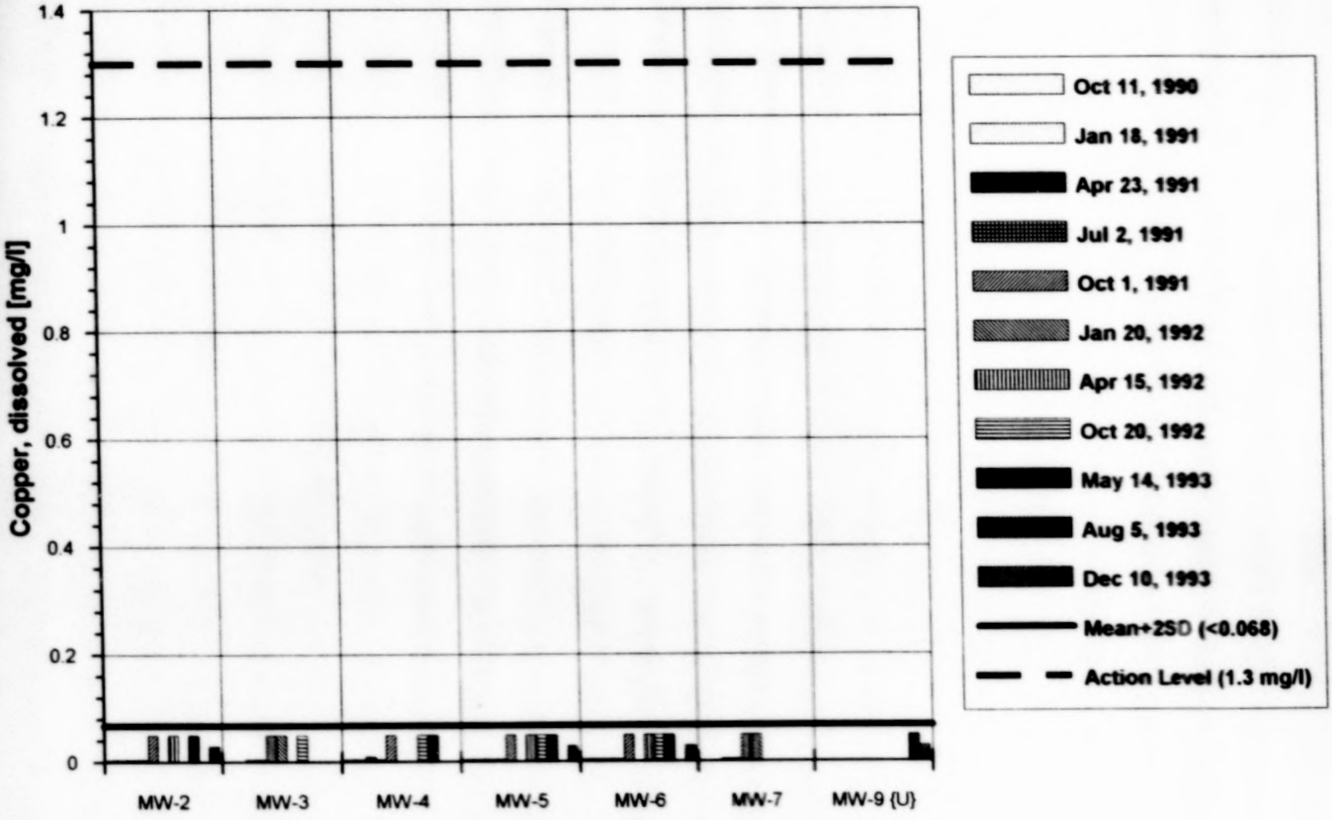

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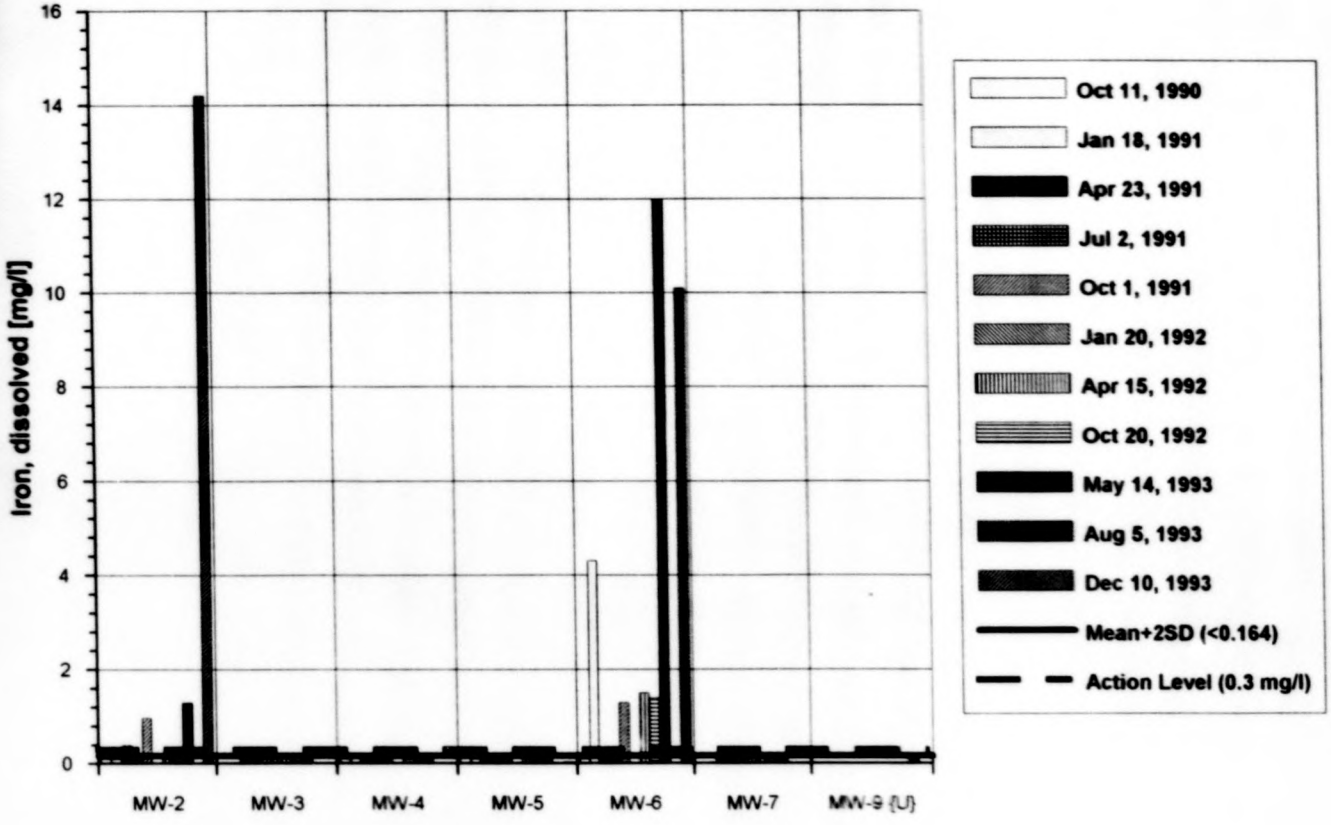

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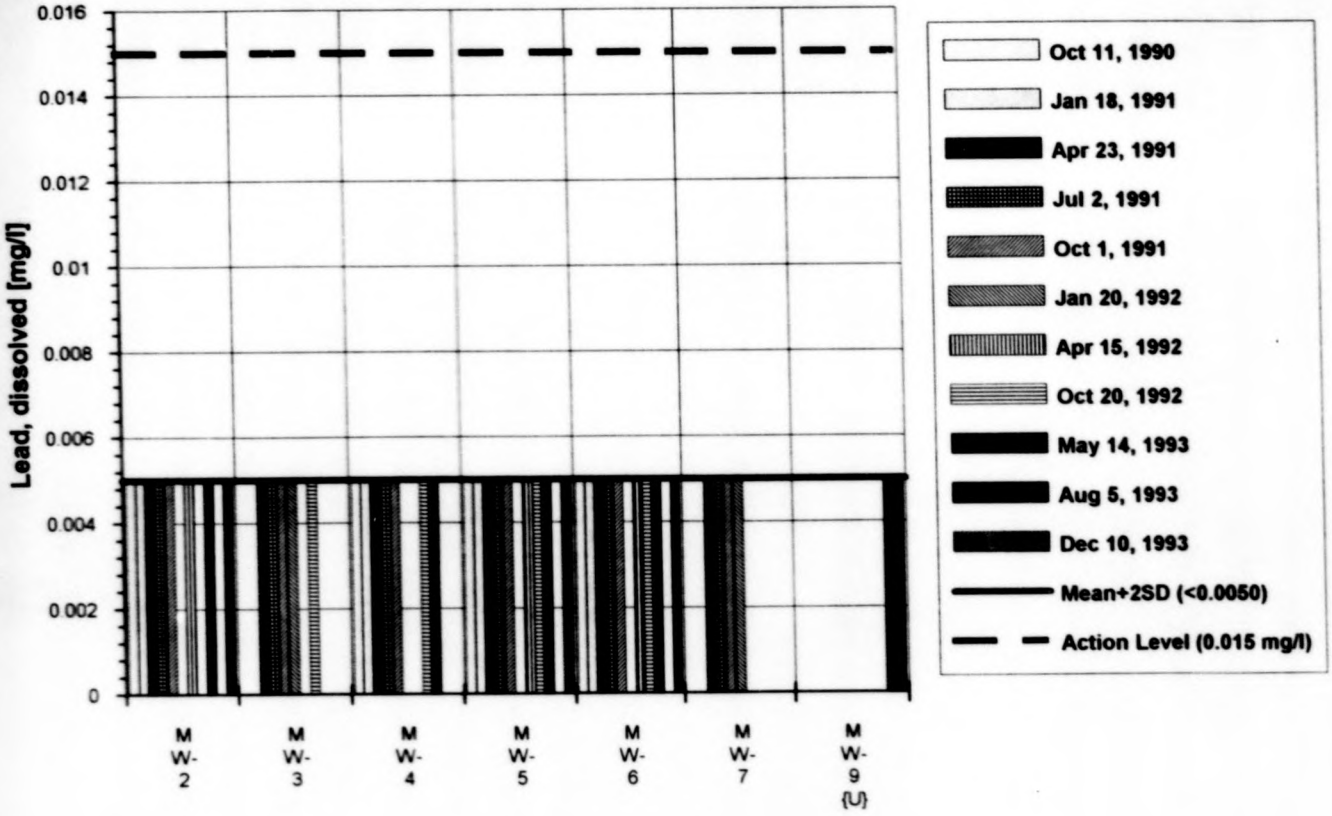

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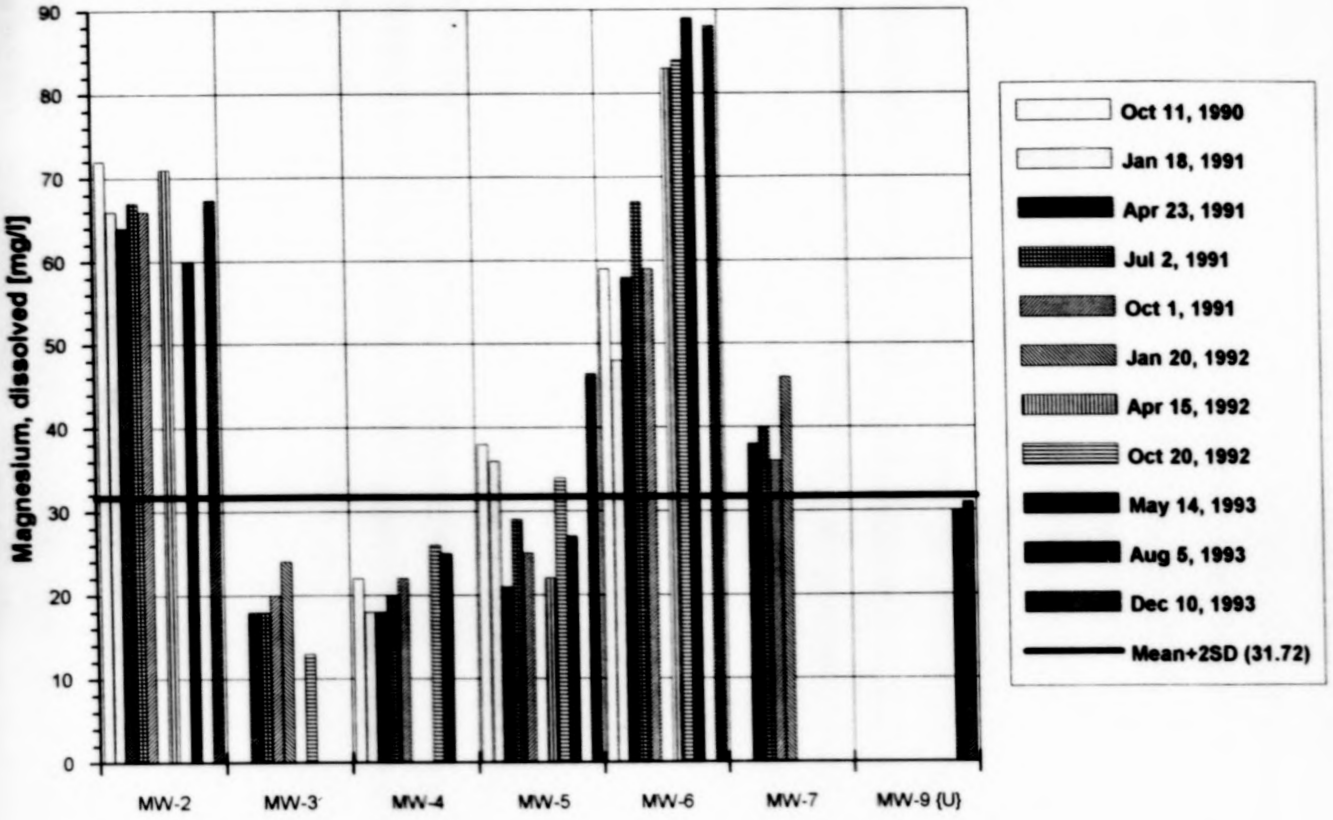

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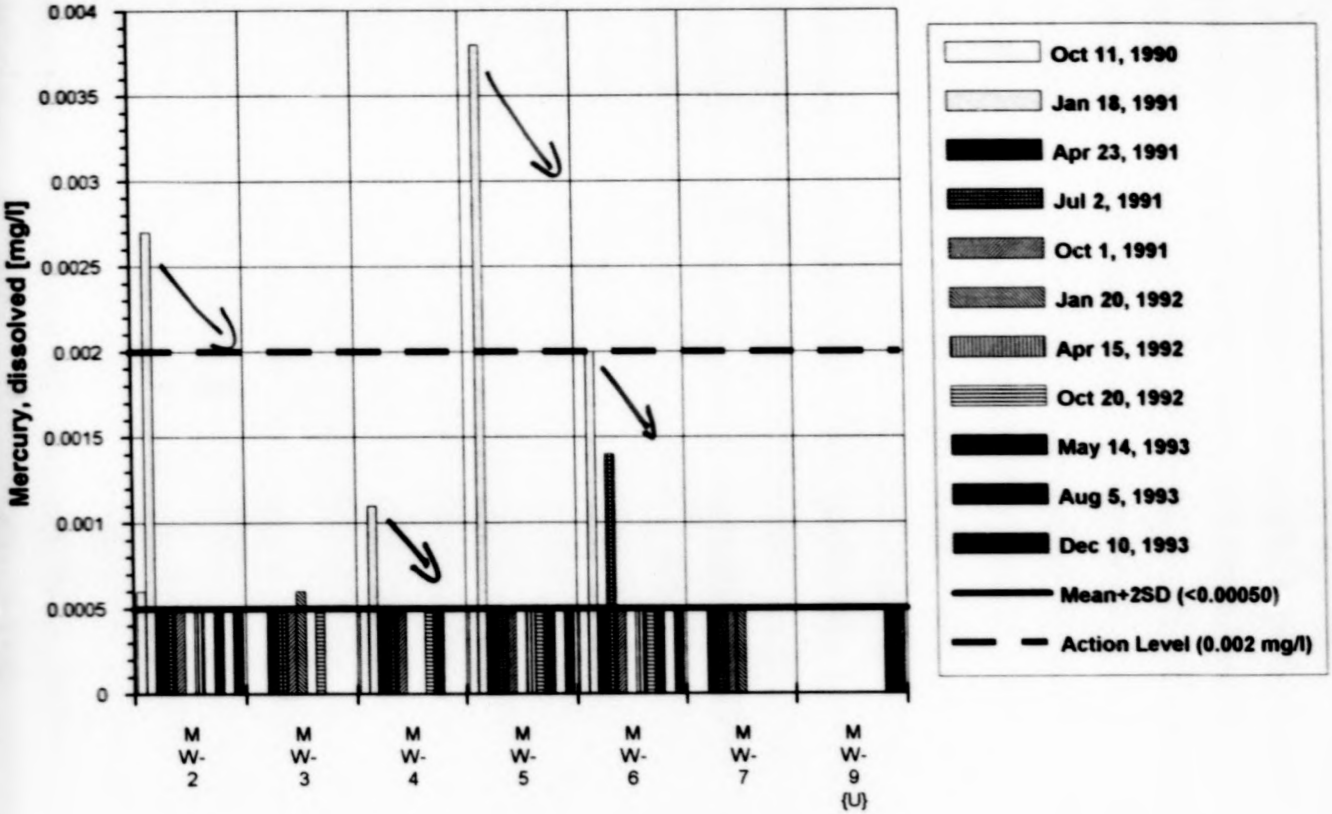

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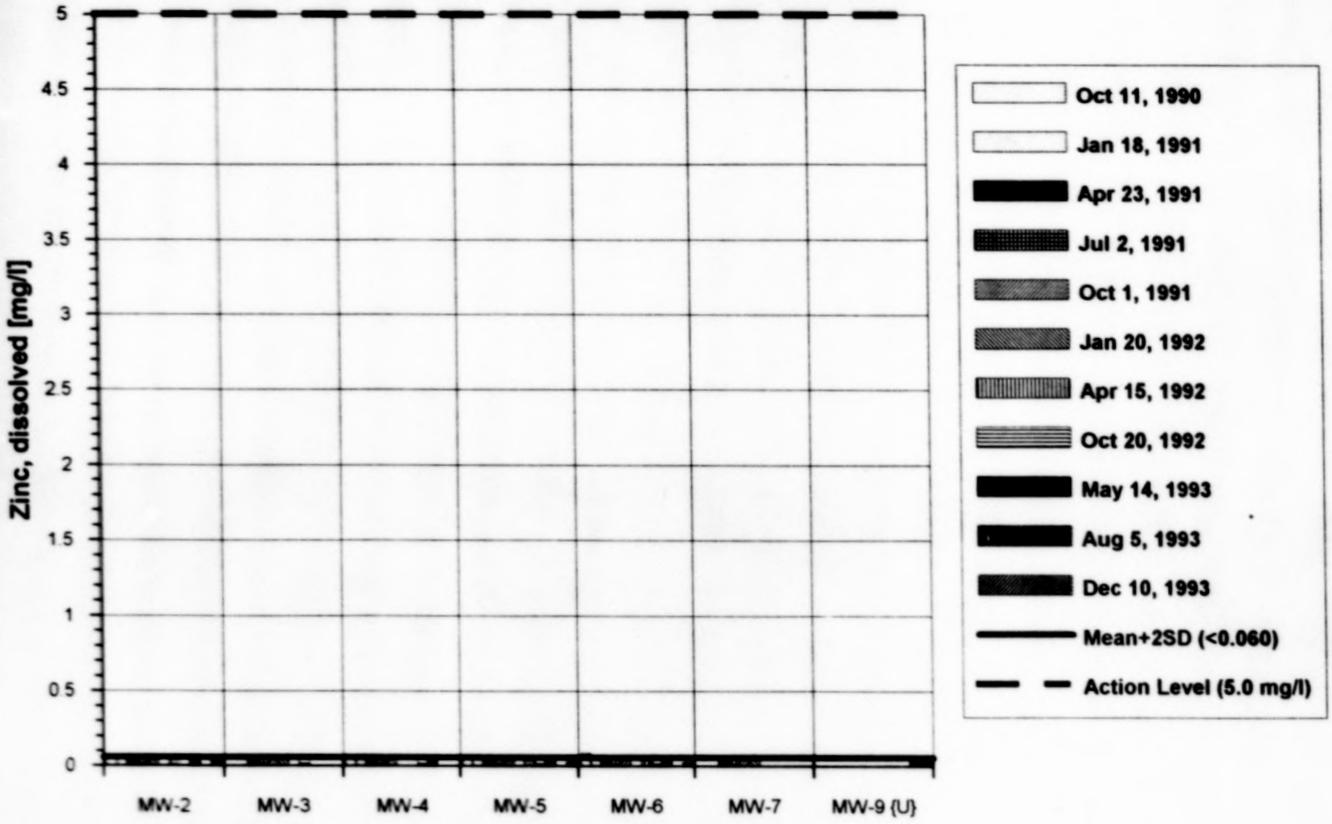

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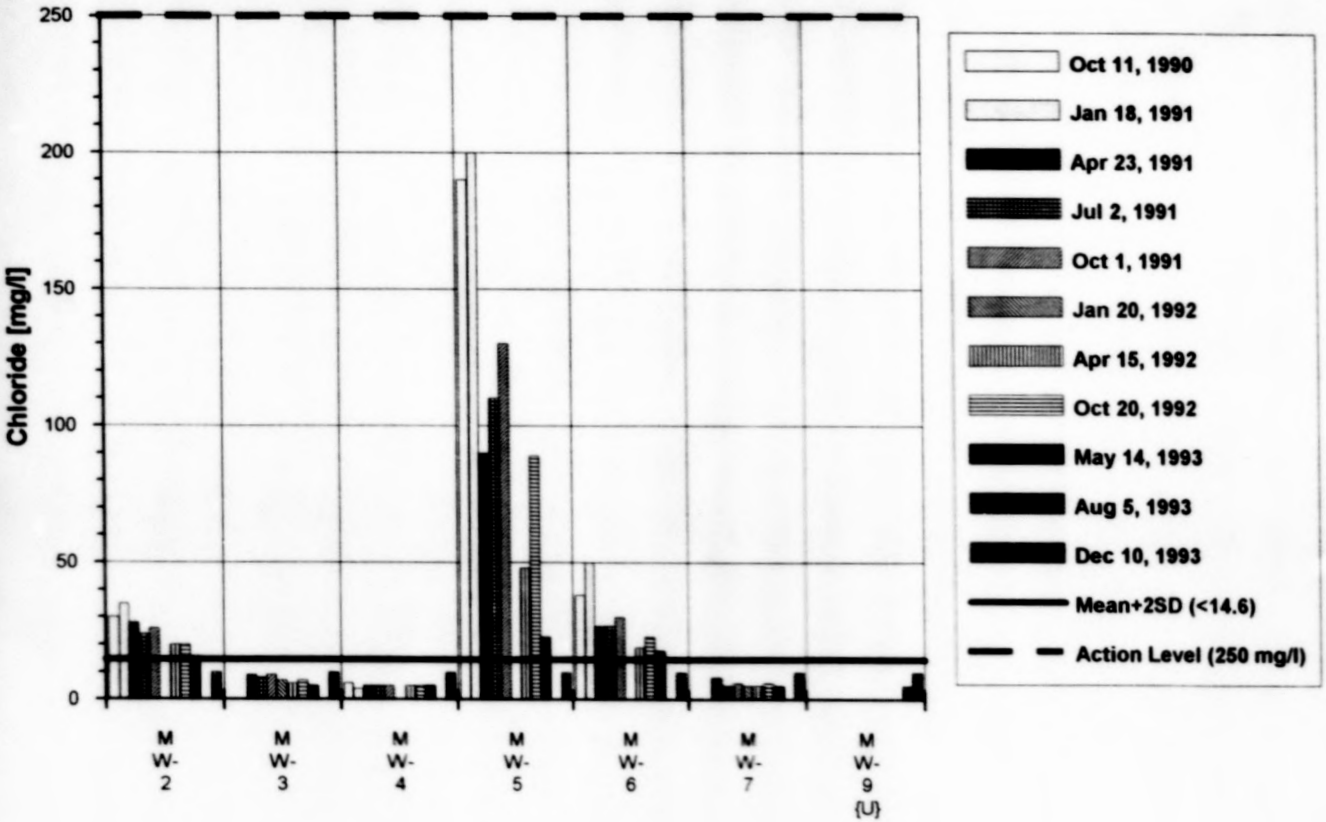

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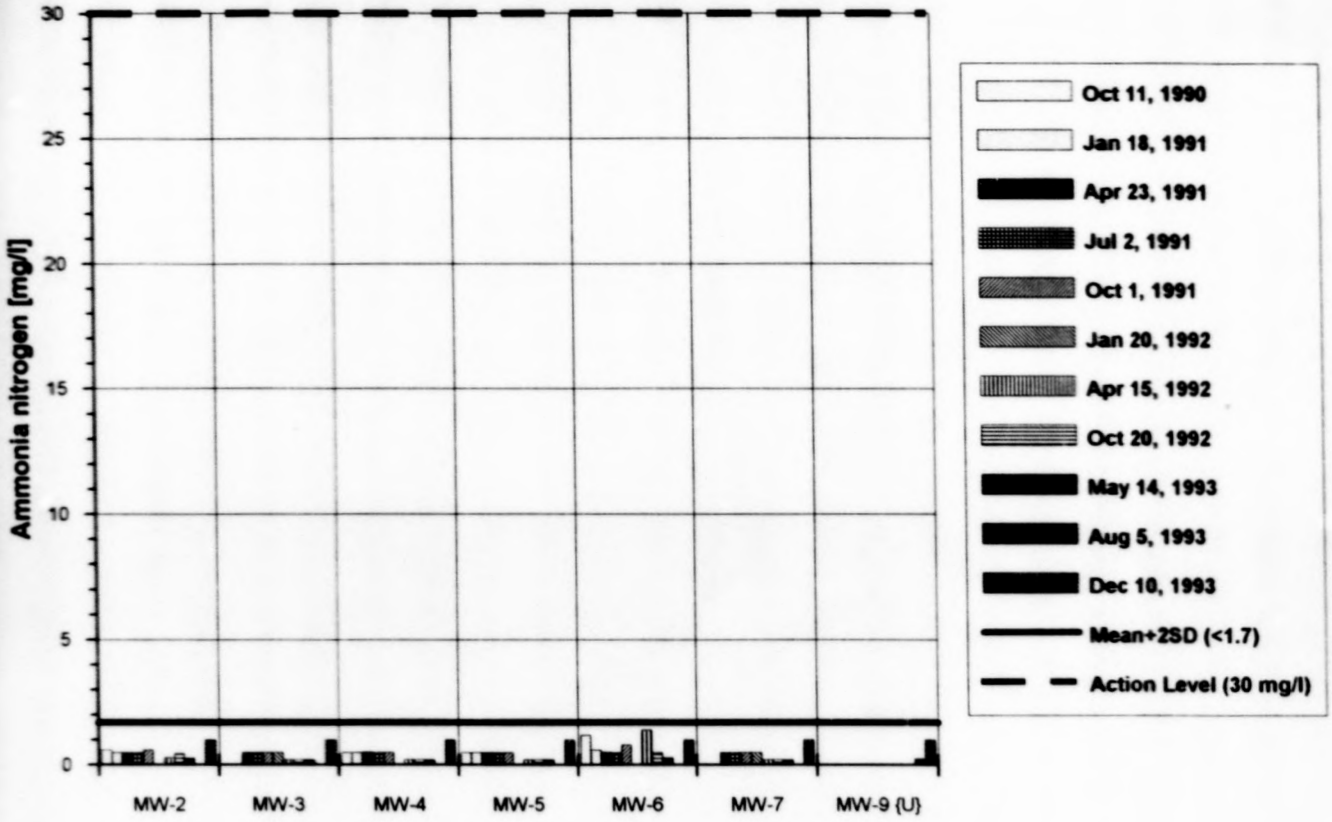

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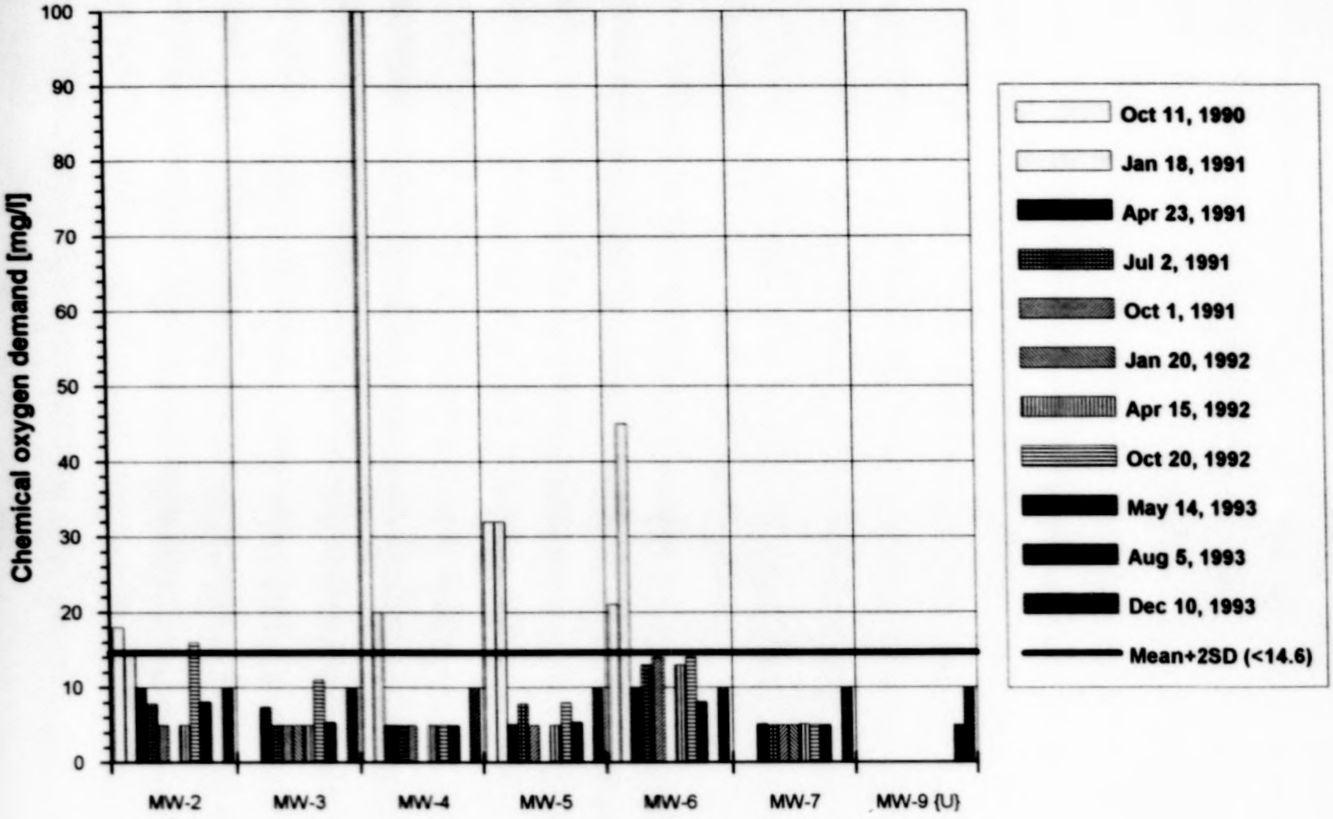

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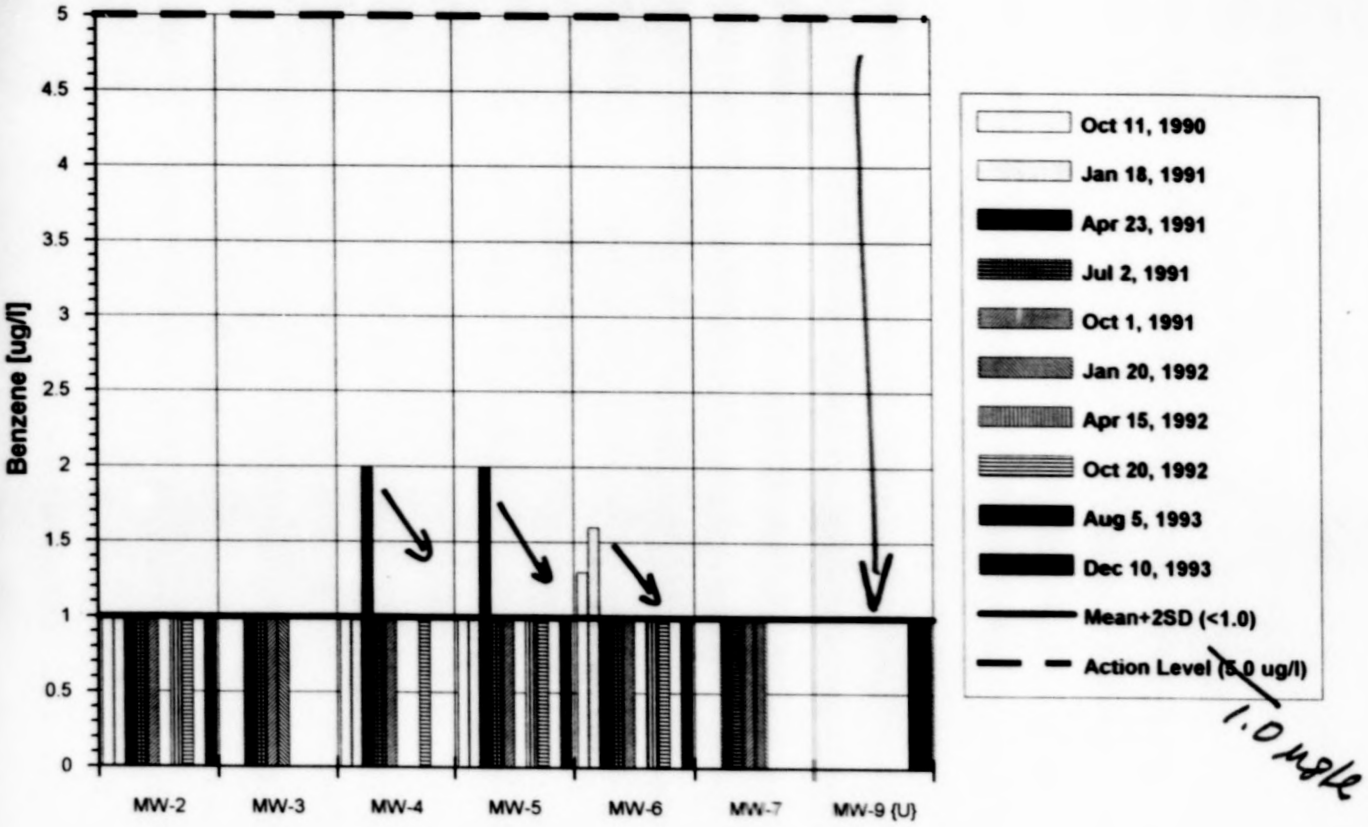

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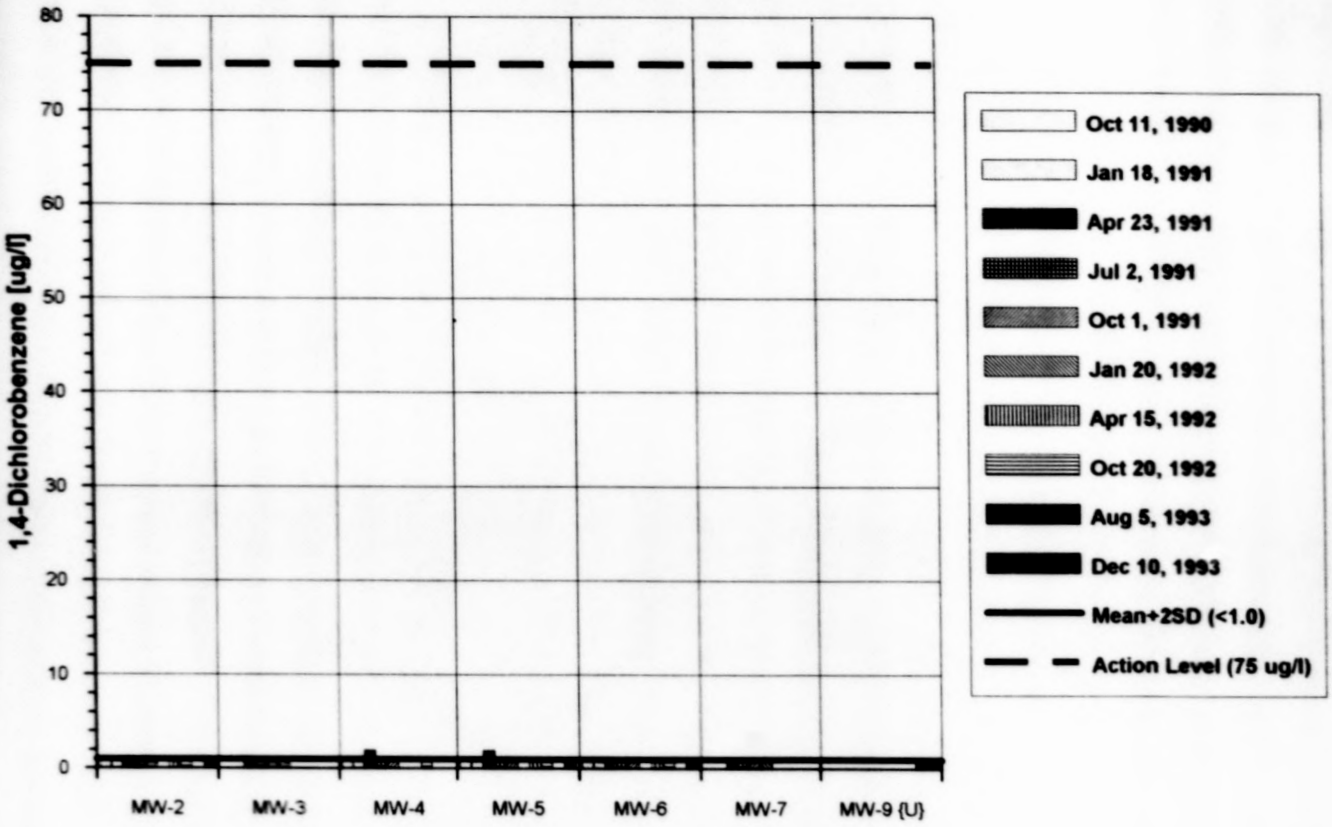

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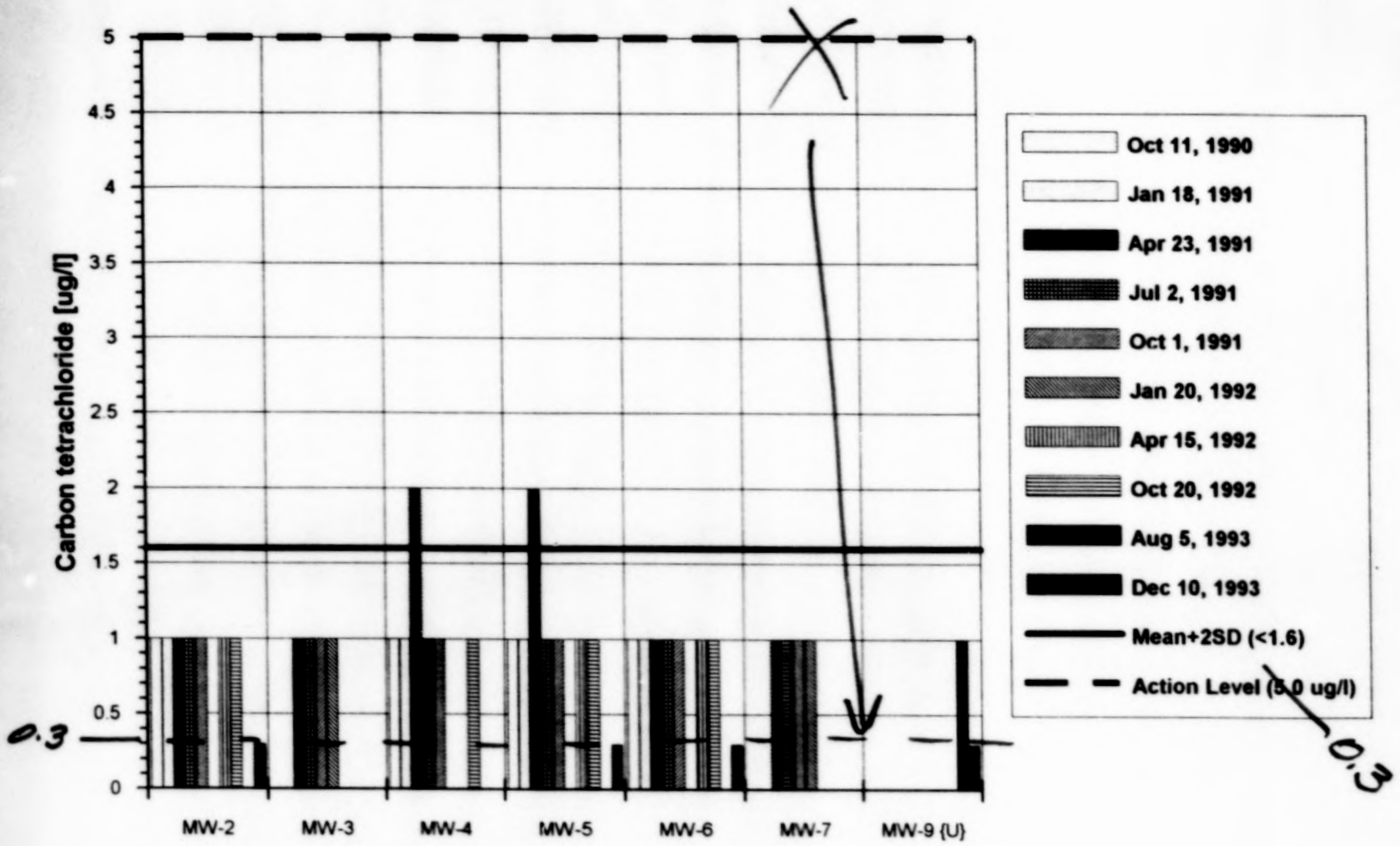

