United States
Environmental Protection
Agency

Office of
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Remedial Response

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September 1988

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Superfund Record of Decision:

John Deere Dubuque Works, IA

50272-101

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The John Deere Dubuque Works (JDDW) site is located approximately 2.5 miles north of the City of Dubuque, Iowa. The site is owned by Deere and Company, which has operated a manufacturing plant at the site since 1946. The plant property includes an area of 1,447 acres located in the flood plain at the confluence of the Little Maquoketa River and the Mississippi River. The waste management history of the plant is complex, but the primary area of concern is an unlined landfill originally placed in a natural depression caused by the Little Maquoketa River. Prior to 1968, wastes were placed in the low areas of the landfill and combustible materials were burned. Wastes included caustics (sodium or potassium hydroxide), acids (hydrochloric or sulfuric), petroleum distillates (solvents, grinding oils, and so forth), heavy metals (chromium, lead, zinc), cyanide, and paint sludges. Another area of concern at the facility is the site of a 1980, 200,000-gallon diesel fuel spill. A diesel fuel recovery system involving an oil/water separator for non-aqueous phase liquids (NAPLs) was implemented that same year. Investigations conducted by John Deere indicated that human health hazards at the landfill could be considered minimal with the primary hazard being the possibility of dissolved organic chemicals impacting offsite domestic wells located east of the plant along the Mississippi River. Maintaining a minimum pumping rate of 1.2 mgd in the plant (See Attached Sheet)

17. Document Analysis a. Descriptors

Record of Decision
John Deere Dubuque Works, IA
First Remedial Action - Final
Contaminated Media: gw
Key Contaminants: VOCs (benzene, PCE, TCE, toluene)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 23
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

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16. ABSTRACT (continued)

production wells will create sufficient drawdown to prevent migration of contaminated ground water to the offsite wells. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCE, and toluene.

The selected remedial action for this site includes: development of an alternate potable water supply for the plant; extraction and offsite discharge of water from the contaminated alluvial aquifer using the existing production wells to maintain drawdown around the plant and landfill areas; continuation of extraction and treatment of NAPLs from production well No. 3 with offsite discharge of treated ground water and offsite disposal of collected NAPLs; imposition of deed restrictions to prevent inappropriate use of the plant property in the future; and development of a contingency plan to ensure that contaminants do not migrate offsite in the event of a plant shutdown (which would result in the loss of drawdown from production wells). The estimated present worth cost for this remedial action is $5,151,800 with annual O&M costs of $276,600.

THE DECLARATION

Site Name and Location

John Deere Dubuque Works, Dubuque, Iowa.

Statement of Basis and Purpose

This decision document presents the selected remedial action for the John Deere Dubuque Works site in Dubuque, Iowa. It was developed in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record for this site. The attached index identifies the items that comprise the administrative record upon which the selection of the remedial action is based.

The Iowa Department of Natural Resources has concurred with the selected remedy.

Description of the Selected Remedy

This remedial action represents the final action for contaminated groundwater at the JDDW site. It addresses the principal threats both onsite and offsite by:

- Developing an alternate potable water supply for the plant.
- Extracting water from the contaminated alluvial aquifer using the existing production wells. This action will maintain drawdown around the plant and landfill areas, thus protecting nearby wells and controlling contaminant releases. The production wells and other monitoring wells would be periodically checked for contamination.
- Continuing to extract and treat non-aqueous phase liquid (NAPL) from the alluvium near production well-3 (PW-3). The source of this material is probably diesel fuel spills and waste oil leaks.
- Using deed restrictions to prevent inappropriate use of the plant property in the future.
- Developing a contingency plan which would assure that contaminants do not migrate off-site in the event of a plant shutdown.

Declaration

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate for this remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. Because treatment of the principal threats of the site was not found to be practicable, however, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy.

RECORD OF DECISION

John Deere Dubuque Works Company Superfund Site

Dubuque, Iowa

Prepared by:

U.S. Environmental Protection Agency

Region VII

Kansas City, Kansas

September 29, 1988

DECLARATION

Because this remedy will leave hazardous substances on-site above health-based levels, a review will be conducted within five years after commencement of remedial action to assure that the remedy continues to provide adequate protection of human health and the environment.

Morris Kay
Regional Administrator
Region VII

9-29-88
Date

DECISION SUMMARY

This document was prepared using EPA Guidance for Developing Superfund Records of Decision (July 1988). Source material for site description, history, and characteristics was primarily the Remedial Investigation (RI) Report. The Feasibility Study Report was the main source for the description of alternatives and comparative analysis.

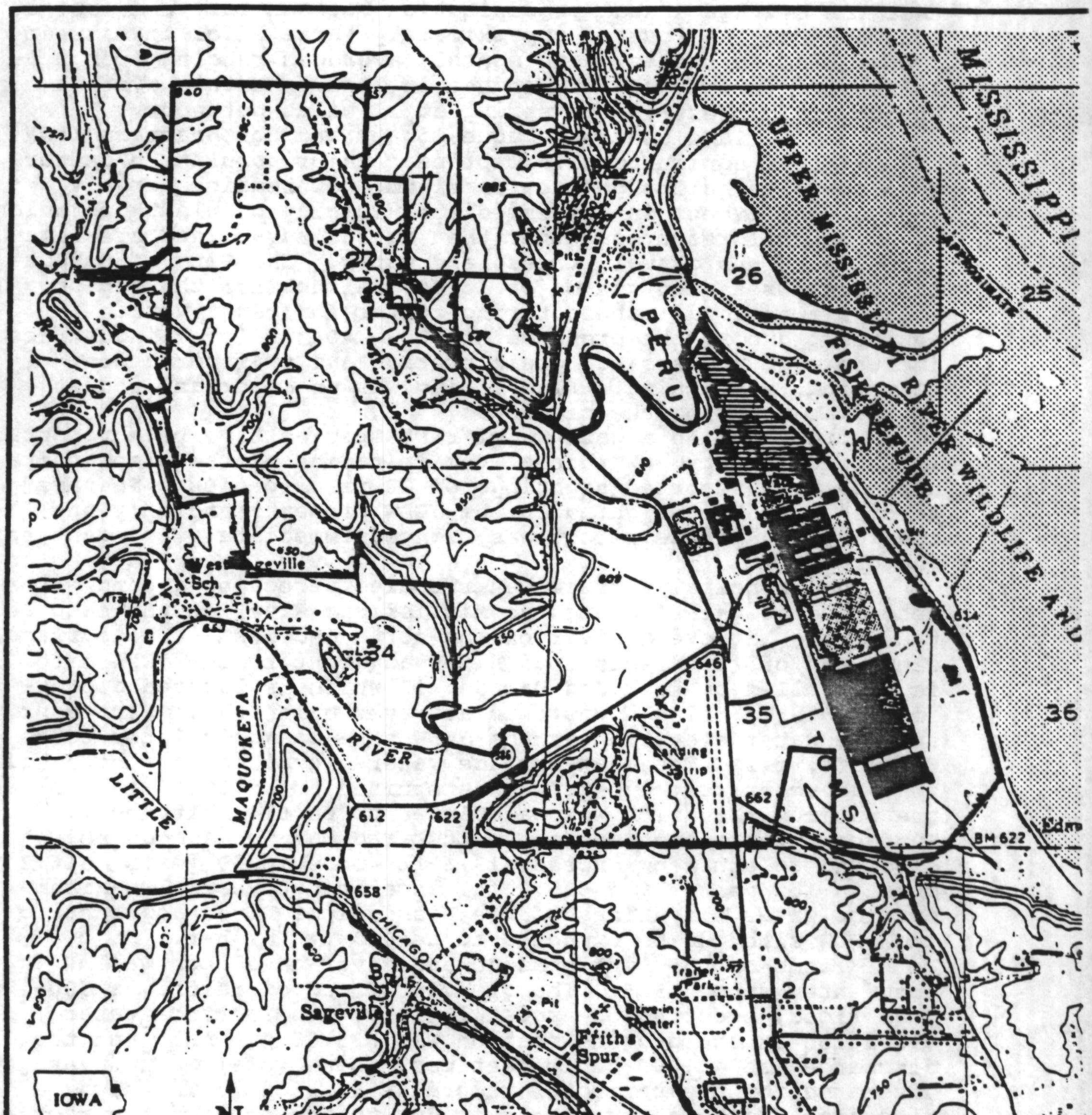
Site Name, Location, and Description

The John Deere Dubuque Works (JDDW) plant is located approximately 2.5 miles north of the city of Dubuque in north-eastern Iowa. Plant buildings are located on a relatively flat delta at the confluence of the Little Maquoketa River on the north and the Mississippi on the east. State highway 386 services the plant site and the CMSP & Pacific Railroad lies between the plant and the Mississippi River. The plant property includes an area of 1,447 acres as shown in Figure 1. The factory itself covers over five million square feet and is located in the eastern half of the site. This area also contains parking lots, storage areas, waste disposal areas, and other facilities that serve the plant. The portion of the Mississippi River adjacent to the plant site is presently part of the Upper Mississippi River Wildlife and Fish Refuge, which was established in 1924. Approximately twenty cottages, leased from the Corps of Engineers to private residents, are located on this tract, between the JDDW facility and the river on the Mississippi River flood plain.

The land surface at JDDW is relatively flat with zero to five percent slopes. In limited areas the top soil has been removed and redistributed. The surficial soils over the majority of the plant site consists of loams, which are a mixture of silt, sand, clay, and some organic matter. Silty-loams are present north of the former landfill and along the Little Maquoketa River. Drainage on the plant property is highly variable and is related to the permeability of the soil. The permeability of the loams present over most of the plant property is moderate to low. Soil materials that were once five to twenty-five feet below the surface and are now on the surface have a higher density than the original surficial soils. Other areas have been compacted by heavy equipment, resulting in less pore space and higher density. The surficial soils along the Little Maquoketa are poorly drained due to the nearly level land surface topography. This area is frequently subject to flooding for short periods of time. Surface water drainage at the north end of the plant is, and has been, to the north into the Little Maquoketa. Surface water drainage in the south and central portions of the plant property has historically been to the east and south into the Mississippi River.

The climate for the State of Iowa is characterized by marked seasonal variations. The average annual temperature at Dubuque is 46.6 degrees F., with average temperatures for July and January of 72.6 and 19.2 degrees F. respectively. National Oceanic and Atmospheric Administration records indicate

Figure 1



REGIONAL LOCATION OF JOHN DEERE DUBUQUE WORKS

Approximate Boundary of Former Landfill

Features Mapped in 1956
Features Mapped in 1972
Features Mapped after 1978
Property Boundary

Prepared For: John Deere Dubuque Works
Project Manager: Steven D. Chatman

Geraghty & Miller, Inc.

that the average annual precipitation between 1937 and 1987 at Lock and Dam 11 (located approximately three miles downstream of JDDW) is 31.75 inches, with monthly averages ranging from 0.99 inches in February to 4.39 inches in June. Monthly average wind speeds are highest in the spring at 13 miles per hour.

General land use in Dubuque County and northeastern Iowa is primarily agricultural except near major population centers. The JDDW site, although once farmland, now remains largely undeveloped except in the immediate vicinity of plant operations. Major natural resources other than agricultural land are limestone, sand and gravel, trees, and water. The City of Dubuque is the county seat and the major commercial hub for the region. The area is a national manufacturing center for construction equipment due to the presence of JDDW. Other local industries include meat processing, grain storage and transportation, quarrying, and mining. Lead mining was an important industry in the area during the mid-1800s.

More than 150 sightings of rare species have been reported in Dubuque County. Within a 10-mile radius of the plant there have been 31 reported sightings of 20 rare species. No rare species have been sighted on the JDDW property and only one species, the pirate perch, was sighted immediately adjacent to the property.

