



Superfund Record of Decision:

Ott/Story/Cordova, MI

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12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			14.
15. Supplementary Notes			
16. Abstract (Limit: 200 words) The Ott/Story/Cordova Chemical site is a former specialty chemical manufacturing facility in Dalton Township, Muskegon County, Michigan. The site is at the headwaters of a small, unnamed tributary of Little Bear Creek, which flows southeast of the site approximately one-half mile away to Muskegon River, three miles to the south. The site operated from 1957 to 1985 under a series of owners. Chemical products manufactured onsite included intermediate items used in manufacturing pharmaceuticals, dyestuffs, agricultural chemicals, diisocyanates, and herbicides. For at least ten years, production vessel clean-out wastes and wastewaters were discharged to onsite unlined lagoons and allowed to dissipate into soil. In subsequent years, wastes were also drummed and stored onsite. In the early 1960s, the State noted signs of water and soil contamination. Site owners attempted to manage the ground water contaminant plumes emanating from the site, but the effectiveness of these measures was uncertain. In 1977, the State negotiated with a new site owner to remove several thousand drums, thousands of cubic yards of lagoon sludge, and to destroy or to neutralize phosgene gas left onsite. In 1982, an alternate water supply was undertaken and financed in part by (See Attached Page)			
17. Document Analysis a. Descriptors Record of Decision - Ott/Story/Cordova/Chemical, WI Second Remedial Action - Final Contaminated Media: gw Key Contaminants: VOCs (benzene, PCE, TCE, toluene, xylenes), other organics (pesticides), metals (arsenic) b. Identifiers/Open-Ended Terms c. COSATI Field/Group			
18. Availability Statement		19. Security Class (This Report) None	21. No. of Pages 94
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Abstract (Continued)

the State and a former owner. A Record of Decision (ROD), signed in 1989 and reaffirmed in 1990 after additional public comment, addressed Operable Unit 1 (OU1), the contamination of the nearby Little Bear Creek system. This ROD addresses aquifer restoration. A subsequent ROD will address remaining threats posed by the contaminated soil areas at the site. The primary contaminants of concern affecting the ground water are VOCs including benzene, 1,2 dichloroethane, PCE, TCE, toluene, vinyl chloride, and xylenes; other organics including pesticides; and metals including arsenic.

The selected remedial action for this site includes installing and operating extraction wells in a phased approach to restore the aquifer and prevent degradation of useable ground water downgradient of the plume; pumping and treatment of ground water in the shallow and deeper zones of the aquifer system using physical-chemical treatment including UV-oxidation, air stripping, biological treatment such as activated sludge, and/or filtration/adsorption such as granular activated carbon as determined in the design phase; discharging the treated effluent in the nearby stream; installing a ground water monitoring system to demonstrate the effectiveness of restoration; and implementing institutional controls, such as deed restrictions to limit ground water use. The estimated present worth cost for this remedial action is \$26,000,000, which includes an annual O&M cost of \$1,400,000.

PERFORMANCE STANDARDS OR GOALS: Ground water cleanup goals include benzene 1 ug/l (10^{-6} cancer risk level), toluene 40 ug/l (State standard), TCE 3 ug/l (10^{-6} cancer risk level), and xylenes 20 ug/l (State standard). Effluents must meet limitations for stream discharge as administered by the State.

Declaration for the Record of Decision

Site Name and Location

Ott/Story/Cordova Site
North Muskegon, Michigan

Statement of Basis and Purpose

This decision document presents the selected remedial action for Operable Unit 2 the Ott/Story/Cordova site, in North Muskegon, Michigan, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for this site.

The State of Michigan concurs with the selected remedy. The information supporting this remedial action decision is contained in the administrative record for this site.

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 (ROD), may present an imminent and substantial threat to public health, welfare, or the environment.

Description of the Selected Remedy

This operable unit is the second of three planned operable units for the site.

Operable Unit 1 addressed the contamination of the nearby Little Bear Creek system caused by the influx of contaminated groundwater whose original source of pollutants was the Ott/Story/Cordova site. Operable Unit 2 considers aquifer restoration measures. Operable Unit 3 will consider principal threats as may be posed by contaminated soil areas associated with the site.

While Operable Unit 1 addressed one of the key threats posed by the site, the issue of aquifer restoration was beyond the scope of the Operable Unit 1. Operable Unit 2 will consider that goal to the degree possible. The aquifer below and downgradient of the Ott/Story/Cordova site is contaminated to a significant degree. Full restoration, if possible, is likely to take many years. If full restoration is not possible then containment measures must be implemented for what is now an unknown period of time.

The United States Environmental Protection Agency (U.S. EPA) in consultation with the Michigan Department of Natural Resources (MDNR), will re-evaluate groundwater restoration components of this Record of Decision at least every five years to review whether or not satisfactory progress is being made toward aquifer restoration goals.

The major components of the selected remedy for Operable Unit 2 include the following:

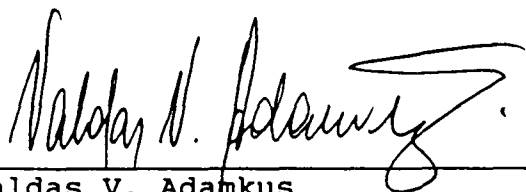
- Installation and operation of extraction wells designed to restore the aquifer and prevent degradation of useable groundwater resources at the southern boundary (downgradient edge) of the plume of contamination.
- Install and operate a purge and treatment system at points in the unconfined and semiconfined aquifer system specifically designed: (1) to halt movement of the contaminated groundwater plume (2) to reduce pollutant mass (3) restore the aquifer to useable conditions (4) to be sufficiently flexible to allow modifications of the design of the purge system based upon operating experience.
- A phased approach will be used for the installation of extraction and monitoring wells to efficiently define the extent of groundwater contamination, and to apply the knowledge gained to effectively demonstrate the capture and treatment of the entire contaminated groundwater plume.
- Installation of a groundwater monitoring system that: (1) demonstrates the effectiveness of restoration (2) demonstrates complete capture of the groundwater plume, (3) identifies the most efficient locations for extraction wells, (4) is capable of determining when the aquifer is sufficiently restored to allow wells to be taken out of service.
- Provide for adequate treatment of groundwater collected such that the resultant discharge will meet substantive effluent limitations as determined by the authorized State of Michigan program.

Declaration of Statutory Determinations

The selected remedy for Operable Unit 2 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 it satisfies the statutory preference for remedies that employ treatment that reduce toxicity, mobility, or volume as their principal element.

The United States Environmental Protection Agency (U.S. EPA) will re-evaluate this remedy to determine whether health-based levels can be attained throughout the aquifer. If a determination is made that any portion of the aquifer cannot be restored, then containment measures must be employed to avoid contamination of downgradient areas.

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



Valdas V. Adamkus
Regional Administrator
U.S. EPA - Region V

9/29/90.

Date

STATE OF MICHIGAN



NATURAL RESOURCES COMMISSION

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DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING
P.O. BOX 30028
LANSING, MI 48909

DAVID T. HALEF, Director

September 27, 1990

Mr. Valdas Adamkus, Regional Administrator
U.S. Environmental Protection Agency
Region V, 5RA-14
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Adamkus:

The Michigan Department of Resources (MDNR), on behalf of the State of Michigan, has reviewed the proposed Record of Decision (ROD) for the Ott/Story/Cordova Operable Unit 2, Muskegon County, which we received on August 27, 1990. Operable Unit 2 consists of pumping and treating the contaminated aquifer. The goal of this action is full restoration of the aquifer. We concur with the selected remedy, which includes the following:

Installation of extraction wells designed to restore the aquifer and prevent degradation of useable groundwater resources at the southern boundary (downgradient edge) of the plume of contamination.

Installation of a purge and treatment system at points in the unconfined and semiconfined aquifer system which is specifically designed to:

- (1) halt movement of the contaminated groundwater plume,
- (2) reduce contaminant mass,
- (3) restore the aquifer to useable conditions, and
- (4) be sufficiently flexible to allow modifications of the design of the purge and treatment systems based on operating experience, including evaluation of the effectiveness of the treatment system at removing unidentified compounds.

A phased approach will be used for the installation of extraction and monitoring wells to efficiently define the extent of groundwater contamination, and apply the knowledge gained to effectively demonstrate the capture and treatment of the entire contaminated groundwater plume.

Mr. Valdas Adamkus

-2-

September 27, 1990

Installation of a groundwater monitoring system that:

- (1) demonstrates the effectiveness of restoration,
- (2) demonstrates complete capture of the groundwater plume,
- (3) identifies the most efficient locations for extraction wells, and
- (4) is capable of determining when the aquifer is sufficiently restored to allow wells to be taken out of service.

We understand that the specific types of treatment will be determined in the Remedial Design phase and will probably consist of granular activated carbon, UV-oxidation, air stripping, and biological treatment. The treatment system will be compatible with the treatment system that is being designed for Operable Unit 1. The cleanup of the contaminated groundwater will meet Type B criteria consistent with the Act 307 Rules. The cleanup will also be in compliance with the Michigan Water Resources Act, Public Act 245 of 1929 and associated rules.

We urge your continued efforts to implement this remedy as soon as possible and will continue our efforts to this end as well. If you or your staff have any questions, please contact Mr. Paul Gauthier at 517-373-8427, or you may contact me directly.

Sincerely,



Delbert Rector
Deputy Director
517-373-7917

cc: Mr. Jonas Dikinis, EPA
Mr. Russ Hart, EPA
Ms. Kathy Cavanaugh, DAG
Dr. James Truchan, MDNR
Mr. William Bradford, MDNR
Mr. Peter Ollila, MDNR
Mr. Paul Gauthier, Ott/Story/Cordova File

DECISION SUMMARY FOR THE RECORD OF DECISION

1. SITE NAME, LOCATION, AND DESCRIPTION

The Ott/Story/Cordova site is located in Dalton Township, Muskegon County, Michigan, approximately five miles north of the City of Muskegon (see Figure 1). The site is in what may be termed the northernmost vicinity of the Greater Muskegon area.

A point of concern with regard to the site is the proximity of residential areas. Such areas exist in the form of a trailer park slightly northwest of the site, and some 100 homes located in vicinities shown to be downgradient of the site along Central, River, and Russell Roads. These homes are within a mile of the site.

The Ott/Story/Cordova site is at the headwaters of a small unnamed tributary of Little Bear Creek, which flows southeast of the site approximately one-half mile away. It is unlikely that Little Bear Creek serves as the regional groundwater discharge point. That point is more likely the Muskegon River, some three miles to the south.