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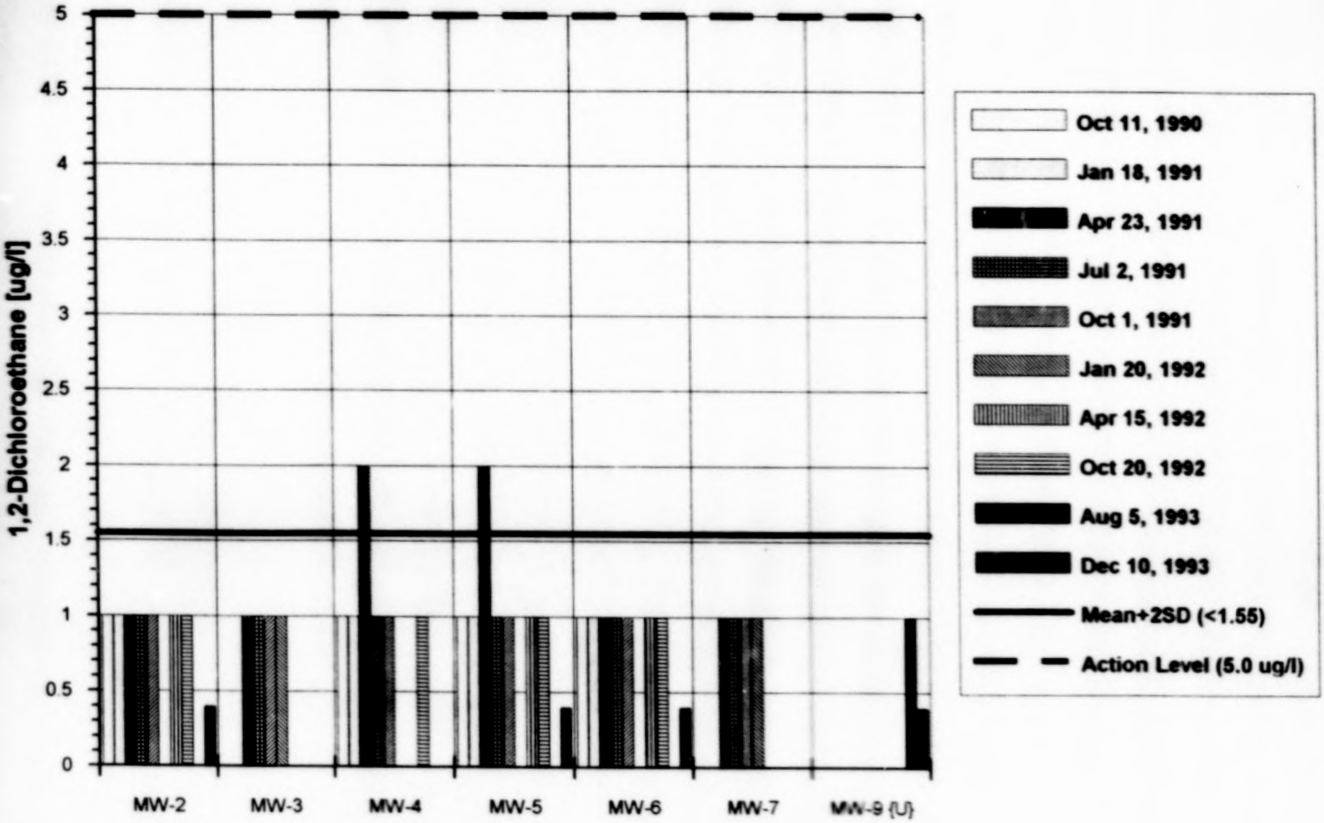

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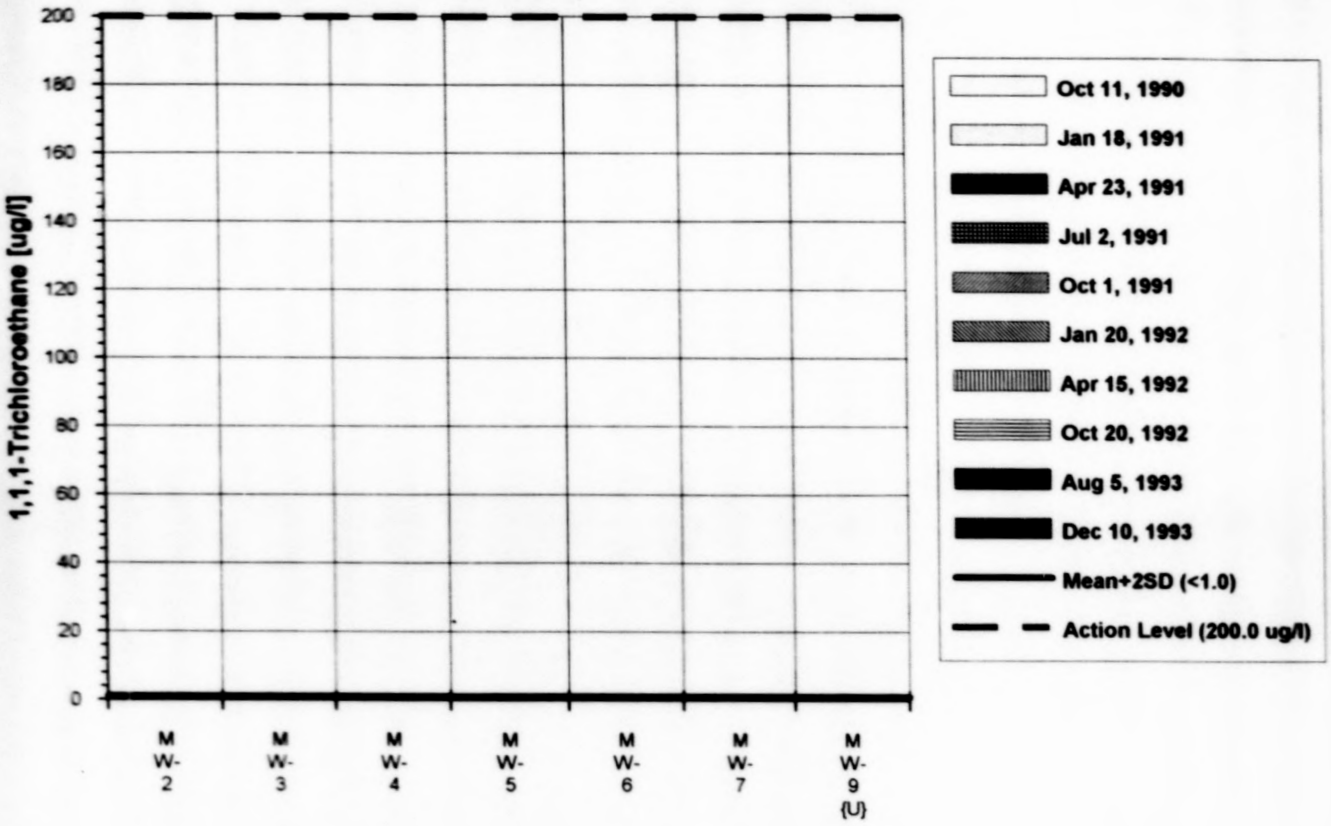

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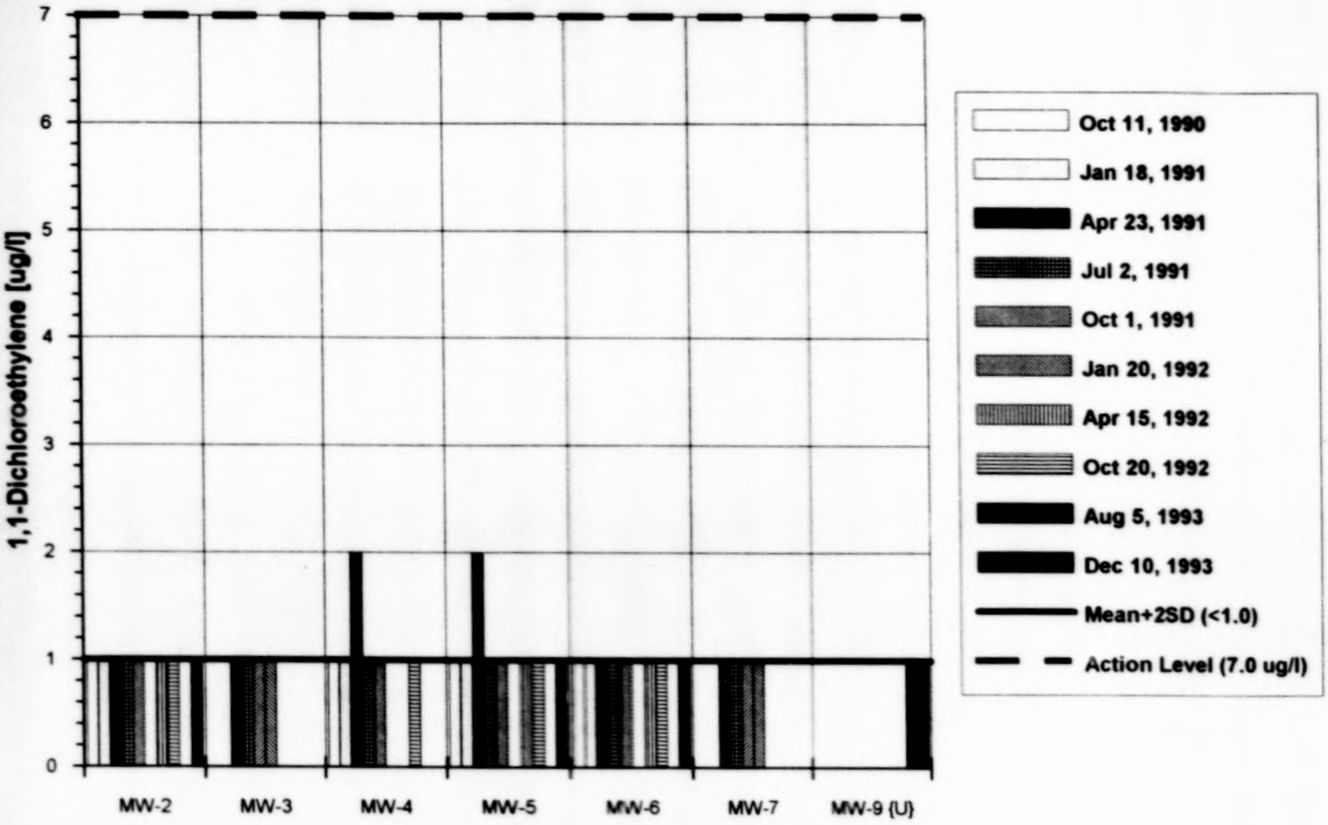

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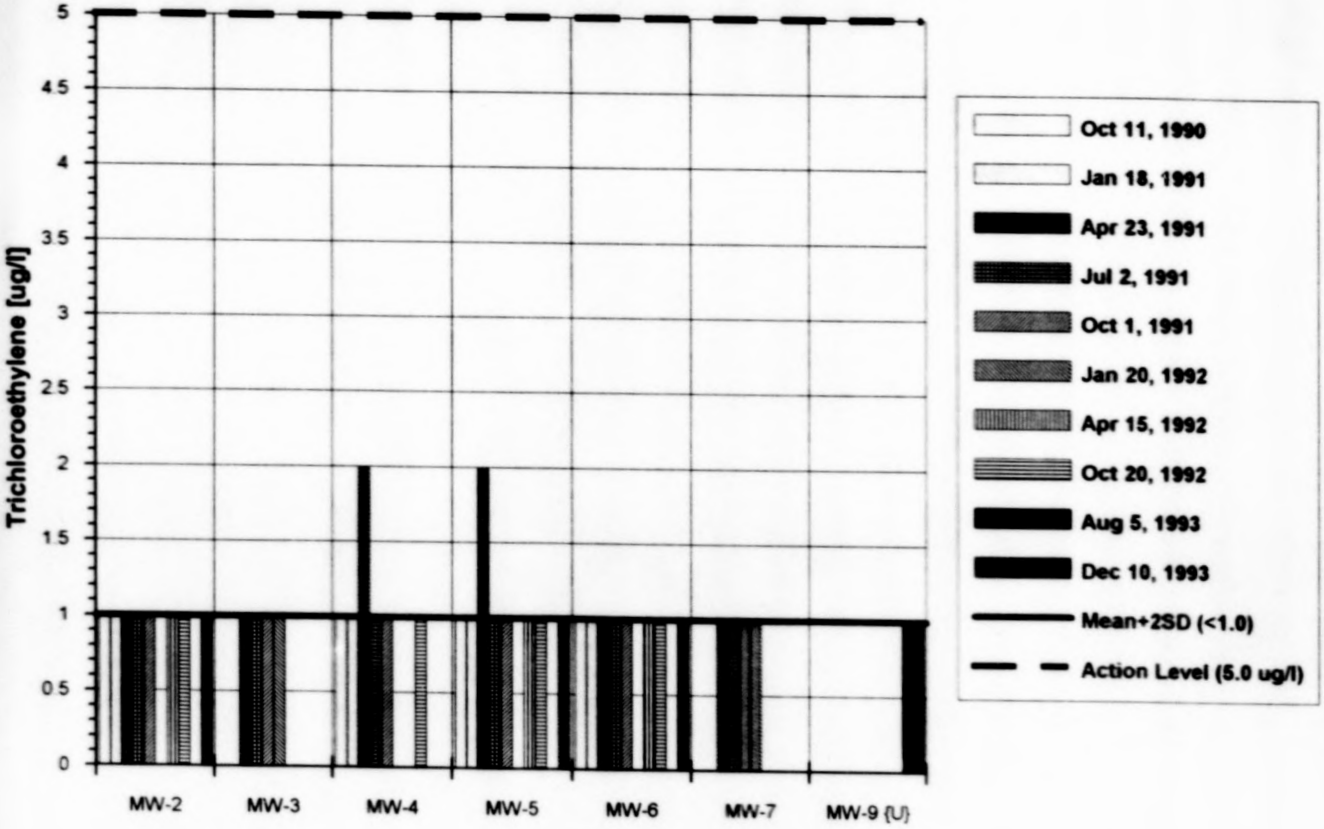

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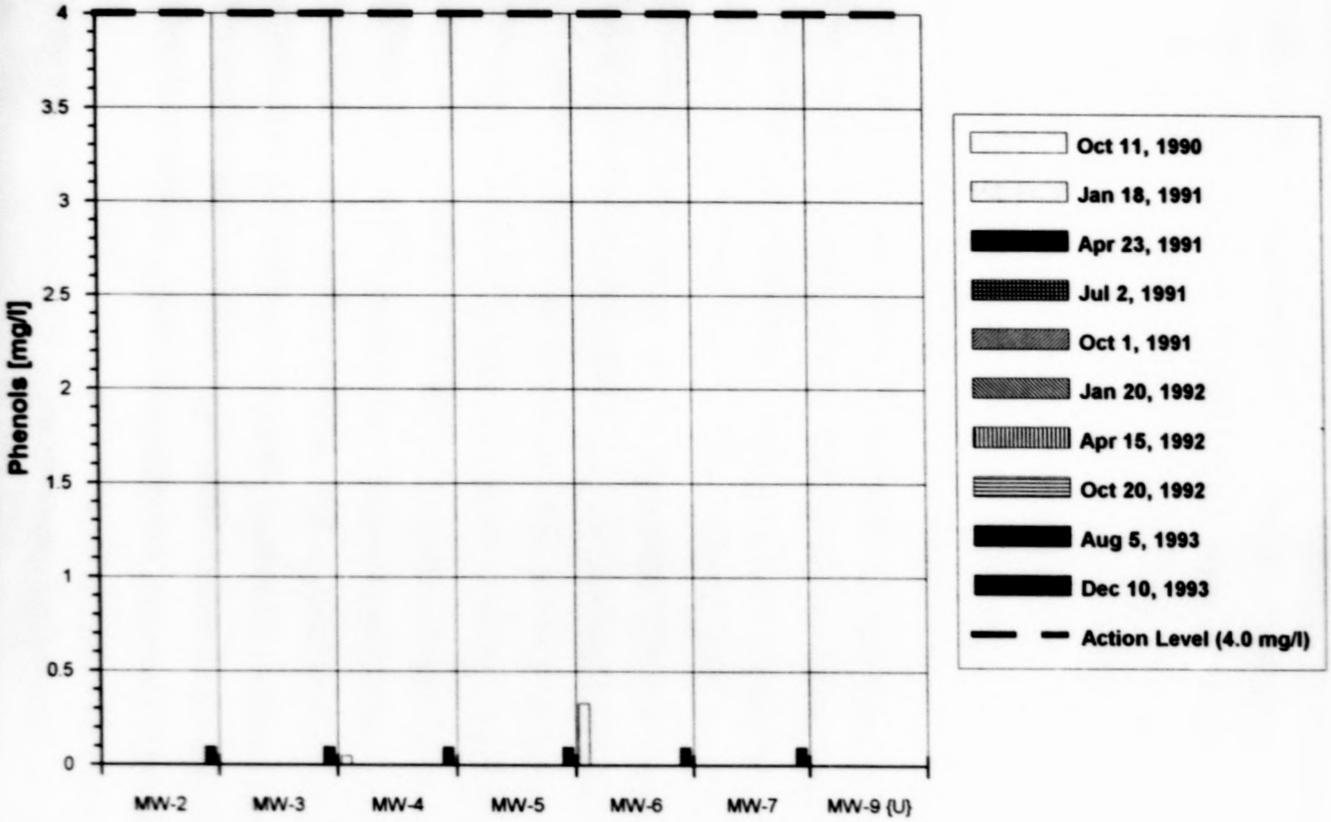

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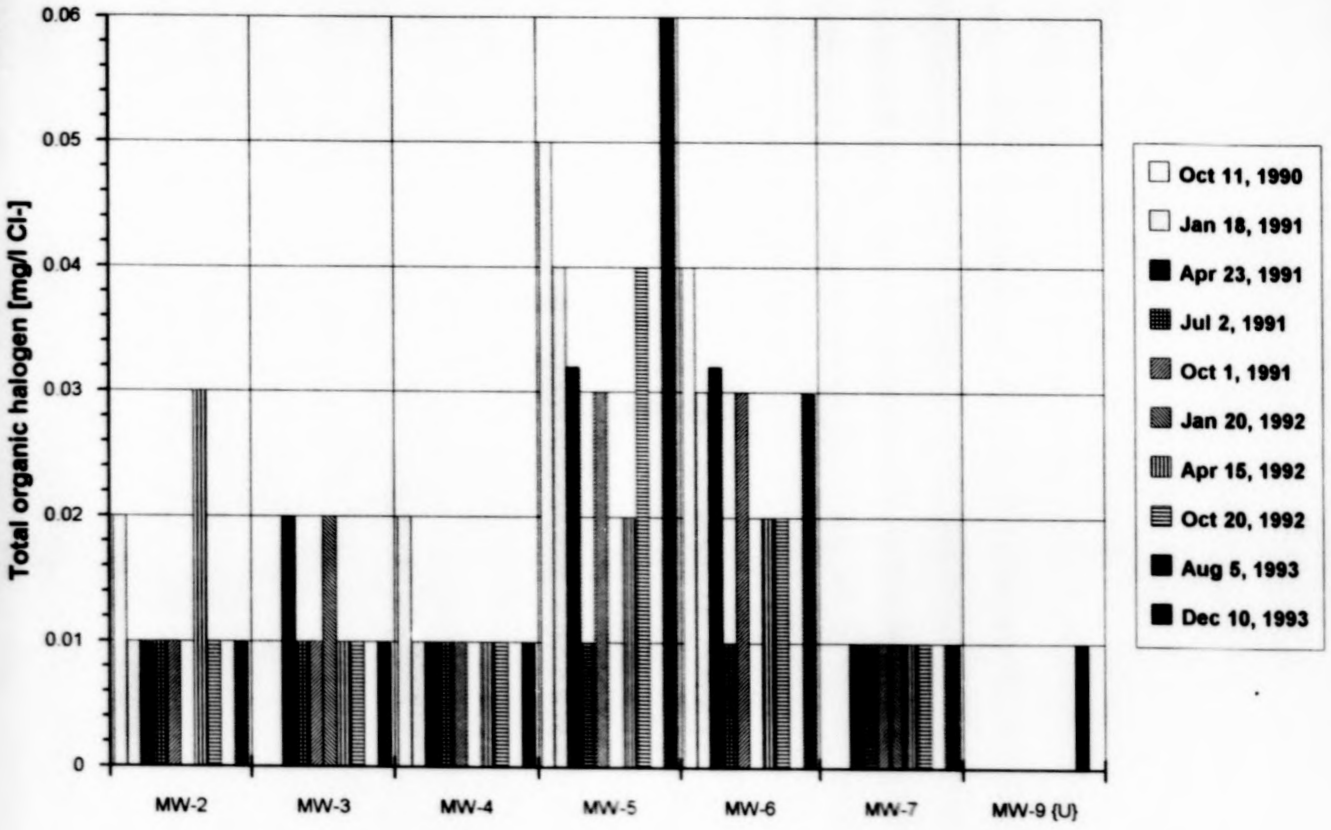

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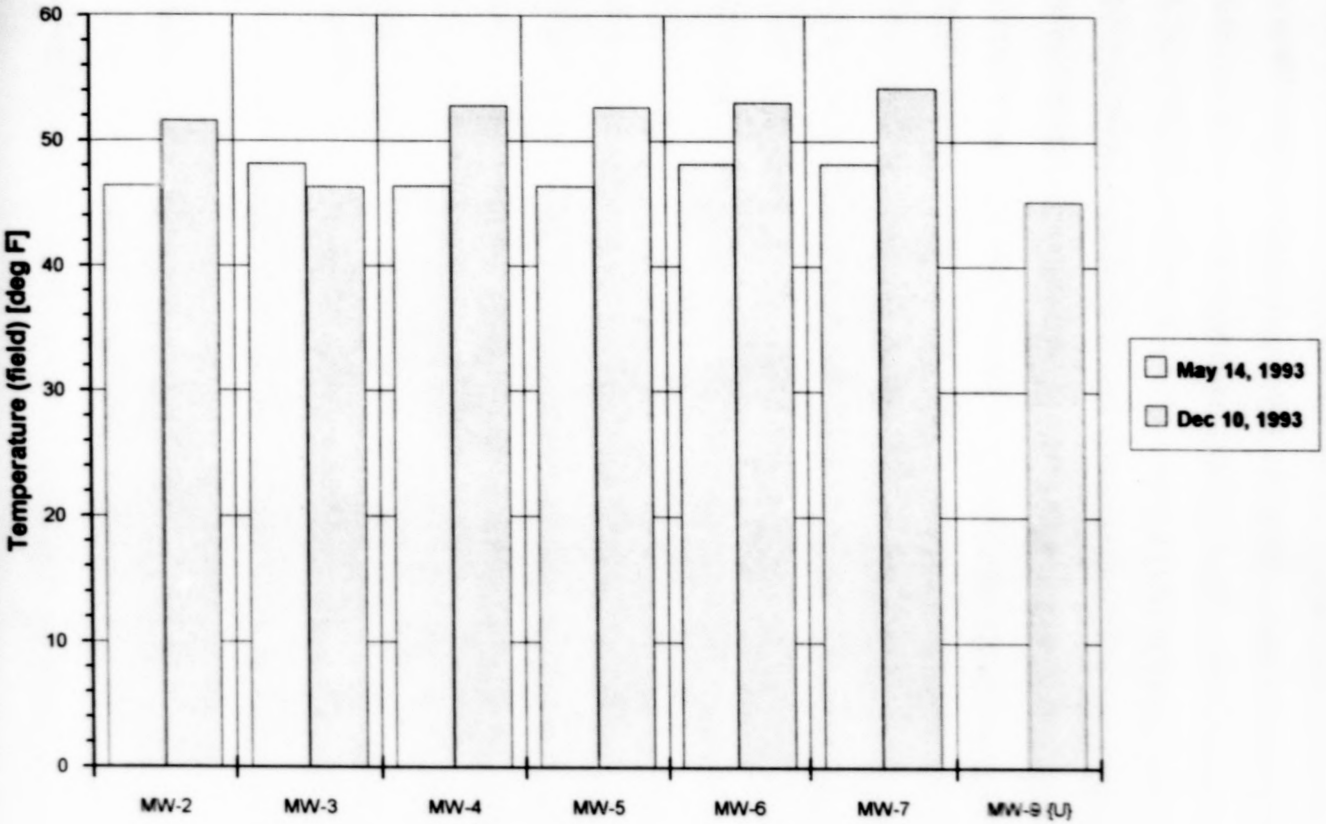

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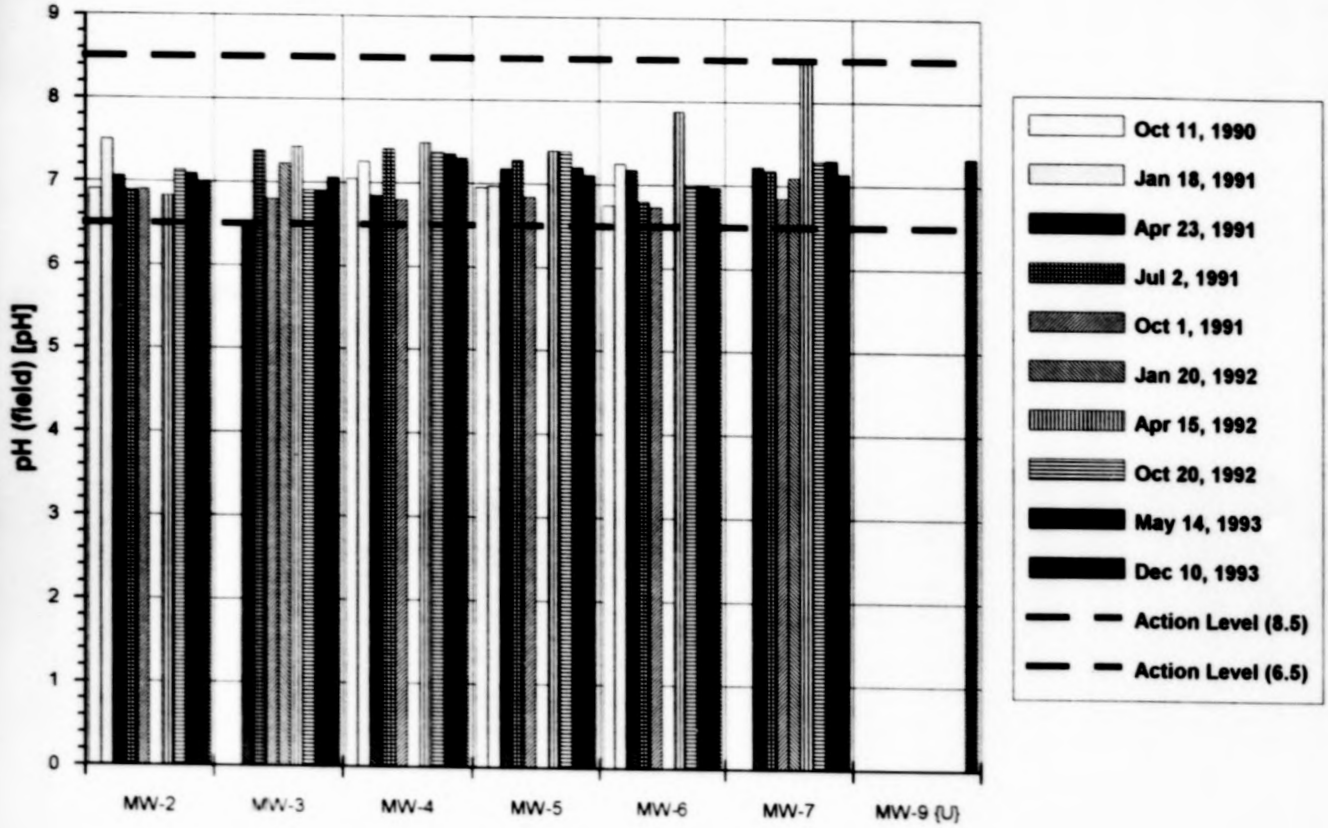
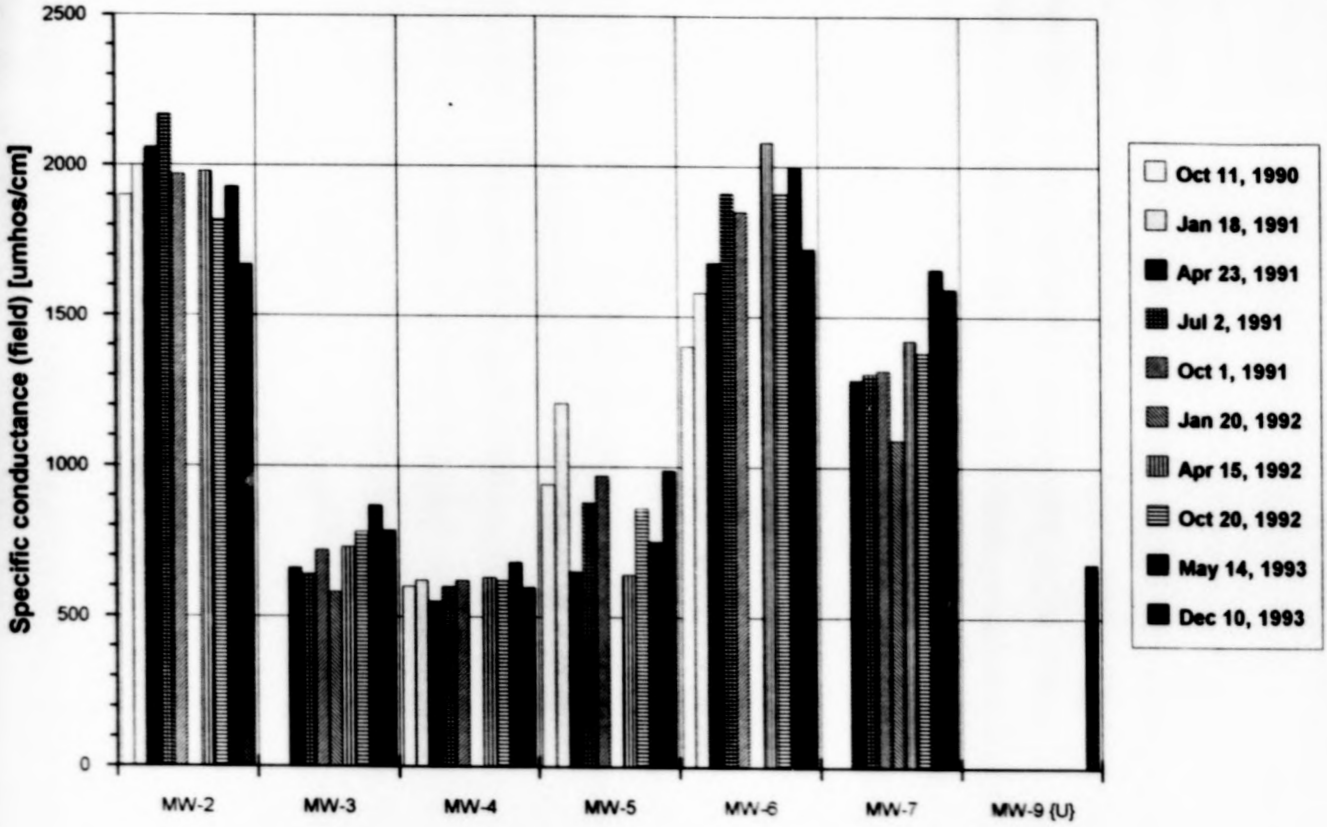


Floyd-Mitchell SLF



66 SDP-01-73P
Corresp File

Iowa Department of Agriculture and Land Stewardship

DALE M. COCHRAN
SECRETARY OF AGRICULTURE

SHIRLEY DANSKIN-WHITE
DEPUTY SECRETARY OF AGRICULTURE

HENRY A. WALLACE BUILDING
DES MOINES, IOWA 50319

March 14, 1994

Ms. Karen Dam-Janovic
Floyd-Mitchell Solid Waste
PO Box Box 32
Osage, IA 50461

Dear Ms. Dam-Janovic:

I have enclosed for your information a copy of the laboratory results for the samples collected from the Floyd-Mitchell Solid Waste landfill on October 25, 1993, by Ken Scott, pesticide investigator, during the Department's follow-up on a pesticide container disposal project.

The laboratory report lists the pesticides for which each sample was analyzed in the first column, the concentrations detected in parts per million (ppm) in the second column, and when applicable, the minimum detection level (MDL) in the third column.

Should you have any further questions, please feel free to contact me at 515/281-8591.

Sincerely,

Mark E Lohafer

Mark E. Lohafer
Field Staff Supervisor

MEL/EAS/o

Enclosure

cc: Ken Scott
Dan Frieberg, IFCA
Lavoy Haage, Supervisor, Solid Waste Section, IDNR

GROUPS\PEST\SANDBE\CRSP\940308.RC

IOWA DEPARTMENT OF AGRICULTURE
& LAND STEWARDSHIP

State Chemical Laboratory
Wallace Bldg., E. 9th and Grand
Des Moines, Iowa 50319

REPORT OF ANALYSIS

Lab. No.	PR-288-93
Sample No.	IA 5019
Date Collected	10/25/93
Date Received	10/26/93
Investigator	K. Scott

Collection Site Information
(Name, Address & Telephone)

Karen Dam Janovic
Floyd-Mitchell Solid Waste
P. O. Box 32
Osage, Iowa 50461

Name, Address & Telephone of Applicator

Description of Sample

1/1 sample/soil, rock & pebbles/container site

Results of Analysis

COMPOUNDS	PPM	MDL
Alachlor	4.7 ppm	
Atrazine	1.8 ppm	
Cyanazine	0.029 ppm	
Dicamba	0.0086 ppm	
2,4-D	None detected	0.006 ppm
Metolachlor	0.19 ppm	
Metribuzin	None detected	0.04 ppm
Pendimethalin	0.23 ppm	
Trifluralin	0.34 ppm	

METHOD OF ANALYSIS: PAM I, 222.13a, version 7/69.

(No. of Determinations - 25)

ANALYSTS: R. Krahn RHK
V. Rongkavilit VR

PPM = parts per million PPB = parts per billion MDL = minimum detection level

Signature of Lab. Supervisor: Roger Bishop Date: 2/24/94

009-0554 PR-6393

OFFICE COPY

66-SDP-1-73P
correspondence

XC: Brian Tormey
RMOD
FYE *
DEC

February 15, 1994

W.M. Jinkinson
Environmental Protection Division
Field Office #2
Box 1443
Mason City, Iowa 50401

Dear Sir:

This letter comprises the written response of the Floyd-Mitchell Solid Waste Management Agency to the inspection of our facility by Jeff Vansteenburg on January 26, 1994.

Recommendations:

1) Consider adding a construction and demolition site to the landfill.

Response: We have instructed our engineer, Rick Yoerger, to include a separate area in the development plan as a C & D site.

2) Contact Sara Lee Corp. about reducing the amount of cardboard waste.

* **Response: A meeting is being planned with representatives from our agency, Sara Lee personnel, and representatives from Comprehensive Systems Recycling to address the issue of recycling more of the cardboard than is presently being done.**

****

Required Actions:

1) Submit all required information to DNR Des Moines per Patricia Schwartz letter dated December 28, 1993. This will enable the department to complete the facilities permit renewal. (Iowa Administrative Code (IAC), Subrule 567-102.1, (455B0 and 102.5 (455B)

* **Response: A letter dated January 25, 1994 was submitted to Patricia Schwartz outlining the response schedule for the required information to complete the facilities permit renewal. (See attached letter.)**

2) Cease disposal of yard waste in the landfill. Develop a policy to control yard waste brought to the facility by waste haulers as well as a plan to deal with yard waste that is found in mixed loads of garbage. (Subrule 567-102.5 (455B), IAC)

* **Response: The agency is in the process of developing a policy that will include a surcharge assessment to any hauler that brings yard waste comingled with the solid waste stream for disposal in the landfill. All haulers will be sent a letter reminding them again of the Administrative rule that prohibits yard waste from the landfill. The haulers will be reminded that it is their responsibilty to remove any yard waste found in mixed loads of garbage and to properly dispose of the yard waste in the area at the landfill designated as the compost site. (This policy to be reviewed by our legal counsel before implementation at the advice of LaVoy Haage)**

66-SDP-1-73P
correspondence

February 15, 1994

W.M. Jinkinson
Environmental Protection Division
Field Office #2
Box 1443
Mason City, Iowa 50401

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2) Cease disposal of yard waste in the landfill. Develop a policy to control yard waste brought to the facility by waste haulers as well as a plan to deal with yard waste that is found in mixed loads of garbage. (Subrule 567-102.11(455B),IAC)

Response: The agency is in the process of developing a policy that will include a surcharge assessment to any hauler that brings yard waste comingled with the solid waste stream for disposal in the landfill. All haulers will be sent a letter reminding them again of the Administrative rule that prohibits yard waste from the landfill. The haulers will be reminded that it is their responsibility to remove any yard waste found in mixed loads of garbage and to properly dispose of the yard waste in the area at the landfill designated as the compost site. (This policy to be reviewed by our legal counsel before implementation at the advice of LeVoy Haage)

FEB 17 3 34 PM '94
NATURAL

3) Sample the petroleum contaminated soil 1/3 months in accordance with the operation permit. (Subrule 567-102.5(4558), IAC)

Response: The agency will sample the petroleum contaminated soil in accordance with the operation permit. Petroleum contaminated soil deposited at the site reserved for that commodity during the winter months will be tested upon thawing. It is difficult, if not impossible, to aerate by disking in the climate we experience in northern Iowa in the winter months.

In summation, the Floyd-Mitchell Solid Waste Management Agency will provide your office with a copy of our policy on controlling yard waste after review and approval of the same by our legal counsel. If there are any questions regarding the responses of our agency, please contact Betty McCarthy.

Sincerely,

Betty McCarthy, chair
Floyd-Mitchell Soild Waste Agency

cc: Patricia Schwartz
Gene Mayer, Director
Bob Roethler, Operator
Jeff Vansteenburg

MIDWEST
ENVIRONMENTAL
CONSULTING

Rick Yoerger P.E.
2441 Cimarron Drive
Marion IA 52302-9792
(319) 377-0334

January 25, 1994

Patricia G. Schwarz
Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand Avenue
Des Moines, IA 50319

Re: Folyd-Mitchell Sanitary Landfill
Permit #66-SDP-1-73P

Dear Patricia:

This letter provides a schedule for addressing the review comments outlined in your December 28,1993, letter. The review comment topics are outlined along with a proposed response schedule.

Review Comment Topics	***Response Schedule***
Leachate Control Plan	January 31, 1994
Permit Application	February 28, 1994
Comprehensive Plan, Part I	April 1, 1994
Development Plans Update	April 30, 1994
Closure/Post Closure Plan	April 30, 1994
Hydrologic Monitoring System Plan	May 31, 1994
All available water quality data has been submitted	January 10, 1994

Patricia, if you have any questions or comments about this schedule please call me at 319-377-0334.

Sincerely,

Rick Yoerger

Rick Yoerger, P.E.

cc: Betty McCarthy

MIDWEST
ENVIRONMENTAL
CONSULTING

Rick Yoerger P.E.
2441 Cimarron Drive
Marion IA 52302-9792
(319) 377-0334

January 28, 1994

Patricia G. Schwarz
Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand Avenue
Des Moines, IA 50319

Re: Floyd-Mitchell Sanitary Landfill
Leachate Control Plan

Dear Patricia:

Enclosed for your review and approval is one copy of the Leachate Control Plan, dated January 1994. Two additional copies will be sent upon request.

Please let me know if you have any questions.

Sincerely,

Rick Yoerger

Rick Yoerger, P.E.

enclosure

cc Betty McCarthy

MIDWEST
ENVIRONMENTAL
CONSULTING

Rick Yoerger P.E.
2441 Cimarron Drive
Marion IA 52302-9792
(319) 377-0334

January 25, 1994

Patricia G. Schwarz
Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand Avenue
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Permit #66-SDP-1-73P

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All available water quality data has been submitted	January 10, 1994

Patricia, if you have any questions or comments about this schedule please call me at 319-377-0334.

Sincerely,

Rick Yoerger

Rick Yoerger, P.E.

cc: Betty McCarthy

Cm 12-1-1 66-SDP-1-73P
Concept SAR

FLOYD-MITCHELL

SOLID WASTE MANAGEMENT AGENCY

PO BOX 32
OSAGE, IOWA 50461

515-982-4288

SPECIAL WASTE AUTHORIZATION LOADS
July 1 to December 31, 1993

	DATE	POUNDS		
HOBSON BROTHERS	7/13	56400		
6601042992	7/14	60920		
	7/15	57220		
	8/05	104460		
	8/06	132920		
	8/09	115360	TOTAL	527280
CHARLES CITY BAR	7/12	8560		
SCREENINGS	9/01	10220		
6601010692	10/13	8180		
	11/22	3960		
	12/21	2660	TOTAL	33580
SOLVAY	8/04	6320		
INCINERATOR ASH	8/11	9860		
6601111991	9/08	6840		
	10/26	9260		
	12/28	8640	TOTAL	40920
F&H ALUMINUM	7/12	37200		
6601031291	8/16	57140		
	9/03	47260		
	9/23	52280		
	10/08	45860		
	10/25	49920		
	11/01	38700		
	11/12	43700		
	11/30	32500		
	12/06	34100		
	12/30	31380	TOTAL	470040

Contaminated Soil 260.55 tons during this time period.

FLOYD-MITCHELL
SOLID WASTE MANAGEMENT AGENCY

Floyd Mitchell Solid Waste Managment Agency
Special Waste Report
07/01/93 to 12/31/93

	DATE	POUNDS	
A-Z DRYING	7/07	2220	
6601010791	7/12	3480	
	7/15	1840	
	7/21	1800	
	8/04	1820	
	8/11	3220	
	8/12	3780	
	8/13	1760	
	8/26	2160	
	9/03	7020	
	9/09	2780	
	10/01	1720	
	10/06	5940	
	10/14	2960	
	10/25	3660	
	11/04	8660	
	11/17	2060	
	11/23	2280	
	12/03	2180	
	12/13	4340	
	12/16	4120	
	12/20	2300	
	12/28	2060	TOTAL 74160
Salsbury Pallets	7/15	5360	
	7/21	8380	
	7/28	5700	
	8/09	5060	
	8/23	6280	
	9/08	5640	
	9/20	4420	
	9/21	4400	
	9/27	3640	
	10/05	3740	
	10/08	4120	
	10/26	4160	
	11/19	4120	
	11/30	4760	
	12/22	4180	TOTAL 73960

CC: DNR Field Office #2
File

66-SDP-1-73P
correspondence

MIDWEST ENVIRONMENTAL CONSULTING

Rick Yoerger P.E.
2441 Cimarron Drive
Marion IA 52302-9792
(319) 377-0334

January 3, 1994

Betty McCarthy
Floyd-Mitchell Solid Waste Management Agency
P.O. Box 32
Osage, IA 50461

Re: Fall 1993 Sampling Results
Floyd-Mitchell Sanitary Landfill

Dear Betty:

Enclosed for your records are the results for the fall 1993 sampling event. Groundwater was sampled and analyzed from MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-9 and MW-10. The samples were collected on December 10, 1993.

The analytical results do not indicate any major violations or unusual findings. The results will be analyzed in greater detail as part of the Annual Water Quality Report (AWQR). The AWQR is the next sampling related activity and with the DNR approved extension, the report is due January 31, 1994.

If there are any questions, please call.