The principal surface water bodies affecting ground water resources at the site are the Mississippi River on the east and the Little Maquoketa River on the north and west. The surface elevation of the Mississippi River adjacent to the JDDW site is controlled by Lock and Dam No. 11 which is located approximately three miles downstream at river mile 583.1. The minimum surface water elevation at the JDDW site was calculated to be 601.1 ft. msl. The mean surface water elevation for the Mississippi adjacent to the site was determined to be 602.5 ft. msl and the maximum elevation was calculated to be 614.3 ft. msl. Surface water elevations above Lock and Dam No. 11 can be expected to equal or exceed 613.1 ft. once in 50 years, 616.2 ft. once in 100 years, and 625.9 ft. once in 500 years. Maximum surface water elevations of the Mississippi River adjacent to the JDDW site can be expected to be 0.3 ft. higher.

Floods on the Little Maquoketa River have been well documented since 1935. The greatest flood of record, a 500-year flood, occurred on August 1, 1972. the surface water elevation at the gauging station was 635.85 ft. msl, and the discharge was 40,000 cubic feet per second (cfs). The average discharge for the period of record is 85.1 cfs. The high discharge during flood stages is due to the physical characteristics of the basin and probably to the fact that the gauging station is located just downstream from the confluence of the three principal tributaries.

Hydrogeology

A comprehensive description of aquifers at the JDDW site is given in the RI Report. The information generated by the RI was used to evaluate the possible migration pathways of contaminants beneath the site and also provided the basis for development and calibration of the numerical ground water model which was, in turn, use to evaluate possible remediation options.

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. Thin, interbedded gravel lenses are present but these are not significant barriers to vertical and horizontal ground water flows. The plant site is located above the thickest portions of the alluvium in the Peru Bottoms area. Toward the bluffs the elevation of the bedrock surface increases and the alluvial deposits become thinner.

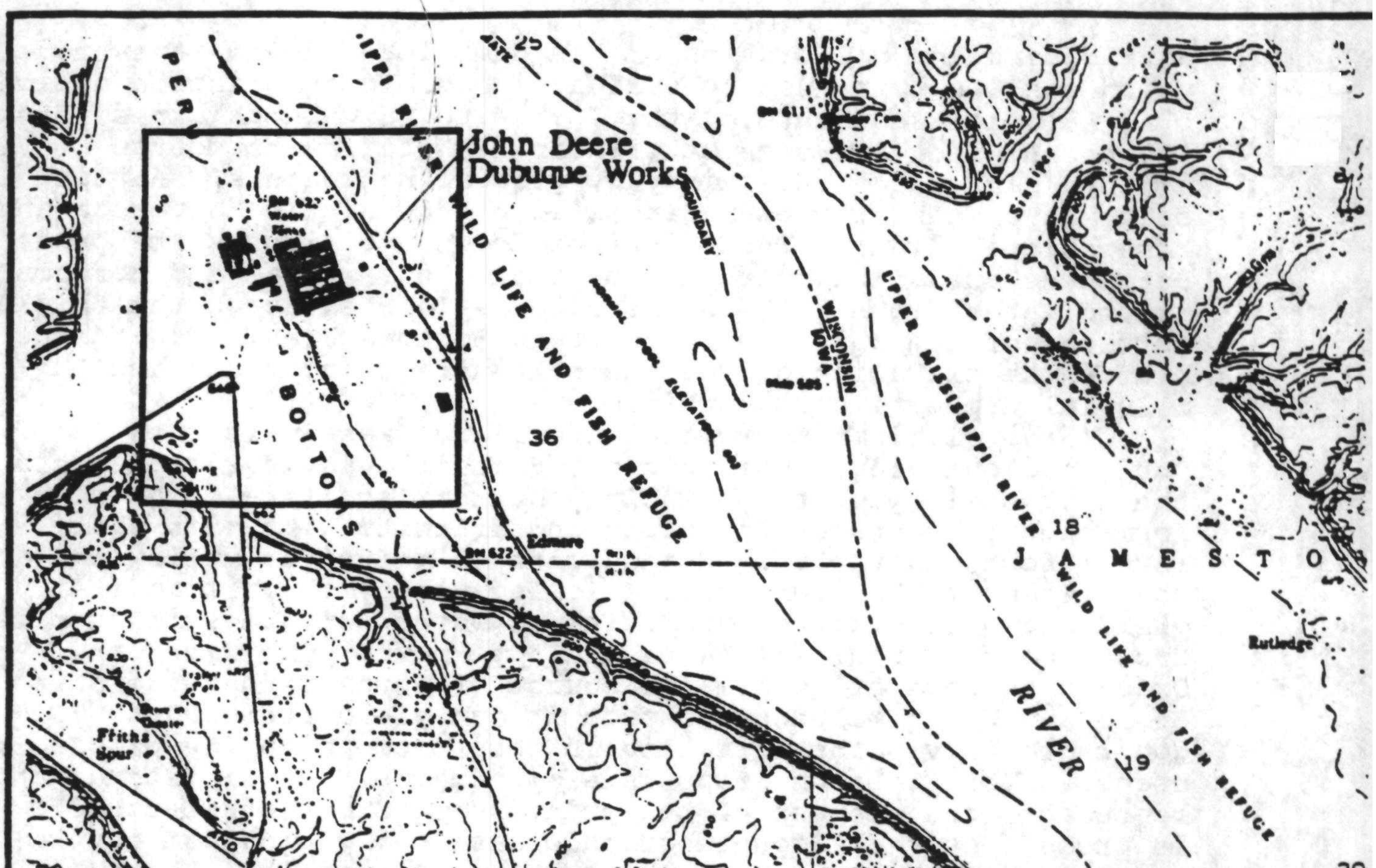
Three distinct bedrock aquifers are present in the Dubuque, Iowa area: The Galena-Platteville aquifer represents the most shallow of the principal bedrock aquifers. The formation consists of limestone and dolomite with thin shaly layers found in the uplands adjacent to the river valley and at the bottom of shallow alluvial filled valleys. This aquifer yields low to moderate quantities of water for domestic supplies. Ground water withdrawal rates are not known. The Cambrian-Ordovician aquifer is a major source of water across the state of Iowa. Wells withdrawing from it can yield from 500 to 750 gpm regionally. The formation is comprised primarily of sandstones. The Dresbach Group is also comprised of sandstones and represents the deepest of the principal bedrock aquifers. It is present over a large geographic area but yields are generally not as great as those from the Cambrian-Ordovician.

Ground water in the alluvial aquifer near the site is derived from several sources, including direct infiltration of precipitation, leakage from the Little Maquoketa and Mississippi Rivers, and lateral inflow and vertical leakage from bedrock. Underflow from the Maquoketa River valley and slope runoff from adjoining upland areas are also minor sources.

JDDW obtains its water supply from both the alluvial aquifer and the underlying bedrock units, with most coming from the alluvial aquifer. From 1962 to 1988, an average of 0.75 million gallons per day (mgd) was withdrawn from the bedrock aquifer and 3.71 mgd was withdrawn from the alluvial aquifer for a total of 4.46 mgd. Peak demand occurred in 1975 at 7.03 mgd. The 1987 level averaged 3.12 mgd. Water levels in the alluvial aquifer near the site fluctuate largely in response to pumping from plant production wells, and to a lesser extent by variations in aquifer recharge and river stage. Upward movement of ground water from the Cambrian-Ordovician aquifer into the alluvial deposits will continue as long as pumpage from the bedrock production wells or other bedrock wells in the immediate area is not significantly increased.

The City of Dubuque obtains its water supply from alluvial wells along the Mississippi River and wells tapping the underlying bedrock aquifers. The location of this well field is shown in Figure 2. Their location and capacities suggest that the majority of water to the wells is derived from infiltration from the Mississippi River. These wells have no effect on water levels and water supply at the JDDW site.

Figure 2



LOCATION OF WATER PLANT AND
ALLUVIAL WELL FIELD FOR DUBUQUE, IOWA

Prepared for: John Deere Dubuque Works   01MAYS8ADF   Project Manager: Steven D. Chatman

Geraghty & Miller, Inc.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

Site History

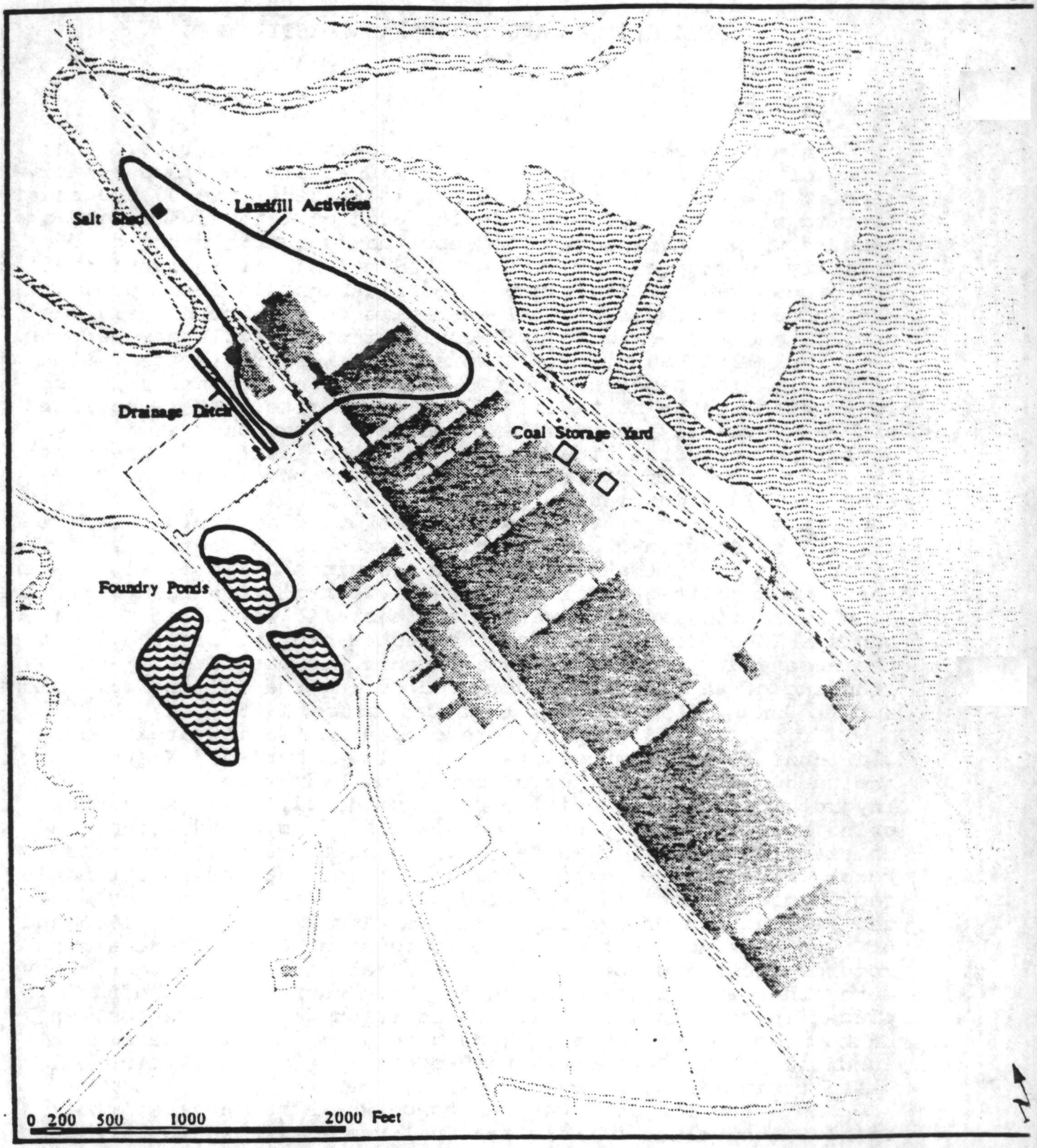
This John Deere facility began operations in 1946. The types of manufacturing processes at JDDW have remained relatively stable; however, factory space has increased from 600,000 square feet to more than 5,000,000 as the product line diversified and manufacturing increased. The waste management history of the facility is complex and varies based on changes in manufacturing processes, raw materials used, modifications in final products, and increasing environmental awareness by JDDW personnel, the public, and state and federal environmental regulatory personnel.

