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Office of
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Remedial Response

EPA/ROD/R07-90/033
June 1990

EPA

Superfund
Record of Decision:

Northwestern States Portland Cement, IA

50272-101

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16. Abstract (Limit: 200 words)

The Northwestern States Portland Cement site, a cement manufacturing facility, is in Mason City, Cerro Gordo County, Iowa. Calmus Creek flows between the Northwestern States Portland Cement Company (NWSPCC) facility and another cement manufacturing plant facility located just north of the site. The site includes a 150-acre area named the West Quarry where NWSPCC disposed of 2 million tons of waste cement kiln dust from 1969 to 1985. Local ground water and surface water have been impacted by elevated pH levels as a result of waste cement kiln dust disposal in the West Quarry. Two seeps emerged from the northeastern portion of the West Quarry in 1979 with high pH water from the seeps flowing overland into Calmus Creek. In 1984, the State found elevated pH levels in Calmus Creek downstream of the seep area, and in 1985 ordered NWSPCC to cease discharge from the seep area to Calmus Creek and to cease kiln dust disposal in the quarry. In 1987, NWSPCC installed an acid-neutralization system to treat the seep water and to dewater the West Quarry pond, the open area of the quarry filled with approximately 420 million gallons of water. This action has significantly decreased the contact of the water with the kiln dust and, as a result, pH levels in the quarry water have declined. This Record of Decision (ROD) addresses the contamination source, the

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Northwestern States Portland Cement, IA
First Remedial Action - Final
Contaminated Media: gw, sw
Key Contaminants: organics (phenols), metals (chromium, lead), other inorganics (waste cement kiln dust)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 42
	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

Abstract (Continued)

cement kiln dust disposed of in the West Quarry, and the resulting ground water and surface water contamination. The primary contaminants of concern affecting the ground water and surface water are organics including phenols; metals including chromium and lead; and other inorganics including waste cement kiln dust.

The selected remedial action for this site includes continued acid neutralization of the water from the dewatered West Quarry, followed by discharge of the neutralized water to Calmus Creek; construction of a permanent drainage system in the dewatered West Quarry to collect precipitation runoff and ground water inflow to the West Quarry, followed by onsite treatment of contaminated water prior to discharge of the treated water to Calmus Creek; installation of bedrock dewatering wells to collect contaminated ground water beneath the West Quarry, to prevent migration of the contaminated ground water from the site, and to maintain ground water levels below the kiln dust; installation of kiln dust dewatering wells, if necessary, to facilitate kiln dust dewatering; capping of the West Quarry area containing cement kiln dust; pumping and treatment of ground water; and monitoring of ground water and treated discharge. The estimated present worth cost for this remedial action is $2,037,129, with estimated O&M costs of $210,000 for year one and $65,000 for subsequent years.

PERFORMANCE STANDARDS OR GOALS: Discharges to Calmus Creek will meet State effluent limitations including pH 6.0 to 9.0 and phenol 0.05 mg/l. Treated ground water will meet State ground water action levels and SDWA MCLs, including chromium 0.05 mg/l (MCL), lead 0.05 mg/l (MCL), and pH 6.5 to 8.5 (MCL).

RECORD OF DECISION

FOR

NORTHWESTERN STATES PORTLAND CEMENT COMPANY SITE

MASON CITY, IOWA

PREPARED BY:

IOWA DEPARTMENT OF NATURAL RESOURCES

June 20, 1990

RECORD OF DECISION

NORTHWESTERN STATES PORTLAND CEMENT COMPANY

MASON CITY, IOWA

Declaration

1.0 Site Name and Location
Northwestern States Portland Cement Company, Mason City, Iowa

1.1 Statement of Basis and Purpose
This decision document presents the selected remedial action for the Northwestern States Portland Cement Company Superfund site located in Mason City, Iowa. The remedial action was chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan. This decision document explains the factual and legal basis for selecting the remedy for this site.

The Iowa Department of Natural Resources concurs with the selected remedy. The information supporting this remedial action decision is contained in the administrative record for this site.

1.2 Assessment of the Site
Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, may present a current or potential threat to public health, welfare or the environment.

1.3 Description of the Remedy
The selected remedy consists of the following actions:

- Dewatering of the West Quarry which contained high pH water, acid-neutralization, and discharge to Calmus Creek. (Action completed September 1989.)

- Construction of a permanent drain system in the dewatered West Quarry to collect precipitation runoff and groundwater inflow to the quarry.

- Placement of an engineered clay cap over the area of the West Quarry filled with cement kiln dust to minimize infiltration through the kiln dust.

- Installation of bedrock dewatering wells to collect contaminated groundwater beneath the West Quarry, prevent migration of contaminated groundwater from the site, and maintain groundwater levels below the kiln dust.

- Installation of kiln dust dewatering wells, if necessary to facilitate kiln dust dewatering. (It is unlikely that this action will be necessary.)

- Treatment of contaminated waters to meet Iowa NPDES discharge permit limits with discharge to Calmus Creek.

- Assurances that the dewatering system will be operated in perpetuity to maintain isolation of water from the waste kiln dust and collect and treat any contaminated water which is generated.

The selected response action constitutes final action for this site. The selected response action addresses the principal threats of contaminated surface water and groundwater and the source of water contamination, the waste kiln dust. The existing contaminated groundwater will be removed and treated thus preventing off-site migration. The waste kiln dust will be isolated from water to the extent practical to minimize production of contaminated water. Any contaminated water which is produced will be collected, treated, and discharged.

1.4 Declaration of Statutory Determination

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element. Because this remedy will result in the source of hazardous substances (kiln dust) remaining on-site, the five year review will apply to this action.

Morris Kay | 6-26-90

MORRIS KAY, REGIONAL ADMINISTRATOR | DATE
ENVIRONMENTAL PROTECTION AGENCY, REGION VII

Concurred on by:

6/22/90

ALLAN STOKES, ADMINISTRATOR | DATE
IOWA DNR, ENVIRONMENTAL PROTECTION DIVISION

Decision Summary

2.0 Site Name, Location, and Description

The Northwestern States Portland Cement Company (NWSPCC) is located in the south half of Section 33, Township 97 North, Range 20 West of the Fifth Principal Meridian and in the north half of the Northwest Quarter of Section 4 Township 96 North, Range 20 West of the Fifth Principal Meridian, in Mason City, Cerro Gordo County, Iowa. (Refer to Figures 1 - 3.) The site is located on the north side of the Mason City residential area. Another cement manufacturing plant is located just north of the NWSPCC site with Calmus Creek between. Calmus Creek flows to the Winnebago River which is less than a mile east of the site.

2.1 Site History and Enforcement Activities

The NWSPCC facility has manufactured cement since 1908. An area referred to as West Quarry site was mined for limestone, a raw material for cement production, until 1950. The West Quarry had reached a depth of approximately 40 feet and covered about 150 acres. In 1969, NWSPCC began using the West Quarry for the disposal of waste kiln dust. When disposal activities ceased in 1985, approximately two million tons of kiln dust had been placed in the quarry and the quarry's unfilled area had been reduced to approximately 40 acres. The open portion of the quarry filled with approximately 420 million gallons of water, known as West Quarry pond. (Refer to Figure 4.)

NWSPCC personnel began a pH monitoring program of the water in the West Quarry in April of 1974 in response to a change in color of the Quarry water. During April, 1974 to January, 1976 the water in the quarry slowly became more alkaline (pH increased from 8.0 to 8.7). The quarry water pH rose sharply following January 1976, increased to 11.8 in April, 1976, and leveled off at about 12.5 in 1980. The increase in pH is attributed to the breakdown of the natural buffering system which was sustaining the quarry water at a near-neutral pH. In response to quarry dewatering initiated in 1987, current pH levels are about 10.5.

In 1979 two seeps emerged from the northeastern portion of the filled West Quarry (Refer to Figure 4.) High pH water from the seeps flowed overland into Calmus Creek. In 1984, the state initiated a study of Calmus Creek and found pH in the creek elevated 2.0 pH units downstream of the seep area. In April 1985, the state ordered NWSPCC to immediately cease discharge from the seep area to Calmus Creek. NWSPCC was also ordered to cease kiln dust disposal in the quarry and to conduct a hydrogeologic investigation.

In May, 1985, as a temporary solution to control groundwater seeps from the West Quarry, NWSPCC installed two groundwater extraction wells in the vicinity of the seeps. The water that was collected by the wells was circulated back into the West Quarry pond.

NWSPCC completed a hydrogeologic investigation of the West Quarry in August 1985. Their conclusions included:

- Regional groundwater flow was northeastward towards the Winnebago River.
- Local groundwater flow is complex due to such influences as water level in the West Quarry, fill distribution, and permeability.
- Wells installed west of the West Quarry could be used to obtain background water quality data.
- Groundwater quality was degraded as determined from wells installed around and within the partially-filled quarry.