Sincerely,

Rick Yoerger

Rick Yoerger, P.E.

enclosures

cc DNR, Field Office #2
Patricia G. Schwarz, DNR Des Moines

Keystone
LABORATORIES, INC.
Quality ▼ Value ▼ Service

ANALYTICAL REPORT

Rick Younger
Midwest Environmental Consulting
2441 Cimarron Drive

Marion, IA 52302
319-377-8334

Work Order: 9312.217
Date Received: 12/13/93 09:15 AM
Collector: Rick Younger
Collector Phone: 319-377-8334
Report Date: 12/27/93

Floyd-Mitchell SLF

Analyte	Analysis Result		Detection Limit	Method	Analyst	Date Analyzed
9318371 MW-1 : 12/10/93 : water						
Iron, dissolved 7.43	0.367	mg/L	0.03	EPA 6010	LKM	12/27/93
Chemical Oxygen Demand 523	< 14	mg/L	10	EPA 410.4	LAR	12/16/93
Chloride	< 10	mg/L	10	EPA 9252	LAR	12/15/93
Nitrogen, Ammonia	2.4	mg/L	1	EPA 350.3	MGF	12/13/93
Phenols, total	< 0.1	mg/L	0.1	EPA 9065	MGF	12/16/93
Total Organic Halogens (TOX)	< 0.01	mg/L	0.01	EPA 9020	GGD	12/20/93
9318372 MW-3 : 12/10/93 : water						
Iron, dissolved 7.06	< 0.03	mg/L	0.03	EPA 6010	LKM	12/27/93
Chemical Oxygen Demand 736	< 10	mg/L	10	EPA 410.4	LAR	12/16/93
Chloride	< 10	mg/L	10	EPA 9252	LAR	12/15/93
Nitrogen, Ammonia	< 1	mg/L	1	EPA 350.3	MGF	12/13/93
Phenols, total	< 0.1	mg/L	0.1	EPA 9065	MGF	12/16/93
Total Organic Halogens (TOX)	0.01	mg/L	0.01	EPA 9020	GGD	12/20/93
9318373 MW-4 : 12/10/93 : water						
Iron, dissolved 7.30	< 0.03	mg/L	0.03	EPA 6010	LKM	12/27/93
Chemical Oxygen Demand 698	< 10	mg/L	10	EPA 410.4	LAR	12/16/93
Chloride	< 10	mg/L	10	EPA 9252	LAR	12/15/93
Nitrogen, Ammonia	< 1	mg/L	1	EPA 350.3	MGF	12/13/93
Phenols, total	< 0.1	mg/L	0.1	EPA 9065	MGF	12/16/93
Total Organic Halogens (TOX)	< 0.01	mg/L	0.01	EPA 9020	GGD	12/20/93

< = less than; ug/L = ppb; mg/L = ppm; mg/kg = ppm

501 West 3rd Street North Newton Iowa 50208 Toll Free (800)-858-LABS Phone (515) 792-8451 FAX (515) 792-7986

Keystone
LABORATORIES, INC.
Quality ▼ Value ▼ Service

Work Order: 9312.217
Report Date: 12/27/93

Analyte	Analysis Result		Detection Limit	Method	Analyst	Date Analyzed
9318374 MW-7 : 12/10/93 : water						
Iron, dissolved 7.14	< 0.03	mg/L	0.03	EPA 6010	LKM	12/27/93
Chemical Oxygen Demand 1593	< 10	mg/L	10	EPA 410.4	LAR	12/16/93
Chloride	< 10	mg/L	10	EPA 9252	LAR	12/15/93
Nitrogen, Ammonia	< 1	mg/L	1	EPA 350.3	MGF	12/13/93
Phenols, total	< 0.1	mg/L	0.1	EPA 9065	MGF	12/16/93
Total Organic Halogens (TOX)	< 0.01	mg/L	0.01	EPA 9020	GGD	12/20/93
9318375 MW-2 : 12/10/93 : water						
1,1-Dichloroethylene	< 1	ug/L	1	EPA 8260	GGD	12/14/93
1,1,1-Trichloroethane 9.01	< 1	ug/L	1	EPA 8260	GGD	12/14/93
Carbon Tetrachloride 1670	< 0.3	ug/L	0.3	EPA 8260	GGD	12/14/93
Benzene	< 1	ug/L	1	EPA 8260	GGD	12/14/93
1,2-Dichloroethane	< 0.4	ug/L	0.4	EPA 8260	GGD	12/14/93
Trichloroethylene	< 1	ug/L	1	EPA 8260	GGD	12/14/93
1,4-Dichlorobenzene	< 1	ug/L	1	EPA 8260	GGD	12/14/93
Arsenic, dissolved	0.009	mg/L	0.005	EPA 7060	LKM	12/17/93
Barium, dissolved	0.022	mg/L	0.01	EPA 6010	LKM	12/20/93
Cadmium, dissolved	< 0.001	mg/L	0.001	EPA 7131	LAR	12/16/93
Chromium, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Copper, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Iron, dissolved	14.2	mg/L	0.03	EPA 6010	LKM	12/20/93
Lead, dissolved	< 0.005	mg/L	0.005	EPA 7421	LKM	12/17/93
Magnesium, dissolved	67.3	mg/L	0.1	EPA 6010	LKM	12/20/93
Mercury, dissolved	< 0.0005	mg/L	0.0005	EPA 7470	LAR	12/20/93
Zinc, dissolved	0.045	mg/L	0.03	EPA 6010	LKM	12/20/93
Chemical Oxygen Demand	< 10	mg/L	10	EPA 410.4	LAR	12/16/93
Chloride	< 10	mg/L	10	EPA 9252	LAR	12/15/93
Nitrogen, Ammonia	< 1	mg/L	1	EPA 350.3	MGF	12/13/93
Phenols, total	< 0.1	mg/L	0.1	EPA 9065	MGF	12/16/93
Total Organic Halogens (TOX)	< 0.01	mg/L	0.01	EPA 9020	GGD	12/20/93
9318376 MW-5 : 12/10/93 : water						
1,1-Dichloroethylene 7.11	< 1	ug/L	1	EPA 8260	GGD	12/14/93
1,1,1-Trichloroethane 908	< 1	ug/L	1	EPA 8260	GGD	12/14/93
Carbon Tetrachloride	< 0.3	ug/L	0.3	EPA 8260	GGD	12/14/93

< = less than; ug/L = ppb; mg/L = ppm; mg/kg = ppm

501 West 3rd Street North Newton Iowa 50208 Toll Free (800)-858-LABS Phone (515) 792-8451 FAX (515) 792-7986

Keystone
LABORATORIES, INC.
Quality ▼ Value ▼ Service

Work Order: 9312.217
Report Date: 12/27/93

Analyte : Date Collected : Matrix	Analysis Result		Detection Limit	Method	Analyst	Date Analyzed
Benzene	< 1.	ug/L	1.	EPA 8260	GGD	12/14/93
1,2-Dichloroethane	< 0.4	ug/L	0.4	EPA 8260	GGD	12/14/93
Trichloroethylene	< 1.	ug/L	1.	EPA 8260	GGD	12/14/93
1,4-Dichlorobenzene	< 1.	ug/L	1.	EPA 8260	GGD	12/14/93
Arsenic, dissolved	< 0.005	mg/L	0.005	EPA 7060	LKM	12/17/93
Barium, dissolved	0.289	mg/L	0.01	EPA 6010	LKM	12/20/93
Cadmium, dissolved	< 0.001	mg/L	0.001	EPA 7131	LAR	12/16/93
Chromium, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Copper, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Iron, dissolved	0.032	mg/L	0.03	EPA 6010	LKM	12/20/93
Lead, dissolved	< 0.005	mg/L	0.005	EPA 7421	LKM	12/17/93
Magnesium, dissolved	46.4	mg/L	0.1	EPA 6010	LKM	12/20/93
Mercury, dissolved	< 0.0005	mg/L	0.0005	EPA 7470	LKM	12/20/93
Zinc, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Chemical Oxygen Demand	< 10.	mg/L	10.	EPA 410.4	LAR	12/16/93
Chloride	< 10.	mg/L	10.	EPA 9252	LAR	12/15/93
Nitrogen, Ammonia	< 1.	mg/L	1.	EPA 350.3	MGF	12/13/93
Phenols, total	< 0.1	mg/L	0.1	EPA 9065	MGF	12/16/93
Total Organic Halogens (TOX)	0.06	mg/L	0.01	EPA 9020	GGD	12/20/93
9312577 MW-6 : 12/10/93 : water						
1,1-Dichloroethylene	< 1.	ug/L	1	EPA 8260	GGD	12/14/93
1,1,1-Trichloroethane	< 1.	ug/L	1.	EPA 8260	GGD	12/14/93
Carbon Tetrachloride	< 0.3	ug/L	0.3	EPA 8260	GGD	12/14/93
Benzene	< 1	ug/L	1	EPA 8260	GGD	12/14/93
1,2-Dichloroethane	< 0.4	ug/L	0.4	EPA 8260	GGD	12/14/93
Trichloroethylene	< 1	ug/L	1	EPA 8260	GGD	12/14/93
1,4-Dichlorobenzene	< 1.	ug/L	1	EPA 8260	GGD	12/14/93
Arsenic, dissolved	< 0.005	mg/L	0.005	EPA 7060	LKM	12/17/93
Barium, dissolved	0.024	mg/L	0.01	EPA 6010	LKM	12/20/93
Cadmium, dissolved	< 0.001	mg/L	0.001	EPA 7131	LAR	12/16/93
Chromium, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Copper, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Iron, dissolved	10.1	mg/L	0.03	EPA 6010	LKM	12/20/93
Lead, dissolved	< 0.005	mg/L	0.005	EPA 7421	LKM	12/17/93
Magnesium, dissolved	88.1	mg/L	0.1	EPA 6010	LKM	12/20/93

6.97
1925

< = less than; ug/L = ppb; mg/L = ppm; mg/kg = ppm

501 West 3rd Street North Newton, Iowa 50208 Toll Free (800)-858-LABS Phone (515) 792-8451 FAX (515) 792-7989

Keystone
LABORATORIES, INC.
Quality ▼ Value ▼ Service

Work Order: 9312.217
Report Date: 12/27/93

Sample No : Description : Date Collected : Matrix Analyte	Analysis Result		Detection Limit	Method	Analyst	Date Analyzed
Mercury, dissolved	< 0.0005	mg/L	0.0005	EPA 7470	LAR	12/20/93
Zinc, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Chemical Oxygen Demand	< 10.	mg/L	10.	EPA 410.4	LAR	12/16/93
Chloride	< 10.	mg/L	10.	EPA 9252	LAR	12/15/93
Nitrogen, Ammonia	< 1.	mg/L	1.	EPA 350.3	MGF	12/13/93
Phenols, total	< 0.1	mg/L	0.1	EPA 9065	MGF	12/16/93
Total Organic Halogens (TOX)	0.03	mg/L	0.01	EPA 9020	GGD	12/20/93

Keystone Laboratories, Inc.

Jeffrey S. King, Ph.D.

< = less than; ug/L = ppb; mg/L = ppm; mg/kg = ppm

501 West 3rd Street North Newton, Iowa 50208 Toll Free (800)-858-LABS Phone (515) 792-8451 FAX (515) 792-7989

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ANALYTICAL REPORT

Report To

Rick Yoerger
Midwest Environmental Consulting
2441 Cimarron Drive

Marion, IA 52302
319-377-0334
Report Date: 12/21/93

Sample Information

Work Order: 9312.215
Sample No: 9318364
Date Collected: 12/09/93 12:00 AM
Date Received: 12/13/93 09:15 AM
Collector: Rick Yoerger
Collector Phone: 319-377-0334
Matrix: water

Site Information/Sample Description

Floyd-Mitchell SLF

MW-9

Comments

Analyte	Analysis Result		Detection Limit	Method	Analyst	Date Analyzed
1,1-Dichloroethylene	< 1	ug/L	1	EPA 8260	GGD	12/14/93
1,1,1-Trichloroethane	< 1	ug/L	1	EPA 8260	GGD	12/14/93
Carbon Tetrachloride	< 0.3	ug/L	0.3	EPA 8260	GGD	12/14/93
Benzene	< 1	ug/L	1	EPA 8260	GGD	12/14/93
1,2-Dichloroethane	< 0.4	ug/L	0.4	EPA 8260	GGD	12/14/93
Trichloroethylene	< 1	ug/L	1	EPA 8260	GGD	12/14/93
1,4-Dichlorobenzene	< 1	ug/L	1	EPA 8260	GGD	12/14/93
Arsenic, dissolved	< 0.005	mg/L	0.005	EPA 7060	LKM	12/17/93
Barium, dissolved	0.181	mg/L	0.01	EPA 6010	LKM	12/20/93
Cadmium, dissolved	< 0.001	mg/L	0.001	EPA 7131	LAR	12/16/93
Chromium, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Copper, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Iron, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Lead, dissolved	< 0.005	mg/L	0.005	EPA 7421	LKM	12/17/93
Magnesium, dissolved	30.9	mg/L	0.1	EPA 6010	LKM	12/20/93
Mercury, dissolved	< 0.0005	mg/L	0.0005	EPA 7470	LAR	12/13/93
Zinc, dissolved	0.039	mg/L	0.03	EPA 6010	LKM	12/20/93
Chemical Oxygen Demand	< 10	mg/L	10	EPA 410.4	LAR	12/16/93
Chloride	< 10	mg/L	10	EPA 9252	LAR	12/15/93
Nitrogen, Ammonia	< 1	mg/L	1	EPA 350.3	MGF	12/13/93

< = less than, ug/L = ppb, mg/L = ppm, mg/kg = ppm

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ANALYTICAL REPORT

Report To

Rick Yoerger
Midwest Environmental Consulting
2441 Cimarron Drive

Marion, IA 52302
319-377-0334
Report Date: 12/21/93

Sample Information

Work Order: 9312.215
Sample No: 9318365
Date Collected: 12/09/93 12:00 AM
Date Received: 12/13/93 09:15 AM
Collector: Rick Yoerger
Collector Phone: 319-377-0334
Matrix: water

Site Information/Sample Description

Floyd-Mitchell SLF

MW-10

Comments

Analyte	Analysis Result		Detection Limit	Method	Analyst	Date Analyzed
1,1-Dichloroethylene	< 1	ug/L	1	EPA 8260	GGD	12/14/93
1,1,1-Trichloroethane	< 1	ug/L	1	EPA 8260	GGD	12/14/93
Carbon Tetrachloride	< 0.3	ug/L	0.3	EPA 8260	GGD	12/14/93
Benzene	1.5	ug/L	1	EPA 8260	GGD	12/14/93
1,2-Dichloroethane	< 0.4	ug/L	0.4	EPA 8260	GGD	12/14/93
Trichloroethylene	< 1	ug/L	1	EPA 8260	GGD	12/14/93
1,4-Dichlorobenzene	< 1	ug/L	1	EPA 8260	GGD	12/14/93
Arsenic, dissolved	< 0.005	mg/L	0.005	EPA 7060	LKM	12/17/93
Barium, dissolved	0.187	mg/L	0.01	EPA 6010	LKM	12/20/93
Cadmium, dissolved	< 0.001	mg/L	0.001	EPA 7131	LAR	12/16/93
Chromium, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Copper, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Iron, dissolved	0.339	mg/L	0.03	EPA 6010	LKM	12/20/93
Lead, dissolved	< 0.005	mg/L	0.005	EPA 7421	LKM	12/17/93
Magnesium, dissolved	23.5	mg/L	0.1	EPA 6010	LKM	12/20/93
Mercury, dissolved	< 0.0005	mg/L	0.0005	EPA 7470	LAR	12/13/93
Zinc, dissolved	< 0.03	mg/L	0.03	EPA 6010	LKM	12/20/93
Chemical Oxygen Demand	< 10	mg/L	10	EPA 410.4	LAR	12/16/93
Chloride	< 10	mg/L	10	EPA 9252	LAR	12/15/93
Nitrogen, Ammonia	1.9	mg/L	1	EPA 350.3	MGF	12/13/93

< = less than, ug/L = ppb, mg/L = ppm, mg/kg = ppm

501 West 3rd Street North Newton Iowa 50208 Toll Free (800) 858-LABS Phone (515) 792-8451 FAX (515) 792-7989

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name Elmore-Mitchell SLF Permit No. _____

Monitoring Well/Piezometer No. MW-1 Upgradient _____ Downgradient ✓

Name of person sampling Rick Yoerger

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? Yes Standing Water or Litter? No
If no, explain _____ If yes, explain _____

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)

Elevation: Top of inner well casing _____ Ground Elevation _____
Depth of Well _____ Inside Casing Diameter (in inches) 2"
Equipment Used Solinst

Groundwater Level (± 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	12/9/92 9:55 AM	24.32	
*After Purging	12/9/92 3:40 PM	34.3	
*Before Sampling	12/10/92 8:?? AM	34.51	
well depth		93.96	

*C. WELL PURGING

Quantity of Water Removed from Well (gallons) 28 gallons
No. of Well Volumes (based on current water level) 2.8 gallons
Was well pumped/bailed dry? No

Equipment used:
Bailer type _____ Dedicated Bailer? _____
Pump type _____ Dedicated Pump? Yes - Waterra
If not dedicated, method of cleaning _____

*D. FIELD MEASUREMENT

Weather Conditions Overcast 30°s
Field Measurements (after stabilization):
Temperature 50.6 Units °F
Equipment Used Hydac
pH 7.43
Equipment Used "
Specific Cond. 223 Units µS/cm
Equipment Used "

Comments _____

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

(June - 1989) 542-1322

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name Elmore-Mitchell SLF Permit No. _____

Monitoring Well/Piezometer No. MW-2 Upgradient _____ Downgradient ✓

Name of person sampling Rick Yoerger

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? Yes Standing Water or Litter? No
If no, explain _____ If yes, explain _____

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)

Elevation: Top of inner well casing _____ Ground Elevation _____
Depth of Well _____ Inside Casing Diameter (in inches) 4"
Equipment Used Solinst

Groundwater Level (± 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	12/9/92 10:?? AM	7.50	
*After Purging	12/9/92 3:05 PM	21.70	
*Before Sampling	12/10/92 9:?? AM	14.51	
Well Depth		31.04	

*C. WELL PURGING

Quantity of Water Removed from Well (gallons) 48 Gallons
No. of Well Volumes (based on current water level) 4? gallons
Was well pumped/bailed dry? No

Equipment used:
Bailer type _____ Dedicated Bailer? _____
Pump type _____ Dedicated Pump? Yes, Waterra
If not dedicated, method of cleaning _____

*D. FIELD MEASUREMENT

Weather Conditions Overcast - 30°.
Field Measurements (after stabilization):
Temperature 51.6 Units °F
Equipment Used Hydac
pH 7.01
Equipment Used "
Specific Cond. 620 Units µS/cm
Equipment Used "

Comments Purged with 1½" S.S. Waterra pump

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

(June - 1989) 542-1322

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name *Floyd-Mitchell SLF* Permit No. ______

Monitoring Well/Piezometer No. *MW-3* Upgradient ______ Downgradient *✓*

Name of person sampling *Rick Yoerger*

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? *Yes* Standing Water or Litter? *No*
If no, explain ______ If yes, explain ______

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)

Elevation: Top of inner well casing ______ Ground Elevation ______
Depth of Well ______ Inside Casing Diameter (in inches) *2"*
Equipment Used *Solinst*

Groundwater Level (± 0.01 foot below top of inner casing, MSL): *2"* *4.8 gal*

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	*12/9/93 10:20 AM*	*12.40*	
*After Purging	*12/9/93 3:53 PM*	*19.15*	
*Before Sampling	*12/10/93 8:20 AM*	*16.15*	
Well Depth		*22.55*	

*C. WELL PURGING

Quantity of Water Removed from Well (gallons) *5.0*
No. of Well Volumes (based on current water level) *4.8 gal*
Was well pumped/bailed dry? ______

Equipment used:
Bailer type ______ Dedicated Bailer? ______
Pump type ______ Dedicated Pump? *Yes - Waterra*
If not dedicated, method of cleaning ______

*D. FIELD MEASUREMENT

Weather Conditions *Overcast 30°'s*
Field Measurements (after stabilization):
Temperature *46.3* Units *°F*
Equipment Used *Hydac*
pH *7.06*
Equipment Used *"*
Specific Cond. *796* Units *u/cm*
Equipment Used *"*

Comments ______

NOTE: Attach Laboratory Report and 8-1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name *Floyd-Mitchell SLF* Permit No. ______

Monitoring Well/Piezometer No. *MW-4* Upgradient ______ Downgradient *✓?*

Name of person sampling *Rick Yoerger*

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? *Yes* Standing Water or Litter? *No*
If no, explain ______ If yes, explain ______

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)

Elevation: Top of inner well casing ______ Ground Elevation ______
Depth of Well ______ Inside Casing Diameter (in inches) *4"Ø*
Equipment Used *Solinst*

Groundwater Level (± 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	*12/9/93*	*9.86*	
*After Purging	*12/9/93 1:15 PM*	*26.0*	
*Before Sampling	*12/10/93 12:25 PM*	*9.91*	
Well Depth		*32.1*	

*C. WELL PURGING

Quantity of Water Removed from Well (gallons) *45 gallons*
No. of Well Volumes (based on current water level) *45 gallons*
Was well pumped/bailed dry? *No*

Equipment used:
Bailer type ______ Dedicated Bailer? ______
Pump type *1½" Ø suction - 485* Dedicated Pump? *Yes - Waterra*
If not dedicated, method of cleaning *[illegible]*

*D. FIELD MEASUREMENT

Weather Conditions *Overcast - 30's*
Field Measurements (after stabilization):
Temperature *53.8* Units *°F*
Equipment Used *Hydac*
pH *7.30*
Equipment Used ______
Specific Cond. *878* Units *u/cm*
Equipment Used ______

Comments *Purged with suction pump*

NOTE: Attach Laboratory Report and 8-1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name Fisher-Mitchell SLF Permit No. _____

Monitoring Well/Piezometer No. MW-5 Upgradient _____ Downgradient ✓

Name of person sampling Rick Goerger

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? Yes Standing Water or Litter? No
If no, explain _____ If yes, explain _____

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)

Elevation: Top of inner well casing _____ Ground Elevation _____
Depth of Well _____ Inside Casing Diameter (in inches) 4"
Equipment Used Solinst

Groundwater Level (± 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	12/1/93 9:01 AM	2.35	
*After Purging	12/1/93 12:25 PM	15.2	
*Before Sampling	12/1/93 1430 PM	9.37	
Depth of Well		31.65	

*C. WELL PURGING

Quantity of Water Removed from Well (gallons) 44 gal
No. of Well Volumes (based on current water level) 44 gal
Was well pumped/bailed dry? No

Equipment used:
Bailer type _____ Dedicated Bailer? _____
Pump type 3" Grundfos - 485 Dedicated Pump? Yes - Waterra
If not dedicated, method of cleaning Alconox wash, double rinse

*D. FIELD MEASUREMENT

Weather Conditions Overcast 30's
Field Measurements (after stabilization):
Temperature 12.7 Units °F
Equipment Used Hydac
pH 7.11
Equipment Used _____
Specific Cond. 986 Units µmhos/cm
Equipment Used _____

Comments Purged with Waterra pump

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

(June - 1989) 542-1322

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name Fisher-Mitchell SLF Permit No. _____

Monitoring Well/Piezometer No. MW-6 Upgradient _____ Downgradient ✓

Name of person sampling Rick Goerger

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? Yes Standing Water or Litter? No
If no, explain _____ If yes, explain _____

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)

Elevation: Top of inner well casing _____ Ground Elevation _____
Depth of Well _____ Inside Casing Diameter (in inches) 4"
Equipment Used Solinst

Groundwater Level (± 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	12/1/93 9:25 AM	10.2	
*After Purging	12/1/93 2:30 PM	12.-	
*Before Sampling	12/1/93 1430 PM	13.64	
Well depth		39.7	

*C. WELL PURGING

Quantity of Water Removed from Well (gallons) 43 gallons
No. of Well Volumes (based on current water level) 22.7 volumes
Was well pumped/bailed dry? No

Equipment used:
Bailer type _____ Dedicated Bailer? yes - Waterra
Pump type 3" Grundfos - 485 Dedicated Pump? _____
If not dedicated, method of cleaning Alconox wash, double rinse

*D. FIELD MEASUREMENT

Weather Conditions Overcast 30's
Field Measurements (after stabilization):
Temperature 53.1 Units °F
Equipment Used Hydac
pH 6.97
Equipment Used _____
Specific Cond. 1728 Units µmhos/cm
Equipment Used _____

Comments Purged with Waterra pump

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

(June - 1989) 542-1322

e,f

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name Floyd Mitchell SLF Permit No. ____

Monitoring Well/Piezometer No. MW-7 Upgradient ____ Downgradient ✓

Name of person sampling Rick Yoeger

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? Yes Standing Water or Litter? No
If no, explain ____ If yes, explain ____

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)

Elevation: Top of inner well casing ____ Ground Elevation ____
Depth of Well ____ Inside Casing Diameter (in inches) 2"
Equipment Used Solinst

Groundwater Level (± 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	12/1/93 9:35 AM	9.85	
*After Purging	12/1/93 2:30 PM	17.20	
*Before Sampling	12/1/93 10:00 AM	11.31	
Well depth		22.66	

*C. WELL PURGING

Quantity of Water Removed from Well (gallons) ____
No. of Well Volumes (based on current water level) 6.1 gal
Was well pumped/bailed dry? ____

Equipment used:
Bailer type ____ Dedicated Bailer? ____
Pump type ____ Dedicated Pump? Yes - Waterra
If not dedicated, method of cleaning ____

*D. FIELD MEASUREMENT

Weather Conditions Overcast 30°'s
Field Measurements (after stabilization):
Temperature 54.3 Units °F
Equipment Used Hydac
pH 7.8
Equipment Used "
Specific Cond. 1593 Units µs/cm
Equipment Used "

Comments ____

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

Sat d,c

FORM FOR
GROUNDWATER SAMPLING AND/OR
GROUNDWATER ELEVATION MEASUREMENT

Site Name Floyd Mitchell SLF Permit No. ____

Monitoring Well/Piezometer No. MW-9 Upgradient ✓ Downgradient ____

Name of person sampling Rick Yoeger

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? Yes Standing Water or Litter? No
If no, explain ____ If yes, explain ____

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)

Elevation: Top of inner well casing ____ Ground Elevation ____
Depth of Well ____ Inside Casing Diameter (in inches) 2"
Equipment Used Solinst

Groundwater Level (± 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	12/1/93 9:20 AM	6.7	
*After Purging	12/1/93 12:37 PM	30.2	
*Before Sampling	12/1/93 9:10 PM	27.3	
Well depth		32.62	

*C. WELL PURGING

Quantity of Water Removed from Well (gallons) 11 gal
No. of Well Volumes (based on current water level) 2.5 gal
Was well pumped/bailed dry? yes

Equipment used:
Bailer type ____ Dedicated Bailer? ____
Pump type ____ Dedicated Pump? Yes - Waterra
If not dedicated, method of cleaning ____

*D. FIELD MEASUREMENT

Weather Conditions Overcast 30's
Field Measurements (after stabilization):
Temperature 45.2 Units °F
Equipment Used Hydac
pH 7.33
Equipment Used "
Specific Cond. 279 Units µs/cm
Equipment Used "

Comments ____

NOTE: Attach Laboratory Report and 8-12" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.

West 4,2

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name Floyd Mitchell SLF Permit No. ______

Monitoring Well/Piezometer No. MW-10 Upgradient ✓
Downgradient ______

Name of person sampling Rick Greiger

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Properly Capped? Yes Standing Water or Litter? No
If no, explain ______ If yes, explain ______

B. GROUNDWATER ELEVATION MEASUREMENT (± 0.01 foot, MSL)

Elevation: Top of inner well casing ______ Ground Elevation ______
Depth of Well ______ Inside Casing Diameter (in inches) 2"6
Equipment Used Solinst

Groundwater Level (± 0.01 foot below top of inner casing, MSL):

	Date/Time	Depth to Groundwater	Groundwater Elevation
Before Purging	12/5/93 9:10 AM	61.7'	
*After Purging	12:01 PM	61.81'	
*Before Sampling	12/5/93 3:00 PM	61.46	
Well depth		144.7	

***C. WELL PURGING**

Quantity of Water Removed from Well (gallons) 40 gal
No. of Well Volumes (based on current water level) 39.1 [illegible]
Was well pumped/bailed dry? No

Equipment used:
Bailer type ______ Dedicated Bailer? ______
Pump type ______ Dedicated Pump? yes - Waterra
If not dedicated, method of cleaning ______

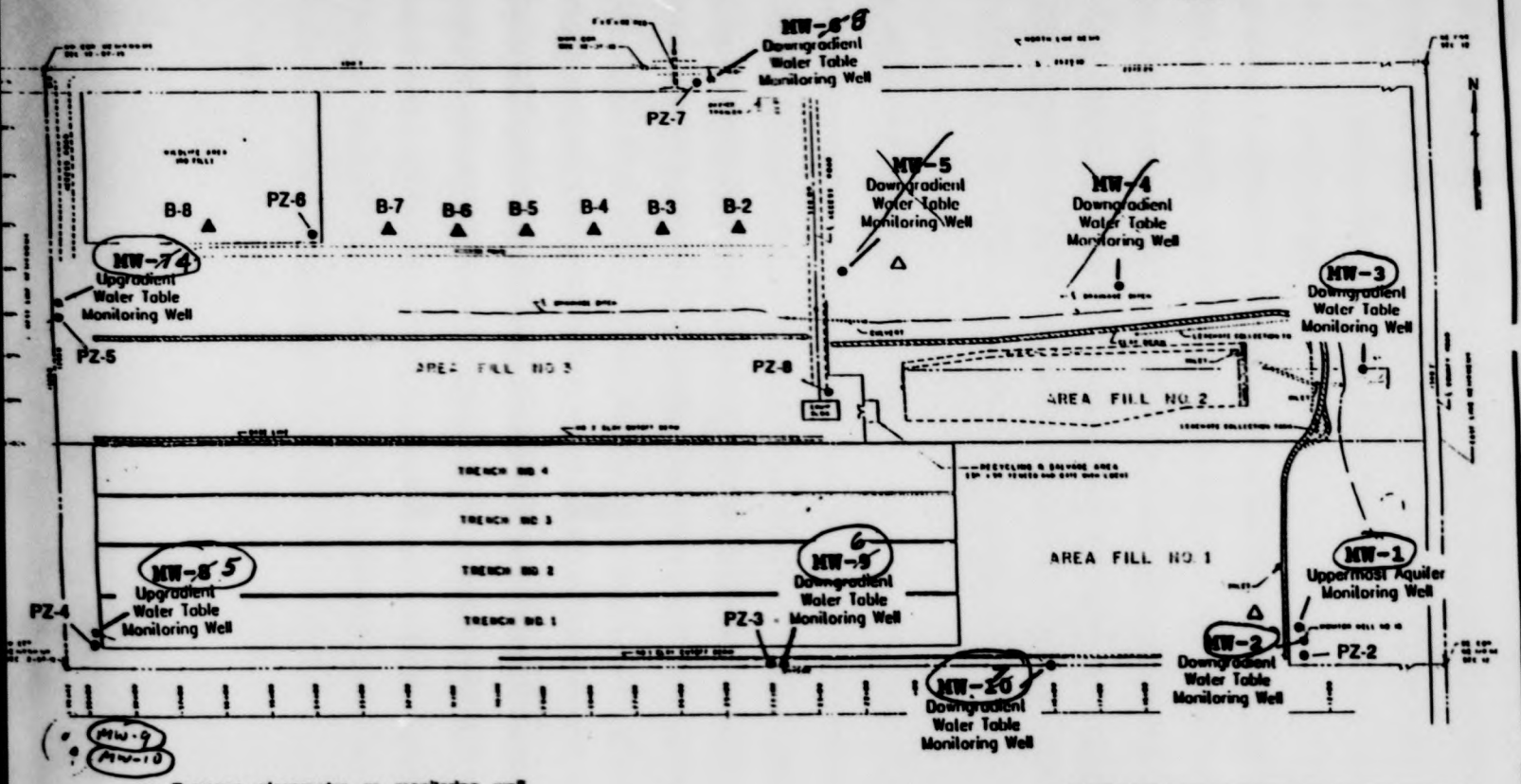
***D. FIELD MEASUREMENT**

Weather Conditions Overcast 30's
Field Measurements (after stabilization):
Temperature 49.7 Units °F
Equipment Used Hydac
pH 7.59
Equipment Used ______
Specific Cond. 499 Units us/cm
Equipment Used ______

Comments ______

NOTE: Attach Laboratory Report and 8-1/2" x 11" site plan showing locations of all surface and groundwater monitoring points. One map per sampling round.

*Omit if only measuring groundwater elevations.



- Terracon piezometer or monitoring well
- ▲ Terracon soil boring
- • Pre-existing monitoring well
- △ Pre-existing soil boring

0 500

Scale in Feet

Figure modified after WHKS & Co.

FIGURE 5.
WATER TABLE AND UPPERMOST AQUIFER MONITORING WELLS
FLOYD–MITCHELL LANDFILL
SOUTHEASTERN MITCHELL COUNTY
JOB # 40895057

Terracon

Corresp
RECORD COPY
File Name 66-SDP-1-73P
Senders Initials DA

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

December 28, 1993

Betty McCarthy, Chairperson
Floyd-Mitchell Solid Waste Board
R.R.5
Osage, IA 50461

Re: Floyd-Mitchell Sanitary Landfill
Permit #66-SDP-1-73P

Dear Ms. McCarthy:

We received a letter dated December 1, 1993 from Rick Yoerger requesting an extension for completing the Floyd-Mitchell Landfill Annual Water Quality Report from November 30, 1993 to January 31, 1994. This extension is hereby approved. The letter also provided an update for design completion of the Leachate Control Plan by January 31, 1994.

To assist you as you proceed toward permit renewal, the Department has conducted a review of the Floyd-Mitchell Sanitary Landfill file. The following review comments are provided:

Permit Application:

We received your permit application with the attached proof of legal entitlement on June 30, 1992. By letter dated May 11, 1993, you requested that the city of LeRoy, Minnesota be added to your service area. Please, complete and submit the enclosed Form 45 to reflect the change in service area and waste quantities, consistent with your subsequent Comprehensive Plan. You do not need to resubmit proof of site ownership.

Comprehensive Plan, Part I:

The Waste Management Division provided review comments of your subsequent Comprehensive Plan by letter dated September 27, 1993. A response to these review comments was due on or before December 23, 1993.

Development Plans Update:

Provide the Department with updated, detailed design and operational plans (DOPs) and specifications for at least the three year term of the permit. The need for DOPs updating was previously addressed in our letter to you dated May 24, 1993. Key elements must include current fill locations and elevations, detailed development sequence shown progressively with time, soil stockpile and wet weather stockpile locations, location of the wet weather area, leachate control plan elements, current storage locations for all salvaged materials, erosion control, surface water runoff and run-on control, and final grading. Compare your currently approved plans with IAC Chapter 103 and supply all information that is not included in your currently approved plans.

Please also consider providing drainage terraces and intermediate let down structures in the areas that are currently designed at a 25% slope. Intermediate let down structures should be provided to minimize water residence time, consistent with erosion control requirements. This design will minimize soil erosion and assist you in long term maintenance of the 25% slopes. Any drainage structures proposed must be designed to meet the 25 year, 24 hour rainfall event.

Hydrologic Monitoring System Plan (HMSP):

Your HMSP was approved on September 12, 1990 and revised by letter dated April 9, 1991. It is our understanding that you installed two additional upgradient wells in 1993 after suspecting that the existing upgradient wells 4 and 5 have been impacted by the landfill. Provide the monitoring well identification and documentation forms, sample schedule and HMSP revisions to reflect the addition of these wells and the deletion of unused monitoring wells. You may also need an additional monitoring well to monitor the water table downgradient of the leachate storage facility, if will be located outside of the current monitoring envelope. Please include your revised sampling order and a revised Figure 5 indicating the monitoring well identification and locations. Submit the noted HMSP revisions so that their approval can be incorporated into the approved plans by permit amendment.

A review of the file also indicated that we have not received any water quality monitoring data for MW1 through MW-8 since May of 1992. Provide this data for the October 1992, April 1993, and October 1993 routine semiannual sample events. Also

provide all sample data for the newly installed monitoring wells.

Leachate Control Plan (LCP):

Rick Yoerger's letter dated December 1, 1993, indicates that a revised LCP will be submitted by January 31, 1993. Because your previous LCP submittals will be outdated and have been found to be in error by Mr. Yoerger, we are hereby returning your preliminary LCP submittals for your use or disposal. Your revised LCP should be submitted as a complete separate document.

The revised LCP must meet the requirements of IAC 103.2(12) to address removal of leachate exceeding one foot of head in the existing fill areas. We require that you include justification for a lesser than five foot separation between the waste and the high water table in your LCP. We also wish to remind you that an approved LCP must be implemented by July 1, 1994.

Closure/Post Closure Plan:

We received two copies of your revised C/PC Plan on September 7, 1993 from RUST Engineers. The report is still missing the required evidence that the plan has been reviewed by the local soil conservation district commissioner. In addition, we ask that the plan be amended to include the monitoring system and leachate control system operational requirements for the C/PC period, and any modifications to your erosion control plan necessary to be consistent with your revised DOPs.

A vertical expansion in Areas 1 and 2 has not yet been proposed or approved, and this expansion will not be initiated in the near future. Therefore, you must demonstrate that the existing cover slope and thickness have been constructed in accordance with the approved plans and specifications or the rules in effect at the time of completion of these areas. Core samples must be completed on a 100'x100' grid pattern to demonstrate cover thickness. This documentation shall be included in your C/PC Plan. Any areas deficient in thickness of cover or areas not adequately sloped must be defined and repaired as promptly as possible.

With the exceptions noted above, the C/PC Plan is approvable. You may provide C/PC Plan revised pages and plan sheets as needed plus an additional copy of the complete C/PC Plan, or you may submit three complete copies of your final C/PC Plan. All revisions and the final cover documentation must be

certified by a Professional Engineer registered in Iowa. We are returning the outdated copies of your C/PC Plans received on April 21 and May 17 of 1993 for your use or disposal.

Schedule:

Submit all specified documentation as a response to these review comments by January 31, 1994. Once these issues are addressed, we will initiate permit renewal.

Please, feel free to contact me at (515) 281-8899 if you have any questions about these review comments or the requirements for permit renewal.

Sincerely,

Patricia G. Schwarz
Environmental Engineer
Solid Waste Section

PGS:pgs\floyd.rev

enclosure Form 45

cc: Field Office 2

Rick Yoerger, P.E.
Midwest Environmental Consulting
2441 Cimarron Drive
Marion, Iowa 52302

[redacted]

Doc H
Cindy T
Dell
Rick ; Approved for

See attached
LCP proposal...

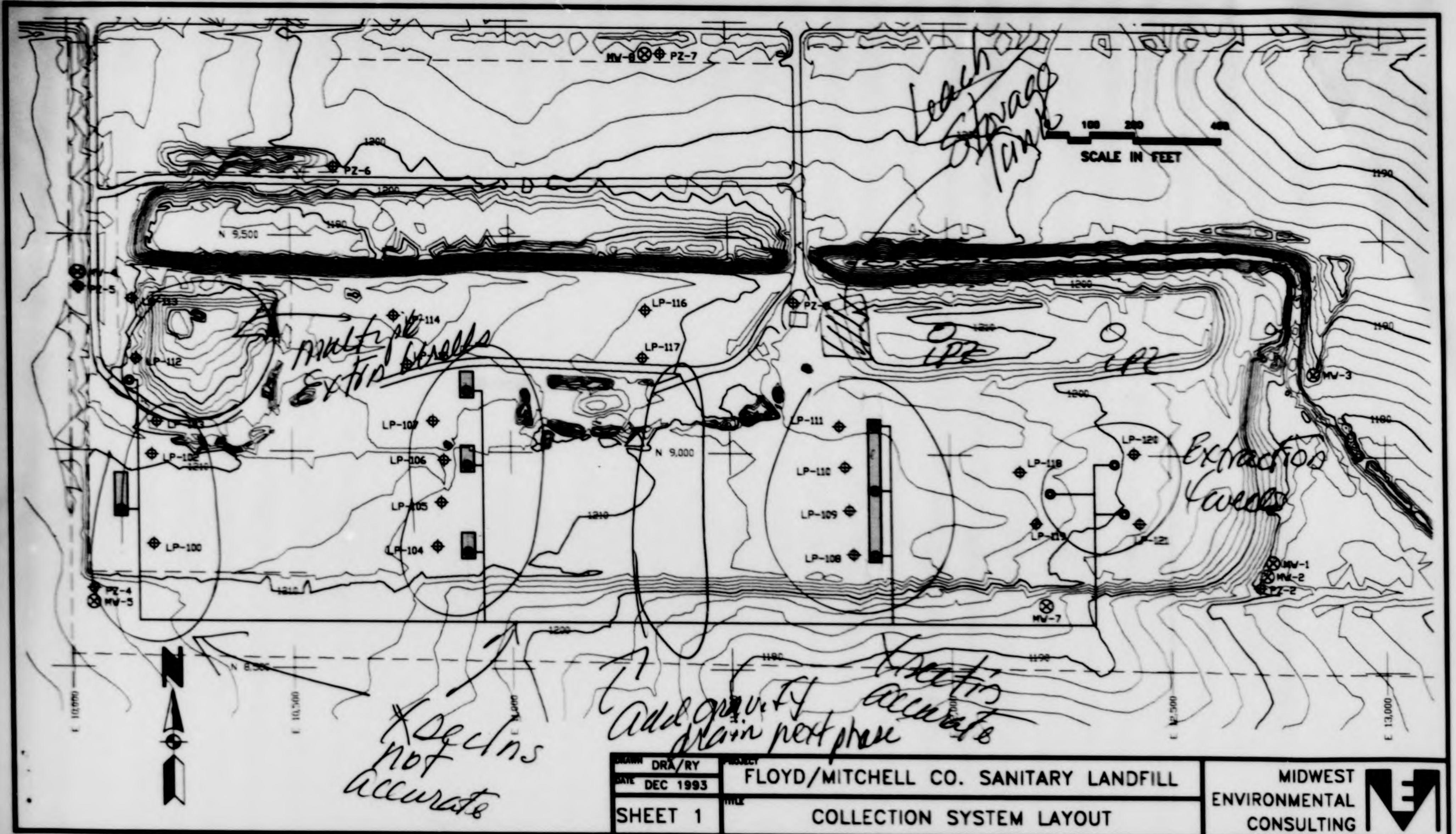
Keys —
Rust LCP xsections not accurate
and need to change leach
removal plans... not all
gravity reasonable in deep waste
areas (E & NW areas)...
use pumps in those.

39-SDR-1-73P

Corresp

Guthrie Co SLF

Radial laterals NW corner
reasonable as proposed
and extraction in central
w/ wells OK


MW-8
PZ-7
PZ-6
1200
1190
N 9,500
SCALE IN FEET
100
200
400
MW-4
PZ-5
LP-113
LP-114
LP-116
LP-117
PZ-
LP-112
LP-107
LP-106
LP-105
LP-104
LP-102
LP-100
LP-111
LP-110
LP-109
LP-108
LP-118
LP-119
LP-120
LP-121
MW-3
MW-1
MW-2
PZ-2
PZ-4
MW-5
MW-7
N 9,000
N 8,500
1210
E 10,000
E 10,500
E 12,500
E 13,000
Leach Storage Tank
multiple Extrn wells
Extraction 4 wells
Locations not accurate
add gravity drain next phase
Locatin accurate
DRAWN DRA/RY
DATE DEC 1993
SHEET 1
PROJECT FLOYD/MITCHELL CO. SANITARY LANDFILL
TITLE COLLECTION SYSTEM LAYOUT
MIDWEST ENVIRONMENTAL CONSULTING

Floyd-Mitchell SLF
66-SDP-1-73P correspondence

MIDWEST
ENVIRONMENTAL
CONSULTING

Rick Yoerger P.E.
2441 Cimarron Drive
Marion IA 52302
(319) 377-0334

December 1, 1993

Patricia G. Schwarz
Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand Avenue
Des Moines, IA 50319

Re: Floyd-Mitchell Sanitary Landfill

Dear Patricia:

The purpose of this letter is to request an extension for completing the Annual Water Quality Report (AWQR). The AWQR was due November 30, 1993. The revised schedule is January 31, 1994.