The plant has utilized two separate landfills for waste disposal. The newer of the two, and the one presently in use, is located to the northwest of the plant site. It is equipped with a synthetic liner and a leachate collection system which pumps the collected liquids back into the landfill. The other landfill, shown in Figure 3, is the main concern of the RI/FS study. This older landfill was originally placed in a natural depression caused by the Little Maquoketa floodplain. Before 1974, John Deere had placed their wastes up to the banks of the river. In 1974, the Iowa Natural Resources Council, along with the Iowa Department of Environmental Control (now IDNR), required John Deere to place all wastes at least 140 feet from the river banks. John Deere bulldozed the wastes back within the limits the same year and placed fences around the perimeter. Some flooding of the low areas occurred during the filling operations but no known flooding has occurred since 1965.

Prior to 1968, wastes were placed in the low areas of the old landfill and combustible material was burned. Wastes included caustics (sodium or potassium hydroxide), acids (hydrochloric or sulfuric), petroleum distillents (solvents, grinding oils, etc.), heavy metals (chromium, lead, zinc used in electroplating), cyanide (used in heat treating and tool room), and paint sludges. The only major changes in the manufacturing process that affected types of waste generated were the elimination of cyanide heat treating processes in 1965 and of cyanide zinc electroplating process in 1977. There are no records showing quantities of these materials or whether there were other wastes in addition to those suspected of being placed in the old landfill. In addition to these wastes, an unknown amount of foundry sands were deposited in the old landfill. This sand contained approximately one percent oil-based resin which was used as a hardener.

In 1980, the John Deere-Dubuque Works had a diesel fuel spill. The volume of released fuel was estimated to have been approximately 200,000 gallons. Soil borings showed the fuel was floating on the water table. A diesel fuel recovery system was implemented on November 10, 1980. The recovered fuel was retained for on-site reclamation and the water from the oil-water separator was discharged to the Mississippi River. Eighteen monitoring wells were installed February through June,

Figure 3



LOCATION OF HISTORICAL FEATURES

Water
Building
Railroad
Property Line

Prepared for: John Deere Dubuque Works | 16JUL88ADF | Project Manager: Steven D. Chatmar

Geraghty & Miller, Inc.

1981 to monitor the effectiveness of the recovery system. By October 1985, approximately 86,000 gallons of diesel fuel had been recovered. One recovery well (RW-3) remains in operation.

Previous Investigations

JDDW notified the EPA of its status as a hazardous waste site on June 5, 1981. A preliminary assessment report, issued in July 1983, summarized site conditions and cited an initial hazardous waste rating of 34.95 (low to moderate hazard). A site investigation was conducted by Ecology & Environment in 1984 and a report was issued in January 1986.

In 1985 JDDW contracted with Geraghty & Miller, Inc. to perform limited site studies related to the former landfill. Four supplemental monitoring wells were installed to provide additional subsurface data. Ground water samples were collected from 17 on-site monitoring wells and five domestic wells for analyses of metals and volatile organic compounds. John Deere personnel have collected additional ground water samples for analyses. The data from those activities are presented in Appendix I.2 of the RI/FS and are also discussed in Section 4.5 of the main report.

JDDW attempted to estimate the quantities of wastes disposed of on the plant property and, in particular, in the former landfill portion of the plant. This information is contained in a document entitled "Superfund Information John Deere Dubuque Works." The above reports are all on file and available in the Administrative Record.

Enforcement Activities

The site scored 34.95 under EPA's Hazard Ranking System (a score of 28.5 is sufficient to place a site on the National Priority List or NPL). On September 18, 1985, the facility was proposed as a candidate to be placed on the NPL. However, the site was never placed on the final NPL. On June 24, 1988, EPA announced its new national policy in the Federal Register (53 FR 23978) whereby RCRA treatment, storage, or disposal facilities would not be placed on the NPL. As a result of this policy, the EPA 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 pursuant to which the potentially responsible party (PRP) funds the work. Region VII plans to continue to treat the facility as a Superfund site.

Deere and Company is the sole PRP for the site. On September 29, 1986, the EPA Region VII Regional Administrator and Deere and Company entered into a Consent Order pursuant to Section 106(a) of CERCLA which provided for the development and implementation of a RI/FS, with the anticipation that upon completion the EPA would select the appropriate remedial action measures. The RI/FS has been completed pursuant to this order.

Technical discussions between EPA, JDDW, and their respective contractors during the RI/FS are summarized in the Administrative Record for the site.

Deere has indicated a willingness to perform the Remedial Design/Remedial Action pursuant to a consent decree. The Agency anticipates that the agreement with Deere to perform the remedy will be incorporated into a judicial consent decree within the next few months.

COMMUNITY RELATIONS HISTORY

The EPA conducts community relations activities to ensure that the local public has input into the decisions about Superfund actions and is kept well informed about the progress of those actions. The community relations program at this site provides an opportunity for the community to learn about and participate in the Superfund remedial process and site activities.

John Deere Dubuque Works and EPA have an open working relationship. Information sharing is done on an informal basis. Weekly telephone conference calls were held throughout the RI/FS study to coordinate activities and to resolve issues and disagreements. The Company routinely shares its weekly employee bulletins with EPA.

At this time, EPA's community relations activities have included the following:

-- Established an information repository at the Carnegie-Stout Public Library in Dubuque.
-- Prepared mailing lists.
-- Designated an agency contact.
-- Distributed a fact sheet about project activities to area interested parties.
-- The Remedial Investigation/Feasibility Study Report and Proposed Plan were made available for public review at the information repository.
-- Maintained telephone contact with the community and company.
-- Held a public meeting at the Carnegie-Stout Public Library in Dubuque on September 24, 1988.

SUMMARY OF SITE CHARACTERISTICS

The old landfill was utilized from 1946 to 1974. It is approximately 20 acres in area and is situated on the northern section of the site. Some portions are now covered by buildings and concrete slabs. It's average depth is 15 to 20 feet. No cover material is in place nor does it have a leachate collection system or liner.

It was not possible to estimate the amount of liquid waste disposed in the old landfill. They were basically of two types: 1) waste oils and coolants; and 2) caustics, solvents and paints. Used oils and coolants were disposed of in various ways both on-site and off-site while the former landfill was active.

Until about 1968, temporary surface impoundments of oil in the former landfill and north and south skimmer ponds were ignited periodically to volatilize hydrocarbons and other combustible materials. JDDW personnel believe these burn areas would now be located beneath the existing northern plant buildings. Prior to 1974, used oil or coolant generally was disposed of by selling to road oilers, spraying on stored coal to increase the energy gained from its burning and spraying to suppress fugitive dust emissions.

Waste solvents are generally depleted by way of evaporative losses prior to treatment or disposal, thus reducing the volume of waste solvents to be treated and discarded. Before 1980, waste solvents were typically blended with used oils and disposed of with the oils. Beginning in 1974, waste solvents were disposed of in the oil reclamation system. Since approximately 1980, waste solvents have been segregated and reclaimed through the services of an off-site contract reclaimer. According to JDDW personnel, solvents, oils, and coolants were discharged directly to the surface water along with other process fluids prior to the start of operation of the wastewater treatment plant in 1977. 1,1,1-Trichloroethane (1,1,1-TCA) is used as a general solvent throughout the plant. Plant wide use of 1,1,1-TCA limits JDDW's ability to strictly control solvent use and disposal. It is possible that unauthorized disposal of small quantities waste oils could result in relatively low concentrations of organic compounds beneath the site.

Caustic solutions and metal-plating acids generally were not directed into the former landfill. Plating bath solutions normally were disposed of off-site via a contract disposer or were mixed with noncontact water, process water, and storm water runoff prior to discharge. It is likely that prior to 1977, caustic solutions and metal plating acids were probably discharged directly to the surface water along with other process fluids.

A John Deere estimate of the total amount of solid wastes materials placed in the landfill include the following:

	Quantity (tons)
Sand and Ash	- 290,000
Cyanides	- 1/2
Heavy metals (arsenic, chromium, lead, and zinc)	- 1/2
Waste Paint sludge	- 2811
Waste paint filters	- 320
Alkali (NaOH salt bath residue)	- 262
Miscellaneous Waste	- 34,107

In order to assess the impact of disposal of these materials, a Remedial Investigation (RI) was conducted. The purpose of the remedial investigation was to collect necessary data to characterize the site and to assess the potential release of hazardous materials from the site. Data collection efforts included surface and subsurface soil sampling, ground water sampling, and air monitoring. The collected data were then used to evaluate potential hazards associated with possible exposure to the detected contaminants; taking into account toxicity, physical/chemical factors, measured concentrations, and present and future exposure pathways. Results of this process are included in the "Baseline Risk Assessment" below.

The September 15, 1987 RI/FS Work Plan identified known releases of potentially hazardous materials. Areas and events identified in the Work Plan as being potential source areas are:

Old foundry ponds.
Chrome basin leak related to the industrial wastewater treatment plant.
Diesel fuel line leak.
Several isolated waste oil/coolant spills.
Coal storage yard.
Former landfill.

The remedial investigation identified the following areas of concern:

<u>Surface</u> <u>Water</u>- Any chemical discharges through the Company's NPDES system will enter the Mississippi or Maquoketa River systems. Also, surface runoff and seepage from the landfill enters the Little Maquoketa River. Any contaminants contained in the runoff would then enter the Upper Mississippi River Wildlife and Fish Refuge. Chemicals entering the rivers might impact downstream wildlife and biota. Disturbances of the landfill slopes would be a concern in cases of extremely high river water levels, but the landfill slopes appear to be stable. The Company reported that the Little Maquoketa experienced a 500 year flood in 1972 with no instances of slope failure at the landfill.

Potential parameters of concern which were detected in the surface water discharges were benzene, bromodichloromethane, 1,2-dichloroethene, chloroform, 1,1,1-trichloroethane, trichloroethylene, and xylenes.

<u>Ground</u> <u>Water</u> - The plant obtains its water supply from eight production wells located on-site. Two wells are installed into deep bedrock aquifers while six wells are constructed into the alluvial aquifer. The predominant direction of ground water flow in the alluvial aquifer is toward the production wells.

Contamination has been detected in the on-site alluvial production and monitoring wells. The chemicals include: 1,1,1-trichloroethane, 1,1-dichloroethene, carbon tetrachloride, tetrachloroethene, trichloroethene, benzene, nitrate, chromium, iron, and manganese.

Specific sources of ground water contamination were not identified. However, localized areas of contamination appear to exist near production well-3 (PW-3) and soil boring well-3 (SBW-3). The locations of these wells are shown in Figure 4. A nonaqueous phase liquid (NAPL) is currently being recovered in the vicinity of PW-3. This material may be present due to the diesel fuel spill of 1980. Some of the constituents

detected at PW-3 may be due to dissolution of the NAPL into the ground water system. However, low levels of chlorinated volatile organics, which are not common components of diesel, were also detected in ground water and the NAPL samples. The source of the chlorinated compounds is assumed to be from previous solvent handling practices at the site. Contamination at SBW-3 may be related to a past chrome basin leak (the chrome basin is part of the industrial waste water treatment system).

The City of Dubuque's shallow well field is located about 3.5 miles from the JDDW plant. The contaminants in the alluvial aquifer at JDDW have no influence on ground water at the Dubuque well field.

Surficial Soils - Data indicate some concern for transport of potentially contaminated soil via runoff and seepage from the landfill into the Little Maquoketa. The constituent of concern is lead at the old landfill. Possible exposure points would be direct contact with contaminated soil and ingestion both off-site and at the JDDW grounds.

Air- A large percentage of the immediate plant work area is covered by pavement and buildings. Volatile organic concentrations in soil and sediment samples are minimal and are not expected to be present at levels that would impact overall air quality. Lead could present a concern due to possible inhalation of fugitive dust at the JDDW grounds and the off-site residences along the Mississippi.

Ground Water Flow During Plant Shutdown - Pumpage of production wells on the JDDW property controls ground water flow in the alluvium beneath the site. The flow of water is from the Mississippi River toward the pumping wells. However, in the absence of well pumpage, flow would be toward the Mississippi River and the private wells in the vicinity of JDDW, particularly those to the east between the plant and the Mississippi.