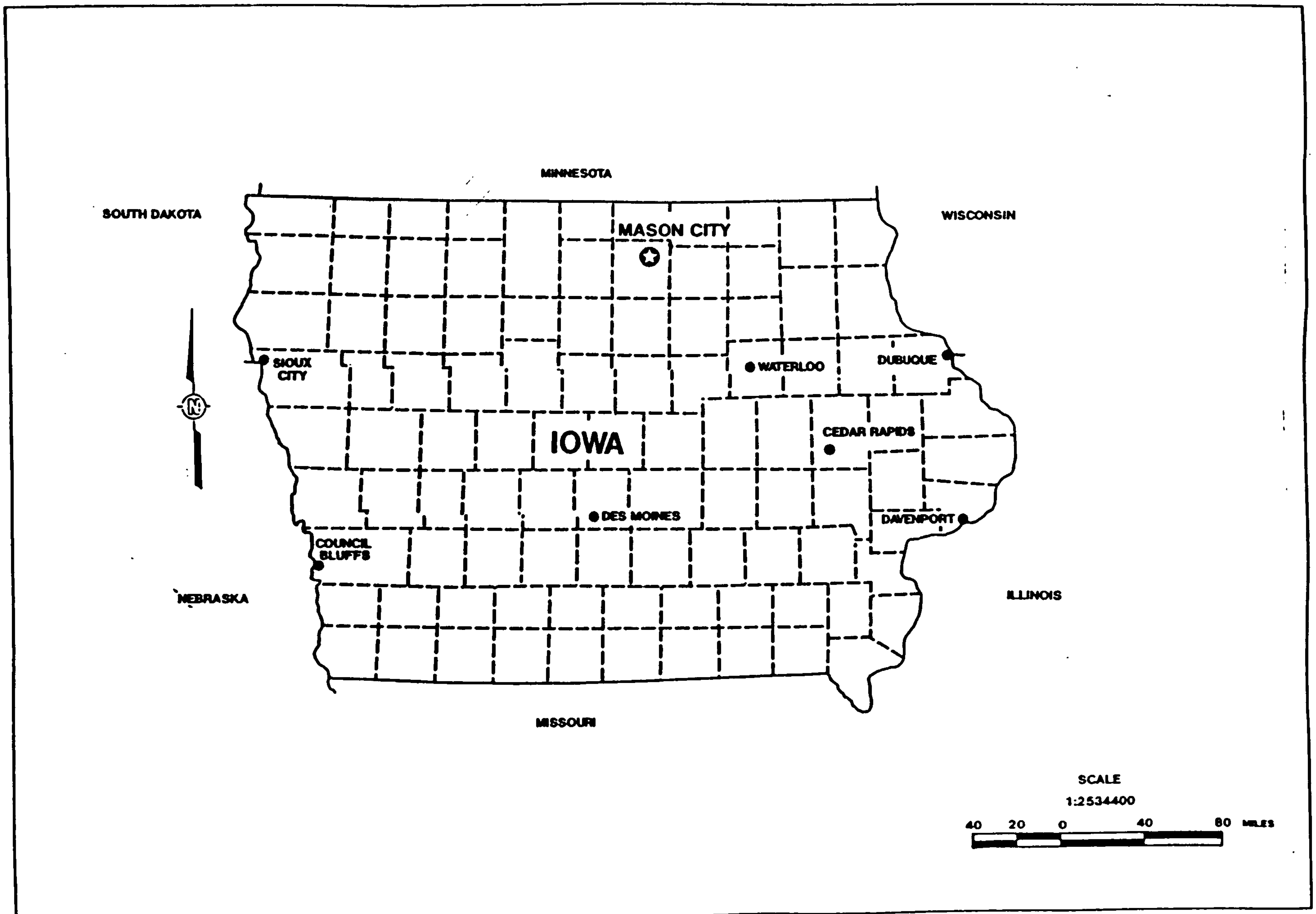


Figure 1 Location Map

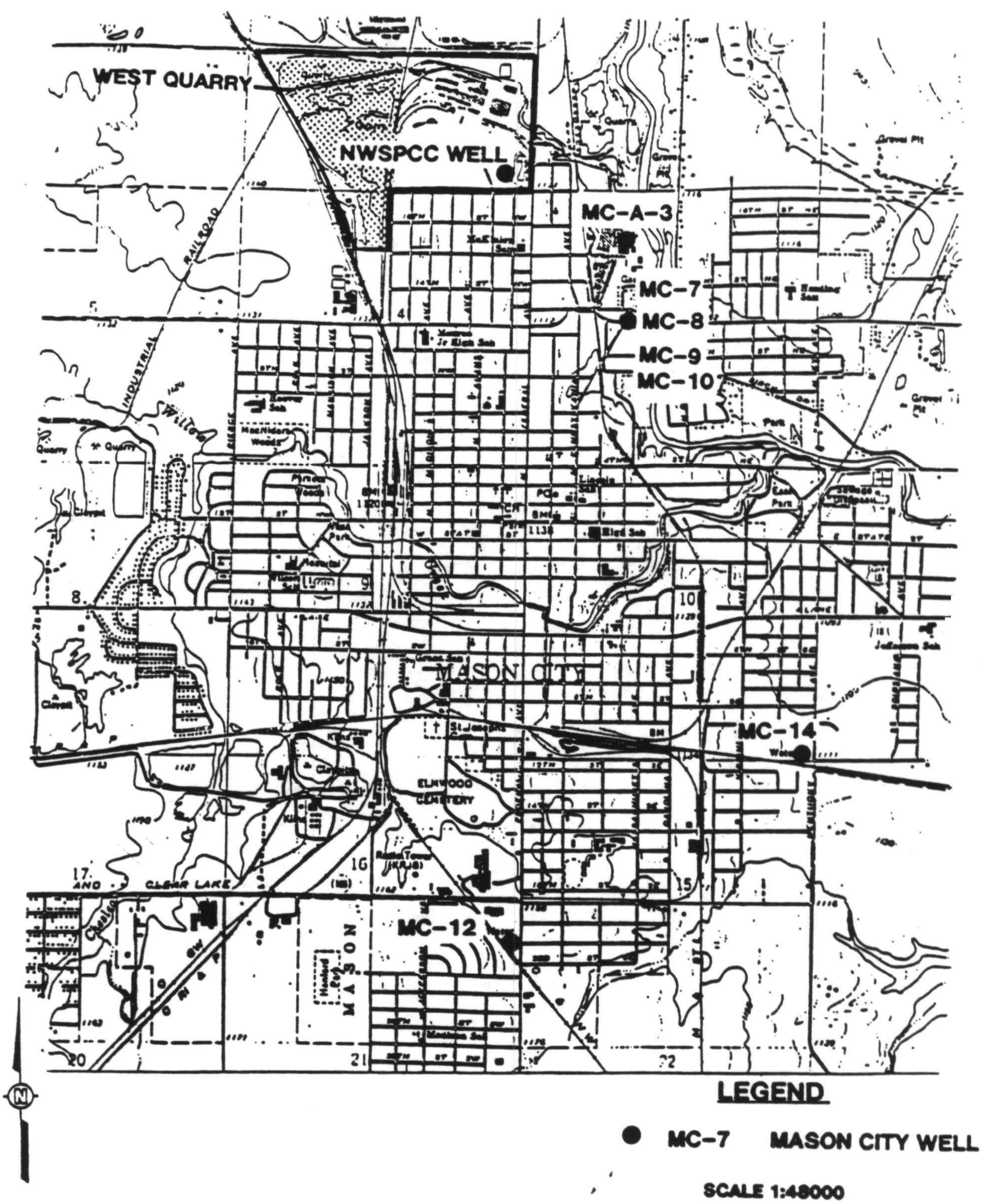


Figure 2 Map of Mason City with NWSPCC Site and City Wells

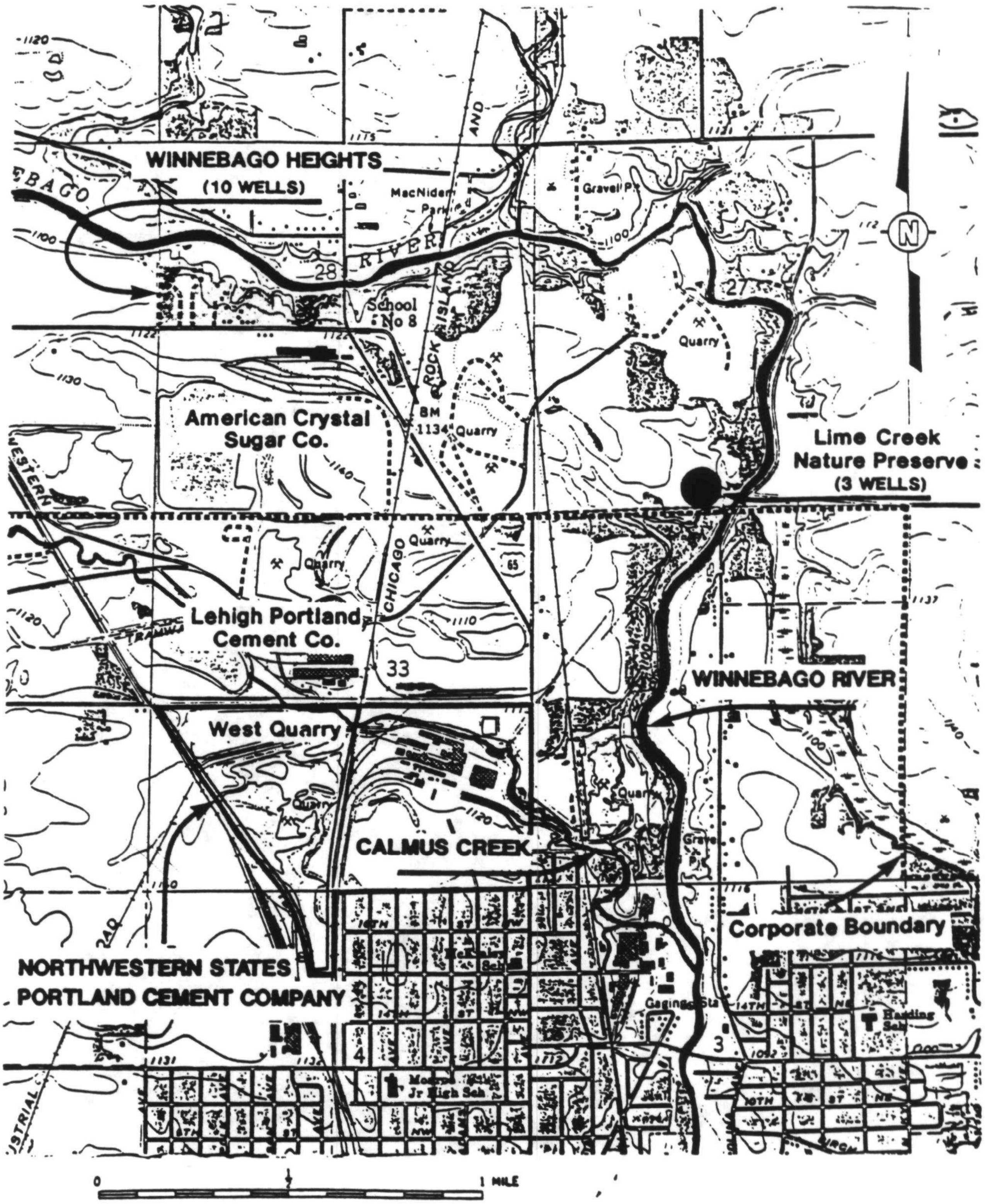
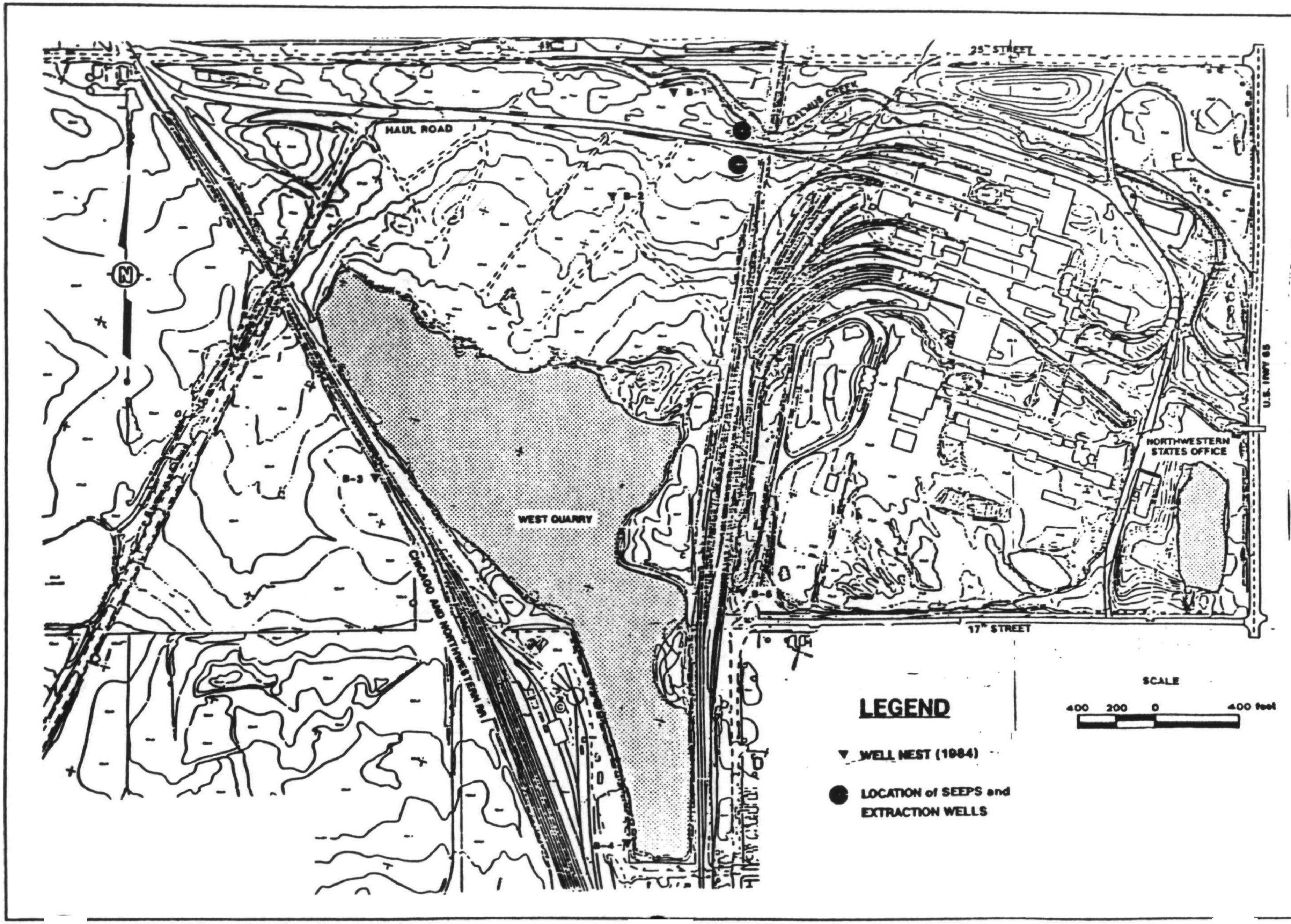


