FIVE-YEAR REVIEW REPORT

Fourth Five-Year Review Report

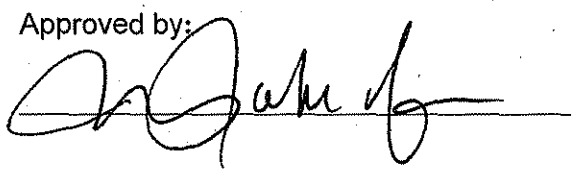
April 2003 to March 2008

For

John Deere Dubuque Works

Dubuque, Iowa

EPA ID Number: IAD005269527

Approved by: 

Date: 8-11-08

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Prepared for:
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Date:
29 August 2008

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LIST OF ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
BOD5	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminants of Concern
FS	Feasibility Study
ft^2	Square Feet
HAL	Health Advisory Level
HRS	Hazard Ranking System
IDNR	Iowa Department of Natural Resources
IRIS	Integrated Risk Information
JDDW	John Deere Dubuque Works
kg	Kilogram
lbs/day	Pounds per Day
MCLs	Maximum Contaminant Levels
mg/kg-day	Milligrams per Kilogram Day
mg/L	Milligrams per Liter
msl	Mean Sea Level
MGD	Million Gallons per Day
NAPL	Non-aqueous Phase Liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRL	Negligible Risk Level
O&M	Operation and maintenance
PCE	Tetrachloroethene
PRP	Potentially responsible party
RA	Remedial Action
RAOs	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
TCE	Trichloroethene

TTO	Total Toxic Organic
ug/L	Micrograms per Liter
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

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Fourth Five-Year Review Report April 2003 to March 2008

John Deere Dubuque Works
Dubuque, Iowa

EXECUTIVE SUMMARY

The remedy for the John Deere Dubuque Works (JDDW) site in Dubuque, Iowa includes pumping groundwater from the alluvial aquifer, using the existing production wells to maintain an inward hydraulic gradient. The remedy also includes using deed restrictions to prevent inappropriate use of the plant property in the future. In addition, wells tapping the alluvial aquifer beneath the JDDW property for the purpose of extracting water for human drinking purposes or for irrigation of food or feed crops are not allowed.

According to the data reviewed, the site inspection, and the interviews, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. The selected remedy remains protective of human health and the environment and complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action. Therefore, this remedy continues to be protective to human health and the environment.

Fourth Five-Year Review Report April 2003 to March 2008

John Deere Dubuque Works
Dubuque, Iowa

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Fourth Five-Year Review Report April 2003 to March 2008

John Deere Dubuque Works
Dubuque, Iowa

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: **John Deere (Dubuque Works)**		
EPA ID *(from WasteLAN)*: IAD005269527		
Region: VII	**State: Iowa**	**City/County: Dubuque/Dubuque**
SITE STATUS		
NPL status: ☐ Final ☐ **Deleted** X Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction **fl Operating** ☐ Complete		
Multiple OUs?* ☐ YES **fl NO**	**Construction completion date: ___/___/_____N/A**	
Has site been put into reuse? ☐ YES **fl NO**		
REVIEW STATUS		
Lead agency: **fl EPA** ☐ State ☐ Tribe ☐ Other Federal Agency _____		
Author name: Bill Gresham		
Author title: Environmental Scientist	**Author affiliation: USEPA**	
Review period:** **4/1/03 – 3/31/08**		
Date(s) of site inspection: 02/04/08		
Type of review: ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only **fl Non-NPL Remedial Action Site** ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☐ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) **4 (fourth)**		
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#____ ☐ Construction Completion **fl Previous Five-Year Review Report** ☐ Other (specify)		
Triggering action date *(from WasteLAN)*: 09/30/2003		
Due date *(five years after triggering action date)*: 09/30/2008		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the five-year review in WasteLAN.]

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y/N)	
				Current	Future
Issue: A potential exposure route continues to exist via ground water to the twenty nearby residences located between the eastern boundary of the site and the Mississippi River Recommendation: Sample wells at twenty nearby residences to verify that the remedy continues to prevent off-site migration of contaminants	Deere	EPA	04/30/10	No	Yes
Issue: No action recommendation for landfill was based on data from 20 years ago. EPA Region VII human health risk staff calculated slightly elevated risk levels for direct contact or inhalation of fugitive dust. Recommendation: A new, separate evaluation of the former landfill should be performed.	Deere	EPA	04/30/10	No	Yes
Issue: The EPA has come to realize that the filing of a Consent Decree with the County Recorder, as was done in 1990 for this site, amounts to more of a notice to a future buyer rather than an immediately effective, enforceable, institutional control that runs with the land. Recommendation: A Uniform Environmental Covenant Act (UECA) Environmental Covenant with appropriate land use restrictions be put in place at the JDDW.	EPA/Deere	EPA	04/30/09	No	Yes

1 Introduction

The United States Environmental Protection Agency (USEPA), Region VII, has conducted a five-year review of the remedial actions implemented at the John Deere Dubuque Works (JDDW) in Dubuque, Iowa. This review was conducted for the period September 2003 through June 2008. This report documents the results of the review. ARCADIS was contracted by JDDW to conduct an analysis in support of the five-year review.

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and recommendations to address them.

The USEPA is preparing this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121(c) states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, and the results of all such reviews, and any actions taken as a result of such reviews.*

The agency interpreted this requirement further in NCP; 40 Code of Federal Regulations (CFR) § 300.430(f)(4)(ii):

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

This is the fourth five-year review for the JDDW site. The first five-year review was completed in September 1995, the second five-year review was completed in September 1998 and the third five-year review was completed in September 2003. Subsequent five-year reviews should be completed no later than five years following the signature of the previous five-year review report. The triggering action for this statutory review is the date of completion of the third five-year view (September 2003) as shown in USEPA's WasteLAN database. This five-year review is required because the JDDW remedial action resulted in hazardous substance, pollutants, or contaminants remaining on site.

2 Site Chronology

A chronology of site events for the JDDW site is presented in Table 1.

3 Background

3.1 Physical Characteristics

The JDDW plant is located approximately 2.5 miles north of the City of Dubuque in northeastern Iowa and covers 1,447 acres near the confluence of the Mississippi and the Little Maquoketa Rivers. Land surface elevations vary from 600 feet above mean sea level (msl) along the Mississippi River close to the JDDW plant to greater than 850 feet above msl on the uplands away from the river. The Mississippi River is located east of the site, and the Little Maquoketa River bisects the JDDW property and enters the Mississippi River east of the northeast facility boundary. A site map is included as **Figure 1**. The plant buildings are located on a relatively flat delta at the confluence of the Little Maquoketa River and the Mississippi River.

Site geology consists of alluvial sediment overlying bedrock. The alluvial sediments at the JDDW site vary in thickness from 100 to 158 feet and consist principally of fine-to-coarse grained sand deposited mainly by glacial meltwaters. A thin silty layer has also been deposited by the Little Maquoketa and Mississippi Rivers. The plant site is located above the thickest portion of the alluvium in the Peru Bottoms area. Toward the bluffs, the elevation of the bedrock increases and the alluvial deposits become thinner. Groundwater flow in the alluvial aquifer is towards the production wells.

Three distinct bedrock aquifers are present in the Dubuque Iowa area: the Galena-Platteville aquifer, Cambrian-Ordovician aquifer, and Dresbach Group aquifer. The Galena-Platteville aquifer is comprised of the Galena, Decorah, and Platteville Formations of Ordovician age, which are the younger bedrock units in the vicinity of JDDW. These bedrock units, which consist of limestone and dolomite with shaley layers, are not present in the JDDW plant area but are found in the uplands adjacent to the River valley and at the bottom of shallow filled valleys. The Galena-Platteville aquifer yields small quantities of water adequate for domestic supply. The Galena-Platteville aquifer is underlain by the deeper-lying Cambrian-Ordovician aquifer, which is comprised of the Ordovician age St. Peter Sandstone and Prairie du Chien (Dolomite) Group and the Cambrian age Jordan Sandstone. This aquifer is a major source of water across the State of Iowa. In the JDDW plant area, the Galena-Platteville aquifer and the St. Peter Sandstone (the upper portion of the Cambrian-Ordovician aquifer) are absent and the alluvium is in direct contact with the Prairie du Chien Group of the Cambrian-Ordovician aquifer. The Cambrian-Ordovician aquifer is underlain by the St. Lawrence Formation and the Franconia Sandstone, which are relatively impermeable and provides an effective confining layer between the Cambrian-Ordovician aquifer and the deeper lying Dresbach Group aquifer. The Dresbach Group aquifer consists of the Galesville Sandstone, the Eau Claire Formation, and the Mt. Simon Sandstone. This aquifer is not as productive or as widely used as the Cambrian-Ordovician aquifer.

3.2 Land and Resource Use

General land use in Dubuque County and northeastern Iowa is primarily agricultural except near major population centers. JDDW is zoned M-2 Heavy Industrial District by Dubuque County. Areas adjacent to JDDW are zoned R-1 Rural Residential to the north, which includes mostly farms; C-1 Conservancy to the east; A-1 Agricultural to the west; and C-1 Conservancy, R-2 Single Family Residential, and R-3 Multifamily Residential to the south.

The JDDW site, although once farmland, remains largely undeveloped except for the immediate vicinity of the plant operations, which is located on the eastern half of the JDDW site. In 1946, JDDW began manufacturing operations in a 600,000 square foot (ft^2) facility. A site map is included in **Figure 2**. Prior to 1976, several major additions to the plant were completed predominantly to the south of the original building. As a result of these additions, the facility occupied more than 5,000,000 ft^2, which included the

original plant building, storage areas, waste disposal areas, and parking lots. In 1997, 1998, and 2003, JDDW reduced the size of the facility by closing down and demolishing buildings. In 1997, JDDW closed down and demolished Heat Treat buildings E, E1, E2 and E3, which comprised 78,694 ft^2 (**Figure 2**). In 1998, JDDW closed down and demolished buildings J, K, and I used for miscellaneous manufacturing, which comprised 405,482 ft^2 (**Figure 2**). In 2003, JDDW demolished Engine Manufacturing Buildings U, V, and V1, which comprises 448,600 ft^2 (**Figure 2**). The demolition of these buildings reduces the size of the facility by 932,776 ft^2.

In the past, JDDW has employed over 8,000 workers in the manufacture of heavy construction equipment including backhoes, bulldozers, and forestry equipment. As of 16 April 2008, 1870 workers are employed at the plant.

The portion of the Mississippi River adjacent to the site is part of the Upper Mississippi River Wildlife and Fish Refuge established in 1924. A CMSP & Pacific Railroad track lies between the plant and the Mississippi River (**Figure 2**). Approximately 20 cottages are located between the JDDW facility and the Mississippi River on the flood plain (Geraghty & Miller, 1990). Nineteen of the 20 cottages sites are leased from the United States Army Corps of Engineers (USACE) to private residents. JDDW has filed a copy of the Consent Decree with the Dubuque County Recorder's Office. The Consent Decree requires that the deed or other instrument which might be used to convey the property will contain restrictions which run with the land and which: (1) prohibit use of the "Site" Area, and Area A for residential or agricultural purposes; (2) prohibit use of Area B for residential purposes: and (3) prohibit the construction, installation, maintenance of use of any alluvial wells on the "Site" Area or Areas A and B for the purpose of extracting water for human drinking purposes or for irrigation of food or feed crops.

It is anticipated that the current land uses of the JDDW plant and adjacent areas will continue into the future. JDDW has a deed restriction that limits the use of the current plant property to industrial activity only.

The JDDW plant water supply is obtained from two bedrock wells (PW-1 and PW-2), six wells installed in the alluvial aquifer (PW-3A, PW-4A, PW-5, PW-6, PW-7A, and PW-8), and the Mississippi River (**Figure 3**). The JDDW potable water supply is obtained from two bedrock wells PW-1 and PW-2. Process and cooling water for the plant are provided by alluvial wells PW-3A, PW-4A, and PW-7A. Alluvial well PW-5 is retained as a backup well, alluvial wells PW-

6 and PW-8 are reserved for fire protection and the Mississippi River supplies non-contact powerhouse cooling water. A well location map illustrating the locations of production wells PW-3A, PW-4A, PW-5, PW-6, PW-7A and PW-8 is included as **Figure 3**.

Three production wells were replaced in the 1990's. After obtaining USEPA's approval, production well PW-3 was abandoned in April 1997 due to changes in plant production and replaced with PW-3A. Production well PW-4 was replaced with PW-4A in May 1995 and PW-7 was replaced with PW-7A in September 1995, because water being pumped from these wells contained large volumes of sand. The locations of former production wells PW-3, PW-4 and PW-7 are also shown on **Figure 3**.

3.3 History of Contamination

Potential sources of environmental contamination were identified in the Remedial Investigation (RI) conducted at the JDDW site in 1988. Identified sources of contamination included a former landfill, a foundry, a chrome basin at the industrial wastewater treatment plant, a coal storage yard, and a diesel fuel line leak located under the plant which occurred in 1980.

Throughout its history, the JDDW facility has used two separate landfills for waste disposal. The older landfill, identified as a potential source of contamination in the RI report, was placed in a natural depression in the Little Maquoketa River floodplain, near the northern end of the facility. The old landfill was utilized from 1946 until 1974 and is approximately 20 acres in area. Prior to 1974, JDDW placed wastes up to the banks of the river. In 1974, the Iowa Department of Natural Resources (IDNR) required the wastes be moved to at least 140 feet from the riverbanks. The wastes were bulldozed back and fences were placed along the perimeter of the landfill. The newer landfill is not included in the Remedial Action.

Prior to 1968, wastes were placed in the low areas of the old landfill and combustible material was burned. Wastes disposed in the older landfill include caustics (sodium or potassium hydroxide), acids (hydrochloric or sulfuric), petroleum distillates (solvents, grinding oils, etc.), heavy metals (chromium, lead, and zinc used in electroplating), cyanide, paint sludge, and foundry sand containing 1% oil-based resin. The quantities of materials disposed in the old landfill are not known (Geraghty & Miller, 1991).

In October 1980, a fuel layer was present on the shallow water table under building G-2 as a result of an underground diesel fuel line leak. An estimated 200,000 gallons of diesel fuel leaked from the line. Recovery well G-2S was installed in October 1980 and JDDW initiated fuel recovery operation on November 10, 1980. Groundwater was separated from the fuel using an oil/water separator. The recovered fuel was retained for onsite reclamation, and the water from the oil/water separator was discharged via a National Pollution Discharge Elimination System (NPDES) permitted discharge to the Mississippi River. In May 1981, recovery well G-2D was installed and used to draw down the water table providing better recovery in well G-2S. Eighteen monitoring wells were installed between February and June 1981 to monitor groundwater quality related to the fuel spill. Groundwater monitoring results indicated that the spill was limited to an area around G-2 extending to and including PW-3. Recovery Wells RW-3, RW-4 and RW-5 were installed in 1981 near corresponding production wells PW-3, PW-4 and PW-5. In April 1982, both G-2 recovery wells were discontinued after approximately 20,610 gallons of diesel were recovered and diesel recovery at RW-3 was initiated. Diesel recovery from RW-4 was initiated in June 1982 and discontinued in November 1983 after recovering 20 gallons of diesel fuel. RW-5 did not yield measurable quantities of diesel and recovery was not initiated. By October 1985, approximately 86,000 gallons of diesel fuel had been recovered. Locations of the monitoring wells and the recovery wells are shown on **Figure 3**.

3.4 Regulatory History

The JDDW facility was identified as a potential hazardous waste site on June 5, 1981. A Preliminary Assessment Report issued in July 1983 cited an initial Hazard Ranking System (HRS) score of 34.95 (low to moderate hazard). In 1984, a Site Investigation was performed, and in 1985, JDDW contracted Geraghty & Miller (now ARCADIS) to perform site studies related to the former landfill.

In September 1985, the USEPA proposed the JDDW site for inclusion on the National Priorities List (NPL). An HRS score of 28.5 is sufficient to place a site on the NPL; however, the site was never placed on the final NPL. The USEPA and Deere & Company, Inc. entered into an Administrative Consent Order on September 30, 1986 requiring the development of a Remedial Investigation/Feasibility Study (RI/FS) for the site. The RI/FS process was near completion, when on June 24, 1988, the USEPA announced its new national policy in the Federal Register (53 FR 23978), whereby Resource

Conservation and Recovery Act (RCRA) treatment, storage, or disposal facilities would not be placed on the NPL. As a result of this policy, the USEPA announced its intention to remove several sites, including the JDDW site, from the list of sites proposed for the NPL. One of the main purposes of this policy was to avoid spending Superfund money at RCRA sites that are subject to the corrective action authorities of RCRA. The policy does not prohibit site cleanup from proceeding under a CERCLA Consent Decree under which the potentially responsible party (PRP) funds the work. Region VII decided to continue to treat the facility as a Superfund site. Deere & Company, Inc. has been the sole owner and operator of the site, is the only PRP for onsite contamination, and has funded the remedial work at the site to date.

The RI report was submitted to the USEPA in August 1988. The purpose of the RI was to collect necessary data to characterize the site and to assess the potential release of hazardous materials from waste management units, waste disposal, or product leakage and/or spillage. The RI focused on potential constituent sources identified through a review of plant operations. Potential sources identified in the RI included the former landfill, the foundry (old foundry ponds), the chrome basin at the industrial wastewater treatment plant, several isolated waste oil/ coolant spills, the coal storage yard, and the 200,000-gallon diesel fuel line leak, which occurred in 1980. RI activities included collection of data to characterize air, surface water, sediments, surface soils, subsurface soils, and groundwater quality. The floating hydrocarbon was also analyzed and it was found to be predominantly diesel fuel, with lesser concentrations of volatile organic compounds (VOCs) not typically associated with diesel fuel. It was suspected that leaks occurring prior to 1980 may have contributed to the other "non-diesel" VOCs found within the floating layer. The floating layer was renamed non-aqueous phase liquid (NAPL).

Low concentrations of VOCs were detected in the alluvial aquifer groundwater underlying the JDDW site; however, specific sources of the VOCs were not identified. Low concentrations of benzene, ethylbenzene, toluene, and xylenes (BTEX) were associated with the diesel fuel spill. Low levels of chlorinated volatile organics, which are not common components of diesel, were also detected in groundwater samples. The source of the chlorinated compounds was assumed to be from previous solvent handling practices at the site. The JDDW site constituents of concern identified during the RI are listed in **Table 2**.

RI analytical results were used in a risk assessment to evaluate potential threats to human health and the environment. Results of the risk assessment

analysis concluded that waste disposal activities at the site did not represent an unacceptable risk to the public health and environment (Geraghty & Miller, 1990). However, there was potential future exposure of residents located east of the JDDW facility to groundwater containing organic contaminants related to discontinuation of pumping for long periods of time.

4 Remedial Actions

4.1 Remedial Investigation and Feasibility Study

Based on the results of the RI, three remedial action objectives were developed which included:

- Ensure long-term quality of the plant potable water supply;
- Continue to prevent offsite migration of the potentially contaminated groundwater; and
- Restore groundwater quality in the alluvial aquifer.

The Feasibility Study (FS) report was submitted to the USEPA concurrently with the RI report in August 1988. The purpose of the FS was to identify and evaluate a range of remedial alternatives based on the data collected and the remedial action objectives developed during the RI. The alternatives addressed potential threats to public health, welfare, and the environment. The USEPA-approved alternatives included the following:

- Installation of an alternative potable water supply for the JDDW facility.
- Continued pumping of plant production wells for onsite containment of potentially impacted groundwater.
- NAPL recovery primarily associated with the diesel line leak.
- Continued groundwater monitoring.

On August 5, 1988, the USEPA published a notice of completion of the FS and the proposed plan for remedial action. A public comment period was established and the public comments were documented in the Administrative Record.

4.2 Record of Decision

The RI and FS resulted in the USEPA selecting a remedy in its Record of Decision (ROD), which was signed by the USEPA Regional Administrator, Region VII on September 29, 1988.

The final RA specified in the ROD includes the following:

1. Developing an alternative potable water supply for the plant;

2. Extracting water from the alluvial aquifer using the existing production wells. This action maintains drawdown around the plant and landfill areas, thus protecting nearby wells and controlling contaminant releases;

3. Continuing to extract and treat NAPL from the alluvial production well PW-3;

4. Using deed restrictions to prevent inappropriate use of the plant property in the future. Future use of the current plant property will be limited to industrial activity only. In addition, water wells tapping the alluvial aquifer beneath the JDDW property would not be allowed; and

5. Developing a contingency plan which would assure that contaminants do not migrate offsite in the event of a plant shutdown.

4.3 Consent Decree and Performance Standards

In September 1989, the USEPA and JDDW entered into a Consent Decree requiring the development of a Remedial Design (RD) and implementation of Remedial Action (RA). The Performance Standards, an attachment to the Consent Decree, established the guidelines for RA and the RA end point. The Consent Decree performance standards and USEPA approved modifications to the performance standards that have occurred since signing the Consent Decree are summarized below:

1. Develop an alternate water supply for the site.

2. Continue to extract water from the alluvial aquifer under the Site, at rates which will maintain an inward gradient condition adequate to contain contaminants and prevent migration to private wells offsite.

   Performance standards for No. 2 are as follows:

   A. Pumpage rate: Simulations performed during the RI/FS estimated that a minimum pumping rate of 1.2 million gallons per day (MGD) would maintain an inward gradient condition adequate to contain the contaminant plume in the alluvial groundwater beneath the site. The Consent Decree required that as part of the RD phase of the work, JDDW would review the existing data and further analyze the hydrology beneath the Site to more accurately estimate the minimum pumping rate required to capture the contaminated groundwater flow, and prepare a Well Management Plan. The Well Management Plan supersedes the 1.2 MGD guideline in the Consent Decree.

   B. Maintenance and verification of hydraulic gradient: As part of the verification that contaminants are not migrating offsite, a minimum of three piezometer pairs would be utilized near the perimeter of the site. The monitoring well pairs and required water-level differences are listed below:

      - South perimeter monitoring well pair MW-1 and MW-20S – water-level difference at least 0.10 feet;
      - East perimeter monitoring well pair MW-5 (MW-5 was replaced with MW-5N in 1994) and MW-6 water-level difference at least 0.15 feet; and
      - North perimeter monitoring well pair MW-10 and MW-11S – water-level difference at least 0.15 feet.

      The groundwater elevation measured at the outer well of the monitoring well pair should be higher than the groundwater elevation at the inner well of the pair. The Consent Decree specified that the water levels would be measured at least once every 4 hours. The difference in groundwater levels at each monitoring well pair is calculated on a rolling annual average basis. In July 1997,

the USEPA approved reducing the frequency of recording groundwater level measurements from every 4 hours to monthly.

The Mississippi River stage adjacent to the site would be measured on a normally scheduled working day basis to within 0.1 feet. Although it was not specified in the performance standards, the Little Maquoketa River stage was also measured on a working day basis. In October 2001, the USEPA approved reducing the stage monitoring of the Little Maquoketa River from daily to monthly at the same time as the water levels.

Measure water levels on a monthly basis for the 14 shallow monitoring wells listed in **Table 3** and prepare contour maps of water levels in these wells and in the Mississippi and Little Maquoketa Rivers. Water levels are also measured in Production Wells PW-3 (now PW-3A), PW-4 (now PW-4A), PW-5, and PW-7 (now PW-7A). After one year, if the water levels in the three perimeter monitoring well pairs indicated a consistent inward gradient, contour maps would be prepared on a quarterly basis for the next two years. Although quarterly contour maps are no longer required, JDDW has continued to prepare water-level maps on a quarterly basis.

C. Monitoring performance of the withdrawal well system: The Consent Decree required alluvial production wells PW-3 (now PW-3A), PW-4 (now PW-4A), PW-5, and PW-7 (now P-7A) and the 14 monitoring wells listed in **Table 3** to be sampled quarterly for the first year and annually thereafter for the constituents of concern listed in **Table 2.** In September 1998, the USEPA approved reducing the groundwater monitoring frequency to biennial, eliminating hexavalent chromium, lead, and copper sampling from all wells in the monitoring program, and reducing the number of monitoring wells included in the monitoring program **(Table 3)**. In June 2004, USEPA approved abandoning and removing MW-13D from the monitoring program.

D. Discharge of surface water from the site: The Consent Decree required JDDW to obtain a revised NPDES permit with the groundwater monitoring constituents included for sampling at Outfalls 002, 005, and 011. Outfalls 002 and 005 discharge non-

contact cooling water, drinking fountain water, and storm water through the north and south sedimentation ponds, respectively. These ponds are equipped with oil skimmers. Outfall 011 discharges wastewater from a physical, chemical, and biological treatment plant, which treats all process wastewater from the facility (IDNR, 1999).

E. Completion of the work. Alluvial groundwater is required to be extracted and sampled until the constituents of concern are reduced to below the federal Maximum Contaminant Levels (MCLs) or applicable Iowa state groundwater remediation regulations, whichever are more stringent. The State of Iowa has defined the groundwater action level to be the Lifetime Health Advisory Level (HAL) if one exists. If there is no HAL, the action level is the Negligible Risk Level (NRL). It there is no HAL or NRL, the action level is equal to the MCL. For constituents for which there is no MCL or State requirement, the following regulatory sources shall be used in descending order to identify completion levels.

- Proposed MCL.
- The USEPA Office of Drinking Water Lifetime Health Advisory Levels.
- Integrated Risk Information (IRIS) verified reference dose or 10^{-6} cancer potency factor and ingestion of 2 liters of water per day by a 70 kilogram (kg) adult.
- The USEPA Office of Research and Development Health Effect Assessment Criteria.

The groundwater extraction will continue until four consecutive quarters of monitoring indicate that the alluvial water quality beneath the Site has been at or below completion levels in effect at that time. In December 1996, the USEPA and IDNR approved the use of federal MCLs for those contaminants with MCLs as cleanup goals instead of the more stringent HALs and NRLs. The current groundwater Performance Standards identified as of April 2008 for the constituents of concern are listed in **Table 4**.

3. Develop contingency plans to ensure that contaminants in the alluvial aquifer do no migrate offsite in the event of plant shutdown or modifications, which decrease pumpage rates.

4. Continue to extract non-aqueous phase liquid ("NAPL") from the alluvium and to separate the NAPL, with the groundwater effluent to be discharged through NPDES outflows and the remaining materials to be transported for offsite management at a permitted RCRA hazardous waste disposal facility, unless Deere demonstrates the alternative disposition measures meet all applicable or relevant and appropriate requirements, and the USEPA approves such alternative measures.

   Performance standards for No. 4 are as follows:

   A. NAPL management: The NAPL management is outlined in Number 4 above.

   B. Record keeping: Record volume of NAPL and volume of contaminated water withdrawn on a normal scheduled work week basis for each recovery well. NAPL thickness is measured quarterly at NAPL recovery wells RW-3 (now RW-3A), RW-4 (now RW-4A), RW-5, and G-2S and the monitoring wells listed in **Table 3.** SBW-4 was added to the NAPL monitoring program in the Fourth Quarter of 2004.

   C. Monitoring performance of the NAPL withdrawal system: Alluvial production wells PW-3 (now PW-3A), PW-4 (now PW-4A), PW-5, and PW-7 (now PW-7A) and six monitoring wells listed in **Table 3** are to be sampled quarterly for the first year and annually thereafter for BTEX and trichloroethene (TCE). These wells are monitored concurrently with 2(c). In September 1998, the USEPA approved reducing the groundwater monitoring frequency to biennial and reducing the number of monitoring wells included in the monitoring program **(Table 3)**.

   D. Completion of work. NAPL monitoring and recovery operations shall continue until no more than ¼-inch of NAPL is detected and verified in RW-3 (now RW-3A), and no more than 1/8-inch of NAPL is detected and verified in monitoring wells MW-4, MW-6, MW-7S, MW-8S, MW-12, and MW-13S and recovery wells RW-4,

RW-5, and G-2S. When ¼-inch or less of NAPL is detected at RW-3 (now RW-3A) and/or 1/8-inch or less of NAPL is detected at any other of the above listed wells, the well in question shall be purged of three well volumes and allowed to stabilize for 24 hours before a verification thickness measurement is taken.

Before certifying completion of the NAPL phase of work, the wells listed in the paragraph above will be analyzed for BTEX, TCE, and total petroleum hydrocarbons. If the BTEX and TCE concentrations are below performance standards for four consecutive quarters, the NAPL extraction and treatment requirements are considered complete.

4.4 Remedy Implementation

4.4.1 Remedial Design

The RD was started on February 7, 1989 and the RD report was approved by the USEPA in September 1990. Pursuant to Section IV of the Consent Decree paragraphs 18 and 23, Deere & Company, Inc. filed the required deed restriction and a copy of the Consent Decree with the Dubuque County Recorder's Office on January 19, 1990. The RD report addressed implementation of the requirements set in the ROD and Consent Decree. The RD report included documentation on the modifications made to the JDDW potable well system and a Groundwater Management Plan.

4.4.1.1 Potable Well System Modifications

Installation of an alternative potable water supply for the JDDW facility was completed in 1988. Prior to 1988, the potable water and plant process water source for the plant included groundwater from the alluvial aquifer. In 1988, JDDW separated the potable water piping from other plant process water piping and connected it solely to bedrock wells PW-1 and PW-2 installed in the lower Cambrian-Ordovician limestone aquifer. The bedrock aquifer provides higher quality water without the potential for contamination from surficial sources.

4.4.1.2 Groundwater Management Plan

The Groundwater Management Plan included three components: a Well Management Plan, a Groundwater Monitoring Plan, and a NAPL Management

Plan. JDDW initiated groundwater monitoring activities required by the Consent Decree in January 1990.

The Well Management Plan addressed the containment and recovery of impacted alluvial aquifer groundwater. The Plan was developed from the RD modeling results and included alluvial production well system operating guidelines to maintain a minimum total pumping rate necessary to create an inward hydraulic gradient, to prevent offsite migration of VOCs. The Well Management Plan indicated that under extreme hydrologic conditions, the optimum minimum total pumping rates from production wells PW-4 and PW-7 required to maintain the hydraulic head differences in the three perimeter wells are 0.52 MGD and 0.37 MGD, respectively. The total minimum rate of 0.89 MGD is lower than the earlier estimated total pumping rate of 1.2 MGD derived during the RI/FS. The Well Management Plan also provided operating guidelines for contingency activities implemented if the alluvial production system is shutdown or modified. The Well Management Plan supersedes the 1.2 MGD guideline in the Consent Decree.