2. SITE HISTORY AND ENFORCEMENT ACTIVITIES

Site operations began approximately in 1957. The site has been owned by various specialty organic chemical manufacturers. Products made over the span of active operations included intermediate items used in the making of pharmaceuticals, dyestuffs, agricultural chemicals, diisocyanates, herbicides, etc.

For at least ten years, production vessel clean-out wastes and wastewaters were all initially discharged to on-site unlined lagoons and allowed to dissipate into soils by seepage. Later, accumulation of large numbers of drums of waste occurred.

By the early 1960s, signs of water and soil contamination were beginning to be noted. Later, in response to Michigan concerns, efforts were made by the site owners to slow the spread of the groundwater contaminant plume emanating from the site. Correspondence by some members of the Michigan Water Resources Commission and later the Michigan Department of Natural Resources (MDNR) expressed concern as to the effectiveness of such efforts.

By 1977, with the then present site owner (Story Chemical) in bankruptcy, a removal action was undertaken by the State of Michigan and financed in part by a new site owner. Several thousand drums and thousands of cubic yards of lagoon sludge were removed and disposed of from the site. During the site's history, various information and documents were filed with

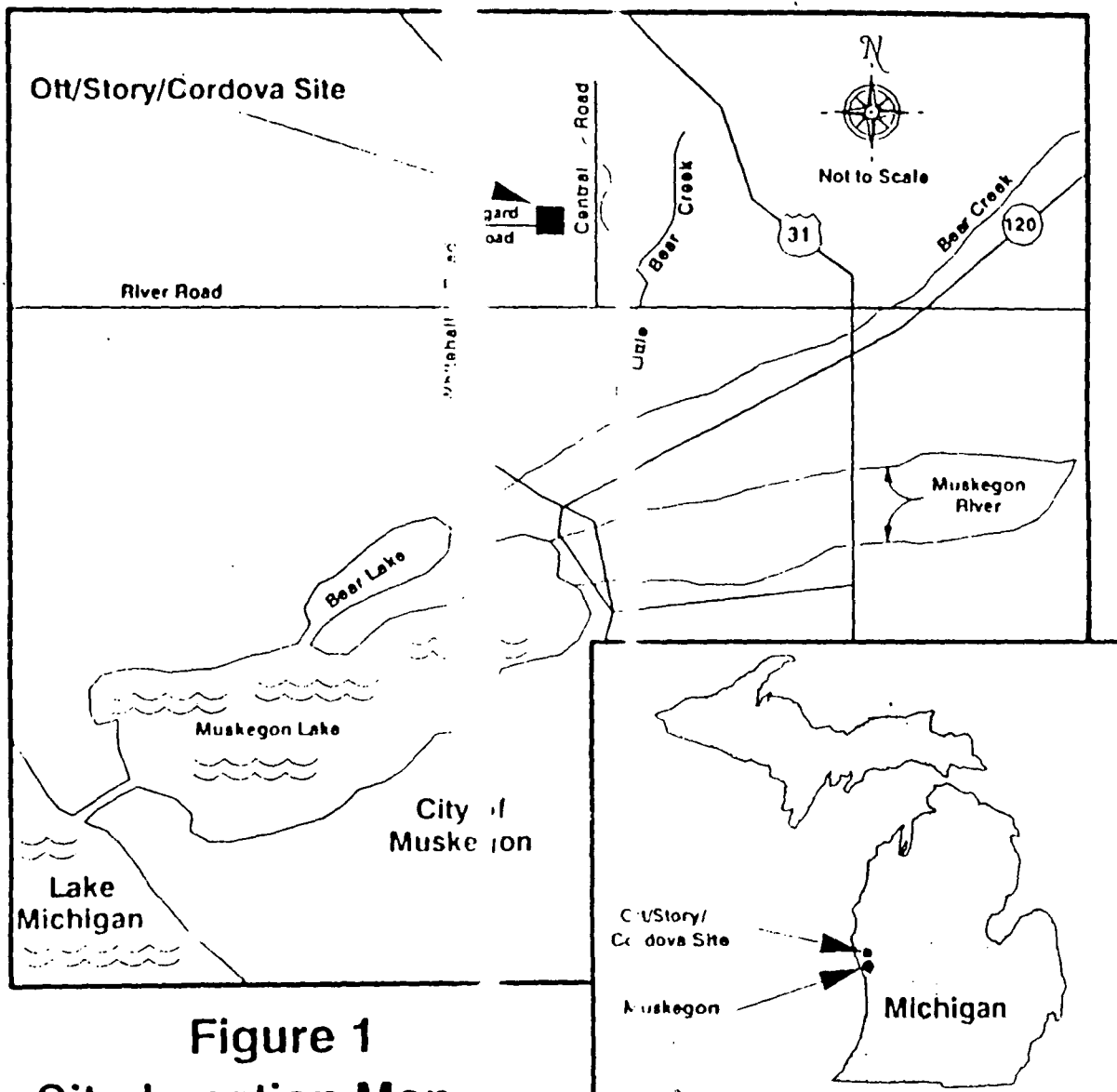


Figure 1
Site Location Map

federal and state governments. Briefly, and in approximate chronological order, these are:

- Information generated by Ott Chemical regarding Michigan Orders of Determination concerning groundwater and lagoon usage (approximately 1965-1966).
- Information generated by Ott and Story Chemical concerning effluent content to waters of the State of Michigan (approximately 1967-1973).
- Information generated by Ott Chemical and submitted to the Corps of Engineers regarding the River and Harbors Act, (a forerunner of the National Pollutant Discharge Elimination System) (approximately 1971).
- Filing for generator status and treatment/storage permits by Cordova Chemical of Michigan under the Resource Conservation and Recovery Act (approximately 1980).
- Filing by Cordova for various Michigan air permits (early 1980s).

In 1982, the site was placed on the National Priorities List (NPL). Also in 1982, an alternate water supply was undertaken in the vicinity of the site in settlement of a citizens' suit against of former site owner, and financed in part by a former site owner, and in part by the State of Michigan.

Three distinct sets of site owner/operators have been involved in the site over its history. The Ott Chemical Company began operations at the site in the 1950s as an independent company. In 1965, Corn Products Company, now CPC International, purchased all stock of Ott Chemical. In 1972, CPC sold assets that comprised the Ott Chemical operations to Story Chemical. In late 1976-early 1977, Story Chemical initiated bankruptcy proceedings. In late 1977-early 1978, Cordova Chemical Company of Michigan purchased the site after entering into an agreement with the State of Michigan. The agreement called for Cordova to destroy or neutralize phosgene gas left at the site, and to finance in part the State's action to remove drums of waste and lagoon sludges. In return, the State of Michigan agreed to limit Cordova's liability for future site releases caused by past activities. U.S. EPA was not a party to the agreement.

In 1985, a notice letter was sent to Cordova and CPC, potentially responsible parties (PRPs), advising them of their potential liability for the site. The letter offered them an opportunity to conduct a site Remedial Investigation/Feasibility Study (RI/FS). Both CPC and Cordova declined to accept this offer, and U.S. EPA conducted an RI/FS. In March 1989, U.S. EPA also sent demand letters for cost recovery to CPC and Cordova. In May

1989, U.S. EPA also informed Cordova Chemical Co. of California (parent company of Cordova-MI), Aerojet-General (parent company of Cordova of California) and Swanton-Story Corporation (successor of Story Chemical) of their potential liability as regards this site and sent demand letters to these firms. Both Aerojet-General and Swanton-Story Corp. are considered PRPs due to Aerojet's ownership of Cordova Chemical and Swanton-Story being what remains of Story Chemical after the bankruptcy proceedings.

In August 1989, PRPs were given notice pursuant to a Section 122(a) letter that U.S. EPA had determined that a period of negotiations would not facilitate an agreement for remedial design and action for Operable Unit 1. The availability of the Proposed Plan/Focused Feasibility Study, and notice of the start of a public comment period were also stated in the letter. Presently, litigation among the PRPs, the state and federal government is underway. CPC International has filed a suit for its costs against Aerojet, Cordova and the State of Michigan in the U.S. District Court, Western District of Michigan. In October 1989, U.S. EPA filed a cost recovery action in the same federal court.

A ROD for Operable Unit 1 was signed by U.S. EPA in September 1989. However, in November 1989, U.S. EPA reopened public comment on its selected remedy for Operable Unit 1, and declared that it would reconsider the selected remedy. This comment period extended to December 1989. In December 1989, CPC filed a counter claim against U.S. EPA, alleging improper procedure regarding compilation of the Administrative Record supporting Operable Unit 1. Response to this claim was made by U.S. EPA through the U.S. Department of Justice in February 1990.

In March 1990, U.S. EPA affirmed its Record of Decision for Operable Unit 1, and later that same month issued a Unilateral Order pursuant to Section 106 of CERCLA to undertake actions as determined in the Record of Decision. The PRPs chose not to comply with the Order. In June 1990, an Inter-Agency agreement was finalized between the U.S. EPA and the U.S. Army Corps of Engineers, such that remedial design work for Operable Unit 1 could begin.

3. HIGHLIGHTS OF COMMUNITY PARTICIPATION

A RI/FS "Kickoff" availability session was held near the site in November 1987. Upon the completion of the RI in April 1989, a copy of the RI report was made available to the public at the information repositories maintained at the Dalton Township Public Hall and the Walker Memorial Library in North Muskegon. The RI was also made a part of the administrative record file maintained in Region 5 and at the local repository at the Walker Memorial

Library. A Proposed Plan and Focused Feasibility Study for Operable Unit 2 were released to the public on August 1, 1989 to initiate a public comment period for the proposed action. A public meeting was held in August 1989.

The Feasibility Study (FS) and Proposed Plan for Operable Unit 2 were made available to the public in July 1990. A notice of availability was published in the Muskegon Chronicle on July 24, 1990 to initiate a public comment period on the alternatives from July 25, 1990 to August 23, 1990. In addition, a public meeting was held on August 16, 1990 in Muskegon County. At this meeting, representatives from EPA and the Michigan Department of Natural Resources (MDNR) answered questions concerning site conditions, problems, and remedial alternatives under consideration. In response to a request for extension, U.S. EPA subsequently extended the public comment period to September 24, 1990. A response to the comments - received during this period is included in the Responsiveness Summary, which is part of this Record of Decision. This decision document presents the selected remedial action for Operable Unit 2 for the Ott/Story/Cordova Site in North Muskegon, Michigan, 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.