Figure 3 Map of Area North of Mason City Showing NWSPCC Site and Location of Private Wells



Figu[...] West Quarry Site Base Map

- Total dissolved solids, dissolved iron and pH exceeded secondary drinking water standards (limits for aesthetic qualities).

- Groundwater quality impact in the vicinity of the West Quarry decreased with depth.

In response to a fish kill in Calmus Creek in September 1986, the WAWM again sampled Calmus Creek. Water in the creek upstream of the seep area had a pH of 8.4 and four samples downstream ranged in pH of 10.2 to 10.5. Elevated potassium and white residue on the stream bed were also noted. In October 1986, the WAWM again ordered NWSPCC to cease discharge from the seep area to Calmus Creek. NWSPCC installed an acid treatment system in June, 1987 adjacent to Calmus Creek in the northeastern portion of the filled West Quarry. In addition to treating the seep water, the system was utilized in the dewatering of the West Quarry pond. Up to 1,100 gallons per minute of high pH water from the West Quarry pond were pumped to the acid-neutralization treatment facility with discharge to Calmus Creek in accordance with an NPDES permit issued by the Iowa Department of Natural Resources (DNR). At present, water formerly accumulated in the West Quarry pond has been removed by these procedures and the system is pumping approximately 70 gallons per minute to remove incoming water. This action has significantly decreased the contact of water with kiln dust and, as a result, pH levels in the quarry water have declined about two orders of magnitude to about 10.5 pH units, as shown in Figure 5.

In 1987, EPA conducted a Site Inspection of the NWSPCC site and based on the findings of this investigation and the site was scored with the Hazard Ranking System for possible inclusion on the National Priorities List (NPL). Since the site had a documented impact on Calmus Creek, did not fall under RCRA jurisdiction, had an unknown potential for human risk, and had a sufficiently high HRS score; it was proposed for the NPL in June 1988. The EPA has not yet finalized this proposed listing.

In 1988, NWSPCC initiated a Remedial Investigation/Feasibility Study (RI/FS). In September 1989, the DNR issued an administrative order to NWSPCC for completion of the RI/FS. In November 1989, this order was replaced with a consent order for the same. NWSPCC completed the RI/FS in March 1990. The Remedial Investigation assessed the potential impact of the West Quarry on the local surface water and groundwater flow systems. This investigation demonstrated that significant impact to groundwater outside the West Quarry boundaries has not occurred. Discharge from the acid treatment system to Calmus Creek was found to contain total dissolved solids and phenols at levels which may cause violations of Iowa water quality standards in Calmus Creek (these parameters were not included in the original NPDES permit.)

2.2 Highlights of Community Participation

The Remedial Investigation and Feasibility Study Reports and the Proposed Plan for the Northwestern site were released to the public for comment March 30, 1990. These two documents were made available to the public in the administrative record maintained in an information repository at DNR Records Center, 5th Floor, Wallace Building, 900 East Grand, Des Moines, Iowa, and in the Mason City Public Library.

The notice of availability for these two documents was published on March 30, 1990, in the Mason City Globe-Gazette. A public comment period on these documents was held from March 30, 1990 through May 29, 1990. Also, a public meeting was held on May 1, 1990 at the Mason City Public Library. At this meeting, representatives from the DNR, EPA and NWSPCC discussed the site and the selected remedial alternative. Questions from the media were answered regarding the severity of the existing problem at NWSPCC and the potential for future hazards at the site. A response to comments received during this period is included in the Responsiveness Summary, which is part of

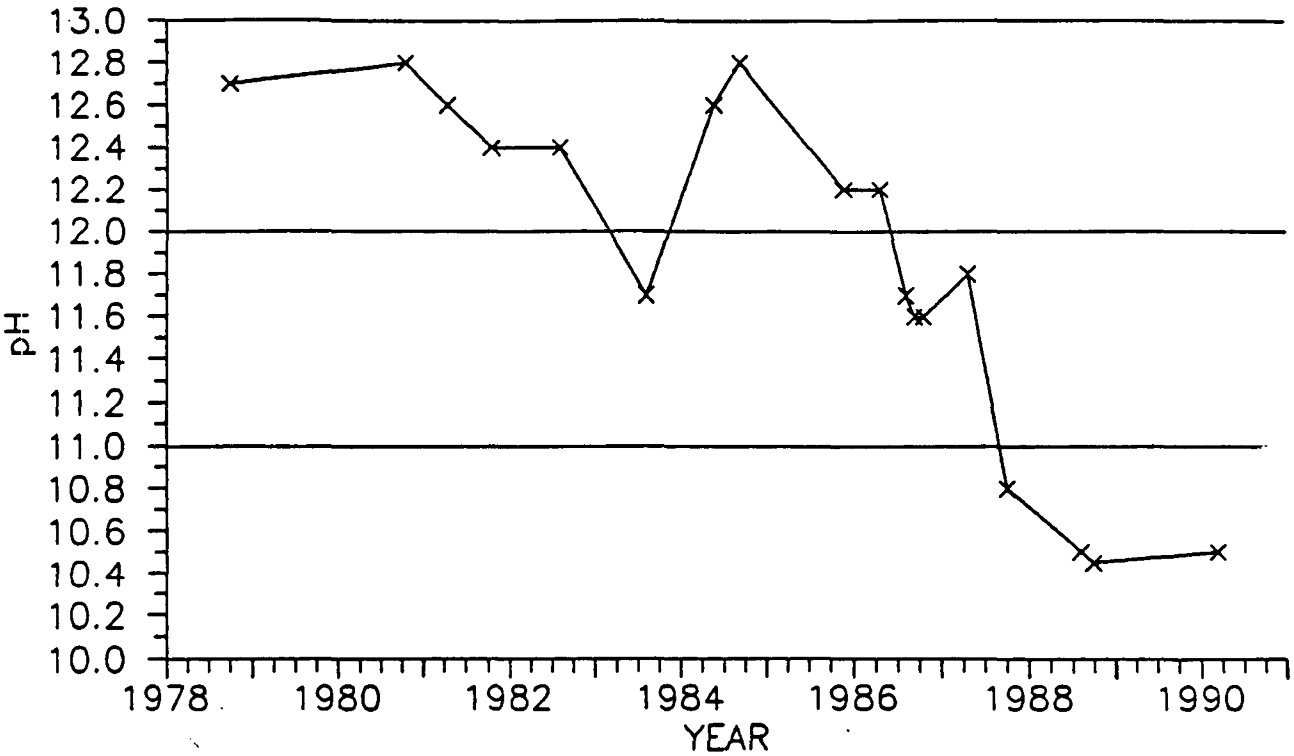


Figure 5 **Temporal Trend of pH in the West Quarry**

the record. This decision document presents the selected remedial action for the NWSPCC site in Mason City, Iowa, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. The decision for this site is based on the Administrative Record.

2.3 Scope and Role of Response Actions Within Site Strategy

The selected response action addresses the principal threats of surface water, groundwater contamination and the source of water contamination. Based on investigations of the site prior to 1989, and based on the Remedial Investigation, the source of contamination is the cement kiln dust disposed of in the West Quarry. Of particular concern is its impact on the groundwater and on Calmus Creek. The kiln dust would be sufficiently isolated from water in the selected alternative to minimize production of contaminated water. Any contaminated groundwater which is produced, as well as existing contaminated groundwater, will be removed, treated and discharged, thus preventing off-site migration of contaminated water.

The response actions selected in this ROD address all principal threats posed by this site and are intended to constitute final action for the site.

2.4 Summary of Site Characteristics

The major concern at NWSPCC is contaminated surface water and groundwater as a result of contact with waste cement kiln dust in the West Quarry. The kiln dust is composed of a major cement constituent, calcium oxide (CaO), which reacts with water and releases hydroxide ions (OH^-) into solution. The hydroxide ion concentration directly controls the pH level of an aqueous solution. Local groundwater and surface water have been impacted by high pH levels, and by an increase in total dissolved solids content, as well as elevated concentrations of potassium, sulfate, sodium and other relatively nonhazardous parameters. Figures 6 - 9 show the distribution of pH, total dissolved solids, sulfate and potassium concentration found at site monitoring wells. Trace amounts of heavy metals and phenol have also been detected sporadically. (Refer to Table I.) Of the contaminants identified, only arsenic is a suspected carcinogen. Levels of metals found in soil/sediment samples are not considered to be significantly different than background soils. The kiln dust in the West Quarry is a RCRA special study waste, not a RCRA hazardous waste. Water at the NWSPCC site having a pH value exceeding 12.5 would exceed the RCRA criterion for corrosivity and be considered a RCRA hazardous waste.

Surface water contamination was previously a problem with water from the West Quarry entering Calmus Creek and adversely impacting the aquatic habitat of the creek. The primary problems have been sharp increases in the pH and mineral deposition in the stream. Actions taken by NWSPCC have eliminated untreated discharges from the West Quarry to Calmus Creek. Discharge of water from the acid-neutralization facility, however, still poses potential water quality problems in Calmus Creek due to elevated levels of total dissolved solids and phenols.