The Groundwater Monitoring Plan identified groundwater quality sampling and hydraulic monitoring to be completed for the duration of the RA and reporting requirements. The monitoring program provided assurance that the RA would be effective and would prevent offsite migration of potentially contaminated groundwater and restore groundwater quality in the alluvial aquifer. A contingency monitoring program was also included in the Groundwater Monitoring Plan. The NAPL Management Plan presented existing and future NAPL recovery operations and reporting requirements. **Table 3** summarizes the monitoring required by the Groundwater and NAPL Management Plans.

4.4.2 Remedial Performance from Implementation in September 1990 to March 2003

The five-year reviews completed in September 1995, September 1998 and September 2003 concluded that the response actions implemented by JDDW, together with the long-term monitoring, continue to protect the public health, welfare, and the environment at the JDDW site.

During the 1994 to 2003 period, the following modifications were made to the alluvial groundwater recovery system, NAPL recovery system, and groundwater monitoring network, after obtaining USEPA's approval:

- JDDW received approval from USEPA in September 1994 to relocate well MW-5 due to construction activities. This well was relocated in the fourth quarter of 1994 and was renamed MW-5N.

- Production wells PW-4 and PW-7 were replaced because water being pumped from these wells contained large volumes of sand. Production well PW-4 was replaced with PW-4A in May 1995 and PW-7 was replaced with PW-7A in September 1995.

- NAPL recovery well RW-4 was also replaced in May 1995 with RW-4A.

- In August 1995, JDDW replaced monitoring well SBW-3 with SBW-3N due to inadvertent covering of SBW-3 with concrete.

- In April 1997, JDDW received approval from the USEPA to relocate Production Well PW-3 and Recovery Well RW-3 due to changes in plant production. The old wells were abandoned on April 21, 1997. The replacement wells were called PW-3A and RW-3A. The replacement well locations are shown on **Figure 3**.

- As recommended in the September 2003 Five-Year Review Report, a NAPL monitoring program was developed for SBW-4 well which included adding this well to the quarterly NAPL monitoring in 2004.

The following modifications were made to the Consent Decree performance requirements:

- In December 1996, the USEPA and IDNR approved the use of federal MCLs for those contaminants with MCLs as cleanup goals instead of the more stringent HALs and NRLs.

- In July 1997, JDDW received approval from the USEPA to reduce the frequency of recording groundwater-level measurements at the perimeter piezometer pairs from every 4 hours to monthly.

- In the September 1998 Five-Year Review Report, JDDW received approval from the USEPA to reduce the frequency of groundwater monitoring to every 2 years beginning in 1998. This approval was granted because the groundwater data collected in 1998 was comparable to the 1997 data. Additionally, lead, copper, and

hexavalent chromium were eliminated from all monitoring wells sampled and the wells included in the biennial groundwater sampling events were reduced from the 18 wells specified in the Consent Decree to MW-6, MW-8S, MW-9D, MW-9S, MW-12, MW-13D, MW-13S, and alluvial production well PW-3A, PW-4A, PW-5, and PW-7A (**Table 3**).

- In June 2002, JDDW received approval from the USEPA to abandon monitoring well MW-9D because the physical state of the well inhibited its usefulness as a monitoring well. The well could not be sampled during the 2000 and 2002 biannual events because an obstruction, located approximately 25 feet below ground surface, prohibited the introduction of any variety of submersible pumps to the depth of the water table. USEPA also approved the recommendation not to replace MW-9D, by stating that it is apparent that there are enough other monitoring well locations at which to gather data, and at this point in time, the cessation of sampling at MW-9D does not represent a critical loss of meaningful data, especially since this location hasn't demonstrated contamination above MCLs. Monitoring well MW-9D was abandoned on August 22, 2002, in accordance with IDNR requirements by a licensed well contractor.

- In June 2004, JDDW received approval from the USEPA to remove monitor well MW-13D from the biennial groundwater sampling event and abandon the well (**Table 3**). In addition, USEPA approved reducing the river stage monitoring of the Mississippi River to monthly, at the same time as the monitor well water levels.

4.4.2.1 Maintain Inward Gradient

During the September 1990 to March 2003 period, the groundwater extraction system continued to be fully operational and functional. Operation of the system created a hydraulic capture zone to contain contaminants. The system met the performance criteria for hydraulic capture of the groundwater except during the weeks of December 25, 1995, December 28, 1999, November 6, 13, and 20, 2000 and December 3, 2000 when the daily pumping rates were 0.82, 0.91, 0.85, 0.81, 0.78, and 0.72 MGD, respectively. These rates are below the 0.89 MGD minimum pumping rate specified in the Water Management Plan and the 1.2 MGD guideline specified in the Consent Decree. Despite the reduced pumping rate, monitoring water levels showed that an inward hydraulic gradient had been maintained. Water levels in the

three piezometer pairs at the perimeter of the site consistently exhibited rolling annual average head differences greater than the minimum requirements, established in the performance standards.

4.4.2.2 Performance of Withdrawal System

Between September 1990 and March 2003, groundwater quality monitoring was performed in accordance with the Consent Decree. Groundwater samples were collected in the required onsite wells listed in **Table 3** quarterly in 1990, annually between 1991 and 1998, and biennially thereafter. The tetrachloroethene (PCE) concentrations detected in MW-6, MW-9S, MW-13S, and SBW-3; the TCE concentrations detected in MW-6, MW-9S, MW-13S, MW-16, PW-4, and SBW-3; and the benzene concentrations detected in MW-13S, PW-3 and PW-5 have been above performance standards, as shown in the summary of analytical data presented in **Appendix B**. Chromium concentrations exceeded the standard in MW-11S during one Quarter, February 1990.

Figures 4, 5, and 6 illustrate trends in concentrations of PCE, TCE, and benzene, respectively, from September 1990 to March 2002. The following bullets summarize trend plots for MW-6, MW-9S, MW-13S, PW-3/PW-3A and PW-4/PW-4A.

- **MW-6**: In MW-6, concentrations of PCE were not detected until 1997 when the concentration temporarily increased to above the MCL. Concentrations of PCE detected in MW-6 decreased in 1998 and have remained below the MCL. Concentrations of TCE in MW-6 fluctuated between 1990 and 2002. Concentrations of TCE increased to above the MCL in 1991, 1993, and 2000 and subsequently decreased to below the MCL during the next sampling event.

- **MW-9S**: In MW-9S, concentrations of PCE and TCE increased between 1990 and 1993 and then decreased to below the MCL in 1994. In 1997, PCE and TCE concentrations increased to above the MCL and decreasing trends occurred between 1997 and 2002. Concentrations of TCE and PCE decreased to below the MCL in 1998 and 2002, respectively.

- **MW-13S**: In MW-13S, concentrations of PCE decreased between 1990 and 1992 to below the MCL and concentrations remained below

the MCL between 1992 and 2002. Concentrations of TCE were not detected in MW-13S until 1995 when the concentration temporarily increased to above the MCL. Concentrations of TCE detected in MW-13S decreased in 1996 and have remained below the MCL. Concentrations of benzene were not detected in MW-13S until 1992 when the concentration increased to above the MCL. Concentrations of benzene in MW-13S decreased to below the MCL in 1994 and a second increasing trend occurred between 1997 and 2002.

- **PW-3/PW-3A**: Concentrations of benzene in PW-3/PW-3A fluctuated between 1990 and 1997. Concentrations of benzene increased to above the MCL in 1990, 1991, 1993, and 1996 and subsequently decreased to below the MCL. Concentrations of benzene detected in PW-3A remained below the MCL between 1996 and 2002.

- **PW-4/PW-4A**: Concentrations of TCE in PW-4/PW-4A fluctuated between 1990 and 1993. Concentrations of TCE increased to above or equal to the MCL in 1990 and 1993 and subsequently decreased to below the MCL in 1991 and 1994, respectively. Concentrations of benzene detected in PW-4/PW-4A remained below the MCL between 1994 and 2002.

Between 1990 and 2003, TCE, benzene, and PCE concentrations have fluctuated, with concentrations generally declining, with the exception of benzene in MW-13S. In 1997, increases in concentrations of PCE and TCE were detected in MW-9S and benzene in MW-13S. These concentration increases correspond to the relocation of production well PW-3A in 1997. It appears that the relocation of PW-3A in 1997 modified the groundwater flow path in the vicinity of MW-13S, resulting in residual benzene associated with the NAPL being drawn into the monitoring well. During subsequent sampling events, the concentrations of PCE and TCE detected in MW-9S decreased to below the MCL. Concentrations of benzene detected in MW-13S exhibited an increasing trend in 2002.

4.4.2.3 NAPL Recovery

NAPL recovery occurred in Wells G-2S, RW-4, and RW-3 from November 1980 to July 1991. During this time, 138,163 gallons of NAPL were recovered. No measurable amounts of NAPL were recovered from January 1991 through

July 1991, although 3.67 million gallons of groundwater were pumped from RW-3 during this time.

NAPL recovery operations were discontinued in July 1991; however the recovery wells and monitoring wells listed in **Table 3** have continuously been monitored for NAPL thickness as required by the Consent Decree.

Until January 1998, less than ¼-inch of NAPL had been measured at RW-3 since recovery operations ceased. As a result of relocating PW-3 and RW-3, approximately 4.6 inches of NAPL was detected in new recovery well RW-3A in January 1998. Lab analysis shows the material is consistent with No. 6 fuel oil. The NAPL was removed in three days. Twenty-hours after removal, the NAPL was measured at a thickness less than 1/8-inch. Measurements in April 1998 showed a thickness of 0.01 feet (less than 1/8-inch), and during the five-year review site visit in May 1998, NAPL was measured at a thickness of 0.02 feet (1/4 inch). NAPL was recorded in RW-3A during the third (0.48 ft) and fourth (0.21 ft) quarters of 1998. NAPL has been absent from RW-3A since January 1999.

NAPL was detected at a thickness of a trace to 0.02 feet in MW-9S in July 2002. The MW-9S dedicated pump motor would not operate on June 18, 2002 when the biannual groundwater sampling event was conducted. The MW-9S pump was removed and inspected and it was determined that the source of the NAPL was the dedicated pump's motor. The motor's casing had deteriorated to a point where the motor leaked some of its own oil into the well. The NAPL was removed from MW-9S, using absorbent material and NAPL was not detected in the well during subsequent monitoring events.

Soil boring well SBW-4 was not abandoned in May 1999 because 0.11 feet of NAPL was detected in this monitoring well during the well sounding step conducted on May 24, 1999, prior to abandonment activities. On May 25, 1999, an absorbent sock was installed in SBW-4. The absorbent sock was removed and checked on May 26, 1999 and approximately 4 ounces of NAPL was removed from the well. After the sock was removed, the well was checked for the presence of NAPL and none was detected. SBW-4 was checked again for NAPL during the week of May 31, 1999 and no NAPL was detected. SWB-4 was monitored periodically in June 1999 and once in July 1999. Each monitoring event indicated that NAPL was not present. SBW-4 was monitored for NAPL on September 23, 2003 and NAPL was detected.

4.4.2.4 Discharge of Surface Water from Site

JDDW has 18 NPDES permitted outfalls with various monitoring requirements and discharge limits, which are listed in the NPDES permit presented in **Appendix C**. Surface water discharge through the NPDES permitted outfalls to the Mississippi River and the Little Maquoketa River are monitored and reported in monthly wastewater monitoring reports, in accordance with the NPDES Permit for the JDDW facility. Only Outfalls 002, 005, and 011 were identified by the Consent Decree for monitoring discharges for the constituents of concern.

The March 5, 1991 NPDES permit amendment required that Outfalls 002 and 005 be monitored monthly for copper and quarterly for total toxic organic (TTO) pollutants. The TTO pollutant list is comprised of the JDDW site constituents of concern (**Table 2**). The permit established copper limits for Outfall 002 (0.071 milligrams per liter [mg/L], 0.39 pounds per day [lbs/day]) and Outfall 005 (0.04 mg/L, 3.004 lbs/day). Additionally, the effluent limitations for metal finishing, which include copper, lead and hexavalent chromium, and TTO pollutants were added for Outfall 011 **(Table 5)**. Outfalls 002 and 005 were analyzed for copper and TTO pollutants in July 1992. Copper levels identified in Outfalls 002 (0.01 mg/L, 0.07 lbs/day) and 005 (0.01 mg/L, 0.35 lbs/day) in July 1992 did not exceed established effluent limitations (USEPA, 1995). The TTO constituents identified in Outfalls 002 (0.042 mg/L, 0.277 lbs/day) and 005 (0.041 mg/L, 1.269 lbs/day) were all BTEX compounds (USEPA, 1995).

A revised NPDES permit was issued by IDNR for the JDDW facility on September 3, 1992. The final effluent from Outfall 011 was required to be analyzed once every six months for TTO pollutants. The TTO effluent limit for Outfall 011 is listed on **Table 5**. The inorganic constituents of concern, lead, copper and hexavalent chromium, were required to be analyzed two times a week. The IDNR did not consider it necessary to continue to monitor Outfalls 002 or 005 for copper and TTO pollutants. Amendments to the September 3, 1992 NPDES permit were issued on January 21, 1994 and August 14, 1995. The effluent limitations set for lead, copper and hexavalent chromium at Outfall 011 in the September 3, 1992 NPDES Permit and in the August 14, 1995 revision to the permit are listed in **Table 5**. The revised permit expired on September 1, 1997 and at IDNR's direction, JDDW continued operating under this permit until a new permit was issued on July 15, 1999.

Outfalls 002 and 005 are regularly monitored for flow rate, oil and grease, pH, and temperature. Effluent limitations and monitoring requirements for these parameters are set in the NPDES permits. Between September 1990 and July 1999, none of the parameters monitored in Outfall 005 exceeded the effluent limitations. Beginning in February 1994, Outfall 002 was also monitored for total residual chlorine in accordance with a January 21, 1994 amendment to the NPDES Permit, which took effect August 1, 1994. At Outfall 002, the daily maximum total residual chlorine effluent limitation was slightly exceeded during one week in May 1999.

During the September 1990 to July 1999 period, all concentrations of lead, copper, and hexavalent chromium detected at Outfall 011 were below the permitted discharge limits, except for four days in April 1995 when hexavalent chromium exceeded the effluent limitation and one day in July 1994 when lead exceeded the effluent limitation. None of the TTO constituents of concern were detected at Outfall 011 during this period. Outfall 011 is also regularly monitored for flow rate, biochemical oxygen demand (BOD5), total suspended solids, pH, temperature, cadmium, total chromium, cyanide, nickel, lead, oil and grease, silver, and zinc. Total chromium exceeded effluent limitations three days in April 1995 and BOD5 exceeded effluent limitations one day in November 1992 and one day in October 1993. All other constituents monitored at Outfall 011 did not exceed the effluent limitations set in the NPDES permit.

A new NPDES permit was issued on July 15, 1999 and expired on July 14, 2004. At IDNR's direction, JDDW is continuing to operate under this permit until a new permit is issued. The July 15, 1999 NPDES permit is included as **Appendix C**. The following modifications were made in the July 15, 1999 NPDES permit:

- The hexavalent chromium monitoring requirement was removed for Outfall 011 in the July 1999 NPDES permit. (Note: The source of hexavalent chromium at JDDW was eliminated when the chrome electroplating operation was discontinued in October 1994. The electroplating equipment was physically removed from the site in January 1996.)

- The monitoring frequency for cadmium, total chromium, copper, lead, nickel and zinc at Outfall 011 was reduced from twice a week to quarterly.

- The temperature effluent limits were eliminated for Outfalls 002, 005, and 011.

The NPDES effluent Outfall 011 limitations for the constituents of concern and sampling frequency are listed in **Table 5**.

Between July 1999 and March 2003, none of the parameters monitored at Outfall 005 exceeded the effluent limitations set forth in the July 1999 NPDES permit. At Outfall 002, the monthly average flow rate exceeded the effluent limitations in May, June and July 2002. In Outfall 011, concentrations of lead, copper, and TTO constituents of concern were identified at levels below the permitted discharge limits. Outfall 011 is also regularly monitored for flow rate, BOD5, total suspended solids, pH, temperature, cadmium, total chromium, cyanide, nickel, lead, oil and grease, silver and zinc. None of these constituents exceeded effluent limitations except for the daily maximum flow rate in March 2001.

4.4.3 Systems Operations/Operation and Maintenance

Since the alluvial aquifer groundwater recovery system at the JDDW site is the plant production well system, the Operation and Maintenance (O&M) of the system includes general activities associated with plant operations. Consequently, consistent O&M of the extraction system is assured. The costs associated with maintaining the system are included in the plant's operating budget. O&M costs for the RA include costs for hydraulic and groundwater quality monitoring, administrative services and reporting, and the alternate water supply. Since these costs were not compiled in the previous five-year review report and cannot be used to indicate potential remedy problems, these costs were not included in this five-year review report.

5 Progress since Last Review

5.1.1 Protectiveness Statement

The September 2003 Five-Year Review stated that the groundwater extraction system continues to be fully operational and functional. Operation of the system creates a hydraulic capture zone that contains and withdraws the contaminated groundwater. All progress reports submitted to date indicate an inward hydraulic gradient has been maintained. The response actions

implemented by JDDW, together with the long-term monitoring, continue to protect the public health, welfare, and environment.

5.1.2 Recommendations and Status of Follow-up Actions

Recommendations from the last five-year review were that JDDW should continue to monitor and maintain the inward hydraulic gradient; monitor the presence of NAPL and perform NAPL recovery as necessary; and monitor the surface water and groundwater.

JDDW requested that USEPA approve abandoning monitor well MW-13D and reduction of river stage monitoring of the Mississippi River to monthly at the same time as the monitor well water levels. Relative to SBW-4, EPA approved abandoning SBW-4 during the second five-year review; however, the abandonment of this well was delayed because NAPL was detected in the well. JDDW recommended submittal of a NAPL monitoring program for SBW-4.

Groundwater Monitoring Program

JDDW requested that the USEPA approve abandoning monitor well MW-13D. MW-13D has not had contaminant exceedances (inorganic or organic) in Performance Standards since 1990. USEPA approved abandoning MW-13D in correspondence dated June 4, 2004. Beginning in June 2004, MW-13D was removed from the biennial groundwater sampling program. As of this five-year review, JDDW has not abandoned MW-13D.

River Stage Monitoring Frequency

JDDW requested that USEPA approve reducing the river stage monitoring of the Mississippi River to monthly at the same time as the monitor well water levels since this data is only used in the development of site water table maps. USEPA approved reducing the Mississippi River stage monitoring to monthly in correspondence dated June 4, 2004. JDDW measures the Mississippi River stage on a production day basis and has continued to report the production day measurements in the quarterly reports.

SBW-4 NAPL Monitoring Plan

The USEPA had approved abandoning monitoring well SBW-4 during the second five-year review; however, the abandonment was delayed because 0.11 feet of NAPL was detected in the well on May 24, 1999. On May 25, 1999, an absorbent sock was installed in SBW-4. The absorbent sock was removed and checked on May 26, 1999 and approximately 4 ounces of NAPL was removed from the well. After the sock was removed, the well was checked for the presence of NAPL and none was detected. SBW-4 was monitored for NAPL during May, June and July 1999. NAPL was not detected in SBW-4 during this monitoring period, and in July 1999, the NAPL monitoring for SBW-4 was discontinued. As part of the third five-year review for JDDW, SBW-4 was checked to determine if NAPL was in the well. On September 23, 2003, an absorbent sock was placed in SBW-4 and NAPL was present on the sock when it was removed from the well. In the third five-year review report, JDDW recommended a plan detailing the NAPL monitoring program for SBW-4 would be developed and implemented.

The NAPL monitoring program for SBW-4 was submitted to the USEPA in the May 21, 2004 correspondence: Third Five-Year Review Report March 1998 to September 2003 Recommendations (ARCADIS, 2004). During the June 2004 biannual groundwater sampling event, JDDW proposed measuring the NAPL thickness in SBW-4 and collecting a sample of the NAPL for analysis of total petroleum hydrocarbons (TPH) by method USEPA 8015 and semi-volatile organic compounds (SVOCs) by USEPA Method 8270. JDDW proposed installing an absorbent sock to remove the remaining NAPL after the sample was collected. After the NAPL is removed, JDDW proposed to monitor the NAPL in SBW-4 daily for one week, weekly for three weeks, and monthly for a quarter to assess the infiltration rate of the NAPL. SBW-4 would then be monitored quarterly during the NAPL monitoring program. The results of the SBW-4 monitoring program are summarized in Section 6.3.3

6 Fourth Five-Year Review Findings

The fourth five-year review team includes Bill Gresham of USEPA, George Hellert of JDDW, and Pedro Fierro, Kathy Thalman and Bridget Stahl of ARCADIS. The five-year review includes community notification, document review, interviews with plant personnel, a site inspection, review of applicable or relevant and appropriate requirements (ARARs), and monitoring data evaluation.

6.1 Community Notification and Involvement

The community was notified by the USEPA via public notice published on February 4, 2008 in the Telegraph Herald and via a mailed "Fact Sheet" dated January 2008, that the five-year review was being conducted. After the five-year review is completed, the results of the review will be provided to the local site repository.

6.2 Document Review

The following documents were reviewed during the fourth five-year review:

- USEPA Record of Decision (USEPA, 1988);
- Consent Decree (USEPA, 1989);
- Final Remedial Design Report (Geraghty & Miller, 1990);
- September 1995 Five-Year Review Report (USEPA, 1995);
- September 1998 Five-Year Review Report (CDM, 1998);
- September 2003 Five-Year Review Report (ARCADIS, 2003);
- Quarterly Long Term Monitoring Reports from the second quarter of 2003 through the first quarter of 2008 (ARCADIS, 2003-2008);
- The July 15, 1999 NPDES permit (IDNR);
- Monthly NPDES Reports for JDDW site (JDDW April 2003-March 2008); and

- The documents in the local site repository were reviewed on February 4, 2008 to evaluate record keeping. The documents present at the Carnegie-Stout Public Library in Dubuque are listed in **Appendix A**.

The following ARARs documents were reviewed:

- Federal Clean Water Act/Safe Drinking Water Act (Federal Maximum Contaminant Levels);
- The USEPA Office of Drinking Water Lifetime Health Advisory Levels;
- Integrated Risk Information System (IRIS) verified reference dose or 10^{-6} cancer potency factor and ingestion of 2 liters of water per day by a 70 kilogram adult;
- The USEPA Office of Research and Development Health Effects Assessment Criteria; and
- Iowa state groundwater remediation regulations (Iowa Environmental Protection Commission, Chapter 133, "Rules for Determining Cleanup Actions and Responsible Parties").

A detailed document list is presented in **Appendix A**.

6.3 Data Review

Data reviewed during the five-year review included groundwater withdrawal amounts, water-level data, groundwater quality data, NAPL recovery, and surface water discharge data collected between April 2003 and March 2008. This data was compared to the site Performance Standards specified in the Consent Decree.

6.3.1 Groundwater Withdrawal

During the April 2004 to March 2008 period, the groundwater extraction system continued to be fully operational and functional. Operation of the system created a hydraulic capture zone to contain contaminants. The volume of groundwater pumped out of production wells has exceeded the 0.89 MGD minimum pumping rate specified in the Water Management Plan and the 1.2 MGD guideline specified in the Consent Decree, except during the weeks of

January 15, 22, and 29, 2006; February 19 and 26, 2006, and March 5 and 19 when the daily pumping rates were 1.03, 0.96, 1.00, 1.14, 1.12, 1.1, and 1.05 MGD, respectively. These rates are below the 1.2 MGD guideline specified in the Consent Decree. **Table 6** presents a summary of the well pumping rates.

Despite the reduced pumping rate, monitoring water levels showed that an inward hydraulic gradient had been maintained. Water levels in the three piezometer pairs at the perimeter of the site have consistently exhibited rolling annual average head differences greater than the minimum requirements established in the Consent Decree Performance Standards. A summary of the rolling head differences at each of the three piezometer pairs is provided in **Table 7**.

6.3.2 Surface Water

The JDDW facility has 18 NPDES-permitted outfalls with various monitoring requirements and discharge limits, which are listed on the July 1999 NPDES permit (**Appendix C**). Surface water discharge through the NPDES permitted outfalls to the Mississippi River and the Little Maquoketa River has been monitored and reported in monthly wastewater monitoring reports in accordance with the NPDES Permit for the JDDW facility. The site constituents of concern are monitored in Outfall 011 as specified by the Consent Decree.

As discussed previously, a revised NPDES permit was issued by IDNR for the JDDW facility on July 15, 1999. The revised permit expired on July 14, 2004 and at IDNR's direction, JDDW is continuing to operate under this permit until a new permit is issued. The July 15, 1999 NPDES permit is included as **Appendix C**. The NPDES effluent Outfall 011 limitations for the constituents of concern and sampling frequency are listed in **Table 5**.

Surface water discharge through the NPDES permitted outfalls to the Mississippi River and the Little Maquoketa River have been monitored and reported in monthly wastewater monitoring reports to IDNR, in accordance with the July 15, 1999 NPDES permit for the JDDW.

Outfalls 002 and 005 are regularly monitored for flow rate, oil and grease, and pH. Outfall 002 is also monitored for total residual chlorine. None of the parameters monitored at Outfall 005 and 002 have exceeded the effluent limitations set forth in the July 1999 NPDES permits during the past five years.

In accordance with the NPDES permit, the final effluent from Outfall 011 was analyzed once every six months for TTOs. The inorganic constituents of concern, lead copper, and hexavalent chromium, were analyzed quarterly.

In Outfall 011, concentrations of lead and copper were identified at levels below the permitted discharge limits **(Table 5)**. Outfall 011 was analyzed for TTO constituents of concern in April and October of 2003, 2004, 2005 and 2007 and April and July 2006. The wastewater monitoring reports reviewed from April 2003 to March 2008 indicate the TTO concentrations were below effluent limitations.

Outfall 011 is also regularly monitored for flow rate, BOD5, total suspended solids, pH, temperature, cadmium, total chromium, cyanide, nickel, lead, oil and grease, silver and zinc. None of these constituents exceeded effluent limitations during the five-year review period.

6.3.3 NAPL

6.3.3.1 Quarterly NAPL Monitoring

NAPL operations were discontinued on July 21, 1991; however, NAPL thickness has been continuously monitored quarterly at the well locations listed in **Table 3**. As recommended in the September 2003 Five-Year Review Report, a NAPL monitoring program was developed for SBW-4 well, which included adding this well to the quarterly NAPL monitoring in 2004.

With the exception of SBW-4 in June and October 2004 and January 2005, NAPL has only been measured up to 0.01 feet (approximately 1/8 inch) in MW-1, MW-12, SBW-3N, G-2S, RW-3A and RW-5 (**Table 9**).

6.3.3.2 SBW-4 NAPL Monitoring

The SBW-4 NAPL monitoring plan was implemented during the June 2004 biennial monitoring. Due to the highly viscous nature of the NAPL, the NAPL thickness could not be measured with an oil water interface probe. As the oil water interface probe was lowered into the well, the probe became coated with NAPL and the sensors in the probe could not take readings. A bailer was used to collect the NAPL samples for laboratory analysis. Based on the amount of NAPL present in the bailer, it is estimated 0.6 feet of NAPL was present in the well on June 8, 2004. After the NAPL laboratory sample was collected, an

absorbent sock was placed in the well to remove the NAPL. JDDW had proposed monitoring the NAPL in SBW-4 daily for one week, weekly for three weeks, and monthly for a quarter to assess the infiltration rate of the NAPL. However, this monitoring was not performed due to the inability of the oil water interface probe to measure the thickness of the NAPL. Beginning in the fourth quarter of 2004, JDDW proposed to monitor the NAPL thickness quarterly by replacing the absorbent sock in SBW-4 during the quarterly NAPL monitoring program.

The NAPL sample was analyzed for SVOCs by Method 8270C and was also submitted for a fingerprint evaluation utilizing gas chromatography with a flame ionization detector (FID) by Core Laboratories (Core) of Houston, Texas.

The original proposal for the NAPL evaluation was to utilize SW-846 Method 8015 to determine TPH concentration and to attempt to identify the material. However, the primary laboratory was unable to perform this analysis utilizing a range of petroleum hydrocarbon standards for identification. It was determined that the actual concentration of the NAPL was less of a consideration than identification of the type of material present. Therefore, Core was selected to perform an analysis similar to the Method 8015 procedure utilizing extraction in carbon disulfide (CS2) and analysis by gas chromatography with a FID.

The Core report indicates that "the sample appears to be hydrocarbon based with the predominant constituents eluting in a range of molecular weights, typically associated with normal decane (nC10) to beyond pentatriacontanes (nC35+)". The majority of the fingerprint elutes between the C15 and C35 ranges as a typical hydrocarbon "hump". Pristane and phytane peaks are present in the chromatogram and both compounds are normally associated with hydrocarbons. Phytane is considered to be the product of the "diagenesis of phytol at low pressures and temperatures from naturally occurring organic deposits". Both compounds are commonly found in unrefined crude oils and may be used as biomarkers for geochemical interpretations.

The STL report identifies elevated concentrations of bis(2-Ethylhexyl) phthalate (100 mg/Kg) and Pentachlorophenol (170 mg/Kg) with lesser concentrations of 2-Methylnaphthalene (1.5 mg/Kg) and Naphthalene (0.37 mg/Kg). No other SVOCs were detected above the reporting limits that were attainable, due to the elevated concentrations of some of the target compounds.