SUMMARY OF SITE RISKS

Baseline Risk Assessment

A baseline (no remedial action) public health evaluation was conducted on the potential hazards associated with possible exposure to contaminants detected at the site. Sampling at the JDDW facility has revealed inorganic metals and several organics in the soils at the former landfill, inorganic metals at the foundry sands area, and petroleum hydrocarbons and solvents beneath the JDDW plant and near the chrome treatment basin. Indicator chemicals were selected to identify the highest risk chemicals at the site so that the risk assessment focused on the chemicals of greatest concern.

Of the constituents found at the site, lead and manganese were designated as indicator chemicals for the inorganic constituents in soils (only low levels of organics were detected). Benzene, carbon tetrachloride, 1,1-dichloroethene, and trichloroethene were designated as indicator organic compounds for ground water. The major pathways of potential exposure to these contaminants are:

- Contact with, and ingestion of, small quantities of surficial soils;
- Inhalation of fugitive dust;
- Swimming in the Mississippi River; and
- Contact with water pumped at the JDDW facility.

Exposure to the soils at the old landfill and foundry sands area were assessed for workers, off-site residents and hikers. Estimated chronic intake levels of the indicator chemicals were calculated for potential routes of exposure. Human health hazards are considered minimal based on the comparison of estimated intake levels to acceptable chronic intake levels as published by the USEPA in the Superfund Public Health Evaluation Manual.

Discharge of organic constituents to the Mississippi River was assessed for swimming and fish ingestion exposures. Swimming in the Mississippi River in the vicinity of the plant is considered an infrequent event and the constituents detected in the NPDES discharges have low bioconcentration factors. Consequently, the potential for discharged organic constituents producing adverse effects from swimming or fish ingestion is very low.

Environmental risks at the site are considered low. Access to the site is controlled and there has been no identifiable stress to off-site vegetation. Concentrations of the inorganic parameters in the Little Maquoketa and Mississippi Rivers were at background levels and below federal aquatic-life water quality criteria. Bioconcentration factors and biomagnification potential for the organic constituents are low. Therefore, the organic parameters should not concentrate in the aquatic food chain. Overall, the potential for adverse effects to the terrestrial or aquatic ecosystems adjacent to the JDDW facility is low.

Figure 4 shows the production wells at the plant in relation to the Mississippi River and off-site private wells. There are no wells other than the JDDW production wells that are currently being impacted by the organic constituents in the ground water because flow in the alluvial aquifer is toward the production wells. Future hypothetical risks associated with the ground water are related to discontinuation of production well pumping for a period of time sufficient for the organic constituents to migrate to the residences located east of the facility. Based on computer simulations under non-pumping conditions, it appears possible that the concentrations of the indicator chemicals could exceed the federal drinking water standards if pumping were to cease for long periods of time. Concentrations of chemicals in drinking water supplies above these standards would result in

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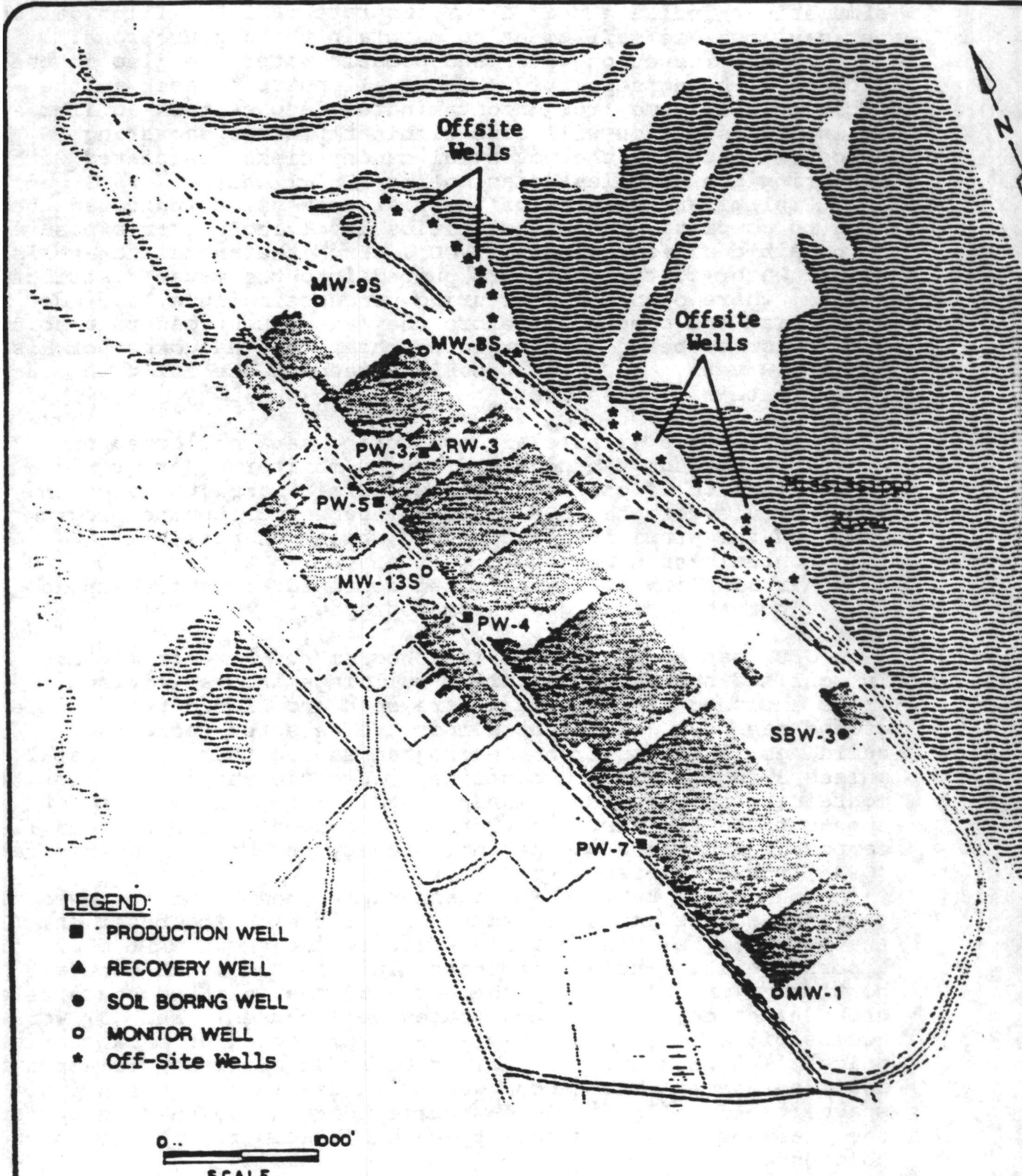
Figure 4



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the potential for adverse health effects. Continued pumping at a minimum rate will maintain the "capture zone" and prevent the off-site wells from becoming contaminated. Current modeling simulations indicate that a pumping rate of 1.2 million gallons per day (mgd) is sufficient to maintain the capture zone.

Plant production water and potable water are also in the process of being separated. Thus, all potable water at the facility will come from uncontaminated deep bedrock aquifer wells. This action will also eliminate future showering exposure, although the potential cancer risks associated with showering are much less than one in a million.

Preliminary results of the risk assessment indicated the need to complete exposure scenarios involving worker exposure to possible air emissions of VOCs. From the production wells, ground water contaminants are pumped into the water distribution system, where plant manufacturing processes dilute, degrade, and volatilize the compounds before they are discharged to a holding pond prior to being discharged to the Little Maquoketa or Mississippi Rivers. JDDW and the EPA agreed to the following tasks to evaluate air emissions:

-- Review of available air monitoring data collected by JDDW through the confined spaces monitoring program.
-- Selection of confined spaces for air sampling based on a review of the JDDW confined spaces monitoring program and the proximity of confined spaces to possible contaminant plumes.
-- Air sampling of the selected confined air spaces using a portable field gas chromatograph.

JDDW has an air monitoring program to test air quality in confined spaces in all plant buildings and facilities. Areas included in the program are open and closed tanks, underground passages, equipment sumps, and selected rooms and buildings. Results from the program showed that, in general, unless a confined space contains a specific chemical as in a vat containing solvent for cleaning metal parts, there does not appear to be any historic problem or concentration of volatile compounds exceeding Occupational Safety and Health Administration (OSHA) worker exposure standards.

John Deere Dubuque Works and their consultant reviewed plant confined spaces and selected two for air sampling based on; (1) the proximity of the confined space to the known NAPL plume or a possible 1,1,1-trichloroethane plume in the south-central portion of the plant, (2) the depth of the confined space below ground (the deeper confined spaces were chosen), and (3) worker accessibility. Two air samples were collected at each confined space. The first was an ambient background air sample above the confined space. The second was collected in the confined air space itself. A portable gas chromatograph was used to perform the analyses. The instrument was calibrated for the following compounds:

Compound	Detection Level(ppb)
1,1,1-trichloroethane	100
1,1-dichloroethane	5
1,2-dichloroethane	100
benzene	5
tetrachloroethene	5
toluene	5
trichloroethane	5

No compounds were reported above the detection levels.

In summary, the primary hazard associated with the JDDW site is the possibility of dissolved organic chemicals impacting off-site domestic wells located east of the plant along the Mississippi River. Maintaining a minimum pumping rate of 1.2 mgd will prevent migration of contaminated ground water to the off-site wells. The reader is encouraged to see the Remedial Investigation Report for a more detailed discussion of the risk assessment.

DOCUMENTATION OF SIGNIFICANT CHANGES

The selected remedy is the one presented as the preferred alternative in the Proposed Plan. There have been no significant changes made as a result of public comments.

DESCRIPTION OF ALTERNATIVES

Table 1 summarizes the effectiveness, implementability, and cost factors of various response actions for both landfill and ground water remediation. Eight alternatives were initially examined and "pre-screened" prior to drafting of the feasibility study. Each included some combination of the Table 1 response actions. One alternative was a contingency plan which was prepared to address the conditions which may occur if the JDDW production wells were shut down for a prolonged period of time, or if production well water required additional treatment.

The preliminary alternatives also included some form of remedial action at the former landfill. With the exception of the contingency plan, all included access restrictions to the landfill. Four of the alternatives considered either a cap or cover to prevent direct contact with contaminated soils and reduce ground water contamination due to percolation and leaching. In addition, two other alternatives included excavation with soil disposal in an on-site RCRA landfill to prevent contaminant leaching, direct contact, and inhalation.

During the RI, a risk assessment (discussed previously) was conducted to determine the potential exposures and associated risks involved with the constituents released to the environment as a result of JDDW past operations. The RI soil data indicated that, in general, contamination was broadly dispersed at relatively low concentrations. Conclusions drawn from the risk assessment indicated that human health hazards at the landfill could be considered minimal, based on comparison of estimated intake levels to acceptable chronic intake levels as published by the USEPA. In addition, contaminated leachate seeping into the ground water is unlikely to be a problem based on EP-toxicity testing. As a result of these determinations, excavation, capping, or covering the landfill were not considered necessary and those parts of the alternatives were eliminated. However, access restrictions, specifically deed restrictions and a security fence, were retained for consideration in order to control future uses of the area.

After preliminary screening, five alternatives were selected for final evaluation. These alternatives and their respective response actions are presented in Figure 5. All of the alternatives include continued pumping of alluvial production wells for on-site containment of the contaminants.