Impacted groundwater has been found to exist within the kiln dust fill and in the bedrock underlying and adjacent to the quarry. The degree of impact has been shown to lessen with depth. No significant off-site groundwater contamination has been found. Figure 10 is a groundwater flow map showing current conditions. Prior to dewatering of the quarry groundwater flow was primarily toward northeast to Calmus Creek and/or the Winnebago River. Potential pathways of groundwater migration exist via the upper bedrock (Devonian aquifer). The Devonian aquifer yields moderate amounts of water to wells. Devonian wells produce water primarily from the upper weathered portion of the rock and solution-enlarged fractures. Nearby wells which draw water from this aquifer include 10 private wells about a mile north of the site and 3 wells in the Lime Creek Nature Preserve about a mile and a half northeast of the site. (Refer to Figure 3.) Wells with higher capacity in the area are completed in the Cambrian Jordan Sandstone at depths greater than 1200 feet, including the

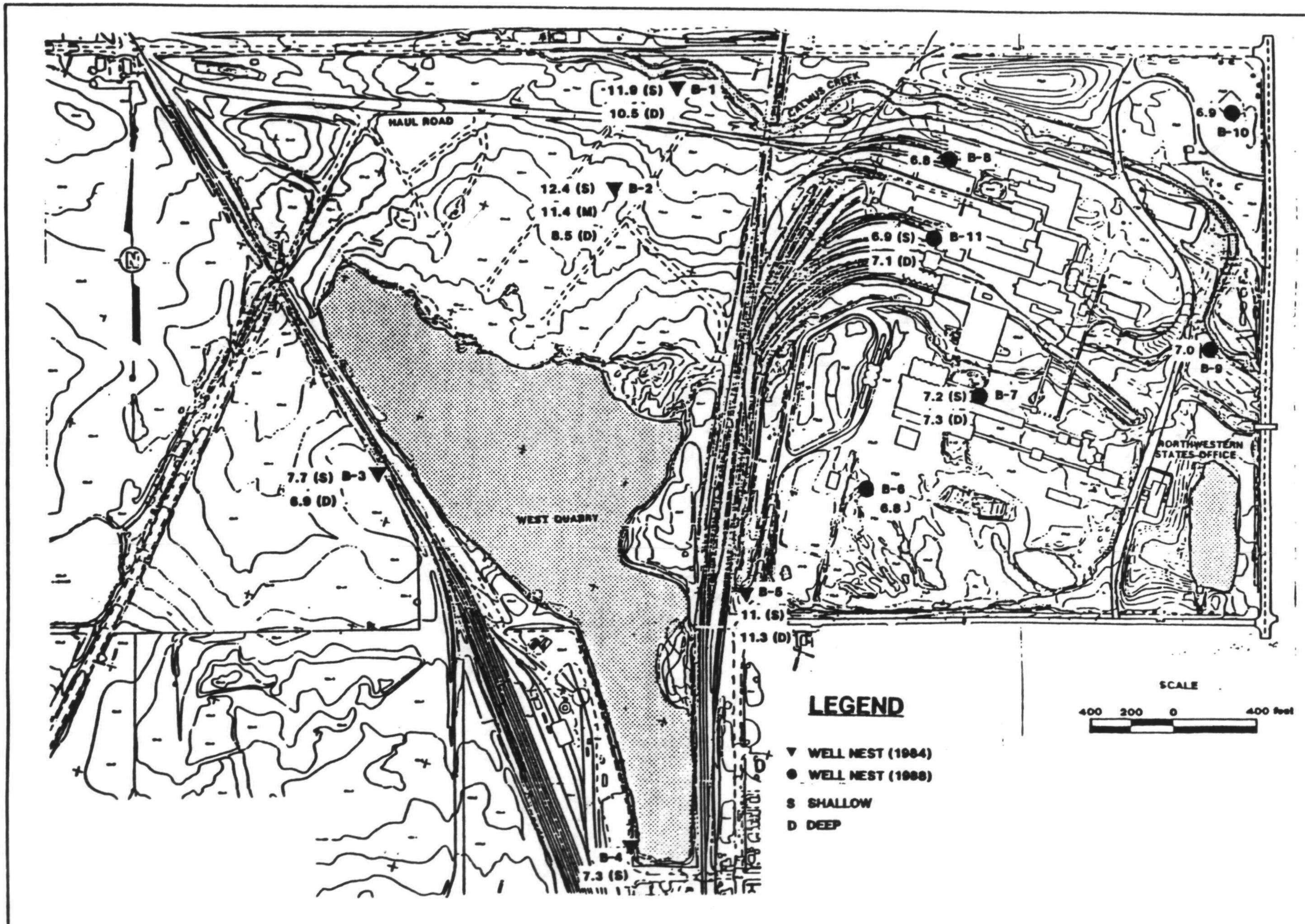


Figure Groundwater pH - Jan. 1989

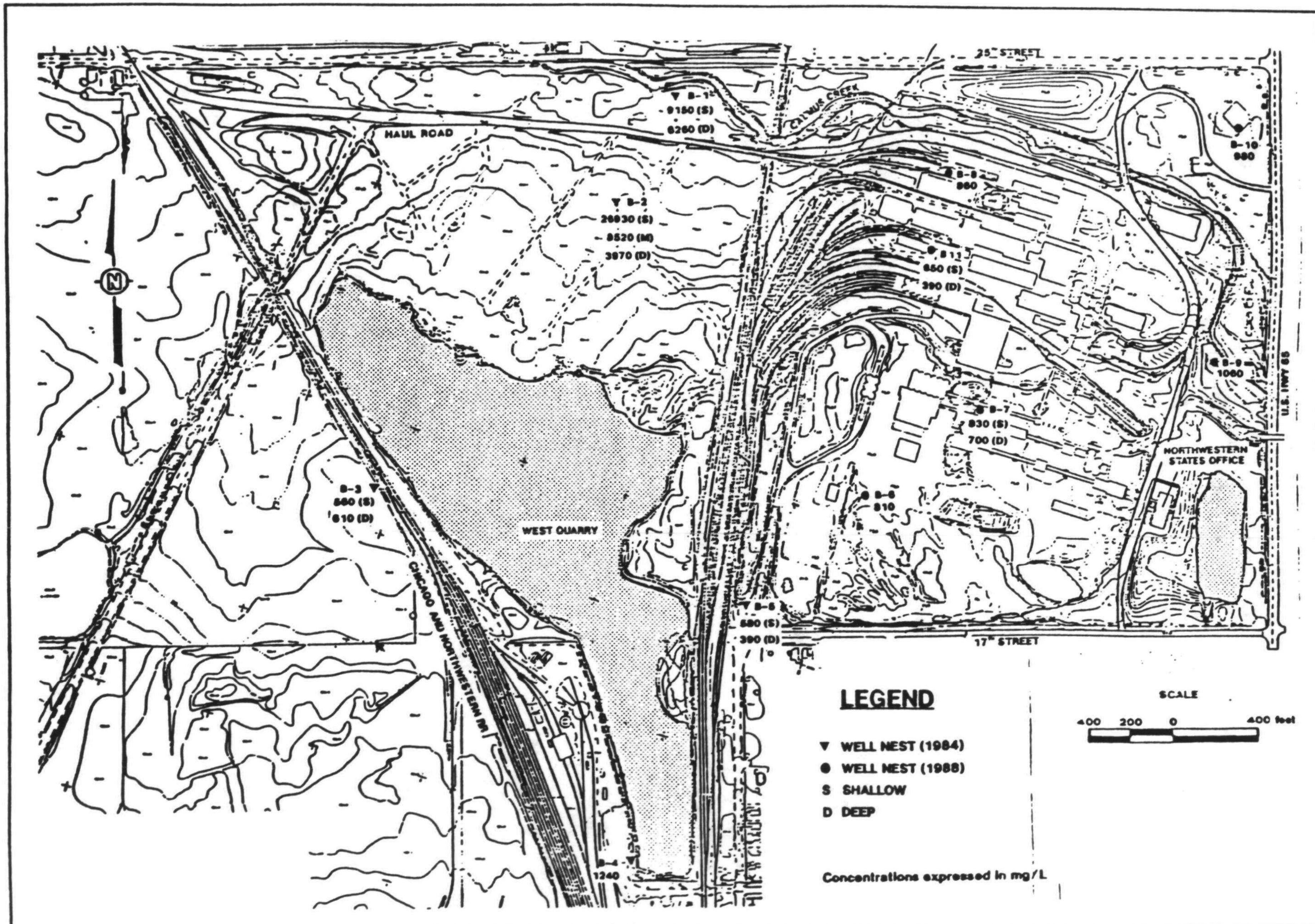


Figure 7 Total Dissolved Solids Concentrations in Groundwater - Jan. 1989

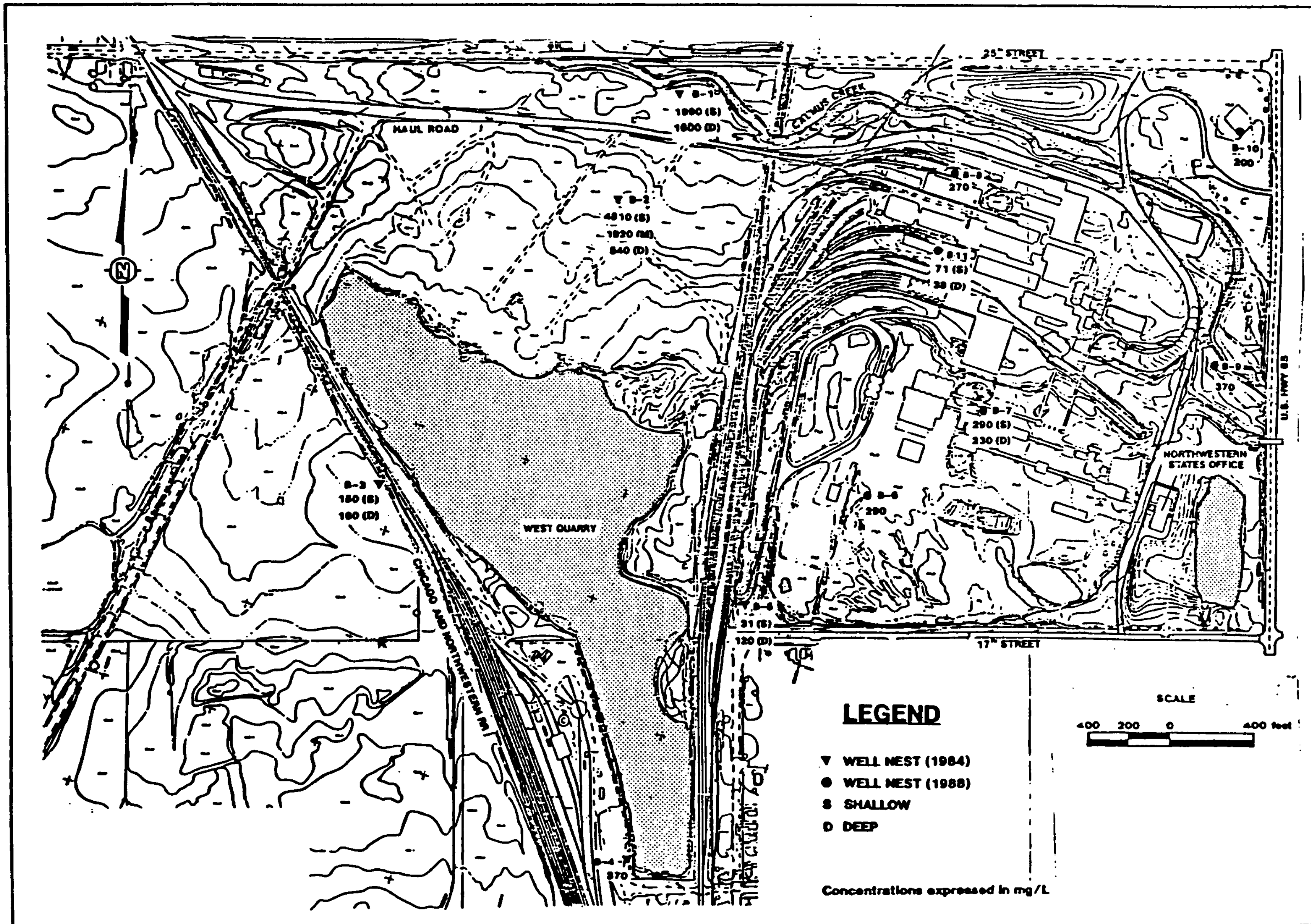


Fig Sulfate Concentrations in Groundwater - Jan. 1989

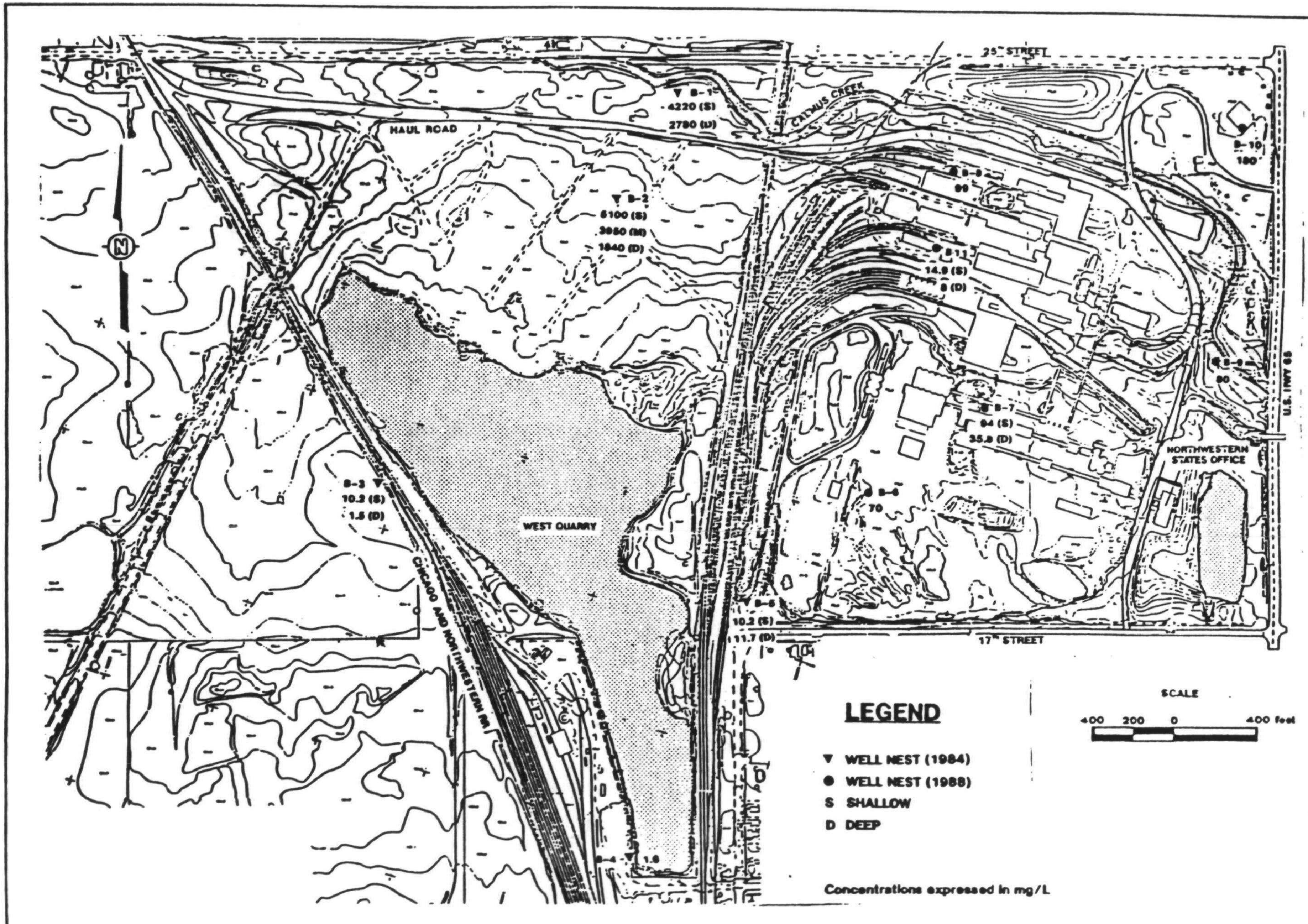


Figure 9 Potassium Concentrations in Groundwater - Jan. 1989

Table I. Concentration Values in Various Environmental Media - Mean and Maximum Values

Chemical	ug/l (ppb) Groundwater		ug/l (ppb) Surface Water		mg/kg (ppm) Soil/Sediment	
	Mean	Max	Mean	Max	Mean	Max
Antimony	12	12	NA	ND	NA	ND
Arsenic	12	45J	15	15	5.0	13J
Cadmium	5.6	6	5	8	1.1	1.1
Total Chromium	41.7*	170	38.7	61	10.9	16.0
Copper	20	20	20	20	11.0	11.0
Lead	12	74J	10	10	59.7	150
Mercury	0.63	1.2	NA	ND	NA	ND
Nickel	153.7	460	66.5	90	NA	12.0M
Zinc	42.3	720J	70	70	57.3	130
Phenol	195**	230**	133	469	NA	ND