SBW-4 was added to the quarterly NAPL monitoring program beginning in the fourth quarter of 2004. SBW-4 was monitored for NAPL monthly during this quarter. The absorbent sock that was placed in SBW-4 in June 2004 was removed in October 2004 and approximately 1.19 feet of NAPL was present in the well. NAPL was not present in SBW-4 in November 2004 and 0.01 feet of NAPL was present in the well in December 2004. During each of these monitoring events, the absorbent sock was removed to measure the NAPL and then reinstalled in the well. After the NAPL was removed from the well, the absorbent sock was replaced.

NAPL was also monitored monthly during the first and second quarters of 2005. Beginning in the third quarter of 2005, the NAPL was monitored quarterly. The results of the NAPL monitoring are presented in **Table 10**. During the November 2004 to January 2008 period, the NAPL thickness present in SBW-4 has for the most part been 0.01 feet or not detected.

6.3.4 Groundwater Quality

In June 2004, 2006 and February 2008, groundwater samples were collected from MW-6, MW-8S, MW-9D, MW-9S, MW-12, MW-13S and alluvial production well PW-3A, PW-4A, PW-5, and PW-7A and (**Table 3**). The third five-year review report recommended removing monitor well MW-13D from the groundwater monitoring program and abandoning the well. In June 2004, USEPA approved the recommendation to remove monitor well MW-13D from the groundwater monitoring program. MW-13D was not sampled in 2004, 2006 and 2008.

A summary of the analytical data is presented in **Appendix B**. Wells that have contaminants of concern (COC) above federal MCLs are listed in **Table 8**. Contaminants that have been above MCLs during the last five years of monitoring include TCE and benzene.

Figures 4, 5, and 6 illustrate the trends in concentrations of PCE, TCE, and benzene in the alluvial aquifer from 1990 to 2008. Between 1990 and 2003, TCE, benzene, and PCE concentrations fluctuated with concentrations generally declining with the exception of benzene in MW-13S. In 1997, increases in concentrations of PCE and TCE were detected in MW-9S and benzene in MW-13S. During subsequent sampling events, the concentrations of PCE and TCE detected in MW-9S decreased to below the MCL. These

concentration increases correspond to the relocation of production well PW-3A in 1997.

Between 1990 and 1997, the benzene concentrations detected in MW-13S exceeded the MCL only during one sampling event (September 1992). The concentrations of benzene detected in MW-13S began to increase after production well PW-3 was replaced with PW-3A, which occurred in 1996 (**Figure 6, Appendix B**). It appears that the relocation of PW-3A has modified the groundwater flow path in the vicinity of MW-13S, resulting in residual benzene associated with the NAPL being drawn into the monitoring well. The concentrations of benzene detected in MW-13S increased from 19 µg/L in August 2000 to 130 µg/L in June 2002. Concentrations of benzene detected in MW-13S exhibited a decreasing trend between 2002 and 2008. Concentrations were equal to the USEPA MCL (5.0 micrograms per liter [µg/L]) in February 2008.

Concentrations of TCE detected in MW-6 fluctuated between 1990 and 2002. Concentrations of TCE increased to above the MCL in 1991, 1993, and 2000 and subsequently decreased to below the MCL during the next sampling event. Concentrations of TCE detected in MW-6 increased to above the USEPA MCL in June 2006 and subsequently decreased to equal the MCL (5.0 µg/L) in February 2008. The increase in TCE concentrations may be due to fluctuations in the water table caused by variations in the groundwater withdrawal, from the alluvial aquifer and flooding of the Mississippi River.

6.4 Site Inspection

On February 4, 2008, Bill Gresham of the USEPA, George Hellert of JDDW, and Kathy Thalman of ARCADIS conducted the site inspection to evaluate components of the remediation with respect to the Consent Decree and Decision Documents. The Site Inspection Check List is presented in **Appendix D.** The purpose of the inspection was to assess the protectiveness of the remedy, including the presence of fencing to restrict site access and the condition of the site monitoring wells.

No significant issues were identified during the site inspection. Production wells, NAPL recovery wells, and monitoring wells at the JDDW site were in good condition. The site fence is in good condition. The institutional controls that are in place include prohibitions of inappropriate use of the plant property in the future. Future use of the current plant property is limited to industrial

activity only. In addition, wells tapping the alluvial aquifer beneath the JDDW property for the purpose of extracting water for human drinking purposes, or for irrigation of food or feed crops, are not allowed. No activities were observed that violate the institutional controls.

The documents in the local site repository and the Carnegie-Stout Public Library, were reviewed on February 4, 2008 to evaluate record keeping. The documents present at the Carnegie-Stout Public Library in Dubuque are listed in **Appendix A**. The documents were easily accessible and in good condition.

6.5 Interviews

Bill Gresham conducted an interview about the O&M of the site remedy with Kathy Thalman of ARCADIS on February 4, 2008. For the wells, which are production wells, maintenance is regular because they are the JDDW plant production wells. Pumping creates an inward gradient (as required). Costs for O&M are included in the plant operations. Ms. Thalman had no concern regarding the effectiveness of the remedy, and is not aware of any complaints from nearby residents.

Bill Gresham conducted an interview with Bob Drustrup of the Iowa Department of Natural Resources on February 12, 2008. Mr. Drustrup did not indicate any concerns regarding the site or implementation of the remedy, based on his consistent review of project deliverables. He feels the progress and performance of the remedy is reasonable and has heard of no complaints from the residents.

The interview documentation form and interview records are presented in **Appendix D**.

7 Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

YES:

The review of the documents, ARARs, risk assumptions, and the results of the site inspection indicate that the remedy is functioning as intended by the ROD. The JDDW groundwater extraction system is fully operational and functional.

Operation of the system creates a hydraulic capture zone that contains and withdraws the contaminated groundwater. All progress reports submitted to date indicate that an inward hydraulic gradient has been maintained. During the 2008 groundwater sampling event, concentrations of constituents of concern were below USEPA MCLs in all wells included in the groundwater monitoring program except MW-13S and MW-6. The TTO, hexavalent chromium, lead and copper concentrations detected in Outfall 011 did not exceed NDPES effluent limits.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

YES:

This five-year review includes a review of newly promulgated requirements of Federal and State environmental laws. The ROD identified federal MCLs and Iowa's Groundwater Protection Policy identified ARARs to be attained in the extraction of contaminated groundwater.

The Consent Decree Performance Standards require that alluvial groundwater be extracted and sampled until the constituents of concern are reduced to below the federal MCLs or applicable Iowa state groundwater remediation regulations, whichever are more stringent. The State of Iowa (Chapter 133. "Rules for Determining Cleanup Actions and Responsible Parties" Section 133.4(3)b.2) has defined the groundwater action level to be the Lifetime HAL if one exists. If there is no HAL, the action level is the NRL. It there is no HAL or NRL, then the action level is equal to the MCL. For constituents for which there is no MCL or State requirement, the following regulatory sources shall be used in descending order to identify completion levels.

- Proposed MCL;
- The USEPA Office of Drinking Water Lifetime Health Advisory Levels;
- IRIS verified reference dose or 10^{-6} cancer potency factor and ingestion of 2 liters of water per day by a 70 kg adult; and

- The USEPA Office of Research and Development Health Effect Assessment Criteria.

The groundwater extraction will continue until four consecutive quarters of monitoring indicate that the alluvial water quality beneath the Site has been at or below completion levels in effect at that time or if JDDW demonstrates to the USEPA that contaminant concentrations are below background levels.

In October 1995, JDDW requested that the IDNR allow the use of MCLs as cleanup goals rather than the HALs and NRLs. The IDNR, along with the USEPA, approved the use of MCLs in December 1996. This change in ARARs did not affect the protectiveness of the current remedy at the JDDW site.

During the April 2003 to March 2008 period, there were no changes in ARARs. Table 5 lists the current performance standards for the JDDW site. There have been no changes in the physical condition of the site and in land use near the site that would affect the protectiveness remedy.

There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. Standard risk assessment methodologies have not changed in a way that could affect the protectiveness of the remedy. The remedy is progressing as expected.

Question C: Has any other information come to light that could call into question the protectiveness of this remedy.

There is no additional information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. Standard risk assessment methodologies have not changed in a way that could affect the protectiveness of the remedy. There is no additional information that calls into question the protectiveness of the remedy.

8 Issues

No issues were found during the five-year review.

9 Recommendations and Required Actions

This fourth five-year review has developed the following issues and recommendations.

Issue: A potential exposure route continues to exist via groundwater to the twenty nearby residences located between the eastern boundary of the site and the Mississippi River, and the private alluvial wells at these residences have not been sampled since 1986.

Recommendation: It is recommended that these wells be sampled again to verify that the remedy is continuing to prevent contaminants from migrating off-site.

Issue: Capping of the former landfill was not a component of the remedial action, and USEPA Region VII human health risk staff calculated slightly elevated risk levels for direct contact or inhalation of fugitive dust based on 20-year-old data for a number of contaminants found in landfill soils.

Recommendation: A separate evaluation of the former landfill should be performed.

Issue: The EPA has recently adopted the practice of reviewing and updating the institutional controls during five-year reviews. The EPA has come to realize that the filing of a Consent Decree with the County Recorder, as was done in 1990 for this site, amounts to more of a notice to a future buyer rather than an immediately effective, enforceable, institutional control that runs with the land. Since that last previous five-year review, the State of Iowa has adopted the Uniform Environmental Covenants Act ("UECA"), effective July 1, 2005. The Iowa UECA statute provides a simple procedure for the creation and implementation of Environmental Covenants which run with the land and avoids most common law problems involved with previous types of institutional controls.

Recommendation: The EPA recommends that a UECA Environmental Covenant with appropriate land use restrictions be put in place at the JDDW.

Also, JDDW should continue to monitor and maintain the hydraulic gradient; monitor the presence of NAPL and perform NAPL recovery as necessary; and monitor the surface water and groundwater.

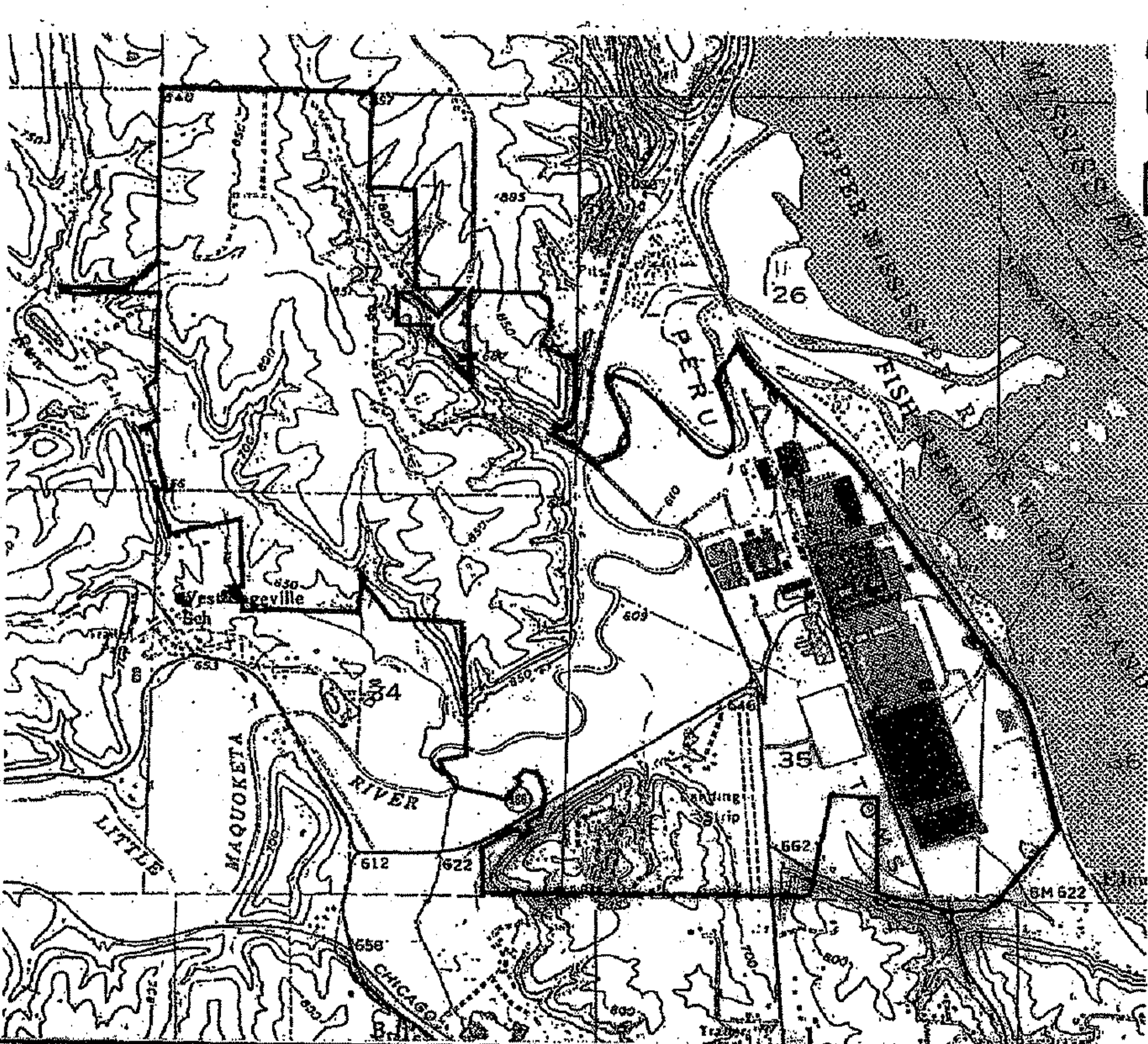
10 Protectiveness Statement

The selected remedy remains protective of human health and the environment and complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action. Therefore, this remedy continues to be protective to human health and the environment.

11 Next Review

The fifth five-year review should be conducted by August 15, 2013.

Figures



LEGEND:

- FEATURES MAPPED IN 1956
- FEATURES MAPPED IN 1972
- FEATURES MAPPED AFTER 1978
- PROPERTY BOUNDARY

0 2000'
SCALE

Area Manager G. PAGE	JOHN DEERE DUBUQUE WORKS FIVE-YEAR REVIEW REPORT	Project Number TF001034.0019
Project Director P. FIERRO		Drawing Date 17 APRIL 2008
Task Manager K. THALMAN	SITE LOCATION	Figure 1
Technical Review K. THALMAN	DUBUQUE, IOWA	

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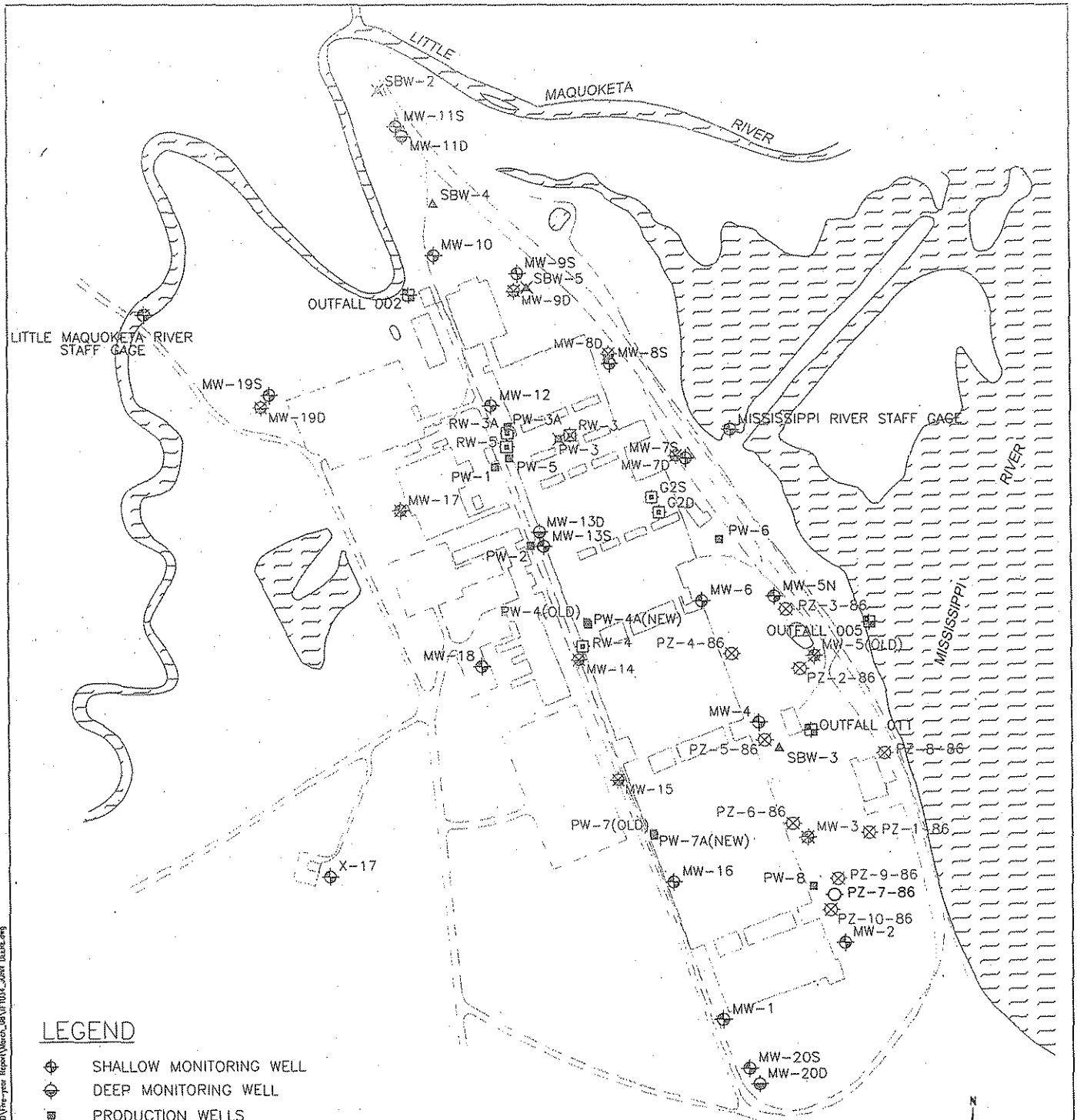
Area Manager G. PAGE		JOHN DEERE DUBUQUE WORKS FIVE-YEAR REVIEW REPORT	Project Number TF001034.0019
Project Director P. FIERRO			Drawing Date 17 APRIL 2008
Task Manager K. THALMAN		SITE MAP	Figure
Technical Review K. THALMAN		DUBUQUE, IOWA	2



LEGEND

- SHALLOW MONITORING WELL
- DEEP MONITORING WELL
- PRODUCTION WELLS
- PIEZOMETER
- SOIL BORING WELL
- RECOVERY WELL
- OUTFALL

AN X THROUGH THE SYMBOL INDICATES THE WELL HAS BEEN ABANDONED.

Area Manager: G. PAGE		JOHN DEERE DUBUQUE WORKS FIVE-YEAR REVIEW REPORT	Project Number: TF001034.0019
Project Director: P. FIERRO			Drawing Date: 17 APRIL 2008
Task Manager: K. THALMAN		WELL LOCATION MAP	Figure: 3
Technical Review: K. THALMAN		DUBUQUE, IOWA	

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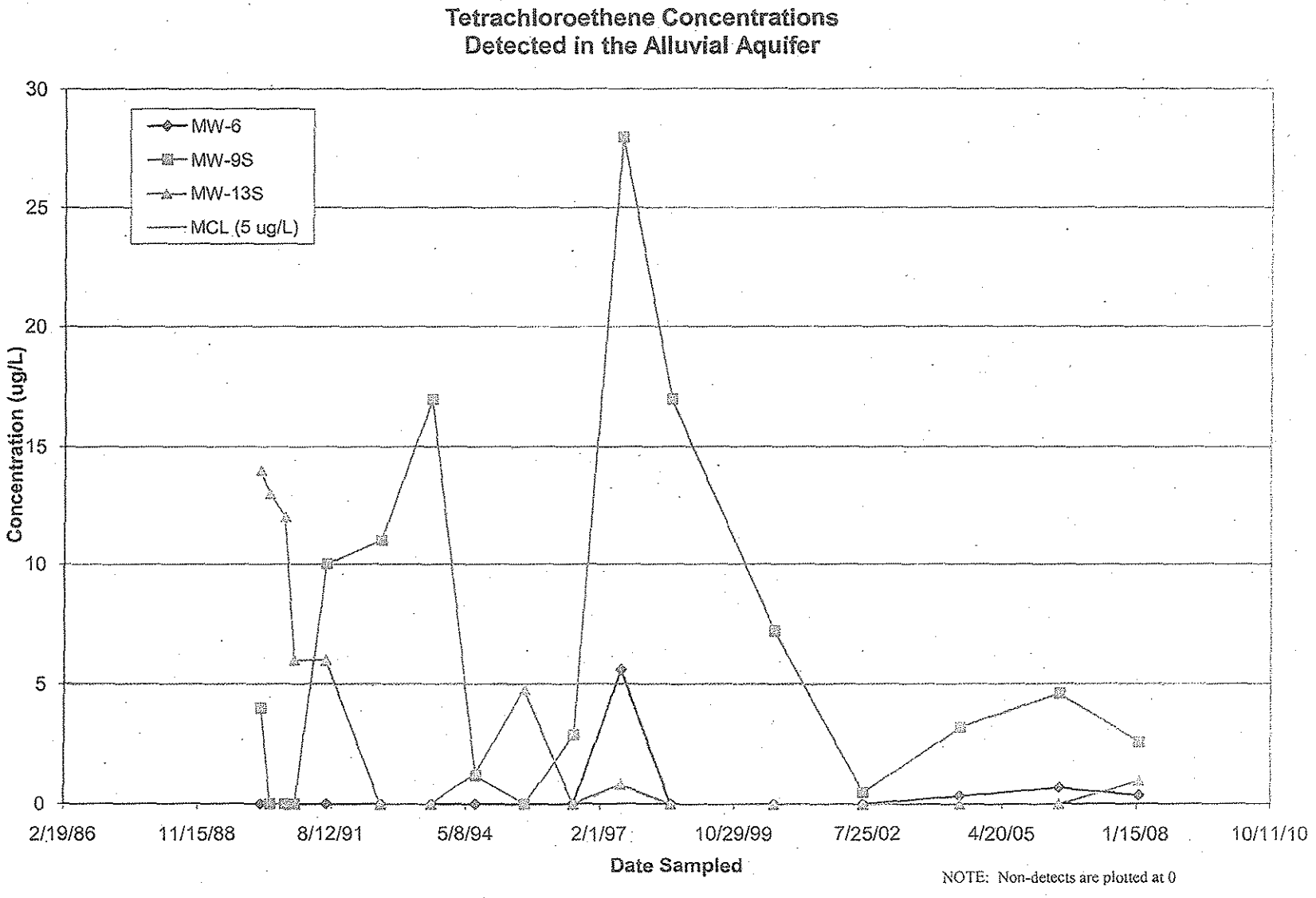

Figure 4. Tetrachloroethene Concentrations Detected in the Alluvial Aquifer, John Deere Dubuque Works, Dubuque, Iowa

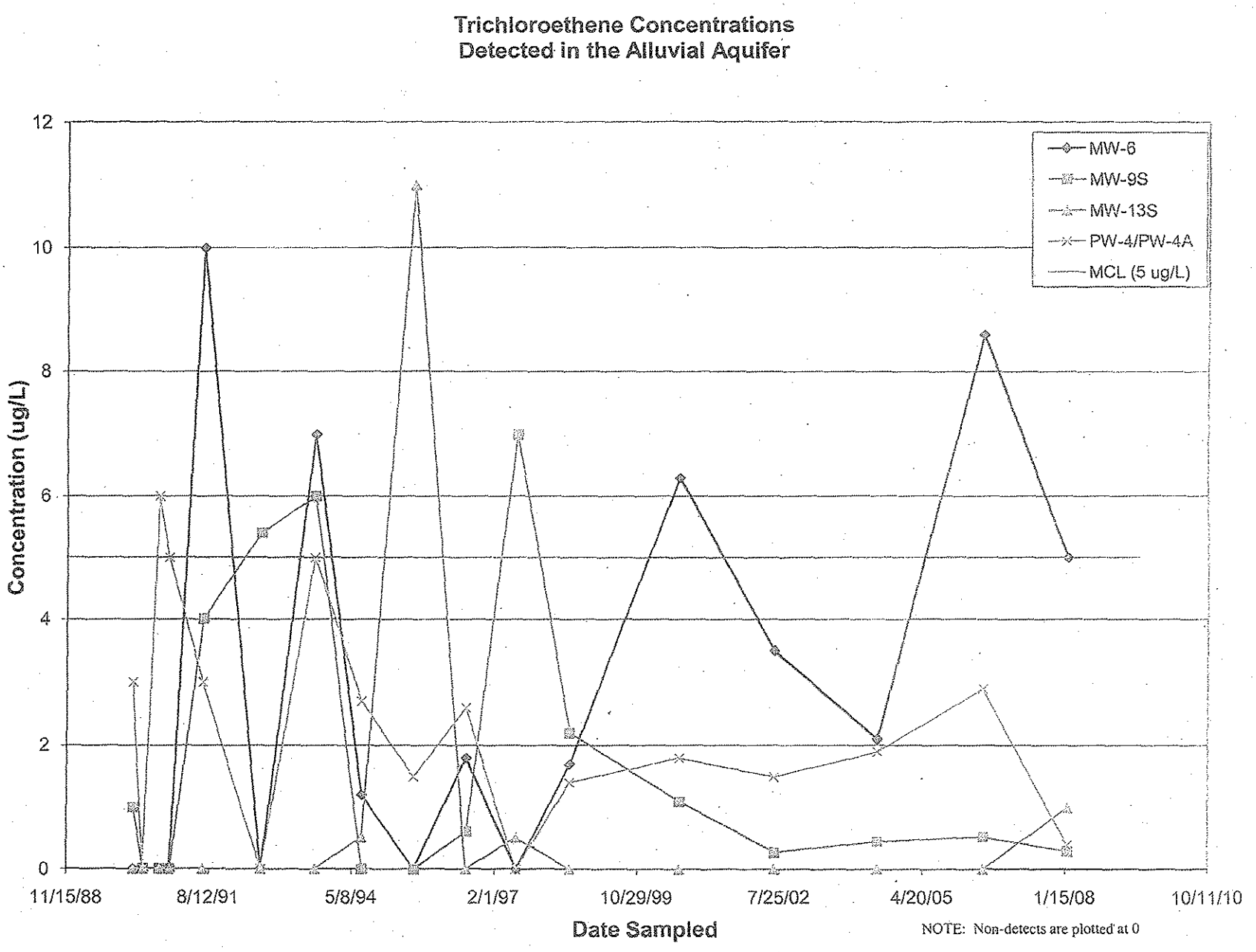

Figure 5. Trichloroethene Concentrations Detected in the Alluvial Aquifer, John Deere Dubuque Works, Dubuque, Iowa

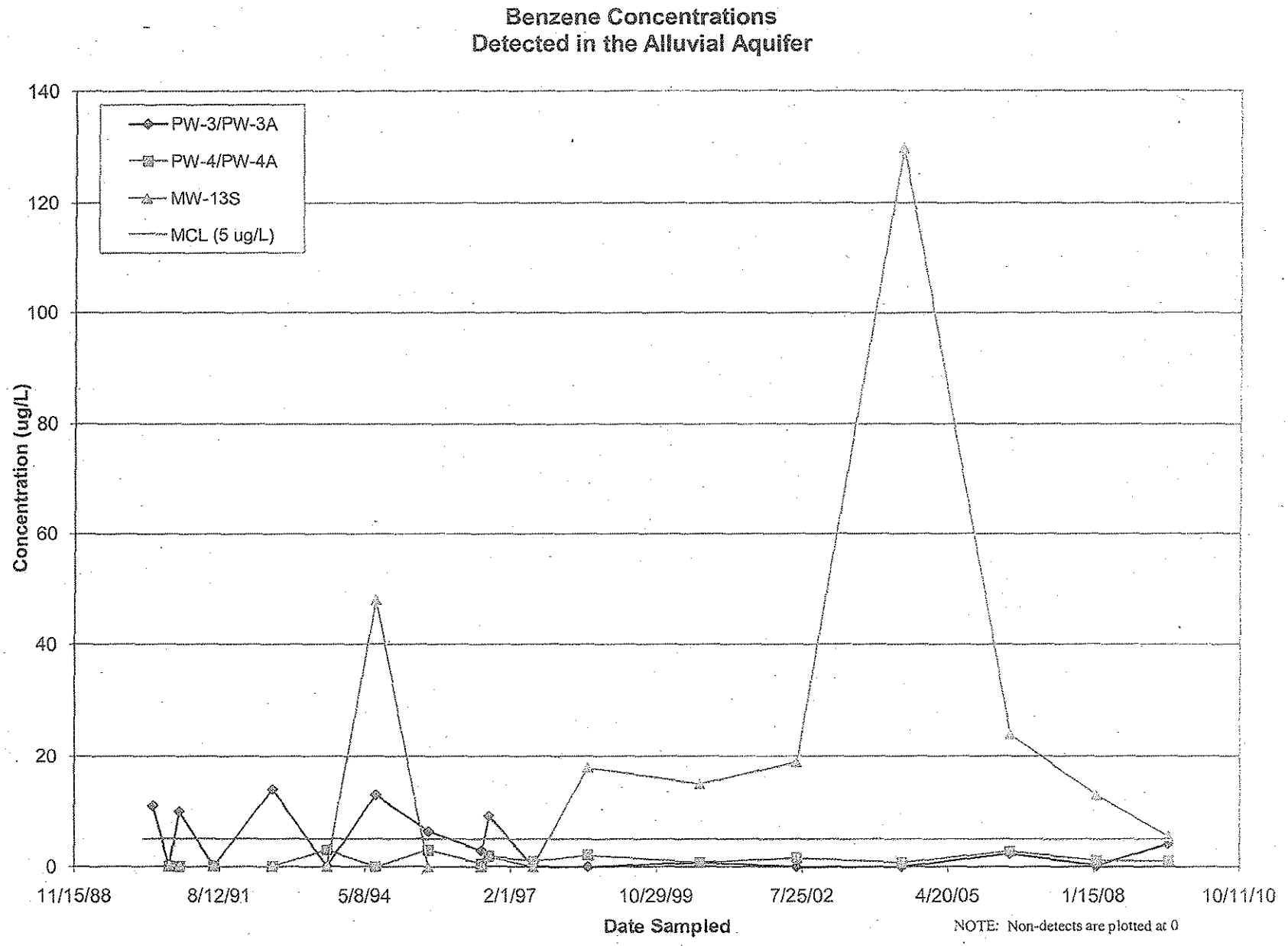

Figure 6. Benzene Concentrations Detected in the Alluvial Aquifer, John Deere Dubuque Works, Dubuque, Iowa

Fourth Five-Year Review Report April 2003 to March 2008

John Deere Dubuque Works
Dubuque, Iowa

Tables

TABLE 1
CHRONOLOGY OF SITE EVENTS
John Deere Dubuque Works
Dubuque, Iowa

Date	Event
August 1, 1980	Discovery
July1,1983	Preliminary Assessment Report Issued
July 1 to September 1, 1983	Site Inspection
December 18, 1984	Hazard Ranking System (HRS) Package
September 18, 1985	The USEPA Proposed the JDDW site for inclusion on the NPL.
September 30, 1986	The USEPA and JDDW enter into an Administrative Order on Consent requiring the development of a Remedial Investigation and Feasibility Study (RI/FS) for the site.
June 24, 1998	The USEPA proposes removing the JDDW site as a candidate for inclusion in the NPL; however, the USEPA determined that JDDW should continue with remedial activities as required by the USEPA for compliance with CERCLA.
August 3, 1988	JDDW Submitted the RI/FS Report to the USEPA
August 5, 1988	The USEPA published a notice of completion for the RI/FS and the proposed plan for remediation. A public comment period was established and public comments were documented in the administrative record.
September 29, 1988	The ROD was signed by the USEPA summarizing the USEPA's decisions for site remediation. This is also the date of the completion of the RI/FS.
December 18, 1989	The USEPA and JDDW enter into a Judicial Consent Decree requiring the development of a Remedial Design (RD) Report and Remedial Action (RA).
January 1990	JDDW initiated groundwater monitoring activities according to the Consent Decree. Quarterly RA reports were prepared and submitted the USEPA.
February 7, 1989	Remedial design start
January 19, 1990	JDDW lodged required deed restriction with Dubuque County Records office.
September 1990	The Final RD Report was submitted to and approved by USEPA. This date marks the start of the RA activities
1994	MW-5 was replaced with MW-5N in the 4th Quarter of 1994
May 1995	JDDW replaced PW-4 with PW-4A due to large volumes of sand in the water pumped from the well.
August 10, 1995	JDDW replaced SBW-3 with SBW-3N because of an inadvertent concrete pour over SBW-3.
September 18, 1995	JDDW replaced PW-7 with PW-7A due to large volumes of sand in the water pumped from the well.