The next round of sampling is scheduled for the week of December 13, 1993. The data from this sampling event may not be available in time to be included in the January 31, 1994, AWQR.

As a separate issue, and as an update, we now have the background date to begin the design for the Leachate Control Plan. The schedule for completing the design is January 31, 1994. We plan to visit with you before we get too involved with the design.

Partricia, if you have any questions please call.

Sincerely,

Rick Yoerger

Rick Yoerger, P.E.

cc Betty McCarthy

66-SDP-1-73P
correspondence

MIDWEST
ENVIRONMENTAL
CONSULTING

Rick Yoerger P.E.
2441 Cimarron Drive
Marion IA 52302
(319) 377-0334

October 30, 1993

Patricia G. Schwarz
Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand Avenue
Des Moines, IA 50319

Re: Semi-Annual Inspection Report
Floyd/Mitchell County Sanitary Landfill
Permit No. 66-SDP-1-73P

Dear Patricia:

The fall semi-annual inspection was conducted on October 20, 1993. The weather was sunny, there was a light breeze from the southwest with temperatures in the 60's.

The current filling operation is ongoing as a second lift at approximately 10,800 E and 9,200 N. A stockpile containing approximately 1,500 cubic yards of cover material is located directly west of the active cell. The operator is increasing the finished slope on the active cell which will eliminate future ponding. This is ideal. The site was in excellent condition.

The inspection was conducted following a two week period of dry weather. The was no evidence of leachate seeps or ponding water on the site.

The Commission recently purchased a ConCover system which is used as an alternative to soil daily cover. The landfill permit has been amended for a 90 day trial period for the ConCover system.

Related Landfill Activities:

Leachate Control Plan --- under design and scheduled to be constructed and operational by July 1, 1994.

Comprehensive Plan Update --- under way with a tentative completion date of February 1994.

Monitoring Well Sampling --- scheduled for November 1993.

Annual Water Quality Report --- completed after receiving data from November 1993, sampling event.

A Solid Waste Landfill Inspection Checklist is attached. Items followed by an asterisk are explained below.

Explanations:

A-17 The western slope is at final grade. The area will be seeded in the spring of 1994.

A-18 (see A-17)

B-3 The next round of sampling is scheduled for November 1993.

If there are any questions, please feel free to call.

Sincerely,

Rick Yoerger

Rick Yoerger, P.E.

enclosures

cc DNR, Field Office #2
Betty McCarthy
Floyd/Mitchell County Sanitary Landfill

SOLID WASTE LANDFILL

INSPECTION CHECKLIST

Facility: Floyd-Mitchell SLF **Permit No.:** 66-SDP-1-73P

Permit Issue: 9/12/90 **Expiration Date:** 10/4/92

Operator: Bob Roethler **Inspection Date:** 10/20/93

An asterisk (*) following an item indicates comments are noted elsewhere in the semi-annual report.

A. Plan Requirements and Operating Procedures

1. **Is the landfill identification, phone number, hours and days open and categories of waste accepted indicated on a sign at the landfill entrance?** Yes X No___
2. **Are the lockable entrance gate and all perimeter fences in good repair?** Yes X No___
3. **Are daily records being kept?** Yes X No___
4. **Is a copy of the operating permit on file at the landfill.office?** Yes X No___
5. **Is there a copy of the landfill plans and specifications on file at the landfill office?** Yes X No___
6. **Is the entrance road into the landfill in good condition?** Yes X No___
7. **Is an all-weather area available for adverse conditions?** Yes X No___
8. **Is solid waste being unloaded in the proper locations in accordance with the plans?** Yes X No___
9. **Is solid waste being spread and compacted properly?** Yes X No___
10. **Is daily cover being provided as required?** Yes X No___
11. **Is intermediate and final cover being provided as required?** Yes X No___
12. **Are fill elevations being maintained according to the plans?** Yes X No___
13. **Is all required equipment available at the landfill site?** Yes X No___
14. **Is back-up equipment available?** Yes X No___

Solid Waste Landfill Inspection Checklist

15. Is litter being controlled properly? Yes X No___

16. Has topsoil been placed on completed portions of the landfill? Yes X No___

17. Have completed areas been properly graded and seeded according to specifications? Yes X No___ *

18. Are completed areas of the landfill showing satisfactory growth of grasses? Yes X No___ *

19. Is drainage and erosion control being maintained on completed areas of the landfill? Yes X No___

20. Is there evidence of landfill gas problems? Yes___ No X

21. Is there evidence of rodents or insects as a result of improper landfilling operations? Yes___ No X

22. Does the landfill accept demolition and construction wastes in a separate location? Yes___ No X

23. Are demolition and construction wastes being properly disposed of ? Yes X No___

24. Are sanitary facilities available at the landfill site? Yes X No___

25. Is a telephone available at the landfill? Yes X No___

26. Is fire control available at the landfill? Yes X No___

B. Monitoring Requirements

1. Are monitoring wells in good condition? Yes X No___

2. Are monitoring wells marked and identified? Yes X No___

3. Have monitoring wells/surface points been sampled and tested according to the permit schedule? Yes X No___ *

4. Have the monitoring sample test results been submitted to DNR? Yes X No___

Solid Waste Landfill Inspection Checklist

C. Miscellaneous Requirements

1. **Is a certified landfill operator on-site?** Yes X No___
2. **Are the Special Waste Authorization reports completed and submitted to DNR every six months?** Yes X No___
3. **Has the landfill received petroleum-contaminated soil recently?** Yes___ No X
4. **Has a quarterly soil sample of the aerated petroleum-contaminated soil been collected and analyzed?** Yes___ No___
5. **Does the landfill have a permit amendment for recycling?** Yes___ No___
6. **Are recycling areas being properly maintained?** Yes___ No___

Field Observation Completed By: Rick Goerger **Date:** 10/20/93

Reviewing Engineer: Rick Goerger **Date:** 10/20/93

Iowa Registration No.: 8580 (expires 12/31/94)

C. Miscellaneous Requirements

1. Is a certified landfill operator on-site? Yes X No__

2. Are the Special Waste Authorization reports completed and submitted to DNR every six months? Yes X No__

3. Has the landfill received petroleum-contaminated soil recently? Yes__ No X

4. Has a quarterly soil sample of the aerated petroleum-contaminated soil been collected and analyzed? Yes__ No__

5. Does the landfill have a permit amendment for recycling? Yes__ No__

6. Are recycling areas being properly maintained? Yes__ No__

Field Observation

Completed By: _____ Date: _____

Reviewing Engineer: _____ Date: _____

Iowa Registration No. _____ (Stamp)

Con 12-1-1 66-SDP-1-73P

Conway

SAR

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

Environmental Protection Division
Field Office #2
Phone 515/424-4073
FAX NO. 515/424-9342

2300 15th St. S.W.
Box 1443
Mason City, IA 50402

October 25, 1993

Betty McCarthy, Chairperson
Floyd/Mitchell Sanitary Landfill Commission
Box 32
Osage, Iowa 50461

Re: Floyd/Mitchell County Sanitary Landfill Inspection
Permit No. 66-SDP-1-73P

Dear Ms. McCarthy:

Enclosed is a report of an inspection of your facility which was conducted by Mr. Jeffrey B. Vansteenburg, Environmental Specialist of this office. I concur with the content of the report.

At the end of his report, Mr. Vansteenburg has summarized a recommendation for facility operation improvement and stated required actions that must be taken by you in order to comply with the Iowa Administrative Code.

If you have any questions concerning the report, please contact Mr. Vansteenburg or me.

Sincerely,

COMPLIANCE & ENFORCEMENT BUREAU

W.M. (Bill) Jinkinson
Field Office Supervisor

AT/mkh
Enclosure

cc: Solid Waste Section
Gene Mayer, Osage
Bob Roethler, Operator, Orchard

Report of Investigation

DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

Investigation Date	FROM: Field Office #2 2300 15th St. S.W. Box 1443 Mason City, IA 50402
Current: 10/06/93 Last: 08/10/93	
To: Floyd/Mitchell County Sanitary Landfill P.O. Box 32 Osage, Iowa 50616 Permit No. 66-SDP-1-73P	**Person(s) Contacted:** Robert Roethler, Operator Gene Mayer, Board Member
Re: Visit	

A visit was made to the Floyd/Mitchell Sanitary Landfill to follow-up on required actions from the August 1993 visit and to observe daily operations. The landfill has recently been given permission to use ConCover for daily cover. The following observations were made:

Previously Noted Required Actions (08/10/93 Inspection)

1. Eliminate all ponded areas.

   Status: Complete. All areas noted in the last visit had been filled.

2. Repair the cover on the area west of the winter stockpile damaged by the previous night's heavy rain. If the area is not to be used for more than seven days, increase the cover to 1 foot.

   Status: Complete. The area had been covered with the 1 foot of soil.

3. Smooth out the cover on the old wet weather area.

   Status: Complete. The top had been leveled and was in good condition. Mr. Roethler stated that he planned to do additional work on the side slopes.

FACILITY EVALUATION

The ConCover had just been applied at the beginning of this visit. The working face was well-compacted and the material appeared to cover all the surfaces. Mr. Mayer sprayed an additional amount to demonstrate how the unit worked. The material creates a coating about an eighth of an inch thick. As a reminder to the operators, the following item should be noted and can result in incomplete coverage:

- Failure to spray the working face from two or more different angles.
- Failure to use enough shredded paper (and/or possibly binder).
- Incomplete solid waste compaction of the working face.

- Shooting ConCover straight onto the working face surface rather than allowing it to fall on the solid waste like rain.

- Failure to use the right size nozzle.

- Failure to take wind direction into consideration.

The ConCover and its application appear to be in accordance with the Department's rules and the manufacturer's recommendations.

The area northwest of the winter stockpile was rough from equipment activity during wet conditions. This should be smoothed out to provide adequate drainage from the site.

There is some litter in the area on the south side of the fill where a leachate seep was repaired. At first glance, it appeared to be exposed waste but was determined to be litter worked into the cover. It is recommended that the material be picked and removed.

The west slope is partially complete. When conditions are dry enough, the west slope should have the black dirt applied and the area should be seeded.

The operator reported that the facility has hired a new engineer. The new engineer is Rick Yoeger (independent). Mr. Yoeger will be updating the Leachate Control Plan and the Comprehensive Plan.

RECOMMENDATION

- Pick the litter in the vicinity of the repaired leachate seep on the south face.

REQUIRED ACTIONS

1. Smooth out the area northwest of the winter stockpile to improve drainage. (Subrule 567-103.2(2)h, IAC)

2. Finish the west slope, apply the top soil, and see the area. (Subrule 567-103.2(2)i, IAC)

JBV/mkh

Inspector:	Jeffrey B. Vansteenburg for Al Tompkins	**Date:**	10/25/93
Reviewer:	Al Tompkins Al Tompkins	**Date:**	10/25/93

66-SDP-1-73P 0

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

September 27, 1993

Ms. Betty McCarthy, Chairperson
Floyd-Mitchell Solid Waste Board
Box 32
Osage, IA 50461

Dear Ms. McCarthy:

The Iowa Department of Natural Resources' Waste Management Division (WMD) has reviewed the December 15, 1992 Subsequent Solid Waste Comprehensive Plan, Part I, along with the December 21, 1992 amendment to the plan, and the December 30, 1992, January 6, 1993 and March 19, 1993 letters of cooperation supplemental submittals, for the Floyd-Mitchell County Sanitary Landfill's planning area, submitted on the Floyd-Mitchell Solid Waste Board's behalf by Brice, Petrides-Donohue, now doing business as RUST Environment & Infrastructure. The subsequent plan does explain planning area changes that have taken place since the original plan was submitted and provides some information on recycling activities in two of three counties in the planning area. However, **the plan does not follow the format nor does it adequately address the requirements for subsequent comprehensive plans described on page 34 and in the revised Appendix C of Guidelines For Solid Waste Comprehensive Plans, Part I. Therefore, the plan cannot be considered for approval until a revised plan containing all of the required information described in the aforementioned documents, which have been enclosed for your information and use, is submitted for the Department's review.**

Following is a brief discussion on a few of the basic points contained in the current subsequent plan document which need to be clarified or which have been omitted, that may provide further guidance as to the information that should be included in the Board's revision.

Updates on Baseline and Subsequent Years' Waste Landfilled and Population Information:
Due to the changes in the composition of the planning area since the original plan was approved, and the availability of more current population data, the original 1988 baseline data must be updated. Tables 1 & 2 in the subsequent plan submittal use 1990 census data for computing "population equivalent" numbers for the 1988 through 1991 calendar years, with no references to the 1988 baseline data. Since the basis for evaluating progress towards meeting the state waste reduction and recycling goals is the 1988 per capita solid waste generation rate, it is essential to use the best available information for estimating the 1988

population for the current planning area. Table 3-1 of the original plan used 1986-88 population figures for Mitchell and Floyd Counties for estimating baseline population. With the availability of 1990 census data, WMD suggests that both the 1980 and 1990 data can be used to extrapolate a more accurate 1988 population estimate for the current planning area, including Chickasaw County, with the assumption that any increase or decrease in the census figures occurred at a constant rate throughout the 10-year time-frame. For more information on obtaining census updates, please refer to the revised Appendix C of the guidelines.

Please note that the population for the City of Riceville in Mitchell County should only be included in the planning area's total population figures in the solid waste abatement table from the year it was amended into the planning area. The urban population totals for the planning area for the years 1988 through 1990, used in Table 2 of the subsequent plan submittal, include the City of Riceville. For 1991, when, according to Table 1, Riceville started using the Floyd-Mitchell Sanitary Landfill, the city's population is added to the previous year's total figure resulting in double counting of this city's residents.

It is uncertain if rural residents are considered in the planning area's population data in the subsequent plan. Table 2 shows "population equivalents", or per capita waste landfilled rates, using only the urban population figures from Table 1. On page 2 of the submittal, in discussing the increase in the amount of waste delivered to the landfill between 1988 and 1990, one possible explanation offered is as a result of expanded solid waste collection services for rural customers. The original plan included the planning area's total population in the baseline data. WMD strongly suggests that a planning area's total population be used for establishing baseline population and in the solid waste abatement table unless ***thorough documentation*** can be provided to show the number of rural residents in the three-county area that do not use the landfill, either on a regular or occasional basis.

The reasoning for the total population inclusion is as follows. The landfill is available for use to all residents in the planning area, either through choosing to use regularly scheduled solid waste collection services in areas where these services are provided or demanded, or through periodic direct haul by individuals. While it is true that some rural residents may be "managing" solid waste on their property, there is a trend showing that an increasing number of rural residents are using permitted sanitary disposal facilities for disposing of their solid waste. This is due to growing environmental awareness, educational programs, and enforcement of state and local regulations banning open dumping, burning and unpermitted land disposal of solid waste. By failing to include the rural portion of the planning area's population in the waste abatement computations, a situation similar to that experienced by the planning area between 1988 to 1990, where there is an unexplained drastic increase in the per capita landfill rate within the area, could be repeated. Using total population will not eliminate the possibility that the actual amount of waste being landfilled will increase due to greater use by rural residents. However, using a larger population base will mitigate the effect this will have on the planning area's per capita waste generation number.

Please explain how the three counties' rural population will be addressed in the planning area's baseline and subsequent years' population data, and corresponding per capita waste generation numbers.

As noted earlier, the basis for evaluating a planning area's progress towards meeting the state waste reduction and recycling goals is the 1988 per capita solid waste generation rate. Equally as important as accurate population figures is the planning area's 1988 landfill tonnage data, and, for comparison purposes, the amount of solid waste landfilled in subsequent years. Regarding landfill tonnage updates, the following points need to be considered:

1.) The Chickasaw County solid waste comprehensive planning area was formally amended into the Floyd-Mitchell plan on December 8, 1992. The subsequent plan indicates that this county began using the Floyd-Mitchell Sanitary Landfill in April, 1991, which coincides with the closure of Chickasaw County Landfill. Therefore, the baseline data for the three county planning area must include the solid waste that was landfilled at the Chickasaw County Landfill in 1988, and the solid waste abatement table must also include the tonnages landfilled at this facility up to its closure as part of the planning area's total annual landfill figures. The corresponding population data, as mentioned previously, must also be provided.

2.) The subsequent plan indicates that the conversion factors that were previously used to convert cubic yards of solid waste to tons has been altered due to the tonnage information that resulted with the installation of a scale at the landfill in August, 1991. The plan reports that the previous conversion factors underestimated the amount of waste being delivered to the landfill, and all tonnage values reported prior to the installation of the scale, including the baseline year's, have now been converted to reflect a density of 800 pounds per cubic yard of solid waste delivered to the landfill. This represents a considerable change from the tonnage figures reported in the past. For example, in calendar years 1989 and 1990, the landfill figures in Table 2 are 60% greater than those indicated in the solid waste tonnage fee reports filed with the Department for that same time period, after making the appropriate adjustments for excluding the amount of solid waste received from Butler County during 1990. Before the Department may consider accepting the revised data, further information to justify this change must be provided. The following points related to this matter must be addressed in your response:

(a). -- Please describe in greater detail the information that was used, including the time-frame over which comparative measurements were kept, to justify this change.

(b). -- Page 1 of the subsequent plan indicates that in the past, the conversion factors described in Chapter 109 of the Iowa Administrative Code, 500 pounds per cubic yard of compacted solid waste and 200 pounds per cubic yard of loose solid waste, were used for estimating landfill tonnages. It appears that the revised conversion mechanism assumes that all waste received in the past was compacted. Please address this discrepancy.

(c). -- On page 2 of the subsequent plan, in discussing possible explanations for the increase in landfill tonnages between 1988 and 1990, it is mentioned that since records were only kept of the estimated volumes of solid waste delivered at the landfill gate, the resulting overestimation's were most likely due to human error that occurred while conducting this activity. If this is the case, the proposed conversion factor only compounds this inaccuracy by further exaggerating the landfill tonnage figures. Also, the issue of possibly overestimating the amount of waste the landfill received in the past contradicts the implication made elsewhere in the plan that the conversion factor used in the past underestimated solid waste tonnages during the same time-frame.

(d). -- In your justification discussion, please include information regarding the landfill's fee structure from 1988 through the time the scale was installed. This could provide a clearer picture of how solid waste was being delivered to the landfill during the time in question. For example, going to a volume-based gate fee would provide an impetus for haulers to place greater emphasis on compacting solid waste.

3.) Chickasaw County reported to the Department that a total of 5,834 tons of solid waste was landfilled at its disposal facility during the last fiscal year it was in operation (July 1, 1990 through June 30, 1991). Table 2 in the subsequent plan indicates that during the 1991 calendar year, 21,160 tons of solid waste was disposed at the Floyd-Mitchell Sanitary Landfill from Floyd, Mitchell and, during April through December of that year, Chickasaw Counties. With the addition of Chickasaw County to the planning area, the area's population increased by 50% yet the actual amount of waste landfilled in 1991 at the Floyd-Mitchell facility from the three counties was 4,783 tons less, an 18% decrease, than the amount shown for 1990 from just Floyd and Mitchell Counties. When examining this from a per capita basis, the decrease is even more pronounced. The recycling activities and amounts provided in the subsequent plan do not account for the actual decrease in the amount of waste landfilled from 1990 to 1991, and certainly doesn't provide for an explanation as to what happened to the solid waste from Chickasaw County. Please include an explanation for this apparent discrepancy. This point should also be considered in your discussion related to justifying the change in the cubic yard conversion factor.

4). Page 1 of the subsequent plan indicates that Butler County used the landfill from October, 1989 to April, 1991. Table 2 in the subsequent plan separates the landfill tonnage figures for this county from those for Mitchell and Floyd Counties. It is acceptable to exclude this portion of the waste stream from the planning area's totals since this county was amended into another comprehensive plan. This data should be reported in that planning area's update. However, WMD has some questions regarding the Butler County's landfill tonnages described for this time period. For 1990, the table shows that a total of 6,897 tons was delivered to the Floyd-Mitchell County Sanitary Landfill from Butler County. Using that county's 1990 census data, for both rural and urban areas, WMD has calculated an annual per capita waste landfilled number of .438 tons. This is less than half of the per capita number (1.001 tons per year) the Division derived from the 1990 landfill tonnage data for Floyd and Mitchell Counties, as shown in Table 2, and the counties' 1990 census data, including rural residents, but excluding the cities of Nora Springs and Riceville which were not using the landfill in that

year. This comparison implies that the 1990 Butler County landfill tonnage figure may be underestimated. However, the landfill tonnage fee reports submitted to the Department for the last full fiscal year (July 1, 1988 through June 30, 1989) the Butler County Landfill was in operation shows a total of 4,135.89 tons of solid waste was received at this facility. In light of these variances, please explain how the Butler County landfill tonnages, as shown in Table 2, were delineated from the total landfill amounts while this county was using the Floyd-Mitchell Sanitary Landfill.

Planning Area Description:

According to the Department's records, the present planning area is defined as all incorporated and unincorporated areas in the following counties except for the noted exclusions: Chickasaw County; Floyd County, excluding the City of Nora Springs (in Cerro Gordo County plan); and Mitchell County. Also included are the Cities of Elma and Chester, both in Howard County. The Division acknowledges the inclusion in the subsequent plan submittal of the letter from the City of Bassett in Chickasaw County requesting its amendment into the planning area. As noted above, this city is included in the current planning area description. Formal approval will be granted upon approval of the subsequent plan.

The planning area described in the subsequent plan submittal differs slightly from what is described in the previous paragraph. Two of these differences are a result of cities that are portioned between two counties. For the sake of simplicity, WMD recognizes a city to be included in the county where the majority of its residents are located according to census data. As points of clarification, Protivin is considered to be in Howard County and Riceville in Mitchell County. Regarding the former, while Protivin is listed in Table 1 under Chickasaw County, no letter of cooperation from this city has been submitted, and Department records indicate that this city is part of the Winneshiek County Solid Waste Agency's comprehensive planning area. Please clarify the status of this city and determine if the planning area requires to be amended.

The City of Ionia in Chickasaw County, which, according to the Department's records is part of the planning area, and is included among the cities which have submitted letters of cooperation, has been omitted from the Table 1 service area description. Please correct this oversight.

Letters of Cooperation:

As stated in the cover letter that accompanied the latest letters of cooperation submittal, dated March 19, 1993, a letter from the City of McIntire in Mitchell County was still outstanding. At this date, no letter has been received for this city. Also, previous submittals did not include a letter from the City of North Washington in Chickasaw County. Please include these documents with your revision.

Other Subsequent Plan Requirements

In addition to the aforementioned deficiencies, the subsequent plan submittal does not adequately address the other requirements described on page 34 of the Guidelines, noted as follows.

- summary of public involvement and education activities since submittal of original plan;
- updates on public participation opportunities (i.e., public comments and input);
- re-evaluation of alternatives according to state's waste management hierarchy;
- an implementation plan and schedule for the next six-year period;
- a thorough evaluation of progress toward meeting the state volume reduction and recycling goal using the revised Appendix C criteria and accompanying Waste Abatement Table.

Regarding the evaluation of progress toward meeting the state waste reduction and recycling goals, the submittal uses a confusing methodology, based upon information contained in the three tables that are attached to the plan, that compares the sum of materials recycled and estimated yard waste diverted from landfilling during a given year to total waste generated in that year. Table 3 indicates that for 1991, this computation derives a "Waste Reduction and Recycling Percentage" that exceeds the 1994 waste reduction and recycling goal of 25%. Please refer to the enclosed revised Appendix C of the Guidelines for information on the proper methodology to use in the subsequent plans for evaluating the planning area's progress toward meeting the state waste reduction and recycling goals.

Please note that in addition to evaluating goal progress by means of the reduction/recycling per capita percentage derived from the solid waste abatement table, the Appendix C guidelines also requires that each reduction and recycling program that has been implemented must be described in the subsequent plan's narrative. For example, page 4 and Table 3 of the subsequent plan submittal provide numbers to show the estimated landfill diversion that has been achieved through the banning of yard waste from landfilling. Yet, the plan provides no information on backyard composting educational programs or yard waste collection and composting sites that have been established as alternatives to landfilling this portion of the waste stream. Please provide this information.

The December 21, 1992 letter amended the December 15, 1992 submittal by replacing the sentence on page 5 of the subsequent plan, "The Solid Waste Agency should also investigate the possibilities for residential curb-side collection of recyclables", with, "The Solid Waste Agency should monitor existing curb-side collection programs and encourage curb-side collection of recyclables in communities without these programs." No further information is provided. Please identify the cities which have these programs, the materials which are collected, the destination facility(ies) for processing the collected recyclables, and plans for expanding programs to cities that, at present, do not have them. Also, please address how the curb-side programs will impact the existence of the drop-off recycling bins program which, according to page 4, have been placed in all the cities of Floyd and Mitchell Counties except for Nora Springs. Have deficiencies in the latter prompted the need to establish curb-side pick-up of recyclables? As described in the revised Appendix C, each program explanation must include an evaluation of its successes and shortcomings, and suggestions for improvements.

Education programs are only mentioned by way of recommendations from your consultant describing what the Floyd-Mitchell Solid Waste Board should be encouraged to pursue in this subject area. The submittal also contains other conclusions and recommendations from your consultant but does not describe which of these are part of the Board's implementation plan for the next six-year period. This plan and schedule must include the plans, including timelines, for implementing source reduction and recycling activities in those portions of the planning area, particularly in Chickasaw County, in which these activities do not exist at the present time.

A complete response to this letter must be submitted to WMD within 60 working days of the date of this letter (December 23 1993).

If you have any questions or comments regarding this matter, or comprehensive planning in general, please feel free to contact me at 515/281-8382 or Reza Khosravi at 515/281-8645.

Sincerely,

Brian Tormey

Brian Tormey
Environmental Specialist
Waste Management Division

ENCL.: Guidelines for Solid Waste Comprehensive Plans, Part I

cc: Rick Yoerger, Midwest Environmental Consulting
Robert E. Bamsey, P.E., RUST Environment & Infrastructure
Lavoy Haage, Environmental Protection Division, DNR

66-SDP-1-73P
correspondence

See P. Amend #5 10/5/93

FLOYD-MITCHELL SOLID WASTE MANAGEMENT AGENCY

P.O. Box 32

Osage, Iowa 50461

September 23, 1993

Ms. Patricia Schwarz
IDNR
Solid Waste Division
900 east Grand
Des Moines, Iowa 50319

Dear Ms. Schwarz:

The Floyd-Mitchell landfill began the use of ConCover on September 15 as per Permit Amendment #4. The amendment provided for a 14 day trial period for use of this alternative cover.

The manufacturer conducted a two day training period on September 15 & 16 for the three landfill operators. A follow up visit by the trainer took place on September 22. The trainers were Chris Lark on the initial training session and Jim Offer on the return visit.

Daily records are being kept as per instructions, The alternative cover is working well and we request a permit amendment allowing the continued use of this material. The material was used on September 15, 16, 21 22, and 23.

The Agency approved purchase of ConCover equipment at their meeting of September 22nd contingent upon your approval of an amendment for the continued use.

Sincerely,

Betty McCarthy

Betty McCarthy, chair
Floyd-Mitchell Solid Waste Agency

cc: Bill Jinkinson
Jeff Vansteenberg

XC: SR
DD

Corr 12-1-1 66-SDP-1-73P
correspondence

FLOYD-MITCHELL SOLID WASTE MANAGEMENT AGENCY

P.O. Box 32

Osage, Iowa 50461

September 22, 1993

Ms. Patricia Schwarz
IDNR
Solid Waste Division
900 East Grand
Des Moines, Iowa 50319

Dear Ms. Schwarz:

This letter will serve to notify your department that the Floyd-Mitchell Solid Waste Management Agency (Permit No. 66-SDP-1-73P) is terminating the services of RUST Environmental Consulting Services as of September 22, 1993.

The engineering firm of record for the Floyd-Mitchell landfill will now be Midwest Environmental Consulting/Rick Yoerger. Mr. Yoerger will be addressing the Leachate Control Plan, Closure-Post-Closure Plan and the Comprehensive Plan update. Please forward any comment letters concerning the plans that have been submitted by RUST Environmental Consulting toRick Yoerger.

Sincerely,

Betty McCarthy, chair
Floyd-Mitchell Solid Waste Agency

cc: Doc Malada
Brian Tormey

Rick Yoerger, P.E.
Midwest Environmental Consulting
2441 Commerce Drive
Marion, Ia 52302
319/ 377-0334

RECORD COPY

File Name 66-SDP-1-73P

Senders Initials

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

September 14, 1993

Betty McCarthy
Floyd-Mitchell Solid Waste Board
Box 32
Osage, IA 50641

Re: Floyd-Mitchell Sanitary Landfill
Permit #66-SDP-1-73P
Exploratory Methane Gas Wells

Dear Ms. McCarthy:

The Department received a letter dated September 3, 1993, from Gary A. Swanson of Associated Consultants Engineers, Inc. (ACE). In the letter, permission was requested to install three to six exploratory wells at the Floyd-Mitchell Sanitary Landfill, in order to obtain information relative to the quality and quantity of methane gas available for generation of electricity.

The Department hereby authorizes the well installation subject to the following conditions:

1. Under no circumstances shall the landfill base liner be penetrated.

2. A site map shall be provided to the Department indicating the locations of exploratory gas well installations with reference to the landfill coordinate system.

3. A boring log and monitoring well documentation Form 542-1277 shall be completed and submitted for each exploratory gas well.

A copy of this authorization is being provided to Mr. Swanson of ACE. Monitoring well documentation Form 542-1277 has been attached for his use.

If you have any questions, you may contact me at (515) 281-8899.

Sincerely,

Patricia G. Schwarz

Patricia G. Schwarz
Environmental Engineer
Solid Waste Section

PGS:pgs\gas.doc

cc: Field Office 2

Gary A. Swanson
Associated Consultants Engineers, Inc.
3131 Fernbrook Lane North
Minneapolis, MN 55447-5323

Floyd-Mitchell Co LF
66-SDP-1-73P

ASSOCIATED
CONSULTANTS
ENGINEERS, INC.
REGISTERED PROFESSIONAL ENGINEERS
3131 FERNBROOK LANE NORTH
MINNEAPOLIS, MINNESOTA 55447-5323
612/559-5511
FAX 612/559-5514

September 3, 1993

Mr. Francis Holada
Solid Waste Section
Iowa Department of Natural Resources
Wallace State Office Building
Des Moines, IA 50319

Subject: Exploratory Wells at the
Floyd-Mitchell County Landfill

Dear Mr. Holada:

We are respectfully requesting permission to install 3 - 6 exploratory wells at the Floyd-Mitchell County Landfill. We have enclosed a topography map and aerial maps for your reference. The site has been highlighted. We aren't sure exactly where the wells will be placed until we get on site and start drilling. Most likely they will be randomly placed throughout the property.

If you would like us to send a copy of a map showing where the wells were drilled after completed, we would be happy to do so.

We are making this request to determine if the quantity and quality of the methane gas in the ground could support a gas engine which would then be used to generate electricity.

Associated Consultants Engineers, Inc. has been hired by Osage Municipal Utilities to see if a methane powered generator would be feasible by using any methane resources at the city owned landfill.

We would like to start drilling in 2 - 3 weeks, subject to the DNR's approval.

If you have any questions or need additional information please do not hesitate to call.

Sincerely,

ASSOCIATED CONSULTANTS ENGINEERS, INC.

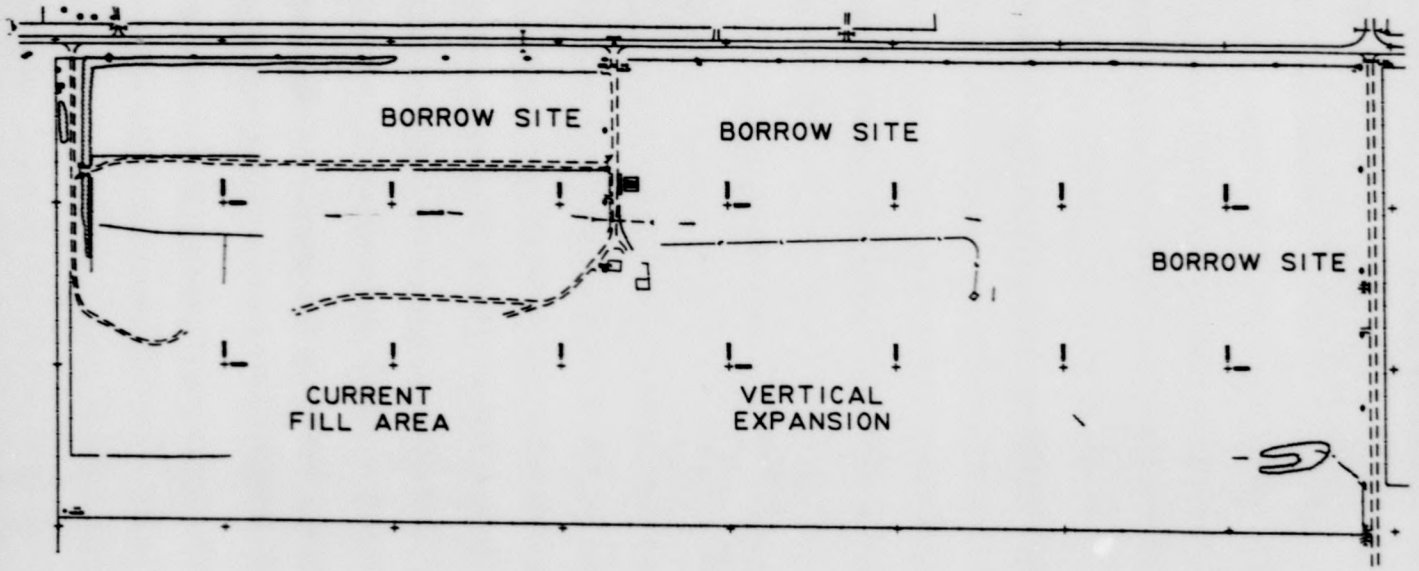
Gary A. Swanson, P.E.

GAS/da

CC: Mr. Dennis Fannin, Osage Municipal Utilities
Ms. Betty McCarthy, Floyd-Mitchell Solid Waste Management Agency

66-SDP-1-73P
correspondence

93 SEP -7 PM 1:14



RUST ENVIRONMENT & INFRASTRUCTURE

66-SDP-1-73P
correspondence

RUST ENVIRONMENT & INFRASTRUCTURE

Formerly Brice, Petrides-SEC Donohue

RUST Environment & Infrastructure Inc.
501 Sycamore Street, Suite 222 • Waterloo, IA 50703
P.O. Box 1497 • Waterloo, IA 50704-1497
Tel. (319) 232-6531 • FAX (319) 232-0271

September 3, 1993

Ms. Patricia Schwarz
Iowa Department of Natural Resources
900 East Grand
Des Moines, Iowa 50319

Re: Floyd/Mitchell Landfill
RUST Project No. 50603

Dear Ms. Schwarz:

Transmitted herewith are two (2) sets of the Leachate Control Plan and Closure/Post-Closure Plan for the Floyd/Mitchell Landfill. These documents supercede all previous versions.

Thank you for your consideration of this matter. If you have any questions or require anything further at this time, please let us know.

Sincerely,

Bob Bamsey

Robert E. Bamsey, P.E.

Enclosures: As Noted

cc: Ms. Betty McCarthy (w/enclosures)

T/L/Schwarz.REB

9-7-93
Bob B says to destroy previous versions.
P. Schwarz
All previous submittals (LCP+CPCP) were discarded 9-7-93.

Floyd-Mitchell Co Lf
66-SDP-1-73P
corresp.

RUST ENVIRONMENT & INFRASTRUCTURE

Formerly Brice, Petrides-SEC Donohue

RUST Environment & Infrastructure Inc.
501 Sycamore Street, Suite 222 • Waterloo, IA 50703
P.O. Box 1497 • Waterloo, IA 50704-1497
Tel. (319) 232-6531 • FAX (319) 232-0271

September 2, 1993

Mr. Francis Hallada
Iowa Department of Natural Resources
900 East Grand
Des Moines, Iowa 50319

Re: Floyd/Mitchell County Landfill
RUST Project No. 50603.070

Dear Mr. Hallada:

The semi-annual inspection of the Floyd/Mitchell Landfill discovered a small area of solid waste deposited outside the current permitted area of the site. The enclosed map indicates the approximate location of the waste material.

The landfill was using clean construction/demolition debris for building the service road on the north side of the drainage ditch for access to the west end of the landfill. During a wet period in 1989 or 1990 the area identified on the map was used for the disposal of regular solid waste for a period of 2 weeks to a month when the working face was inaccessible. At typical waste flow rates, this would result in 500 to 1,000 tons of material which apparently was also incorporated in the construction of the road.

The material was apparently placed above groundwater, and the leachate observed during the semi-annual inspection was probably resulting from precipitation infiltrating to the waste mass. We recommend that the area be covered with a 2-foot thick, compacted clay layer ($1x10^{-7}$ cm/sec) which is available on-site. Two feet of additional soil should be placed over the barrier layer and seeded to reduce infiltration. We will continue to visually monitor the area and additional action will be taken should problems arise in the future.

We are hereby requesting a variance in the current solid waste disposal permit for the Floyd/Mitchell Landfill to allow the waste material to remain in place as you discussed with Betty McCarthy and Gene Mayer previously.

If you have any questions or need anything further at this time, please let us know.

Sincerely,

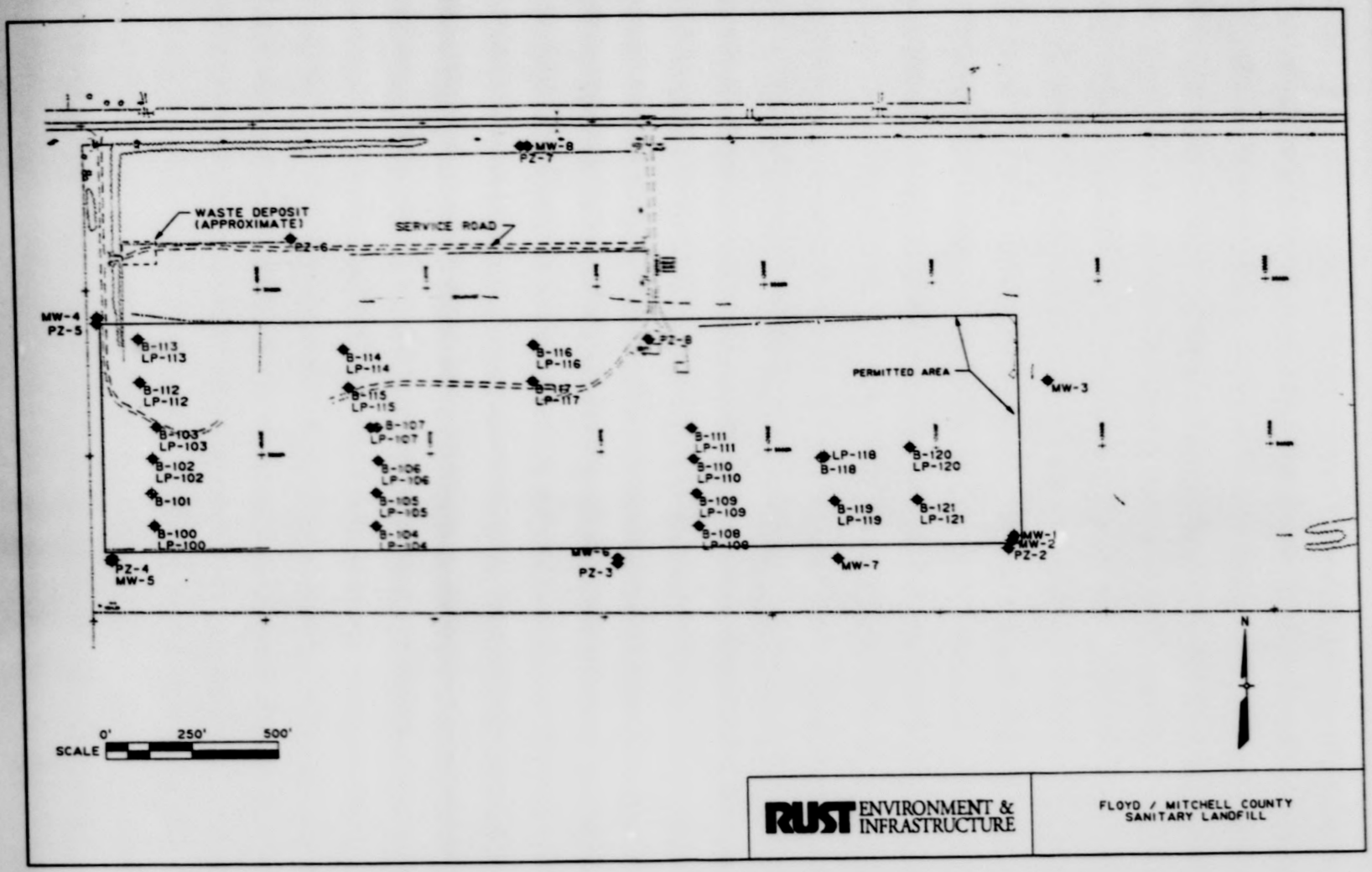
Bob Bamsey

Robert E. Bamsey, P.E.

Enclosure: As Noted

cc: Ms. Betty McCarthy

T/L/FMLCon.REB


MW-8
PZ-7
WASTE DEPOSIT
(APPROXIMATE)
SERVICE ROAD
PZ-6
MW-4
PZ-5
B-113
LP-113
B-114
LP-114
B-116
LP-116
PZ-8
B-112
LP-112
B-115
LP-115
B-117
LP-117
PERMITTED AREA
MW-3
B-103
LP-103
B-107
LP-107
B-111
LP-111
B-102
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B-106
LP-106
B-110
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MW-6
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MW-7
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500'
SCALE
RUST ENVIRONMENT & INFRASTRUCTURE
FLOYD / MITCHELL COUNTY
SANITARY LANDFILL

66-SDP-1-73P
Correspondence

FLOYD-MITCHELL SOLID WASTE MANAGEMENT AGENCY

P.O. Box 32

Osage, Iowa 50461

August 31, 1993

Patricia Schwartz
Department of Natural Resources
Wallace State Office Building
Des Moines, Iowa 50319

Dear Ms. Schwartz:

The Floyd-Mitchell Solid Waste Agency has contracted with Rick Yoerger to review the LCP design and any pertinent information relating to the plan and the permit of the Floyd-Mitchell landfill. The Agency asks that he be permitted to research all information in your files pertaining to our landfill as well as offering assistance in the answering of any questions that Rick may have in regard to the LCP design.

I have visited with Bob Bamsey regarding submission of the revised LCP design and he has assured me that the LCP design will be in the mail to the DNR no later than September 3rd.

Sincerely,

Betty McCarthy

Betty McCarthy, Chair
Floyd-Mitchell Solid Waste Agency

Sent 9/3/93
Recvd 9/7/93

66-SDP-1-73P
correspondence

See P.D. #4
8/20/93

FLOYD-MITCHELL SOLID WASTE MANAGEMENT AGENCY

P.O. Box 32

Osage, Iowa 50461

August 16, 1993

Ms. Patricia Schwarz
Iowa Department of Natural Resources
900 East Grand
Des Moines, Iowa 50319

Re: Floyd/Mitchell Request for Permit Amendment

Dear Ms. Schwarz:

The Floyd/Mitchell Solid Waste Management Agency requests an amendment to Permit No. 66-SDP-1-73P to allow the use of ConCover as an alternative to daily cover with soil on a trial basis. This trial period would be aproximately of two week duration to take place in early September.