Table 1

RESPONSE ACTION SUMMARY
(Initial Screening of Alternatives)

Soil, Waste, and Air Response Actions	Effectiveness	Implementability	Cost
ACCESS RESTRICTIONS	Deed restrictions are dependent upon long-term enforcement. A security fence is effective if maintained.	Legal requirements necessary for deed restrictions; security fence is easily implemented.	Negligible for deed restrictions; low capital and O&M for security fence.
CAP/COVER: CONTAINMENT	Effective as long as O&M is performed. Risk from direct contact is reduced; contamination of ground water reduced but not eliminated. Capping is a well-established technology.	A cap or cover is easily implemented but there are are legal requirements for deed restrictions.	Low to moderate capital; low to high maintenance depending on type of cover material.
EXCAVATION	Effective and reliable; reduces potential for contaminant leaching. Protection required against dermal contact and inhalation of contaminated dust.	Readily implementable.	Moderate to high capital expenditures.
LAND DISPOSAL (ON-SITE RCRA LANDFILL)	Effective and moderately reliable. O&M required to prevent landfill failure.	RCRA landfill relatively easy to implement. No offsite construction. Permits ??	Moderate capital.
Ground Water Response Actions			
ALTERNATE WATER SUPPLY: ISOLATE POTABLE WATER	Effective in preventing use of contaminated drinking water at the plant; reducing risk to the lower aquifer.	Readily implementable; conventional construction.	Moderate capital, low O&M.
MONITORING OF ALLUVIAL, POTABLE, AND PRODUCTION WELLS	Ground water monitoring will document conditions and extent of plume migration. Does not reduce contamination.	Readily implementable.	Low capital, low O&M.
EXTRACTION OF PRODUCTION AND ALLUVIAL WELLS	Effective and reliable; Ground water monitoring will verify effectiveness of the extraction system. Aquifer drawdown required to maintain zone of influence.	Readily implementable. May incorporate use of existing wells.	Low capital, low O&M.
PHYSICAL TREATMENT WITH EXISTING SYSTEM -ALLUVIAL WELLS & NAPL SPILL	Effective and reliable for removal of suspended solids. Requires sludge disposal.	Implementable; however capacity of existing system will limit volume of water that can be treated.	No additional capital expenditures; moderate O&M.

Table 1
(cont.)

	Effectiveness	Implementability	Cost
BIOLOGICAL TREATMENT WITH EXISTING SYSTEM -ALLUVIAL WELLS	May be effective for removal of readily bio-degradable organics Unlikely to be very effective on most contaminants of concern.	Readily implementable, however capacity of system will limit volume of water that can be treated.	No additional capital expenditures; moderate O&M.
PHYSICAL TREATMENT WITH CARBON ABSORPTION AND/OR AIR STRIPPING -PRODUCTION & ALLUVIAL WELLS	Both air stripping and carbon absorption are proven technologies. Treatment of production well water by activated carbon may be ineffective due to large water volumes and relatively low contaminant concentrations. Stripping tower emissions controls probably not required; water vapor may be a problem in winter.	Implementable but pilot testing, design and construction required	Air stripping - low capital, moderate O&M. Carbon absorption - moderate capital, high O&M.
OFF-SITE DISCHARGE	Effective for reducing ground water contamination. Effluent contaminants must not adversely impact Mississippi and Little Maquoketa Rivers.	Readily implementable. Existing discharge permits may require revision.	Low capital, low O&M.

ALTERNATIVE 1 -- NO ACTION

The Superfund program requires that the "no action" alternative be considered at every site. Under this scenario, John Deere would take no further action at the site to control the contamination. Extraction of the ground water from production wells and discharge of wastewaters at selected NPDES outfalls would continue for on-site containment of ground water contamination as part of normal production activities. Under Alternative 1, JDDW would not be required to continue ground water pumpage in the event of plant shutdown. Also, the quality of the plant's potable water supply would not be improved. Monitoring of specified potable and production wells, as well as those installed to monitor the NAPL spill, would continue. The "no action" alternative would not require any capital expenditures by JDDW.

ALTERNATIVE 2 -- EXPOSURE PREVENTION AND CONTAINMENT

This alternative would eliminate the potential risks associated with the alluvial ground water through installation of an alternate water supply for potable water usage at the site. Currently, an alternate water supply is being installed at JDDW to replace alluvial wells PW-4, 5, and 7 as potable water supply wells. The new water supply will use bedrock wells PW-1 and PW-2, which are uncontaminated based on data from the RI. Production well usage will then be as shown in Figure 5. Halting production well pumpage of the bedrock aquifer will also reduce the threat to that aquifer by maintaining an upward gradient. Extraction and monitoring of production wells would continue under normal operations. The alluvial wells and those wells connected with the NAPL spill would be monitored.

ALTERNATIVE 3 -- NAPL MANAGEMENT

This alternative includes the same actions as alternative 2. In addition, the NAPL spill would be extracted and treated using an existing system (oil/water separation). The existing system consists of a recovery well installed near PW-3 to intercept the NAPL and an API separator. The ground water effluent is discharged to the south skimmer pond and ultimately NPDES 005 (Figure 6). Following implementation of this alternative, floating phase NAPL from the separator would be collected and transported for off-site waste management. Collected NAPL would not be stored on-site for a period longer than 90 days.

Reduction of the PW-3 pumping rate may be considered to reduce the tendency of NAPL to enter the PW-3 well screen. Should PW-3 pumping be reduced, the pumpage rates at PW-4, 5, and 7 would be increased, as necessary, to meet plant water usage needs and to contain potential ground water contamination on-site. Thus, continuation of existing NAPL management methods would supplement the remedial action objective of aquifer restoration.

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Figure 5

General Response Action: Medium	Area of Concern	Technology Type	Process Option	Alternative 1 No Action	Alternative 2 Exposure Prevention	Alternative 3 Treatment of NAPL	Alternative 4A Treatment of NAPL and SBV-3 area	Alternative 4B Treatment of NAPL and SBV-3 area
Ground Water (GW)	Potable Water Supply	Alternate Water Supply	PW1, PW2 Usage		●	●	●	●
		Monitoring	Specified Wells	●	●	●	●	●
	Production Well Water	Monitoring	Specified Wells	●	●	●	●	●
		Extraction	Existing Wells	●	●	●	●	●
		Off-site Discharge	NPDES Outfalls	●	●	●	●	●
	NAPL	Monitoring	Specified Wells	●	●	●	●	●
		Extraction	Existing Wells			●	●	●
		Physical Treatment	Existing System			●	●	●
		Off-site Disposal	Incineration or reclamation			●	●	●
		Off-site Discharge	NPDES Outfalls			●	●	●
	SBV-3 Area	Monitoring	Specified Wells	●	●	●	●	●
		Extraction	Recovery Wells				●	●
		Physical Treatment	Air Stripping					●
		Biological Treatment	Existing Plant				●	●
		Off-site Discharge	NPDES Outfalls				●	●

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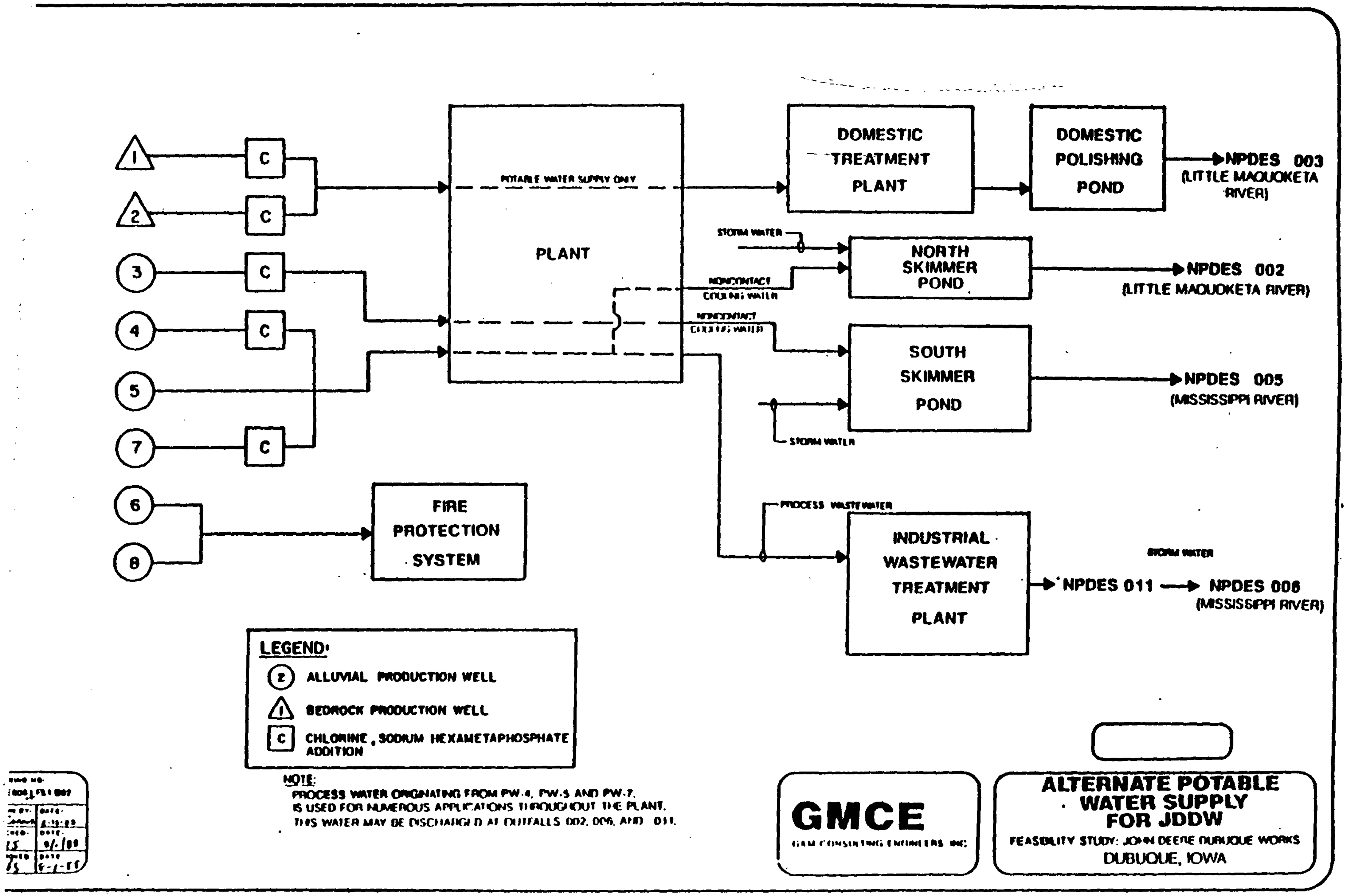
Figure 6



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ALTERNATIVE 4A -- NAPL AND ALLUVIAL GROUND WATER (SBW-3 AREA) MANAGEMENT

Alternative 4A is basically the same as number 3; that is, an alternate potable water supply, extraction of the production wells, and physical treatment of the NAPL spill. In this case, localized remediation of the alluvial ground water system would also be achieved by extraction of well SBW-3, followed by treatment via the existing biological industrial waste water treatment plant. Treatability studies may be required to determine if the ground water extracted from SBW-3 could be managed in the existing plant. Hydraulic capacity of the plant may also limit the implementablity of this alternative. The biological plant would effectively remove the volatile organics from extracted ground water. Aeration achieved in the carousel ditch of the system should be adequate to remove the volatile organics.

ALTERNATIVE 4B -- NAPL AND ALLUVIAL GROUND WATER (SBW-3 AREA) MANAGEMENT

Alternative 4B is the same as 4A with the exception that an air stripper would be used at SBW-3 for treatment of recovered ground water prior to discharge to the biological plant and eventually the Mississippi River via NPDES outfall 011. Air stripping would probably be performed in either a packed air stripper tower or in an air diffuser tank system. Based on available hydraulic capacities, treated ground water would be discharged into the carousel ditch for additional aeration and VOC removal prior to surface water discharge. Treatability studies may be required to determine the appropriate process options, and to optimize removal efficiencies.

CONTINGENCY PLAN

This plan was prepared to address the conditions which may occur if the JDDW production wells were shut down for a prolonged period of time or if recovered ground water from production wells required additional treatment prior to use as process waters for the plant. John Deere has gone on record as saying appropriate pumping of production wells will be maintained at the site, as necessary.

Prior to implementation of any contingency plan it would be necessary for JDDW and regulatory personnel to evaluate changes in site conditions, regulations, remedial technologies, etc. Studies may be performed to optimize the effectiveness of implementing the contingency plan.