4. SCOPE AND ROLE OF OPERABLE UNIT

As with many Superfund sites, the problems at the Ott/Story/Cordova site are complex. Consequently, EPA has organized the remedial work into three planned operable units at the site. This Record of Decision addresses the second operable unit planned for the site.

- Operable Unit 1 focused on the interception of contaminated groundwater entering and degrading the Little Bear Creek system. This action is now in the Remedial Design stage, with construction start-up anticipated for the spring of 1991.
- Operable Unit 2, which is the subject of this Record of Decision, has as its primary goal the restoration of the aquifer system below and downgradient of the Ott/Story/Cordova site.

The goal of the Operable Unit 1 was to address an immediate threat to human health and the environment, namely the introduction of a portion of the contaminated aquifer system in a surface water body that flows through and near a residential area. The broader question of groundwater remediation will be addressed by this Operable Unit 2.

The National Contingency Plan (NCP) provides guidance on this issue. As stated on page 8732 of the March 8, 1990 "Federal Register," the NCP notes that: the goal of U.S. EPA's Superfund approach is to return usable groundwaters to their beneficial uses within a timeframe that is reasonable given the particular circumstances of the site.

The NCP also provides guidance on the important consideration of reasonable timeframe. The NCP calls for very rapid restoration time periods of groundwater currently used for drinking water supply. More extended timeframes may be appropriate for groundwater with the potential to serve as such a supply.

At the Ott/Story/Cordova site, an alternate water supply was provided in nearby areas downgradient of the site. However, groundwater users do exist approximately 1 and 1/2 miles to the east and south (downgradient) of the site. Therefore, restoration in a reasonable timeframe will be an important consideration of this Record of Decision. The NCP also provides guidance on two other important questions; the role of institutional controls, and whether natural attenuation should be expected to play an important part. On page 8706 of the March 8, 1990 "Federal Register," the NCP notes that institutional controls will usually be used as supplementary protective measures during implementation of groundwater remedies. On page 8734 of this document, the NCP also notes that natural attenuation may be recommended when it is expected to reduce concentration of contaminants in groundwater to remediation levels in a reasonable timeframe. U.S. EPA believes that neither the sole use of institutional controls or dependence on natural attenuation for aquifer restoration are prudent or effective means in remedying the highly contaminated groundwater at the site. Groundwater contamination remains very high presently, even twelve years after the site ceased operation, and available information indicates that concentrations of contaminants will not be reduced without active remediation.

- A third operable unit for the Ott/Story/Cordova site will be developed to consider areas of soil contamination found on site. The FS for Operable Unit 2 explored soil alternative to the site. However, shortly after the completion of the FS, the State of Michigan promulgated new regulations concerning environmental response, the Act 307 rules. U.S. EPA believes it is appropriate to examine assumptions made in the latest FS concerning projected soil volumes and cleanup levels in light of those new regulations. In addition, U.S. EPA plans to conduct further soil/sediment sampling along the banks of Little Bear Creek.

5. SUMMARY OF SITE CHARACTERISTICS

An important site characteristic at Ott/Story/Cordova is the sandy nature of site soils which result in a high permeability. Past usage of unlined waste lagoons and subsequent plant spills/releases have resulted in massive introduction of pollutants into the soil and groundwater. The RI revealed over 90 different organic compounds in the groundwater, of which 32 are classified as priority pollutants.

The table on the following page presents selected testing results of groundwater monitoring wells at the site. Highly elevated levels of compounds such as 1,2 dichloroethane, 1,1-dichloroethene, vinyl chloride, tetrachloroethene, and benzene exhibit varying degrees of carcinogenic activity. As was discussed in the RI Report, a contaminant's characteristics such as structure, solubility, and vapor pressure influence its potential to and rate of migration in soils vapor and groundwater.

Compounds such as vinyl chloride and 1,2-dichloroethane may be described as extremely mobile, 1,1-dichloroethene, 1,1,1-trichloroethane, toluene, and xylene as very mobile; and 1,2-dichloro-benzene as slightly mobile.

RESULTS FOR SELECTED TESTING WELLS

(Results given in micrograms per liter or approximately parts per billion)

<u>LOCATION</u>	<u>CONTAMINANTS</u>	<u>HIGHEST CONCENTRATION</u>	<u>MCL</u>
W3	(none detected-background well northwest of site)		
W101S	1,2 Dichloroethane	2200	5
	1,1 Dichloroethene	350	7
	Benzene-3800	3800	5
	Tetrachloroethene	24,000	5
	Toluene	38,000	2000
W1011	1,2 Dichloroethane	110,000	5
	1,1 Dichloroethene	970	7
	Benzene	510	5
W101D	1,2 Dichloroethane	8	5
	Tetrachloroethene	55	5
	Vinyl Chloride	9	2
OW9	1,2 Dichloroethane	21,000	5
	1,1 Dichloroethene	7,900	7
	Vinyl Chloride	50,000	2

OW12	1,2 Dichloroethane	110,000	5
	1,1 Dichloroethene	1,100	7
	Vinyl Chloride	50,000	2
B1	Vinyl Chloride	550	2
OW8	Benzene	15	5
	Vinyl Chloride	7,200	2

At the Ott/Story/Cordova site, soils are predominantly sand to a depth of approximately 65 feet. Then, layers of silts and clays tend to form a barrier separating the upper unconfined aquifer from a lower semiconfined zone which begins at about 85 feet below the ground's surface. All of the samples noted above were taken from the upper sandy aquifer zone, except for well W101D, which is in the lower semi-confined aquifer.

The considerable array of groundwater pollutants shown in the above table yields insight as to the degree of contamination found at the site. The RI shows the presence of intermingled silt and clay layers occurring at a depth of approximately 65-85 feet below the ground surface. Contaminants may be more strongly retained within this interval, and the ability of these layers to slowly release contaminants throughout the groundwater system causes concern over the ability to attain ultimate health-based restoration goals.

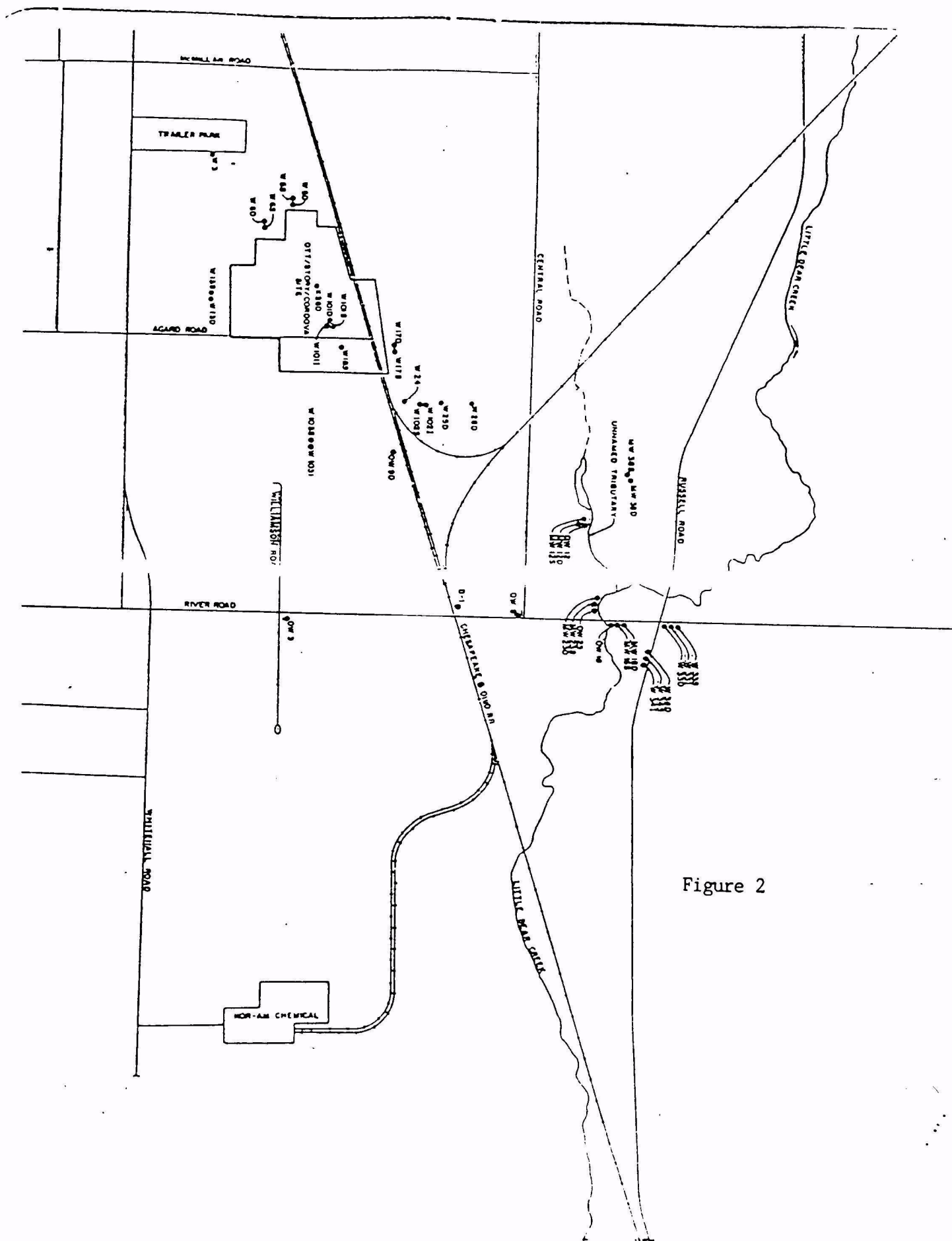
The MCL, or maximum contaminant level, helps provide a useful comparison of the sampled groundwater's relative cleanliness or contamination. MCLs are enforceable standards for contaminants in drinking water supply as established by the Safe Drinking Water Act.

Certain monitoring points are worthy of note as regards to Operable Unit 2. Well B1 is considerably west of the Little Bear Creek area, along River Road. Well 101D is just north of Agard Road, and is screened in sandy soil some 120 feet below the ground's surface (see Figure 2). In these cases, interception by wells designed in operable unit 1 to prevent contaminant discharge into Little Bear Creek from the shallow aquifer is open to doubt.