A trainer will be present initially for the purpose of training our certified landfill operators in the proper application of the product. The operators will apply the product in accordance with the manufacturer's procedure to conform with the requirements of the Iowa Department of Natural Resources.

If the product proves to be valuable in meeting the needs of our landfill for daily cover, we will request that we be allowed to use this as an alternative to soil, weather permitting. Cover dirt will will be used when inclement weather prohibits adequate use of ConCover. We appreciate your prompt response to this request allowing the trial to take place in early September. If you wish additional information regarding this request, please contact me at (515) 982-4276 (Home) or (515) 732-5861 (Office).

Sincerely,

Betty McCarthy

Betty McCarthy, Chair
Floyd/Mitchell Solid Waste Agency

cc: Doc Halada
Jeff Vansteenberg

66-SDP-1-73P
Corresp

CLOSURE/POST-CLOSURE PLAN FOR THE FLOYD/MITCHELL COUNTY SANITARY LANDFILL MITCHELL COUNTY, IOWA

Not Approved
Discarded 2-17-95
P.S.

Prepared By:

RUST ENVIRONMENT & INFRASTRUCTURE
April, 1993

66-SDP-1-73P
Corresp.

LEACHATE CONTROL PLAN
FOR THE
FLOYD/MITCHELL COUNTY LANDFILL
MITCHELL COUNTY, IOWA

Not Approved
discarded 2-17-95 R.S.

PREPARED FOR:
FLOYD/MITCHELL COUNTY SOLID WASTE AGENCY

PREPARED BY:
BRICE, PETRIDES-DONOHUE CO.
JULY, 1991

Corresp

RECORD COPY

File Name Floyd-Mitchell Co's SLF

Scrubers Initials 66-SDP-1-73P

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

May 24, 1993

Betty McCarthy, Chairperson
Floyd-Mitchell Solid Waste Board
R.R.5
Osage, IA 50461

Re: Floyd-Mitchell Sanitary Landfill
Permit #66-SDP-1-73P
Leachate Control Plan and Closure/Post Closure Plan

Dear Ms. McCarthy:

We have completed our review of the Floyd-Mitchell Sanitary Landfill Leachate Control Plan (LCP) received on April 21, 1993 and Closure/Post Closure Plan (C/PC Plan) received on May 17, 1993. Review comments relative to each are addressed in the following sections. The revised documents were submitted in response to our March 3, 1993 review of the preliminary submittals, and discussions with your consultants Eric Meinstma and Bob Bamsey of RUST at our meeting on March 5, 1993.

Leachate Control Plan (LCP):

The LCP submittal proposed an additional north-south leachate drain to be installed at a central location of trenches 1-4 as part of Stage I. The need for additional leachate collection line(s) was discussed at the March 5, 1993 meeting with your consultants.

Issues discussed in our Departmental comment letter of March 3, 1993 were not addressed in the LCP submittal. Your response to these comments must be incorporated into the LCP document.

We wish to offer the following additional comments relative to the plan:

1. The separation from the waste base to the water table is a key issue to be addressed in your LCP. This issue was discussed in our letter to you dated March 3, 1993, and the justification criteria was discussed at our March 5, 1993, meeting with your consultants. If this condition

cannot be adequately justified, continued vertical expansion under the previously approved plan may be limited, and waste additions for vertical adjustment to meet current minimum slope standards in Areas 1 and 2 will not be considered.

2. We require that the Stage II collection line on the west end of T1-T4 be proposed for installation either as part of the Stage I construction, or by July 1, 1994. Your annual evaluation may indicate that additional leachate extraction measures are required to attain the leachate reduction goals. Also, state in the plan that Stage III shall be implemented when one foot of leachate head accumulates in Area Fill #3.

3. Show the horizontal waste limits of all areas on the plan sheets.

4. Show the waste cell limits on the cross sections shown on Plan Sheet 5, and add a section for the west collection line.

5. Provide a composite drawing showing all leachate control elements on Plan Sheet 3.

6. Identify the location of the waste in the typical leachate collection trench detail (Sheet 8). The Department recommends an alternative to crushed limestone be proposed for the coarse aggregate in the leachate collection lines, due to reactivity of limestone with the leachate.

7. A leakage detection system or an additional groundwater monitoring point will be required to detect leakage from the leachate treatment ponds.

8. Elaborate on the leachate treatability by the selected treatment process. Discuss any leachate characteristics that may inhibit leachate treatment.

9. Submit three copies of your Final Iowa P.E. Certified LCP for approval.

Development and Operational Plans

We received your letter dated May 10, 1993 relative to the fill into an unpermitted area in the fall of 1989. In the letter, you expressed interest in including this area into the permitted area, and you identified forthcoming documentation. It is requested that you merge this information with updated

Development and Operational Plans (DOP's) as part of the permit renewal documentation. The DOP's should include your operational sequence, final grading, and all LCP elements.

Closure/Post Closure Plan (C/PC Plan):

1. Incorporate the technical assistance of the local soil conservation district commissioner (SCD) for the seeding and erosion control plan for the fill areas and the restoration plan for the borrow areas. Your May 14, 1992, transmittal letter indicates that assistance has been requested.

2. We have noted that your revised C/PC Plan indicates a future vertical expansion above completed Areas 1 and 2. This expansion is proposed in an area that does not have a five foot separation between the waste base elevation and the high water table, and no justification for a lesser separation has been provided. (See LCP comment #1).

3. Include an Iowa P.E. certification page for the C/PC Report, and submit the Final C/PC Plan in triplicate.

Provide your response to these comments within 30 days of receipt of this letter. If you have any questions relative to this review or your permit renewal status, you may contact me at (515) 281-8899.

Sincerely,

Patricia G. Schwarz

Patricia G. Schwarz
Environmental Engineer
Solid Waste Section

PGS:pgs\floyd2.doc

cc: Field Office 2

Eric Meinstma
RUST
501 Sycamore Street, Suite 222
P.O. Box 1497
Waterloo, Iowa 50704-1497

66-SDP-1-73 P
corresp.

RUST ENVIRONMENT & INFRASTRUCTURE

Formerly Brice, Petrides-SEC Donohue

RUST Environment & Infrastructure Inc.
501 Sycamore Street, Suite 222 • Waterloo, IA 50703
P.O. Box 1497 • Waterloo, IA 50704-1497
Tel. (319) 232-6531 • FAX (319) 232-0271

May 14, 1993

Ms. Patricia Schwarz
Iowa Department of Natural Resources
Solid Waste Division
900 East Grand
Des Moines, Iowa 50319

Re: Closure/Post-Closure
Floyd/Mitchell County Landfill
RUST Project No. 50603.070

Dear Ms. Schwarz:

Enclosed are three copies of the Closure/Post-Closure Plan for the Floyd/Mitchell County Landfill. A copy of the plan was also sent to the local division of Soil Conservation for their review as required by IAC 103.2(1)j. That review will be sent to you, when it is complete.

If you have any questions or require additional information, please contact us.

Sincerely,

Eric Meintsma

Eric W. Meintsma, P.E.

EWM:blc

enc: As Noted

cc: Ms. Betty McCarthy

T/L/ZR5

XC P.S.

Floyd-Mitchell SW
66-SOP-1-73P

FLOYD-MITCHELL

SOLID WASTE MANAGEMENT AGENCY

COLLECTION - TRANSPORTATION & DISPOSAL

May 11, 1993

Doc Halada
IDNR
Wallace State Office Building
Des Moines, Iowa 50319

Dear Sir:

I am requesting an amendment to the Floyd-Mitchell Solid Waste Management Agency's Comprehensive Plan to include the city of LeRoy, Minnesota. The Mower County Commissioners have released that volume of waste from their county solid waste plan, (letter included).

I have visited with the LeRoy City Council at their regular City Council meeting held on May 3rd at which time they reviewed our Comprehensive Plan and asked to become part of our planning area. As you can see their City has been committed to a waste volume reduction program for the past three (3) years and we find their efforts in keeping with the goals of our plan. Their letter of cooperation is enclosed.

Sincerely,

Betty McCarthy

Betty McCarthy, chair
Floyd-Mitchell Solid Waste Agency

cc: Bob Bamsey
Patricia Schwartz

MOWER COUNTY
AUSTIN, MINNESOTA
55912

April 7, 1993

Betty McCarthy
P.O. Box 32
Osage, IA 50461

Dear Ms. McCarthy:

As a follow-up to our March 2, 1993 meeting, I am writing this letter to allow Steve Iverson of S & I Sanitation, Grand Meadow, MN 55936 to deliver waste collected from households and small businesses in the City of LeRoy, MN to your Sanitary Landfill in Mitchell County, Iowa.

Under Minnesota Statute 115A.46 jurisdictions within Minnesota counties are prohibited from conducting activities that are inconsistent with county solid waste plans. Therefore, our Solid Waste Plan will be amended to allow this volume of waste to be designated to your facility. However, wording in our plan will state that if, in the future, Mower County builds or contracts with a solid waste composting or incineration project we will rescind this amendment.

If you need any further documentation or any information regarding this matter, please contact Jeffrey Weaver, Solid Waste Administrator at 507-437-9551.

Respectfully submitted,

Donald Johnson, Chair
Mower County Board of Commissioners

DJ:km

City of Le Roy

Tele. (507) 324-5707

122 W. Main Street
Le Roy, Minnesota 55951

MAY 7, 1993

BETTY MC CARTHY
FLOYD-MITCHELL SOLID WASTE AGENCY
P.O. BOX 32
OSAGE, IA. 50461

DEAR MRS. MC CARTHY:

THE COMPREHENSIVE PLAN FOR THE FLOYD-MITCHELL SOLID WASTE MANAGEMENT AGENCY WAS REVIEWED BY THE LE ROY, MINNESOTA CITY COUNCIL AT THEIR REGULAR MONTHLY MEETING HELD ON MONDAY, MAY 3, 1993. THE COUNCIL VOTED TO ADOPT THE COMPREHENSIVE PLAN AND TO BE COMMITTED TO THE WASTE VOLUME REDUCTION AND RECYCLING GOALS OF 25% BY 1994 AND 50% BY THE YEAR 2000.

THE CITY WILL MAKE ITS BEST EFFORT TO IMPLEMENT THE SCHEDULE CONTAINED IN THE COMPREHENSIVE PLAN.

FOLLOWING IS A BRIEF SUMMARY OF THE WASTE REDUCTION AND RECYCLING EFFORTS CURRENTLY BEING IMPLEMENTED BY THE CITY OF LE ROY.

THE CITY HAS BOTH DROP OFF POINT AND CURBSIDE RECYCLING FOR NEWSPAPER, PLASTIC, CANS, AND GLASS WHICH IS TAKEN TO MOWER COUNTY RECYCLING CENTER. ALL LAWN WASTE IS TAKEN TO THE CITY'S COMPOST SITE. BOTH OF THESE MEASURES HAVE BEEN DONE FOR THE LAST THREE YEARS.

WE WILL FURTHER IN THE FUTURE ENDEAVOR TO MAINTAIN THESE PRACTICES AND CONTINUALLY LOOK FOR NEW METHODS TO REDUCE THE WASTE STREAM.

SINCERELY,
CITY OF LE ROY

Edwin Koppen

EDWIN KOPPEN
MAYOR

FLOYD MITCHELL SLF
66-SDP-1-73P

FLOYD-MITCHELL

SOLID WASTE MANAGEMENT AGENCY

COLLECTION - TRANSPORTATION & DISPOSAL

MAY 12 10 26 AM '93

DEPT. OF
NATURAL RESOURCES

May 10, 1993

Bill Jinkinson
DNR
2300 15th St. S.W.
Mason City, Iowa
50401

Dear Sir:

This letter will serve as a follow up to our phone conversation of May 7th in which I explained the plan to include an area to the permitted area at the Floyd-Mitchell landfill.

In the fall of 1989, Director Dick Messier allowed construction and demolition and rubble to be deposited into an area along the west bank of the area now used as a borrow area after a clay berm had been constructed along the west side. The intent was to fill an area wide enough to be used as a road to access the Fill Area three (3). In the spring of 1990, this area was used for aproximately one (1) month as a wet area; therefore the area has a mixture of material disposed in it. The area by size is aproximately 250 foot long running east to west on the north side of fill area three (3) with a depth of fifty (50) foot, and on the west side going north..from Fill area three (3) to the southern boundary of the wild life area with a depth of about fifty (50) foot. These measurements are aproximate at the toe of area and not nearly as wide at the top.

This spring's inspection by our engineer noted leachate seepage in this area with the report saying that an investigation by our personnel would occur as soon as weather permitted and the removal to a permitted area of any material deposited there was advised.

On Wednesday, May 5th, Director Gene Mayer and Betty McCarthy had an in person visit with Doc Halada at the DNR regarding the situation and asked if this area could become part of the permitted area of the landfill rather than moving the material. Doc asked that the following steps be taken to include this area in the permit:

1) Request an exception from the approved development plan of the permit for waste disposed of outside the permitted area.

2) Show the limits of the waste, rubble etc. deposited in that area.

3) Show the monitoring system that will monitor that area.

Page two DNR letter:

4) How the area will be finished with cover and blended in with final operation.

5) How leachate will be controlled in the area.

Our engineer will be submitting the requested information and plan to the DNR for inclusion of this area into the development plan of the permitted area. In the meantime measures are being taken to control any seepage of leachate to the extent possible given the wet conditions at the landfill.

We will keep your office posted of any communiques with the Des Moines office of DNR.

Sincerely,

Betty McCarthy, Chair
Floyd-Mitchell Solid Waste Agency

cc. Doc Halada
Bob Bamsey
Eric Meintsma

From: FHALLAD --DNRVM Date and time 05/05/93 16:08:32
To: WJINKIN --DNRVM W. M. JINKINSON PSCHWAR --DNRVM PATRICIA SCHWARZ

FROM: FHALLAD
PROFS ID:
SUBJECT: FLOYD-MITCHELL CO SLF

BETTY MC CARTHY STOPPED IN TODAY TO SAY THAT THE PREVIOUS SLF OPERATOR DISPOSED OF REFUSE ALONG WITH RUBBLE IN THE NW CORNER OF THE SITE WITHOUT DNR APPROVAL OR PLANS SHOWING SAME. WANTED TO LET US KNOW AND ASK IF WE WOULD CONSIDER LETTING THEM KEEP IT THEIR VS REMOVING IT. THIS DISPOSAL WAS DONE SUPPOSEDLY 2-3 YEARS AGO.

I SAID SEND IN A SITE MAP SHOWING WASTE LIMITS...QUANTITIES OF RUBBLE AND WASTE...XSECTION SHOWING WASTE POSITION VS APPROVED PLAN...IF HMSP ENVELOPES THIS AREA...HOW THEY ARE GOING TO CONTAIN AND MANAGE LEACHATE PRODUCTION... HOW THEY ARE GOING TO MERGE IT WITH THE DEVELOPMENT PLAN...HOW THEY WILL COVER AND CLOSE IT. SEND ENGRG DOCUMENTATION BY PE AND REQUEST EXCEPTION FROM PERMIT APPROVAL. OTHERWISE...TELL US THEY ARE GOING TO REMOVE THE REFUSE PORTION AND HOW/WHEN. ALSO...COPY FO ON LETTER SO THEY ARE ADVISED.

XC P.S.

RECORD COPY
File Name: Floyd-Mitchell SW
Corresp CO-SOP-1-73P DOC

FLOYD-MITCHELL

SOLID WASTE MANAGEMENT AGENCY

COLLECTION - TRANSPORTATION & DISPOSAL

6/2 —
Orig routed to Brian Tormey for review. DOC

May 11, 1993

Doc Halada
IDNR
Wallace State Office Building
Des Moines, Iowa 50319

Dear Sir:

I am requesting an amendment to the Floyd-Mitchell Solid Waste Management Agency's Comprehensive Plan to include the city of LeRoy, Minnesota. The Mower County Commissioners have released that volume of waste from their county solid waste plan, (letter included).

I have visited with the LeRoy City Council at their regular City Council meeting held on May 3rd at which time they reviewed our Comprehensive Plan and asked to become part of our planning area. As you can see their City has been committed to a waste volume reduction program for the past three (3) years and we find their efforts in keeping with the goals of our plan. Their letter of cooperation is enclosed.

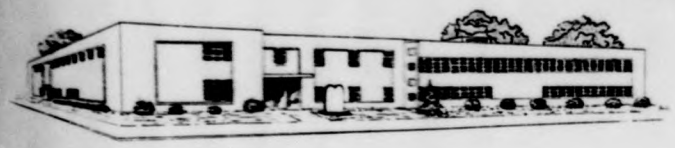
Sincerely,

Betty McCarthy

Betty McCarthy, chair
Floyd-Mitchell Solid Waste Agency

cc: Bob Bamsey
Patricia Schwartz

MOWER COUNTY
AUSTIN, MINNESOTA
55912



April 7, 1993

Betty McCarthy
P.O. Box 32
Osage, IA 50461

Dear Ms. McCarthy:

As a follow-up to our March 2, 1993 meeting, I am writing this letter to allow Steve Iverson of S & I Sanitation, Grand Meadow, MN 55936 to deliver waste collected from households and small businesses in the City of LeRoy, MN to your Sanitary Landfill in Mitchell County, Iowa.

Under Minnesota Statute 115A.46 jurisdictions within Minnesota counties are prohibited from conducting activities that are inconsistent with county solid waste plans. Therefore, our Solid Waste Plan will be amended to allow this volume of waste to be designated to your facility. However, wording in our plan will state that if, in the future, Mower County builds or contracts with a solid waste composting or incineration project we will rescind this amendment.

If you need any further documentation or any information regarding this matter, please contact Jeffrey Weaver, Solid Waste Administrator at 507-437-9551.

Respectfully submitted,

Donald Johnson, Chair
Mower County Board of Commissioners

DJ:km

Tele. (507) 324-5707

City of Le Roy

122 W. Main Street
Le Roy, Minnesota 55951

MAY 7, 1993

BETTY MC CARTHY
FLOYD-MITCHELL SOLID WASTE AGENCY
P.O. BOX 32
OSAGE, IA. 50461

DEAR MRS. MC CARTHY:

THE COMPREHENSIVE PLAN FOR THE FLOYD-MITCHELL SOLID WASTE MANAGEMENT AGENCY WAS REVIEWED BY THE LE ROY, MINNESOTA CITY COUNCIL AT THEIR REGULAR MONTHLY MEETING HELD ON MONDAY, MAY 3, 1993. THE COUNCIL VOTED TO ADOPT THE COMPREHENSIVE PLAN AND TO BE COMMITTED TO THE WASTE VOLUME REDUCTION AND RECYCLING GOALS OF 25% BY 1994 AND 50% BY THE YEAR 2000.

THE CITY WILL MAKE ITS BEST EFFORT TO IMPLEMENT THE SCHEDULE CONTAINED IN THE COMPREHENSIVE PLAN.

FOLLOWING IS A BRIEF SUMMARY OF THE WASTE REDUCTION AND RECYCLING EFFORTS CURRENTLY BEING IMPLEMENTED BY THE CITY OF LE ROY.

THE CITY HAS BOTH DROP OFF POINT AND CURBSIDE RECYCLING FOR NEWSPAPER, PLASTIC, CANS, AND GLASS WHICH IS TAKEN TO MOWER COUNTY RECYCLING CENTER. ALL LAWN WASTE IS TAKEN TO THE CITY'S COMPOST SITE. BOTH OF THESE MEASURES HAVE BEEN DONE FOR THE LAST THREE YEARS.

WE WILL FURTHER IN THE FUTURE ENDEAVOR TO MAINTAIN THESE PRACTICES AND CONTINUALLY LOOK FOR NEW METHODS TO REDUCE THE WASTE STREAM.

SINCERELY,
CITY OF LE ROY

Edwin Koppen

EDWIN KOPPEN
MAYOR

FLOYD-MITCHELL
66-SDP-1-73P
corresp.

RUST ENVIRONMENT & INFRASTRUCTURE

Formerly Brice, Petrides-SEC Donahue

RUST Environment & Infrastructure Inc.
501 Sycamore Street, Suite 222 • Waterloo, IA 50703
P.O. Box 1497 • Waterloo, IA 50704-1497
Tel. (319) 232-6531 • FAX (319) 232-0271

April 20, 1993

Ms. Patricia Schwarz
Iowa Department of Natural Resources
900 East Grand
Des Moines, Iowa 50319

Re: Floyd/Mitchell County Sanitary Landfill
RUST Project No. 50603.000

Dear Ms. Schwarz:

Enclosed are two copies each of the Leachate Control Plan and the Closure/Post-Closure report for the Floyd/Mitchell County Landfill for your review. If you have any questions or need additional information, please contact us.

Sincerely,

Eric Meintsma

Eric W. Meintsma, P.E.

EWM:blc

enc: As Noted

cc: Ms. Betty McCarthy

T/L/ZL7

Floyd-Mitchell
66-SDP-1-73P
corresp.

RUST ENVIRONMENT & INFRASTRUCTURE

Formerly Brice, Petrides-SAC Donohue

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501 Sycamore Street, Suite 222 • Waterloo, IA 50703
P.O. Box 1497 • Waterloo, IA 50704-1497
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April 20, 1993

NATURAL RESOURCES

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900 East Grand
Des Moines, Iowa 50319

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Sincerely,

Eric W. Meintsma, P.E.

EWM:blc

enc: As Noted

cc: Ms. Betty Mc[illegible]

STATE OF IOWA
RECORD COPY
File Name Floyd-Mitchell CK 40E
Senders Initials 66-SDP-1-73P
Permit Corresp
TERRY E. BRANSTAD, GOVERNOR
DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

March 3, 1993

Betty McCarthy, Chairperson
Floyd-Mitchell Solid Waste Board
R.R.5
Osage, IA 50461

Re: Floyd-Mitchell Sanitary Landfill
Permit #66-SDP-1-73P
Review of Permit Renewal Status

Dear Ms. McCarthy:

The sanitary disposal project permit for the Floyd-Mitchell Sanitary Landfill expired on October 4, 1992. A summary of the permit renewal status is presented in the following paragraphs.

Permit Renewal Application

A completed permit application Form 45, along with proof of Floyd-Mitchell Solid Waste Management Agency's ownership of the site, was received on June 30, 1992. The application indicated that approximately 22,000 tons of waste will be accepted per year from the service area described as all towns in Mitchell County; all towns in Floyd County except Nora Springs; all towns in Chickasaw County except Bassett; and the towns of Chester and Elma in Howard County.

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Your Comprehensive Plan was approved by the Waste Management Assistance Division on January 4, 1990. The first revision to the plan required by IAC Subrule 101.5(7) was submitted on December 16, 1992. A request for amendment of the planning area to include the City of Bassett in Chickasaw County was received by letter dated November 26, 1992. Authorization for disposal of the waste tonnage generated in the approved planning area will be defined in the Special Provisions of your renewed permit. Any changes in the waste stream or waste quantities will require an amendment to the permit.

Hydrogeologic Investigation Report (HIR)

Your HIR, in accordance with the current rules, was approved on September 12, 1990.

Hydrologic Monitoring System Plan (HMSP)

Your HMSP was approved on September 12, 1990 and revised by your consultant's letter dated April 9, 1991. The first year quarterly sampling has been completed and the landfill is currently on a semi-annual sampling schedule. A provision for continued monitoring in accordance with your semi-annual schedule will be included in your renewed permit.

We have reviewed the statistical analysis of groundwater quality received on April 14, 1992. Your consultant concludes that MW-2, MW-6, and possibly MW-5 are impacted by landfill leachate. We will incorporate the consultant's recommendation to continue sampling the three impacted monitoring wells for the IAC Subrule 103.2(4)"d" parameters, in addition to the required semi-annual parameters, in your permit special provisions. Such additional analysis will be required until three consecutive sampling events indicate compliance with the statistical baseline data. Evaluations shall be summarized in the November 30 annual report(s). Although concentrations for several parameters were statistically above the upgradient background levels, the report indicated that to date none of the parameters have exceeded primary drinking water standards. Implementation of the leachate control system will reduce your potential liability associated with leachate migration and any required groundwater assessment and remediation.

Leachate Control Plan (LCP)

Your Preliminary LCP was received on November 12, 1991. Proceed in the development of constructible design plans and specifications in accordance with IAC Chapter 103, wastewater treatment design standards, and the following review comments:

1. A request to land apply leachate resulting from pump tests within the permit area was received on July 21, 1992. Land application of leachate resulting from pump tests is not allowed unless a wastewater land application permit is obtained. Further, leachate cannot be recirculated onto waste cells unless an approved leachate control liner and piping systems are below the waste material in accordance with IAC Subrule 103.2(11). Leachate collected from pump tests should be treated at a

wastewater treatment facility or the proposed on site treatment facility, once it's constructed. Leachate from Area Fill No. 2 shall also be properly treated.

2. As part of your final LCP, address the current non-compliance with IAC Subrule 103.2(1)m(2) relative to the required five foot separation between the waste base and the high water table. The water table will need to be lowered to attain compliance with this Subrule, unless it can be demonstrated that a lesser separation is unlikely to have a significant adverse effect on ground and surface waters. Demonstration must include an engineering justification and evaluation documenting that effects of a lesser than five foot separation will not cause exceedances of surface and groundwater quality standards.

3. The facultative lagoon liner design was not discussed in the preliminary plan. Please note that the lagoon design must provide a liner that meets the landfill base liner minimum requirements and leakage criteria listed in IAC Subrule 103.2(1) under maximum liquid head conditions. Compute the allowable leakage under maximum design head conditions to determine the required liner thickness using the Darcy equation and allowable permeability by rule. If an alternative flexible membrane liner is selected, use the manufacturer's design basis permeability rating in the calculations to demonstrate equivalency with rule requirements. Specify the soil material quantity and quality needed for construction of either proposed liner system and the availability of suitable soil.

4. Provide construction details for the extension of leachate level piezometers as the vertical expansion proceeds.

5. Provide calculations to confirm required system piping strength criteria.

6. We have noted that your leachate collection trench detail shown on plan sheet 8 proposes a coarse granular drainage material with no filter fabric or graded filter layer, as required by IAC Subrule 103.2(11)a(5). Provide design revisions or submit engineering justification and a request for rule variance. We recommend a minimum hydraulic conductivity of coarse granular material to be $1x10^{-4}$cm/s to prevent biological clogging.

7. Provide three copies of your final LCP certified by a Professional Engineer registered in Iowa for our review, together with your intended implementation schedule to afford July 1, 1994 completion. Assume a maximum of six months for the Department to review and approve your LCP.

Closure/Post Closure Plan (C/PC)

Your C/PC Plan was received on July 13, 1992. Please address the following comments so that we may complete our review:

1. Provide a maintenance and inspection checklist for the post closure period to facilitate staff inspections and deficiency corrections. The Department recommends a minimum of monthly general inspections to be conducted with the monthly groundwater level measurements. Provide a schedule of post closure activities to include requirements for the leachate control system, hydrologic monitoring system, regular inspections, and submittals.

2. State in the plan your intentions for compliance with the general closure requirements listed in IAC Subrule 102.14(9).

3. Show the estimated final contours of the borrow areas and indicate the estimated quantity of soil material sources and availability for final cover. Provide your plans for borrow site restoration. We have noted your total estimated quantities listed in the C/PC table of estimated costs. Document permeability data and sample locations for material to be used for final cover and the leachate lagoons.

4. Provide evidence that the C/PC Plan was reviewed by the local soil conservation district commissioner.

5. Provide P.E. certification that all drainage and diversion structures are designed for a 25 year, 24 hour storm event.

6. Those portions of existing landfills demonstrating placement of final cover in conformance with previously approved plans and specifications or regulations in effect at the time of such approval, shall not be required to apply additional cover solely to achieve compliance with 103.2(13)b(1) and (2). To demonstrate final cover compliance of fill areas completed prior to promulgation of the current rules in October of 1989, complete the following activities: (1) identify areas with final cover completed before October 1989 on a plan map, (2) document cover compliance by taking core samples of the cover in a 100 x 100 foot grid pattern, (3) document the results on the plan map, (4) submit as part of your C/PC Plan, and (5) provide a schedule for prompt repair of deficient areas identified by the cover documentation. Sample locations shall be properly resealed to minimize rainfall infiltration. As an alternative, you may design the final cover to meet current rules in these portions of the landfill.

7. Those portions of existing landfills demonstrating placement of final cover in conformance with previously approved plans and specifications shall not be required to reconstruct the cover to meet either the minimum or maximum slope established by IAC Subrule 103.2(13)c. Identify areas that were completed prior to October of 1989 and document that the slopes were constructed in conformance with the approved plans at that time. As an alternative, you may propose slopes to meet the current rules.

8. Submit three copies of your revised C/PC Plan certified by a Professional Engineer registered in the State of Iowa.

Design and Operational Plans and Specifications

In your July 8, 1992 letter, we received notification that a truck scale and administrative building have been constructed at the Floyd-Mitchell County Landfill. This modification of your operational plan will be approved as part of your renewed permit.

Summary

Provide a response to the Leachate Control Plan and Closure/Post Closure Plan review comments within 30 days of receipt of this letter. Once these documents are approvable, we will initiate issuance of your renewed permit. If you have any questions relative to this review or your permit renewal status, you may contact me at (515) 281-8899.

Sincerely,

Patricia G. Schwarz

Patricia G. Schwarz
Environmental Engineer
Solid Waste Section

PGS:pgs\floyd.doc

cc: Field Office 2

Eric Meinstma
Brice Petrides SEC Donohue
501 Sycamore Street, Suite 222
P.O. Box 1497
Waterloo, Iowa 50704-1497

Corresp Floyd Mitchell LF
66-SDP-1-73P

RUST ENVIRONMENT & INFRASTRUCTURE

Formerly Brice, Petrides-SEC Donohue

RUST Environment & Infrastructure Inc.
501 Sycamore Street, Suite 222 • Waterloo, IA 50703
P.O. Box 1497 • Waterloo, IA 50704-1497
Tel. (319) 232-6531 • FAX (319) 232-0271

April 19, 1993

Mr. Francis Hallada, P.E.
Iowa Department of Natural Resources
Solid Waste Division
900 East Grand
Des Moines, Iowa 50319

Re: Floyd/Mitchell County Sanitary Landfill
Groundwater Monitoring and Monitoring Well Construction
RUST Project No. 50603

Dear Mr. Hallada:

Initially, it was anticipated that monitoring wells were to be installed in April at the Floyd/Mitchell County landfill. The landfill is replacing an upgradient monitoring well and installing an upgradient well to monitor a deep aquifer. Due to the wet weather conditions, however, projected construction has been delayed until the first week of May. Semi-annual groundwater sampling will also be delayed until these wells are installed, to enable concurrent sampling of the existing and the new wells.

We will continue to keep you informed of any changes in construction scheduling. If you have any questions, please contact us.

Sincerely,

Eric W. Meintsma, P.E.

EWM:bsp

cc: Ms. Betty McCarthy

T/Ltr YJ3

Floyd/Mitchell LF (Corres)
66-SDP-1-73P

RUST ENVIRONMENT & INFRASTRUCTURE

April 19, 1993

Mr. Francis Halliada, P.E.
Iowa Department of Natural Resources
Solid Waste Division
900 East Grand
Des Moines, Iowa 50319

NATURAL RESOURCES
APR 21 '93

Re: Floyd/Mitchell County Sanitary Landfill
Groundwater Monitoring and Monitoring Well Construction
RUST Project No. 50603

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We will continue to keep you informed of any changes in construction scheduling. If you have any questions, please contact us.

Sincerely,

Eric W. McIntosh, P.E.

EWM/sp

cc: Mr. Rusty McCarthy

RECORD OF TELEPHONE CONVERSATION cm12-1 66-SDP-1-73P Correspondence

DATE 3-31-93	TIME 205pm	[ ] INITIATED [x] RECEIVED	FILE NO. SW	Routing To	Routing Initials
EMPLOYEE NAME Clay Johnston		PHONE NO.			
BUREAU/DIVISION Rpd 2					
OTHER PARTY NAME Karen Johnson		PHONE NO.			
FIRM/ADDRESS Floyd-Mitchell Co SCF					
SUBJECT asbestos shingles					

DEPARTMENT	CONVERSATION	OTHER PARTY
	OK to accept asbestos shingles?	
yes		
	Handle like regular SW?	
yes		
cc SW		

66-SDP-01-73P
Floyd-Mitchell
SLF
Corresp. File

Iowa Department of Agriculture and Land Stewardship

DALE M. COCHRAN
SECRETARY OF AGRICULTURE

SHIRLEY DANSKIN-WHITE
DEPUTY SECRETARY OF AGRICULTURE

HENRY A. WALLACE BUILDING
DES MOINES, IOWA 50319

March 15, 1993

Ms. Karen Johnson
Floyd-Mitchell County Landfill
Box 32
Osage, IA 50461

Dear Ms. Johnson:

I have enclosed for your information a copy of the laboratory results for the samples collected from the Floyd-Mitchell County Landfill on November 16, 1992, by John Clemons, pesticide investigator, during the Department's followup on a pesticide container disposal project.

The laboratory reports list the pesticides for which each sample was analyzed in the first column, the concentrations detected in parts per million (ppm) in the second column, and when applicable, the minimum detection level (MDL) in the third column.

Should you have any further questions, please feel free to contact me at 515/281-8591.

Sincerely,

Mark E. Lohafer

Mark E. Lohafer
Investigation Supervisor

MEL/ES:oo

Enclosure

cc: John Clemons, Pesticide Investigator
IFCA
Lavay Haage, Supervisor, Solid Waste Section, IDNR

IOWA DEPARTMENT OF AGRICULTURE
& LAND STEWARDSHIP

State Chemical Laboratory
Wallace Bldg., E. 9th and Grand
Des Moines, Iowa 50319

REPORT OF ANALYSIS

Lab. No.	PR-360-92
Sample No.	IA 4848
Date Collected	11/16/92
Date Received	11/18/92
Investigator	J. Clemons

Collection Site Information
(Name, Address & Telephone)

Karen Johnson
Floyd-Mitchell Co. Landfill
Box 32
Osage, Iowa 50461

Name, Address & Telephone of Applicator

Description of Sample

1/1 sample/approx. 2 lb./soil/containment area

Results of Analysis

COMPOUNDS	PPM	MDL
Alachlor	1.4 ppm	
Atrazine	0.59 ppm	
Cyanazine	0.34 ppm	
Dicamba	0.017 ppm	
2,4-D	None detected	0.01 ppm
Metolachlor	0.76 ppm	
Metribuzin	0.43 ppm	
Pendimethalin	0.49 ppm	
Trifluralin	0.067 ppm	

METHOD OF ANALYSIS: PAM I. 222.13a, version 7/69.

(No. of Determinations - 42)

ANALYST: V. Rongkavilit

PPM = parts per million PPB = parts per billion MDL = minimum detection level

Signature of Lab Supervisor: Joyce Billings Date: 3/1/93

RECORD COPY

File Name 66-SDP-01-730

Senders Initials _____

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

February 26, 1993

Betty McCarthy
Chairperson
Floyd-Mitchell Solid Waste Board
R.R. #5
Osage, IA 50461

Dear Ms. McCarthy

This letter is an amendment to Special Waste Authorization (SWA) number 6601090192

This will authorize an extension of disposal period until September 1, 1995 at which time the SWA will expire.

This will not change any other portion of the SWA. If you have questions regarding this matter you may contact me at 515/281-4968.

Sincerely,

Lavoy Haage

Lavoy Haage
Supervisor
Solid Waste Section

cc: DNR Field Office - 2
Karen Johnson, Landfill Operator
Donald Ristin, City of Osage

CITY OF OSAGE IOWA

LOUIS J. HALVORSON .. MAYOR ..... CATHY PENNEY .. CITY CLERK

114 SOUTH 7th STREET

OSAGE, IOWA 50461
Phone (515) 732-3709
FAX (515) 732-4483

February 22, 1993

Lavoy Haage, Supervisor
Solid Waste Section
Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand
Des Moines, IA 50319-0034

RE: SWA 6601090192

Dear Mr. Haage:

The disposal period for our current SWA expires on March 1, 1993.

We are requesting an extension for the disposal period.

Sincerely,

William H. Bollinger

WHB/rlm

Enclosure: Copy of SWA 6601090192

CC: Donald Risting, Wastewater Treatment Plant Operator

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

To: Floyd-Mitchell Solid Waste Board
Betty McCarthy, Chairman
RR # 5
Osage, IA 50461

Authorization No. 660/090192

SPECIAL WASTE AUTHORIZATION

Disposal Site: Floyd-Mitchell County Sanitary Landfill (66-SDP-1-73P)

The following and attached instructions 21.4 apply ONLY to the specific waste described and to the volume and time period specified. This is not an overall approval to accept other toxic or hazardous wastes or industrial sludges. DNR must authorize the disposal of such additional wastes from the same generator or similar wastes from a different generator. Failure to obtain this approval is a violation of Solid Waste Disposal Rule 102.14. These instruction in no way obligate the above-named disposal site to accept the described waste. The disposal site has the final decisions whether to accept the waste, and does so at its own risk. This form shall be kept in the office of the sanitary landfill for review by DNR personnel. Each disposal shall be recorded on the reverse of this form and reported in accordance with the reporting requirements contained in the landfill's permit.

By delivery of this waste, the waste generator certifies that the intended disposal of the described waste is in compliance with all RCRA hazardous waste regulations.

Waste and Volume:	Approximately 20 lbs. of stockpiled grit & bar screenings, and 25 lbs. of grit & bar screenings every 4 months thereafter.
Generator:	City of Osage, 114 South 7th Street, Osage, IA 50461 Donald Risting 515-732-5828
Disposal Period:	Until March 1, 1993 (The SWA is good for 3 years from the date signed, if an extension of time is required, contact Jim Thayer.)
Landfill Operator:	Karen Johnson 515/982-4288

If you have any questions regarding this authorization, please contact Jim Thayer at 515/281-3426.

Authorized by Jim Thayer for Larry Haage Date: 9/1/92
Supervisor, Solid Waste Section

cc: Field Office - 2
Karen Johnson, Landfill Operator
Jim Thayer/Record
Donald Risting, City of Osage

10:15
3-3-93

Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand Avenue
Des Moines, Iowa 50319-0034

FAX SHEET

DELIVER TO: ERIC MEINSTMA **PHONE:** (319) 232-6531

FAX NUMBER: (319) 232-0271

FROM: PATRICIA SCHWARZ

NUMBER OF PAGES (including this cover sheet): 6

MESSAGE: THIS LETTER TO BETTY MCCARTHY WENT OUT TODAY. NE THOUGHT YOU SHOULD GET A COPY PRIOR TO OUR MEETING ON FRIDAY, SO WE CAN DISCUSS

P.S.

Our Fax Phone Number is 515/281-8895

Any problems with transmission call: 515/281-8941

542.1352.4

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

March 3, 1993

Betty McCarthy, Chairperson
Floyd-Mitchell Solid Waste Board
R.R.5
Osage, IA 50461

Re: Floyd-Mitchell Sanitary Landfill
Permit #66-SDP-1-73P
Review of Permit Renewal Status

Dear Ms. McCarthy:

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wastewater treatment facility or the proposed on site treatment facility, once it's constructed. Leachate from Area Fill No. 2 shall also be properly treated.

2. As part of your final LCP, address the current non-compliance with IAC Subrule 103.2(1)m(2) relative to the required five foot separation between the waste base and the high water table. The water table will need to be lowered to attain compliance with this Subrule, unless it can be demonstrated that a lesser separation is unlikely to have a significant adverse effect on ground and surface waters. Demonstration must include an engineering justification and evaluation documenting that effects of a lesser than five foot separation will not cause exceedances of surface and groundwater quality standards.

3. The facultative lagoon liner design was not discussed in the preliminary plan. Please note that the lagoon design must provide a liner that meets the landfill base liner minimum requirements and leakage criteria listed in IAC Subrule 103.2(1) under maximum liquid head conditions. Compute the allowable leakage under maximum design head conditions to determine the required liner thickness using the Darcy equation and allowable permeability by rule. If an alternative flexible membrane liner is selected, use the manufacturer's design basis permeability rating in the calculations to demonstrate equivalency with rule requirements. Specify the soil material quantity and quality needed for construction of either proposed liner system and the availability of suitable soil.

4. Provide construction details for the extension of leachate level piezometers as the vertical expansion proceeds.

5. Provide calculations to confirm required system piping strength criteria.

6. We have noted that your leachate collection trench detail shown on plan sheet 8 proposes a coarse granular drainage material with no filter fabric or graded filter layer, as required by IAC Subrule 103.2(11)a(5). Provide design revisions or submit engineering justification and a request for rule variance. We recommend a minimum hydraulic conductivity of coarse granular material to be $1x10^{-1}$cm/s to prevent biological clogging.

7. Provide three copies of your final LCP certified by a Professional Engineer registered in Iowa for our review, together with your intended implementation schedule to afford July 1, 1994 completion. Assume a maximum of six months for the Department to review and approve your LCP.

Closure/Post Closure Plan (C/PC)

Your C/PC Plan was received on July 13, 1992. Please address the following comments so that we may complete our review:

1. Provide a maintenance and inspection checklist for the post closure period to facilitate staff inspections and deficiency corrections. The Department recommends a minimum of monthly general inspections to be conducted with the monthly groundwater level measurements. Provide a schedule of post closure activities to include requirements for the leachate control system, hydrologic monitoring system, regular inspections, and submittals.

2. State in the plan your intentions for compliance with the general closure requirements listed in IAC Subrule 102.14(9).

3. Show the estimated final contours of the borrow areas and indicate the estimated quantity of soil material sources and availability for final cover. Provide your plans for borrow site restoration. We have noted your total estimated quantities listed in the C/PC table of estimated costs. Document permeability data and sample locations for material to be used for final cover and the leachate lagoons.

4. Provide evidence that the C/PC Plan was reviewed by the local soil conservation district commissioner.

5. Provide P.E. certification that all drainage and diversion structures are designed for a 25 year, 24 hour storm event.

6. Those portions of existing landfills demonstrating placement of final cover in conformance with previously approved plans and specifications or regulations in effect at the time of such approval, shall not be required to apply additional cover solely to achieve compliance with 103.2(13)b(1) and (2). To demonstrate final cover compliance of fill areas completed prior to promulgation of the current rules in October of 1989, complete the following activities: (1) identify areas with final cover completed before October 1989 on a plan map, (2) document cover compliance by taking core samples of the cover in a 100 x 100 foot grid pattern, (3) document the results on the plan map, (4) submit as part of your C/PC Plan, and (5) provide a schedule for prompt repair of deficient areas identified by the cover documentation. Sample locations shall be properly resealed to minimize rainfall infiltration. As an alternative, you may design the final cover to meet current rules in these portions of the landfill.

7. Those portions of existing landfills demonstrating placement of final cover in conformance with previously approved plans and specifications shall not be required to reconstruct the cover to meet either the minimum or maximum slope established by IAC Subrule 103.2(13)c. Identify areas that were completed prior to October of 1989 and document that the slopes were constructed in conformance with the approved plans at that time. As an alternative, you may propose slopes to meet the current rules.

8. Submit three copies of your revised C/PC Plan certified by a Professional Engineer registered in the State of Iowa.

Design and Operational Plans and Specifications

In your July 8, 1992 letter, we received notification that a truck scale and administrative building have been constructed at the Floyd-Mitchell County Landfill. This modification of your operational plan will be approved as part of your renewed permit.