J - Compound was qualitatively identified; however, compound failed to meet all QA criteria and, therefore, is only an estimated value.
M - Compound was qualitatively identified; however, qualitative value is less than contract required detection limits.
NA - Not applicable
ND - Not detected

NOTE: J and M - coded data not included in calculation of mean values.

* The three highest chromium measurements of 70, 90, and 170 ppb all occurred on the first sampling event in March 1984. Subsequent total chromium measurements have averaged 14 ppb.

** Phenol values in groundwater based on seep water only which is believed to be more representative of surface water.

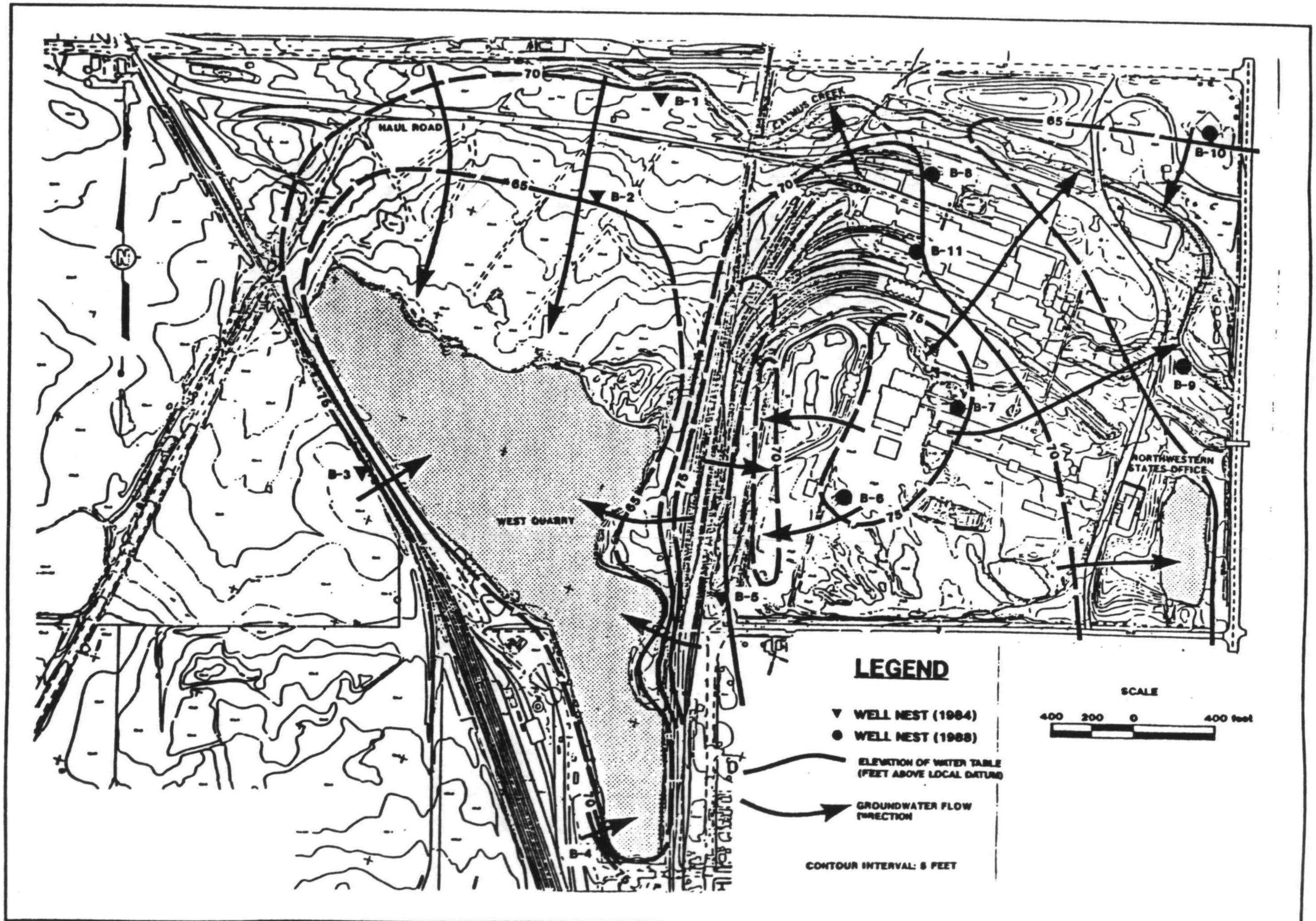


Figure 10 Groundwater Flow - Jan. 1989

NWSPCC plant well and Mason City water supply wells. (Refer to Figure 2.) These deep wells ar· typically uncased though the Devonian aquifer, allowing Devonian water to enter the well, albeit a small portion of the total well capacity.

Direct exposure to high pH water in the West Quarry pond was a past risk which has since been eliminated by dewatering of the quarry.

2.5 Summary of Site Risks

The U.S. Public Health Service Agency for Toxic Substances and Disease Registry (ATSDR) conducted a draft Health Assessment for the NWSPCC site. They concluded that the site is of potential health concern because of the potential risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse health effects. The ATSDR report expressed a concern for potential human exposure to chromium, lead, sodium, sulfate, and elevated pH via ingestion of groundwater from on-site and off-site private wells. Also human exposure to elevated pH may occur and may have occurred in the past via dermal contact, ocular contact, and incidental ingestion of on-site soil, sediment, surface water and groundwater; and via inhalation of reentrained dust. Human exposure pathway of concern includes the sodium and sulfate concentrations in the groundwater which may be detrimental to high risk populations.