TABLE 1
CHRONOLOGY OF SITE EVENTS
John Deere Dubuque Works
Dubuque, Iowa

Date	Event
September 22, 1995	Completion of the initial Five-Year Review
July 1996	The USEPA approved reducing the frequency of water level measurements in wells from once every four hours of operation to once monthly.
December 1996	The USEPA approved the use of Federal MCLs at JDDW instead of the more stringent NRLs and HALs.
December 1996	JDDW requested to abandon Wells G2S and G2D
April 1997	The USEPA approved the relocation of Well PW-3 to PW-3A
September 30, 1998	Completion of the second Five-Year Review
July 1997	Frequency of groundwater level measurements in perimeter wells was reduced from every four hours to monthly.
September 30, 1998	USEPA approved abandonment of selected monitoring wells after an entire round of groundwater sampling; the groundwater sampling frequency be changed to biennially, and the elimination of lead, chromium, and copper analyses from all wells in the monitoring program.
May 1999	Historical soil boring wells SBW-2, SBW-5; piezometers PZ-1-86, PZ-2-82, PZ-3-86, PZ-4-86, PZ-5-86, PZ-6-86, PZ-8-86, PZ-9-86, PZ-10-86; monitoring wells MW-3, MW-7D, MW-8D, MW-14, MW-15, MW-17 and MW-19D were abandoned
October 25, 2001	USEPA approved reducing the stage monitoring the Little Maquoketa River from daily to monthly at the same time as water levels
June 18, 2002	USEPA approved abandonment of MW-9D
August 22, 2002	MW-9D was abandoned
September 25, 2003	Completion of the third Five-Year Review
June 4, 2004	USEPA approved reducing the river stage monitoring of the Mississippi River to monthly at the same time as the monitor well water levels
June 4, 2004	USEPA approved abandoning monitor well MW-13D. JDDW removed this well from the monitoring program in 2004. As of this five-year review, JDDW has not abandoned MW-13D.

TABLE 2
CONSTITUENTS OF CONCERN
John Deere Dubuque Works
Dubuqe, Iowa

Constituents
Volatile Organic Compounds
Benzene
Carbon Tetrachloride
Chloroform
1,1-Dichloroethane
1,1-Dichloroethene
1,2-Dichloroethene (total)
Ethylbenzene
1,1,2,2-Tetracloroethane
Tetrachloroethene
Toluene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Xylenes
Metals
Copper
Hexavalent Chromium
Lead

TABLE 3
SUMMARY OF GROUNDWATER WITHDRAWAL SYSTEM AND NAPL MONITORING
John Deere Dubuque Works
Dubuque, Iowa

	Groundwater Withdrawal System Monitoring					NAPL Recovery Monitoring				
Well Name	Hydraulic Water Level	Inward hydraulic Gradient Wells	Consent Decree Quality	Quality Revised 1998[2/]	Quality Revised 2004[3/]	Volume	Consent Decree Quality	Quality Revised 1998[2/]	Compliance	Notes
Monitoring Wells										
MW-1	X	Paired with MW-20							X [1/]	
MW-2										
MW-3										Abandoned in 5/99.
MW-4									X	
MW-5/ MW-5N	X	Paired with MW-6							X [1/]	MW-5 was replaced with MW-5N in the 4th Quarter of 1994
MW-6	X	Paired with MW-5	X	X	X		X	X	X	
MW-7S	X		X				X		X	The 8/98 Five-Year Review Report approved removing this well from the monitoring program- USEPA reserves the right to include this well in future sampling programs. See a/
MW-7D										Abandoned 5/99
MW-8S	X		X	X	X		X	X	X	
MW-8D										Abandoned 5/99
MW-9S	X		X	X	X				X [1/]	
MW-9D			X	X						Obstruction at 25 ft bls prohibited introduction of any variety of pump into well - JD proposed to abandon this monitor well in the July through September 2000 Quarterly Report (page 6), Abandoned in 8/02
MW-10	X	Paired with MW-11							X [1/]	
MW-11S	X	Paired with MW-10	X						X [1/]	The 8/98 Five-Year Review Report approved removing this well from the monitoring program- USEPA reserves the right to include this well in future sampling programs. See a/
MW-11D			X							The 8/98 Five-Year Review Report approved removing this well from the monitoring program- USEPA reserves the right to include this well in future sampling programs. See a/
MW-12			X	X	X		X	X	X	
MW-13D			X	X						The 9/03 Five-Year Review Report recommended abandoning this well. USEPA approved abandoning the well. JDDW removed this well from the monitoring program and has not abandoned the well.
MW-13S	X		X	X	X		X	X	X	
MW-14										Abandoned 5/99
MW-15										Abandoned 5/99

TABLE 3
SUMMARY OF GROUNDWATER WITHDRAWAL SYSTEM AND NAPL MONITORING
John Deere Dubuque Works
Dubuque, Iowa

	Groundwater Withdrawal System Monitoring					NAPL Recovery Monitoring				
Well Name	Hydraulic Water Level	Inward hydraulic Gradient Wells	Consent Decree Quality	Quality Revised 1998[2/]	Quality Revised 2004[3/]	Volume	Consent Decree Quality	Quality Revised 1998[2/]	Compliance	Notes
MW-16			X						X [1/]	The 8/98 Five-Year Review Report approved removing this well from the monitoring program- USEPA reserves the right to include this well in future sampling programs. See a/
MW-17										Abandoned 5/99
MW-18	X									
MW-19S	X									
MW-19D										Abandoned 5/99
MW-20S	X	Paired with MW-1	X						X [1/]	The 8/98 Five-Year Review Report approved removing this well from the monitoring program- USEPA reserves the right to include this well in future sampling programs. See a/
MW-20D			X							The 8/98 Five-Year Review Report approved removing this well from the monitoring program- USEPA reserves the right to include this well in future sampling programs. See a/
X-17	X									
PZ-1-86										Abandoned 5/99
PZ-2-86										Abandoned 5/99
PZ-3-86										Abandoned 5/99
PZ-4-86										Abandoned 5/99
PZ-5-86										Abandoned 5/99
PZ-6-86										Abandoned 5/99
PZ-7-86	X									
PZ-8-86										Abandoned 5/99
PZ-9-86										Abandoned 5/99
PZ-10-86										Abandoned 5/99
SBW-2										Abandoned 5/99
SBW-3										In 8/10/95 SBW-3 was replaced with SBW-3N because concrete poured over SBW-3
SBW-3/ SBW-3N			X				X		X [1/]	In 8/10/95 SBW-3 was replaced with SBW-3N because concrete poured over SBW-3. The 8/98 Five-Year Review Report approved removing this well from the monitoring program- USEPA reserves the right to include this well in future sampling programs. See a/
SBW-4									X [4/]	This well was supposed to be abandoned in 5/99 but NAPL found in well. As recommended in the 9/03 Five-Year Review Report, a NAPL monitoring program was developed for this well which included adding the well to the quartely NAPL monitoring.
SBW-5										Abandoned 5/99

TABLE 3
SUMMARY OF GROUNDWATER WITHDRAWAL SYSTEM AND NAPL MONITORING
John Deere Dubuque Works
Dubuque, Iowa

	Groundwater Withdrawal System Monitoring					NAPL Recovery Monitoring				
Well Name	Hydraulic Water Level	Inward hydraulic Gradient Wells	Consent Decree Quality	Quality Revised 1998[2/]	Quality Revised 2004[3/]	Volume	Consent Decree Quality	Quality Revised 1998[2/]	Compliance	Notes
Production Wells										
PW-1										
PW-2										
PW-3/ PW-3A	X		X	X	X		X	X		April 1997 EPA approved relocation of PW-3 to PW-3A. PW-3 was abandoned in April 12, 1997.
PW-4/ PW-4A	X		X	X	X		X	X		In May 1995, PW-4 was replaced with PW-4A because large volumes of sand in the water pumped from the well
PW-5	X		X	X	X		X	X		
PW-6										
PW-7/ PW-7A	X		X	X	X		X	X		In September 1995, PW-7 replaced with PW-7A due to large volumes of sand in the water pumped from the well
PW-8										
NAPL Recovery Wells										
RW-3/ RW-3A						X			X	April 1997 EPA approved relocation of RW-3 to RW-3A, RW-3 was abandoned on April 12, 1997, NAPL recovery was discontinued in July 1991
RW-4/ RW-4A						X			X	In May 1995 RW-4 was replaced with RW-4A the same time as PW-4 was replaced with PW-4A, NAPL recovery was discontinued in July 1991
RW-5						X			X	NAPL recovery was discontinued in July 1991
G-2S						X			X	NAPL recovery was discontinued in July 1991, JDDW requested to abandon in Dec 1996
G-2D										JDDW requested to abandon in Dec 1996

a/ The removal of this well was conditional on the maintenance of the inward hydraulic gradient and no changes in the groundwater withdrawal program. If the gradient or the withdrawal program changes, the USEPA reserves the right to include this well in future sampling programs.

1/ These wells were not included in the Consent Decree

2/ The reduction in the number of wells required for quality monitoring was approved by USEPA in the September 1998 Second Five-Year Review Report.

3/ Abandoning monitor well MW-13D and removing the well from the biennial water quality monitoring program was approved by USEPA on June 4, 2004 .

3/ Beginning in the 4th quarter of 2004, SBW-4 was added to the NAPL monitoring program.

TABLE 4
CURRENT PERFORMANCE STANDARDS FOR CONTAMINANTS IN GROUNDWATER
John Deere Dubuque Works
Dubuque, Iowa

Analytes	Federal MCL (µg/L)	IRIS (µg/L)	HEAST (µg/L)
Benzene	5		
Carbon Tetrachloride	5		
Chloroform	80 [2/]		
Hexavalent Chromium	100 [3/]	110 (a)	
Copper	1,300 [1/]		
1,1-Dichloroethane	-	-	990 (b)
1,1-Dichloroethene	7		
1,2-Dichloroethene (total)	70 [4/]		
Ethylbenzene	700		
Lead	15 [1/]		
1,1,2,2-Tetracloroethane	-	0.2	
Tetrachloroethene	5		
Toluene	1,000		
1,1,1-Tricloroethane	200		
1,1,2-Trichloroethane	5		
Trichloroethene	5		
Xylenes	10,000		

Footnotes:

- = Indicates that no level has been established.

[1/] = The criteria for lead and copper are action levels, not MCLs.

[2] = MCL for Trihalomethanes (total).

[3/] = MCL for total chromium.

[4] = cis-1,2-Dichloroethene; MCL for trans-1,2-dichloroethene is 100 µg/L.

(a) = The Performance Standard Calculations for chromium (VI) are found in Appendix E.

(b) = The Performance Standard Calculations for 1,1-dicloroethane are found in Appendix E.

(c) = The Performance Standard Calculations for 1,1,2,2-tetrachlorethane corresponds to the acceptable concentration at a 10^{-6} target risk level..

MCL = Maximum Contaminant Level (March 2008).

IRIS = Integrated Risk Information System, 2008.

HEAST = Health Effects Assessment Summary Tables, July 1997.

Sources: USEPA Office of Water 2008.
USEPA Integrated Risk Information System 2008.
USEPA 1991
IDNR 2002

TABLE 5
NPDES EFFLUENT LIMITATIONS FOR THE CONSTITUENTS OF CONCERN IN OUTFALL 011.
John Deere Dubuque Works
Dubuque, Iowa

Constituent	Monitoring Frequency	Effluent Limitation			
		Daily Maximum		30 Day Average	
		Concentration mg/L	Mass lbs/day	Concentration mg/L	Mass lbs/day
September 3, 1992 NPDES Permit					
Lead	2/week	0.69	2.00	0.43	1.26
Copper	2/week	0.94	2.73	0.63	1.83
Chromium (VI)	2/week	0.41	1.20	0.27	0.82
Total Toxic Organics*	1/6 months	2.13	6.00	NEL	NEL
September 3, 1992 NPDES Permit - August 14, 1995 Amendment					
Lead	2/week	0.69	2.00	0.43	1.26
Copper	2/week	0.81	2.70	0.54	1..80
Chromium (VI)	2/week	1.00	3.40	0.67	2.30
Total Toxic Organics*	1/6 months	2.13	6.00	NEL	NEL
July 15, 1999 NPDES Permit					
Lead	1/3 months	0.69	2	0.43	1.26
Copper	1/3 months	0.81	2.70	0.54	1..80
Chromium (VI)	NEL	NEL	NEL	NEL	NEL
Total Toxic Organics*	1/6 months	2.13	NEL	NEL	NEL

Footnotes:

* Total Toxic Organics include benzene, carbon tetrachloride, chloroform, 1,1-dichloroethane, 1,1-dichloroethene, trans-1,2-dichloroethene, ethylbenzene, 1,1,2,2-tetrachloroethane, tetrachloroethene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethene, xylenes.

NEL - No effluent limitation

mg/L - Milligrams per liter

lbs/day - Pounds per day

TABLE 6
ALLUVIAL PRODUCTION WELL PUMPING SUMMARY
John Deere Dubuque Works
Dubuque, Iowa

Period		Alluvial Aquifer Pumping (MGD)		
Year	Quarter	Minimum	Maximum	Average
2003	2	9.48	17.87	14.44
	3	15.32	19.28	17.33
	4	9.98	14.25	11.67
2004	1	10.66	13.82	11.64
	2	13.90	19.97	16.91
	3	15.68	20.62	17.81
	4	12.15	15.89	13.14
2005	1	10.68	14.43	13.06
	2	13.60	18.44	16.11
	3	13.51	23.58	19.12
	4	12.67	16.90	14.25
2006	1	6.69	9.11	7.79
	2	10.14	16.14	12.77
	3	13.77	16.14	15.18
	4	8.60	21.45	12.81
2007	1	10.17	15.8	12.89
	2	12.60	19.12	16.96
	3	15.86	20.80	18.60
	4	9.03	17.28	13.16
2008	1	8.01	13.03	11.23

Footnotes:
MGD- Millions of gallons per day
Alluvial Wells include production wells PW-3A, PW-4A, PW-5, and PW-7A.

TABLE 7
PAIRED WELL HEAD DIFFERENCE SUMMARY
John Deere Dubuque Works
Dubuque, Iowa

Year	Annual Average Head Difference (feet)*					
	MW-10 & MW-11S		MW-5N and MW-6		MW-1 & MW-20S	
	Actual	Required	Actual	Required	Actual	Required
2003	0.44	0.15	0.27	0.15	0.34	0.10
2004	0.45	0.15	0.22	0.15	0.27	0.10
2005	0.53	0.15	0.42	0.15	0.35	0.10
2006	0.51	0.15	0.22	0.15	0.22	0.10
2007	0.53	0.15	0.26	0.15	0.31	0.10
2008**	0.57	0.15	0.19	0.15	0.29	0.10

Footnotes:
* Numbers represent the annual average of the difference between the outer and inner well pair. A positive value indicates that the potentiometric surface slopes toward the main facility
** Includes First Quarter Only

TABLE 8
CHEMICAL GROUNDWATER ANALYSIS SUMMARY
John Deere Dubuque Works
Dubuque, Iowa

Benzene (MCL= 5 ug/L)			
Well	2004 (2)	2006 (2)	2008 (1)
MW-13S	24	13 J	5.5
Trichloroethene (MCL= 5 ug/L)			
Well	2004 (2)	2006 (2)	2008 (1)
MW-6	2.1	8.6	5

Sources of the groundwater data are the quarterly reports submitted by JDDW to USEPA.

Footnotes:
JDDW- John Deere Dubuque Works
USEPA- United States Environmental Protection Agency
( ) = Quarter in which data was collected
J= Estimated by laboratory due to value below calibration limit or positive result has been classified as qualitative during data validation
ug/L= Micrograms per liter
MCL= Maximum Contaminant Level
Note: Only wells which have contaminants detected above the MCLs have been included in this table. All data is listed for a well location if at least one sample contained concentrations above MCLs.

TABLE 9
NON-AQUEOUS PHASE LIQUID (NAPL) MONITORING RESULTS
John Deere Dubuque Works
Dubuque, Iowa

Monitoring Location	2003				2004				2005			
	01/15/03	04/15/03	07/14/03	10/29/03	01/15/04	04/12/04	07/20/04	10/26/04	01/12/05	04/20/05	07/19/05	10/20/05
MW-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-5N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-7S	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-8S	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-9S	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-11S	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-12	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND
MW-13S	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-16	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-18	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-19S	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-20S	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SBW-3N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PZ-7-86	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
X-17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
G-2S	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RW-3A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RW-4A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RW-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SBW-4*	NM	NM	NM	NM	NM	NM	0.6	1.19	0.02	0.01	0.01	0.01

Footnotes on Page 2

TABLE 9
NON-AQUEOUS PHASE LIQUID (NAPL) MONITORING RESULTS
John Deere Dubuque Works
Dubuque, Iowa

Monitoring Location	2006				2007				2008
	01/19/06	04/18/06	07/19/06	10/18/06	01/24/07	04/19/07	07/20/07	10/24/07	01/15/08
MW-1	ND	ND	ND	ND	ND	0.01	ND	ND	ND
MW-4	ND	ND	ND	ND	ND	ND	ND	ND	0.01
MW-5N	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-6	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-7S	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-8S	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-9S	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-10	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-11S	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-12	ND	ND	0.01	ND	ND	0.01	ND	ND	ND
MW-13S	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-16	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-18	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-19S	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-20S	ND	ND	ND	ND	ND	ND	ND	ND	ND
SBW-3N	ND	ND	ND	ND	ND	ND	0.01	ND	0.01
PZ-7-86	ND	ND	ND	ND	ND	ND	ND	ND	ND
X-17	ND	ND	ND	ND	ND	ND	ND	ND	ND
G-2S	ND	ND	ND	0.01	ND	ND	0.01	ND	0.01
RW-3A	ND	ND	ND	ND	0.01	0.01	ND	ND	ND
RW-4A	ND	ND	ND	ND	ND	ND	ND	ND	ND
RW-5	ND	ND	ND	ND	ND	0.01	ND	ND	ND
SBW-4*	0.01	0.01	ND	0.01	0.01	0.01	ND	0.01	ND

Footnotes:
NAPL- Non-Aqueous Phase Liquid
NM - Not measured
* - The complete history of NAPL monitoring for SBW 4 is presented in Table 10.
ND- NAPL was not detected in well
NAPL thickness is in feet.

TABLE 10
SBW-4 NON-AQUEOUS PHASE LIQUID (NAPL) MONITORING RESULTS
John Deere Dubuque Works
Dubuque, Iowa

Date Measured	NAPL Thickness (feet)
5/24/1999	0.11
5/26/1999	4 ounces of NAPL was removed from the well
5/18/1999	ND
6/17/1999	ND
7/16/1999	ND
9/23/2003	NAPL Present on absorbent towel
6/8/2004	0.6
10/26/2004	1.19
11/17/2004	ND
12/17/2004	0.01
1/12/2005	0.02
2/22/2005	ND
3/15/2005	0.01
4/20/2005	ND
5/17/2005	0.01
6/16/2005	0.01
7/19/2005	0.01
10/20/2005	0.01
1/19/2006	0.01
4/18/2006	0.01
7/19/2006	ND
10/18/2006	0.01
1/24/2007	0.01
4/19/2007	0.01
7/20/2007	ND
10/24/2007	0.01
1/15/2008	ND

ND - NAPL was not detected in well.

Appendix A

Documents Reviewed

APPENDIX A

DOCUMENTS REVIEWED

Reports

ARCADIS G&M, Inc. Final Report 2008 First Quarter Long-Term Monitoring Report, John Deere Dubuque Works, April 2008

ARCADIS G&M, Inc. Final Report 2007 Fourth Quarter Long-Term Monitoring Report, John Deere Dubuque Works, January 2008

ARCADIS G&M, Inc. Final Report 2007 Third Quarter Long-Term Monitoring Report, John Deere Dubuque Works, October 2007

ARCADIS G&M, Inc. Final Report 2007 Second Quarter Long-Term Monitoring Report, John Deere Dubuque Works, July 2007

ARCADIS G&M, Inc. Final Report 2007 First Quarter Long-Term Monitoring Report, John Deere Dubuque Works, April 2007

ARCADIS G&M, Inc. Final Report 2006 Fourth Quarter Long-Term Monitoring Report, John Deere Dubuque Works, January 2007

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ARARs

40 CFR 141.80; Subpart I, Control of Lead and Copper

40 CFR 141.64; Subpart G, Maximum Contaminant Levels for Disinfection By Products

USEPA Office of Water 2008 (http://www.epa.gov/safewater/contaminants/index.html).

USEPA Maximum Contaminant Level Standards as of March 2008 (http://www.epa.gov/safewater/contaminants/index.html).

USEPA Integrated Risk Information System (IRIS) 2008 (http://www.epa.gov/iris).

IDNR 2002 Iowa Environmental Protection Commission, Chapter 133, "Rules for Determining Cleanup Actions and Responsible Parties (http://www.legis.state.ia.us/ACO/IAChtml/567.htm#chapter_567_133)

U.S. Environmental Protection Agency (USEPA), 1991. Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part B: Development of Risk-based Preliminary Remediation Goals. Office of Solid Waste and Emergency Response, Washington, DC. OSWER Directive 9285.7-01B. December 13.

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John Deere Dubuque Works, Dubuque, Iowa, Superfund Site, Administrative Record, File 1/4 Containing Documents Dated From January 1, 1912 to April 27, 1984

John Deere Dubuque Works, Dubuque, Iowa, Superfund Site, Administrative Record, File 2/4 Containing Documents Dated From May 11, 1984 to April 1, 1986

John Deere Dubuque Works, Dubuque, Iowa, Superfund Site, Administrative Record, File 3/4 Containing Documents Dated From April 9,1986 to May 14, 1987

John Deere Dubuque Works, Dubuque, Iowa, Superfund Site, Administrative Record, File 4/4 Containing Documents Dated From April 15, 1987 to June 30, 1988

Appendix B

Summary of Groundwater Analytical Data

APPENDIX B. GROUNDWATER QUALITY RESULTS SUMMARY, MONITORING WELLS AND PRODUCTION WELLS
1990-2008
JOHN DEERE DUBUQUE WORKS, DUBUQUE, IOWA

Source or Location	Sample Collection Date	Inorganic				Organic													
		Chromium (VI)	Chromium	Copper	Lead	1,1-Di-chloro-ethene	1,1-Di-chloro-ethane	1,2-Di chloro-ethene (total)	Chloro-form	1,1,1-Tri-chloro-ethane	Carbon Tetra-chloride	Tri-chloro-ethene	1,1,2-Trichloro-ethane	Benzene	Tetra-chloro-ethene	1,1,2,2-Tetra-chloro-ethane	Toluene	Ethyl-benzene	Total Xylenes
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Reporting Limit *		10	10	10	5.0	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	1.0	0.50	0.50	0.50
Cleanup Criteria		100	100	1,300	15	7	700	70	100	200	5	5	5	5	5	0.2	1,000	700	10,000
MW-6	2/5/2008	---	---	---	---	< 1.0	< 1.0	0.49 J	< 1.0	2.0	< 1.0	5.0	< 1.0	< 1.0	0.38 J	< 1.0	< 1.0	< 1.0	< 2.0
MW-6	6/21/2006	---	---	---	---	< 1.0 UJ	0.18 J	0.77 J	< 1.0	4.0	< 1.0	8.6	< 1.0	< 1.0 UJ	0.70 J	< 1.0	< 1.0	< 1.0	< 2.0
MW-6	6/10/2004	---	---	---	---	< 1.0	< 1.0	< 1.0	< 1.0	1.7	< 1.0	2.1	< 1.0	< 1.0	0.34 J	< 1.0	< 1.0	< 1.0	< 2.0
MW-6	6/18/2002	---	---	---	---	< 0.50	< 0.50	0.28 J	< 0.50	1.8	< 0.50	3.5	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-6	8/22/2000	---	---	---	---	< 0.50	< 0.50	1.70	< 0.50	3.3	< 0.50	6.3	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-6	7/15/1998	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	1.6	< 0.50	1.7	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-6	7/8/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	1.50	< 0.50	2.70	< 0.50	< 0.50	< 1.0	< 0.50	5.60	< 1.0	0.96	< 0.50	< 0.50
MW-6	7/18/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.80	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-6	7/19/1995	< 10	< 10	< 20	< 10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-6	7/19/1994	< 10	< 10	< 25	< 6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.20	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-6	8/25/1993	< 10	< 8.0	< 3.0	< 1.0	< 10	< 10	2	< 10	1	< 10	7	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-6	8/12/1992	< 10	< 10	< 25	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MW-6	7/3/1991	< 10	---	10.7	< 1.0	< 10	< 10	3	< 10	< 10	< 10	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-6	11/8/1990	< 10	---	< 5.0	2.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-6	8/30/1990	< 10	---	< 4.0	3.3	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-6	5/9/1990	< 10	---	< 4.00	11.6	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-6	2/28/1990	< 10	---	< 5.0	11.6	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-7S	2/5/2008	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-7S	6/20/2006	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-7S	6/8/2004	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-7S	6/18/2002	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-7S	8/22/2000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-7S	7/15/1998	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-7S	7/8/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	1.10	< 0.50	< 0.50
MW-7S	7/17/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-7S	7/19/1995	< 10	< 10	< 20	< 10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-7S	7/19/1994	< 10	< 10	< 25	6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-7S	8/25/1993	< 10	< 8.0	3.1	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-7S	11/17/1992	< 10	< 10	< 25	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MW-7S	7/3/1991	< 10	---	12.7	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-7S	11/9/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-7S	8/29/1990	< 10	---	4.6	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-7S	5/8/1990	< 10	---	< 4.00	< 2.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-7S	2/27/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5

APPENDIX B. GROUNDWATER QUALITY RESULTS SUMMARY, MONITORING WELLS AND PRODUCTION WELLS
1998-2008
JOHN DEERE DUBUQUE WORKS, DUBUQUE, IOWA