Summary

Provide a response to the Leachate Control Plan and Closure/Post Closure Plan review comments within 30 days of receipt of this letter. Once these documents are approvable, we will initiate issuance of your renewed permit. If you have any questions relative to this review or your permit renewal status, you may contact me at (515) 281-8899.

Sincerely,

Patricia G. Schwarz
Environmental Engineer
Solid Waste Section

PGS:pgs\floyd.doc

cc: Field Office 2

Eric Meinstma
Brice Petrides SEC Donohue
501 Sycamore Street, Suite 222
P.O. Box 1497
Waterloo, Iowa 50704-1497

Floyd Mitchell SLR
66-SDP-1-73P

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

December 8, 1992

Ms. Betty McCarthy
Floyd-Mitchell County
Solid Waste Agency
Box 32
Osage, Iowa 50461

Dear Ms. McCarthy:

The Waste Management Division has completed its review of the solid waste management comprehensive plan, part I amendment request for Chickasaw County. **The approved planning area includes the cities and rural areas of the following counties: Floyd, Mitchell and Chickasaw.**

The information provided in the letter of November 10, 1992 Chickasaw County board of Supervisors, together with the individual letters of cooperation from the cities of Alta Vista, Bassett, Fredricksburg, Ionia, Nashua, New Hampton, Lawler, and North Washington is sufficient to grant approval for this amendment. Notice of this amendment approval will be forwarded to the department's Environmental Protection Division.

Please note that the subsequent comprehensive plan, part I for this three county area is due January 1, 1993.

If you have questions regarding this letter, or comprehensive planning in general, please contact Julie Kjolhede, at 515/281-8946 or Brian Tormey, at 515/281-8382.

Sincerely,

Gaye Wiekierak

Gaye Wiekierak
Chief, Planning and Grants Bureau
Waste Management Division

cc: John Huegel, Chickasaw County Board of Supervisors
Roger Stone, Simmons, Perrine, Albright & Ellwood
Lavoy Haage, Environmental Protection Division

Patti ==

[redacted]: FA2d files

12.3.92

DOR

Betty Mc Carthy

Yes OK ↓ (want to Blend w/ crushed rock) ↓

Yes OK → Is it OK to use fly ash for daily cover, 50%. (and for road ways in SLE?)

She understands a permit amendment is needed.

Call her at Charles City, Elks Club this morning at 515/ 228-1257.

12/3

Telecon to Betty —

- Told her ok to mix FA 50/50 w/ soil
- Get TCLP on ash
- OK to blend FA w/ crushed rock to stabilize roadways @ site
- Must provide dust control at all times (state methods in request)
- FA is tonnage fee exempt. ~~#~~ Report as same & keep records for construction use
- Can stockpile FA. if requested,.. show where & max amt.
- Send in amend. request

They may do so.

DOR

RECORD COPY
File Name 66-SDP-01-73P Mitchell6
Senders Initials Floyd-Mitchell SLF Permit File Pal

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

November 4, 1992

Ms. Karen Johnson, Office Manager
Floyd-Mitchell Solid Waste Management Agency
P.O. Box 32
Osage, IA 50461

Dear Ms. Johnson:

Thank you for your recent verbal and written request to extend the deadline for removal of the pesticide containers from the landfill site. Your request is approved.

If you have questions or need additional information, please contact Paul A. Lundy, P.E. at 515/281-8912.

Sincerely,

Lavoy Haage

LAVOY HAAGE
Supervisor
Solid Waste Section

LH:pal

cc: Field Office # 2, Mason City, Iowa
Randy Happel, Iowa Fertilizer & Chemical Association,
900 Des Moines Street, Des Moines, IA 50309

FLOYD-MITCHELL

SOLID WASTE MANAGEMENT AGENCY

COLLECTION - TRANSPORTATION & DISPOSAL

PO BOX 32
OSAGE, IOWA 50461

515-982-4288

October 30, 1992

Lavoy Haage, Supervisor
Dept of Natural Resources
Solid Waste Section
Wallace State Office Building
Des Moines, Iowa 50319

Dear Mr. Haage:

At the request of Paul Lundy, I am writing this to inform you that the Floyd-Mitchell Solid Waste Management Agency will be keeping 500-1000 plastic pesticide containers on the premises until November 6, 1992.

I have spoken with Ron at United Agri Products; Randy Happel at Iowa Fertilizer & Chemical; Jeff VanSteenburg at the DNR Field Office #3; Jim Thayer and Shirley Richards at the DNR Des Moines; Betty McCarthy, Chair, Floyd Mitchell SWMA, regarding this matter. Mitchell County's local newspaper would like to do a follow-up article regarding the granulation of these pesticide containers. The granulator is not available until November 5th or 6th. On one of those days either the granulator will be at the landfill for pictures or United Agri Products will send a truck and pick up the remaining containers. The majority of the containers collected at the landfill will be picked up Saturday, October 31, 1992.

If you have questions, please contact me.

Sincerely,

Karen Johnson

Karen Johnson
Office Manager

CC: File

EDD

66-SDP-1-73P
FLOYD-MITCHELL

Brice, Petrides
SEC DONOHUE
Environment & Infrastructure

July 21, 1992

Ms. Patty Schwarz
Iowa Department of Natural Resources
Solid Waste Division
900 East Grand
Des Moines, Iowa 50319

Re: Land Application of Leachate at the
Floyd/Mitchell County Landfill
BPD Project No. 50603.060

Dear Ms. Schwarz:

The Floyd/Mitchell County Solid Waste Agency is requesting Iowa DNR approval to land apply leachate generated as a result of drawdown testing. A drawdown test will be conducted to determine the hydraulic characteristics of existing leachate saturated solid waste. Testing will take place over a 4- to 6-week period. The testing will provide valuable information for the final design of the proposed leachate collection system.

We propose to extract leachate from existing wells constructed from corrugated drainage tile located at the west end of the landfill. Leachate will be extracted and land applied at a rate of 1,000-3,000 gallons per day depending on operator availability and weather conditions.

Land application is proposed for leachate treatment. The application site is currently the borrow source for daily landfill operations, therefore, any buildup of contaminants in the soil, such as metals, will eventually be returned to the landfill as the soil is used for daily and intermediate cover.

Thank you for your consideration of this proposal. If you need additional information or have any questions, please contact us.

Sincerely,

Eric W. Meintsma

Eric W. Meintsma, P.E.

EWM:bsp

cc: Ms. Betty McCarthy

T/LTR/WR2

501 Sycamore Street • Suite 222 • Waterloo, IA 50703 • (319) 232-6531 • Fax: (319) 232-0271

Brice, Petrides
SEC DONOHUE
Environment & Infrastructure

July 10, 1992

Ms. Betty McCarthy, Chairperson
Floyd/Mitchell County Solid Waste Agency
Route 5, P.O. Box 50
Osage, Iowa 50461

Re: July 3, 1992, Correspondence - Engineering Requests
Concerning Latest IDNR Landfill Inspection
BP-D Project No. 50603.070

Dear Ms. McCarthy:

We received your correspondence dated July 3, 1992, requesting specific engineering task information. The following is a status report of this request:

1. Monitoring Well Data

   Copies of the results from groundwater monitoring are provided to the Floyd/Mitchell County Solid Waste Agency and IDNR (Des Moines). Copies of the monitoring well results will also be sent to IDNR Field Office No. 2.

2. Survey of Vertical Expansion Progress

   We have scheduled a survey crew to be at the Floyd/Mitchell Landfill in July, 1992, to establish current elevations of the vertical expansion, provide coordinates of the new administration building and truck scale and establish a permanent bench mark monument.

3. Requirements of Permit Renewal

   We received a letter from the IDNR dated May 1, 1992, concerning requirements for permit renewal. The first requirement is an application for permit renewal which has been completed and submitted for IDNR approval.

   The second requirement is a closure/post-closure plan for the landfill site, which is being submitted for IDNR approval July 10, 1992. The copy for the Floyd/Mitchell Solid Waste Agency is included herewith.

   The third requirement requests submittal of upgraded design and operational plans: The IDNR approved Vertical Expansion plans serves as the design and operational plan. Follow-up discussions with IDNR indicated that a letter of notification of the

501 Sycamore Street • Suite 222 • Waterloo, IA 50703 • (319) 232-6531 • Fax: (319) 232-0271

addition of a scale and administration building would meet their requirements. A letter containing this information has been sent to the IDNR, with a copy sent to the Floyd/Mitchell Solid Waste Agency.

4. Salvage Area

A permit amendment request to allow landfill personnel to salvage scrap metal from the working face was submitted in an August 6, 1991, letter to IDNR. An attachment to that letter was a site plan showing the proposed storage area for the scrap metal. The IDNR was recently contacted to determine the status of this request. Verbal approval was given to proceed with this activity, and the amendment would be made in the new permit.

5. Petroleum Contaminated Soil Testing

The landfill is required to sample petroleum contaminated soil every three months to meet IDNR guidelines. Brice, Petrides-SEC Donohue will collect these samples on your request coordinated with our normal sampling schedule. Since the groundwater sampling has been reduced to a semi-annual schedule, we would need to add two additional sampling trips per year for the soil sampling. Soil samples will be submitted to NET for analyses in accordance with IDNR requirements.

We hope this letter brings you up to date on the engineering activities. We will continue to keep you informed of future activities. If you have any question or concerns, please contact us.

Sincerely,

Eric Meintsma

Eric W. Meintsma, P.E.

EWM:amc

Enc: As Noted

cc: Iowa Department of Natural Resources (w/enclosures)

T/L/WT6

FLOYD-MITCHELL SLF
66-SDP-1-73P

Brice, Petrides
SEC DONOHUE
Environment & Infrastructure

July 8, 1992

Ms. Patricia Schwarz
Iowa Department of Natural Resources
900 East Grand
Des Moines, Iowa 50319

Re: Floyd/Mitchell County Sanitary Landfill
Operations Plan Update
Permit No. 66-SDP-1-73P

Dear Ms. Schwarz:

The Floyd/Mitchell County Landfill has recently constructed a truck scale and administration building. Please update the landfill Operations Plan (IDNR approved Vertical Expansion Plans) to include these additions. We anticipate a survey of the landfill site in July, 1992, at which time the exact location of the new structures will be identified. An updated set of plans will be sent to you upon completion of the survey.

We will continue to keep you informed of changes occurring at the landfill. If you have any questions or require additional information, please contact us.

Sincerely,

Eric Meintsma

Eric W. Meintsma, P.E.

EWM:blc

cc: Ms. Betty McCarthy

T/L/WS5

501 Sycamore Street • Suite 222 • Waterloo, IA 50703 • (319) 232-6531 • Fax: (319) 232-0271

RECORD COPY

File Name Floyd-Mitchell SCF

Senders Initials 66-SDP-1-73P Permit SDP

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES

LARRY J. WILSON, DIRECTOR

June 17, 1992

Ms. Betty McCarthy, Chairperson
Floyd-Mitchell Solid Waste Board
Rural Route #5
Osage, IA 50461

RE: Floyd- Mitchell Sanitary Landfill
Permit #66-SDP-1-73P
Foundry Sand Useage

Dear Betty:

In response to your telephone request today, please consider this letter as a confirmation of proceedures that must be followed if you wish to pursue securing approval of the use of foundry sand as a daily cover alternative.

First, the Department will allow the use of foundry sand if mixed with soil as a 50/50 blend. Such use must be restricted to daily cover only.

Second, the foundy sand to be used for this purpose must be SWA approved by this Department. As you know, current TCLP test documentation must accompany your SWA application.

Third, the foundry sand may be stockpiled at the landfill site for ready access and blending with soil. Locations of these operations should be shown on a copy of your permit plans and submitted with your request for permit amendment.

Fourth, foundry sand used for beneficial purposes, such as noted, or roadway construction is DNR fee exempt in accord with IAC 109.3(1). However, you must keep applicable tonnage and use records and note same in your quarterly payment reports.

Lastly, if you would like to secure our approval of this foundry sand use option, you will need to submit a permit amendment request and include the noted SWA and plan data. If you have any questions, please call Patti Schwarz at (515) 281-8899 or me at 6807. SWA forms can be obtained from Jim Thayer by calling 3426.

Sincerely,

Francis L. Hallada, P.E.
Environmental Engineer
Solid Waste Section

FH:flh

cc: DNR Field Office 2

Patti Schwarz, DNR

Jim Thayer, DNR

Bob Bamsey, P.E.
Brice, Petrides-Donohue
501 Sycamore, Suite 222
Waterloo, IA 50701

FLOYD-MITCHELL SLF
66-SDP-1-73P
CHICKASAW SLF
19-SDP-1-72P

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

June 1, 1992

Mr. Frank Scott
Chairperson
Chickasaw County Board of Supervisors
Chickasaw County Courthouse
New Hampton, Iowa 50659

Dear Mr. Scott:

The Department's Environmental Protection Division has apprised us of the Administrative Order No. 92-SW-13 regarding closure of the Chickasaw County Sanitary Landfill.

Because Floyd-Mitchell County Landfill is currently accepting wastes from Chickasaw County, an amendment request to the Floyd-Mitchell County Solid Waste Management Agency for inclusion into this comprehensive plan, part I is required (please see Iowa Administrative Code 567-101.5(7)).

This amendment request must be made to the Waste Management Division on or before June 26, 1992. Please copy this request and Floyd-Mitchell County Solid Waste Management Agency's response to the following Department personnel: Cyrus Rustin and Patricia Schwarz, Environmental Protection Division.

A copy of plan amendment procedures from the Guidelines For Solid Waste Comprehensive Plans, Part I: Solid Waste Management Alternatives is included for your review.

If you have questions regarding this letter or comprehensive plans, part I in general, please contact Julie Kjolhede, at 515/281-8946.

Sincerely,

Gaye Wiekierak

Gaye Wiekierak
Chief, Planning and Grants Bureau
Waste Management Division

GW:jk

ENCL.

cc: Betty McCarthy, Chairperson, Floyd-Mitchell Solid Waste Board
Patricia Schwarz, Environmental Protection Division, I-DNR
Cyrus Rustin, Environmental Protection Division, I-DNR

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

RECORD COPY

File Name FLOYD - MITCHELL

Senders Initials 66-SDP-1-73P

DEPARTMENT OF NATURAL RESOURCES

LARRY J. WILSON, DIRECTOR

May 1, 1992

Betty McCarthy, Chairperson
Floyd-Mitchell Solid Waste Board
Rural Route #5
Osage, IA 50461

Re: Floyd-Mitchell County Sanitary Landfill
Permit #66-SDP-1-73P
Notice of Expiration

Dear Ms. McCarthy:

The Floyd-Mitchell sanitary disposal project permit expires on October 4, 1992. The following items are required for permit renewal. Your permit renewal application and support documentation are due 90 days prior to the permit expiration date, or July 4, 1992.

1) A completed Form 45 application for Sanitary Disposal Project permit renewal is required in accordance with IAC Section 102.2(1). Form 45 is enclosed for your use.

2) A Closure/Post Closure Plan is due at the time of permit renewal as stated in Section 102.12(10). The plan shall satisfy the requirements of Sections 103.2(13) and 103.2(14).

3) Submit upgraded design and operational plans consistent with current permit requirements as required by Section 102.6.

We would also like to inform you of the status of your previously submitted permit documents.

Comprehensive Plan

Your Comprehensive Plan was approved on January 4, 1990. Proposed rules will requires a subsequent revised Comprehensive Plan for a two county service area by January 1, 1993. Although the subsequent plan approval is not a condition of repermitting, we will require that the current service area and quantities specified on the renewal application be consistent with your approved Comprehensive Plan.

Hydrologic Monitoring

The first year of quarterly sampling has been completed and we received your first year monitoring report on April 14, 1992. We have not reviewed this information to date.

Leachate Control Plan

We received your intermediate Leachate Control Plan on November 12, 1991. To date, we have not reviewed this document.

If you have any questions concerning the permit renewal requirements, you may contact me at (515) 281-8899.

Sincerely,

Patricia G. Schwarz

Patricia G. Schwarz
Environmental Engineer
Solid Waste Section

Enclosure Form 45

PGS:pgs\floyd.noe

cc: Field Office 2

Karen Johnson, Office Manager
P.O. Box 32
Osage, IA 50641

Gene Mayer, Director
Floyd-Mitchell Solid Waste Management Agency
P.O. Box 32
Osage, IA 50461

Eric Meinstma
Brice, Petrides-Donohue
501 Sycamore, Suite 222
Waterloo, IA 50701

Brice,
Petrides-
Donohue ENGINEERS
ARCHITECTS
SCIENTISTS

April 30, 1992

Ms. Nina Koger
Iowa Department of Natural Resources
900 East Grand
Des Moines, Iowa 50319

Re: Landfill Inspections
BPD Project Nos.: 50303.506
50536.060
50603.010

Dear Ms. Koger:

As we discussed, the routine inspections of the Black Hawk County Landfill, Winneshiek County Landfill and Floyd-Mitchell Landfill have been delayed for approximately two weeks. The inspections are scheduled for the week of May 11, 1992.

Thank you for your consideration of this matter.

Sincerely,

BRICE, PETRIDES-SEC DONOHUE

Bob Bamsey

Robert E. Bamsey, P.E.

REB:blc

cc: Ms. Patricia Schwarz

T/L/WG8

501 Sycamore Street, Suite 222, P.O. Box 1497, Waterloo, Iowa 50704-1497 319.232.6531 Fax 319.232.0271

RECORD COPY

File Name Floyd-Mitchell SLF 4900

Senders Initials 66-SDP-1-73P permit

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

April 2, 1992

Eric Meinstma
Brice, Petrides-Donohue
501 Sycamore Street
Suite 222
P.O. Box 1497
Waterloo, Iowa 50704-1497

Re: Floyd-Mitchell Sanitary Landfill
Permit #66-SDP-1-73P
Statistical Analysis of Groundwater Sampling Data

Dear Mr. Meinstma:

We received the hydrologic monitoring data and statistical analysis that you submitted on behalf of the Floyd-Mitchell Sanitary Landfill officials on March 3, 1992. The correspondence contained one diskette and a transmittal form.

We wish to advise you that the guidelines for submittal of landfill water quality monitoring results by electronic media were addressed in a letter to all sanitary landfill officials dated November 1, 1991. A copy is attached for reference. Some of the requirements were omitted from the submittal as summarized below:

1. The diskette label must reflect (1) site name, (2) DNR permit number, (3) reporting date and period, (4) laboratory utilized, (5) firm name, and (6) name and registration number of engineer certifying the accuracy of the data. We have enclosed the diskette so that you may make the appropriate additions to the label.

2. We require a hard copy of the engineer-certified annual report summary addressing the effect of the facility on the environment. This report was due by November 30, 1991.

3. The hard copy must include graphs and support data for all exceptions that are above the two standard deviation upper limit of the mean background. Hard copy graphing of the remaining data is not required.

Please submit the additional information within 30 days so that we may complete our review of the monitoring data at this site.

If you have any questions, you may contact me at (515) 281-8899.

Sincerely,

Patricia G. Schwarz
Environmental Engineer
Solid Waste Section

PGS:pgs\floyd.mon

Enclosure Diskette

cc: Field Office 2

Floyd-Mitchell Solid Waste Board
Betty McCarthy, Chairperson
RR #5
Osage, Iowa 50461

Gene Mayer, Director
Floyd-Mitchell Solid Waste Management Agency
P.O. Box 32
Osage, Iowa 50461

Gene Helfter
RR 2, Box 125
Elma, Iowa 50628

Printout from data disk Lotus 123 (3.1)

LATEST REVISION 02/04/92

GROUNDWATER MONITORING WELL ANALYSIS
FLOYD/MITCHELL CO. LANDFILL

MONITORING WELL NO. 4 (PREVIOUSLY NO. 7) U.E.

CONSTITUENT	UNIT	10/11/90 RESULTS	01/18/91 RESULTS	04/23/91 RESULTS	07/02/91 RESULTS	10/01/91 RESULTS	MEAN	VARIENCE	STANDARD DEVIATION	2*S.DEV + MEAN
STATIC WATER ELEV.	MSL	1202.1	1202.5	1202.33	1199.61	1201.17				
SPECIFIC CONDUCTANCE	mho/cm	600	620	550	600	620				
pH	pH	7.05	7.26	6.85	7.41	6.8				
CHLORIDE	mg/l	6	4	5	5	5	5	0.4	0.6325	6.2649
COD	mg/l		20	5	5	5	8.75	42.1875	6.4952	21.7404
NITROGEN, AMMONIA	mg/l	0.5	0.5	0.52	0.5	0.5	0.504	0.000064	0.0080	0.5200
PHENOL	mg/l		0.005	0.005	0.005	0.005	0.005	0	0.0000	0.0050
TOTAL ORGANIC HALOGENS	mg/l		0.01	0.01	0.01	0.01	0.01	0	0.0000	0.0100
ARSENIC – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005	0.005	0	0.0000	0.0050
BARIUM – DISSOLVED	mg/l	0.5	0.5	0.5	0.5	0.5	0.5	0	0.0000	0.5000
CADMIUM – DISSOLVED	mg/l	0.001	0.001	0.001	0.001	0.001	0.001	0	0.0000	0.0010
CHROMIUM, TOTAL – DISSOLVED	mg/l	0.002	0.002	0.002	0.002	0.002	0.002	0	0.0000	0.0020
COPPER – DISSOLVED	mg/l	0.005	0.005		0.005	0.005	0.005	0	0.0000	0.0050
IRON – DISSOLVED	mg/l	0.1	0.12	0.1	0.1	0.1	0.104	0.000064	0.0080	0.1200
LEAD – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005	0.005	0	0.0000	0.0050
MAGNESIUM – DISSOLVED	mg/l	22	18	18	20	22	20	3.2	1.7889	23.5777
MERCURY – DISSOLVED	mg/l	0.0005		0.0005	0.0005	0.0005	0.0005	0	0.0000	0.0005
ZINC – DISSOLVED	mg/l	0.05	0.05	0.05	0.07	0.05	0.054	0.000064	0.0080	0.0700
BENZENE	ug/l	1	1	1	1	1	1	0	0.0000	1.0000
CARBON TETRACHLORIDE	ug/l	1	1	1	1	1	1	0	0.0000	1.0000
1,4–DICHLOROBENZENE	ug/l	1	1	1	1	1	1	0	0.0000	1.0000
1,2–DICHLOROETHANE	ug/l	1	1	1	1	1	1	0	0.0000	1.0000
1,1–DICHLOROETHENE	ug/l	1	1	1	1	1	1	0	0.0000	1.0000
1,1,1–TRICHLOROETHANE	ug/l	1	1	1	1	1	1	0	0.0000	1.0000
TRICHLOROETHENE	ug/l	1	1	1	1	1	1	0	0.0000	1.0000

MONITORING WELL NO. 5 (PREVIOUSLY NO. 8)

CONSTITUENT	UNIT	10/11/90 RESULTS	01/18/91 RESULTS	04/23/91 RESULTS	07/02/91 RESULTS	10/02/91 RESULTS	MEAN	VARIENCE	STANDARD DEVIATION	2*S.DEV + MEAN
STATIC WATER ELEV.	MSL	1201.45		1202.45	1199.46	1199.39				
SPECIFIC CONDUCTANCE	mho/cm	940	1210	650	880	970				
pH	pH	6.95	6.97	7.18	7.28	6.84				
CHLORIDE	mg/l	190	200	90	110	130	144	1904	43.6348	231.2697
COD	mg/l	32	32	5.1	7.8	5	16.38	163.6656	12.7932	41.9664
NITROGEN, AMMONIA	mg/l	0.5	0.5	0.5	0.5	0.5	0.5	0	0.0000	0.5000
PHENOL	mg/l	0.005	0.005	0.005	0.005	0.005	0.005	0	0.0000	0.0050
TOTAL ORGANIC HALOGENS	mg/l	0.05	0.04	0.032	0.01	0.03	0.0324	0.000175	0.0132	0.0589
ARSENIC – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005	0.005	0	0.0000	0.0050
BARIUM – DISSOLVED	mg/l	0.5	0.5	0.5	0.5	0.5	0.5	0	0.0000	0.5000
CADMIUM – DISSOLVED	mg/l	0.005	0.001	0.001	0.001	0.001	0.0018	2.6E–06	0.0016	0.0050
CHROMIUM, TOTAL – DISSOLVED	mg/l	0.005	0.001	0.005	0.002	0.002	0.003	2.8E–06	0.0017	0.0063
COPPER – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005	0.005	0	0.0000	0.0050
IRON – DISSOLVED	mg/l	0.32	0.1	0.1	0.1	0.1	0.144	0.007744	0.0880	0.3200
LEAD – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005	0.005	0	0.0000	0.0050
MAGNESIUM – DISSOLVED	mg/l	38	36	21	29	25	29.8	41.36	6.4312	42.6623
MERCURY – DISSOLVED	mg/l	0.0005	0.0038	0.0005	0.0005	0.0005	0.00116	1.7E–06	0.0013	0.0038
ZINC – DISSOLVED	mg/l	0.05	0.05	0.05	0.07	0.05	0.054	0.000064	0.0080	0.0700
BENZENE	ug/l	1	1	2	1	1	1.2	0.16	0.4000	2.0000
CARBON TETRACHLORIDE	ug/l	1	1	2	1	1	1.2	0.16	0.4000	2.0000
1,4–DICHLOROBENZENE	ug/l	1	1	2	1	1	1.2	0.16	0.4000	2.0000
1,2–DICHLOROETHANE	ug/l	1	1	2	1	1	1.2	0.16	0.4000	2.0000
1,1–DICHLOROETHENE	ug/l	1	1	2	1	1	1.2	0.16	0.4000	2.0000
1,1,1–TRICHLOROETHANE	ug/l	1	1	2	1	1	1.2	0.16	0.4000	2.0000
TRICHLOROETHENE	ug/l	1	1	2	1	1	1.2	0.16	0.4000	2.0000

MONITORING WELL NO. 1

CONSTITUENT	UNIT	04/23/91 RESULTS	07/02/91 RESULTS	10/01/91 RESULTS	01/20/92 RESULTS
STATIC WATER ELEV.	MSL	1145.67	1146.05	1144.08	1145.3
SPECIFIC CONDUCTANCE	mho/cm	870	890	900	690
pH	pH	7.39	7.41	7.25	7.32
CHLORIDE	mg/l	5	5	5	5
COD	mg/l	5	5	5	7
NITROGEN, AMMONIA	mg/l	2.2	2.7	2.8	2.4
PHENOL	mg/l	0.005	0.005	0.005	0.005
TOTAL ORGANIC HALOGENS	mg/l	0.01	0.01	0.01	0.01
ARSENIC – DISSOLVED	mg/l	0.008	0.006	0.018	0.007
BARIUM – DISSOLVED	mg/l	0.5	0.5	0.5	0.5
CADMIUM – DISSOLVED	mg/l	0.001	0.001	0.001	0.002
CHROMIUM, TOTAL – DISSOLVED	mg/l	0.002	0.002	0.009	0.002
COPPER – DISSOLVED	mg/l	0.005	0.005	0.005	0.005
IRON – DISSOLVED	mg/l	0.1	0.1	0.1	0.2
LEAD – DISSOLVED	mg/l	0.005	0.005	0.005	0.005
MAGNESIUM – DISSOLVED	mg/l	30	34	28	37
MERCURY – DISSOLVED	mg/l	0.0005	0.0005	0.0005	0.0005
ZINC – DISSOLVED	mg/l	0.06	0.07	0.08	0.05
BENZENE	ug/l	1	1	1	1
CARBON TETRACHLORIDE	ug/l	1	1	1	1
1,4–DICHLOROBENZENE	ug/l	1	1	1	1
1,2–DICHLOROETHANE	ug/l	1	1	1	1
1,1–DICHLOROETHENE	ug/l	1	1	1	1
1,1,1–TRICHLOROETHANE	ug/l	1	1	1	1
TRICHLOROETHENE	ug/l	1	1	1	1

MONITORING WELL NO. 2		10/90	1/91	4/91	7/91	10/91
		10/11/90	01/18/91	04/23/91	07/02/91	10/01/91
CONSTITUENT	UNIT	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
STATIC WATER ELEV.	MSL	1174.84	1176.2	1176.06	1172.65	1172.9
SPECIFIC CONDUCTANCE	mho/cm	1900	2000	2060	2170	1970
pH	pH	6.9	7.5	7.06	6.89	6.9
CHLORIDE	mg/l	30	35	28	24	26
COD	mg/l	18	15	10	7.8	5
NITROGEN, AMMONIA	mg/l	0.6	0.5	0.5	0.5	0.6
PHENOL	mg/l	0.005	0.005	0.005	0.005	0.005
TOTAL ORGANIC HALOGENS	mg/l	0.02	0.01	0.01	0.01	0.01
ARSENIC – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005
BARIUM – DISSOLVED	mg/l	0.5	0.5	0.5	0.5	0.5
CADMIUM – DISSOLVED	mg/l	0.005	0.001	0.001	0.001	0.001
CHROMIUM, TOTAL – DISSOLVED	mg/l	0.005	0.001	0.002	0.002	0.002
COPPER – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005
IRON – DISSOLVED	mg/l	0.1	0.1	0.4	0.1	0.97
LEAD – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005
MAGNESIUM – DISSOLVED	mg/l	72	66	64	67	66
MERCURY – DISSOLVED	mg/l	0.0006	0.0027	0.0005	0.0005	0.0005
ZINC – DISSOLVED	mg/l	0.06	0.05	0.06	0.07	0.06
BENZENE	ug/l	1	1	1	1	1
CARBON TETRACHLORIDE	ug/l	1	1	1	1	1
1,4–DICHLOROBENZENE	ug/l	1	1	1	1	1
1,2–DICHLOROETHANE	ug/l	1	1	1	1	1
1,1–DICHLOROETHENE	ug/l	1	1	1	1	1
1,1,1–TRICHLOROETHANE	ug/l	1	1	1	1	1
TRICHLOROETHENE	ug/l	1	1	1	1	1
TETRAHYDROFURAN (*)	ug/l			1500	844	

MONITORING WELL NO. 3

CONSTITUENT	UNIT	4/91 04/30/91 RESULTS	7/91 07/02/91 RESULTS	10/91 10/01/91 RESULTS	1/92 01/20/92 RESULTS
STATIC WATER ELEV.	MSL	1181.43	1178.86	1177.99	1179.78
SPECIFIC CONDUCTANCE	mho/cm	660	640	720	580
pH	pH	6.45	7.38	6.8	7.23
CHLORIDE	mg/l	9	8	9	7
COD	mg/l	7.4	5	5	5
NITROGEN, AMMONIA	mg/l	0.5	0.5	0.5	0.5
PHENOL	mg/l	0.005	0.005	0.005	0.005
TOTAL ORGANIC HALOGENS	mg/l	0.02	0.01	0.01	0.02
ARSENIC – DISSOLVED	mg/l	0.005	0.005	0.005	0.005
BARIUM – DISSOLVED	mg/l	0.5	0.5	0.5	0.5
CADMIUM – DISSOLVED	mg/l	0.001	0.001	0.001	0.001
CHROMIUM, TOTAL – DISSOLVED	mg/l	0.002	0.002	0.009	0.002
COPPER – DISSOLVED	mg/l	0.005	0.005	0.005	0.005
IRON – DISSOLVED		0.1	0.1	0.1	0.1
LEAD – DISSOLVED	mg/l	0.005	0.005	0.005	0.005
MAGNESIUM – DISSOLVED	mg/l	18	18	20	24
MERCURY – DISSOLVED	mg/l	0.0005	0.0005	0.0005	0.0006
ZINC – DISSOLVED	mg/l	0.06	0.06	0.05	0.05
BENZENE	ug/l	1	1	1	1
CARBON TETRACHLORIDE	ug/l	1	1	1	1
1,4–DICHLOROBENZENE	ug/l	1	1	1	1
1,2–DICHLOROETHANE	ug/l	1	1	1	1
1,1–DICHLOROETHENE	ug/l	1	1	1	1
1,1,1–TRICHLOROETHANE	ug/l	1	1	1	1
TRICHLOROETHENE	ug/l	1	1	1	1

MONITORING WELL NO. 6 (PREVIOUSLY NO. 9)

CONSTITUENT	UNIT	10/90 10/11/90 RESULTS	1/91 01/18/91 RESULTS	4/91 04/23/91 RESULTS	7/91 07/02/91 RESULTS	10/91 10/01/91 RESULTS
STATIC WATER ELEV.	MSL	1191.94	1195.55	1193.43	1190.1	1189.61
SPECIFIC CONDUCTANCE	mho/cm	1400	1580	1680	1910	1850
pH	pH	6.75	7.25	7.18	6.8	6.73
CHLORIDE	mg/l	38	50	27	27	30
COD	mg/l	21	45	10	13	14
NITROGEN, AMMONIA	mg/l	1.2	0.6	0.51	0.5	0.8
PHENOL	mg/l	0.33	0.005	0.005	0.005	0.005
TOTAL ORGANIC HALOGENS	mg/l	0.04	0.03	0.032	0.01	0.03
ARSENIC – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005
BARIUM – DISSOLVED	mg/l	0.5	0.5	0.5	0.5	0.5
CADMIUM – DISSOLVED	mg/l	0.005	0.001	0.001	0.001	0.001
CHROMIUM, TOTAL – DISSOLVED	mg/l	0.005	0.001	0.003	0.002	0.002
COPPER – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005
IRON – DISSOLVED	mg/l	0.1	4.3	0.1	0.1	1.3
LEAD – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005
MAGNESIUM – DISSOLVED	mg/l	59	48	58	67	59
MERCURY – DISSOLVED	mg/l	0.0005	0.002	0.0005	0.0014	0.0005
ZINC – DISSOLVED	mg/l	0.09	0.05	0.07	0.08	0.06
BENZENE	ug/l	1.3	1.6	1	1	1
CARBON TETRACHLORIDE	ug/l	1	1	1	1	1
1,4–DICHLOROBENZENE	ug/l	1	1	1	1	1
1,2–DICHLOROETHANE	ug/l	1	1	1	1	1
1,1–DICHLOROETHENE	ug/l	1	1	1	1	1
1,1,1–TRICHLOROETHANE	ug/l	1	1	1	1	1
TRICHLOROETHENE	ug/l	1	1	1	1	1
CIS–1,2–DICHLOROETHENE	ug/l			2.2	3.2	

MONITORING WELL NO. 7 (PREVIOUSLY NO. 10)

CONSTITUENT	UNIT	4/91 04/23/91 RESULTS	7/91 07/02/91 RESULTS	10/91 10/01/91 RESULTS	1/92 01/20/92 RESULTS
STATIC WATER ELEV.	MSL	1190.64	1190.3	1190.39	1190.69
SPECIFIC CONDUCTANCE	mho/cm	1290	1310	1320	1090
pH	pH	7.22	7.18	6.85	7.09
CHLORIDE	mg/l	8	5	6	5
COD	mg/l	5.1	5	5	5
NITROGEN, AMMONIA	mg/l	0.5	0.5	0.5	0.5
PHENOL	mg/l	0.005	0.005	0.005	0.005
TOTAL ORGANIC HALOGENS	mg/l	0.01	0.01	0.01	0.01
ARSENIC – DISSOLVED	mg/l	0.005	0.008	0.005	0.005
BARIUM – DISSOLVED	mg/l	0.5	0.5	0.5	0.5
CADMIUM – DISSOLVED	mg/l	0.001	0.001	0.001	0.001
CHROMIUM, TOTAL – DISSOLVED	mg/l	0.004	0.002	0.002	0.002
COPPER – DISSOLVED	mg/l	0.005	0.005	0.005	0.005
IRON – DISSOLVED	mg/l	0.1	0.1	0.1	0.1
LEAD – DISSOLVED	mg/l	0.005	0.005	0.005	0.005
MAGNESIUM – DISSOLVED	mg/l	38	40	36	46
MERCURY – DISSOLVED	mg/l	0.0005	0.0005	0.0005	0.0005
ZINC – DISSOLVED	mg/l	0.06	0.05	0.05	0.05
BENZENE	ug/l	1	1	1	1
CARBON TETRACHLORIDE	ug/l	1	1	1	1
1,4–DICHLOROBENZENE	ug/l	1	1	1	1
1,2–DICHLOROETHANE	ug/l	1	1	1	1
1,1–DICHLOROETHENE	ug/l	1	1	1	1
1,1,1–TRICHLOROETHANE	ug/l	1	1	1	1
TRICHLOROETHENE	ug/l	1	1	1	1

MONITORING WELL NO. 8 (PREVIOUSLY NO. 6)

CONSTITUENT	UNIT	10/11/90 RESULTS	01/18/91 RESULTS	04/23/91 RESULTS	07/02/91 RESULTS	10/02/91 RESULTS
STATIC WATER ELEV.	MSL	1190.61	1190.45	1190.73	1187.92	1189.38
SPECIFIC CONDUCTANCE	mho/cm	660	670	580	620	650
pH	pH	7.05	7.02	7.49	7.45	6.88
CHLORIDE	mg/l	11	13	12	11	13
COD	mg/l	11	9.9	5	5	5
NITROGEN, AMMONIA	mg/l	0.5	0.5	0.5	0.5	0.5
PHENOL	mg/l	0.005	0.005	0.005	0.005	0.01
TOTAL ORGANIC HALOGENS	mg/l	0.01	0.01	0.01	0.01	0.01
ARSENIC – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005
BARIUM – DISSOLVED	mg/l	0.5	0.5	0.5	0.5	0.5
CADMIUM – DISSOLVED	mg/l	0.005	0.001	0.001	0.001	0.001
CHROMIUM, TOTAL – DISSOLVED	mg/l	0.005	0.001	0.002	0.002	0.002
COPPER – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005
IRON – DISSOLVED	mg/l	0.1	0.1	0.1	0.1	0.1
LEAD – DISSOLVED	mg/l	0.005	0.005	0.005	0.005	0.005
MAGNESIUM – DISSOLVED	mg/l	25	19	16	18	19
MERCURY – DISSOLVED	mg/l	0.0005	0.0025	0.0005	0.0005	0.0005
ZINC – DISSOLVED	mg/l	0.06	0.05	0.06	0.06	0.05
BENZENE	ug/l	1	1	1	1	1
CARBON TETRACHLORIDE	ug/l	1	1	1	1	1
1,4–DICHLOROBENZENE	ug/l	1	1	1	1	1
1,2–DICHLOROETHANE	ug/l	1	1	1	1	1
1,1–DICHLOROETHENE	ug/l	1	1	1	1	1
1,1,1–TRICHLOROETHANE	ug/l	1	1	1	1	1
TRICHLOROETHENE	ug/l	1	1	1	1	1

SURFACE WATER NO. 1

CONSTITUENT	UNIT	04/30/91 RESULTS
SPECIFIC CONDUCTANCE	mho/cm	830
pH	pH	7.15
CHLORIDE	mg/l	15
COD	mg/l	64
NITROGEN, AMMONIA	mg/l	0.5
PHENOL	mg/l	0.005
SOLIDS, TOTAL	mg/l	
TOTAL ORGANIC HALOGENS	mg/l	0.02
ARSENIC – DISSOLVED	mg/l	0.005
BARIUM – DISSOLVED	mg/l	0.5
CADMIUM – DISSOLVED	mg/l	0.001
CHROMIUM, TOTAL – DISSOLVED	mg/l	0.002
COPPER – DISSOLVED	mg/l	0.005
IRON – DISSOLVED	mg/l	0.1
LEAD – DISSOLVED	mg/l	0.005
MAGNESIUM – DISSOLVED	mg/l	25
MERCURY – DISSOLVED	mg/l	0.0005
ZINC – DISSOLVED	mg/l	0.06
BENZENE	ug/l	1
CARBON TETRACHLORIDE	ug/l	1
1,4–DICHLOROBENZENE	ug/l	1
1,2–DICHLOROETHANE	ug/l	1
1,1–DICHLOROETHENE	ug/l	1
1,1,1–TRICHLOROETHANE	ug/l	1
TRICHLOROETHENE	ug/l	1

SURFACE WATER NO. 2

CONSTITUENT	UNIT	04/30/91 RESULTS
SPECIFIC CONDUCTANCE	mho/cm	1610
pH	pH	8.34
CHLORIDE	mg/l	12
COD	mg/l	17
NITROGEN, AMMONIA	mg/l	0.76
PHENOL	mg/l	0.005
SOLIDS, TOTAL	mg/l	
TOTAL ORGANIC HALOGENS	mg/l	0.02
ARSENIC – DISSOLVED	mg/l	0.005
BARIUM – DISSOLVED	mg/l	0.5
CADMIUM – DISSOLVED	mg/l	0.001
CHROMIUM, TOTAL – DISSOLVED	mg/l	0.002
COPPER – DISSOLVED	mg/l	0.005
IRON – DISSOLVED	mg/l	0.1
LEAD – DISSOLVED	mg/l	0.005
MAGNESIUM – DISSOLVED	mg/l	54
MERCURY – DISSOLVED	mg/l	0.0005
ZINC – DISSOLVED	mg/l	0.06
BENZENE	ug/l	1
CARBON TETRACHLORIDE	ug/l	1
1,4–DICHLOROBENZENE	ug/l	1
1,2–DICHLOROETHANE	ug/l	1
1,1–DICHLOROETHENE	ug/l	1
1,1,1–TRICHLOROETHANE	ug/l	1
TRICHLOROETHENE	ug/l	1

RECORD COPY (Floyd Mitchell)

File Name Mitchell Co SDP Permit File

Senders Initials 66-SDP-1-73P

FLOYD-MITCHELL

COLLECTION - TRANSPORTATION & DISPOSAL

SOLID WASTE MANAGEMENT AGENCY

PO Box 32
Osage, Iowa 50461

515-982-4288

July 1, 1991 to December 31, 1991

SPECIAL PERMIT LOADS

NAME	DATE	AMOUNT
A to Z Drying	07/26	4 yards
660101791	07/30	2 yards
	08/09	6 yards
	08/23	4300 pounds
	09/06	1980 pounds
	09/11	1520 pounds
	09/17	1840 pounds
	09/26	2060 pounds
	10/04	2360 pounds
	10/11	1960 pounds
	10/18	1880 pounds
	10/22	1880 pounds
	10/24	1960 pounds
	10/30	1980 pounds
	11/08	2140 pounds
	11/15	1960 pounds
	11/20	2060 pounds
	11/27	2020 pounds
	12/06	2000 pounds
	12/13	1920 pounds
	12/26	2060 pounds
	12/31	1980 pounds
City of Charles City	09/20	11820 pounds
66-SDP-1-73P		
Charles City Water Dept	07/01	5 yards
6601122788	11/08	7900 pounds
	12/16	8180 pounds
Colwell CO-OP	09/04	54480 pounds
66-SDP-1-73P		

FLOYD-MITCHELL
SOLID WASTE MANAGEMENT AGENCY

F & H Aluminum	08/07	11 yards
6601031291	08/19	33020 pounds
	09/09	32060 pounds
	10/07	48760 pounds
	11/05	45300 pounds
	11/22	54940 pounds
	12/13	32840 pounds
Hobson Brothers	07/23	36 yards
6601072089	07/24	18 yards
	07/25	36 yards
	12/11	52400 pounds
	12/12	154720 pounds
	12/13	138160 pounds

RECORD COPY

File Name FLOYD MITCHELL

Senders Initials 66-SDP-1-73P

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

December 17, 1991

Betty McCarthy, Chair
Floyd-Mitchell Solid Waste Agency
P.O. Box 32
Osage, Iowa 50461

Re: Floyd-Mitchell Sanitary Landfill
Permit #66-SDP-1-73P

Dear Ms. McCarthy:

We received your letter regarding the acceptance of solid waste from Chickasaw County at the Floyd-Mitchell Landfill on a temporary basis on December 5, 1991. The Department approved this request in a letter dated April 17, 1991 for a period not to exceed 6 months.