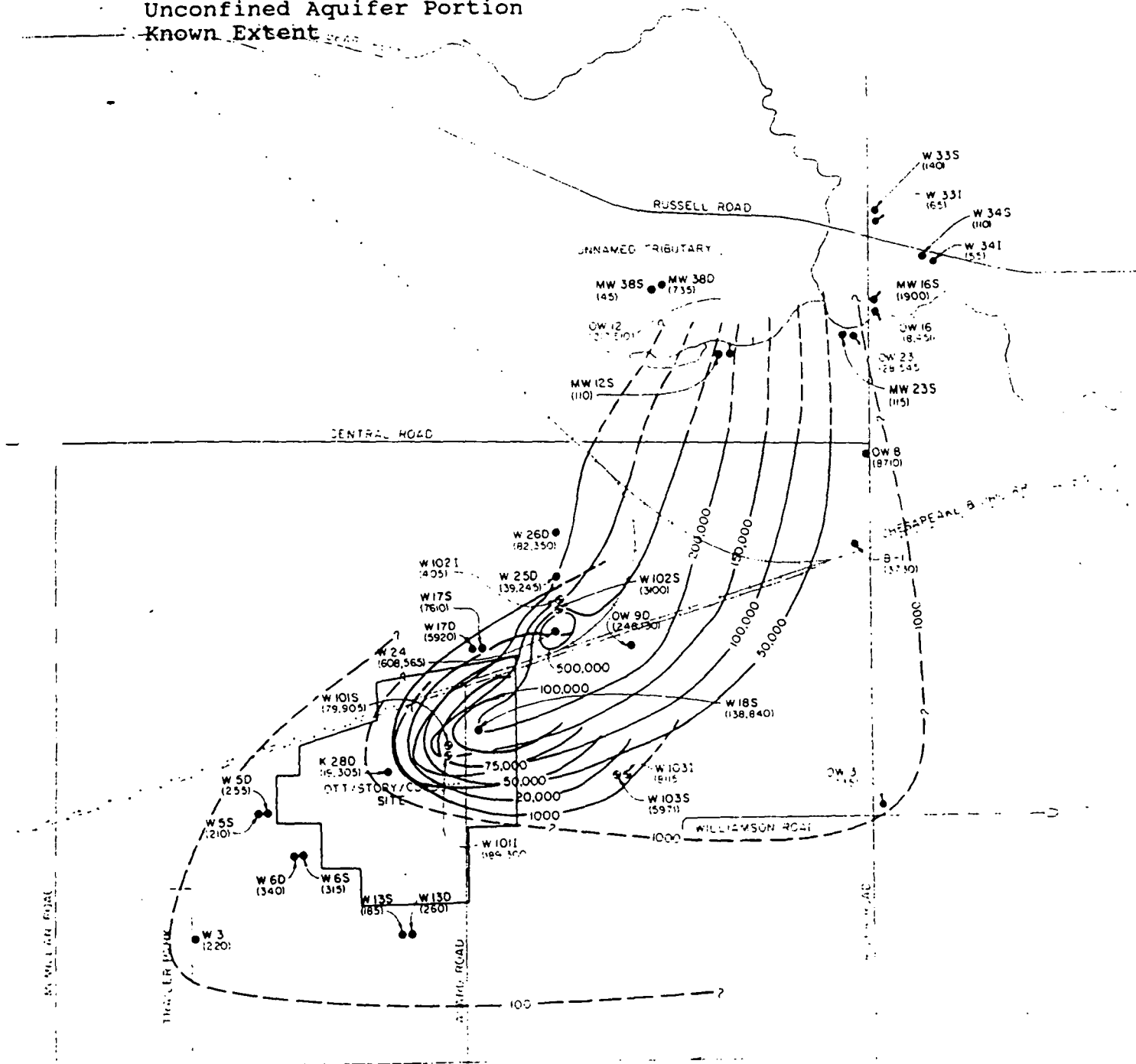
The volume of contaminated groundwater at Ott/Story/Cordova has been estimated at over 1.2 billion gallons. Figures 1 and 2 provide the reader with an approximate idea of site setting, and the location of wells referred to in these discussions.

6. SUMMARY OF SITE RISKS

Numerous chemical compounds were detected during the course of



Total Organic Contaminants in micrograms per liter
Unconfined Aquifer Portion
Known Extent



Ott/Story/ Cordova field investigations. As is explained in further detail in the RI report, some 90 organic compounds were detected in groundwater, and over 200 organic compounds were detected in site soil samples. Inorganic compounds were also detected in both soils and groundwater. Data sets were evaluated to consider those chemicals above background levels, toxicity constants for noncarcinogens and carcinogens were reviewed, and the degree of occurrence of a given substance at the site was considered.

As discussed in the NCP, a baseline risk assessment is initiated as a part of remedial investigation. The purpose is to determine whether the contaminants found pose a current or potential risk to human health and the environment in the absence of remedial action. Such assessment helps provide a basis to determine if remedial action is necessary. The assessment consists of exposure and toxicity components combined so as to characterize overall risk.

Based on this evaluation, twenty-two indicator chemicals were selected at the Ott/Story/Cordova site which appeared to not only be present in significant concentrations, but also exhibit the potential for relatively high toxicity. These substances are:

1,1,2-trichloroethane	benzene	silver
1,2-dichloroethane	heptachlor epoxide	barium
1,1-dichloroethene	xylene	zinc
trichloroethene	toluene	copper
carbon tetrachloride	4,4'-DDT	nickel
vinyl chloride	PCB	cyanide
chloroform	dichloromethane	arsenic
tetrachloroethene		

EXPOSURE ASSESSMENT

During early production periods at the site, releases of contaminants occurred either to the air or soil. Since production activities have now been curtailed, it is assumed that all present releases from the site resulted from previous releases to soil.

Once in soil, further releases can occur by movement of contaminants into groundwater and the subsequent discharge to surface water, volatilization into the air or suspension of contaminated dusts into the air, or runoff of surface water that may carry contaminated soils.

The movement of contaminated groundwater results in several exposure pathways. Users of groundwater are considered a potentially exposed population. Formerly, several residents at the site were supplied by individual groundwater wells. In 1994, as a result of a settlement of a citizens' suit against one

the PRPs, an extension of an alternate water supply to the area was provided. Beyond this supply extension, groundwater is used as a water supply. In recent years, the Muskegon County Health Department has found it necessary to warn residents near the site not to use groundwater for watering lawns or gardens; such usage can present a direct ingestion or inhalation pathway. The groundwater at Ott/Story/Cordova may be classified as a Class II supply, as discussed in the NCP on page 8732 of the March 8, 1990 "Federal Register." Prior to the present contamination, the aquifer below and downgradient of the site served as a source of drinking water.

Operable Unit 2 will address the primary exposure scenario posed by contaminated groundwater. This scenario concerns ingestion by potential groundwater users.

TOXICITY ASSESSMENT

The degree of toxicity which may be posed by a given chemical may be described in part by its acceptable intake for subchronic exposure (AIS), its reference dose or acceptable intake for chronic exposure (AIC), and in the case of carcinogens by its carcinogenic potency factor. Values for AIS and AIC are derived from information available from studies on animals or human epidemiologic studies. These values are normally reported in mg/kg body weight/day, and generally represent the highest calculated exposure level below which the given adverse effect will not occur. A carcinogenic potency factor is expressed as lifetime cancer risk per mg/kg body weight/day, and is estimated at the upper 95 percent confidence limit of the carcinogenic potency of a given chemical.

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-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 of chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

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 individuals. 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.

The following two tables describe AIC, AIS, and carcinogenic potency factors for indicator chemicals at the Ott/Story/Cordova site. The third table lists the weight of evidence for the various categories of potential carcinogens.

RISK CHARACTERIZATION

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., 1×10^{-6} or $1E-6$). An excess lifetime cancer risk of 1×10^{-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.

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 medium to the contaminant'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.

The Agency considers excess cancer risk in the range of 10^{-4} to 10^{-6} as protective of human health. The risk level of 10^{-6} , which represents a probability of one in one million that an individual could contract cancer under the conditions of exposure, is often used as a "benchmark" of protection. Given the large number of carcinogenic contaminants found in site groundwater, the Agency has determined that for groundwater cleanup a risk level of 10^{-6} is appropriate for this site for a given contaminant, such that cumulative excess cancer risk does not exceed the 10^{-4} level.

Risks to future potential ground water users were calculated. Because contaminants in the aquifer are not uniformly distributed, risks were estimated assuming that a given

AIC AND AIS VALUES FOR INDICATOR
CHEMICALS AT THE OTT/STORY/CORDOVA SITE

<u>Indicator Chemical</u>	<u>Acceptable Intake</u>			
	<u>Ingestion Route</u>		<u>Inhalation Route</u>	
	<u>Subchronic</u>	<u>Chronic</u>	<u>Subchronic</u>	<u>Chronic</u>
	<u>(AIS)</u>	<u>(AIC)</u>	<u>(AIS)</u>	<u>(AIC)</u>
	<u>mg/kg/day</u>	<u>mg/kg/day</u>	<u>mg/kg/day</u>	<u>mg/kg/day</u>
1,2-Dichloroethane				
1,1-Dichloroethene		0.009		
Arsenic				
Carbon Tetrachloride		0.0007a		
Vinyl Chloride				
Chloroform		0.01		
Tetrachloroethene		0.01a		
Benzene				
1,1,2-Trichloroethane		0.004a		
Heptachlor Epoxide		0.000013a		
Silver		0.003		
Barium		0.05a	0.0014	0.00014
Zinc	0.21	0.21	0.1	0.01
Copper	0.037	0.037		
Nickel	0.02	0.02a		
Trichloroethene				
toluene	0.43	0.30	1.5	1.5
Cyanide		0.02		
Methylene chloride		0.06		
Xylene	0.1	2a	0.69	0.4
PCB				

Primary Source: USEPA, 1986a

a - Source: RfD; EPA IRIS database (12/1/88)