Source or Location	Sample Collection Date	Inorganic				Organic													
		Chromium (VI)	Chromium	Copper	Lead	1,1-Di-chloro-ethene	1,1-Di-chloro-ethane	1,2-Di chloro-ethene (total)	Chloro-form	1,1,1-Tri-chloro-ethane	Carbon Tetra-chloride	Tri-chloro-ethene	1,1,2-Trichloro-ethane	Benzene	Tetra-chloro-ethene	1,1,2,2-Tetra-chloro-ethane	Toluene	Ethyl-benzene	Total Xylenes
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Reporting Limit *		10	10	10	5.0	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	1.0	0.50	0.50	0.50
Cleanup Criteria		100	100	1,300	15	7	700	70	100	200	5	5	5	5	5	0.2	1,000	700	10,000
MW-8S	2/4/2008	---	---	---	---	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
MW-8S	6/20/2006	---	---	---	---	< 1.0 UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 UJ	< 1.0	< 1.0	0.2 UB	< 1.0	< 2.0
MW-8S	6/9/2004	---	---	---	---	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
MW-8S	6/18/2002	---	---	---	---	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-8S	8/22/2000	---	---	---	---	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-8S	7/15/1998	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-8S	7/8/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	0.87	< 0.50	< 0.50
MW-8S	7/16/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-8S	7/19/1995	< 10	< 10	< 20	< 10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-8S	7/19/1994	< 10	< 10	< 25	< 6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-8S	8/25/1993	< 10	< 8.0	< 3.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-8S	8/12/1992	< 10	< 10	< 25	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MW-8S	7/2/1991	< 10	---	< 6.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-8S	11/7/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-8S	8/30/1990	< 10	---	< 4.0	1.8	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-8S	5/8/1990	20	---	< 4.00	4.60	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-8S	2/26/1990	< 10	---	< 5.0	9.8	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-9S	2/5/2008	---	---	---	---	< 1.0	0.54 J	0.40 J	< 1.0	0.24 J	< 1.0	0.29 J	< 1.0	< 1.0	2.6	< 1.0	< 1.0	< 1.0	< 2.0
MW-9S	6/20/2006	---	---	---	---	< 1.0 J	0.47 J	0.74 J	< 1.0	0.24 J	< 1.0	0.53 J	< 1.0	< 1.0 J	4.6	< 1.0	< 1.0	< 1.0	< 2.0
MW-9S	6/9/2004	---	---	---	---	< 1.0	0.81 J	0.68 J	< 1.0	0.42 J	< 1.0	0.45 J	< 1.0	< 1.0	3.2	< 1.0	< 1.0	< 1.0	< 2.0
MW-9S	8/14/2002	---	---	---	---	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.28 J	< 1.0	< 0.50	0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-9S	8/22/2000	---	---	---	---	< 0.50	1.1	2.9	< 0.50	1.7	< 0.50	1.1	< 1.0	< 0.50	7	< 1.0	< 0.50	< 0.50	< 0.50
MW-9S	7/15/1998	< 10	< 10	< 10	< 5.0	< 0.50	2.2	3.3	< 0.50	4.4	< 0.50	2.2	< 1.0	< 0.50	17	< 1.0	< 0.50	< 0.50	< 0.50
MW-9S	7/8/1997	< 10	< 10	< 10	< 5.0	< 0.50	6.80	45.00	< 0.50	19.00	< 0.50	7.00	< 1.0	< 0.50	28.00	< 1.0	< 0.50	< 0.50	2.50
MW-9S	7/17/1996	< 10	< 10	< 10	< 5.0	< 0.50	1.00	< 0.50	< 0.50	2.20	< 0.50	0.61	< 1.0	< 0.50	2.90	< 1.0	< 0.50	< 0.50	< 0.50
MW-9S	7/19/1995	< 10	< 10	< 20	< 10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-9S	7/19/1994	< 10	< 11	< 25	< 6	< 0.50	0.37 J	< 0.50	< 0.50	0.80	< 0.50	< 0.50	< 1.0	< 0.50	1.2	< 1.0	< 0.50	< 0.50	< 0.50
MW-9S	08/24/093	< 10	< 8.0	< 3.0	1.3	< 10	6	< 10	< 10	23	< 10	6	< 10	1	17	< 10	< 10	< 10	< 10
MW-9S	8/11/1992	< 10	< 10	< 25	< 3.0	< 5.0	3.2	3.7	< 5.0	18	< 5.0	5.4	< 5.0	< 5.0	11	< 5.0	< 5.0	< 5.0	< 5.0
MW-9S	7/2/1991	< 10	---	< 6.0	< 1.0	< 10	5	4	< 10	20	< 10	4	< 10	< 10	10	< 10	< 10	< 10	< 10
MW-9S	11/7/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	13	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-9S	8/30/1990	< 10	---	< 4.0	< 1.0	< 5	< 5	< 5	< 5	8	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-9S	5/8/1990	< 10	---	< 4.00	< 2.00	< 5	< 5	< 5	< 5	8	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-9S	2/26/1990	< 10	---	< 5.0	4.7	< 5	< 5	< 5	< 5	9	< 5	1	< 5	< 5	4	< 5	< 5	< 5	< 5

APPENDIX B. GROUNDWATER QUALITY RESULTS SUMMARY, MONITORING WELLS AND PRODUCTION WELLS
1990-2008
JOHN DEERE DUBUQUE WORKS, DUBUQUE, IOWA

Source or Location	Sample Collection Date	Inorganic				Organic													
		Chromium (VI)	Chromium	Copper	Lead	1,1-Di-chloro-ethene	1,1-Di-chloro-ethane	1,2-Di chloro-ethene (total)	Chloro-form	1,1,1-Tri-chloro-ethane	Carbon Tetra-chloride	Tri-chloro-ethene	1,1,2-Trichloro-ethane	Benzene	Tetra-chloro-ethene	1,1,2,2-Tetra-chloro-ethane	Toluene	Ethyl-benzene	Total Xylenes
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Reporting Limit *		10	10	10	5.0	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	1.0	0.50	0.50	0.50
Cleanup Criteria		100	100	1,300	15	7	700	70	100	200	5	5	5	5	5	0.2	1,000	700	10,000
MW-9D	2/5/2008	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-9D	6/20/2006	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-9D	6/8/2004	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-9D	6/18/2002	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-9D	8/22/2000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-9D	7/21/1998	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-9D	7/8/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	1.10	< 0.50	< 0.50
MW-9D	7/17/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-9D	7/19/1995	< 10	< 10	< 20	< 10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-9D	7/19/1994	< 10	< 10	< 25	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	1.80	< 0.50	< 0.50
MW-9D	8/24/1993	< 10	< 8.0	8.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-9D	8/11/1992	< 10	< 10	< 25	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MW-9D	7/2/1991	< 10	---	< 6.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-9D	11/8/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-9D	8/30/1990	< 10	---	4.1	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-9D	5/8/1990	< 10	---	4.50	< 2.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-9D	2/26/1990	< 10	---	< 5.0	1.6	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-11S	2/5/2008	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-11S	6/20/2006	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-11S	6/8/2004	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-11S	6/18/2002	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-11S	8/22/2000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-11S	7/16/1998	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-11S	7/9/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-11S	7/17/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-11S	7/19/1995	< 10	< 10	< 20	< 10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-11S	7/19/1994	< 10	< 10	< 25	< 6	< 0.50	0.26 J	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	0.32 J	< 0.50	< 0.50
MW-11S	9/7/1993	< 10	< 8.0	< 3.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-11S	8/12/1992	< 10	< 10	< 25	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MW-11S	7/3/1991	< 10	---	< 6.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-11S	11/10/1990	22	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-11S	8/30/1990	< 10	---	4.3	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-11S	5/10/1990	< 10	---	< 4.00	< 2.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-11S	2/27/1990	140	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5

APPENDIX B. GROUNDWATER QUALITY RESULTS SUMMARY, MONITORING WELLS AND PRODUCTION WELLS
1990-2008
JOHN DEERE DUBUQUE WORKS, DUBUQUE, IOWA

Source or Location	Sample Collection Date	Inorganic				Organic													
		Chromium (VI)	Chromium	Copper	Lead	1,1-Di-chloro-ethene	1,1-Di-chloro-ethane	1,2-Di chloro-ethene (total)	Chloro-form	1,1,1-Tri-chloro-ethane	Carbon Tetra-chloride	Tri-chloro-ethene	1,1,2-Trichloro-ethane	Benzene	Tetra-chloro-ethene	1,1,2,2-Tetra-chloro-ethane	Toluene	Ethyl-benzene	Total Xylenes
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Reporting Limit *		10	10	10	5.0	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	1.0	0.50	0.50	0.50
Cleanup Criteria		100	100	1,300	15	7	700	70	100	200	5	5	5	5	5	0.2	1,000	700	10,000
MW-11D	2/5/2008	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-11D	6/20/2006	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-11D	6/8/2004	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-11D	6/18/2002	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-11D	8/22/2000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-11D	7/16/1998	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-11D	7/9/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-11D	7/17/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-11D	7/19/1995	< 10	< 10	< 20	< 5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-11D	7/19/1994	< 10	< 10	< 25	< 6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-11D	8/24/1993	19	< 8.0	< 3.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-11D	8/12/1992	< 10	< 10	< 25	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MW-11D	7/3/1991	< 10	---	< 6.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-11D	11/10/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-11D	8/30/1990	12	---	5.8	1.7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-11D	5/10/1990	< 10	---	< 4.00	< 2.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-11D	2/27/1990	< 10	---	< 5.0	2.5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5

APPENDIX B. GROUNDWATER QUALITY RESULTS SUMMARY, MONITORING WELLS AND PRODUCTION WELLS
1990-2008
JOHN DEERE DUBUQUE WORKS, DUBUQUE, IOWA

Source or Location	Sample Collection Date	Inorganic				Organic													
		Chromium (VI)	Chromium	Copper	Lead	1,1-Di-chloro-ethene	1,1-Di-chloro-ethane	1,2-Di chloro-ethene (total)	Chlorm-form	1,1,1-Tri-chloro-ethane	Carbon Tetra-chloride	Tri-chloro-ethene	1,1,2-Trichloro-ethane	Benzene	Tetra-chloro-ethene	1,1,2,2-Tetra-chloro-ethane	Toluene	Ethyl-benzene	Total Xylenes
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Reporting Limit *		10	10	10	5.0	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	1.0	0.50	0.50	0.50
Cleanup Criteria		100	100	1,300	15	7	700	70	100	200	5	5	5	5	5	0.2	1,000	700	10,000
MW-12	2/5/2008	---	---	---	---	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
MW-12	6/20/2006	---	---	---	---	< 1.0 UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
MW-12	6/9/2004	---	---	---	---	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
MW-12	6/18/2002	---	---	---	---	< 0.50	3.2	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-12	8/22/2000	---	---	---	---	< 0.50	22.0	0.64	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-12	7/15/1998	< 10	< 10	< 10	< 5.0	< 0.50	3.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-12	7/9/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-12	7/18/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-12	7/17/1995	< 10	< 10	< 25	< 10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	4.4	< 0.50	< 0.50
MW-12	7/19/1994	< 15	< 15	4.3 J	< 6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-12	9/7/1993	< 10	< 8.0	5.6	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-12	8/11/1992	< 10	< 10	< 25	< 3.0	< 5.0	23	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MW-12	7/3/1991	< 10	---	10.7	< 3.0	< 10	29	3	< 10	1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-12	11/7/1990	< 10	---	< 5.0	1.5	< 5	< 5	7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-12	8/29/1990	< 10	---	< 4.0	3.1	< 5	10	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-12	5/8/1990	20	---	< 4.00	2.10	< 5	12	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-12	2/26/1990	< 10	---	< 5.0	8.4	< 5	7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-13S	2/6/2008	---	---	---	---	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.5	< 1.0	< 1.0	0.30 J	3.9	7.3
MW-13S	6/21/2006	---	---	---	---	< 1.0 UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	13 J	< 1.0	< 1.0	0.78 UB	5	3
MW-13S	6/10/2004	---	---	---	---	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	24	< 1.0	< 1.0	3.2	37	62
MW-13S	6/18/2002	---	---	---	---	< 0.50	< 0.50	0.23 J	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	130 J	< 0.50	< 1.0	17 J	250 J	520 J
MW-13S	8/22/2000	---	---	---	---	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	19	< 0.50	< 1.0	2.4	150.0	130.0
MW-13S	7/15/1998	< 10	< 10	< 10	< 5.0	< 0.50	1.4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	15	< 0.50	< 1.0	1.9	8.3	3.7
MW-13S	7/9/1997	< 10	< 10	< 10	< 5.0	< 0.50	1.20	2.40	< 0.50	< 0.50	< 0.50	0.51	< 1.0	18.00	0.84	< 1.0	2.60	72.00	60.00
MW-13S	7/16/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-13S	7/18/1995	< 10	< 10	< 25	< 20	< 0.62	1.5	4.8	< 0.50	9.3	< 0.50	11	< 1.0	1.8	4.8	< 1.0	< 0.50	< 0.50	< 0.50
MW-13S	7/19/1994	< 10	< 10	< 25	< 6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.5	< 0.50	0.51	< 1.0	< 0.50	1.3	< 1.0	< 0.50	< 0.50	< 0.50
MW-13S	8/25/1993	< 10	< 8.0	3.9	1.5	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-13S	8/12/1992	< 10	< 10	< 25	< 3.0	< 5.0	< 5.0	< 5.0	1.3	< 5.0	< 5.0	< 5.0	< 5.0	48	< 5.0	< 5.0	2.0	6.1	10
MW-13S	7/3/1991	< 10	---	10.6	< 1.0	< 10	< 10	< 10	< 10	2	< 10	< 10	< 10	6	< 10	< 10	2	4	
MW-13S	11/8/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	< 5	< 5	< 5	< 5	< 5
MW-13S	8/29/1990	< 10	---	6.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	12	< 5	< 5	< 5	< 5	< 5
MW-13S	5/9/1990	< 10	---	< 4.00	< 2.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	13	< 5	< 5	< 5	< 5	< 5
MW-13S	2/26/1990	< 10	---	< 5.0	3.1	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	14	< 5	< 5	< 5	< 5	< 5

APPENDIX B. GROUNDWATER QUALITY RESULTS SUMMARY, MONITORING WELLS AND PRODUCTION WELLS
1990-2008
JOHN DEERE DUBUQUE WORKS, DUBUQUE, IOWA

Source or Location	Sample Collection Date	Inorganic				Organic													
		Chromium (VI)	Chromium	Copper	Lead	1,1-Di-chloro-ethene	1,1-Di-chloro-ethane	1,2-Di chloro-ethene (total)	Chloro-form	1,1,1-Tri-chloro-ethane	Carbon Tetra-chloride	Tri-chloro-ethene	1,1,2-Trichloro-ethane	Benzene	Tetra-chloro-ethene	1,1,2,2-Tetra-chloro-ethane	Toluene	Ethyl-benzene	Total Xylenes
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Reporting Limit *		10	10	10	5.0	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	1.0	0.50	0.50	0.50
Cleanup Criteria		100	100	1,300	15	7	700	70	100	200	5	5	5	5	5	0.2	1,000	700	10,000
MW-13D	2/5/2008	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-13D	6/20/2006	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-13D	6/8/2004	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-13D	6/18/2002	---	---	---	---	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-13D	8/22/2000	---	---	---	---	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-13D	7/15/1998	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-13D	7/9/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-13D	7/16/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.70	< 1.0	< 0.50	2.00	< 1.0	< 0.50	< 0.50	< 0.50
MW-13D	7/18/1995	< 10	< 10	< 25	< 5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-13D	7/19/1994	< 10	< 10	< 25	< 6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-13D	8/24/1993	< 10	< 8.0	< 3.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-13D	8/12/1992	< 10	< 10	< 25	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MW-13D	7/3/1991	< 10	---	< 6.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-13D	11/8/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-13D	8/29/1990	< 10	---	4.6	1.6	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-13D	5/9/1990	< 10	---	< 4.00	< 2.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-13D	2/27/1990	< 10	---	< 5.0	3.3	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-16	2/5/2008	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-16	6/20/2006	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-16	6/8/2004	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-16	6/18/2002	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-16	8/22/2000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-16	7/16/1998	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	0.65	< 0.50	0.84	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-16	7/9/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	0.77	< 0.50	1.30	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-16	7/18/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	1.40	< 0.50	1.70	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-16	7/18/1995	< 10	< 10	< 25	< 10	< 0.50	< 0.50	0.91	< 0.50	2.5	< 0.50	2.9	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-16	7/19/1994	< 10	< 10	< 25	< 12	< 0.50	< 0.50	< 0.50	< 0.50	1.3	< 0.50	3.5	< 1.0	< 0.50	0.31 J	< 1.0	< 0.50	< 0.50	< 0.50
MW-16	8/25/1993	< 10	< 8.0	< 3.0	< 1.0	< 10	< 10	1	< 10	1	< 10	2	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-16	8/11/1992	< 10	< 10	< 25	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	2.3	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MW-16	7/2/1991	< 10	---	< 6.0	< 1.0	< 10	< 10	< 10	< 10	1	< 10	[illegible]	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-16	11/7/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	[illegible]	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-16	8/29/1990	< 10	---	6.2	2.1	< 5	< 5	< 5	< 5	< 5	< 5	[illegible]	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-16	5/10/1990	< 10	---	< 4.00	< 2.00	< 5	< 5	< 5	< 5	< 5	< 5	[illegible]	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-16	2/28/1990	< 10	---	< 5.0	3.2	< 5	< 5	< 5	< 5	< 5	< 5	[illegible]	< 5	< 5	< 5	< 5	< 5	< 5	< 5

APPENDIX B. GROUNDWATER QUALITY RESULTS SUMMARY, MONITORING WELLS AND PRODUCTION WELLS
1990-2008
JOHN DEERE DUBUQUE WORKS, DUBUQUE, IOWA

Source or Location	Sample Collection Date	Inorganic				Organic													
		Chromium (VI)	Chromium	Copper	Lead	1,1-Di-chloro-ethene	1,1-Di-chloro-ethane	1,2-Di chloro-ethene (total)	Chloro-form	1,1,1-Tri-chloro-ethane	Carbon Tetra-chloride	Tri-chloro-ethene	1,1,2-Trichloro-ethane	Benzene	Tetra-chloro-ethene	1,1,2,2-Tetra-chloro-ethane	Toluene	Ethyl-benzene	Total Xylenes
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Reporting Limit *		10	10	10	5.0	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	1.0	0.50	0.50	0.50
Cleanup Criteria		100	100	1,300	15	7	700	70	100	200	5	5	5	5	5	0.2	1,000	700	10,000
MW-20S	2/5/2008	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-20S	6/20/2006	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-20S	6/8/2004	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-20S	6/18/2002	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-20S	8/22/2000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-20S	7/16/1998	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-20S	7/7/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-20S	7/17/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-20S	7/18/1995	< 10	< 10	< 25	< 10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-20S	7/19/1994	< 10	< 10	< 25	< 6	< 0.50	< 0.50	< 0.50	< 0.50	0.34 J	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-20S	9/7/1993	< 10	< 8.0	< 3.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-20S	8/12/1992	< 10	< 10	< 25	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MW-20S	8/22/1991	< 10	---	7.3	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-20S	11/9/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-20S	8/29/1990	< 10	---	< 4.0	3.1	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-20S	5/11/1990	< 10	---	< 4.00	2.60	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-20S	2/27/1990	< 10	---	< 5.0	2.3	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-20D	2/5/2008	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-20D	6/20/2006	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-20D	6/8/2004	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-20D	6/18/2002	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-20D	8/22/2000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-20D	7/16/1998	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-20D	7/7/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-20D	7/17/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-20D	7/18/1995	< 10	< 10	< 25	< 10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-20D	7/19/1994	< 15	< 15	< 25	< 6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
MW-20D	8/25/1993	< 10	< 8.0	< 3.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-20D	8/11/1992	< 10	< 10	< 25	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MW-20D	7/3/1991	< 10	---	< 10.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
MW-20D	11/9/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-20D	8/30/1990	12	---	< 4.0	2.2	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-20D	5/11/1990	< 10	---	< 4.00	< 2.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
MW-20D	2/27/1990	< 10	---	< 5.0	2.7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5

APPENDIX B. GROUNDWATER QUALITY RESULTS SUMMARY, MONITORING WELLS AND PRODUCTION WELLS
1990-2008
JOHN DEERE DUBUQUE WORKS, DUBUQUE, IOWA

Source or Location	Sample Collection Date	Inorganic				Organic													
		Chromium (VI)	Chromium	Copper	Lead	1,1-Di-chloro-ethene	1,1-Di-chloro-ethane	1,2-Di chloro-ethene (total)	Chloro-form	1,1,1-Tri-chloro-ethane	Carbon Tetra-chloride	Tri-chloro-ethene	1,1,2-Trichloro-ethane	Benzene	Tetra-chloro-ethene	1,1,2,2-Tetra-chloro-ethane	Toluene	Ethyl-benzene	Total Xylenes
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Reporting Limit *		10	10	10	5.0	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	1.0	0.50	0.50	0.50
Cleanup Criteria		100	100	1,300	15	7	700	70	100	200	5	5	5	5	5	0.2	1,000	700	10,000
PW-3A	2/4/2008	---	---	---	---	< 1.0	1.1	0.45 J	< 1.0	0.61 J	< 1.0	< 1.0	< 1.0	4.1	< 1.0	< 1.0	0.22 J	1.8	2.6
PW-3A	6/20/2006	---	---	---	---	< 1.0 UJ	1.8	1.1	< 1.0	0.53 J	< 1.0	< 1.0	< 1.0	0.21 J J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PW-3A	6/8/2004	---	---	---	---	< 1.0	2.0	1.6	< 1.0	0.89 J	< 1.0	0.19 J	< 1.0	2.4	< 1.0	< 1.0	< 1.0 UB	0.50 J	1.2 J
PW-3A	6/18/2002	---	---	---	---	< 0.50	3.1	3.9	< 0.50	1.4	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	0.98
PW-3A	8/22/2000	---	---	---	---	< 0.50	2.00	2.7	< 0.50	1.7	< 0.50	< 0.50	< 1.0	< 0.50	0.51	< 1.0	< 0.50	< 0.50	< 0.50
PW-3A	7/16/1998	< 10	< 10	< 10	< 5.0	< 0.50	1.40	2.9	< 0.50	1.7	< 0.50	< 0.50	< 1.0	0.81	< 0.50	< 1.0	< 0.50	< 0.50	1.1
PW-3A	7/8/1997	< 10	< 10	< 10	< 5.0	< 0.50	4.70	5.60	< 0.50	2.40	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	0.98	< 0.50	0.58
PW-3A	9/4/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	35	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	16	< 0.50	< 0.50
PW-3	7/16/1996	< 10	< 10	< 10	< 5.0	< 0.50	2.70	6.20	< 0.50	2.50	< 0.50	< 0.50	< 1.0	9.20 J	< 0.50	< 1.0	7.50 J	44.00 J	140.00 J
PW-3	7/18/1995	< 10	< 10	< 25	< 10	< 0.50	1.6	4.5	< 0.50	1.7	< 0.50	< 0.50	< 1.0	2.9	< 0.50	< 1.0	1.9	26	90
PW-3	7/19/1994	< 10	< 10	< 25	< 3	< 0.50	2.9	< 0.50	< 0.50	1.8	< 0.50	< 0.50	< 1.0	6.4	< 0.50	< 1.0	4.9	30	110
PW-3	8/23/1993	< 10	< 8.0	< 3.0	< 1.0	< 10	3	10	< 10	< 10	< 10	< 10	< 10	13	< 10	< 10	16	71	340
PW-3	8/10/1992	< 10	< 10	< 25	< 3.0	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	72	100
PW-3	7/2/1991	< 10	---	< 6.0	< 1.0	< 25	3	30	< 25	3	< 25	< 25	< 25	14	< 25	< 25	14	63	210
PW-3	11/8/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	9	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	17	53
PW-3	8/28/1990	< 10	---	< 4.0	< 1.0	< 10	< 10	17	< 10	< 10	< 10	< 10	< 10	10	< 10	< 10	10	32	130
PW-3	5/10/1990	< 10	---	< 4.00	< 2.00	< 25	< 25	37	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	33	150
PW-3	2/28/1990	< 10	---	< 5.0	1.2	< 5	2	56	< 5	1	< 5	4	< 5	11	< 5	< 5	15	33	140
PW-4A	2/4/2008	---	---	---	---	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.40 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
PW-4A	6/20/2006	---	---	---	---	0.2 J	0.17 J	0.62 J	< 1.0	1.6	< 1.0	2.9	< 1.0	1.1 J	0.84 J	< 1.0	< 1.0	4.0	11
PW-4A	6/8/2004	---	---	---	---	< 1.0	< 1.0	0.42 J	< 1.0	1.1	< 1.0	1.9	< 1.0	2.8	0.65 J	< 1.0	< 1.0 UB	5.2	19
PW-4A	6/18/2002	---	---	---	---	< 0.50	< 0.50	0.55	< 0.50	0.86	< 0.50	1.5	< 1.0	0.74 J	< 0.50	< 1.0	< 0.50 UJ	1.4 J	6.2 J
PW-4A	8/22/2000	---	---	---	---	< 0.50	< 0.50	0.66	< 0.50	1.20	< 0.50	1.8	< 1.0	1.60	0.87	< 1.0	0.39	6.4	29
PW-4A	7/14/1998	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	1.20	< 0.50	1.4	< 1.0	0.79	< 0.50	< 1.0	< 0.50	7.1	25
PW-4A	7/9/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	2.10	< 0.50	< 1.0	0.51	7.40	22.00
PW-4A	7/16/1996	< 10	< 10	< 10	< 5.0	< 0.50	0.59	1.30	< 0.50	1.80	< 0.50	2.60	< 1.0	0.99	0.90	< 1.0	0.79	7.80	25.00
PW-4A	7/18/1995	< 10	< 10	< 25	< 10	< 0.50	< 0.50	0.52	< 0.50	0.71	< 0.50	1.5	< 1.0	1.9	< 0.50	< 1.0	< 0.50	12	45
PW-4	7/19/1994	< 10	< 10	< 25	< 6	< 0.50	0.48 J	< 0.50	< 0.50	1.20	< 0.50	2.7	< 1.0	0.54	0.62	< 1.0	< 0.50	3.0	8.5
PW-4	8/23/1993	< 10	< 8.0	< 3.0	< 1.0	< 10	1	2	< 10	2	< 10	5	< 10	3	1	< 10	< 10	8	30
PW-4	8/10/1992	< 10	< 10	< 25	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	8.4
PW-4	7/2/1991	< 10	---	< 6.0	< 1.0	< 10	< 10	< 10	< 10	3	< 10	3	< 10	3	< 10	< 10	< 10	3	10
PW-4	11/7/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	6	< 5	< 5	< 5	< 5	< 5	< 5	12
PW-4	8/28/1990	< 10	---	4.6	< 1.0	< 5	< 5	< 5	< 5	6	< 5	6	< 5	< 5	< 5	< 5	< 5	< 5	11
PW-4	5/10/1990	< 10	---	< 4.00	< 2.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	5	20
PW-4	2/28/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	3	< 5	3	< 5	< 5	< 5	< 5	< 5	3	7

APPENDIX B. GROUNDWATER QUALITY RESULTS SUMMARY, MONITORING WELLS AND PRODUCTION WELLS
1990-2008
JOHN DEERE DUBUQUE WORKS, DUBUQUE, IOWA

Source or Location	Sample Collection Date	Inorganic				Organic													
		Chromium (VI)	Chromium	Copper	Lead	1,1-Di-chloro-ethene	1,1-Di-chloro-ethane	1,2-Di chloro-ethene (total)	Chloro-form	1,1,1-Tri-chloro-ethane	Carbon Tetra-chloride	Tri-chloro-ethene	1,1,2-Trichloro-ethane	Benzene	Tetra-chloro-ethene	1,1,2,2-Tetra-chloro-ethane	Toluene	Ethyl-benzene	Total Xylenes
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Reporting Limit *		10	10	10	5.0	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	1.0	0.50	0.50	0.50
Cleanup Criteria		100	100	1,300	15	7	700	70	100	200	5	5	5	5	5	0.2	1,000	700	10,000
PW-5	2/4/2008	---	---	---	---	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
PW-5	6/19/2006	---	---	---	---	< 1.0 UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
PW-5	6/8/2004	---	---	---	---	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
PW-5	6/18/2002	---	---	---	---	< 0.50	< 0.50	0.19 J	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	1.1 J	< 0.50	< 1.0	0.48 J	3.0 J	1.3 J
PW-5	8/22/2000	---	---	---	---	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	7.60	< 0.50	< 1.0	5.3	52	130
PW-5	7/15/1998	< 10	< 10	< 10	3.3	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	4.8	38	150
PW-5	7/9/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
PW-5	7/16/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
PW-5	7/18/1995	< 10	< 10	< 25	< 10	< 0.50	< 0.50	0.71	< 0.50	0.83	< 0.50	1.0	< 1.0	16	< 0.50	< 1.0	38	56	270
PW-5	7/19/1994	< 10	< 10	< 25	< 3	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
PW-5	8/24/1993	< 10	< 8.0	3.3	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	21	27	217
PW-5	8/10/1992	< 10	< 10	< 25	< 3.0	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	< 8.5	55	49	250
PW-5	7/1/1991	< 10	---	< 10.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
PW-5	11/9/1990	< 10	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	23	22	100
PW-5	8/28/1990	< 10	---	6.2	8.6	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	40	39	180
PW-5	5/10/1990	< 10	---	< 4.00	7.20	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	75	54	320
PW-5	2/28/1990	< 10	---	< 5.0	5.6	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
PW-7A	2/4/2008	---	---	---	---	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.38 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
PW-7A	6/20/2006	---	---	---	---	< 1.0 UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.40 J	< 1.0	< 1.0 UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
PW-7A	6/8/2004	---	---	---	---	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.29 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
PW-7A	6/18/2002	---	---	---	---	< 0.50	< 0.50	0.17 J	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
PW-7A	8/22/2000	---	---	---	---	< 0.50	< 0.50	< 0.50	< 0.50	0.42	< 0.50	0.73	< 1.0	< 0.50	0.49	< 1.0	< 0.50	< 0.50	< 0.50
PW-7A	7/14/1998	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
PW-7A	7/9/1997	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
PW-7A	7/16/1996	< 10	< 10	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	0.52	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
PW-7	7/18/1995																		
PW-7	7/19/1994	< 10	< 10	< 25	< 3	< 0.50	< 0.50	< 0.50	< 0.50	0.34 J	< 0.50	0.32 J	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
PW-7	9/23/1993	< 10	< 8.0	< 3.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
PW-7	8/10/1992	< 10	< 10	< 25	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
PW-7	7/2/1991	< 10	---	< 6.0	< 1.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
PW-7	11/7/1990	< 10	---	8.2	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
PW-7	8/28/1990	< 10	---	5.7	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
PW-7	5/23/1990	< 10	---	4.20	< 2.00	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
PW-7	2/28/1990	< 10	---	< 5.0	1.7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5

APPENDIX B. GROUNDWATER QUALITY RESULTS SUMMARY, MONITORING WELLS AND PRODUCTION WELLS
1990-2008
JOHN DEERE DUBUQUE WORKS, DUBUQUE, IOWA