The beginning date for the temporary diversion of solid waste from Chickasaw County, as indicated by their letter dated July 16, was July 24, 1991. The six month period thus extends through January 24, 1992. However, based on your latest request, the Department will extend this temporary period to allow continued disposal of Chickasaw County solid waste at the Floyd-Mitchell Sanitary Landfill without an amendment or revision to your approved Comprehensive Plan until such time as the Chickasaw County Landfill permit issue relative to closure or continued operation is resolved.

If Chickasaw County will continue to be included in your service area beyond that time, an amendment to your Comprehensive Plan will be required to incorporate the additional source and quantities as per the Guidelines for Solid Waste Comprehensive Plans, Part I page 17.

If you have any questions regarding this letter, you may contact me at (515) 281-8899.

Sincerely,

Patricia G. Schwarz

Patricia G. Schwarz
Environmental Engineer
Solid Waste Section

PGS:pgs\floyd.doc

cc: Field Office 2

Julie Kjolhede, WMAD

Cyrus Rustin, SWS

Frank Scott
Chickasaw County Courthouse
New Hampton, IA 50659

John L. Huegel, Chair
Chickasaw County Board of Supervisors
Box 311
New Hampton, IA 50659

RECORD COPY

File Name FLOYD-MITCHELL

Senders Initials 66-SDP-1-73P

FLOYD-MITCHELL

SOLID WASTE MANAGEMENT AGENCY

COLLECTION - TRANSPORTATION & DISPOSAL

[redacted]

[redacted]

November 25, 1991

Dear Paul,

As per request I am sending copies of both the letter from myself and from Chickasaw County regarding request for extension of Chickasaw use. Also included is the letter of April 17, 1991 from Harris Dutton authorizing use for 6 month period.

My question was "Does the 6 month period run from date of Harris's letter of April 17, 1991 or from time of second request when they actually began using our landfill - July 24, 1991. We received verbal affirmation by Harris but nothing in writing.

Chickasaw County & the city of New Hampton have not asked for further information regarding disposal of the vegetable oil by-product at our landfill.

Sincerely,

Betty McCarthy, Chair

P.O. Box 32

Osage, Ia 50461

COPY

July 17, 1991

Mr. Morris Preston
Iowa Dept. of Natural Resources
Wallace State Office Building
Des Moines, IA 50319-0034

Dear Morris,

The Floyd-Mitchell Solid Waste Agency respectfully asks your consideration of permitting Chickasaw County's solid waste stream to be disposed of at the Floyd-Mitchell Sanitary Landfill for a period of six (6) months from the date of July 24, 1991.

It is our understanding that the County of Chickasaw will cease their operation of the landfill site in Chickasaw County at the end of business hours on July 23, 1991.

Following my phone conversation with you on July 16, when you made mention of the need for us to develop our comprehensive plan with the inclusion of that waste stream, I spoke with the Chickasaw County Board of Supervisors in that regard.

I am not sure of the legal ramifications of the closure of the landfill, but I was told by the Chickasaw County Board that they are in no position at this time to make a permanent commitment because of some legal aspects. Perhaps your department could give us some direction as how to proceed with the planning process given that answer.

I also spoke with you regarding authorization for our landfill to accept a vegetable oil by-product of Sara Lee Industries for disposal at our landfill site. In the event that we would be asked to accept it, the process for disposal is land application using a disc to incorporate into the ground. The City of New Hampton has been in charge of assisting with the disposal process and has an area they had been authorized to use. I was erroneously informed as to disposal of this material at their landfill site.

Would you authorize the Floyd-Mitchell Sanitary Landfill to accept this material along with rates of application, etc.? The testing lab [NET] is in the process of testing this by-product so at this time we have no analysis.

Thank you, Morris, for your cooperation with our agency.

I'm extremely proud of our landfill and if ever the new austerity pitch of the state of Iowa would allow for field trips, please consider a personal tour of our site. We will be installing a truck scales within the next month.

Sincerely,

Betty McCarthy

Betty McCarthy, Chair
Floyd-Mitchell Solid Waste Agency

bjm:cal

Chickasaw County Board of Supervisors

BOX 311
PHONE 515-394-2100
NEW HAMPTON, IOWA 50659

July 16, 1991

Morris L. Preston, P.E.
Department of Natural Resources
Wallace State Office Building
Des Moines, Iowa 50319

Dear Mr. Preston:

As per your letter to Betty McCarthy, Chairman of Floyd-Mitchell Solid Waste Agency, dated April 17, 1991, and as per your telephone conversation with Betty McCarthy on July 16, 1991, from our Board Room, we are formally requesting to have our waste hauled to the Floyd-Mitchell Landfill on a temporary basis for a six-month period beginning July 24, 1991.

Sincerely,

John L. Huegel

John L. Huegel
Chairman
JLH/gh

STATE OF IOWA

Sent Copy to Landfill

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

April 17, 1991

Ms. Betty McCarthy, Chair
Floyd-Mitchell Solid Waste Agency
Courthouse
Osage, IA 50461

Dear Ms. McCarthy:

This letter is in regard to your request to accept solid waste from Chickasaw County on a temporary basis. The Department will allow this request on a temporary, emergency basis for a period not to exceed six months. However, a modification to the comprehensive waste plan and permit will be required for continued acceptance.

Sincerely,

Morris L. Preston, P.E.
Supervisor
Solid Waste Section

MLP:nmf

cc: Arnie Boge
Chickasaw County Board of Supervisors
Chickasaw County Courthouse
New Hampton, IA 50659

66 SDP-1-73P

Brice, Petrides-Donohue ENGINEERS ARCHITECTS SCIENTISTS

November 11, 1991

Ms. Patricia Schwarz
Iowa Department of Natural Resources
Solid Waste Division
900 East Grand
Des Moines, Iowa 50319

Re: Leachate Control Plan for the Floyd/Mitchell County Landfill

Dear Ms. Schwarz:

Enclosed is additional information as you requested concerning the above-referenced project. Many of your questions relate to the design of the aerated lagoons and conformance to the Iowa DNR Wastewater Facilities Design Standards. This reply generally follows the order of your questions. Additional information was added to the Leachate Control Plan and is included on the enclosed supplement. Also, please note the changes made to the plan set.

We are requesting IDNR approval of the proposed Leachate Collection System Concept prior to proceeding with construction plans and specifications. The required construction permit and discharge permit applications will be submitted during the preparation of the final design plans and specifications. We understand that the final plans, specifications and Leachate Control Plan will require final IDNR approval prior to construction.

If you have any questions, please contact us.

Sincerely,

BRICE, PETRIDES-DONOHUE CO.

Eric W. Meintsma

Eric W. Meintsma

EWM:sdt

Enclosure

T/L/UP3

501 Sycamore Street, Suite 222, P.O. Box 1497, Waterloo, Iowa 50704-1497 ■ 319.232.6531 ■ Fax 319.232.0271

LEACHATE COLLECTION SYSTEM

A leachate flow of 8.2 million gallons per year is estimated from the proposed leachate collection system. This estimate was derived by draining existing leachate and additional leachate from precipitation over a five-year period. Sample calculations are presented in Appendix A of the Leachate Control Plan.

Six-inch diameter SDR 17 HDPE will be used for the collection system (refer to sample calculations for pipe strength calculations). The maximum flow capacity of the pipe must be greater than 15.6 gpm to accommodate the expected flow. The critical section of pipe with respect to flow characteristics is between Manholes 7 and 8. The flow velocity in this section of the system is 2.7 ft./sec. and pipe capacity of 240 gpm, which exceeds the required pipe capacity.

Manhole 1 is referred to as a pumping station. This consists of a 60-inch diameter manhole which acts as a wet well. The pump to be used will be a 1/2 hp. Grundfos stainless steel submersible pump, Model No. SP 6-2 or equivalent. The pump operates at a nominal flow rate of 30 gpm against 50 feet of head. The pump will cycle 40 minutes on and 40 minutes off. Floats will be used to cycle the pump.

PROCESS FACILITIES

Aerated lagoons are proposed for the leachate treatment system. Hydraulic and organic loadings are discussed in the Leachate Control Plan. Sludge accumulation is not significant in this process. Flow equalization takes place in the lagoons; however, flow is expected to be stable and uniform under most circumstances.

WASTEWATER PUMPING STATIONS

General Requirements - Flood Protection

The landfill elevation is greater than the 100-year flood elevation. All electrical and mechanical components will be protected from the elements, as necessary. A gauging station on the Wapsipinicon River is located approximately one mile east of the landfill. Since beginning operation in 1958, the highest flood elevation recorded at that location was 1,145 msl, which is about 35 feet below the ground elevation at the pumping station location.

WASTEWATER TREATMENT WORKS

Flood Protection

This was discussed in the preceding paragraph.

Quality of Effluent

The lagoons will discharge to an intermittent stream which, in turn, discharges to the Wapsipinicon River approximately one mile from the landfill. Effluent limitations established by IDNR are not yet available. This design is based on secondary discharge standards of 30 mg/l BOD and suspended solids.

Guidelines for the design of the treatment process are given in Section 14.4 of the design standards.

Critical Flow Conditions

The leachate flow rate is expected to be 22,500 gallons per day and is the value used for the hydraulic design of the lagoons. If the flow rate * exceeds the design rate, a valve will be adjusted to throttle the flow.

Industrial Loadings

Leachate at the landfill has been sampled on two occasions. The results and expected loading conditions are presented in the leachate control plan. The lagoons have been designed to treat the leachate and meet the discharge limits.

Treatment Facility Reliability Classes

This facility will conform to Reliability Class II.

WASTEWATER TREATMENT PONDS (LAGOONS)

It is not practical at this time to conduct a bench scale analysis to determine a K-factor for the landfill leachate. A sample representative of existing leachate throughout the landfill is not realistically obtainable. A K-factor was derived after reviewing the literature. In this case, a K-factor of 0.25 appears to be conservative for treating this waste. The lagoon design calculations follow:

Lagoon Design Calculations

Two leachate samples were analyzed and the results are presented in the Leachate Control Plan. The following are the accepted conditions for this analysis.

BOD_5	2,400 mg/l
Ammonia (NH_3)	32 mg/l
Suspended Solids	2,500 mg/l
First Order Removal Rate Constant at 1°C (K)	0.25

1. Determine Lagoon Cell Sizes (Use Detention Time)

$$t = \frac{\text{\% BOD Removal}}{(100-\text{\% BOD Removal})K}$$

t = Detention Time, Days

or

$$\frac{S}{S_o} = \frac{1}{1+K(V/Q)}$$

S = Effluent BOD, mg/l
S_o = Influent BOD, mg/l
V = Volume
Q = Flow Rate

.. V/Q = Detention Time (t), Days

Using First Order Equation:

$$t = \frac{89.5}{(100-89.5)0.25} = 34 \text{ Days (Cell 1)}$$

Influent BOD to Cell 2 = (1-0.895)(2400)=252 mg/l

The second equation is used to determine the detention time in Cell 2. Effluent BOD or the lagoon discharge will have a maximum BOD of 30 mg/l.

Therefore: $\frac{30}{252} = \frac{1}{1+0.25(V/Q)}$ V/Q = t

$$0.119 + 0.0298t = 1$$

t = 30 Days (Cell 2)

Use the following values to accommodate ice cover:

Cell 1 - t = 40 Days
Cell 2 - t = 37 Days

Oxygen Requirements

Oxygen requirements depend upon BOD and ammonia loading, degree of treatment, and temperature. Generally, two pounds of oxygen is required per one pound of BOD, and four pounds oxygen is required per one pound of ammonia. The following are the oxygen requirement calculations:

$$\text{BOD Loadings} = \frac{2,400 \text{ mg/l } (8.34 \text{ \#/MGal.})(22,500 \text{ Gal/Day})}{1\text{x}10^{-6} \text{ MGal/Gal.}}$$

BOD Load = 450 Lbs/Day

$$\text{Ammonia Loading} = \frac{32 \text{ mg/l } (8.34)(22,500)}{1\text{x}10^{-6}}$$

Ammonia Load = 6 Lbs/Day

Oxygen Requirement = 450 Lbs BOD/Day (2 Lbs O_2/Lb BOD)
+ 6 Lbs NH_4/Day (4 Lbs O_2/Lb NH_4)

Oxygen Requirement = 924 Lbs O_2/Day

NUTRIENT AND PRETREATMENT REQUIREMENTS

The principal nutrients necessary for a biological system are nitrogen and phosphorus. Nitrogen exists predominantly in the form of ammonia in leachate. Ammonia concentrations of 30 mg/l and phosphorus in the form of phosphates of 1 mg/l are anticipated.

A conservative method to estimate nitrogen and phosphorus requirements in biological treatment is to relate these elements to the influent BOD concentration. A 20:1 relationship for BOD to nitrogen and 100:1 for BOD to phosphorus should exist for proper biological treatment. It appears that the landfill leachate may be deficient in these nutrients. If nutrient deficiency is observed during operation of the lagoon, supplements will be added to the system.

SLUDGE PRODUCTION

The aerated lagoon system will produce sludge solids that will accumulate in the quiescent cell. An accurate estimate of sludge production cannot be made because of the unknown leachate characteristics. It is anticipated, however, that sludge accumulation will be minimal.

Sludge solids in the quiescent cell will decompose under anaerobic conditions, resulting in a reduction of the sludge mass. Solids not removed by this process will continue to accumulate. Sludge depth in the quiescent cell will be periodically monitored to determine when it is necessary to dredge this cell. Sludge removed will be dried and properly disposed by land application or landfilling.

COMMENTS

Because of the unknown leachate characteristics, flexibility has been built into the aerated lagoon design. The treatment ability of the lagoons will be monitored to determine if further action is necessary. Courses of action to enhance treatment may include reducing the flow rate to increase the detention time, addition of another aerated cell, providing an influent clarifier or installation of an effluent sand filter. To avoid unnecessary treatment processes, the lagoon should be built, monitored and reassessed. If the lagoons discharge water not meeting the permitted values, further action can be taken at that time.

R/Floydmit/AA2

FLOYD MITCHELL

IOWA DEPARTMENT OF NATURAL RESOURCES

*** * * * TRANSMITTAL SLIP * * * ***

Date 1/7/91

TO: Patty Schwantz

FROM: Janet Gastineau

[ ] REPLY FOR MY SIGNATURE
[ ] REPLY DIRECT
[ ] REVIEW, COMMENT AND RETURN
[ ] INVESTIGATE AND REPORT
[ ] SEE ME
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[ ] FILE
[ ] FOR YOUR SIGNATURE
[ ] FOR YOUR APPROVAL
[X] PER YOUR REQUEST
[ ] PER OUR CONVERSATION
[ ] TAKE ACTION BY _____ (Date)

[ ] COMMENTS:

Patty This is the write up I submitted once water quality-based permit limits were hand calculated. Ralph always reviews and approves wasteloads first. I asked him to cc: you a copy of his correspondence. There may be changes to the numbers in this write-up so wait on Ralph's approval.

Janet

Printed on Recycled Paper

Form (Rev. 10-90)

542-0593

IOWA DEPARTMENT OF NATURAL RESOURCES

Date _____

FROM THE OFFICE OF: _____

TO (Individual's name):

DIVISION/BUREAU: (✓)

___ DIRECTOR
___ DEPUTY DIRECTOR

___ ADMINISTRATIVE SERVICES
___ ADMINISTRATIVE SUPPORT
___ RECORDS/LIBRARY
___ BUDGET AND GRANTS
___ CONSTRUCTION SERVICES
___ DATA PROCESSING
___ FINANCE
___ PAYROLL/PERSONNEL
___ LAND ACQUISITION
___ LICENSING
___ PURCHASING
___ WORD PROCESSING

___ COORDINATION & INFORMATION
___ GOVERNMENTAL LIAISON
___ INFORMATION AND EDUCATION
___ PLANNING

___ ENERGY & GEOLOGICAL RES.
___ ENERGY
___ GEOLOGICAL SURVEY

___ ENVIRONMENTAL PROTECTION
___ FIELD EVALUATION/EMERGENCY RESPONSE
___ AIR AND SOLID WASTE
___ SURFACE AND GROUNDWATER
___ FIELD OFFICE #_____

___ FISH AND WILDLIFE
___ FISHERIES
___ LAW ENFORCEMENT
___ WILDLIFE

___ FORESTS AND FORESTRY
___ STATE FORESTS MANAGEMENT
___ FORESTRY SERVICES

___ PARKS, RECREATION & PRESERVES
___ PARK MANAGEMENT
___ PRESERVES & ECOLOGICAL SERVICES
___ TRAILS AND WATERWAYS UNIT

___ WASTE MANAGEMENT AUTHORITY
___ PLANNING AND GRANTS
___ WASTE REDUCTION

___ REPLY FOR MY SIGNATURE

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___ REVIEW, COMMENT, RETURN

___ INVESTIGATE AND REPORT

___ SEE ME

___ FILE

___ FOR YOUR INFORMATION

___ FOR YOUR SIGNATURE

___ FOR YOUR APPROVAL

___ PER YOUR REQUEST

___ PER OUR CONVERSATION

___ TAKE ACTION BY:

_____
(Date)

___ NOTE AND FORWARD

___ OTHER: _____ **COMMENTS:** ___ _____

FLOYD/MITCHELL COUNTY LANDFILL WLA/permit limits

These wasteload allocations and permit limitations are part of an investigation by the Floyd/Mitchell Solid Waste Agency to determine the best method of leachate treatment for the area landfill. Currently 3 alternatives are being investigated - hauling to Osage WWTP, the construction of a 2-cell aerated lagoon on site, and construction of a controlled discharge lagoon on site. The first alternative has proven cost prohibitive, and an agreement with the Osage has not been pursued. The large area needed for a controlled discharge lagoon has made this form of treatement impractical. Therefore, Brice, Petrides-Donahue has asked that water quality-based permit limits be estimated for a 2-cell aerated leachate treatment lagoon.

The following WLA is based on the newly revised Water Quality Standards. In addition to conventional pollutants, there are several characteristics that are required sampling for sanitary landfill leachate, but not all of these characteristics necessarily have ambient water quality criteria that are to be met and sampled for in the effluent. Included in this WLA were metals, phenol, toluene, and TCE, certain human health parameters, and many more parameters. The proposed lagoon would discharge into an existing drainage ditch tributary of an intermittent tributary of the Wapsipinicon River. At this time, the Wapsipinicon River has not been field assessed for water use designation; this WLA will be hand calculated assuming a Class B(WW) Significant Resource Warm Water stream use designation will be adopted and the intermittent stream is General use.

Since the first reaches of the receiving waterbody are General in use, the conventional pollutant water quality-based permit limits given in the WLA are to be met at the mouth of the intermittent stream at the Wapsipinicon River. The water quality-based permit limits for the remaining parameters are to be met at the lagoon outfall. The 7Q10 stream flow of the Wapsipinicon River is 4.0 cfs according to the most recent gage information. For ammonia, 25% of the 4.0 cfs flow is used as the flow available for the mixing zone calculations with 2.5% of the entire stream flow available for the Zone of Initial Dilution calculation.

Outfall 001

I. A WLA for this outfall was calculated based on an average design flow of **0.0225 mgd.** This is the flow used to derive the concentration (mg/l) and mass loading (lbs/d) permit limits.

   Standard stream background temperatures, pH's and concentrations of NH3-N were mixed with the lagoon facility's effluent pH and temperature values to calculate the applicable instream WQS criteria for the Wapsipinicon River.

Background pH, Temperature, and ammonia statewide values:

	pH	Temperature °C	NH3-N(mg/l)
Summer	8.2	23.8	0.0
Winter	7.8	0.6	0.5
Spring/Fall	8.1	21.4	0.5

Effluent pH and Temperature are statewide values for the lagoon facilities:

	pH	Temperature °C
Summer	8.5	25.56
Winter	8.0	8.39
Spring/Fall	8.5	15.19

II. Permit Limits: The most stringent of the acute or chronic WLA as calculated in the Wapsipinicon River, is used as the value for input into the permit derivation procedure. Acute WLA's are governing the ammonia and several metals concentration and loading values, while some metals are governed by the chronic WLA's. Permit limits were then calculated using the simplified permit derivation approach where the governing WLA is the maximum permit limit and the average permit limit is 67% of the maximum.

No sampling frequencies were offered for use in the statistical approach. However, for ammonia 4, 8, and 30 samples/month were calculated to determine if less stringent permit limits would result. If a frequency of 30/month is implemented in the treatment system, the values are less stringent than what the simplified permit derivation yields. For the other effluent characteristics, a sampling frequency of 1/3 months, 1/month, and 4/week were used in the calculation to determine which gave the least stringent permit limits. The simplified permit derivation was the least stringent approach in each instance.

AMMONIA-NITROGEN

For the purpose of these Permit Limitations, the ammonia seasons are defined as:

Summer - July and August
Winter - January and February
Spring/Fall - March thru June
- September thru December

The following water quality-based permit limits are to be met at the mouth of the intermittent tributary at the Wapsipinicon River. Modeling would be required to determine if secondary standard treatment or some other less stringent effluent limits could be discharged to account for the decay and uptake of ammonia by algae in the unclassified reaches.

Water Quality Based Permit Limits

AMMONIA	Average mg/l	Maximum mg/l	Average lbs/d	Maximum lbs/d
Summer	13	18	2.5	3.4
Winter	STANDARD SECONDARY TREATMENT			
Spring/Fall	13	18	2.6	3.4

NITRATE-NITROGEN (NO_3)
An acute water quality criteria of 0.16 mg/l will have to be met at the end of the zone of initial dilution. This WQ criteria is ½ of the 96-hour LC50 for Lepomis macrochirus. The following calculations use a river flow in the ZID of 0.025 of the 7Q10.

Acute water quality-based permit limits for NO_3 are:

Concentration:

$$\text{max} = 210 \text{ mg/l} * \frac{(0.0348075 \text{ cfs} + 0.1 \text{ cfs})}{0.0348075} = \mathbf{813 \text{ mg/l}}$$

avg = 813 mg/l * 0.67 = **545 mg/l**

Load:
max = 813 mg/l * 8.34 * 0.0225 mgd = **152 lbs/d**

avg = 545 mg/l * 8.34 * 0.0225 mgd = **102 lbs/d**

CBOD-5
The discharge of Standard secondary treatment or equivalent will not cause a water quality violation in the Wapsipinicon River.

METALS
The following are water quality-based permit limits that are to be met at the lagoon outfall in order to prevent a water quality violation in the Wapsipinicon River.

Water Quality Based Permit Limits

Metals	Average mg/l	Maximum mg/l	Average lbs/d	Maximum lbs/d
Arsenic	0.93	1.4	0.17	0.26
Cadmium	0.19	0.29	0.03	0.05
Chromium +6	0.15	0.23	0.02	0.04
Copper	0.15	0.22	0.02	0.04
Cyanide	0.12	0.17	0.02	0.03
Lead	0.52	0.77	0.09	0.15
Mercury	0.001	0.0015	0.0002	0.0003
Nickel	13	19	2.4	3.6
Silver	0.17	0.25	0.03	0.04
Zinc	1.3	1.9	0.24	0.36

MISCELLANEOUS

The following are water quality-based permit limits for miscellaneous parameters. These limits are to be met at the mouth of the intermittent stream at the Wapsipinicon River.

Water Quality Based Permit Limits

	Average mg/l	Maximum mg/l	Average lbs/d	Maximum lbs/d
Selenium VI	0.45	0.68	0.08	0.13
Phenol	0.99	1.5	0.19	0.28
Toluene	0.99	1.5	0.19	0.28
TCE	1.6	2.4	0.30	0.45

IRON
An acute water quality criteria of 0.16 mg/l will have to be met at the end of the zone of initial dilution. This WQ criteria is ½ of the 96-hour LC50 for the mayfly, stonefly, and caddisfly. The following calculations use a river flow in the ZID of 0.025 of the 7Q10.

Acute water quality-based permit limits for iron are:

Concentration:

$$\text{max} = 0.16 \text{ mg/l} * \frac{(0.0348075 \text{ cfs} + 0.1 \text{ cfs})}{0.0348075} = \mathbf{0.62 \text{ mg/l}}$$

avg = 0.619 mg/l * 0.67 = **0.41 mg/l**

Load:
max = 0.62 mg/l * 8.34 * 0.0225 mgd = **0.11 lbs/d**

avg = 0.41 mg/l * 8.34 * 0.0225 mgd = **0.07 lbs/d**

1,2-DICHLOROETHANE
For maximum protection of human health from exposure to 1,2-dichloroethane, the following permit limits are to be met at the lagoon outfall: average 19 mg/l
maximum 29 mg/l

1,1,1-TRICHLOROETHANE
For maximum protection of human health from exposure to 1,1,1-trichloroethane, the following permit limits are to be met at the lagoon outfall: average 3430 mg/l
maximum 5143 mg/l

BENZENE
For maximum protection of human health from exposure to benzene, the following permit limits are to be met at the lagoon outfall: average 14 mg/l
maximum 21 mg/l

CARBON TETRACHLORIDE
For maximum protection of human health from exposure to carbon tetrachloride, the following permit limits are to be met at the lagoon outfall: average 0.87 mg/l
maximum 1.3 mg/l

1,4-DICHLOROBENZENE
An acute water quality criteria of 6.0 mg/l will have to be met at the end of the zone of initial dilution. This WQ criteria is ½ of the 96-hour LC50 for the genus Leponis. The following calculations use a river flow in the ZID of 0.025 of the 7Q10.

Acute water quality-based permit limits for 1,4-dichlorobenzene are:

Concentration:

$$\text{max} = 6.0 \text{ mg/l} * \frac{(0.0348075 \text{ cfs} + 0.1 \text{ cfs})}{0.0348075} = 23 \text{ mg/l}$$

avg = 23 mg/l * 0.67 = **15 mg/l**

Load:

max = 23 mg/l * 8.34 * 0.0225 mgd = **4.3 lbs/d**

avg = 15 mg/l * 8.34 * 0.0225 mgd = **2.8 lbs/d**

ETHYL BENZENE

An acute water quality criteria of 16.0 mg/l will have to be met at the end of the zone of initial dilution. This WQ criteria is ½ of the 96-hour LC50 for the genus Lepomis. The following calculations use a river flow in the ZID of 0.025 of the 7Q10.

Acute water quality-based permit limits for ethyl benzene are:

Concentration:

$$\text{max} = 16.0 \text{ mg/l} * \frac{(0.0348075 \text{ cfs} + 0.1 \text{ cfs})}{0.0348075} = 62 \text{ mg/l}$$

avg = 1780 mg/l * 0.67 = **41 mg/l**

Load:

max = 62 mg/l * 8.34 * 0.0225 mgd = **11 lbs/d**

avg = 41 mg/l * 8.34 * 0.0225 mgd = **7.7 lbs/d**

NAPHTHALENE

An acute water quality criteria of 3.30 mg/l will have to be met at the end of the zone of initial dilution. This WQ criteria is ½ of the 96-hour LC50 for the genus Lepomis. The following calculations use a river flow in the ZID of 0.025 of the 7Q10.

Acute water quality-based permit limits for naphthalene are:

Concentration:

$$\text{max} = 3.3 \text{ mg/l} * \frac{(0.0348075 \text{ cfs} + 0.1 \text{ cfs})}{0.0348075} = 12 \text{ mg/l}$$

avg = 12 mg/l * 0.67 = **8.0 mg/l**

Load:

max = 12 mg/l * 8.34 * 0.0225 mgd = **2.2 lbs/d**

avg = 8.0 mg/l * 8.34 * 0.0225 mgd = **1.5 lbs/d**

Two sets of analytical reports were provided for comparison of leachate concentrations of all of the above characteristics. Althought the range of the 2 sample sets varied, which exemplifies the extent of the differences that exist within the same landfill, it is assumed that the treatment lagoon would be designed based on the average characteristic. All leachate characteristic results appear to be within the effluent permit limits.

No ambient water quality criteria or LC50s were found for:

chloride
flouride
phospate
total volatile solids
total organic halogens
magnesium
cis-1,2-dichloroethene
xylenes
1,1-dichloroehtene
4-BFB SUR.
1,2-DCA-d4 SUR.
Toluene-d8 SUR.

At this time, the Wapsipinicon River has not been designated as a Class A Primary Contact Recreation Stream, so no Fecal Coliform or TRC water quality-based limits are required.

RECORD COPY
Floyd Mitchell SOF
Initials 66-SDP-1-73P

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

September 30, 1991

Betty McCarthy, Chairperson
Floyd-Mitchell Solid Waste Board
Rural Route 5
Osage, IA 50461

Re: Floyd-Mitchell County Sanitary Landfill
Permit #66-SDP-1-73P
Leachate Control Plan

Dear Ms. McCarthy:

The Leachate Control Plan (LCP) submitted August 8 by Brice, Petrides-Donohue is being reviewed. Leachate Control Plans for existing landfills must meet the requirements of sections 103.2(12) and applicable portions of 103.2(11) of the Iowa Code. The following items must be addressed and submitted to complete the review process:

1) In accordance with Section 103.2(11)a(6)-(8), submit documentation including methods and specifications for cleaning of the leachate collection pipes, chemical compatibility of the pipes, and calculations and specifications for pipe strength. Identify the locations of the shutoff valves to enable the flow of leachate from the facility to be shut off during periods of maintenance. Note that the leachate collection system shall be cleaned out a minimum of once every three years and that the results and methods of the cleanout shall be submitted at the time of permit renewal.

2) Section 103.2(11)c.(1) applies and the proposed aerated lagoon treatment system must meet effluent limitations established by an NPDES permit issued to the landfill. The Wastewater Permit Section establishes the effluent limitations for each wastewater discharger upon request as stipulated in the Wastewater Facilities Design Standards Chapter 14.3. Leachate characterization analysis must include all the parameters in the enclosed list. The NPDES permit application must be submitted to the Wastewater Permit Section a minimum of 6 months prior to discharge.

3) It appears that the construction of the drainage system will necessitate excavation within the landfill waste boundaries. Include disposal of excavated waste in the design.

4) Include a maintenance and operational plan for the proposed lagoon system.

The proposed aerated lagoon treatment system shall conform to wastewater treatment design standards as stated in section 103.2(11)c.(3)IAC and your LCP report. Applicable design standards include elements of Chapters 11, 13, 14 and 18C.

Chapter 11 Address the applicable sections of Chapter 11.2.11 concerning technical information and design criteria including flow and wasteload variability.

Chapter 13 Address section 13.2 General Requirements for wastewater pumping stations and force mains.

Chapter 14 Applicable requirements in this chapter include portions of sections 14.2.4 Flood Protection, 14.3 Quality of Effluent, 14.4 Design, 14.4.5.4 Critical Flow Conditions, 14.4.6.2 Industrial Loadings, and 14.5 Treatment Facility Reliability Classes.

Chapter 18C The aerated facultative lagoons must be designed in accordance with Chapter 18C sections 18C.3-18C.4 and 18C.6-10.

- Submit the experimentally determined kinetic factors and calculations for sizing, selected design mixed-liquor volatile suspended solids concentration, and biological solids retention time. Determine the oxygen requirements of the waste based on the leachate characterization and compare to the minimum requirements.

- Discuss the expected nutrient and pretreatment requirements, or probability of shock loading.

- Calculate expected sludge production for the waste and produce a plan for sludge management.

Complete the enclosed construction permit application schedule K2 and return to the Department with the other submittal requirements by October 31, 1991.

If you have any questions concerning this review letter, you may contact me at (515) 242-6490.

Sincerly,

Patricia G. Schwarz

Patricia G. Schwarz
Environmental Engineer
Solid Waste Section

enclosures

PGS:pgs\WP51\DOCS\FLOYD.LCP

cc: Field Office 2

Gene Meyer, Director
Floyd-Mitchell Solid Waste Management Agency
P.O. Box 32
Osage, IA 50461

Robert Bamsey, P.E.
Brice, Petrides-Donohue
501 Sycamore, Suite 222
Waterloo, IA 50701

RECORD COPY

File Name FLOYD-MITCHELL

Senders Initials 66-SDP-1-73P

Brice, Petrides-Donohue
ENGINEERS
ARCHITECTS
SCIENTISTS

August 7, 1991

Ms. Patricia Schwarz
Iowa Department of Natural Resources
Solid Waste
Wallace State Office Building
900 East Grand
Des Moines, Iowa 50319

Dear Ms. Schwarz:

Enclosed are plans and specifications for the Leachate Control Plan for the Floyd/Mitchell County Landfill. The plan involves a phased approach to leachate extraction. Leachate will be extracted and treated over a 5-year period which was discussed at the July 25 meeting. Also discussed was temporary leachate extraction from existing piezometers to study the flow characteristics of leachate through the solid waste. The leachate extracted during these tests will be treated using land application. These issues are addressed in the Control Plan.

If you need additional information or have questions concerning this matter, please contact us.

Sincerely,

BRICE, PETRIDES-DONOHUE CO.

Eric W. Meintsma

EWM:bsp

Enclosures

T/Ltr/TT4

501 Sycamore Street, Suite 222, P.O. Box 1497, Waterloo, Iowa 50704-1497 ■ 319.232.6531 ■ Fax 319.232.0271

RECORD COPY

File Name Mitchell Co SDP Permit File

Senders Initials 66-SDP-1-73P JJ

FLOYD-MITCHELL

SOLID WASTE MANAGEMENT AGENCY

COLLECTION - TRANSPORTATION & DISPOSAL

Box 573
ROCKFORD, IOWA 50468

Director: 515/756-2266
Bookkeeper: 515/756-3708

July 31, 1991

Jewell Youngman
IDNR
Wallace Building
Des Moines, Iowa 50319

Dear Jewell,

This is to inform you that Richard Bessire is no longer the director of the Floyd-Mitchell Solid Waste Management Agency. The Associate Director Gene Mayer has been appointed director and we no longer have an Associate Director position. His address is P.O. Box 32, Osage, Iowa 50461

Sincerely,

Betty McClatchy, Chair
F-M Solid Waste Agency

C.C. IDNR District Office

FLOYD-MITCHELL

SOLID WASTE MANAGEMENT AGENCY

Box 523
ROCKFORD, IOWA 50468

Director 515/756-2286
Bookkeeper 515/756-3708

COLLECTION - TRANSPORTATION & DISPOSAL

Thursday July 25, 1991

Re: Floyd-Mitchell Landfill Leachate Control Plan
66-SDP-1-73P

Present:
Doc Hallada, IDNR
Patricia Schwarz, IDNR
Robert Bamsey, Donohue
Eric Meintsma, Donohue (319)232-6531

Meeting Minutes:

The purpose of the meeting was to discuss elements of the intended leachate control plan under design for Floyd-Mitchell County Landfill.

Presently, leachate collected in landfill area 2 is being land applied to a non-fill area in the northwest corner of the site north of an access road. It was noted that monitoring wells in AREA fill No. 3 were essentially dry, but that in TRENCHES 1-4 leachate had collected nearly to the surface of the trenches. The most recent proposal is a modified version of the conceptual plan received by the DNR dated July 1, 1991.

An optional toe drain along the north edge of AREA fill No. 3 will be implemented should the monitoring wells indicate leachate accumulating in the fill.

Eric denied phone call 7/8/92.

The plan provides for extraction of leachate from the west end of TRENCHES 1-4 to obtain parameters to be used in the design of the permanent leachate collection system. The proposed plan is to land apply the extracted leachate with the currently collected leachate from AREA fill No. 2. An estimate of quantities and quality of the leachate will be provided to determine the adequacy of this proposal. Movement of leachate in TRENCHES 1-4 is expected to be west to east, so a toe drain along the east edge is provided with an optional toe drain along the west edge should the west edge monitoring wells indicate that additional drainage is needed. Each trench is separated from the adjacent trench by a clay berm. If drainage is inadequate in any of the cells, the clay berm may be excavated and additional relief drains may be placed between the cells to help facilitate drainage.

The plan includes a toe drain along the south and east edge of AREA fill No. 1 that would tie in with the drain originating from TRENCHES 1-4. This would be in place of the force main in the July 1 plan.

The plan does not include any additional leachate collection for AREA fill No. 2.

The system will not be in continuous operation, but the fills will be drained intermittently as needed and weather permitting. The toe drains will flow easterly to lagoons that will be used for storage, as needed, and treatment. The design of the lagoons will be permitted through the solid waste department as part of the leachate collection plan, and additional permitting through the Water Treatment division will not be required. A NPDES effluent discharge permit will be required.

The leachate control plan will be submitted to DNR by August 9, 1991.

P. Schwarz

STATE OF IOWA

File Name Floyd-Mitchell SLF
Senders Initials 66-SDP-1-73P permit 1986

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

July 18, 1991

Ms. Betty McCarthy, Chairperson
Floyd-Mitchell Solid Waste Board
R.R. #5
Osage, IA 50461

RE: Floyd-Mitchell Landfill
66-SDP-1-73P

Dear Ms. McCarthy:

We received on July 3, 1991 a letter status report concerning the referenced project Leachate Control Plan development from your consulting engineering representative. In addition, an extension request for submittal of this document was made from the regulatory deadline of July 1, 1991 to August 1, 1991. The Department hereby grants this extension to the noted requested date.

The status report included a conceptual plan map for the Leachate Control System that is currently under design. The information in this document is too general in nature to afford our design plan review. We received an earlier request from your consultant on April 17, 1991 relative to our approval for the land application of leachate on a temporary basis. We are currently in review of this request and have asked as of this date that additional information be provided, so as to determine how the temporary and final control plan design will be merged. A pre-submittal meeting with DNR representatives was suggested to streamline our review process.

If you have any questions, please contact me at (515) 281-6807 or Nina Koger at 8968.

Sincerely,

Francis L. Hallada, P.E.
Environmental Engineer
Solid Waste Section

FH:flh

cc: Robert E. Bamsey, P.E.
Brice,Petrides-Donohue
P.O. Box 1497
Waterloo, IA 50704-1497

Floyd - Mitchell
#66-SDP-1-73P permit

Brice,
Petrides-
Donohue ENGINEERS
ARCHITECTS
SCIENTISTS

July 1, 1991

Mr. Doc Hallada
Iowa Department of Natural Resources
Wallace State Office Building
900 East Grand
Des Moines, Iowa 50319

Re: Floyd-Mitchell County Landfill

Dear Mr. Hallada:

This letter is a status report on the Leachate Control Plan for the Floyd-Mitchell County Landfill. As you know, the wet weather experienced in the spring of 1991, has made landfill operation and planning difficult. As a result of this, the leachate control plans for the Floyd-Mitchell County Landfill have been delayed. We anticipate the submittal date of the Leachate Control Plans for Floyd-Mitchell County will be August 1, 1991.

Leachate head piezometers have been installed at the facility and the conceptual design has been developed. Operating staff are currently hauling leachate from the existing leachate collection system which has been active since the extreme wet weather experienced this spring. We are anticipating a combination of a leachate interceptor system and leachate extraction wells at the Floyd-Mitchell Landfill. Enclosed is a map showing the conceptual plan of the Leachate Control System at the Floyd-Mitchell Landfill for your information.

<- To where?

Thank you for your consideration of the above matter. If you have any questions or if we can provide any further information, please let us know.

Sincerely,

BRICE, PETRIDES-DONOHUE CO.

Bob Bamsey

Robert E. Bamsey, P.E.

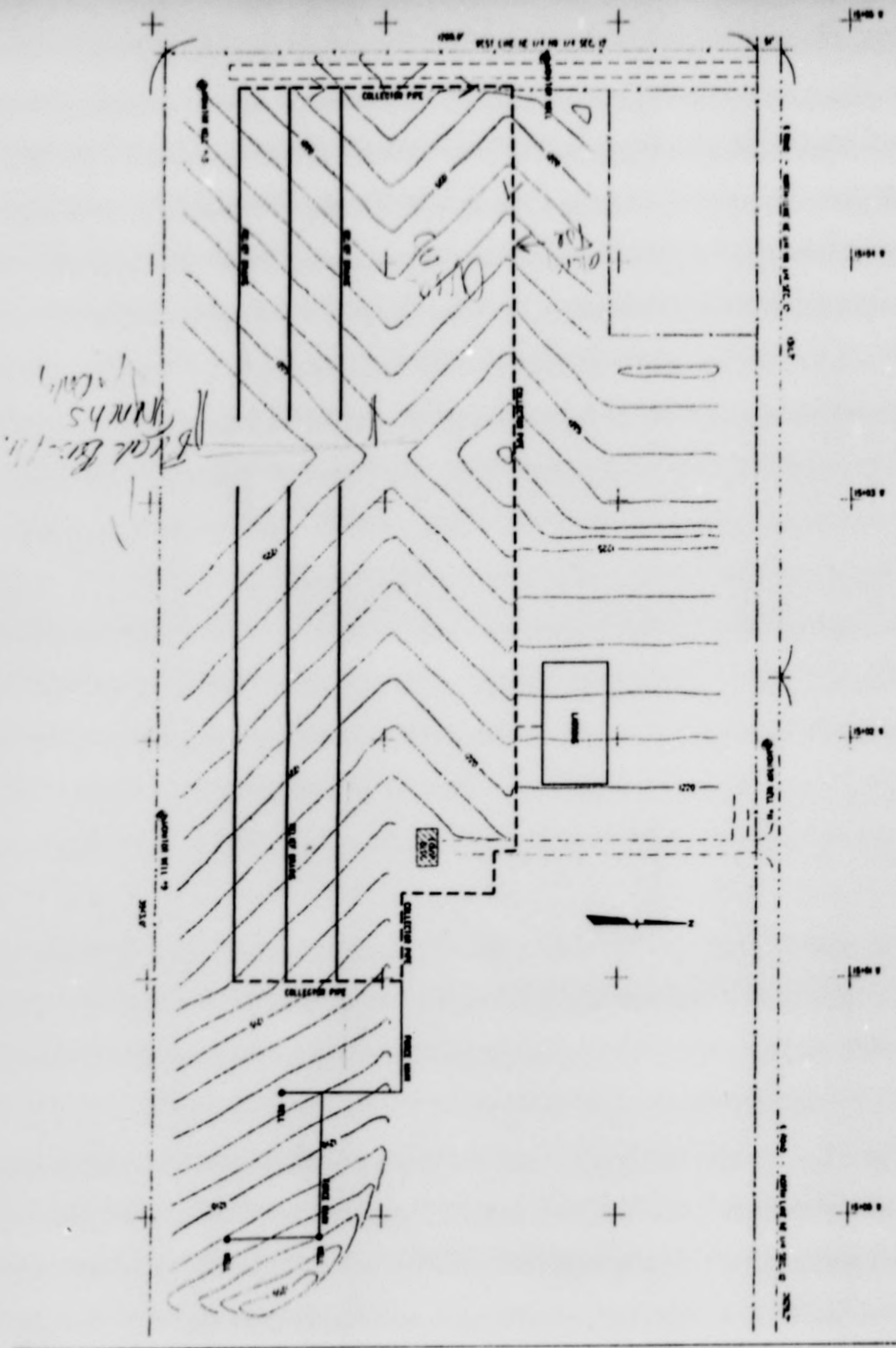
REB:bsp

Enclosure

cc: Ms. Betty McCarthy

T/Ltr/TL1

501 Sycamore Street, Suite 222, P.O. Box 1497, Waterloo, Iowa 50704-1497 319.232.6531 Fax 319.232.0271



FLOYD / MITCHELL COUNTY LANDFILL
PROPOSED LEACHATE COLLECTION SYSTEM

Donohue ENGINEERS ARCHITECTS SCIENTISTS

RECORD COPY

File Name Mitchell Co SDP Permit file

Senders Initials 66-SDP-1-73P

FLOYD-MITCHELL

SOLID WASTE MANAGEMENT AGENCY

COLLECTION - TRANSPORTATION & DISPOSAL

Box 573
ROCKFORD, IOWA 50468

Director: 515/756-2266
Bookkeeper: 515/756-3708

January 1, 1991 to June 30, 1991

SPECIAL PERMIT LOADS

NAME	DATE	YARDS	TICKET No.
A & Z Drying	1/3/91	5	2584
#660101288801	1/15/91	2	2660
#6601010791	1/29/91	12	2761
	2/5/91	2	2818
	2/12/91	2	2886
	2/21/91	2½	2950
	2/27/91	2	2987
	3/18/91	2	3134
	3/18/91	2½	3137
	3/4/91	2	3026
	4/4/91	10	3304
	5/13/91	2	3750
	5/13/91	2	3755
	5/29/91	2	3928
	5/29/91	2	3937
	5/29/91	2	3940
Ragsdale Dozer			
#6601072089	1/23/91	9	2719
	1/29/91	18	2762
	1/29/91	18	2769
	1/29/91	18	2775
	1/30/91	18	2777
	4/8/91	18	3336
	4/8/91	18	3348
	4/16/91	18	3413
	4/18/91	18	3446
	4/18/91	18	3451
City of Charles City			
#6601122788			
	3/26/91	4	3216
	5/29/91	5	3938

STATE OF IOWA

File Name Floyd-Mitchell SLF & 66-SDP-1-73P permit 1986

Senders Initials

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

July 18, 1991

Ms. Betty McCarthy, Chairperson
Floyd-Mitchell Solid Waste Board
R.R. #5
Osage, IA 50461

RE: Floyd-Mitchell Landfill
66-SDP-1-73P

Dear Ms. McCarthy:

We received on July 3, 1991 a letter status report concerning the referenced project Leachate Control Plan development from your consulting engineering representative. In addition, an extension request for submittal of this document was made from the regulatory deadline of July 1, 1991 to August 1, 1991. The Department hereby grants this extension to the noted requested date.