CARCINOGEN POTENCY FACTORS FOR INDICATOR
CHEMICALS AT THE OTT/STORY/CORDOVA SITE

<u>Indicator Chemical</u>	<u>Ingestion Route</u>		<u>Inhalation Route</u>	
	<u>Potency Factor (mg/kg/d)⁻¹</u>	<u>EPA Weight of Evidence</u>	<u>Potency Factor (mg/kg/d)⁻¹</u>	<u>EPA Weight of Evidence</u>
1,2-Dichloroethane	0.091	B2	0.091a	B2
1,1-Dichloroethene	0.58	C	1.16	C
Arsenic	1.65b	A	15a	A
Carbon tetrachloride	0.13	B2	0.13a	B2
Vinyl Chloride	2.3	A	0.295a	A
Chloroform	0.0061a	B2	0.081a	B2
Tetrachloroethene	0.051	B2	0.0033a	B2
Benzene	0.029a	A	0.029a	A
1,1,2-Trichloroethane	0.0573	C	0.057a	C
Heptachlor Epoxide	9.1	B2	9.1	B2
Silver				
Barium				
Zinc				
Copper				
Nickel		A	1.19	A
Trichloroethene	0.011	B2	0.013a	B2
Toluene				
Cyanide				
Methylene chloride	0.0075	B2	0.0143	B2
Xylene				
PCB	7.7	B2		B2

Primary Source: EPA, 1986

a - Source: RfD; EPA IRIS database (revised 12/1/88)

b - USEPA, 1987

EPA WEIGHT OF EVIDENCE
CATEGORIES FOR POTENTIAL CARCINOGENS

<u>EPA Category</u>	<u>Description of Group</u>	<u>Description of Evidence</u>
Group A	Human Carcinogen	Sufficient evidence from epidemiologic studies to support a causal association between exposure and cancer
Group B1	Probable Human Carcinogen	Limited evidence of carcinogenicity in humans from epidemiologic studies
Group B2	Probable Human Carcinogen	Sufficient evidence of carcinogenicity in animals, inadequate evidence of carcinogenicity in humans
Group C	Possible Human Carcinogen	Limited evidence of carcinogenicity in animals
Group D	Not Classified	Inadequate evidence of carcinogenicity in animals
Group E	No Evidence of Carcinogenicity in Humans	No evidence of carcinogenicity in at least two adequate animal tests or in both epidemiologic and animal studies

monitoring well served as a water supply source. Chronic hazard index values and base case cancer risks were estimated for indicator chemicals found in each well.

The chronic hazard index value exceeded unity in 19 monitoring wells. Consequently, were groundwater used in its present state, there is a health risk with regard to noncarcinogenic chemicals.

With regard to carcinogenic indicator chemicals, cancer risks for at least one compound exceeded 1×10^{-6} in 22 wells. Particularly striking were results obtained in monitoring wells OW12 and OW9. Vinyl chloride concentrations in these wells were found to be at such levels that the excess cancer risk from this compound alone was found to approach 1. Eight other wells exhibited instances of either vinyl chloride or 1,2-dichloroethane exceeding cancer risks of 1×10^{-1} . It is important to consider risk associated with groundwater ingestion at points in the aquifer system unlikely to be influenced by remedial action of the Operable Unit 1.

Deep well W101D is located north of Agard Road, on the grounds of the former plant. Additive excess cancer risk at this point is approximately 9×10^{-4} , primarily from 1,2-dichloroethane, vinyl chloride, and tetrachloroethene. Well W101D is screened within the deeper semiconfined aquifer portion. Well W101I, noted earlier, is located nearby and is screened in the unconfined aquifer.

Monitoring wells B1 and OW8 are both screened in the unconfined aquifer zone and are located along River Road near the intersections with the C & O railroad tracks and Central Road, respectively. Primarily due to the known human carcinogen vinyl chloride, excess cancer risk associated with groundwater ingestion at well B1 is 4×10^{-2} ; at well OW8 such risk is in excess of 1×10^{-1} . These points are sufficiently west of Little Bear Creek that interception by extraction wells serving the Operable Unit 1 is open to question.

These results indicate that any potential ingestion of groundwater from certain areas at the Ott/Story/Cordova site poses enormous health risks. The above discussions indicate that the risks from current and potential exposure to contaminated groundwater are unacceptable. 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 an imminent and substantial endangerment to public health, welfare, or the environment.

Uncertainly associated with site risk concerns to what degree contaminated groundwater is used for washing and watering purposes, despite County warning to avoid such usage.

7. DESCRIPTION OF ALTERNATIVES

The alternatives analyzed for Operable Unit 2 are presented below. As was indicated above, these alternative only pertain to the final groundwater remedy.

Alternative 1: No Action

Alternative 2: Institutional Control

Alternative 3a: Supplementary Extraction in only the Shallower Aquifer Portion, Monitoring, Deed Restriction, Physical-Chemical Treatment, Biological Treatment, Stream Discharge

Alternative 3b: Supplementary Extrac-tion in both Shallow and Deep Aquifer Portions, Monitoring, Deed Restriction, Physical-Chemical Treatment, Biological Treatment, Stream Discharge

Alternative 3c: Phased Supplementary Extraction in both Shallow and Deep Aquifer Portions, Monitoring, Deed Restriction, Physical-Chemical Treatment, Biological Treatment, Stream Discharge

Common Elements. Except for the "No Action" alternative, other alternatives noted have certain elements in common. All envision that usage of this portion of the aquifer in its current degraded state will be restricted, either indefinitely (Alternative 2) or for the duration of the treatment period (Alternative 3a, 3b, 3c). U.S. EPA presumes development of a deed restriction with the current site owner, and cooperation with other private citizens. The Michigan Department of Public Health advises U.S. EPA that restrictions for residential wells in Muskegon County may not be enforceable. All envision that monitoring of groundwater contaminant levels and movement will be conducted. Alternatives 3a, 3b, and 3c envision employment of identical treatment schemes, which in concept are identical to that employed for the Operable Unit 1. (U.S. EPA notes that remedial design activity for the Operable Unit 1 is underway, and that U.S. EPA has recently approved a work plan for the treatability study of expected removal efficiencies from certain treatment components to be performed concurrently with remedial design.) It is not anticipated that the RCRA Land Disposal Restrictions are ARARs for any of the alternatives discussed above, since the waste are not listed wastes. Any residuals created through Alternatives 3a, 3b, or 3c must be managed properly.

Alternative 1 - No Action

U.S. EPA is required to consider a no-action alternative pursuant to the NCP. This alternative serves as a baseline for comparison purposes. Under this alternative, U.S. EPA would take no additional remedial action at the site to monitor, control, collect, treat, or otherwise cleanup contaminated groundwater. The cost of this alternative is therefore zero.

Alternative 2-Institutional Controls and Monitoring.

Institutional controls, such as deed restrictions, would be implemented under this alternative, restricting current and future uses of ground water at and downgradient of the facility. Additional ground water monitoring wells would be placed in both the unconfined and semi-confined ground water systems to evaluate the southern extent of contamination and provide a basis for placement of deed restrictions. Alternative 2 relies solely on institutional control and a monitoring well network as a means of precluding public usage of contaminated groundwater. U.S. EPA believes that institutional control has a role to play, but should not be relied on solely where engineering controls and treatment are practicable as is the case for the Ott/Story/Cordova site.

Capital Cost: \$0.3 million
Present Worth: \$1.3 million
Annual O & M: \$0.06 million
Time to Implement: 4-5 months

Alternative 3a - Supplementary Extraction, Monitoring, Usage Restriction, Physical-Chemical Treatment, Biological Treatment, Stream Discharge.

Supplementary extraction wells would be installed only in the shallow aquifer systems, primarily along the southern edge of contaminated groundwater areas. Primary ARARs that will be met by this alternative include the Safe Drinking Water Act for this portion of the aquifer, effluent limitations as administered by Michigan for stream discharge, air emission and waste management regulations. Design life of this, and other restoration groundwater alternatives, is estimated at 30 years.

Physical-chemical treatment will provide initial removal of organic contaminants. Biological treatment will yield enhanced removal of organics prior to stream discharge. Coupled with filtration and adsorption techniques, further contaminant and suspended solids removal will occur.

The specific types of physical-chemical treatment (e.g. UV-

oxidation, air stripping), biological treatment (e.g. activated sludge), and filtration\adsorption (e.g. granular activated carbon), will be determined in the Remedial Design phase through engineering design and analysis.

Capital Cost: \$6.4 million
Present Worth: \$26 million
Annual O & M: \$1.2 million
Time to Implement: 22-24 months

Alternative 3b - Supplementary Extraction, Monitoring, Usage Restriction, Physical-Chemical Treatment, Biological Treatment, Stream Discharge

Supplementary extraction wells would be installed as noted in alternative 3a, and additional extraction wells would be installed near points of higher contamination levels in both the shallow and deeper zones of the aquifer. Requirements to be met for this alternative are as noted for Alternative 3a. This alternative contemplates the installation of an extensive groundwater extraction system that assumes worst case in terms of magnitude and extent of groundwater contamination. Treatment of extracted groundwater would proceed as described in 3a, above.

Capital Cost: \$8.9 million
Present Worth: \$40.3 million
Annual O & M: \$1.9 million
Time to Implement 25 months

Alternative 3c - (Phased) Supplementary Extraction, Monitoring, Usage Restriction, Physical-Chemical Treatment, Biological Treatment, Stream Discharge

Supplementary extraction wells would be installed in both shallow and deeper zones of the aquifer such that, in conjunction with the Operable Unit 1 all known areas of contaminated groundwater would be addressed. Alternative 3c differs from alternative 3b in that it adopts a phased approach to aquifer restoration. This alternative would have the extraction system installed in incremental steps based on the actual extent and magnitude of groundwater contamination. Treatment of extracted groundwater would proceed as described in 3a, above.

Capital Cost: \$6 million
Present Worth: \$26 million
Annual O & M: \$1.4 million
Time to Implement: 22-24 months

8. Summary of Comparative Analysis of Alternatives

A detailed analysis was performed on the alternatives developed in the FS.

The nine evaluation criteria utilized in accordance with the NCP are: overall protection of human health and the environment; compliance with ARARs; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; cost; state acceptance; and community acceptance.

These criteria are defined below:

- Overall protection of human health and the environment: addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls;
- Compliance with ARARs: addresses whether a remedy will meet all of the applicable or relevant and appropriate Federal and State environmental laws and/or justifies use of a waiver.
- Long-term effectiveness and permanence: addressess the expected residual risk and the ability to maintain reliable protection of human health and the environment over time, once clean-up goals have been met;
- Reduction of toxicity, mobility, or volume through treatment: addresses the anticipated performance of the treatment technologies the remedy may employ;
- Short-term effectiveness: addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period (i.e., until clean-up goals are achieved);
- Implementability: addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option; and
- Cost: addresses the estimated capital and O & M costs, as well as a present-worth.
- State agency acceptance: addresses the support agency's comments and concerns.
- Community acceptance: addresses the public's comments on concerns about the Proposed Plan and RI/FS report. (The

specific response to public comments are addressed in the Responsiveness Summary section of the ROD).