An Endangerment Assessment was conducted as part of the remedial investigations and is included in the Administrative Record as a separate report. This Endangerment Assessment provided a baseline risk assessment to assist in the development of remedial alternatives. It assessed only the hazardous substances listed in Table I, which was subsequently reduced to the chemicals having the most potential impact as listed in Table II. The Endangerment Assessment did not consider pH, sodium, potassium, sulfate, or total dissolved solids which are the primary parameters impacting water quality at the site. These parameters are naturally occurring, often at relatively high concentrations; are not particularly toxic; and, as a result, do not fit into the endangerment assessment process. With this in mind, the Endangerment Assessment had the following conclusions:

1) There are no complete exposure pathways identified for contaminants in the soil or air.

2) The surface water does not pose any adverse health exposure potential to the general public. Neutralizing and monitoring water quality of the West Quarry before releases should be continued.

3) The only potentially complete exposure pathway for the West Quarry is through groundwater in the bedrock. There is no current or anticipated adverse exposure potential for the surrounding public and private wells in the near future.

4) The West Quarry at NWSPCC is not a present threat to the public health or welfare of the Mason City area.

Potential risks from drinking site groundwater were calculated in the Endangerment Assessment and are summarized in Table II. These hazards were based upon "potential" consumption of water with the mean contaminant concentrations found in on-site monitoring wells. In reality there is no current consumption of this impacted water and modeling has demonstrated that there is little potential for significant migration of impacted groundwater in the near future (e.g. 30 years). The following paragraphs explain the information presented in Table II.

Reference doses (Rfds) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive

Table II Summary of Potential Hazards from Chronic Consumption of Contaminated groundwater

CHEMICAL	EDI	RFD	HQ	CPF	ELC
Arsenic	$3.4x10^{-4}$	NA	NA	15	$5.1x10^{-3}$
Chromium	$1.2x10^{-3}$	$5.0x10^{-3}$	0.24	NA	NA
Lead	$3.4x10^{-4}$	$1/4x1^{-3}$	0.25	NA	NA
Nickel	$4.5x10^{-3}$	$1.0x10^{-3}$	0.45	NA	NA

Hazard Index = 0.94

Total Excess Lifetime Cancer Risk = $5.1x10^{-3}$

EDI - Estimated Daily Intake (mg/kg/day)

RFD - Reference Dose

HQ - Hazard Quotient

CPF - Cancer Potency Factor

ELC - Excess Lifetime Cancer Risk

individuals, that are not likely to be without an appreciable risk of adverse health effects. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur. Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given media to the contaminants's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. HI values less than one are acceptable.

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., $1x10^{-6}$). An excess lifetime cancer risk of a $1x10^{-6}$ indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

In summary, Table II shows that long-term consumption of the impacted site groundwater would not pose a significant noncarcinogenic effect since the HI value is less than one. An estimated excess cancer risk of one in 5,000 would be posed due to consumption of arsenic at the estimated mean concentration found in site groundwater. This would be an unacceptable risk if people were drinking this water. However, arsenic has been detected in only three of eleven samples from the two monitoring wells which have otherwise yielded the most impacted groundwater. Therefore, the consistency of arsenic occurrence in site groundwater is uncertain. Regardless, the selected remedy will prevent off-site migration of any impacted groundwater and consumption of contaminated water will not occur.

As stated previously, the Endangerment Assessment did not address the major parameters affecting water quality of the NWSPCC site. Figures 6-9 illustrate the concentrations of pH, total dissolved solids (TDS), sulfate, and potassium found in groundwater throughout the NWSPCC site. Sodium concentrations have also been found to be substantially elevated with levels greater than 800 mg/l found in well 2-A compared to background levels of around 20 mg/l in well B-3.

National secondary drinking water regulations set non-enforceable limits for contaminants in drinking water which may affect the aesthetic qualities or the public's acceptance of drinking water (e.g., taste and odor). These secondary maximum contaminant levels (SMCLs) have been established for pH (6.5-8.5), sulfate (250 mg/l) and TDS (500 g/l). In addition, a guidance of 20 mg/l sodium exists for people on low-sodium diets. Significantly elevated levels, much in excess of the SMCLs, have been identified in the groundwater and surface water at the site. The elevated pH levels have been the primary concern associated with the NWSPCC West Quarry site. Levels of pH in excess of 13 have been found in site groundwater and the West Quarry pond had pH levels in excess of 12.5 (the level above which a liquid is considered a hazardous waste) prior to dewatering operations which were begun in 1987 (refer to Figure 5).

No significant off-site effect in groundwater has been found and groundwater modeling results suggest that significant migrations of the constituents associated with the SMCLs and sodium will not occur in the near future (e.g., 30 years). However, significant long-term off-site impacts to groundwater are possible if no response action is taken. Also continued adverse impacts to the Calmus Creek aquatic habitat and threats of direct contact to high pH water in the West Quarry pond will exist without response action.

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD present an imminent and substantial endangerment to public health, welfare, or the environment.

2.6 Description of Alternatives

The alternatives for soil and groundwater cleanup have been evaluated and listed below.

Remedial Action Alternative 1 - No Action

Remedial Action Alternative 2 - Waste stabilization.

Remedial Action Alternative 3 - Waste isolation.

Remedial Action Alternative 4 - Offsite disposal.

Remedial Action Alternative 5 - Drainage of Quarry.

Alternative 1- No Action

The no action alternative includes allowing conditions at the site to return to what they were prior to 1985. Evaluation of this Alternative is required by the National Contingency Plan (NCP) and also provides a baseline of comparison for the other alternatives. ARAR's would not be attained.

There would be no cost associated with this alternative.

Alternative 2- Waste Stabilization

The implementation of this alternative would be expected to result in the total remediation of the West Quarry, attain all ARAR's, and provide a permanent remedy.

Dewatering of the West Quarry would continue. This would require a pumping system, water treatment to meet Iowa NPDES discharge permit limits, discharge to Calmus Creek, and groundwater monitoring. There would be laboratory kiln dust/fixative tests performed to establish the most effective fixative agent and concentrations. The waste kiln dust would be stabilized and solidified in-situ with the fixative agent introduced through kiln dust augering. The aquifer beneath the quarry would be remediated through the installation of extraction wells screened within the bedrock beneath the quarry. This water would be treated and discharged along with the quarry drainage water.

The estimated present worth cost of this alternative is 18.6 million dollars. It would take about two years to implement.

Alternative 3 - Waste Isolation

The implementation of this alternative would result in the total remediation of the West Quarry. It is expected to attain all ARAR's and provide a permanent remedy.

In this alternative, the Quarry would continue to be dewatered. This would require a pumping system, water treatment to meet Iowa NPDES discharge permit limits, discharge to Calmus Creek and groundwater monitoring. In conjunction with dewatering of the West Quarry, a low-permeability clay cap and a topsoil surface cover would be placed over the existing kiln dust fill areas. Several monitoring wells would be installed within the kiln dust to determine if dewatering has been effective. If necessary, several kiln dust dewatering wells would be installed to facilitate kiln dust dewatering with the resultant water being treated and discharged along with the quarry drainage water. A deeper recovery well system would be installed to collect impacted groundwater in the limestone bedrock beneath the quarry. This water would also be treated and discharged along with the quarry drainage water. Appropriate portions of the pumping system would be maintained to continually induce hydraulic gradients toward the quarry, and prohibit any migration of contaminants from the quarry. Assurances for perpetual operation of this system would be provided.

The estimated present worth cost of this alternative is 2.0 million dollars. It would take about 1.5 years to implement.

Alternative 4 - Offsite Disposal

The implementation of this alternative would result in a total remediation of the site, is expected to attain all ARAR's, and would provide a permanent remedy.

Water would continue to be drained from the Quarry. This would again require a pumping system, water treatment to meet Iowa NPDES discharge permit limits, discharge to Calmus Creek, and groundwater monitoring. Kiln dust would be removed from the quarry and transferred to an off-site engineered landfill storage facility. The aquifer beneath the quarry would be remediated through the installation of extraction wells screened within the bedrock beneath the quarry. This water would be treated and discharged along with the quarry drainage water. Continued pumping of inflowing meteoric water from the quarry would be done until completion of aquifer restoration when the quarry would be allowed to fill with water.

The estimated present worth cost of this alternative is 18.5 million dollars. It would take about 3 to 5 years to complete.

Alternative 5 - Drainage of the Quarry

The implementation of this alternative would reduce the threat from the contaminated water within the West Quarry, but could not attain all ARAR's since nothing would be done to address existing groundwater contamination.

The quarry would continue to be drained. This would require a pumping system, water treatment to meet Iowa NPDES discharge permit limits, discharge to Calmus Creek, and groundwater monitoring.

The estimated present worth cost of this alternative is $312,000. It could be implemented in about 6 months.

2.7 Summary of Comparative Analysis of Alternatives

The treatment of impacted groundwater and surface water is a common remediation denominator to several of the alternatives. Although the actual quantity of water to be treated varies somewhat between individual alternatives, treatment processes and costs would be similar. This similarity results from the interim actions NWSPCC has already taken to remedy the problems on the site.

A comparative analysis of each alternative against the following nine criteria has been made.

1) Overall protection of human health and the environment
2) Compliance with applicable or relevant and appropriate requirements (ARARs)
3) Long-term effectiveness and permanence
4) Reduction of toxicity, mobility, or volume through treatment
5) Short-term effectiveness
6) Implementability
7) Cost
8) State acceptance
9) Community acceptance

Table III shows a relative ranking of the first seven of these criteria for each alternative.

Overall Protection of human health and the environment

The No Action alternative and the Drainage of Quarry alternative are not protective of human health because they do not provide for removal of existing impacted groundwater. The No Action alternative also fails to protect the environment because discharges of high pH/TDS water to Calmus Creek would occur. The Waste Stabilization, Waste Isolation, and Off-Site Disposal alternatives are protective of human health and the environment because they would remove the contaminated groundwater and prevent future discharges of contaminated water to Calmus Creek and the bedrock. With the Waste Isolation alternative, a long-term monitoring program would be necessary to protect against future threats to human health and the environment. It would also be necessary to conduct a long-term monitoring program for the off-site disposal alternative to evaluate the impact of a new disposal area on its surrounding environment.

Compliance with ARARs

The No Action alternative would not comply with ARARs for the discharge to Calmus Creek or for the groundwater contamination. The Drainage of Quarry alternative would not be expected to comply with ARARs regarding groundwater contamination, but would comply with ARARs for the discharge to Calmus Creek.

The Waste Stabilization, Waste Isolation, and Off-Site Disposal alternatives all would comply with ARARs regarding groundwater and discharges to Calmus Creek. The Off-Site Disposal alternative would be expected to attain state solid waste disposal ARARs.

Long-term effectiveness and permanence

The No Action alternative and the Drainage of Quarry alternative lack long-term effectiveness and cannot be considered as permanent cleanup actions.

The Waste Isolation alternative has long-term effectiveness and permanence, but requires assurances for continued pumping and groundwater monitoring to maintain long-term compliance with this criterion. The Waste Stabilization alternative and the Off-Site Disposal alternative provide long-term effectiveness and permanence without the need for long-term pumping and monitoring at the West Quarry site. However, the off-site disposal alternative would require long-term monitoring at the new disposal site and could result in adverse impacts at the new site.