The status report included a conceptual plan map for the Leachate Control System that is currently under design. The information in this document is too general in nature to afford our design plan review. We received an earlier request from your consultant on April 17, 1991 relative to our approval for the land application of leachate on a temporary basis. We are currently in review of this request and have asked as of this date that additional information be provided, so as to determine how the temporary and final control plan design will be merged. A presubmittal meeting with DNR representatives was suggested to streamline our review process.

If you have any questions, please contact me at (515) 281-6807 or Nina Koger at 8968.

Sincerely,

Francis L. Hallada, P.E.
Environmental Engineer
Solid Waste Section

FH:flh

cc: Robert E. Bamsey, P.E.
Brice,Petrides-Donohue
P.O. Box 1497
Waterloo, IA 50704-1497

VARIANCE REQUEST

Iowa Department of Natural Resources

1. Date	: 31 May 91	13. Decision:	Approved
2. Review Engineer	: F. Hallada	Date:	6/4/91
3. Date Received	: 24 April 91		
4. Facility Name	: Floyd-Mitchell Sdf	14. Appeal:	
5. County Number	: 66	Date:	
6. Program Area 30	: Solid Waste		
7. Facility Type 501	: (66-SDP-1-73P)		
8. Subject Area 100	: Soil Daily Cover		
9. Rule Reference	: 20C Chapter 103.3(2)b.		
10. Design Std. Ref.	: —		
11. Consulting Engr.	: Bruce, Petrides - Donohue		
12. Variance Rule	: 20C Chapter 101.2 (455B)		

15. Description of Variance Request

- Floyd-Mitchell County Solid Waste Agency filed a written request 24 April 91 to use a geotextile, under trade name FABRISOIL produced by Phillips Fibers Corp., in place of 6-inches daily soil cover on deposited solid waste.
- Normal operations will utilize FABRISOIL for most daily cover operations and soil will be used as needed to alleviate any instability.
- FABRISOIL to be applied as working face, edge weighted and disposed in-place.

16. Consulting Engineer's Justification

- Daily cover availability at site is short supply
- FABRISOIL will only be used for daily cover... other cover requirements met with suitable site soil inventory

16. Consulting Engineer's Justification (cont.)

- Understood DNR has allowed FABRISOIL use at Grundy Co. SLF on conditional basis and working successfully per B-P Donohue (Eric Meintsma) contacts with LF operator.

17. Department's Justification

- Soil cover supply at SDP is in short availability
- Hallada requested Clayton Swanson in F.O. # 2 to visit Grundy Co. SLF site to review effectiveness of FABRISOIL use relative to litter, vector and odor control and precipitation diversion and limitations.
- Grundy Co. SLF revised 16 May 91 findings —
  a) Litter control . . . . . Effective
  b) Vector Control . . . . . Effective
  c) Odor Control . . . . . No noticeable impacts
  d) Precipitation diversion . . . . . Effective ... dry waste with moderate rainfalls
  e) Observed limitations:
     1. Keep runon from adjacent areas away from upper and side edges
     2. Likely limited to less than 50'x50' application area on daily basis
     3. Must keep edges weighted with soil liners, etc.
     4. Monitor integrity ... observed FABRISOIL or patch rips that occur
- Limited evaluation thus far has shown reasonable effectiveness ... recommend use conditional via permit ammendment.

18. Precedents Used

19. Staff Reviewer	: Francis C. Hallada	Date: 31 May 91
20. Supervisor	: Norm Letts	Date: 6/4/91
21. Authorized by	:	Date: 6/4/91

Brice, Petrides-Donohue ENGINEERS ARCHITECTS SCIENTISTS

TO: Ms. Patty Schwartz
Solid Waste Division
Iowa Department of Natural Resources
900 East Grand
Des Moines, Iowa 50319

RE: Floyd/Mitchell County Landfill Leachate

DATE: July 18, 1991

PROJECT NO.: 50603

TRENCHES 1-4
vicinity of LP 102 and LP 103 50' W of boundary West

We Are Transmitting: X **HEREWITH** ____ **UNDER SEPARATE COVER**

____DRAWINGS
X REPORT
____FORMS

____SPECIFICATIONS
____SHOP DRAWINGS
____OTHER

QUANTITY	DESCRIPTION
1	Lab Results of Leachate Sample From Floyd/Mitchell Landfill

____FOR YOUR INFORMATION
X PER YOUR REQUEST
____FOR YOUR APPROVAL
____FOR YOUR SIGNATURE
____RETURNED TO YOU

____AS REQUESTED BY YOU
____FOR REVIEW AND COMMENTS
____PER OUR CONVERSATION
____OTHER

COMMENTS: If you need more information please contact me.

EWM:blc

Enclosure

Eric W. Montag

501 Sycamore Street, Suite 222, P.O. Box 1497, Waterloo, Iowa 50704-1497 ■ 319.232.6531 ■ Fax 319.232.0271

Jul 23 10 21 AM '91

DEPT. OF
NATURAL RESOURCES

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Cedar Falls Division
704 Enterprise Drive
P.O. Box 625
Cedar Falls, IA 50613
Tel: (319) 277-2401
Fax: (319) 277-2425

ANALYTICAL REPORT

Betty McCarthy
FLOYD/MITCHELL SOLID WASTE AGENCY
Route 5, Box 50
Osage, IA 50461

05-13-91

Sample No.: 127663

Sample Description: **L #1 Leachate**
CC: BRICE, PETRIDES-DONOHUE ATTN: MIKE DOWNS
PROJECT #50603.030

Date Taken: 04-23-91

Date Received: 04-24-91 0800

	Result	Units	Date Analyzed
BOD - Five Day	110.	mg/L	05-01-91
Chloride	29.	mg/L	04-29-91
COD	140.	mg/L	04-29-91
Cyanide, Total	<0.010	mg/L	04-26-91
Fluoride	<0.20	mg/L	05-01-91
Nitrogen, Ammonia	9.0	mg/L	05-01-91
Nitrogen, Kjeldahl	12.	mg/L	04-30-91
Nitrogen, Nitrate	<0.50	mg/L	04-25-91
Phenol	0.073	mg/L	05-02-91
Phosphate, Total	1.0	mg/L	04-25-91
Solids, Total	1020.	mg/L	04-29-91
Solids, Total Volatile	190.	mg/L	04-30-91
Total Organic Halogens	0.332	mg/L Cl-	05-10-91
Arsenic - Dissolved	0.0200	mg/L	04-29-91
Barium - Dissolved	<0.50	mg/L	04-26-91
Cadmium - Dissolved	<0.0010	mg/L	05-02-91
Chromium Total - Dissolved	<0.0020	mg/L	05-03-91
Copper - Dissolved	<0.0050	mg/L	04-25-91
Iron - Dissolved	0.30	mg/L	04-29-91
Lead - Dissolved	<0.0050	mg/L	04-29-91
Magnesium - Dissolved	29.	mg/L	04-29-91
Mercury - Dissolved	<0.0005	mg/L	04-30-91
Nickel - Dissolved	0.015	mg/L	04-25-91
Potassium - Dissolved	7.3	mg/L	05-01-91
Selenium - Dissolved	<0.005	mg/L	04-30-91
Silver - Dissolved	<0.0010	mg/L	05-06-91

R. L. Bindert
Project Manager

ANALYTICAL REPORT

NET TESTING, INC.
ENVIRONMENTAL
NATIONAL

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Cedar Falls Division
704 Enterprise Drive
P.O. Box 625
Cedar Falls, IA 50613
Tel: (319) 277-2401
Fax: (319) 277-2425

ANALYTICAL REPORT

Betty McCarthy
FLOYD/MITCHELL SOLID WASTE AGENCY
Route 5, Box 50
Osage, IA 50461

05-13-91

Sample No.: 127663

Sample Description: L #1 Leachate
CC: BRICE, PETRIDES-DONOHUE ATTN: MIKE DOWNS
PROJECT #50603.030

Date Taken: 04-23-91

Date Received: 04-24-91 0800

	Result	Units	Date Analyzed
Zinc - Dissolved	<0.050	mg/L	04-26-91
cis-1,2-Dichloroethene	5.4	ug/L	05-03-91
Ethyl benzene	18.0	ug/L	05-03-91
Toluene	182.	ug/L	05-03-91
Xylenes, Total	197.	ug/L	05-03-91
Benzene	<5.0	ug/L	05-03-91
Carbon tetrachloride	<5.0	ug/L	05-03-91
1,4-Dichlorobenzene	8.1	ug/L	05-03-91
1,2-Dichloroethane	<5.0	ug/L	05-03-91
1,1-Dichloroethene	<5.0	ug/L	05-03-91
1,1,1-Trichloroethane	<5.0	ug/L	05-03-91
Trichloroethene	<5.0	ug/L	05-03-91
4-BFB SUR.	101.	%	05-03-91
1,2-DCA-d4 SUR.	97.6	%	05-03-91
Toluene-d8 SUR.	103.	%	05-03-91
Naphthalene	32.6	ug/L	05-03-91

R. L. Bindert
Project Manager

2

Brice, Petrides-Donohue ENGINEERS ARCHITECTS SCIENTISTS

May 16, 1991

Ms. Nina Koger
Iowa Department of Natural Resources
Solid Waste Division
Wallace State Office Building
East Ninth and Grand
Des Moines, Iowa 50319

RECORD COPY Floyd-Mitchell Co SDP Permit file
File Name #66-SDP-1-73P
Sender's Initials

Dear Ms. Koger:

Enclosed is the analytical report for a soil sample taken from the petroleum contaminated soil at the Floyd/Mitchell County Landfill. Since the analysis indicates that the total hydrocarbon concentration is less than 100 ppm, the soil will be used for cover unless the landfill is instructed to the contrary.

If you have any questions or comments, please contact us.

Sincerely,

BRICE, PETRIDES-DONOHUE CO.

Eric W. Meintsma

EWM:bsp

Enclosure

cc: IDNR - Field Office #2

T/L/TA8

501 Sycamore Street, Suite 222, P.O. Box 1497, Waterloo, Iowa 50704-1497 319.232.6531 Fax 319.232.0271

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Cedar Falls Division
704 Enterprise Drive
P.O. Box 625
Cedar Falls, IA 50613
Tel: (319) 277-2401
Fax: (319) 277-2425

ANALYTICAL REPORT

Betty McCarthy
FLOYD/MITCHELL SOLID WASTE AGENCY
Route 5, Box 50
Osage, IA 50461

05-14-91

Sample No.: 128361

Sample Description: Soil Jar W/Label
CC: BRICE, PETRIDES-DONOHUE ATTN: MIKE DOWNS
PROJECT #50603.030

Date Taken: 04-30-91

Date Received: 05-01-91 1035

	Result	Units	Date Analyzed	Analyst
Benzene	<0.5	ug/g	05-03-91	kk
Toluene	<0.5	ug/g	05-03-91	kk
Xylenes, Total	<0.5	ug/g	05-03-91	kk
Total Hydrocarbons	24.	ug/g	05-03-91	kk
Extractable Hydrocarbons	19.	ug/g	05-12-91	ae
Ethyl benzene	<0.5	ug/g	05-03-91	kk

Sample introduction performed in reference to EPA Method 5030 (purge & trap). Analysis performed in reference to EPA Method 8020 for volatile organics using flame ionization detection. (Iowa Method OA-1, Revision 1/10/90).

Method Detection Limits: Benzene 0.5 ug/g; Toluene 0.5 ug/g; Xylenes, Total 0.5 ug/g; Total Hydrocarbons 15. ug/g; Ethyl Benzene 0.5 ug/g.

Extractable Hydrocarbons are extracted in accordance with EPA Method 3550 (sonication extraction). Analysis is performed in reference to EPA Method 8100 using flame ionization detection. (Iowa Method OA-2, Revision 1/10/90).

R. L. Bindert
Project Manager

ANALYTICAL REPORT

NET ENVIRONMENTAL NATIONAL TESTING, INC.
NET Midwest, Inc.
104 Enterprise Drive
P.O. Box 458
Cedar Falls, IA 50613
Tel: (319) 277-2401
Fax: (319) 277-2425

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Cedar Falls Division
704 Enterprise Drive
P.O. Box 625
Cedar Falls, IA 50613
Tel: (319) 277-2401
Fax: (319) 277-2425

ANALYTICAL REPORT

Betty McCarthy
FLOYD/MITCHELL SOLID WASTE AGENCY
Route 5, Box 50
Osage, IA 50461

05-14-91

Sample No.: 128362

Sample Description: Soil Jar W/O Label
CC: BRICE, PETRIDES-DONOHUE ATTN: MIKE DOWNS
PROJECT #50603.030

Date Taken: 04-30-91

Date Received: 05-01-91 1035

	Result	Units	Date Analyzed/Analyst	
Benzene	<0.5	ug/g	05-06-91	kk
Toluene	<0.5	ug/g	05-06-91	kk
Xylenes, Total	<0.5	ug/g	05-06-91	kk
Total Hydrocarbons	24.	ug/g	05-06-91	kk
Extractable Hydrocarbons	<15.0	ug/g	05-12-91	ae
Ethyl benzene	<0.5	ug/g	05-06-91	kk

Sample introduction performed in reference to EPA Method 5030 (purge & trap). Analysis performed in reference to EPA Method 8020 for volatile organics using flame ionization detection. (Iowa Method OA-1, Revision 1/10/90).

Method Detection Limits: Benzene 0.5 ug/g; Toluene 0.5 ug/g; Xylenes, Total 0.5 ug/g; Total Hydrocarbons 15. ug/g; Ethyl Benzene 0.5 ug/g.

Extractable Hydrocarbons are extracted in accordance with EPA Method 3550 (sonication extraction). Analysis is performed in reference to EPA Method 8100 using flame ionization detection. (Iowa Method OA-2, Revision 1/10/90).

R. L. Bindert
Project Manager

NET NATIO ENVIR TESTI

FLOYD/MITCH. REPORT.

TO:
BETTY MC CARTHY
ROUTE 5 BOX 50
OSAGE, IA. 50461
515-982-4276

CHAI

Client FLOYD/MITCHELL CO. LAND

Send Report to: " & BP/

Address BETTY MC CARTHY RT. 5 BOX 50 OSAGE, IA. 50461

Telephone # 515-982-4276

WATERLOO, IA. 50704

Collection Information								Parameters																
Sample ID	Sampling Location	Date	Time	GRAB	COMP	Sample Type	No. of Container	TOX	COD	METALS/CL	PAESOL	VOA												
MW #3	FMC LANDFILL	4/30/91	12:10			WTR	7	X	X	X	X	X												
SW #1	" "	"	1:10			"	7	X	X	X	X	X												
SW #2	" "	"	12:20			"	7	X	X	X	X	X												
SOIL 1	" "	"	1:00			SOIL	1	}																
SOIL 2	" "	"	1:00			SOIL	1	}																

OA1 & OA2

Remarks:

Relinquished by:	Date	Time	Received by:	Date	Time
Mike Downs	5/1/91				

Shipping Notes/Lab Comments

Received for NET Midwest by: Melissa Saccani 5/1/91 10:3

Samples Field Filtered: ___ Yes ___ No

Seals Intact Upon Receipt: ___ Yes ___ No ___ N/A

Ms. Nina Koger
May 6, 1991

Brice, Petrides-Donohue
ENGINEERS
ARCHITECTS
SCIENTISTS

Leachate
No leachate seepage was observed on the entire landfill site. The leachate collection system serving Fill Area No. 2 was producing larger than normal volumes of leachate as a result of the wet weather. This leachate was being applied to unfilled areas of the landfill during the inspection.

Cover Settlement, Subsidence and Displacement
Area Fill No. 1 and Trenches 1-4 contain areas of uneven settlement which has produced some depressions. It will be necessary to fill and possibly regrade these areas during the summer months. Drainage on other areas of the landfill appears to be adequate. The rainy weather produced excellent conditions for observing drainage patterns on the landfill.

Vegetative Cover
Vegetative cover appears to be adequate to very good in some areas. Borrow and filling areas which do not currently have vegetative cover will be seeded as needed. It will also be necessary to reseed the areas that have uneven settlement and will be repaired this summer.

Monitoring Wells
All of the newly installed monitoring wells have been fitted with a protective casing with locking covers. The wells and piezometers appear to be in good condition.

The unusually wet weather conditions have hindered operations at the landfill. After the weather improves, measures will be taken to correct the problems observed during this inspection.

Sincerely,

BRICE, PETRIDES-DONOHUE CO.

Bob Bamsey

Robert E. Bamsey, P.E.

Eric Meintsma

Eric W. Meintsma, E.I.T.

EWM:bsp

cc: Iowa DNR Field Office 2
Ms. Betty McCarthy

T/L/SW2

4

-RECORD COPY

File Name Mitchell Co SDP Permit file

Senders Initials

Brice, Petrides-Donohue

ENGINEERS
ARCHITECTS
SCIENTISTS

May 6, 1991

Ms. Nina Koger
Iowa Department of Natural Resources
Solid Waste Division
Wallace State Office Building
East Ninth and Grand
Des Moines, Iowa 50319

Re: Semi-Annual Inspection Report
Floyd/Mitchell County Sanitary Landfill
Mitchell County, Iowa
Landfill Permit No. 66-SDP-1-73P

Dear Ms. Koger:

The semi-annual inspection of the Floyd/Mitchell County Sanitary Landfill was conducted on April 29, 1991. Conducting the inspection were Robert Bamsey, P.E., and Eric Meintsma, E.I.T., of Brice, Petrides-Donohue Co. Also in attendance during the inspection were Betty McCarthy, Chairperson, Gene Meyer, Assistant Director, Floyd/Mitchell Solid Waste Management Agency, and Arlin Enabnit, member of the Board of Supervisors. The weather conditions in April were unseasonably wet. It was reported an excess of 7 inches of rain in the 3 weeks prior to the inspection.

Landfill Operations

The wet weather area approximately 100 feet west of the equipment storage area was in use during the inspection. Weather conditions prohibited access to the normal fill area. Access roads to the wet weather area were in good shape and allowed trouble free access to the working face. A shortage of cover soil was observed on the south face of the wet weather area. The landfill operator informed us that more soil will be placed over the wet weather area when soil excavating conditions in the borrow areas improve.

The vertical expansion at the west end of the landfill which is the location of the normal filling operation was also investigated. Soil cover was adequate around the outside slopes of the vertical expansion, however, it appeared that the working face lacked the necessary soil coverage. This problem will be resolved when weather conditions improve and allow access to the borrow areas.

501 Sycamore Street, Suite 222, P.O. Box 3497, Waterloo, Iowa 50704-1497 ■ 319.232.6531 ■ Fax 319.232.0271

Brice, Petrides-Donohue ENGINEERS ARCHITECTS SCIENTISTS

May 6, 1991

Mr. W. M. Jinkinson
Iowa Department of Natural Resources
Field Office No. 2
P.O. Box 1443
Mason City, Iowa 50401

Re: Floyd/Mitchell County Sanitary Landfill Inspection
Conducted April 15, 1991
Permit No. 66-SDP-1-73P permit file

Dear Mr. Jinkinson:

Your letter dated April 18, 1991, requested a response stating the measures the landfill will take to comply with two required actions at the conclusion of Mr. Tompkins' report. These required actions are:

3. Eliminate the ponding and ruts south of the petroleum-contaminated soil site. Eliminate the ponding in Area Fill No. 1.

4. Grade and compact the mudded in daily cover at the current operation area and the wet weather area. Provide at least six inches of compacted daily cover after each day of operation.

The unusually wet weather this spring has produced poor landfill operation conditions. Daily cover is difficult to obtain when borrow areas are inaccessible due to the saturated soil. The wet soil is also more difficult to spread and compact properly over the daily working face. When the weather improves, the operators will apply the required soil to those areas lacking soil and to the active filling areas.

As discussed in our response to the previous inspection conducted by your office, the ponding is an ongoing problem at the landfill. The older areas of the landfill were poorly compacted as they were filled. The result has been uneven settlement and ponding water. During the semi-annual inspection conducted by our office on April 29 of this year, it was evident that a major effort will be required to re-establish proper drainage. The landfill will be filling and, in some cases, regrading and shaping areas of the landfill with poor drainage. The landfill is in the process of purchasing a scraper which will be used to help alleviate the drainage problem.

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Brice, Petrides-Donohue
ENGINEERS
ARCHITECTS
SCIENTISTS

We hope the actions will improve conditions at the landfill. If you have additional recommendations or questions concerning the operation of the landfill, please contact us.

Sincerely,

BRICE, PETRIDES-DONOHUE CO.

Eric W. Meinsma

EWM:blc

cc: Ms. Nina Koger
Ms. Betty McCarthy

T/L/SX4

STATE OF IOWA

RECORD COPY
File Name FLOYD-MITCHELL SLF
Senders Initials 66-SDP-1-73P

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

April 17, 1991

Ms. Betty McCarthy, Chair
Floyd-Mitchell Solid Waste Agency
Courthouse
Osage, IA 50461

Dear Ms. McCarthy:

This letter is in regard to your request to accept solid waste from Chickasaw County on a temporary basis. The Department will allow this request on a temporary, emergency basis for a period not to exceed six months. However, a modification to the comprehensive waste plan and permit will be required for continued acceptance.

Sincerely,

Morris L. Preston, P.E.
Supervisor
Solid Waste Section

MLP:nmf

cc: Arnie Boge
Chickasaw County Board of Supervisors
Chickasaw County Courthouse
New Hampton, IA 50659

Brice,
Petrides-
Donohue ENGINEERS
ARCHITECTS
SCIENTISTS

April 11, 1991

Ms. Nina Koger
Iowa Department of Natural Resources
Solid Waste Division
900 East Grand
Des Moines, Iowa 50319

Dear Ms. Koger:

The Floyd/Mitchell County Solid Waste Agency is requesting approval for land application of leachate generated at the Floyd/Mitchell County Landfill (Permit No. 66-SDP-1-73P).

A leachate collection and treatment system is currently under design for the landfill to meet the requirements of Section 103.2(12) of the IAC. It is anticipated that construction of the system will be performed in the summer of 1992. We would like to extract leachate from the currently filled areas, Trenches 1-4, and land apply it. The removal of as much leachate as possible from this area prior to construction will facilitate construction of the collection system and reduce the volume of leachate that will need to be treated as a result of the construction.

IDNR guidelines for land application of leachate are not available; therefore, the guidelines in Chapter 121 of the IAC, "Land Application of Wastes," will be followed. The leachate will be sampled, analyzed and application rates determined. The results will be submitted to the IDNR prior to land application. The proposed areas for leachate application are the unfilled areas north and south of the existing filled sections of the landfill, refer to the enclosed map.

Please give this matter prompt review so leachate removal can be initiated. If you have any questions or need additional information, please contact us.

Sincerely,

BRICE, PETRIDES-DONOHUE CO.

Eric W. Meintsma

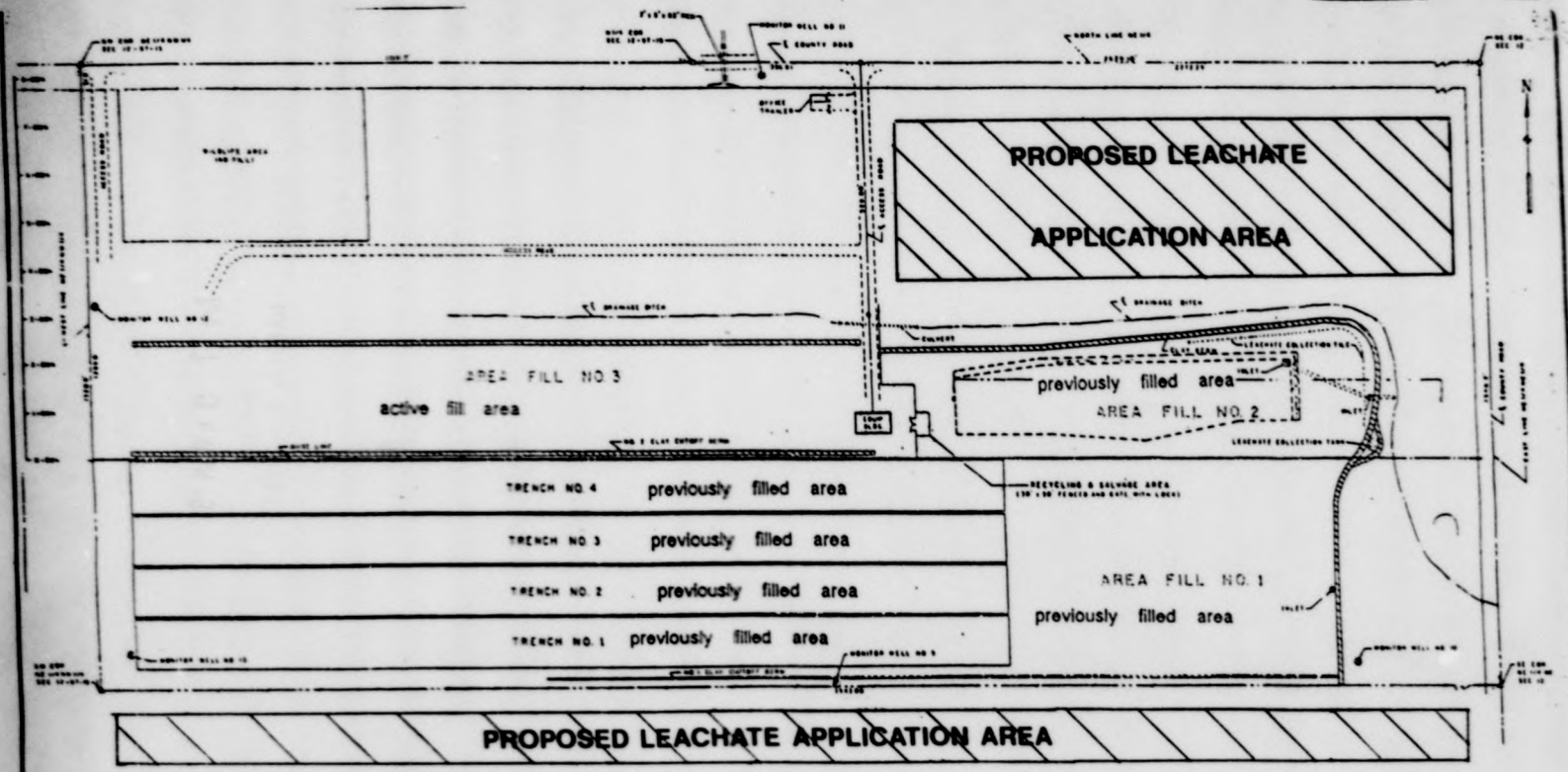
Eric W. Meintsma

EWM:blc

T/L/SP6

501 Sycamore Street, Suite 222, P.O. Box 1497, Waterloo, Iowa 50704-1497 ■ 319.232.6531 ■ Fax 319.232.0271

Farmstead



ATTACHMENT NO. 1

Form 102—6-85

ATTACHMENT NO. 1

PROPOSED LEACHATE APPLICATION AREA

Application Area
Proposed Leachate

66-SDP-1-73P
Floyd-Mitchell Co. SLF
permit file

April 10, 1991

Morris Preston
IDNR
Wallace Building
Des Moines, Iowa 50319

Dear Morris,

This is to advise you that the Floyd-Mitchell Solid Waste Agency has received a request from Arnie Boge on behalf of the Chickasaw County Board of Supervisors and A. Donald Johnson, Mayor of New Hampton for authorization to bring their solid waste into the Floyd-Mitchell Landfill on a temporary basis for up to six months in the event that the Findland Landfill is suddenly closed.

At an Executive Board Meeting of the Floyd-Mitchell Solid Waste Agency held April 4, 1991 a motion was made to approve the use of our landfill as a contingency site if needed subject to appropriate plan submissions to IDNR and their approval.

The Floyd-Mitchell Solid Waste Agency sees the need to expand our service area in order to generate the revenues needed to comply with all regulations governing landfills. Our landfill was originally sited to service a four County area, Chickasaw, Floyd, Howard and Mitchell Counties.

Our engineering firm, Brice-Petrides-Donahue feels that our landfill has the potential of serving an extended service area for many future years given the mandate to reduce volume and the number of unfilled acres that could be dewatered for a lateral expansion.

Please advise as to course of action needed to be taken for your approval.

Sincerely,

Betty McCarthy

Betty McCarthy, Chair
Floyd-Mitchell Solid Waste Agency

ph

cc: Chickasaw County Board of Supervisors
A. Donald Johnson
Jendro Sanitation Services, Inc.

April 10, 1991

Dennis Rops, Chair
Butler Co. Solid Waste Commission
PO Box 305
Allison, Iowa 50602

Dear Dennis,

We are in receipt of recent letter from IDNR approving a 90 day extension for use of Floyd-Mitchell landfill by Butler County. The letter from Morris Preston further states that the request is approved for a period not to exceed 90 days with the understanding that the Butler County Solid Waste Commission would enter into a permanent agreement with a permitted solid waste agency.

We wish to extend an invitation to your Commission to enter into a permanent agreement with the Floyd-Mitchell Solid Waste Agency for the disposal of Butler County solid waste. We are viewing options open for a buy in to extend our service area allowing member status if desired rather than current out of county surcharges.

On behalf of our agency I would be open to attending any of your meetings to answer questions. Please keep us advised as to your future intentions.

Yours truly,

Betty McCarthy

Betty McCarthy, Chair
Floyd-Mitchell Solid Waste Agency

ph

cc Bob Waychoff
Morris Preston

RECORD COPY
File Name Floyd-Mitchell SLF
Senders Initials 66-SDP-1-73P
permit file

4

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

April 1, 1991

Mr. Rod Baumann
Terracon Environmental, Inc.
2211 South 156th Circle
Omaha, NE 68130-2506

Dear Rod:

This letter is in regard to your request to omit MW-6 from the Floyd-Mitchell Sanitary Landfill Hydrologic Monitoring System Plan (HMSP). Since MW-6 is not within 50 feet of the waste boundary, as required by 567--110.10(1) I.A.C., the Department will allow this well to be omitted from the HMSP.

Sincerely,

Nina M. Koger

Nina M. Koger
Environmental Engineer
Solid Waste Section

NK:nmf

cc: Bob Bamsey, Brice, Petrides-Donahue, P.O. Box 1497
Waterloo, IA 50704
Richard Messier, Floyd-Mitchell Solid Waste Agency
P.O. Box 573, Rockford, IA 50468

4

Brice,
Petrides-
Donohue ENGINEERS
ARCHITECTS
SCIENTISTS

March 13, 1991

Ms. Nina Koger
Iowa Department of Natural Resources
Solid Waste Division
900 East Grand
Des Moines, Iowa 50319

Dear Ms. Koger:

This letter is a response to the Floyd-Mitchell County Sanitary Landfill (Permit No. 66-SDP-1-73P) inspection conducted by Mr. Al Tompkins of the IDNR Regional office on February 21, 1991. The following required actions were summarized at the end of Mr. Tompkins' report.

1. Amend the permit to include Butler County in the service area if you plan to continue accepting waste.

2. Submit the leachate/control/treatment system plan by July 1, 1991.

3. Spread petroleum-contaminated soil to 4 inches or less and disk it at least three times per week to allow evaporation of contaminants. Test the treated soils once every three months for total hydrocarbon content.

4. Eliminate the ponding south of the petroleum-contaminated soil site.

It is anticipated that the Floyd-Mitchell County Landfill will continue to receive solid waste from Butler County for another two weeks. It is anticipated that Butler County will then use the RDF system in Iowa Falls as the primary disposal site. Because of the short duration which Butler County will be utilizing the Floyd-Mitchell County Landfill site, an amendment to the current permit will not be pursued for the short term; however, clarification will be sought regarding the Butler County waste stream and contingency plan. If an amendment to the current permit is necessary, it will be pursued.

A leachate/control/treatment system plan is currently being designed, and we anticipate that it will be submitted to IDNR by July 1, 1991.

■ 501 Sycamore Street, Suite 222, P.O. Box 1497, Waterloo, Iowa 50704-1497 ■ 319.232.6531 ■ Fax 319.232.0271

Brice,
Petrides-
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The petroleum-contaminated soil on-site will be spread to 4 inches or less as soon as the frost is out. Future management of this soil will involve disking and testing for total hydrocarbon content once every three months.

Differential settlement of filled areas at the landfill is an ongoing problem. These areas will continue to be filled and graded to drain as settlement occurs.

If you have questions or comments concerning these required actions or the operation of the landfill in general, please feel free to contact our office.

Sincerely,

BRICE, PETRIDES-DONOHUE CO.

Eric W. Meintsma

EWM:blc

T/L/SF0

4

Brice, Petrides-Donohue
ENGINEERS
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SCIENTISTS

March 25, 1991

Ms. Nina Koger
Iowa Department of Natural Resources
Solid Waste Division
Wallace State Office Building
East Ninth and Grand
Des Moines, Iowa 50319

permit file

Dear Ms. Koger:

The Floyd/Mitchell Solid Waste Agency is requesting an amendment to the current sanitary disposal project permit (No. 66-SDP-1-73P). The Agency is proposing to accept yard waste at the existing Floyd/Mitchell County Landfill location. The yard waste will not be landfilled.

An unfilled section of the landfill will be developed to process the yard waste (refer to the enclosed figure). Processing will include tipping and debagging an all-weather surface. The yard waste will be applied to land currently under cultivation at a rate not to exceed 20 dry tons/acre/year.

If you have any questions or need additional information, please contact me.

Sincerely,

BRICE, PETRIDES-DONOHUE CO.

Eric W. Meintsma

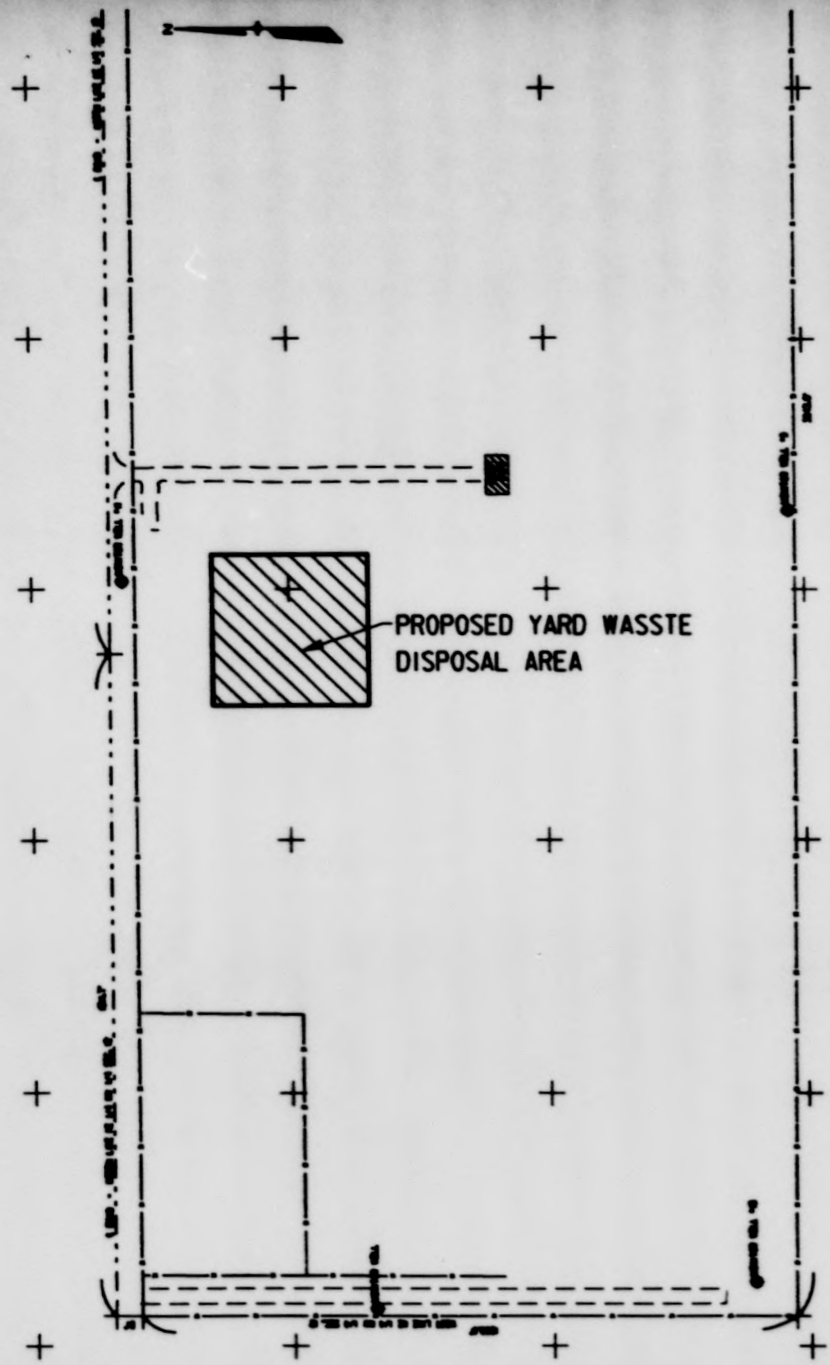
EWM:bsp

Enclosure

cc: Ms. Betty McCarthy, Director
Floyd/Mitchell County Solid Waste Agency

T/L/SK3

501 Sycamore Street, Suite 222, P.O. Box 1497, Waterloo, Iowa 50704-1497 ■ 319.232.6531 ■ Fax 319.232.0271



PROPOSED YARD WASTE DISPOSAL AREA
FLOYD/MITCHELL SANITARY LANDFILL
MITCHELL COUNTY, IOWA
FIGURE 1

Donohue ENGINEERS ARCHITECTS SCIENTISTS

RECORD COPY

File Name Mitchell Co SDP Permit file 9

Senders Initials 6a6-SDP-1-73P

FLOYD-MITCHELL

SOLID WASTE MANAGEMENT AGENCY

COLLECTION - TRANSPORTATION & DISPOSAL

Box 573
ROCKFORD, IOWA 50468

Director: 515/756-2266
Bookkeeper: 515/756-3708

July 1, 1990 to December 31, 1990

SPECIAL PERMIT LOADS

NAME	DATE	YARDS	TICKET NO.
Hobson Bros.	7-26-90	9	706
#1201072988	7-27-90	9	713
#6601072089	8-7-90	9	862
	8-9-90	9	898
	8-9-90	9	907
	8-9-90	9	914
	8-10-90	9	929
	8-14-90	9	959
	10-22-90	9	1924
	10-23-90	9	1928
	10-23-90	9	1940
	10-23-90	9	1948
	10-24-90	9	1951
	10-24-90	9	1956
	10-26-90	9	1977
	10-26-90	9	1983
	10-26-90	9	1989
	10-29-90	9	2005
	10-29-90	9	2012
City of Charles City			
#6601122788	8-29-90	5	1146
	11-29-90	5	2342
A & Z Drying			
#660101288801	7-5-90	2	431
	7-5-90	2	437
	7-23-90	2	648
	7-23-90	2	657
	8-6-90	2	843
	8-6-90	2	847
	8-20-90	2	1030
	8-20-90	2	1033
	9-5-90	2	1214
	9-5-90	2	1220
	9-19-90	2	1504
	9-19-90	2	1509
	10-31-90	2	2031
	11-7-90	2	2112
	11-14-90	2	2189
	11-21-90	2	2259
	11-28-90	2½	2333
	12-7-90	1½	2395
	12-12-90	2	2439
	12-21-90	2	2511

Copied to FOR 89

FEB 6 9 37 AM '91

STATE OF IOWA

RECORD COPY

File Name FLOYD - MITCHELL SLF

Senders Initials 66-SDP-1-73P

Permit file

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

February 28, 1991

Mr. Al Tompkins
Field Office 2
P.O. Box 1443
Mason City, IA 50401

Dear Al:

Here is the information you requested regarding the Floyd-Mitchell Sanitary Landfill. I have also included the letter proposing to delete two monitoring wells from the monitoring plan, as well as our response to this proposal.

If you have any questions concerning the above information contact me at 515/281-8986.

Sincerely,

Nina M. Koger

Nina M. Koger
Environmental Engineer
Solid Waste Section

NK:nmf

ATTACHMENT

STATE OF IOWA

RECORD COPY
File Name FLOYD - MITCHELL SLF
Senders Initials 66-SDP-1-73P

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

January 4, 1991

Rod Baumann
Terracon Environmental, Inc.
2211 South 156th Circle
Omaha, NE 68130-2506

Dear Rod:

This letter is in regard to your October 30, 1990 letter requesting to modify the Hydrolic Monitoring System Plan (HMSP) for the Floyd-Mitchell Sanitary Landfill. Based on your presumptions that the drainage ditch will intercept the groundwater upgradient to monitoring wells MW-4 and MW-5 and because of dewatering of these wells by soil excavation in the area, the department will allow the removal of monitoring wells MW-4 and MW-5 from the HMSP.

Sincerely,

Nina M. Koger

Nina M. Koger
Environmental Engineer
Solid Waste Section

NK:nmf

cc: Bob Bamsey, Brice, Petrides-Donahue, P.O. Box 1497
Waterloo, IA 50704
Richard Messier, Floyd-Mitchell Solid Waste Agency
P.O. Box 573, Rockford, IA 50468