The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria:

Overall Protection of Human Health and the Environment

Unlike certain other criteria, a remedy is either deemed protective or it is not. There are not "degrees" of protection. Only those alternatives determined to be protective will be considered for the selected remedial alternative.

Alternatives 3b and 3c which call for supplementary extraction and treatment of contaminated groundwater in both shallow and deep aquifer zones to health-based standards offer protection of human health and the environment. Alternative 3a envisions supplementary extraction and treatment only in the shallower zone of groundwater, and allows the deeper aquifer to remain contaminated. Alternatives 1 and 2 do nothing to abate the movement of contaminated groundwater areas which as discussed previously in this document cannot logically be expected to be contained by extraction wells serving Operable Unit 1. Alternatives 1 and 2 are not protective of human health and the environment because they may permit spread of contamination into areas where future well users may be adversely affected.

Compliance with ARARs

This criterion, as with the protectiveness criterion, must be met for an alternative to be a selected remedy (unless one of the six waivers allowed under the statute is appropriate).

A table of all known site-specific federal and state ARARs and to-be-considered information is provided below. Key ARARs for each alternative have been noted in Section 7 of this document. Each alternative carries its own set of criteria that must be met before implementation of that alternative can be termed to be compliant.

Alternative 3a, 3b, and 3c would meet their respective applicable or relevant and appropriate requirements of federal/state environmental laws and regulations. The preferred (3c) alternative would comply with the Clean Air Act and pertinent Michigan regulations on dust and volatile emissions control, RCRA regulations on proper residuals management, the Michigan-administered Pollutant Discharge Elimination System, the Safe Drinking Water Act, and Michigan Act No. 307

TABLE OF FEDERAL ARARs

- . Safe Drinking Water Act (SDWA), 42 U.S.C. 300f: Establishes criteria for drinking water quality. Chemical specific, regarding alternatives 3a, 3b, 3c.
- . Clean Water Act (CWA), 33 U.S.C. 1251: Establishes effluent guidelines and water quality criteria. Chemical specific, regarding alternatives 3a, 3b, 3c.
- . National Pollutant Discharge Elimination System (NPDES) Program; 40 CFR Parts 122, 125 and Subchapter N: Regulates the discharge of water into surface water. (CWA Section 402). Chemical specific, regarding alternatives 3a, 3b, 3c.
- . Federal Standards for Toxic Pollutant Effluent; 40 CFR Part 129: Regulates the discharge of certain pollutants. Chemical specific, regarding alternatives 3a, 3b, 3c.
- . Fresh Water Quality Criteria (FWQC): Regulates surface water discharge from site. Chemical specific, regarding alternatives 3a, 3b, 3c.
- . Clean Air Act and National Ambient Air Quality Standards (CAA and NAAQS), 40 CFR Part 50: Regulates site emissions including particulates during on-site excavation. Action-specific, regarding alternatives 3a, 3b, 3c.
- . 40 C.F.R. Part 50; EPA Regulations on National Primary and Secondary Ambient Air Quality Standards (NAAQS). Action-specific, regarding design of treatment for alternatives 3a, 3b, 3c.

Note: An ARAR for an on-site incinerator, air stripper for groundwater treatment or soils treatment units. Used to establish units for air emission based upon modeling. The NAAQS specify the maximum concentration of a federally regulated air pollutant (i.e., SO₂, particulate matter (PM₁₀), NO_x, CO, ozone, and lead) in an area resulting from all sources of that pollutant.

- . 40 C.F.R. 125, Subpart A; EPA regulations on Criteria on Standards for the NPDES, Criteria and Standards for Technology-Based Treatment Requirements in Permits.

Note: An ARAR because it sets out applicability of technology based treatment requirements for discharges of certain pollutants. Section 125.3(c) establishes methods for determining technology based limits. Action-specific, regarding alternatives 3a, 3b, 3c.

- . 40 C.F.R. 125, Subpart K; Criteria and Standards for Best Management Practices.

Note: An ARAR because it requires implementation of best management practices requirements in substantive permits to prevent release of toxic constituents. Chemical-specific, regarding alternatives 3a, 3b, 3c.

- . Safe Drinking Water Act; 42 U.S.C. 300

40 C.F.R. Part 141; EPA National Primary Drinking Water Standards; Maximum Contaminant Levels (MCLs).

This standard is an ARAR since the aquifer is potentially usable as a drinking water source. Chemical-specific; alternatives 1,2,3a,3b,3c. (Alternatives 1 and 2 make no attempt at compliance.)

- . Resource Conservation and Recovery Act (RCRA) of 1976, as amended by the Hazardous Solid Waste Amendments (HSWA) of 1984, 42 U.S.C. 6901. Regulates disposal of solid waste and the generation, transport, storage, treatment and disposal of hazardous wastes.

Action-specific, regarding alternatives 3a, 3b, 3c since via treatment processes sludges/residuals will be created which will require proper management.

- . Executive Order (EO) for Wetlands (11990) and Floodplains (11988) as implemented by EPA's August 6, 1985, Policy on Floodplains and Wetlands assessments for CERCLA Actions: Regulates remedial action implementation in wetlands or floodplains. Location-specific regarding alternatives 2, 3a, 3b, 3c.
- . 40 C.F.R. 122, R122.41; EPA NPDES Permit Regulations, Conditions Applicable to all Permits.

Note: Administrative procedural requirements are not ARARs if remedial action is undertaken on-site under CERCLA. A substantive technical requirement to ensure compliance with technical discharge standards including monitoring, record keeping and notification of noncompliance with discharge standards would be an ARAR. U.S. EPA believes actions envisioned by alternatives 3a, 3b, 3c constitute on-site response.

TABLE OF STATE ARARs

- . Michigan Water Resources Act, Public Act 245 of 1929, as Amended (Water Resources Commission General Rules, Part 4, 21): establishes surface water and groundwater quality discharge standards and monitoring requirements. Provides ground water criteria for CERCLA sites, landfills and discharges to surface water. Implements NPDES regulations.
- . Michigan Air Pollution Act, Public Act 348 of 1965, as Amended: Regulates air quality in the presence of new or modified air sources. Action-specific, pending design of volatile organics in 3a, 3b, 3c.
- . Mineral Well Act, Public Act 315 of 1969: Dictates that the proper procedures for installing and abandoning monitoring wells are adhered to. Action-specific for alternatives 1, 2, 3a, 3b, 3c. (Note: Alternative 1 would fail to comply.)

- . 40 C.F.R. 262; Regulations for Hazardous Waste Generators

Michigan Hazardous Waste Management Rules, Part 3, R299.9301 to 9309; "Generators of Hazardous Wastes."

Note: This is an ARAR if CERCLA site materials are shipped off-site to RCRA treatment, storage or disposal (TSD) facility. Chemical-specific, pending analysis of sludges/residuals from alternatives 3a, 3b, 3c. Michigan has an authorized hazardous waste program with substantively identical requirements to 40 C.F.R. 262-265.

40 C.F.R. 264, Subpart C; Preparedness and Prevention.

This regulation requires written records of waste management operations. This is an ARAR if CERCLA site materials are shipped to a RCRA TSD facility. Chemical-specific, pending analysis of treatment residuals for alternatives 3a, 3b, 3c.

40 C.F.R. 264, Subpart F; Ground Water Protection.

- . Michigan Hazardous Waste Management Rules.

Note: Provides requirements to detect and respond to releases in an aquifer. An ARAR for post-closure detection monitoring after remediation where constituents remain on-site. Chemical-specific, pending selection of treatment reagents for alternatives 3a, 3b, 3c.

- . Part 4, Rule 57; Acute Toxicity, Chronic Toxicity, Etc.

Note: An ARAR because it provides requirement that surface water must not be toxic to aquatic life (except in small zones to initial dilution at discharge points.) Not an ARAR if wastewater is discharged to a POTW. Chemical-specific, POTW discharge not contemplated for alternatives 3a, 3b, 3c.

- . Michigan Safe Drinking Water Act; Michigan Public Act 399

Note: Act 399 is an ARAR because although a "public drinking water supply system" as defined under the Act does not or may not currently exist at or near the site, ground water could potentially be used as a drinking water source in the future. Action-specific for alternatives 1, 2, 3a, 3b, 3c.

- . Part 7, R336.1702; New Sources of VOC Emissions.

Note: This is an ARAR for new sources of VOC emissions for new remedial action. Any person responsible for any new source of VOC emissions shall not cause or allow the emission of VOC emissions from the new source to exceed the lowest maximum allowable emission rates. A design consideration for alternatives 3a, 3b, 3c since volatile organics make up a substantial portion of groundwater pollutants, and transfer from groundwater to air without proper treatment not appropriate.

- . Michigan Environmental Response Act; Act No. 307

The substantive provisions of Parts 6 and 7 of the rules promulgated under the Michigan Environmental Response Act (Act 307) are considered to be an ARAR for the remedial action to be undertaken at this site. These rules provide, inter alia that remedial action be protective of human health, safety, and the environment, (Rule 299.5705(1)). The rules specify that this standard is achieved by a degree of cleanup which conforms to one or more of three cleanup types; a type A cleanup generally achieves cleanup to background (Rule 299.5707); a type B cleanup meets specified risk-based levels in a given media (Rule 299.5709); and a type C cleanup is based on a site-specific risk assessment which considers specified criteria. U.S. EPA has determined that the selected remedy meets the criteria for a type B cleanup of the groundwater. The State has identified Act 245 as an ARAR. U.S. EPA disagrees that Act 245 as interpreted and applied by the State, is an ARAR. Nonetheless, it is the State judgement that the selected remedial action for this site will provide for attainment of all ARARs including the Michigan Water Resources Act and Part 22 rules. The remedial action will halt the migration of contaminated groundwater and restore the aquifer.

to a usable condition. The purged water will be treated prior to discharge.

Long-Term Effectiveness and Permanence

This criterion focuses on any residual risk remaining at the site after the completion of the remedial action. The criterion assesses the adequacy and reliability of any controls used to manage hazardous substances remaining at the site. Unlike the criterion of protectiveness, it is possible to consider effectiveness in terms of degree of permanence.