Table III Ranking of Remedial Action Alternatives

	PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	COMPLIANCE WITH THE APPLICABLE REQUIREMENTS	LONG-TERM EFFECTIVNESS AND PERMANENCE	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
RAA #1 NO ACTION	5	5	5	5	5	1	1
RAA #2 STABILIZATION	2	3	2	2	2	5	5
RAA #3 ISOLATION	1	2	2	2	1	2	2
RAA #4 OFF-SITE DISPOSAL	1	1	2	2	1	5	5
RAA #5 QUARRY DRIANAGE	3	4	4	4	4	3	3

RATING: 1=HIGHEST 5=LOWEST

Reduction of toxicity, mobility, and volume through treatment

The No Action alternative would not reduce the toxicity, mobility, or volume of the contaminated materials. All other alternatives include treatment of water prior to discharge. The Drainage of Quarry alternative would reduce the volume of the contaminated water, but would not reduce the toxicity or mobility of the contaminants that remain in the groundwater. Future leachate production in the kiln dust deposit would also be a concern with this alternative.

The Waste Stabilization, Waste Isolation, and Off-Site Disposal alternatives would all reduce the volume, mobility, and toxicity of impacted groundwater to similar levels. Impacted groundwater would be removed and treated. Future discharges of contaminated water to Calmus Creek and to the bedrock would be eliminated.

Only the waste stabilization alternative addresses treatment of the waste kiln dust which is the source of contamination.

Short-term effectiveness

The No Action alternative lacks short-term effectiveness. The Drainage of Quarry alternative is partially effective in the short-term, since it prevents discharge to Calmus Creek and to the bedrock. It has no short-term effect on the groundwater contamination already present at the site. The Waste Stabilization, Waste Isolation, and Off-Site Disposal alternatives are all similarly effective in stopping discharges to Calmus Creek and to the bedrock. They also will have similar short-term effectiveness in removing the groundwater contamination present at the site. The Off-Site Disposal alternative would take considerably longer time to implement and would have short-term impacts due to airborne dust and transportation of large quantities of kiln dust.

Implementability

The No Action alternative presents no implementation difficulties. The Drainage of Quarry alternative also is unlikely to present implementation difficulties because much of the necessary equipment and personnel are in place and operational.

The Waste Stabilization alternative requires that a usable fixative be identified and that it be augered and mixed into the kiln dust deposit that is over 35 feet deep and over 100 acres in area. Implementation would be technically difficult and would require at least two years.

The Waste Isolation alternative involves technologies which are well established and would be easy to implement.

The Off-Site Disposal alternative would require the siting and construction of a landfill capable of containing the kiln dust. Then the kiln dust deposit would have to be dewatered and transferred to the landfill. Airborne dust would have to be controlled during this process. Siting of a landfill will be difficult because of problems in finding a suitable location, landfill permitting and design time, likely public opposition to a new landfill, and other factors. This alternative is considered to be the most difficult to implement.

Cost

The costs of the alternatives are presented in the Description of Alternatives section of this document.

State acceptance

This criterion addresses the concern and degree of support that the State government has expressed regarding the remedial action alternative. The Iowa Department of Natural Resources (DNR) has been the lead agency for this project under a cooperative agreement with EPA. The DNR reviewed the documents pertaining to the site and prepared the Proposed Plan and this ROD. The DNR has given its concurrence on the selected remedial action.

Community acceptance

At the end of the public comment period (May 29, 1990), there were no comments objecting to the preferred remedial alternative. This includes comments during the public hearing held May 1, 1990. No written comments were received during the March 30 through May 29, 1990 public comment period.

2.8 The Selected Remedy

The selected remedy is the Waste Isolation alternative.

Isolation of the kiln dust will be accomplished by sequential implementation of remedial technologies. The initial remedial action, the draining of the West Quarry, has been accomplished as of September, 1989. Easeways and water collection systems have also been installed in the floor of the dewatered Quarry. The water removed from the Quarry continues to be acid neutralized and discharged to Calmus Creek. Subsequent site remediation activities will include: construction of a permanent drain system in the dewatered Quarry; placement of an engineered clay cap over the kiln dust body; installation of bedrock dewatering wells; installation of kiln dust monitoring wells; installation of kiln dust dewatering wells, if necessary; and treatment of all extracted waters prior to discharge to Calmus Creek.

A permanent drain system will be installed in the dewatered Quarry to collect precipitation runoff as well as groundwater seeps. The system will be designed to segregate contaminated from uncontaminated water as shown in Figure 11. The contaminated water collected within the Quarry will be pumped to the site water treatment system for treatment to attain Iowa NPDES discharge limitations and discharged to Calmus Creek.

The hydraulic isolation of the waste kiln dust and the extraction of adjacent contaminated groundwater would be achieved through the placement of bedrock dewatering wells (Figure 11). The drawdown cones formed by the pumping of the dewatering wells placed around the perimeter and within the filled portion of the Quarry will limit lateral and vertical groundwater flow into the kiln dust thereby limiting future resaturation. These wells will be cased through the kiln dust. The wells will pump approximately 10 gpm and be completed to a depth of approximately 150 feet in order to provide for efficient isolation system. As the impacted groundwater is extracted from beneath the West Quarry and eventually purged, treatment of the extracted water may not be necessary.

Kiln dust extraction wells will be installed, if necessary to facilitate dewatering of the kiln dust. Such wells will likely not be necessary.

The kiln dust body within the West Quarry will be isolated from surficial resaturation through the placement of an engineered clay cap (Figure 11). The clay for the cover will be obtained from adjacent NWSPCC property. The clay cap installation will require excavation, transport, and placement of clay-rich soils and topsoil.

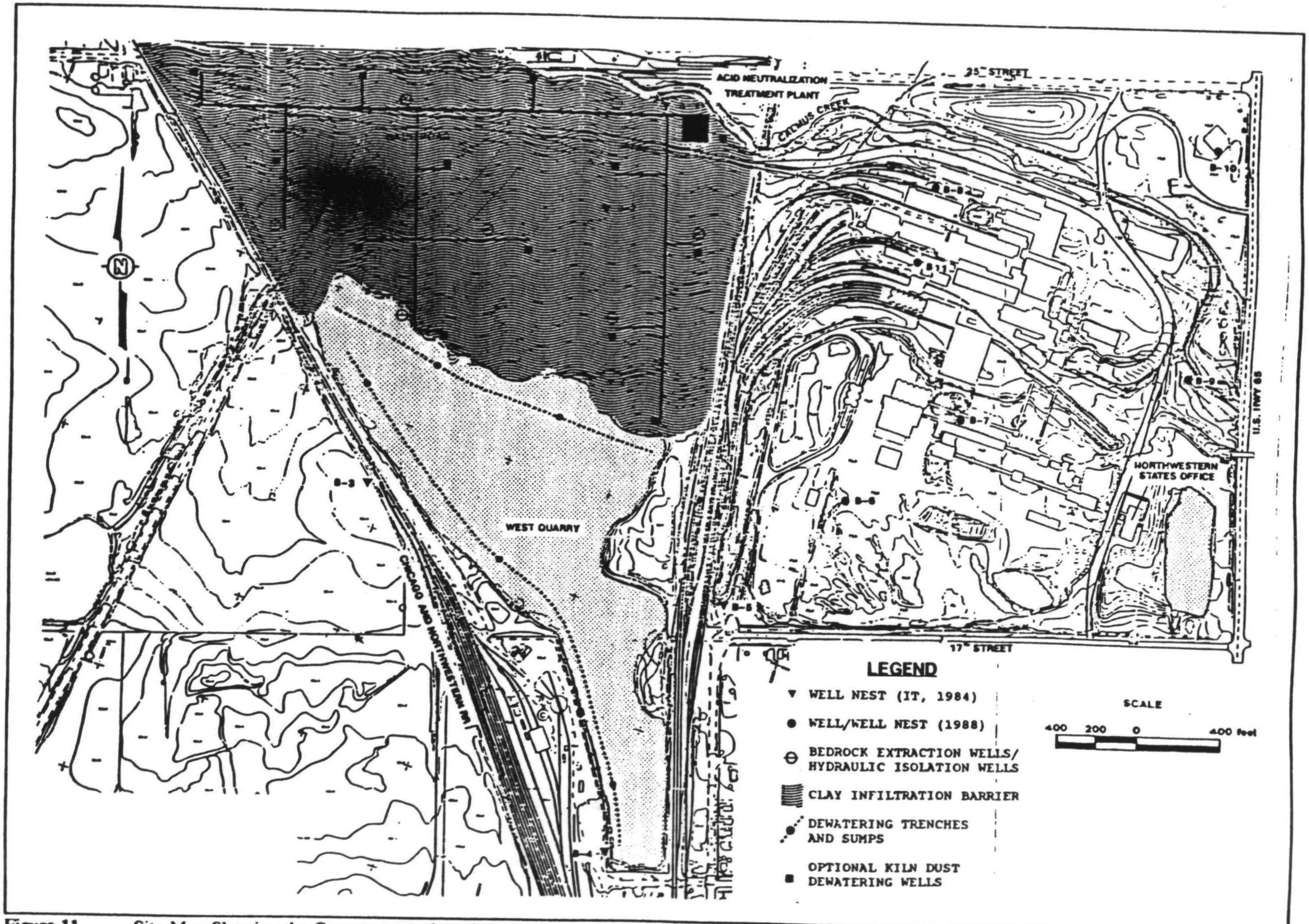


Figure 11 Site Map Showing the Components of the Selected Remedy - Remedial Alternative No. 3 - Waste Isolation

As part of the remediation, maintenance manuals will be generated by NWSPCC to instruct NWSPCC personnel concerning the continual and proper operation of the system. The site will be monitored during and after remediation to insure the effectiveness of the alternative. The monitoring will consist of engineering oversight of the installation and operation of the system, and of sampling the groundwater on a selected interval and analyzing for indicator chemicals. The treated discharge to Calmus Creek will monitored to insure compliance with the Iowa NPDES permit. Long-term pumping will be necessary to maintain the separation of the kiln dust deposit and the groundwater system. A contingency plan will be required to ensure continued operation, including financial assurances.

The remedy was selected from among three alternatives that would provide for protection of human health and environment; comply with ARARs; reduce the toxicity, mobility, and volume of the contamination through treatment; and have both long-term and short-term effectiveness. The No Action alternative and the Drainage of Quarry alternative would not meet all of these criteria; and were not selected. Of the remaining three alternatives, the Waste Isolation alternative could be implemented with greater assurance of effectiveness, without risk of adverse off-site impacts associated with removal of the kiln dust to another location, and at a substantially lower cost.

A summary of the estimated costs of the selected remedy are presented in Table IV.

2.9 Statutory Determinations

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, section 121 of CERCLA established several other statutory requirements and preferences. These specify that, when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternatives treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy protects human health and the environment by removing and treating impacted waters and minimizing further impacts on water from the kiln dust by minimizing kiln dust contact with water. This should result in groundwater contaminant levels below health-based standards and surface water meeting state water quality standards. This will be accomplished through capping the waste kiln dust, quarry drainage, and sub-quarry dewatering.

Existing impacted groundwater will be extracted and treated. This will prevent off-site migration of impacted groundwater thus eliminating potential human exposure via drinking water wells. All water discharged to Calmus Creek from the site will be treated as necessary to meet Iowa water quality standards which are established to protect aquatic life and secondary human contact (e.g. wading).