Source or Location	Sample Collection Date	Inorganic				Organic													
		Chromium (VI)	Chromium	Copper	Lead	1,1-Di-chloro-ethene	1,1-Di-chloro-ethane	1,2-Di chloro-ethene (total)	Chloro-form	1,1,1-Tri-chloro-ethane	Carbon Tetra-chloride	Tri-chloro-ethene	1,1,2-Trichloro-ethane	Benzene	Tetra-chloro-ethene	1,1,2,2-Tetra-chloro-ethane	Toluene	Ethyl-benzene	Total Xylenes
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Reporting Limit *		10	10	10	5.0	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	1.0	0.50	0.50	0.50
Cleanup Criteria		100	100	1,300	15	7	700	70	100	200	5	5	5	5	5	0.2	1,000	700	10,000
SBW-3N		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SBW-3N	6/20/2006	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SBW-3N	6/8/2004	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SBW-3N	6/18/2002	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SBW-3N	8/22/2000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SBW-3N	7/14/1998	67	62	< 10	4.1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
SBW-3N	7/7/1997	48	51	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
SBW-3N	7/16/1996	< 10	98	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50
SBW-3	7/18/1995	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SBW-3	7/19/1994	37	34	< 25	< 6	< 0.50	< 0.50	< 0.50	0.26 J	1.2	< 0.50	0.49 J	< 1.0	< 0.50	0.43 J	< 1.0	< 0.50	< 0.50	< 0.50
SBW-3	9/23/1993	30	29.2	4.5	< 1.0	< 10	< 10	< 10	< 10	2	< 10	1	< 10	< 10	1	< 10	< 10	< 10	< 10
SBW-3	8/11/1992	42	39	< 25	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	5.8	< 5.0	2.0	< 5.0	< 5.0	8.0	< 5.0	< 5.0	< 5.0	< 5.0
SBW-3	7/4/1991	58	---	11.0	< 1.0	< 10	2	< 10	< 10	13	< 10	3	< 10	< 10	6	< 10	< 10	< 10	< 10
SBW-3	11/8/1990	30	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
SBW-3	8/30/1990	70	---	6.2	< 1.0	< 5	< 5	< 5	< 5	15	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
SBW-3	5/9/1990	40	---	< 4.00	< 2.00	< 5	8	< 5	< 5	34	< 5	6	< 5	< 5	< 5	< 5	< 5	< 5	< 5
SBW-3	2/28/1990	17	---	< 5.0	< 1.0	< 5	< 5	< 5	< 5	13	< 5	3	< 5	< 5	1	< 5	< 5	< 5	< 5
# Samples		215	125	215	215	262	262	262	262	262	262	262	262	262	262	262	262	262	262
# Detected Values		17	6	27	36	1	43	49	3	72	0	67	0	37	42	0	41	43	48
Maximum Value		140	98	12.7	11.6	< 50	29.0	56	35	34	< 50	11	< 50	130	28	< 50	75	250	520
Minimum Value		< 10	< 8	< 10	< 5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50

Laboratory services provided by Quanterra Environmental Services, Arvada, Colorado
ug/L = Micrograms per liter
(dup) = Duplicate sample
< = Not detected at or above specified detection limit.
* = Reporting limit was raised by the laboratory for some compounds as noted to address matrix interference
J = Estimated by laboratory due to value below lower calibration limit or positive result but been classified as qualitative during data validation
UB = Analyte detected in associated blank; result is non-detect at the reporting limit or the value reported if above the reporting limit
UJ = Analyte was analyzed for, but was not detected. The sample quantitation limit is presumed, and should be considered approximate
--- = Not analyzed.
Bold = Detected Values
Bold/Highlighted = Detected values above clean-up criteria
T:\F1034\2004\3rdQtr\90-04GW_ANALYTICAL.xls

Appendix C

NPDES Permit

IOWA DEPARTMENT OF NATURAL RESOURCES
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

NPDES PERMIT

PERMITTEE

John Deere Dubuque Works
18600 South John Deere Road
P.O. Box 538
Dubuque, Iowa 52004

IDENTITY AND LOCATION OF FACILITY

John Deere Dubuque Works
Section 35, T-90N, R-2E
Dubuque County, Iowa

IOWA NPDES PERMIT NUMBER: 31-26-1-07

RECEIVING WATERCOURSE

Little Maquoketa and Mississippi Rivers

DATE OF ISSUANCE: July 15, 1999

DATE OF EXPIRATION: July 14, 2004

YOU ARE REQUIRED TO FILE FOR RENEWAL OF THIS PERMIT BY: January 14, 2004

EPA NUMBER - IA 0000051

This permit is issued pursuant to the authority of section 402(b) of the Clean Water Act (33 U.S.C. 1342(b)), Iowa Code section 455B.174, and rule 567--64.3, Iowa Administrative Code. You are authorized to operate the disposal system and to discharge the pollutants specified in this permit in accordance with the effluent limitations, monitoring requirements and other terms set forth in this permit.

You may appeal any conditions of this permit by filing written notice of appeal and request for administrative hearing with the director of this department within 30 days of receipt of this permit.

Any existing, unexpired Iowa operation permit of Iowa NPDES permit previously issued by the department for the facility identified above is revoked by the issuance of this Iowa NPDES operation permit.

FOR THE DEPARTMENT OF NATURAL RESOURCES

Paul W. Johnson, Director

By _____
WAYNE FARRAND, Supervisor
Wastewater Section
ENVIRONMENTAL PROTECTION DIVISION

Outfall Number	Description
001	Old foundry area storm water only discharge
002	Non-contact cooling water, drinking fountain drains and storm water discharge through the north sedimentation pond which is equipped with an oil skimmer.
003	Treated domestic wastewater from an extended aeration treatment plant with polishing pond.
004	Condenser cooling water from electrical generator.
005	Non-contact cooling water, drinking fountain drains and storm water discharge through the south sedimentation pond which is equipped with an oil skimmer.
006	Stormwater discharge from Buildings W-3,4,5 and C-26,27 through the new sedimentation pond which is equipped with an oil skimmer.
008	Discharge consists of tractor wash booth drain, optional landfill leachate when recirculation is not viable and storm water discharge thru a sedimentation pond
009	Building Y storm water only discharge.
010	Drinking fountain drains and Building W-6 storm water discharge.
011	Wastewater from a physical chemical and biological treatment plant which treats all process wastewater from the facility.
012	Lot-A storm water only discharge.
013	West foundry area storm water only discharge.
014	North end area storm water only discharge from a pallet reclaim and scrap salvage area.
015	North V-1 storm water only discharge from a parts storage yard.
016	North Y-lot area storm water only discharge from a tractor storage yard.
017	Ringle yard area storm water only discharge from a tractor storage and shipping yard.
018	Center Y-lot storm water only discharge from a tractor storage yard.
019	South Y-lot storm water only discharge from a tractor storage yard.
020	South truck gate storm water only discharge from vehicle parking areas.
021	Building x-16 storm water only discharge.
022	Landfill ravine storm water only discharge.
023	Gottschalk ravine storm water only discharge from a natural ravine.
024	Site 4 test area stormwater only discharge.
025	NW corner property storm water only discharge
026	Guler ravine storm water only discharge.
027	X-18 access road storm water only discharge.
028	Dirt draw bar area storm water only discharge.
801	Combined discharge of outfalls 005 and 006.

Effluent Limitations

Permit Number: 3126107

OUTFALL NO.: 002 NON-CONTACT COOLING WATER, DRINKING FOUNTAIN DRAINS AND STORM WATER DISCHARGE THROUGH THE NORTH SEDIMENTATION PO

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

			EFFLUENT LIMITATIONS							
			Concentration				Mass			
Wastewater Parameter	Season	Type	7 Day Average	30 Day Average	Daily Maximum	Units	7 Day Average	30 Day Average	Daily Maximum	Units
FLOW	YEARLY	FINAL		3.5000	6.4000	MGD				
PH (MINIMUM - MAXIMUM)	YEARLY	FINAL	6.0000		9.0000	STD UNITS				
CHLORINE,TOTAL RESIDUAL	YEARLY	FINAL		.0500	.0760	MG/L		1.50	2.20	LBS/DAY
OIL AND GREASE	YEARLY	FINAL		10.0000	15.0000	MG/L		258.00	517.00	LBS/DAY
ACUTE TOXICITY, CERIODAPHNIA	YEARLY	FINAL						1.00		NON TOXIC
ACUTE TOXICITY, PIMEPHALES	YEARLY	FINAL						1.00		NON TOXIC

NOTE: If seasonal limits apply, summer is from April 1 through October 31, and winter is from November 1 through March 31.

Facility Name: John Deere Dubuque Works
Permit Number: 31-26-1-07

EFFLUENT LIMITATIONS

Outfall No.: 003
Treated domestic wastewater from an extended aeration treatment plant with polishing pond.

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

Wastewater Parameter	Season	Type	30-day Avg mg/l	Daily Max mg/l	30-day Avg lbs/day	Daily Max lbs/day
Flow (mgd)	Yearly	Final	0.20	0.24	-	-
BOD_5	Yearly	Final	30.0	45.0	50.0	75.0
TSS	Yearly	Final	30.0	45.0	50.0	75.0
Coliform, Fecal *	Seasonal	Final	-	20,700 Organisms/100 ml	-	-
pH (Min. - Max.)	Yearly	Final	6.0	9.0	STD UNITS	-

* Limits apply from April 1 through October 31

The discharge of total residual chlorine is prohibited. If chlorine is added to the discharge the concentration shall not exceed method detection limits using the EPA approved method with the lowest detection limit.

Facility Name: John Deere Dubuque Works
Permit Number: 31-26-1-07

EFFLUENT LIMITATIONS

Outfall No.: 004 Condenser cooling water from electrical generator

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

Wastewater Parameter	Season	Type	30-day Average	Daily Maximum	30-day Avg lbs/day	Daily Max lbs/day
Flow	Yearly	Final	21.5 mgd	23.0 mgd	-	-
Chlorine, Total Residual	Yearly	Final	-	0.20 mg/l	-	-
pH (minimum-maximum)	Yearly	Final	6.0 Std Units	10.0 Std Units	-	-
*Temperature	Yearly	Final	-	5.4° Fahrenheit		-

* See Page 19

Effluent Limitations

Permit Number: 3126107

OUTFALL NO.: 005 NON-CONTACT COOLING WATER, DRINKING FOUNTAIN DRAINS AND STORM WATER DISCHARGE THROUGH THE SOUTH SEDIMENTATION PO

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

Wastewater Parameter	Season	Type	EFFLUENT LIMITATIONS							
			Concentration				Mass			
			7 Day Average	30 Day Average	Daily Maximum	Units	7 Day Average	30 Day Average	Daily Maximum	Units
PH (MINIMUM - MAXIMUM)	YEARLY	FINAL	6.0000		9.0000	STD UNITS				
OIL AND GREASE	YEARLY	FINAL		10.0000	15.0000	MG/L				

NOTE: If seasonal limits apply, summer is from April 1 through October 31, and winter is from November 1 through March 31.

Effluent Limitations

Permit Number: 3126107

OUTFALL NO.: 006 STORMWATER DISCHARGE FROM BUILDINGS W-3,4,5 AND C-26,27 THROUGH THE NEW SEDIMENTATION POND WHICH IS EQUIPPED WIT

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

Wastewater Parameter	Season	Type	EFFLUENT LIMITATIONS							
			Concentration				Mass			
			7 Day Average	30 Day Average	Daily Maximum	Units	7 Day Average	30 Day Average	Daily Maximum	Units
PH (MINIMUM - MAXIMUM)	YEARLY	FINAL	6.0000		9.0000	STD UNITS				
OIL AND GREASE	YEARLY	FINAL		10.0000	15.0000	MG/L				

NOTE: If seasonal limits apply, summer is from April 1 through October 31, and winter is from November 1 through March 31.

Effluent Limitations

Permit Number: 3126107

OUTFALL NO.: 008 DISCHARGE CONSISTS OF TRACTOR WASH BOOTH DRAIN, OPTIONAL LANDFILL LEACHATE WHEN RECIRCULATION IS NOT VIABLE AND

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

			EFFLUENT LIMITATIONS							
			Concentration				Mass			
Wastewater Parameter	Season	Type	7 Day Average	30 Day Average	Daily Maximum	Units	7 Day Average	30 Day Average	Daily Maximum	Units
FLOW	YEARLY	FINAL		.0500	.2280	MGD				
AMMONIA NITROGEN (N)	JAN	FINAL		29.0000	43.0000	MG/L		22.00	33.00	LBS/DAY
AMMONIA NITROGEN (N)	FEB	FINAL		29.0000	43.0000	MG/L		22.00	33.00	LBS/DAY
AMMONIA NITROGEN (N)	MAR	FINAL		11.0000	16.0000	MG/L		9.00	13.00	LBS/DAY
AMMONIA NITROGEN (N)	APR	FINAL		11.0000	16.0000	MG/L		9.00	13.00	LBS/DAY
AMMONIA NITROGEN (N)	MAY	FINAL		11.0000	16.0000	MG/L		9.00	13.00	LBS/DAY
AMMONIA NITROGEN (N)	JUN	FINAL		15.0000	22.0000	MG/L		5.10	7.60	LBS/DAY
AMMONIA NITROGEN (N)	JUL	FINAL		10.0000	15.0000	MG/L		9.00	13.00	LBS/DAY
AMMONIA NITROGEN (N)	AUG	FINAL		10.0000	15.0000	MG/L		9.00	13.00	LBS/DAY
AMMONIA NITROGEN (N)	SEP	FINAL		11.0000	16.0000	MG/L		9.00	13.00	LBS/DAY
AMMONIA NITROGEN (N)	OCT	FINAL		11.0000	16.0000	MG/L		9.00	13.00	LBS/DAY
AMMONIA NITROGEN (N)	NOV	FINAL		11.0000	16.0000	MG/L		9.00	13.00	LBS/DAY
AMMONIA NITROGEN (N)	DEC	FINAL		11.0000	16.0000	MG/L		9.00	13.00	LBS/DAY
PH (MINIMUM - MAXIMUM)	YEARLY	FINAL	6.0000		9.0000	STD UNITS				
CADMIUM,TOTAL (AS CD)	YEARLY	FINAL		.0870	.1300	MG/L		.12	.18	LBS/DAY
CHROMIUM,TOTAL (AS CR)	YEARLY	FINAL		.1400	.2000	MG/L		.12	.17	LBS/DAY
COPPER,TOTAL (AS CU)	YEARLY	FINAL		.1300	.1900	MG/L		.11	.17	LBS/DAY
LEAD,TOTAL (AS PB)	YEARLY	FINAL		.4500	.6800	MG/L		.24	.36	LBS/DAY
ZINC,TOTAL (AS ZN)	YEARLY	FINAL		1.1300	1.7000	MG/L		.97	1.45	LBS/DAY

NOTE: If seasonal limits apply, summer is from April 1 through October 31, and winter is from November 1 through March 31.

Effluent Limitations

Permit Number: 3126107

OUTFALL NO.: 011 WASTEWATER FROM A PHYSICAL CHEMICAL AND BIOLOGICAL TREATMENT PLANT WHICH TREATS ALL PROCESS WASTEWATER FROM THE

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

			EFFLUENT LIMITATIONS							
			Concentration				Mass			
Wastewater Parameter	Season	Type	7 Day Average	30 Day Average	Daily Maximum	Units	7 Day Average	30 Day Average	Daily Maximum	Units
FLOW	YEARLY	FINAL		.3500	.4000	MGD				
BIOCHEMICAL OXYGEN DEMAND (BOD5)	YEARLY	FINAL		30.0000	45.0000	MG/L		88.00	131.00	LBS/DAY
TOTAL SUSPENDED SOLIDS	YEARLY	FINAL		31.0000	60.0000	MG/L		91.00	175.00	LBS/DAY
PH (MINIMUM - MAXIMUM)	YEARLY	FINAL	6.0000		9.0000	STD UNITS				
CADMIUM,TOTAL (AS CD)	YEARLY	FINAL		.2600	.6900	MG/L		.76	2.01	LBS/DAY
CHROMIUM,TOTAL (AS CR)	YEARLY	FINAL		1.7100	2.7700	MG/L		5.00	8.00	LBS/DAY
COPPER,TOTAL (AS CU)	YEARLY	FINAL		.5400	.8100	MG/L		1.80	2.70	LBS/DAY
CYANIDE,TOTAL (AS CN)	YEARLY	FINAL		.4600	.7000	MG/L		1.40	2.10	LBS/DAY
LEAD,TOTAL (AS PB)	YEARLY	FINAL		.4300	.6900	MG/L		1.26	2.00	LBS/DAY
NICKEL,TOTAL (AS NI)	YEARLY	FINAL		2.3800	3.9800	MG/L		7.00	11.62	LBS/DAY
OIL AND GREASE	YEARLY	FINAL		26.0000	52.0000	MG/L		76.00	152.00	LBS/DAY
SILVER,TOTAL (AS AG)	YEARLY	FINAL		.2400	.4300	MG/L		.70	1.26	LBS/DAY
TOTAL TOXIC ORGANICS	YEARLY	FINAL			2.1300	MG/L				
ZINC,TOTAL (AS ZN)	YEARLY	FINAL		1.4800	2.6100	MG/L		4.32	7.62	LBS/DAY

NOTE: If seasonal limits apply, summer is from April 1 through October 31, and winter is from November 1 through March 31.

Effluent Limitations

Permit Number: 3126107

OUTFALL NO.: 801 COMBINED DISCHARGE OF OUTFALLS 005 AND 006.

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

			EFFLUENT LIMITATIONS							
			Concentration				Mass			
Wastewater Parameter	Season	Type	7 Day Average	30 Day Average	Daily Maximum	Units	7 Day Average	30 Day Average	Daily Maximum	Units
FLOW	YEARLY	FINAL		9.5400	22.9600	MGD				
ACUTE TOXICITY, CERIODAPHNIA	YEARLY	FINAL						1.00		NON TOXIC
ACUTE TOXICITY, PIMEPHALES	YEARLY	FINAL						1.00		NON TOXIC

NOTE: If seasonal limits apply, summer is from April 1 through October 31, and winter is from November 1 through March 31.

Monitoring and Reporting Requirements

(a) Samples and measurements taken shall be representative of the volume and nature of the monitored wastewater.

(b) Analytical and sampling methods as specified in 40 CFR Part 136 or other methods approved in writing by the department, shall be utilized.

(c) Chapter 63 of the rules provides you with further explanation of your monitoring requirements.

(d) You are required to report all data including calculated results needed to determine compliance with the limitations contained in this permit. This includes daily maximums and minimums, 30-day averages and 7-day averages for all parameters that have concentration (mg/l) and mass (lbs/day) limits. Also, flow data shall be reported in million gallons per day (MGD).

(e) Results of all monitoring shall be recorded on forms provided by the department, and submitted to the department by the fifteenth day following the close of the reporting period. Your reporting period is on a monthly basis, ending on the last day of each month.

Outfall Number	Wastewater Parameter	Sample Frequency	Sample Type	Monitoring Location
002	FLOW	5/WEEK	24 HR TOTAL	FINAL EFFLUENT
002	PH (MINIMUM - MAXIMUM)	1/WEEK	GRAB	FINAL EFFLUENT
002	CHLORINE,TOTAL RESIDUAL	1/2 WEEKS	GRAB	FINAL EFFLUENT
002	OIL AND GREASE	1/WEEK	GRAB	FINAL EFFLUENT
002	TEMPERATURE	1/WEEK	GRAB	FINAL EFFLUENT
002	ACUTE TOXICITY, CERIODAPHNIA	1/12 MONTHS	24 HR COMP	FINAL EFFLUENT
002	ACUTE TOXICITY, PIMEPHALES	1/12 MONTHS	24 HR COMP	FINAL EFFLUENT
003	BIOCHEMICAL OXYGEN DEMAND (BOD5)	1/WEEK	24 HR COMP	RAW WASTE
003	TOTAL SUSPENDED SOLIDS	1/MONTH	24 HR COMP	RAW WASTE
003	PH (MINIMUM - MAXIMUM)	1/WEEK	GRAB	RAW WASTE
003	FLOW	7/WEEK	24 HR TOTAL	RAW WASTE OR FINAL EFFLUENT(FLOW)
003	BIOCHEMICAL OXYGEN DEMAND (BOD5)	1/WEEK	24 HR COMP	FINAL EFFLUENT
003	TOTAL SUSPENDED SOLIDS	1/MONTH	24 HR COMP	FINAL EFFLUENT
003	AMMONIA NITROGEN (N)	1/3 MONTH	24 HR COMP	FINAL EFFLUENT
003	PH (MINIMUM - MAXIMUM)	1/WEEK	GRAB	FINAL EFFLUENT
003	TEMPERATURE	1/WEEK	GRAB	FINAL EFFLUENT
003	COLIFORM,FECAL	1/3 MONTH	GRAB	EFFLUENT AFTER DISINFECTION - APRIL 1 THROUGH OCTOBER 31
003	DISSOLVED OXYGEN (MINIMUM)	2/WEEK	GRAB	AERATION BASIN CONTENTS
003	SOLIDS,MIXED LIQUOR SUSPENDED	2/WEEK	GRAB	AERATION BASIN CONTENTS
003	TEMPERATURE	2/WEEK	GRAB	AERATION BASIN CONTENTS
003	30-MINUTE SETTLEABILITY	2/WEEK	GRAB	AERATION BASIN CONTENTS

Monitoring and Reporting Requirements

(a) Samples and measurements taken shall be representative of the volume and nature of the monitored wastewater.

(b) Analytical and sampling methods as specified in 40 CFR Part 136 or other methods approved in writing by the department, shall be utilized.

(c) Chapter 63 of the rules provides you with further explanation of your monitoring requirements.

(d) You are required to report all data including calculated results needed to determine compliance with the limitations contained in this permit. This includes daily maximums and minimums, 30-day averages and 7-day averages for all parameters that have concentration (mg/l) and mass (lbs/day) limits. Also, flow data shall be reported in million gallons per day (MGD).

(e) Results of all monitoring shall be recorded on forms provided by the department, and submitted to the department by the fifteenth day following the close of the reporting period. Your reporting period is on a monthly basis, ending on the last day of each month.

Outfall Number	Wastewater Parameter	Sample Frequency	Sample Type	Monitoring Location
004	FLOW	1/MONTH	24 HR TOTAL	FINAL EFFLUENT
004	PH (MINIMUM - MAXIMUM)	1/MONTH	GRAB	FINAL EFFLUENT
004	TEMPERATURE	1/MONTH	GRAB	FINAL EFFLUENT
004	TEMPERATURE	1/MONTH	GRAB	RIVER INTAKE UPSTREAM OF ACTUAL INTAKE BEYOND INFLUENCE OF RE-CIRCULATED WATER
004	CHLORINE,TOTAL RESIDUAL	1/BATCH	GRAB	CONDENSER OUTLET #2
004	CHLORINE,TOTAL RESIDUAL	1/BATCH	GRAB	CONDENSER OUTLET #4
005	PH (MINIMUM - MAXIMUM)	1/WEEK	GRAB	FINAL EFFLUENT
005	OIL AND GREASE	1/WEEK	GRAB	FINAL EFFLUENT
005	TEMPERATURE	1/WEEK	GRAB	FINAL EFFLUENT
006	PH (MINIMUM - MAXIMUM)	1/WEEK	GRAB	FINAL EFFLUENT
006	OIL AND GREASE	1/WEEK	GRAB	FINAL EFFLUENT
006	TEMPERATURE	1/WEEK	GRAB	FINAL EFFLUENT
008	FLOW	1/WEEK	24 HR TOTAL	FINAL EFFLUENT
008	AMMONIA NITROGEN (N)	1/3 MONTH	GRAB	FINAL EFFLUENT
008	PH (MINIMUM - MAXIMUM)	1/MONTH	GRAB	FINAL EFFLUENT
008	CADMIUM,TOTAL (AS CD)	1/MONTH	GRAB	FINAL EFFLUENT
008	CHROMIUM,TOTAL (AS CR)	1/MONTH	GRAB	FINAL EFFLUENT
008	COPPER,TOTAL (AS CU)	1/MONTH	GRAB	FINAL EFFLUENT
008	LEAD,TOTAL (AS PB)	1/MONTH	GRAB	FINAL EFFLUENT
008	TEMPERATURE	1/MONTH	GRAB	FINAL EFFLUENT
008	ZINC,TOTAL (AS ZN)	1/MONTH	GRAB	FINAL EFFLUENT

Monitoring and Reporting Requirements

(a) Samples and measurements taken shall be representative of the volume and nature of the monitored wastewater.

(b) Analytical and sampling methods as specified in 40 CFR Part 136 or other methods approved in writing by the department, shall be utilized.

(c) Chapter 63 of the rules provides you with further explanation of your monitoring requirements.

(d) You are required to report all data including calculated results needed to determine compliance with the limitations contained in this permit. This includes daily maximums and minimums, 30-day averages and 7-day averages for all parameters that have concentration (mg/l) and mass (lbs/day) limits. Also, flow data shall be reported in million gallons per day (MGD).

(e) Results of all monitoring shall be recorded on forms provided by the department, and submitted to the department by the fifteenth day following the close of the reporting period. Your reporting period is on a monthly basis, ending on the last day of each month.

Outfall Number	Wastewater Parameter	Sample Frequency	Sample Type	Monitoring Location
009	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
010	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
011	FLOW	7/WEEK	24 HR TOTAL	FINAL EFFLUENT
011	BIOCHEMICAL OXYGEN DEMAND (BOD5)	2/WEEK	24 HR COMP	FINAL EFFLUENT
011	TOTAL SUSPENDED SOLIDS	2/WEEK	24 HR COMP	FINAL EFFLUENT
011	PH (MINIMUM - MAXIMUM)	2/WEEK	GRAB	FINAL EFFLUENT
011	CADMIUM,TOTAL (AS CD)	1/3 MONTH	24 HR COMP	FINAL EFFLUENT
011	CHROMIUM,TOTAL (AS CR)	1/3 MONTH	24 HR COMP	FINAL EFFLUENT
011	COPPER,TOTAL (AS CU)	1/3 MONTH	24 HR COMP	FINAL EFFLUENT
011	CYANIDE,TOTAL (AS CN)	1/6 MONTH	GRAB	FINAL EFFLUENT
011	LEAD,TOTAL (AS PB)	1/3 MONTH	24 HR COMP	FINAL EFFLUENT
011	NICKEL,TOTAL (AS NI)	1/3 MONTH	24 HR COMP	FINAL EFFLUENT
011	OIL AND GREASE	2/WEEK	GRAB	FINAL EFFLUENT
011	SILVER,TOTAL (AS AG)	1/6 MONTH	24 HR COMP	FINAL EFFLUENT
011	TEMPERATURE	2/WEEK	GRAB	FINAL EFFLUENT
011	TOTAL TOXIC ORGANICS	1/6 MONTH	GRAB	FINAL EFFLUENT
011	ZINC,TOTAL (AS ZN)	1/3 MONTH	24 HR COMP	FINAL EFFLUENT
011	BENZENE	1/6 MONTH	GRAB	FINAL EFFLUENT
011	ETHYLBENZENE	1/6 MONTH	GRAB	FINAL EFFLUENT
011	TRICHLOROETHANE	1/6 MONTH	GRAB	FINAL EFFLUENT
011	1,1-DICHLOROETHENE	1/6 MONTH	GRAB	FINAL EFFLUENT

Monitoring and Reporting Requirements

(a) Samples and measurements taken shall be representative of the volume and nature of the monitored wastewater.

(b) Analytical and sampling methods as specified in 40 CFR Part 136 or other methods approved in writing by the department, shall be utilized.

(c) Chapter 63 of the rules provides you with further explanation of your monitoring requirements.

(d) You are required to report all data including calculated results needed to determine compliance with the limitations contained in this permit. This includes daily maximums and minimums, 30-day averages and 7-day averages for all parameters that have concentration (mg/l) and mass (lbs/day) limits. Also, flow data shall be reported in million gallons per day (MGD).

(e) Results of all monitoring shall be recorded on forms provided by the department, and submitted to the department by the fifteenth day following the close of the reporting period. Your reporting period is on a monthly basis, ending on the last day of each month.

Outfall Number	Wastewater Parameter	Sample Frequency	Sample Type	Monitoring Location
011	1,1-DICHLOROETHANE	1/6 MONTH	GRAB	FINAL EFFLUENT
011	1,2-DICHLOROETHENE	1/6 MONTH	GRAB	FINAL EFFLUENT
011	CHLOROFORM	1/6 MONTH	GRAB	FINAL EFFLUENT
011	1,1,1-TRICHLOROETHANE	1/6 MONTH	GRAB	FINAL EFFLUENT
011	CARBON TETRACHLORIDE	1/6 MONTH	GRAB	FINAL EFFLUENT
011	1,1,2,2,-TETRACHLOROETHANE	1/6 MONTH	GRAB	FINAL EFFLUENT
011	TRICHLOROETHENE	1/6 MONTH	GRAB	FINAL EFFLUENT
011	TETRACHLOROETHENE	1/6 MONTH	GRAB	FINAL EFFLUENT
011	TOLUENE	1/6 MONTH	GRAB	FINAL EFFLUENT
011	XYLENE	1/6 MONTH	GRAB	FINAL EFFLUENT
014	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
015	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
016	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
017	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
018	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
019	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
020	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
021	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
023	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
024	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
025	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS

Monitoring and Reporting Requirements

(a) Samples and measurements taken shall be representative of the volume and nature of the monitored wastewater.

(b) Analytical and sampling methods as specified in 40 CFR Part 136 or other methods approved in writing by the department, shall be utilized.

(c) Chapter 63 of the rules provides you with further explanation of your monitoring requirements.

(d) You are required to report all data including calculated results needed to determine compliance with the limitations contained in this permit. This includes daily maximums and minimums, 30-day averages and 7-day averages for all parameters that have concentration (mg/l) and mass (lbs/day) limits. Also, flow data shall be reported in million gallons per day (MGD).

(e) Results of all monitoring shall be recorded on forms provided by the department, and submitted to the department by the fifteenth day following the close of the reporting period. Your reporting period is on a monthly basis, ending on the last day of each month.