Alternatives 3a, 3b, and 3c provide a superior degree of permanence compared to alternatives 1 and 2, in that the contaminants within the aquifer system will be extracted and given treatment. Further, both 3b and 3c are superior to 3a because they allow for the treatment of aquifer portions which cannot be addressed satisfactorily by 3a or Operable Unit 1. While the ability to fully restore all portions of the aquifer now contaminated is not certain, alternatives 3a, 3b, and 3c clearly offer an enhanced opportunity to meet cleanup goals than with alternatives 1 or 2.

Alternatives 3b and 3c meet this criterion through pumping and treating contaminated groundwater in an effort to mitigate off-site migration of contaminated groundwater and return the aquifer to its beneficial use. Alternative 3a may not be as effective in the long term in that the uncertainty in its ability to capture all the contaminated groundwater is much greater than Alternatives 3b and 3c.

Reduction of Toxicity, Mobility, or Volume through Treatment

This evaluation addresses the statutory preference for selecting remedial actions that employ treatment technologies which permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances. This preference is satisfied when treatment is used to reduce the principal threats at the site through destruction of toxic contaminant mobility, toxicity or reduction of total volume of contaminated media.

By providing for extraction of portions of the contaminated aquifer which may not be satisfactorily addressed by the implementation of the Operable Unit 1, contaminant mobility can be substantially curtailed by alternative 3b and 3c. While extraction rates and well locations are best left to design phases of this project coupled with operating experience yielding enhanced aquifer response information, up to 400 gallons per minute of contaminated groundwater may be extracted if alternative 3c is undertaken. Alternatives 3a, 3b and 3c also allow for reduction of toxicity of groundwater contaminants via physical-chemical and aerobic biological treatments. In summary,

alternatives 3a, 3b, and 3c would provide reduction in contaminant toxicity and mobility and are clearly superior to alternative 1 or 2 which do not offer such capability; no alternative would have a pronounced effect on contaminant volume.

Short-term Effectiveness

Short-term effectiveness considers the time needed to achieve protection against any adverse impacts on human health and the environment that may be posed during the alternative's construction and implementation period until remedial clean-up goals are achieved. Important factors to consider to evaluate the short-term effectiveness of each alternative are protection of the community during remedial action, protection of site workers during remedial action, and time until remedial objectives are met.

Alternatives 2, 3a, 3b, and 3c may require the installation of groundwater monitoring wells to complement existing wells at the site. Such installation can be accomplished within a relatively short time frame of 4-5 months. Some minimal disturbance to the surrounding community may occur. Various protection measures will require implementation during the construction phase, such as air monitoring for the community and protection gear for site workers.

The activity noted above should cause no more than temporary inconvenience to the local community. Supplements to treatment systems envisioned for Operable Unit 1 may be necessary for alternatives 3a, 3b, and 3c. This may require excavation activity which could result in increased dust generation.

However, both workers and the local community should be protected through proper application of dust suppression techniques. Alternatives 3a, 3b, and 3c should take (respectively) 24, 28, and 24 months for implementation of construction activity.

Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative, and the availability of various services and materials required during the remedy implementation.

All the alternatives can be implemented without significant difficulty concerning availability of extraction and treatment component hardware. Treatability study efforts regarding Operable Unit 1 will provide important design information for the treatment system. U.S. EPA cannot judge precisely the degree of cooperation that may be given by various property owners over the area of contamination. Consequently, there may be some difficulty in gaining access from property owners to install the

extraction system.

In considering the three active restoration approaches, alternative 3a is likely the easiest to implement. This is because it addresses only restoration of the shallow portion of the aquifer. Alternative 3c poses a moderate challenge. It attempts to address both shallow and deeper zones of the aquifer, which is a more complex design consideration. However, because 3c envisions a phased approach to well installation, any refinement to the system should be taken in an informed manner. Alternative 3b, which does not envision a phased approach, would likely prove the most difficult to implement.

Cost

This criterion assesses the cost effectiveness of the alternatives. The projected present-worth cost of Alternative 3a is approximately \$26,000,000. Alternative 3b has a present worth

cost of approximately \$40,300,000, which is the highest cost alternative. Alternative (3c) has a present-worth cost of \$26,000,000.

Alternatives 3a and 3c are estimated to cost \$26,000,000 in terms of present net worth for installation of new monitoring wells, data gathering efforts regarding future pollutant migration trends, installation of extraction wells, associated conveyance and treatment, and operation-maintenance of such devices. Alternative 3b has a present net worth of \$40,000,000 for these same tasks. Costs are predicated to a large degree on design and future operating experience. While a precise number and location of extraction wells cannot be projected at this time, design should consider those segments of the aquifer that cannot be satisfactorily addressed by Operable Unit 1.

In terms of initial capital cost, alternative 3c is most advantageous. For approximately the same cost, it addresses both shallow and deep zones of the aquifer; whereas alternative 3a addresses only the shallower area. In terms of capital, operation/maintenance, and present net worth, alternative 3c is superior to alternative 3b which also envisions addressing shallow and deep aquifer zones.

Alternative 1 and 2 have far lower costs than 3a, 3b, or 3c. However, alternatives 1 and 2 are not protective of human health and the environment, and therefore cost comparisons are not meaningful between such subsets of alternatives.

State Acceptance

This criterion has been explored more fully in comments the State

of Michigan made regarding the Proposed Plan. As noted in the transcript of the public meeting, the State of Michigan indicated concurrence on the approach recommended in the Proposed Plan.

Community Acceptance

The issues of community acceptance will be addressed more fully in the Responsiveness Summary developed for this operable unit. If comment from Operable Unit 1 can be used as a guide, the citizens who live in the vicinity of the site will favor aggressive groundwater restoration efforts. PRP comments on the Operable Unit 1 were highly negative; such comments can be expected again for any measures beyond institutional control or no-action.

9. Selected Remedy

Before noting the major components and costs of the selected remedy, it is appropriate to discuss remediation goals for groundwater at the site. The goal of this remedial action is to restore all portions of the aquifer so that it may serve as a drinking water resource. Some studies suggest, however, that not all groundwater extraction and treatment programs are completely successful in reducing contaminant concentrations to health-based levels throughout an aquifer. U.S. EPA therefore recognizes that review of future operating data may indicate the technical impracticability of attaining health-based groundwater quality standards throughout the aquifer. If, at any of the subsequent five-year reviews, it becomes apparent that unsatisfactory progress is being made in attaining groundwater goals, the remedy may be reevaluated. If the remedy is reevaluated, any change in remedy shall be accomplished through reopening and amendment of the ROD, to include an explanation and documentation of all findings, in accordance with 42 U.S.C. 9261(d)(4), and 9617. The following list notes higher levels of certain hazardous substances detected in the aquifer below and downgradient of the Ott/Story/Cordova site, maximum contaminant levels (MCLs) associated with certain hazardous substances, Integrated Risk Information Systems (IRIS) concentrations that represent a 1×10^{-6} cancer risk for certain carcinogenic substances, to be considered levels, and proposed Michigan Act 307 cleanup standards which represent a "Type B" cleanup response. (See table on following page.)

It should be noted that monitoring well W3 located upgradient of the site showed no detectable volatile organic contaminants or pesticide fractions, and for semivolatiles revealed only two phthalate compounds at low part per billion levels.

As the table indicates, there are several hazardous substances within the aquifer system at the site that demonstrate carcinogenic behavior. Consequently, achieving MCLs may not be

Ott/Story/Cordova
Groundwater Cleanup Goals
(micrograms per liter)

SUBSTANCE	RI FINDING	MCL	CONC. AT 1 x 10 ⁻⁶	TBC NATL PRIMARY	MICH. 307 TYPE B
Benzene	3800	5	1		1
Chlorobenzene	110			60	100
Chloroform	1900		0.19		
1,2-Dichlorobenzene	2700			600	10
1,4-Dichlorobenzene	74				1.5
1,2-Dichloroethane	110000	5	0.4		0.4
1,1-Dichloroethene	7900	7	0.06		0.06
1,2-Dichloroethene (total cis/trans)	810			70(cis) 100(trans)	100
Ethylbenzene	2100			700	30
Heptachlor	0.15		0.008	0.0004	0.004
Heptachlor Epoxide	0.49		0.004	0.0002	0.004
n-Nitroso- diphenylamine	46		7		
Tetrachloro- ethene	24000			5	0.7
Toluene	93000			2000	40
1,1,1-Tri- chloroethane	3100				200
Trichloroethene	110	5	3		
Vinyl Chloride	130000	2	0.015		0.1
Xylene(s)	12000				

where MCL= Maximum Contaminant Level as per Safe Drinking Water Act
TBC= To-Be-Considered as a National Primary Drinking Water
Regulation
1 x 10⁻⁶= level noted in Integrated Risk Information System

MICHIGAN LIMITS ON STREAM DISCHARGE (Act 245, Part 21; Rule 57) for paramaters to be treated and discharged from the Ott/Story/Cordova site. Alternative discharge sites are located on Little Bear Creek or the N. Branch Muskegon River at a discharge rate of 0.57 MGD.

Parameters	BAT Limits	Rule 57(2)	LBCrk.	NBrMR
vinyl chloride	3	3.1	BAT	BAT
1,1-DCE	2	2.6	BAT	BAT
benzene	5	60	BAT	BAT
toluene	5	100	225	10327
chloroform		43	BAT	BAT
meth. chloride		59	BAT	BAT
1,2-DCA	10	560	1260	BAT
chlorobenzene		71	160	7332
MIBK		1155	2599	119280
acetone		500	1125	51636
benzyl alcohol		44	99	4544
4-meth. phenol		3	7	310
2-chlorophenol		10	22	1033
2-ethylaniline		27	61	2789
4-chloroaniline		5	11	516
tetraethyl urea		533	1199	27788
camphor		60	135	6196
benzoic acid		208	468	21481
THF		11	25	1136
bis (2-ethylhexyl) phthalate		100	BAT	BAT
arsenic		184	241	4863
cadmium		0.7	0.9	18
chromium		93	121	2435
copper		40	51	977
cyanide A		4	5	106
lead		10	11	130
nickel		148	191	3666
selenium		22	29	585
zinc		177	229	4435

Note:

- all units above are expressed in terms of micrograms per liter
- "BAT" refers to best available treatment

sufficiently protective. Achieving a concentration of contaminant that would yield no more than a 1×10^{-6} cancer risk for any individual carcinogen is therefore a desirable cleanup level for any substance which exhibits carcinogenic behavior. Since there are several carcinogenic substances in the groundwater, total cumulative carcinogenic risk due to ingestion would be approximately 2×10^{-5} . The cleanup goal is the more stringent value listed for a given contaminant in the following table.