This plan was provided to illustrate remediation strategies that could be implemented. Ground water recovery rates from PW-3, 4, 5, and 7 would be maintained for a minimum total recovery rate of 1.2 mgd, the minimum flow for containment of the alluvial aquifer underlying JDDW. Constituents recovered in ground water could be treated in air stripping units installed at each production well. Treated ground water may be managed in two different scenarios; 1) treated effluent could be discharged to surface waters from NPDES permitted outfalls via the industrial treatment facility, the sanitary facility, and/or 2) treated effluent could be injected into the alluvial aquifer to recharge the aquifer and form a hydraulic barrier between the impacted ground water and potential off-site ground water users. Use of the hydraulic barrier may make it possible for JDDW to decrease ground water recovery rates and still maintain on-site containment. The existing NAPL recovery system would remain in use and recovered NAPL would be incinerated off-site. Use of the API separator would still be used and ground water still would be discharged to the south skimmer pond and then to NPDES 005.

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Alternatives 1, 2, 3, 4A, and 4B were then screened with respect to effectiveness, implementability, and cost. This analysis is summarized in Table 2. Alternative 2 was eliminated from further consideration based on the initial screening as presented in the feasibility study report. The alternative was protective by virtue of providing an alternate water supply and alluvial aquifer restoration. However, it did not address the NAPL floating on the ground-water surface near PW-3. If the NAPL is not extracted in a separate system it may be extracted from PW-3, which could impact plant process operations and surface water quality at NPDES outfalls.

Alternatives 1, 3, 4A, and 4B then underwent a more detailed analysis according to nine criteria as defined by EPA in the 1988 draft guidance for conducting a RI/FS. A summary of the detailed analysis of the final alternatives is presented in Table 3.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT. This criterion addresses whether or not a remedy provides adequate protection and describes how risks are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

All of the alternatives, with the exception of the "no action" alternative, would provide adequate protection of human health and the environment. Risks are reduced and controlled by maintaining a capture zone such that contaminated ground water will not migrate off-site and gradually reducing levels of contaminants. Replacement of the potable water supply with the use of uncontaminated bedrock ground water from PW-1 and PW-2 would mitigate the potential risks for direct contact by on-site workers to contaminated ground water. The NAPL recovery system expedites remediation of the alluvial aquifer by removing concentrated quantities of undesirable constituents. This unit consists of an API separator which removes the floating NAPL for subsequent off-site management.

Table 2

Initial Screening of Remedial Alternatives
Feasibility Study: John Deere Dubuque Works
Dubuque, Iowa

Remedial Alternative	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4A & 4B
	o Ground-water Monitoring o Continued Production Well Pumpage	o Ground-water Monitoring o Continued Production Well Pumpage o Alternate Water Supply	o Ground-water Monitoring o Continued Production Well Pumpage o Alternate Water Supply o NAPL Recovery/Treatment	o Ground-water Monitoring o Continued Production Well Pumpage o Alternate Water Supply o NAPL Recovery/Treatment o SBW-3 Area Management
EENING CRITERIA				
ectiveness				
Protectiveness	o Continued operation of the production wells would prevent off-site migration of ground-water contamination o The potential remains for exposure of JDDW personnel to contaminated potable water	o Addresses the remedial action objectives established in the FS o A minimal risk for worker exposure would result from conducting the remedial actions o The remedial actions conducted would not adversely affect the surrounding community o Continued operation of the production wells would prevent off-site migration of contaminated ground water	o Addresses the remedial action objectives established in the FS o A minimal risk for worker exposure would result from conducting the remedial actions o The remedial actions conducted would not adversely affect the surrounding community o Continued operation of the production wells would prevent off-site migration of contaminated ground water o Recovery of NAPL would enhance aquifer restoration	o Addresses the remedial action objectives established in the FS o A minimal risk for worker exposure would result from conducting the remedial actions o The remedial actions conducted would not adversely affect the surrounding community o Continued operation of the production wells would prevent off-site migration of contaminated ground water o Recovery of NAPL would enhance aquifer restoration o Recovery of contaminated ground water at SBW-3 would enhance aquifer restoration

Table 2
(cont.)

Initial Screening of Remedial Alternatives
Feasibility Study: John Deere Dubuque Works
Dubuque, Iowa

Remedial Alternative	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4A & 4B
	o Ground-water Monitoring o Continued Production Well Pumpage	o Ground-water Monitoring o Continued Production Well Pumpage o Alternate Water Supply	o Ground-water Monitoring o Continued Production Well Pumpage o Alternate Water Supply o NAPL Recovery/Treatment	o Ground-water Monitoring o Continued Production Well Pumpage o Alternate Water Supply o NAPL Recovery/Treatment o SBW-3 Area Management
EENING CRITERIA				
lementability (Continued)				
Administrative Feasibility	o Approval from regulatory agencies to implement alternative is unlikely	o Approval from regulatory agencies to implement alternative is unlikely due to presence of NAPL	o Approval from regulatory agencies to implement alternative is likely	o Approval from regulatory agencies to implement alternative is likely
	o Adequate work force, materials, specialists are available	o Adequate work force, materials and specialists are available	o Adequate work force, materials and specialists are available	o Adequate work force, materials and specialists are available
		o Remedial action technology components available and could be easily implemented at the site	o Remedial action technology components are available and could be easily implemented at the site	o Remedial action technology components are available and could be easily implemented at the site
t (Relative)				
Capital	o Low	o Low	o Moderate	o Moderate
Replacement	o Low	o Low	o Low	o Moderate
O&M	o Low	o Moderate	o Moderate	o Moderate
ained for Detailed ilysis of Alternatives	o Yes	o No	o Yes	o Yes

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Table 2
(cont.)

Initial Screening of Remedial Alternatives
Feasibility Study: John Deere Dubuque Works
Dubuque, Iowa

Remedial Alternative	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4A & 4B
	o Ground-water Monitoring o Continued Production Well Pumpage	o Ground-water Monitoring o Continued Production Well Pumpage o Alternate Water Supply	o Ground-water Monitoring o Continued Production Well Pumpage o Alternate Water Supply o NAPL Recovery/Treatment	o Ground-water Monitoring o Continued Production Well Pumpage o Alternate Water Supply o NAPL Recovery/Treatment o SBW-3 Area Management
SCREENING CRITERIA				
Effectiveness (Continued)				
Reduction of Toxicity, Mobility or Volume of Waste	o Recovered ground water would be treated to reduce the toxicity, mobility and volume of the aqueous waste constituents detected in the alluvial aquifer	o Recovered ground water would be treated to reduce the toxicity, mobility and volume of the aqueous waste constituents detected in the alluvial aquifer	o Recovered ground water and NAPL would be treated to reduce the toxicity, mobility and volume of the waste streams	o Recovered ground water and NAPL would be treated to reduce the toxicity, mobility and volume of the waste streams
Implementability				
Technical Feasibility	o Remedial actions on-going	o Remedial actions on-going, alternate water supply being implemented	o Remedial actions could be implemented without significant problems	o Remedial actions could be implemented without significant problems
	o Periodic maintenance would be continued for the existing production and monitoring well systems	o Periodic maintenance would be required for the existing production and monitoring well systems	o Periodic maintenance would be required for the existing production and monitoring well systems, and the NAPL remediation system	o Periodic maintenance would be required for the production and monitoring well systems, the NAPL remediation system, and the recovery/treatment system for the SBW-3 area
	o Ground-water monitoring would be required to monitor the effectiveness of remedial activities	o Ground-water monitoring would be required to monitor the effectiveness of remedial activities	o Ground-water monitoring would be required to monitor the effectiveness of remedial activities	o Ground-water monitoring would be required to monitor the effectiveness of remedial activities

Table 3

Comparison of Remedial Alternatives
Feasibility Study: John Deere Dubuque Works
Dubuque, Iowa

	Alternative 1 (No Action)	Alternative 3	Alternative 4A and 4B
Screening Criteria	o Ground-water Monitoring o Continued Production Well Pumpage	o Ground-water Monitoring o Continued Production Well Pumpage o Alternate Water Supply o NAPL Management	o Ground-water Monitoring o Continued Production Well Pumpage o Alternate Water Supply o NAPL Management o SBW-3 Area Management
Short-term Effectiveness	o Potential risks associated with ground-water monitoring would be controlled o Complete	o Potential risks reduced for remediation workers o Minimal additional threat to the community, surrounding environment, and/or JDDW workers doing remedial activities o Complete in approximately one year.	o Potential risks reduced for remediation workers o Minimal additional threat to the community, surrounding environment, and/or JDDW workers doing remedial activities o Complete in approximately one year
Long-term Effectiveness and Permanence	o Remediates alluvial aquifer o Production and monitor well systems require long-term maintenance	o Remediates alluvial aquifer o NAPL and ground-water recovery and treatment systems require monitoring and long-term maintenance	o Remediates alluvial aquifer o NAPL and ground-water recovery and treatment systems require monitoring and long-term maintenance o Minimal increase in recovery efficiency contributed by recovery well at SBW-3
Reduction of Toxicity, Mobility and Volume	o Toxicity, mobility, and volume of aqueous contaminants in the ground water reduced	o Toxicity, mobility, and volume of aqueous contaminants in the ground water reduced	o Toxicity, mobility, and volume of aqueous contaminants in the ground water reduced
Implementability	o Requires operation and maintenance of existing systems o Potential for additional remedial action in the future	o Utilizes conventional construction and installation methods o Negligible potential for additional remedial action	o Utilizes conventional construction and installation methods o Negligible potential for additional remedial action

Table 3
(cont.)

Comparison of Remedial Alternatives
Feasibility Study: John Deere Dubuque Works
Dubuque, Iowa

	Alternative 1 (No Action)	Alternative 3	Alternative 4A and 4B
Screening Criteria	o Ground-water Monitoring o Continued Production Well Pumpage	o Ground-water Monitoring o Continued Production Well Pumpage o Alternate Water Supply o NAPL Management	o Ground-water Monitoring o Continued Production Well Pumpage o Alternate Water Supply o NAPL Management o SBW-3 Area Management
mplementability (Continued)		o Materials, personnel, and technologies are available for implementation	o Materials, personnel, and technologies are available for implementation
ost			
Capital	o None	o $ 800,000	o A: $1,017,500 B: $1,166,000
Replacement	o None	o $ 69,000	o A: $ 69,000 B: $ 161,000
Annual O&M	o $68,100/yr	o $ 278,600/yr	o A: $ 309,300/yr B: $ 315,900/yr
Total Present Worth	o $1,046,900	o $5,151,800	o A: $5,841,200 B: $6,183,200
ompliance with ARARs	o Remedial action goals would be attained unless remediation is limited by best available technologies	o Remedial action goals would be attained unless remediation is limited by best available technologies	o Remedial action goals would be attained unless remediation is limited by best available technologies
		o Recovery of NAPL would address remedial action goals for maximum recoverable amount of NAPL	o Recovery of NAPL would address remedial action goals for maximum recoverable amount of NAPL.
verall Protection of Human lealth and the Environment	o Reduces risk of exposure to ground-water contaminants off-site	o Reduces risk of exposure to ground-water contaminants off-site	o Reduces risk of exposure to ground-water contaminants off-site
	o Risks associated with contact between contaminated water and JDDW workers may still exist	o Reduces risk of direct contact with contaminated water by JDDW workers	o Reduces risk of direct contact with contaminated water by JDDW workers
		o Reduces risk of off-site migration NAPL	o Reduces risk of off-site migration NAPL
State Acceptance	o Unlikely	o Likely	o Likely
Community Acceptance	o Unlikely	o Likely	o Likely

COMPLIANCE WITH ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other environmental statutes and/or provide grounds for invoking a waiver.

Compliance with ARARs would be accomplished by alternatives 3, 4A, and 4B. Treatment of the recovered NAPL and contaminated ground water will focus on attaining chemical-specific ARARs for surface waters at the discharge points for treated ground water. Specifically, State water quality standards and federal water quality criteria in the Mississippi and Little Maquoketa Rivers would not be violated by the discharges to the NPDES system with these alternatives. In order to assure that these standards and criteria are not violated, the State of Iowa may require additional NPDES permit limitations for any organic contaminants that are discharged during implementation of the selected remedy.