Outfall Number	Wastewater Parameter	Sample Frequency	Sample Type	Monitoring Location
026	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
027	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
028	STORMWATER	1/3 MONTH	VISUAL	SEE PAGE 7 OF STORM WATER REQUIREMENTS
801	FLOW	5/WEEK	24 HR TOTAL	FINAL EFFLUENT
801	ACUTE TOXICITY, CERIODAPHNIA	1/12 MONTHS	24 HR COMP	FINAL EFFLUENT
801	ACUTE TOXICITY, PIMEPHALES	1/12 MONTHS	24 HR COMP	FINAL EFFLUENT

Facility Name: John Deere Dubuque Works
Permit Number: 31-26-1-07

SPECIAL MONITORING REQUIREMENTS

Total Residual Chlorine: Outfall 004

Samples shall be collected at the condenser discharge before mixing with other wastestreams. Samples need to be collected only on days that the condenser is chlorinated.

Total Toxic Organics: Outfall 011

Total Toxic Organic pollutants shall be limited to the following parameters:

1,1 DCE	CARBON TET.
1,1 DCA	CHLOROFORM
T-1,2-DCE	BENZENE
1,1,1-TCA	ETHYLBENZENE
1,1,2 - TRICHLOROETHANE	TOLUENE
TETRACHLOROETHANE	XYLENE
1,1,2,2 TETRACHLOROETHANE	TCE

Stormwater: Outfall 009, 010, 014, 015, 016, 017, 018, 019, 020, 021, 023, 024, 025, 026, 027, and 028

See the attached "Stormwater Discharge Requirements" for Outfall applicability and monitoring parameters. Where an Outfall requires stormwater monitoring, the monitoring shall be conducted at the frequency and location specified by the "Monitoring and Reporting Requirements".

If John Deere maintains that each outfall in the groupings drains similarly compared to the other outfalls in the same groupings and probably contain similar pollutants, it is acceptable to conduct stormwater monitoring at only one of the outfalls in each grouping.

Facility Name: John Deere Dubuque Works
Permit Number: 31-26-1-07
Outfall Number: 002

Ceriodaphnia and Pimephales Toxicity Effluent Testing

1. For facilities that have not been required to conduct toxicity testing by a previous NPDES permit, the annual toxicity test shall be conducted within three months of permit issuance and at least annually thereafter. For facilities that have been required to conduct toxicity testing by a previous NPDES permit, the initial annual toxicity test shall be conducted within twelve months (12) of the last toxicity test.

2. The test organisms that are to be used for acute toxicity testing shall be *Ceriodaphnia dubia* and *Pimephales promelas*. The acute toxicity testing procedures used to demonstrate compliance with permit limits shall be those listed in 40 CFR Part 136 and adopted by reference in rule 567--63.1(1). The method for measuring acute toxicity is specified in USEPA. 1993. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. Fourth Edition. Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio August 1993, EPA/600/4-90/027F.

3. **The diluted effluent sample must contain a minimum of 91.8% effluent and no more than 8.2% of culture water.**

4. One valid positive toxicity result will require quarterly testing for effluent toxicity.

5. Two successive valid positive toxicity results or three positive results out of five successive valid effluent toxicity tests will require a toxic reduction evaluation to be completed to eliminate the toxicity.

6. A non-toxic test result shall be indicated as a "1" on the monthly operation report. A toxic test result shall be indicated as a "2" on the monthly operation report. DNR Form 542-1381 shall also be submitted to the DNR field office along with the monthly operation report.

Ceriodaphnia and Pimephales Toxicity Effluent Limits

The 30 day average mass limit of "1" for the parameters Acute Toxicity, Ceriodaphnia and Acute Toxicity, Pimephales means no positive toxicity results.

Definition: "Positive toxicity result" means a statistical difference of mortality rate between the control and the diluted effluent sample. For more information see USEPA. 1993. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. Fourth Edition. Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio August 1993, EPA/600/4-90/027F.

Facility Name: John Deere Dubuque Works
Permit Number: 31-26-1-07
Outfall Number: 801

Ceriodaphnia and Pimephales Toxicity Effluent Testing

1. For facilities that have not been required to conduct toxicity testing by a previous NPDES permit, the annual toxicity test shall be conducted within three months of permit issuance and at least annually thereafter. For facilities that have been required to conduct toxicity testing by a previous NPDES permit, the initial annual toxicity test shall be conducted within twelve months (12) of the last toxicity test.

2. The test organisms that are to be used for acute toxicity testing shall be *Ceriodaphnia dubia* and *Pimephales promelas*. The acute toxicity testing procedures used to demonstrate compliance with permit limits shall be those listed in 40 CFR Part 136 and adopted by reference in rule 567--63.1(1). The method for measuring acute toxicity is specified in USEPA. 1993. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. Fourth Edition. Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio August 1993, EPA/600/4-90/027F.

3. **The diluted effluent sample must contain a minimum of 79% effluent and no more than 21% of culture water.**

4. One valid positive toxicity result will require quarterly testing for effluent toxicity.

5. Two successive valid positive toxicity results or three positive results out of five successive valid effluent toxicity tests will require a toxic reduction evaluation to be completed to eliminate the toxicity.

6. A non-toxic test result shall be indicated as a "1" on the monthly operation report. A toxic test result shall be indicated as a "2" on the monthly operation report. DNR Form 542-1381 shall also be submitted to the DNR field office along with the monthly operation report.

Ceriodaphnia and Pimephales Toxicity Effluent Limits

The 30 day average mass limit of "1" for the parameters Acute Toxicity, Ceriodaphnia and Acute Toxicity, Pimephales means no positive toxicity results.

Definition: "Positive toxicity result" means a statistical difference of mortality rate between the control and the diluted effluent sample. For more information see USEPA. 1993. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. Fourth Edition. Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio August 1993, EPA/600/4-90/027F.

Facility Name: John Deere Dubuque Works
IA NPDES permit #: 31-26-1-07
Outfall #: 004

SPECIAL EFFLUENT LIMITATIONS

Compliance with the temperature limitations for Outfall #004, which prohibits the discharge of water which would increase the ambient stream temperature by more than 3 °C (5.4 °F), shall be determined by using the following formula for calculating temperature increase:

$$\Delta T = \frac{(D)}{Q} \times (T_d - T_q)$$

Where:

ΔT = temperature increase across mixing zone
T_d = temperature of discharge (°F)
T_q = temperature of river at intake (°F)
D = discharge flow (mgd)
Q = mixing zone flow (82.3 mgd)

The temperature of the river at intake (T_q) shall be measured upstream of the actual intake at a point beyond the influence of re-circulated water flow.

Appendix D

February 4, 2008 Five-Year Review Site Inspection Check List, Interview Summary Forms, and Photograph Log

Appendix C
Five-Year Review Interviews

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Five-Year Review Interviews

Information gathered from interviews during the site inspection may be key to understanding site status. Interviews should be conducted with various individuals or groups, including the operation and maintenance (O&M) site manager, O&M staff, local regulatory authorities and response agencies, community action groups or associations, site neighbors, and other stakeholders.

When conducting an interview, the interviewer should note the date of the interview, and the name, title, and affiliation of the person interviewed. The interviewer should also indicate whether the interview was conducted at the site, the office, or by phone. Written documentation of the interview should briefly summarize the discussion, address any problems or successes with the implementation of the remedy, and provide suggestions for future reference. Forms to use during interviews are provided at the end of this appendix.

The following tables provide lists of potential individuals to interview and the type of information which may be obtained during the interviews. The potential individuals to be interviewed are categorized by their ability to provide the following types of information:

- Background information;
- State and local considerations;
- Construction considerations; and
- Performance, Operation and maintenance problems.

All of these individuals may be contacted during the five-year review. In most cases interviewing only a few key individuals will provide sufficient information for the review.

Background Information

The individuals listed below may provide information concerning previous and current concerns about the site, influences that affected the remedy decision, and further clarification on decisions made during remedy selection.

Interview	Information Sought
Previous EPA Staff/Management	– staff members may offer insight and clarification on decisions made during remedy selection and implementation
Nearest Neighbors	– neighbors may provide insight into the enforcement of institutional controls, changes in land use, trespassing, and unusual or unexpected activity at the site

Interview	Information Sought
Community Representatives*	– members of the community may provide a broader view of site activities and issues than can be obtained during the site inspection

* Several types of individuals may be interviewed: residents/businesses adjacent to or on the site; residents/businesses within the path of migration; local civic leaders, local officials, Community Advisory Group (CAG), Technical Assistance Grant (TAG) group, and local environmental groups; and other audiences listed in the community profile in the Community Involvement Plan.

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. What effects have site operations had on the surrounding community?

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

5. Do you feel well informed about the site's activities and progress?

6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

State and Local Considerations

State and local authorities may provide you with information about changes in State laws and regulations and present and prospective land uses and restrictions.

Interview	Information Sought
State Contacts (including those responsible for State water quality, hazardous waste, and environmental health issues)	– changes in State laws and regulations that may impact protectiveness – whether the site has been in compliance with permitting or reporting requirements – information on site activities, status, and issues
Local Authorities (such as police, emergency response or fire departments, and local environmental or planning offices)	– status of institutional controls, site access controls, new ordinances in place, changes in actual or projected land use, complaints being filed, and unusual activities at the site

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

4. Do you feel well informed about the site's activities and progress?

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Construction Considerations

It is important for you to determine the status of construction at the site and to ensure that health and safety concerns are addressed:

Interview	Information Sought
Construction Contractor	– progress of project and changes in design due to field conditions – revisions to the O&M Manual, implementation of the Health and Safety Plan/Contingency Plan – insight into potential O&M problems
Construction Manager	– overview of all contractor construction activities at the site, health and safety issues, site protectiveness during construction, and the quality of the construction
Local Emergency Response Officials	– adequacy of contractor's Health and Safety Plan and the contractor's implementation of the Plan – adequacy of contractor's emergency response duties as outlined in the Contingency Plan or Emergency Response Plan of the Health and Safety Plan

Some example interview questions for remedial actions still under construction are given below.

1. What is your overall impression of the project? (general sentiment).

2. What is the current status of construction (*e.g.*, budget and schedule)?

3. Have any problems been encountered which required, or will require, changes to this remedial design or this ROD?

4. Have any problems or difficulties been encountered which have impacted construction progress or implementability?

5. Do you have any comments, suggestions, or recommendations regarding the project (i.e., design, construction documents, constructability, management, regulatory agencies, etc.)?

Performance, Operation And Maintenance Problems

The following individuals may provide information to you regarding the performance of the remedy and status of O&M at the site so that the team can assess the progress of the implementation and effectiveness of the remedy, and any O&M problems.

Interview	Information Sought
O&M Manager/Operating Contractor	– O&M status of the remedy, compliance with permit and reporting requirements, and complaints filed – effectiveness of the O&M Plan – information about any potential causes for concern about the remedy – progress and performance of the remedy
O&M Staff	– effectiveness of the O&M Manual – information about any potential causes for concern about the remedy – Recommendations for adjusting the mode of operation or optimizing the operations protocol
Remedial Design/Remedial Action Consultant	– original concepts behind the O&M of the remedy – questions about remedial design parameters, expected performance and cost, and changes that have occurred during implementation

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Is the remedy functioning as expected? How well is the remedy performing?

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

8. Do you have any comments, suggestions, or recommendations regarding the project?

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
George Hellert	Supervisor Environmental Engineering Dept.	John Deere - Dubuque	02/04/08
Kathy Thalman	Project Manager	ARCADIS	02/04/08
Bob Drustrup	Project Manager	IDNR	02/12/08

INTERVIEW RECORD

Site Name: John Deere - Dubuque Works		EPA ID No.: IAD005269527	
Subject: Fourth Five Year Review		Time: 10:30	Date: 02/04/08
Type: ☐ Telephone ☒ Visit ☐ Other Location of Visit: John Deere Dubuque Works Site		☐ Incoming ☐ Outgoing	

Contact Made By:

Name: Bill Gresham	Title: RPM	Organization: EPA

Individual Contacted:

Name: George Hellert	Title: Supervisor, Environmental Engineering Dept	Organization: John Deere - Dubuque	
Telephone No: 563-589-6332 Fax No: 563-589-6001 E-Mail Address: HellertGeorgeK@JohnDeere.com		Street Address: Dept:955 P.O. Box 538 City, State, Zip: Dubuque, Iowa 52004-0538	

Summary Of Conversation

I spoke to Mr. Hellert about O&M at the site. The facility continues to pump wells to depress the water table, to ~~depress~~ control NAPL/dissolved contamination. Well No. 5 is in reserve now (the pump has been pulled). The facility is in compliance with all permits (air - Title V; construction permits; NPDES permit; water withdrawal & dredging permits; landfilling permits to fill sediments dredged). He has no concern with the remedy, which he believes to be making progress and performing well. There have been no complaints from nearby residents.

INTERVIEW RECORD

Site Name: John Deere - Dubuque Works	EPA ID No.: IAD005269527
Subject: Fourth Five Year Review	Time: 12:45 Date: 02/04/08
Type: ☐ Telephone ☒ Visit ☐ Other Location of Visit: John Deere Dubuque Works Site	☐ Incoming ☐ Outgoing

Contact Made By:

Name:	Title:	Organization:
Bill Gresham	RPM	EPA

Individual Contacted:

Name:	Title:	Organization:
Kathy Tholman	Project Manager	ARCADIS G&M

Telephone No: 813-903-3100 Fax No: 813-903-3129 E-Mail Address: kthalman@arcadis-us.com	Street Address: 14055 Riveredge Drive, Suite 400 City, State, Zip: Tampa, Florida 33637

Summary Of Conversation

Ms Thalman and I discussed O&M at the site. For the wells, which are production wells, maintenance is regular because they are production wells. Pumping creates an inward gradient (as required). Costs are included in plant operation. She has no concern regarding the effectiveness of the remedy, and is aware of no complaints from nearby residents.

INTERVIEW RECORD

Site Name: John Deere - Dubuque Works		EPA ID No.: IAD005269527	
Subject: Fourth Five Year Review		Time: 9:30	Date: 02/12/08
Type: ☒ Telephone ☐ Visit ☐ Other Location of Visit:		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name: Bill Gresham	Title: RPM	Organization: EPA	
Individual Contacted:			
Name: Bob Drustrup	Title: Environmental Engineer	Organization: IDNR	
Telephone No: 515-281-8900 Fax No: 515-281-8895 E-Mail Address: Bob.Drustrup@dnr.state.ia.us		Street Address: 900 East Grand Ave City, State, Zip: Des Moines, IA 50319	

Summary Of Conversation

Mr. Drustrup did not indicate any concerns regarding the site, based on his consistent review of project deliverables. He feels the progress and performance of the remedy is reasonable, and has heard of no complaints from nearby residents.

Appendix D
Five-Year Review Site Inspection Checklist

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Five-Year Review Site Inspection Checklist

Purpose of the Checklist

The site inspection checklist provides a useful method for collecting important information during the site inspection portion of the five-year review. The checklist serves as a reminder of what information should to be gathered and provides the means of checking off information obtained and reviewed, or information not available or applicable. The checklist is divided into sections as follows:

I. Site Information
II. Interviews
III. On-site Documents & Records Verified
IV. O&M Costs
V. Access and Institutional Controls
VI. General Site Conditions
VII. Landfill Covers
VIII. Vertical Barrier Walls
IX. Groundwater/Surface Water Remedies
X. Other Remedies
XI. Overall Observations

Some data and information identified in the checklist may or may not be available at the site depending on how the site is managed. Sampling results, costs, and maintenance reports may be kept on site or may be kept in the offices of the contractor or at State offices. In cases where the information is not kept at the site, the item should not be checked as "not applicable," but rather it should be obtained from the office or agency where it is maintained. If this is known in advance, it may be possible to obtain the information before the site inspection.

This checklist was developed by EPA and the U.S. Army Corps of Engineers (USACE). It focuses on the two most common types of remedies that are subject to five-year reviews: landfill covers, and groundwater pump and treat remedies. Sections of the checklist are also provided for some other remedies. The sections on general site conditions would be applicable to a wider variety of remedies. The checklist should be modified to suit your needs when inspecting other types of remedies, as appropriate.

The checklist may be completed and attached to the Five-Year Review report to document site status. Please note that the checklist is not meant to be completely definitive or restrictive; additional information may be supplemented if the reviewer deems necessary. Also note that actual site conditions should be documented with photographs whenever possible.

Using the Checklist for Types of Remedies

The checklist has sections designed to capture information concerning the main types of remedies which are found at sites requiring five-year reviews. These remedies are landfill covers (Section VII of the checklist) and groundwater and surface water remedies (Section IX of the checklist). The primary elements and appurtenances for these remedies are listed in sections which can be checked off as the facility is inspected. The opportunity is also provided to note site conditions, write comments on the facilities, and attach any additional pertinent information. If a site includes remedies beyond these, such as soil vapor extraction or soil landfarming, the information should be gathered in a similar manner and attached to the checklist.

Considering Operation and Maintenance Costs

Unexpectedly widely varying or unexpectedly high O&M costs may be early indicators of remedy problems. For this reason, it is important to obtain a record of the original O&M cost estimate and of annual O&M costs during the years for which costs incurred are available. Section IV of the checklist provides a place for documenting annual costs and for commenting on unanticipated or unusually high O&M costs. A more detailed categorization of costs may be attached to the checklist if available. Examples of categories of O&M costs are listed below.

Operating Labor - This includes all wages, salaries, training, overhead, and fringe benefits associated with the labor needed for operation of the facilities and equipment associated with the remedial actions.

Maintenance Equipment and Materials - This includes the costs for equipment, parts, and other materials required to perform routine maintenance of facilities and equipment associated with a remedial action.

Maintenance Labor - This includes the costs for labor required to perform routine maintenance of facilities and for equipment associated with a remedial action.

Auxiliary Materials and Energy - This includes items such as chemicals and utilities which can include electricity, telephone, natural gas, water, and fuel. Auxiliary materials include other expendable materials such as chemicals used during plant operations.

Purchased Services - This includes items such as sampling costs, laboratory fees, and other professional services for which the need can be predicted.

Administrative Costs - This includes all costs associated with administration of O&M not included under other categories, such as labor overhead.

Insurance, Taxes and Licenses - This includes items such as liability and sudden and accidental insurance, real estate taxes on purchased land or right-of-way, licensing fees for certain technologies, and permit renewal and reporting costs.

Other Costs - This includes all other items which do not fit into any of the above categories.

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Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: John Deere Dubuque Works	**Date of inspection:** Feb. 4, 2008
Location and Region: Dubuque, IA Region 7	**EPA ID:** IAD005269527
Agency, office, or company leading the five-year review: EPA Region 7	**Weather/temperature:** cloudy, drizzly, 35°F

Remedy Includes: (Check all that apply)

- Landfill cover/containment
- Access controls
- Institutional controls ✓
- Groundwater pump and treatment ✓
- Surface water collection and treatment
- Other _____
- Monitored natural attenuation
- Groundwater containment ✓
- Vertical barrier walls

Attachments: Inspection team roster attached Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** George Hellert (Name) — Supervisor, Environmental Engineering Dept (Title) — 02/04/08 (Date)
   Interviewed (at site) at office by phone Phone no. 563-589-6332
   Problems, suggestions; Report attached _____

2. **O&M staff** Kathy Thalman (Name) — Project Manger, ARCADIS (Title) — 02/04/08 (Date)
   Interviewed (at site) at office by phone Phone no. 813-903-3100
   Problems, suggestions; Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Iowa Department of Natural Resources
Contact Bob Dhustrup Environmental Engineer 02/12/08 515-281-8900
Name Title Date Phone no.
Problems; suggestions; Report attached

Agency
Contact
Name Title Date Phone no.
Problems; suggestions; Report attached

Agency
Contact
Name Title Date Phone no.
Problems; suggestions; Report attached

Agency
Contact
Name Title Date Phone no.
Problems; suggestions; Report attached

4. **Other interviews** (optional) Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	**O&M Documents**			
	O&M manual	Readily available	Up to date	N/A ✓
	As-built drawings ✓	Readily available ✓	Up to date ✓	N/A
	Maintenance logs	Readily available	Up to date	N/A ✓
	Remarks			
2.	**Site-Specific Health and Safety Plan**	Readily available ✓	Up to date ✓	N/A
	Contingency plan/emergency response plan	Readily available ✓	Up to date ✓	N/A
	Remarks			
3.	**O&M and OSHA Training Records**	Readily available ✓	Up to date ✓	N/A
	Remarks			
4.	**Permits and Service Agreements**			
	Air discharge permit	Readily available ✓	Up to date ✓	N/A
	Effluent discharge	Readily available ✓	Up to date ✓	N/A
	Waste disposal, POTW	Readily available	Up to date	N/A ✓
	Other permits dredging, landfilling	Readily available ✓	Up to date ✓	N/A
	Remarks			
5.	**Gas Generation Records**	Readily available	Up to date	N/A ✓
	Remarks			
6.	**Settlement Monument Records**	Readily available	Up to date	N/A ✓
	Remarks			
7.	**Groundwater Monitoring Records**	Readily available ✓	Up to date ✓	N/A
	Remarks			
8.	**Leachate Extraction Records**	Readily available	Up to date	N/A ✓
	Remarks			
9.	**Discharge Compliance Records**			
	Air	Readily available ✓	Up to date ✓	N/A
	Water (effluent)	Readily available ✓	Up to date ✓	N/A
	Remarks			
10.	**Daily Access/Security Logs**	Readily available ✓	Up to date ✓	N/A
	Remarks			

IV. O&M COSTS

1. **O&M Organization**
   - State in-house — Contractor for State
   - PRP in-house ✓ — Contractor for PRP ✓
   - Federal Facility in-house — Contractor for Federal Facility
   - Other_____

2. **O&M Cost Records**
   - Readily available ✓ — Up to date ✓
   - Funding mechanism/agreement in place
   - Original O&M cost estimate_____ — Breakdown attached

   Total annual cost by year for review period if available

   From_____ (Date) To_____ (Date) _____ (Total cost) — Breakdown attached
   From_____ (Date) To_____ (Date) _____ (Total cost) — Breakdown attached
   From_____ (Date) To_____ (Date) _____ (Total cost) — Breakdown attached
   From_____ (Date) To_____ (Date) _____ (Total cost) — Breakdown attached
   From_____ (Date) To_____ (Date) _____ (Total cost) — Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period** No.
   Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS — Applicable ✓ N/A

A. Fencing

1. **Fencing damaged** — Location shown on site map — Gates secured ✓ — N/A
   Remarks_____

B. Other Access Restrictions

1. **Signs and other security measures** — Location shown on site map — N/A ✓
   Remarks_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
   Site conditions imply ICs not properly implemented — Yes No N/A ✓
   Site conditions imply ICs not being fully enforced — Yes No N/A ✓

   Type of monitoring (*e.g.*, self-reporting, drive by) _____
   Frequency _____
   Responsible party/agency _____
   Contact _____ _____ _____ _____
   Name Title Date Phone no.

   Reporting is up-to-date — Yes No N/A ✓
   Reports are verified by the lead agency — Yes No N/A ✓

   Specific requirements in deed or decision documents have been met — Yes No N/A ✓
   Violations have been reported — Yes No N/A ✓
   Other problems or suggestions: Report attached

2. **Adequacy** ICs are adequate ICs are inadequate N/A ✓
   Remarks _____

D. General

1. **Vandalism/trespassing** Location shown on site map No vandalism evident ✓
   Remarks _____

2. **Land use changes on site** N/A ✓
   Remarks _____

3. **Land use changes off site** N/A ✓
   Remarks _____

VI. GENERAL SITE CONDITIONS

A. Roads Applicable ✓ N/A

1. **Roads damaged** Location shown on site map Roads adequate ✓ N/A
   Remarks _____

B. Other Site Conditions

Remarks_____

VII. LANDFILL COVERS Applicable N/A ✓

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** Location shown on site map Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Holes** Location shown on site map Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** Grass Cover properly established No signs of stress
   Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** N/A
   Remarks_____

7. **Bulges** Location shown on site map Bulges not evident
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** — Wet areas/water damage not evident
   - Wet areas — Location shown on site map — Areal extent_____
   - Ponding — Location shown on site map — Areal extent_____
   - Seeps — Location shown on site map — Areal extent_____
   - Soft subgrade — Location shown on site map — Areal extent_____

   Remarks_____

9. **Slope Instability** — Slides — Location shown on site map — No evidence of slope instability
   Areal extent_____
   Remarks_____

B. Benches — Applicable — N/A ✓

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** — Location shown on site map — N/A or okay
   Remarks_____

2. **Bench Breached** — Location shown on site map — N/A or okay
   Remarks_____

3. **Bench Overtopped** — Location shown on site map — N/A or okay
   Remarks_____

C. Letdown Channels — Applicable — N/A ✓

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** — Location shown on site map — No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____

2. **Material Degradation** — Location shown on site map — No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____

3. **Erosion** — Location shown on site map — No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____

4. **Undercutting** Location shown on site map No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ No obstructions
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
No evidence of excessive growth
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations Applicable N/A✓

1. **Gas Vents** Active Passive
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance
N/A
Remarks_____

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

3. **Monitoring Wells (within surface area of landfill)**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

4. **Leachate Extraction Wells**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed N/A
Remarks_____

E. Gas Collection and Treatment Applicable N/A ✓

1. **Gas Treatment Facilities**
   Flaring Thermal destruction Collection for reuse
   Good condition Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   Good condition Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   Good condition Needs Maintenance N/A
   Remarks_____

F. Cover Drainage Layer Applicable N/A ✓

1. **Outlet Pipes Inspected** Functioning N/A
   Remarks_____

2. **Outlet Rock Inspected** Functioning N/A
   Remarks_____

G. Detention/Sedimentation Ponds Applicable N/A ✓

1. **Siltation** Areal extent_____ Depth_____ N/A
   Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   Erosion not evident
   Remarks_____

3. **Outlet Works** Functioning N/A
   Remarks_____

4. **Dam** Functioning N/A
   Remarks_____

H. Retaining Walls Applicable N/A ✓

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge Applicable N/A ✓

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map N/A
   Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** Functioning N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS Applicable N/A ✓

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES	Applicable ✓	N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines Applicable ✓ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   Good condition ✓ All required wells properly operating ✓ Needs Maintenance N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition ✓ Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available ✓ Good condition Requires upgrade Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines Applicable N/A ✓

1. **Collection Structures, Pumps, and Electrical**
   Good condition Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

C. Treatment System Applicable N/A ✓

1. **Treatment Train** (Check components that apply)
   - Metals removal — Oil/water separation — Bioremediation
   - Air stripping — Carbon adsorbers
   - Filters_____
   - Additive (*e.g.*, chelation agent, flocculent)_____
   - Others_____
   - Good condition — Needs Maintenance
   - Sampling ports properly marked and functional
   - Sampling/maintenance log displayed and up to date
   - Equipment properly identified
   - Quantity of groundwater treated annually_____
   - Quantity of surface water treated annually_____
   - Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   - N/A — Good condition — Needs Maintenance
   - Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   - N/A — Good condition — Proper secondary containment — Needs Maintenance
   - Remarks_____

4. **Discharge Structure and Appurtenances**
   - N/A — Good condition — Needs Maintenance
   - Remarks_____

5. **Treatment Building(s)**
   - N/A — Good condition (esp. roof and doorways) — Needs repair
   - Chemicals and equipment properly stored
   - Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   - Properly secured/locked — Functioning — Routinely sampled — Good condition
   - All required wells located — Needs Maintenance — N/A
   - Remarks_____

D. Monitoring Data

1. Monitoring Data
   - Is routinely submitted on time ✓ — Is of acceptable quality ✓

2. Monitoring data suggests:
   - Groundwater plume is effectively contained ✓ — Contaminant concentrations are declining ✓

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   Properly secured/locked Functioning Routinely sampled Good condition
   All required wells located Needs Maintenance N/A ✓
   Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The selected remedy (develop an alternative water supply, maintain an inward hydraulic gradient adequate to contain contaminant plume, extract and treat NAPL, employ deed restrictions to prevent inappropriate future land use, develop a contingency plan to prevent contamination from migrating offsite) is effective in preventing exposure, and functioning as designed.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O&M of the system includes general activities associated with plant operations. Consequently, consistent O&M of extraction system is assured. This, and periodic monitoring, assure current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

The selected remedy is effective in preventing exposure by preventing contaminated groundwater from migrating offsite. As long as the system is operational (either through facility operations or by implementing the contingency plan), the system will remain protective.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

N/A.