Capping of the kiln dust will reduce production of leachate due to infiltration of precipitation.

	CAPITAL OUTLAY Range Midpoint	1st YEAR OPERATING	ANNUAL OPERATING
Drain Quarry			
Pumping	$25,000		
Trenches	$45,000		
	$70,000	$10,000	$10,000
Surficial Capping			
Clay Cap/Topsoil Seed	$875,000		
Dewatering System			
Bedrock Wells	$200,000		
Kiln Dust Wells	$4,000		
Piping Runs	$50,000		
	$255,000	$25,000	$20,000
Waste Water Treatment			
Acid Neutralization	$40,000	$125,000	$25,000
Engineering	$120,000		
Design/Construction Management	$100,000		
Longterm Monitoring and Maintenance	$40,000	$50,000	$10,000
TOTAL:	**1,500,000**	**$210,000**	**$65,000**

The Projected Value Cost for RAA 3, assuming a 10% interest rate, would be $2,037,129.

Compliance with Applicable or Relevant and Appropriate Requirements

The following ARARs apply to the selected remedy. It should be noted that levels of metals detected in groundwater are generally low and in all likelihood will not be a determining factor. The primary water quality parameter of concern is pH.

Current and anticipated Iowa NPDES effluent limitations for discharge to Calmus Creek:

pH	6.0 to 9.0
TDS	750 mg/l
Phenol	0.050 mg/l

Iowa Groundwater Action Levels:

Chromium(total)	0.1 mg/l
Lead	0.05 mg/l
Cadmium	0.05 mg/l
Nickel	0.2 mg/l

Maximum Contaminant Levels, Federal Safe Drinking Water Act (SDWA):

Chromium	0.05 mg/l
Lead	0.05 mg/l
Cadmium	0.005 mg/l
pH	6.5 to 8.5

The selected remedy should be able to attain these ARARs.

Cost-effectiveness

The selected remedy is cost-effective because it is the least expensive action alternative and yet provides a high degree of overall protection. The other alternatives which were less costly did not provide long-term remediation or compliance with ARARs. It was also uncertain whether the Waste Stabilization alternative, which would be much more costly (18.6 million dollars), could be effectively implemented. The Off-Site disposal alternative was also more costly (18.5 million dollars) and moved the source of the problem to another site where additional problems could result. The selected remedy will meet all ARARs and provide a long-term solution to the problem at a substantially lower cost. Thus there are no significant advantages to the more expensive alternatives.

Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable (MEP):

The Iowa DNR and EPA have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be practically utilized in a cost-effective manner for the final response actions at the NWSPCC site. Of those alternatives that are protective of human health and the environment and comply with ARARs, the State and EPA have determined that this selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through treatment; short-term effectiveness; implementability; cost; consideration of the statutory preference for treatment as a principal element; and State and community acceptance.

Preference for Treatment as a Principal Element

The cement kiln dust is not a hazardous substance in itself. It is through interaction with water that high pH conditions are created. The selected remedy does not treat the kiln dust, but it does isolate the kiln dust from water to minimize further production of high pH water. Existing impacted water will be treated prior to discharge. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

2.10 Documentation of Significant Changes

The Proposed Plan for the NWSPCC site was released for public comment March 30, 1990. The Proposed Plan identified Remedial Action Alternative 3, Waste Isolation, as the preferred alternative. The Iowa DNR reviewed all comments received during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as it was identified in the Proposed Plan, were necessary.

RESPONSIVENESS SUMMARY

The Proposed Plan for NWSPCC was released for public comment on March 29, 1990. The Proposed Plan identified Remedial Action Alternative 3, Waste Isolation, as the preferred alternative. Verbal comments during the public meeting were received during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.

No written comments were received. Several oral comments were received at the public meeting as discussed below.

1. Question: What is the status of the final listing on the National Priorities List (NPL)?

   Response: The site is currently proposed for the NPL. The next update is due in a month or two and this site is expected to be included in that update. However, that is a EPA headquarters decision.

2. Question: Is there any indication that there is any degradation of well water in Winnebago Heights or in the shallow wells from the area of Calmus Creek and Winnebago River?

   Response: No, there is no indication that there is any contamination there. Those wells were sampled as part of the EPA study back in 1987. The Northwestern site has had a number of sampling events and contamination has not been found to leave the site.

3. Question: Is contamination entering Calmus Creek?

   Response: With the dewatering of the West Quarry Pond, the groundwater table has been lowered and, as a result, groundwater is now flowing toward the quarry and not from the quarry to Calmus Creek. Treated water from dewatering of the quarry, however, has been found to contain levels of total dissolved solids and phenols which may cause exceedances of water quality standards in Calmus Creek.

4. Question: What about the questions about turbidity and dissolved solids entering Calmus Creek? The report indicates that stream life has been adversely affected in Calmus Creek and even in the Winnebago River.

   Response: That is true. It was quite obvious back in 1979 when this original problem was identified. There is no longer high-pH water being discharged to Calmus Creek from Northwestern. The Northwestern discharge does still have high levels of dissolved solids and phenols. The dissolved solids still may be causing some problem by a white mineral deposit occurring on the streambed downstream of the Northwestern site. As part of the remedial action, Northwestern is going to be required to meet some new discharge requirements. In the past, their discharge permit has only included limits for pH, but additional limits for dissolved solids and possibly phenols will be added.

5. Question: Recently the Creek was seen to run yellow after a rain. Is that part of this problem and will it be mediated by this dissolved solids standards being proposed?

   Response: The West Quarry site could not be the source of that water because the quarry is nearly dry. The local DNR field office is aware of this situation and will be investigating other suspected sources.

6. Question: Is there is any indication that the water is penetrating the deeper layers of rock and entering the layer of rock from which the Winnebago Heights people pump their water?

Response: The Northwestern site has bedrock monitoring wells at different depths. Impacted water has been found in some of these wells. However, the degree of impact lessens with depth and also lessens laterally from the site. No evidence of impacted water leaving the site has been found. Therefore, impacted water has entered the rock layer from which the Winnebago Heights people pump their water. However, the impacted water in the bedrock has not been found to leave the site and there is little potential for contamination of the Winnebago Heights wells. The selected remedy will insure this by removing impacted water and minimizing production of additional impacted water.

7. Question: Since there does not appear to be much of a threat from the NWSPCC site, how much of a chance is there that this site will make the Superfund NPL list?

Response: The NPL list addresses potential problems and it is very hard to assess potential problems from groundwater contamination. It is almost impossible to say that there is no potential risk from groundwater contamination. In the Superfund program, just the existence of contaminated groundwater and the existence of drinking water supplies in the vicinity are all it takes to get on the NPL list. During the more intensive RI/FS studies the degree and likelihood of threat are demonstrated.

8. Question: How did this site first come to your attention?

Response: In 1979, there were problems in Calmus Creek and the Winnebago River with water quality. In 1984, the Iowa Hygienic Laboratory did a study of Calmus Creek and did water sampling in Winnebago and Calmus Creek and various locations, as well as sediment samples. They tracked the source of this contamination to an overflow from the nearby Lehigh Portland Cement Company site and seeps or blow-out areas on the Northwestern site.

Since then, both companies have done a considerable amount of work and have been under order by the DNR to eliminate those discharges at Calmus Creek, which they both have done.

In 1987, a contractor for the U.S. EPA did additional investigations, based on data from that investigation, the site was assessed and proposed for the NPL in 1988.

9. Question: Can you describe what the conditions for stream life were back in 1979 and what they are now?

Response: Prior to 1979, Calmus Creek supported a good diversity of aquatic life. EPA recently conducted a study on the aquatic life of Calmus Creek which found a lack in the variety of species of aquatic life just below the NWSPCC discharge. Thus, despite improvements in stream pH, there does not appear to be a significant improvement in the aquatic habitat since NWSPCC began treatment. High dissolved solids causing mineral deposits on the streambed is the likely cause for poor continued aquatic habitat. This situation will be addressed as part of the selected remedy.

10. Question: How much tax money has been spent on this RI/FS study?

Response: Nothing. The study has been paid for totally by the NWSPCC. The EPA, along with the DNR, has had expenses in oversight of these projects. That is not tax money, per se, and that money, in all likelihood, will be recovered from the responsible parties at the conclusion of the projects.

11. Question: What happens if we have a couple of very wet years and it rains a lot and the quarry begins to refill?

Response: NWSPCC will have equipment in place to keep the quarry dewatered.

12. Question: What about the method that was overlooked because of the costs (Waste Stabilization)?

Response: Other than costs, there are other potential problems with stabilization of the kiln dust. It would be very difficult to implement and its success would be uncertain. Assuming it was successful, it would be the best option because there would no longer be any potential for interaction with the kiln dust. In the Superfund process there are a number of evaluation criteria that are looked at. It was concluded that the selected alternative presents the best trade-off among the alternatives.

13. Question: How much has Northwestern States had to spend on remediation, to date?

Response: To date, approximately $750,000 has been spent on the project. Another million and a half is anticipated.

14. Question: How many gallons of acid have been used to neutralize the 400 million gallons of water that were in there?

Response: Approximately 5000 gallons per week.

15. Question: How thick would the clay cap be?

Response: That layer would depend on what was determined necessary to effectively reduce infiltration of water. There is no specific thickness required. The cap is an additional safeguard, since all the water which would be generated from the site would be collected in the dewatering system in any event. The cap prevents contaminated water from being produced in the first place.

16. Question: Are there other cement plants around the state where this is going on?

Response: The Lehigh Portland Cement Company site just north of NWSPCC has a similar problem.

17. Question: How would you characterize a degree of human risk from this problem?

Response: It is very low. However, prior to dewatering of the West Quarry, the high pH water in the quarry posed a human risk from direct contact.

18. Question: Was it known to be low when you started?

Response: No. The extent of contamination and degree of risk were not known. It was the objective of the RI/FS to determine those.

19. Question: If you knew then what you know now, would you have required Northwestern States to go through all this?

Response: If we knew then what we know now, they wouldn't have had to conduct the RI/FS, but they would still have had to do the remediation that is being proposed. While the human risk is low, adverse environmental impact to Calmus Creek is a confirmed problem which needs to be addressed. Also, without remediation there would be potential impacts to groundwater which could affect current or future water supplies.

20. Question: Where does Northwestern take its kiln dust now, since 1985?

Response: They no longer generate kiln dust. They have changed their source of raw materials so the kiln dust can be placed back into the product without adversely impacting the product.

21. Question: Did the State receive any comments from people who were concerned about their drinking water?

Response: No such comments were received.

22. Question: Could you summarize why it was the second least expensive alternative chosen as the proposal here?

Response: The least expensive alternative was not chosen because it did not address the existing groundwater contamination at the site. Of the remaining alternatives, all of them were believed to meet the regulatory requirements. They were believed to provide long-term, permanent solutions to the problem. The selected alternative was chosen because it was the least expensive and managed to meet all of the other criteria. In addition, the stabilization of the kiln dust was questionable as to whether or not it could be implemented realistically and effectively. The off-site disposal of kiln dust alternative raised whole new issues and brings potential for moving a problem to another site and raising a lot of public concern about an additional site.