Due to the presence of the NAPL, implementation of Alternative 1, no action, may result in nonattainment of chemical-specific ARARs for surface water at NPDES 005. Extraction of contaminated ground water (all alternatives) will eventually attain federal MCLs and/or meet the State of Iowa's Ground Water Protection Policy.

LONG-TERM EFFECTIVENESS AND PERMANENCE refers to the ability of a remedy to maintain reliable protection of human health and the environment once cleanup goals have been met.

Alternative 3 would replace the current potable water supply with an uncontaminated source. Continual pumpage of plant production wells and NAPL recovery would prevent contaminant migration off-site. Eventually, contaminants would achieve levels that are in compliance with State ARARs. Contaminant reduction already occurs as water is pumped from the affected aquifer, through the various unit processes involved with production, and finally to the NPDES outfalls. Potential risks associated with direct contact with contaminated ground water would also be mitigated. The ground water monitoring system surrounding the plant will assess the effectiveness of the extraction process.

Alternatives 4A and 4B would achieve relatively the same long-term effectiveness and permanence as Alternative 3. The proposed recovery well near SBW-3 might also increase the efficiency of alluvial aquifer remediation. However, it is anticipated that the increase in contamination recovery efficiency contributed by the recovery well near SBW-3 would not significantly reduce the time required for remediation of the alluvial aquifer system. The low levels of contaminants detected in the SBW-3 area would be removed by continued pumping at PW-7, and the additional aquifer restoration provided by a recovery system at SBW-3 was predicted to be minimal. Thus, installation of such a system was deemed unnecessary.

Alternative 1 would not increase the quality of the plant's potable water supply. Discontinuing usage of the NAPL recovery system may also adversely impact the water quality of alluvial ground water extracted from production wells and used as process or potable water at the plant.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME is the anticipated performance of the treatment technologies a remedy may employ.

With the exception of Alternative 4B, treatment using existing systems would be employed. Contaminant reduction would be achieved with all alternatives via the various plant production processes. Alternative 1 does not treat the NAPL spill which would delay reduction of toxicity, mobility, and volume of the contaminants in the alluvial aquifer.

Alternative 3 would recover and treat the NAPL, thus reducing contamination in the alluvial aquifer. Alternatives 4A and 4B's use of a recovery well at SBW-3 would also continue to reduce the toxicity, mobility, and volume of alluvial contamination.

SHORT-TERM EFFECTIVENESS involves the period of time needed to achieve protection from any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

Alternative 3 would replace the potable water supply with an uncontaminated source drawn from the bedrock aquifer. This could be accomplished within one year after initiation of this alternative. Workers would be provided protection as appropriate. The NAPL recovery system and ground water extraction system are currently existing and functional. The NAPL that has been collected thus far has been stored on-site and would be disposed in accordance with prevailing RCRA and/or CERCLA requirements. Off-site disposal of the NAPL could be implemented within three months after initiation of this alternative.

Alternatives 4A and 4B would have the same short-term effectiveness as the preferred alternative. In addition, the SBW-3 recovery system could be installed within nine months of implementation. The biological treatment units are already in use at the site. Alternative 4B may require treatability studies. The design and installation of the air stripping system would be completed within one year of implementation.

Activated carbon filters would have to continue to be maintained at drinking water sources should alternative 1 be implemented because the potable water supply would not be replaced. JDDW workers involved with production well maintenance and ground water monitoring would be provided protection as necessary.

IMPLEMENTABILITY is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

The no action alternative (number 1) can be readily implemented at the site. The existing ground water monitoring network would be utilized and the program implemented within a short time frame. Likewise, Alternative 3 should pose no significant construction or operation problems. The potable water supply wells, PW-1 and PW-2, are already installed into the bedrock aquifer and are being readied for connection to the domestic water supply. The existing ground water and NAPL recovery systems have been operational for several years and, in addition, the equipment, specialists and technologies required to implement Alternative 3 are available. Nor would implementation difficulties be expected with 4A and 4B. Installation of the air stripping unit should not present any special difficulties and the biological treatment units are currently operational. However, the capacity of the biological system to treat additional volumes of water may be limited.

COST includes capital costs and operation and maintenance costs. Estimated capital cost of implementing the preferred alternative is $800,000, with replacement and annual O&M costs estimated at $69,000 and $276,600/year respectively. The estimated capital cost, replacement costs, and annual O&M cost for implementation of Alternative 4A are $1,017,500, $69,000, and $305,400/year respectively. The estimated capital cost, replacement cost, and annual O&M cost for Alternative 4B are $1,166,000, $161,000, and $312,000/year respectively. The costs of implementing Alternative 1 relate to ground water monitoring and would be approximately $63,700 /year. A more more detailed cost analysis for each of the final alternatives is presented in the Feasibility Study.

STATE ACCEPTANCE indicates whether, based on its review of the RI/FS and Proposed Plan, the State concurs with, opposes, or has no comment on the preferred alternative.

The Iowa Department of Natural Resources has reviewed the Proposed Plan, the RI/FS Reports, and the draft ROD. The State concurs with the selected remedy (presented below) as indicated by the September 21, 1988 letter from Morris Preston, Iowa Department of Natural Resources, to Glenn Tucker, EPA Remedial Project Officer. Since each of the final alternatives would involve the discharge of certain organic chemicals to the Little Maquoketa and Mississippi Rivers, the NPDES permits may be revised by the State as required.

COMMUNITY ACCEPTANCE reflects local residents' preferences regarding the implementation of specific alternatives.

During the public comment period, concern was raised regarding the ability of the monitoring program to detect spills and whether contamination from JDDW was reaching off-site private wells. The Agency has agreed to require monitoring of a number of off-site wells in response to the concerns of residents living near the site. Specific comments and the Agency's responses are given in the Responsiveness Summary following the Decision Summary Section.

THE SELECTED REMEDY

Alternative 3, the Contingency Plan, and requirements placing future use restrictions on the plant property is the selected remedial action for the John Deere site. The selected remedy will consist of these major actions:

- **Develop an alternate potable water supply for the plant.** The new water supply will use bedrock wells PW-1 and PW-2, which are uncontaminated based on analytical data contained in the RI.
- **Extract water from the alluvial aquifer using the existing production wells.** This action will maintain drawdown around the plant and landfill areas, thus protecting nearby wells and controlling contaminant releases. The production wells and other monitoring wells would be periodically checked for contamination.
- **Continue to extract and treat non-aqueous phase liquid (NAPL) from the alluvium near production well-3.** The source of this material is probably diesel fuel spills and waste oil leaks. Contaminated oils would be collected and transported for off-site waste management.
- **Use deed restrictions to prevent inappropriate use of the property in the future.** Future use of the current plant property will be limited to industrial activities only. In addition, water wells tapping the alluvial aquifer beneath the current JDDW property would not be allowed.
- **Develop, and be prepared to implement, a contingency plan which would assure that contaminants do not migrate off-site in the event of a plant shutdown.** The plan would address conditions which may occur if the plant is shut down for a prolonged period of time, if process modifications are made which decrease production well pumpage below 1.2 mgd or pumping rates developed in the RD/RA, or if constituents recovered in ground water from production wells require additional treatment prior to surface water discharge.

Maintaining a drawdown and controlling ground water flows beneath the plant would assure that contaminants do not migrate to private wells in the vicinity, while extraction and discharge lowers the level of contamination in the ground water. John Deere will monitor the NPDES outfalls to assure that contaminants are not discharged at levels which would cause State water quality standards or federal ambient water quality criteria in the Mississippi and Little Maquoketa Rivers to be violated. The appropriate pumping rate and configuration would be maintained during periods of plant shutdown as well as normal operations. This rate and configuration will be based on computer simulations of ground water flow.

Although some volatile organics and metals will remain in the ground water and soils at the site, these actions will reduce the levels over the long-term while providing protection of human health and the environment. EPA believes the selected remedy is the best balance among the nine evaluation criteria.

Recovery operations will be continued until ground water quality meets the remedial action goals (e.g., Federal primary drinking water standards, USEPA Health Advisories), and until the maximum recoverable amount of NAPL is withdrawn. An evaluation will be conducted every five years, which will consist of a detailed review of the monitoring program and a summary of the effectiveness of site remedial actions. EPA will then make a decision on whether additional remedial measures are required or if remedial actions can be terminated.

STATUTORY DETERMINATIONS

EPA believes the selected remedy satisfies the requirements of Section 121 of CERCLA and is the most appropriate solution for the site.

Protectiveness

The selected remedy mitigates the human health and environmental risks identified in the risk assessment. Replacement of the potable water supply at the JDDW site with the use of uncontaminated bedrock ground water from PW-1 and PW-2 would mitigate the potential risks for direct contact by on-site workers to contaminated ground water. In addition, the alluvial production well extraction rates will continue to maintain the hydraulic gradient of the alluvial aquifer such that ground water flows towards the production wells, effectively containing the contaminated ground water on-site. The NAPL recovery system will also expedite remediation of the alluvial aquifer by removing the NAPL which contains concentrated quantities of undesirable constituents.

Deed restrictions are protective by assuring that the site will remain industrial, and by prohibiting the installation of domestic water wells in the alluvial aquifer beneath JDDW property.

Attainment of Applicable or Relevant and Appropriate Requirements

The recovery of the NAPL and contaminated ground water should restore the alluvial aquifer to the chemical-specific ARARs for ground water. Ground water remediation would be specifically monitored and maintained until chemical-specific ARARs are met or constituent recovery is limited by the best available technologies. Compliance with chemical-specific ARARs for surface water would also be accomplished by monitoring NPDES outfalls and controlling discharges depending upon monitoring results.

Cost Effectiveness

Alternative 3 has the highest cost/benefit ratio among all remedial alternatives evaluated for the site. Capital costs relative to the other final alternatives are moderate, operation and maintenence costs are also moderate, and replacement costs are low. The remedy can be readily implemented at the site because several of the technologies incorporated in Alternative 3 are already in use at JDDW. Tables 2 and 3 summarize the estimated implementation costs for the selected remedy in comparison with other evaluation criteria.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy will provide for long-term effectiveness and permanence as the incorporated technologies are reliable and address potential risks associated with the site. Replacement of the potable water supply, the continual pumpage of plant production wells, and NAPL recovery minimize future potential risks by removing exposures to contaminated ground water and restoring the aquifer.

Preference for Treatment as a Principal Element

The total volume of extracted ground water is not treated using state of the art technologies (e.g. activated carbon filtration). The tremendous volumes of extracted water make such actions impractical. However, the extracted water is used in plant processes; thus the contaminant levels are reduced by such mechanisms as dilution, degradation, and volatilization in conduits, open storage basins, skimmer ponds, and the industrial wastewater treatment system. Ground water in the vicinity of the 1980 diesel fuel spill is treated through the NAPL recovery and treatment system. .FI ROD.RES

RESPONSIVENESS SUMMARY

Record of Decision for
John Deere Dubuque Works
Dubuque, Iowa

This Responsiveness Summary presents EPA's responses to public comments received regarding the proposed remedial actions for contaminated ground water at the John Deere Dubuque Works site in Dubuque, Iowa. This document addresses all comments received by the Agency during the public comment period conducted as part of the remedy selection process. The Responsiveness Summary is a component of the Record of Decision (ROD) package, which also includes the ROD declaration, ROD summary and index to the administrative record.

Introduction

On August 5, 1988 EPA announced its Proposed Plan for remediation of the ground water contamination at the John Deere Dubuque Works in Dubuque, Iowa. Under the Proposed Plan the preferred remedial alternative would consist of the following major actions:

- Develop an alternate potable water supply for the plant.
- Extract water from the alluvial aquifer using the existing production wells. This action will maintain drawdown around the plant and landfill areas, thus protecting nearby wells and controlling contaminant releases. The production wells and other monitoring wells would be periodically checked for contamination.
- Continue to extract and treat non-aqueous phase liquid (NAPL) from the alluvium near production well-3. The source of this material is probably diesel fuel spills and waste oil leaks.
- Use deed restrictions to prevent inappropriate use of the plant property in the future.
- Develop and be prepared to implement a contingency plan which would assure that contaminants do not migrate off-site in the event of a plant shut down.