John Deere Dubuque Works, Dubuque, Iowa

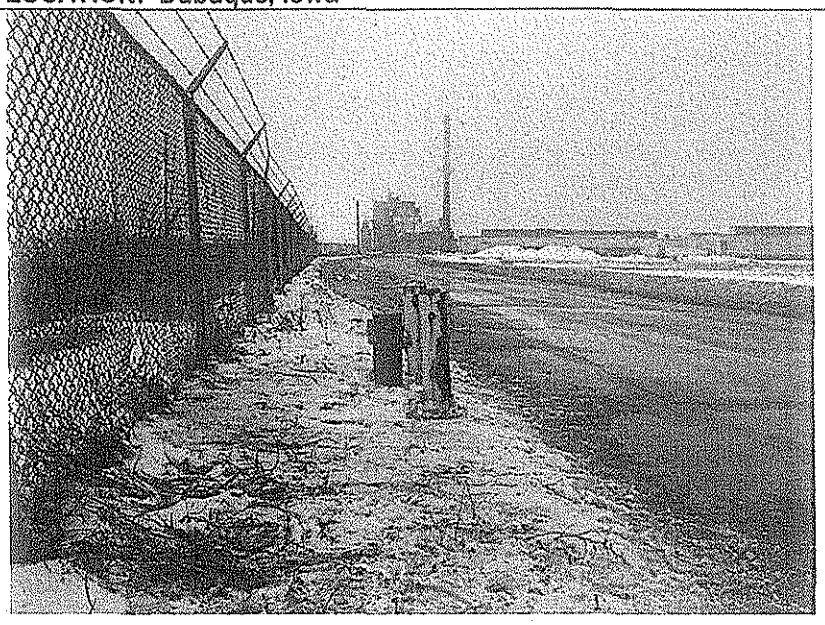
Site Photographs

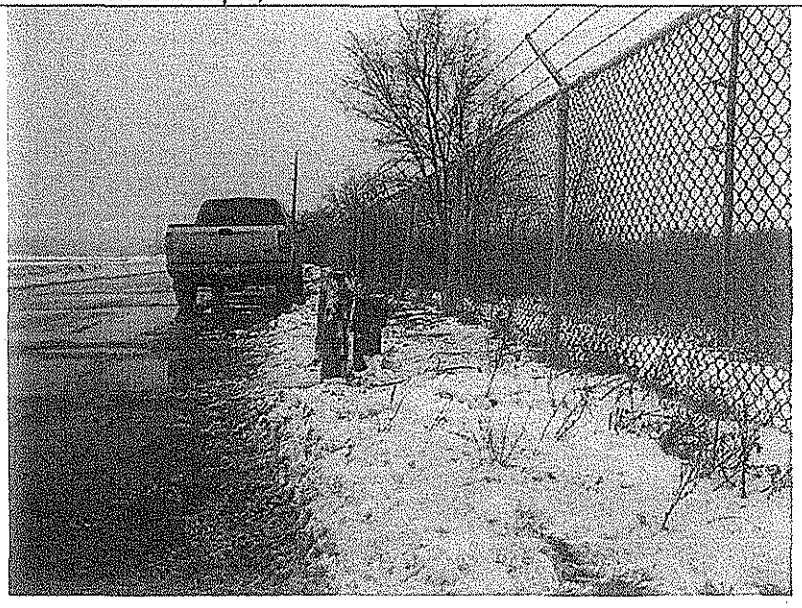
CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 1	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: East	
COMMENT: Looking at MW-6.	

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 2	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: West	
COMMENT: Looking at MW-6.	

John Deere Dubuque Works, Dubuque, Iowa

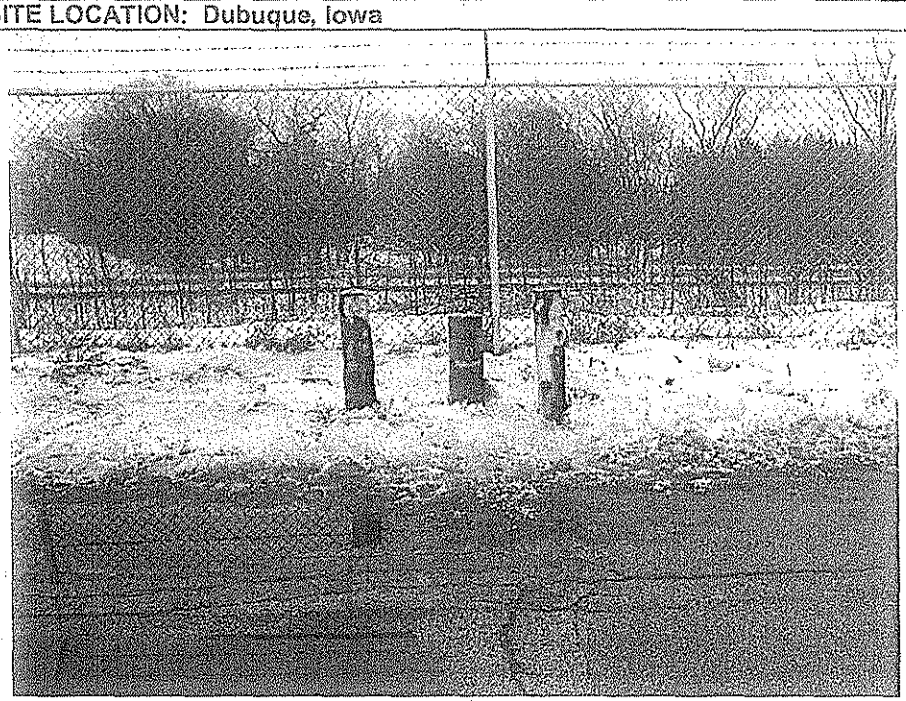
Site Photographs

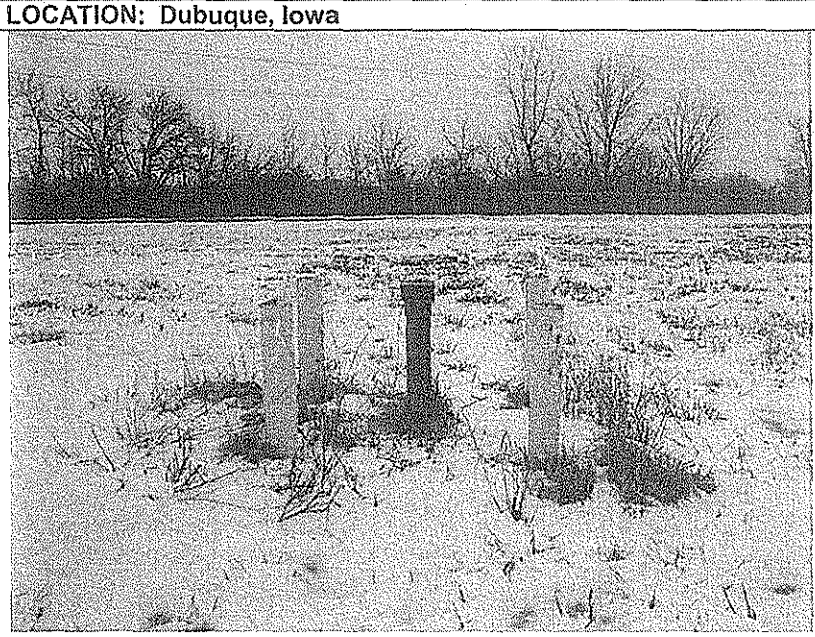
CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 3	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: South	
COMMENT: Looking at MW-8S	

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 4	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: North	
COMMENT: Looking at MW-8S	

John Deere Dubuque Works, Dubuque, Iowa

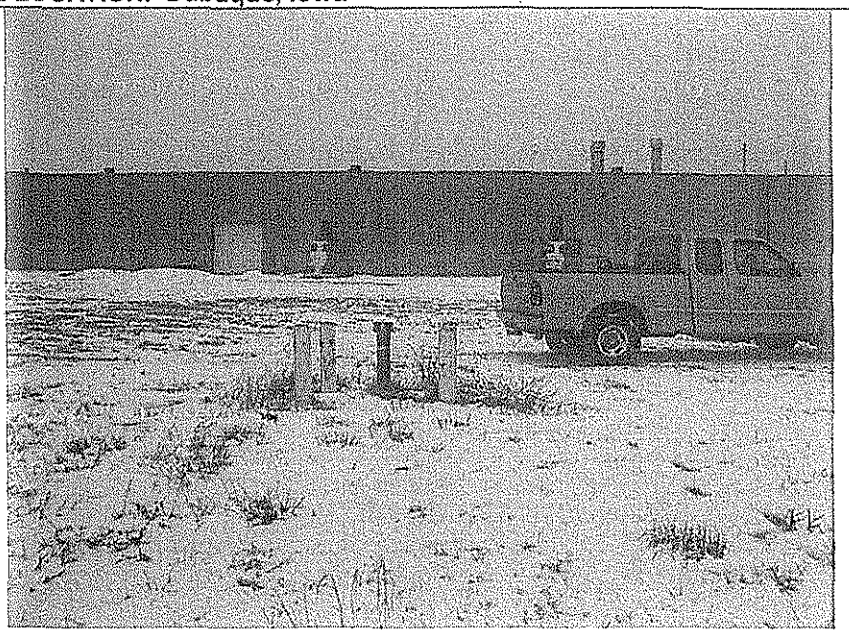
Site Photographs

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 5	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: East	
COMMENT: Looking at MW-8S	

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 6	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: East	
COMMENT: Looking at MW-9S	

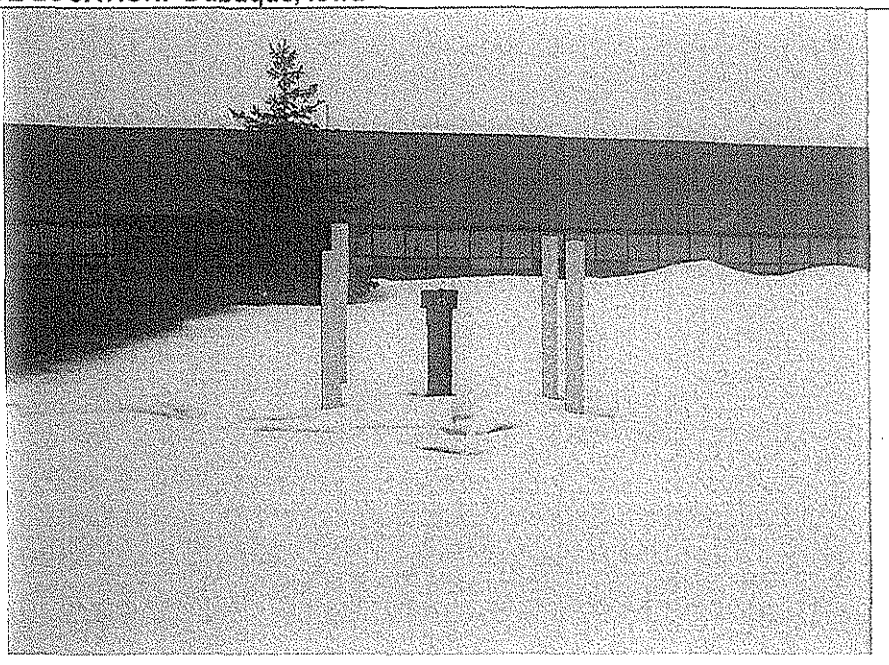
John Deere Dubuque Works, Dubuque, Iowa

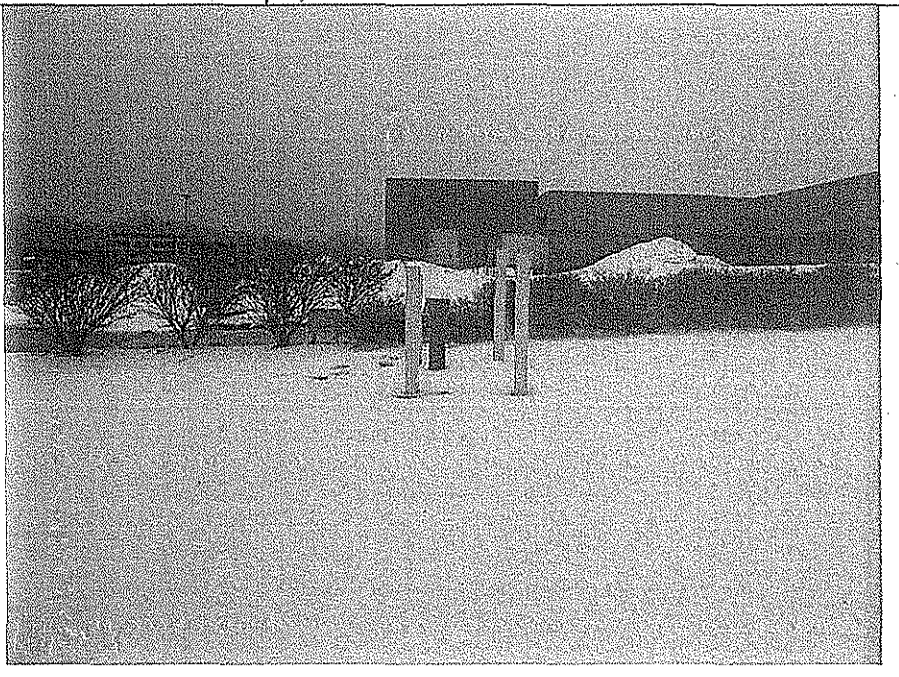
Site Photographs

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 7	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: West	
COMMENT: Looking at MW-9S	

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 8	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: South	
COMMENT: Looking at MW-9S	

John Deere Dubuque Works, Dubuque, Iowa
Site Photographs

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 9	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: East	
COMMENT: Looking at MW-12	

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 10	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: North	
COMMENT: Looking at MW-12	

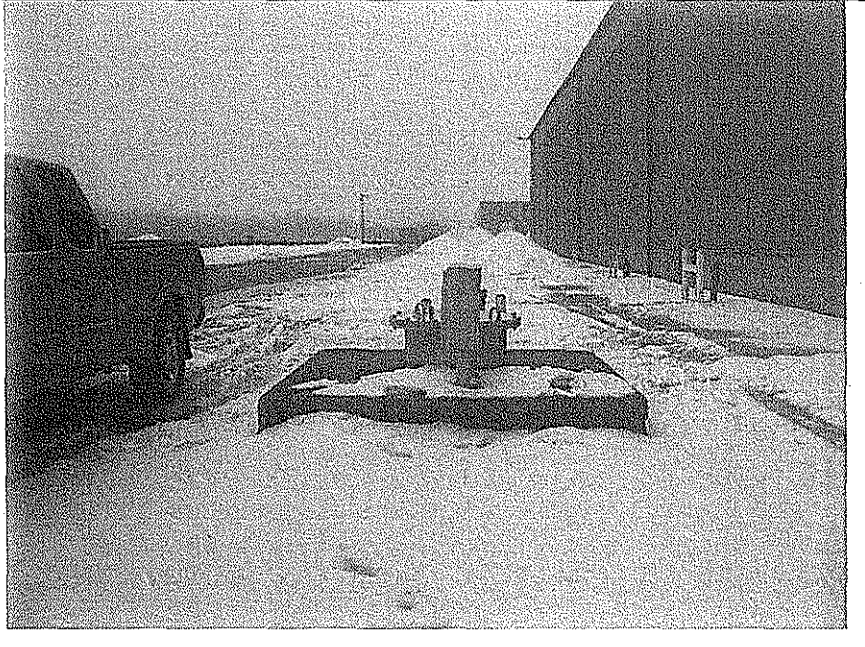
John Deere Dubuque Works, Dubuque, Iowa
Site Photographs

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 11	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: West	
COMMENT: Looking at MW-12	

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 12	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: East	
COMMENT: Looking at MW-12 well cover.	

John Deere Dubuque Works, Dubuque, Iowa
Site Photographs

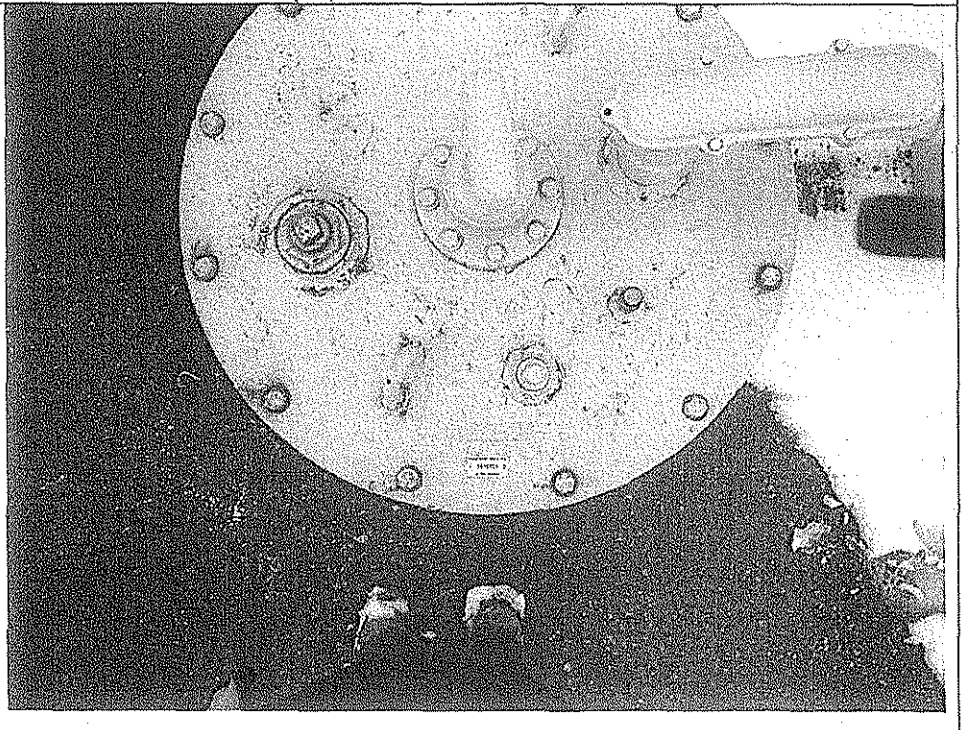
CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 13	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: South	
COMMENT: Looking at PW-5.	

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 14	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: North	
COMMENT: Looking at PW-5	

John Deere Dubuque Works, Dubuque, Iowa

Site Photographs

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 15	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: Down	
COMMENT: Looking at PW-5 well cover.	

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 16	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: Down	
COMMENT: Looking at PW-5 well cover.	

John Deere Dubuque Works, Dubuque, Iowa

Site Photographs

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 17	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: North	
COMMENT: Looking at MW-13S.	

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 18	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: South	
COMMENT: Looking at MW-13S.	

John Deere Dubuque Works, Dubuque, Iowa
Site Photographs

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 19	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: East	
COMMENT: Looking at SBW-4	

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 20	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: East	
COMMENT: Looking at SBW-4.	

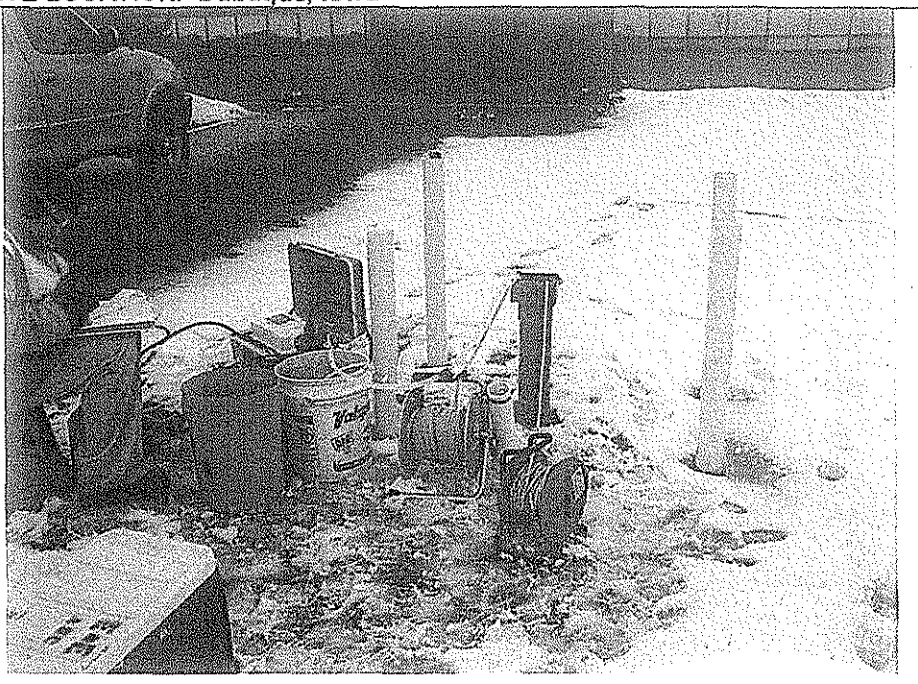
John Deere Dubuque Works, Dubuque, Iowa

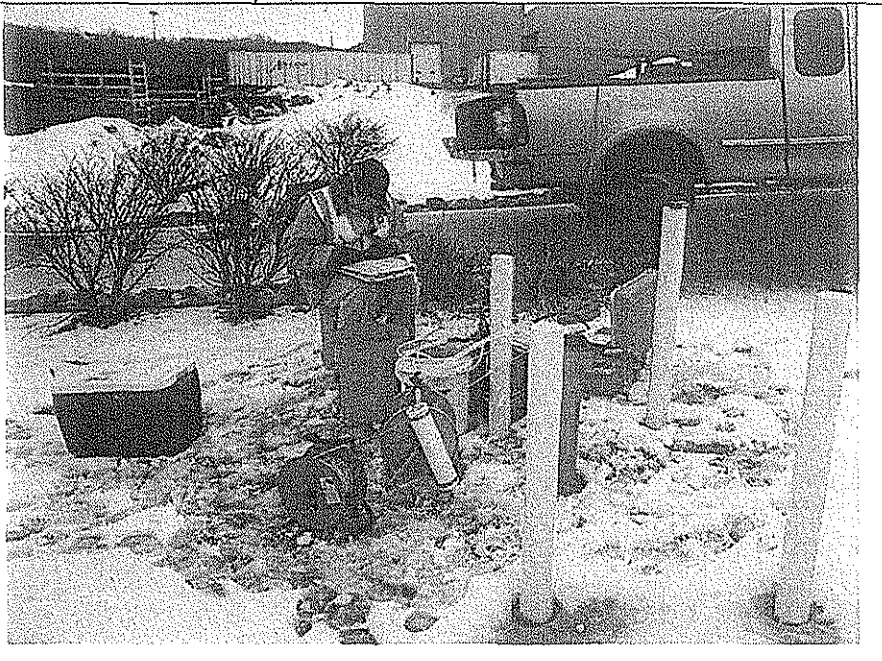
Site Photographs

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 21	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: North	
COMMENT: Looking at MW-10	

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 22	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: North	
COMMENT: Looking at MW-10.	

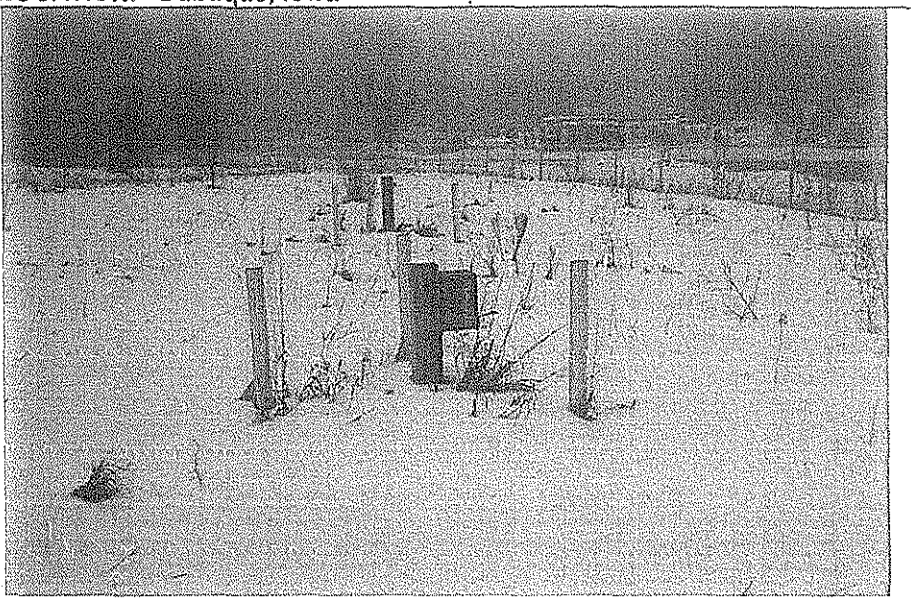
John Deere Dubuque Works, Dubuque, Iowa
Site Photographs

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 23	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: East	
COMMENT: Groundwater sampling at MW-12	

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 24	
PHOTOGRAPHER: TNK	
DATE: 2/4/08	
DIRECTION: North	
COMMENT: Groundwater sampling at MW-12	

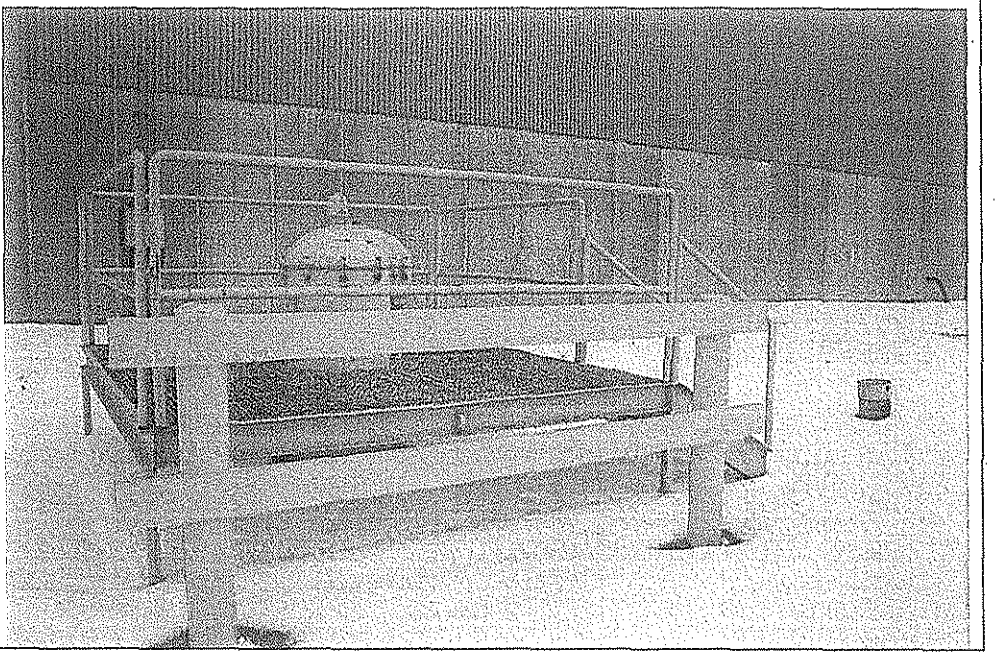
John Deere Dubuque Works, Dubuque, Iowa

Site Photographs

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 25	
PHOTOGRAPHER: KT	
DATE: 2/4/08	
DIRECTION: South	
COMMENT: Looking at MW-20S and MW-20D	

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 26	
PHOTOGRAPHER: KT	
DATE: 2/4/08	
DIRECTION: Northwest	
COMMENT: Looking at MW-1	

John Deere Dubuque Works, Dubuque, Iowa
Site Photographs

CLIENT: John Deere	SITE NAME: John Deere Dubuque Works
PROJECT #: TF001034	SITE LOCATION: Dubuque, Iowa
PHOTOGRAPH #: 27	
PHOTOGRAPHER: KT	
DATE: 2/4/08	
DIRECTION: East	
COMMENT: Looking at PW-7A	

Appendix E

Performance Standard Calculations

1,1-Dichloroethane

$$C(mg/L) = \frac{THI \times BW \times AT \times 365\ days/year}{EF \times ED \times [(\frac{1}{RfD_i} \times K \times IR_a) + (\frac{1}{RfD_o} \times IR_w)]}$$

Parameters	Definition	Default Value
C	Chemical Concentration in water mg/L	-
THI	Target Hazard Index (unitless)	1
RfD_o	Oral Reference Dose (mg/kg-day)	1.0×10^{-1} mg/kg-day
RfD_i	Inhalation Reference Dose (mg/kg-day)	1.4×10^{-1} mg/kg-day
BW	Adult Body Weight (kg)	70 kg
AT	Averaging Time (yr)	30 yr
EF	Exposure Frequency (days/yr)	350 days/yr
ED	Exposure Duration (yr)	30 yr
IR_a	Daily Indoor Inhalation Rate (m^3/day)	15 m^3/day
IR_w	Ingestion Rate (L/day)	2 L/day
K	Volatilization Factor (L/m^3)	0.5 L/m^3

$$C(mg/L) = \frac{73}{\frac{7.5}{0.14} + \frac{2}{0.1}} = 0.99\ mg/L$$

Source: Risk Assessment Guidance for Superfund, Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals), p. 22.

1,1,2,2-Tetrachloroethane

$$C(mg/L) = \frac{TR \times BW \times AT \times 365\ days/year}{EF \times ED \times [(SF_i \times K \times IR_a) + (SF_o \times IR_w)]}$$

Parameters	Definition	Default Value
C	Chemical Concentration in water mg/L	-
TR	Target Excess Individual Lifetime Cancer Risk (unitless)	10^{-6}
SF_o	Oral Slope Factor $(mg/kg\text{-}day)^{-1}$	2.0×10^{-1} mg/kg-day^{-1}
SF_i	Inhalation Slope Factor $(mg/kg\text{-}day)^{-1}$	2.0×10^{-1} mg/kg-day^{-1}
BW	Adult Body Weight (kg)	70 kg
AT	Averaging Time (yr)	70 yr
EF	Exposure Frequency (days/yr)	350 days/yr
ED	Exposure Duration (yr)	30 yr
IR_a	Daily Indoor Inhalation Rate (m^3/day)	15 m^3/day
IR_w	Ingestion Rate (L/day)	2 L/day
K	Volatilization Factor (L/m^3)	0.5 L/m^3

$$C(mg/L) = \frac{1.7 \times 10^{-4}}{(7.5 \times 0.2) + (2 \times 0.2)} = 8.95 \times 10^{-5}\ mg/L$$

Source: Risk Assessment Guidance for Superfund, Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals), p. 23.

Hexavalent Chromium

$$C(mg/L) \quad \frac{THI \times BW \times AT \times 365\ days/year}{EF \times ED \times [(\frac{1}{RfD_i} \times K \times IR_a \quad \frac{1}{RfD_o} \times IR_w)]}$$

Parameters	Definition	Default Value
C	Chemical Concentration in water mg/L	-
THI	Target Hazard Index (unitless)	1
RfD_o	Oral Reference Dose (mg/kg-day)	3×10^{-3}
RfD_i	Inhalation Reference Dose (mg/kg-day)	none
BW	Adult Body Weight (kg)	70 kg
AT	Averaging Time (yr)	30 yr
EF	Exposure Frequency (days/yr)	350 days/yr
ED	Exposure Duration (yr)	30 days/yr
IR_a	Daily Indoor Inhalation Rate (m^3/day)	15 m^3/day
IR_w	Ingestion Rate (L/day)	2 L/day
K	Volatilization Factor (L/m^3)	0.5 L/m^3

$$C(mg/L) = \frac{73}{(\frac{2}{0.003})} = 0.110\ mg/L$$

Source: Risk Assessment Guidance for Superfund, Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals), p. 22.

Fourth Five-Year Review Report April 2003 to March 2008

John Deere Dubuque Works
Dubuque, Iowa

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