Although some volatile organics and metals will remain in the ground water and soils at the site, these actions will reduce the levels over the long-term while providing protection of human health and the environment. EPA believes the preferred alternative represents the best balance among the evaluation criteria used to evaluate remedies.

Public Participation

EPA Region VII received five comment letters in response to its request for public comment on the Proposed Plan and Remedial Investigation/Feasibility Study for the John Deere

Dubuque Works Superfund site. The following are summaries of the written comments received and the Agency's response.

Two commenters expressed dissatisfaction with the time allowed by EPA for submittal of comments. They both stated that they had less than the 21 days between the time they actually received the notice and the public comment closure date.

The minimum time allowed for public comment is 21 days according to EPA regulations. Based upon previous public input regarding this project, the Agency felt that 21 days would be an adequate amount of time for the public to respond. The appropriate documents were made available to the public on August 5, 1988 and an announcement was made requesting comments on that same date in the local newspaper. Shortly thereafter, "fact sheets" were sent to "interested parties" in the vicinity of the plant to further inform them of project actions and plans. These fact sheets would have arrived after the date of formal opening of the public comment period. We acknowledge that the fact sheets should have been sent earlier so they would have arrived at the same time the public notice was published in the newspaper.

To assure that the public, particularly nearby residents, were allowed sufficient opportunity for comment, EPA and John Deere held a public meeting in Dubuque on September 24, 1988. Comments and responses from that meeting are summarized below.

Four commenters live in the immediate vicinity of the plant and expressed concern about either the immediate safety of their water supply or the potential for future contamination. Three people suggested that John Deere make an alternate source of water available to homeowners whose supplies may become threatened if the contamination moves off-site. Two commenters requested that, at the very least, John Deere periodically test their wells.

The off-site well analyses that have been conducted thusfar have not shown any contamination in these wells as a result of activities at JDDW. Potential off-site ground water contamination is currently controlled by production well pumpage. Furthermore, EPA will require that sufficient pumpage continue even in the event of a plant shutdown. A monitoring program designed to detect any potential off-site contaminant migration would also be implemented should this occur. Sampling and analysis of off-site wells would be incorporated into the monitoring program if potential off-site movement were indicated.

However, to alleviate concerns about the current safety of water supplies, **EPA will require the testing of selected private wells in the area on a periodic basis.** The well location and monitoring frequency will be determined in the near future. This program will be reviewed five years after ROD implementation to determine its continued necessity.

One commenter wanted to know where the contaminated well water goes after it is pumped out of the wells. He was concerned since his well was close to the river.

The contaminated well water is not directly discharged to the Mississippi River. It is used in the production processes of the plant. By the time it is eventually discharged to the river, the original concentrations have been reduced and would be further diluted by the river.

One commenter was Deere & Company. Two comments regarded corrections on the size of the old landfill and the volumes of hazardous waste disposed there. Another expressed concern that a statement in the Baseline Risk Assessment Section of the Proposed Plan left the impression that ground water would immediately begin to flow toward private wells if pumpage stopped. One recommended that EPA not specify water withdrawal rates from each well unless shown to be necessary to prevent offsite migration; while another recommended that the Agency not specify specific methods of handling and disposing the NAPL, allowing the Company to choose the methods as long as they meet existing regulations. The final comment requested that RCRA comments and requirements be addressed in the ROD so as to avoid imposition of additional remedial actions after issuance of the ROD.

The Agency has made the appropriate corrections regarding the size of the old landfill and the volumes of hazardous wastes disposed there in the Summary of Site Characteristics Section of the ROD. We will acknowledge, in the risk assessment section of the ROD, that ground water flow would not immediately reverse if pumpage ceased; nor will we specify specific well withdrawal rates and methods of NAPL handling and disposal. Finally, the EPA RCRA Branch has been reviewing the RI/FS and Proposed Plan. Their comments will be taken into account before the ROD is finalized.

The Iowa Department of Natural Resources (IDNR) reviewed the data that was collected at the NPDES outfalls during the RI. In a letter to Deere & Company, they presented the results of a wasteload allocation for JDDW's discharge of ground water to the Little Maquoketa River. The following contaminant levels at Outfall 005 were determined to be required to protect fish flesh for human consumption (i.e. human health criteria for a risk of 10E-6 cancer cases):

Chloroform	**18 ug/l or 1.35 lbs/day**
1,2-dichloroethene	**2.1 ug/l or 0.16 lbs/day**

Concern over contaminated ground water discharges was also expressed by a previous commenter. The IDNR is responsible for overseeing water quality programs and setting discharge limits in the State of Iowa. Since surface water quality standards are considered ARARs for the JDDW site, JDDW must assure that compliance with these ARARs will be achieved through monitoring the NPDES outfalls and, if necessary, implementation of additional treatment to meet any mandated permit requirements.

One commenter noted that no mention was made of an oil film on a sand pit located near the residences. This person was concerned since his water supply is located "less than 150 feet from the sand pit." He was also was concerned about the cancer risks associated with the site and felt that people in the area be "notified of these dangers." He also requested a meeting between area residents, John Deere, and EPA.

Based upon the results of the remedial investigation, the contamination that can be attributed to activities of JDDW has been contained either on the JDDW property or beneath it. We do not know, at this time, where the source of the oil in the sand pit is. The potential health risks for both plant workers and off-site residents have been evaluated and are presented in the Risk Assessment Section of the RI. It appears unlikely that there are unacceptable health effects currently associated with site contaminants, based on exposure scenarios presented in the risk assessment.

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In response to the request for a meeting and to also allow more time for public input, EPA and John Deere held a public meeting at the Carnegie-Stout Public Library in Dubuque on September 24. The remainder of the Responsiveness Summary summarizes the questions, comments, responses, and answers that were voiced at that meeting. A copy of the transcript of the meeting is available in the Administrative Record.

How much more time will it take to recover the 1980 spill material?

There will always some material left because the oil attaches to the soil particles and all of it can not be extracted. Usually 50 to 60 percent is the maximum that can be recovered. The Company is continuing to extract material, but there is a possibility that they may very well have recovered about all they can at this time.

When will the bedrock water wells be implemented?

Construction is already underway and the system should be on-line and functional by the first of the year.

Doubt was expressed about whether the monitoring program program would be able to detect contaminant releases off-site, such as through the storm sewers. The commenter cited specific spill incidents. In addition, how will the program insure that the diesel fuel recovery system and

process water withdrawal wells operate properly?

The Company has implemented an Oil Spill Prevention and Countermeasure Plan as well as other measures to prevent such spills in the future. EPA has a role and responsibility to see that John Deere monitors these systems according to our standards and reporting requirements. If problems are detected, they will be required to take corrective actions. These various requirements will be explained in the Consent Decree which will be lodged in federal district court making it relatively easy to enforce compliance.

A primary concern of residents was that diesel fuel from the 1980 spill was getting into their wells. Severe taste and odor problems were cited.

The diesel fuel recovery system, plus the other withdrawal wells draw water in such a fashion as to capture the plume and prevent migration off-site. The RI/FS Study showed that the ground water pumpage is controlling the contaminants that were found at the site. This does not mean that there are not some contaminants in the private wells. However, our study results show that when the off-site private well sampling was conducted, no evidence of toxic contaminants was found that could be linked with the site. Some secondary contaminants that could affect taste and odor were detected, but we don't believe that John Deere is the source of these problems.

Based on the written requests and concerns expressed at the public meeting, EPA will require monitoring at representative off-site private wells in the vicinity.

Concern was expressed over the long-term health consequences of contaminants, especially heavy metals.

Potential health effects posed by contaminants at the site have been evaluated, and to the best of our knowledge, there is no predictable or measurable health effects that can be anticipated from the concentrations that are present. While we cannot be sure that acceptable safe levels will not change in the future, the current contaminant levels are present in acceptable concentrations for the given exposure settings.

Are there any materials that were used in the construction of the dike that could affect water quality?

We do not know at this time. EPA will ask John Deere to review their files to see if we can determine what was disposed there and what potential impact it might have.

Dead fish and high water temperatures have been periodically observed near the pumping station on the Mississippi.

John Deere withdraws non-contact cooling water and then puts it back into the river, adding about 20 degrees temperature during the process. That is the only thing that is added to it. Thermal radiation during the summertime can also increase the temperature. The discharge is a regulated NPDES discharge.

One resident expressed concern that the residents could be evicted from the Corps of Engineers owned property. Were this to occur, the resident's wells could no longer be used as monitoring points.

The Corps and EPA are separate Federal Agencies. EPA does not have any influence over any of the Corps leasing activities. The monitoring system we are relying upon is not dependent on the private wells that are located near the facility.

Could the tremendous volume of water that John Deere is pumping have an affect on water quality in the area?

The alluvial aquifer of the Mississippi River is probably one of the most productive aquifers anywhere in the country. The aquifer is capable of yielding those quantities of water, and recharge from the river is almost continuous. By pumping large volumes of water, the flow of the contaminated ground water is toward the Company production wells and not the off-site wells.

What are the long-term consequences to the biota in the in the vicinity, particularly in the river?

The organic chemicals are the types that degrade in the environment fairly rapidly and they do not tend to bioaccumulate in the body. In terms of heavy metals, they do have a tendency to bioaccumulate, but they are also the type of metals that people are naturally exposed to in the environment. The body has mechanisms to use these chemicals and to dispose of excess amounts to a degree. You run into problems when there is an overdose of these chemicals, but we do not have over-exposure conditions at John Deere.

There is a "ponding condition" in the Mississippi adjacent to the plant, but siltation processes are also taking place. Metals are settling out in the river but are also being covered up at the same time; so we are not actually running into a situation where lead is increasing at unacceptable levels at the bottom surface.

What happens to the ground water that is extracted?

It is used in the various process operations throughout the plant. Some of it goes through an oil/water separator. Most is merged and then discharged to the Mississippi and Little Maquoketa Rivers.

How are discharges to the Mississippi River monitored?

Water is monitored before it actually goes into the discharge pipes. John Deere meets all of the current Iowa NPDES discharge standards relative to the required parameters and monitoring frequency. Results are periodically reported to the State and they periodically inspect John Deere's discharges.

The organic contaminants detected in the discharges are not currently in John Deere's permits to discharge. Mr. Morris Preston, from the Iowa Department of Natural Resources, stated that the permits are periodically reviewed and this is an appropriate time to look at the additional information that has become available, and determine if those limits are acceptable. EPA has also told John Deere that there may be additional, more stringent NPDES permit requirements in the future coming from the State.

What is the extent of the contaminated aquifer that underlies the John Deere plant? Is it controlled by land faults?

We know the extent of the aquifer and the extent of the contamination. We believe that migration of contaminants off-site is being controlled. These assertions have been documented in the RI Report. There is no evidence at all to indicate any interaction with faults that would impact the flow.

What are the obstacles that are connected with cleaning up the old landfill?

A determination has to be made on how bad the situation is based on the concentration of materials throughout the depth of the landfill, concentrations near the surface, and whether any material is leaching out of it into the ground water. In the case of John Deere, lead was found to be the primary contaminant of concern at the old landfill. However, it is not impacting the groundwater, nor is it in the type of setting that people are likely to be exposed to unsafe levels at the surface.

One resident requested access to the plant drinking water and yearly testing of his well by John Deere.

John Deere maintained that they have not affected the off-site wells and they have an adequate monitoring program in effect. They do not plan, at this time, to provide water for the off-site residents. As state above, the Agency will require sampling of a representative number of off-site wells.

Is it possible for ground water to be released over the top of the aquifer?

The water's surface is drawn down in a conical shape around the well(s), so that water is also within the capture zone. All of the water migrates toward the well(s).

Will the coal storage area have any impact on the wells?

Soil samples were taken and wells installed nearby to address this question. Some metals were detected in the soil but not in the ground water. So, the ground water does not appear to be impacted by the coal storage area and even if it was, it would go back to John Deere via the production wells.

What standards are applied to construction of the new landfill?

The landfill is a permitted sanitary landfill, subject to inspections by the State of Iowa. Hazardous wastes are not disposed there. It is lined and has a leachate collection system to prevent ground water contamination.