Based on the remediation goals, the selected remedy for Operable Unit 2 at the OTT/STORY/CORDOVA site is alternative 3c for groundwater restoration. In keeping with recent guidance, U.S. EPA believes it may be advisable to consider the phased installation of extraction wells based on knowledge gained of aquifer response. It is not known at this time whether such additional installation will be necessary, nor how many years into the future such a step may be taken. Some changes may be made to the remedy as a result of remedial design and construction processes.

10. Statutory Determinations

Protection of Human Health and the Environment

The aquifer system below and down gradient of the OTT/STORY/CORDOVA site has been severely degraded through the introduction of contaminants associated with former material or product usage activity at the site. At least a portion of the aquifer in question can no longer serve as a source of residential and industrial water supply, which it once did. At several locations within the aquifer, cancer risks in excess of 1×10^{-1} would be encountered by a potential groundwater user.

The selected remedy protects human health and the environment with regard to contaminated groundwater. For groundwater, extraction of contaminated groundwater, treatment utilizing physical-oxidation, adsorption, and filtration will assist in reducing contaminant levels. Monitoring and institutional controls will assist in evaluating effectiveness of restoration measures.

Implementation of the groundwater remedy will not pose unacceptable short-term risks or cross-media impacts. With regard to groundwater, the goal of the selected remedy is to restore levels of risk to potential users of the aquifer to 10^{-6} for a given carcinogen, such that cumulative risk is below 10^{-4} . If this goal proves unattainable, then a possible future goal is containment of groundwater contamination, and the avoidance of pollution of downgradient aquifer portions not now known to be affected.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The groundwater selected remedy is required to fully comply with all federal and more stringent state ARARs unless a waiver is invoked. The selected remedy complies with all ARARs. With regard to groundwater, the selected remedy has as its goal the attainment of all ARARs concerning degree of restoration in conformance with CERCLA Section 121.

Cost Effectiveness

The selected remedy for groundwater affords overall effectiveness proportionate to its cost. The groundwater remedy does promote aquifer restoration. Alternative 3c affords a high degree of effectiveness by promoting restoration in both shallow and deep zones of the aquifer, monitoring restoration progress, and providing information on how the system can/should be refined in the future to meet remediation goals. Alternative 3c is the least costly alternative that addresses both zones of the aquifer.

Utilization of Permanent Solutions to the Maximum Extent Practicable

The groundwater remedy selected provides the best balance of tradeoffs among the alternatives considered with respect to the nine evaluation criteria. The remedies selected also utilize permanent solutions and treatment technologies to the maximum extent practicable for the OTT/STORY/CORDOVA site in conformance with CERCLA Section 121. Beyond the criteria of protection and ARARs compliance, the selected remedy had the best overall balance of long term effectiveness and permanence, reduction of hazardous substance toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, and cost. For groundwater, a remedy invoking active restoration attempt through extraction and treatment is clearly superior with regard to reduction of substance toxicity, mobility, or volume and long-term effectiveness.

The State of Michigan has been consulted during development of the site feasibility study, proposed plan, and participated in the public comment period.

Community views were solicited during the public comment period. The U.S. EPA attempted to keep the community informed of site developments via the local information repositories and by the local establishment of certain documents in the administrative record for this site prior to the commencement of the public comment period.

Preference for Treatment as a Principal Element

By providing treatment for contaminated groundwater collected by extraction wells the selected remedy fulfills the statutory preference for treatment as a principal element. Utilization of such treatment will assist in the destruction of various site pollutants.

11. Documentation of Significant Changes

The U.S. EPA has reviewed and responded to all significant comments received from interested parties during the public comment period. Comments were made on the alternative indicated as preferred in the Proposed Plan as well as other alternatives. Based on review of these comments, the U.S. EPA has determined that there is no need for any significant change to the selected alternative, 3c. In the event that additional data or information during the design of the remedy reveals the need for modification, U.S. EPA will notify the public of any changes to the remedy presented here in this Record of Decision in accordance with applicable law and Agency guidance.

Ott/Story/Cordova (OSC)
North Muskegon, Michigan
Operable Unit 2

RESPONSIVENESS SUMMARY

Introduction

The purpose of this responsiveness summary is to document the comments received during the public comment period, and to provide the response of the United States Environmental Protection Agency (U.S. EPA) to such comments. All of the comments summarized in this document were considered prior to U.S. EPA's decision concerning appropriate remedial action regarding Operable Unit 2 for the OSC site.

The responsiveness summary is divided into two parts. The first portion provides the reader with a brief site history, and provides an account of community involvement and citizen concern. The second portion summarizes public comment, both written and oral, concerning the Proposed Plan and contains U.S. EPA's response to such comments. Lengthier comments are provided in their entirety in the administrative record developed for the OSC site. In some instances, comments which address a common concern or subject matter may be grouped according to that common issue, and responded to together.

Site Overview and Community Concern

The OSC site is located in Dalton Township, Muskegon County, Michigan. The site is near the headwaters of a small unnamed tributary of Little Bear Creek. Within a mile of the site there are residential areas along Central, River, and Russell Roads.

The site has been owned by various specialty organic chemical manufacturers. Production operations began approximately in 1957 and continued until 1985. Products made included pharmaceutical intermediates, dyestuffs, agricultural chemicals, herbicides, and diisocyanates.

A prominent feature of the site is the highly sandy nature of its soils. For at least ten years, production vessel clean-out wastes and wastewaters were discharged to on-site unlined lagoons and allowed to dissipate into soils by seepage. By the early 1960s, signs of groundwater and soils contamination were beginning to be noted.

The first instances of community concern began to surface in the 1960s. For a time, contaminated groundwater was collected and sent untreated to Little Bear Creek, beginning about 1967. Complaints about odor followed. In the 1970s, community concern again arose

when complaints about degraded private well water supplies linked to movement of contaminated groundwater from the OSC site were raised. In 1982, an out of court settlement was reached between area residents and a former site owner concerning extension of an alternate water supply into the vicinity of the site.

In 1982, U.S. EPA also placed the site on the National Priorities List (NPL). In 1987, after having concluded negotiations with potentially responsible parties (PRPs) that did not result in private performance of a Remedial Investigation/Feasibility Study (RI/FS), U.S. EPA conducted a "kickoff" availability session at the Dalton Township Hall. U.S. EPA also established two local site information repositories to inform the local residents of site progress.

In August 1989, U.S. EPA released a Proposed Plan and FS for a first operable unit for the site. This dealt with the matter of intercepting that portion of the contaminated groundwater which would otherwise enter and degrade Little Bear Creek. A public meeting was held in August 1989. A Record of Decision for OU 1 was signed in September 1989 and affirmed in March 1990. A further Proposed Plan and FS were developed and released to the public in July 1990 to address overall restoration of the groundwater as a second operable unit.

A notice was placed in the "Muskegon Chronicle" advising of the initiation of a public comment period for the second operable unit on July 25, 1990. A public meeting was held at the Dalton Township Hall on August 16, 1990 at which representatives from U.S. EPA, the Michigan Department of Natural Resources (MDNR), and the Michigan Department of Public Health (MDPH) explained site history, key study findings, alternatives developed, and the preferred alternative at the outset of the comment period. A question and answer session followed. Oral comments on the Proposed Plan were then taken. U.S. EPA also noted at the public meeting its receipt of a request to extend the public comment period. U.S. EPA announced to those in attendance at the meeting of its intention to extend the close of the comment period from August 23, 1990 to September 24, 1990. Subsequently, U.S. EPA advised the general public of this extension by placing an advertisement in the "Muskegon Chronicle".

It is U.S. EPA's belief that the following topics are of concern to citizens who reside in the vicinity of the OSC site:

- 1) health concerns with regard to past and present inhalation of air which may be contaminated due to site releases and ingestion of water which may be contaminated by the site;
- 2) deterioration of warning signs in the vicinity of Little Bear Creek and the need for replacement of those signs;
- 3) concern that if the U.S. EPA needs to fund a possible long term remedy that a shortage of funds for cleanup may develop in the future;

recover such funds spent in accordance with its authority. Hopefully, the taxpayer will not bear the ultimate cost of necessary action.

Comment 2b- "...this type of desolation of our water and other resources will never stop until the state and national Governments, the DNR and the EPA included padlock the doors of all proven and suspected polluters and seize all assets until each case is resolved..."

Response 2b: U.S. EPA believes that if such environmental statutes as the Clean Water Act, Resource Conservation and Recovery Act, Clean Air Act, etc. and their state counterparts are vigorously enforced, then in large measure conditions that lead to the designation of Superfund sites will be avoided in the future.

Comment 3- "...There are a lot of things happening not just here but everywhere and I tell you sometimes I go home and cry..."

Response 3: U.S. EPA notes that the challenge of promoting a clean environment is indeed an ongoing and seemingly never ending task.

Comment 4- "...I'm really concerned about the fact that incineration is even...an option..."

Response 4: While the FS developed for the site explored certain treatment possibilities concerning site soils, incineration is not an option with regard to the Proposed Plan for operable unit 2, which deals solely with the question of whether further groundwater restoration steps should be taken.

Comment 5- "...we have created our government, our EPA and our DNR to help us and we've got to do more ourselves to support them and to let them know that it is more important to us to have safe standards...we have to create jobs that are not devastating the environment so that the children won't grow up to have a job anyway..."

Response 5: U.S. EPA recognizes that a sound economy is a vital part of any community. U.S. EPA sincerely hopes that it is ably representing the environmental interests of citizens, and looks forward to working with the community in this regard.

Comment 6- "...It's a real crime that a site can be allowed to get this bad...we have to have laws that will shut these places down until everything is resolved so we don't build pollution on top of pollution...we want this site cleaned up but we can see beyond this site to this same company that polluted this area... we're great at hindsight. They come back and say don't eat the fish, don't sprinkle your lawns with this water, don't let your children play in this water...The people have real concerns around here. We don't just want to treat one situation we want to help

- 4) concern that operable units will not compliment each other;
- 5) concern over the chemical industry in general, contaminants that may be generated from such industry, and how to prevent similar situations such as OSC from occurring in the future;
- 6) concern expressed over other bodies of water to which the Little Bear Creek system is tributary, and the effect the OSC site may have on them;
- 7) concern over the possible interaction of contaminants already in the environment from the site, and the new contaminants which may be formed as a result of their interaction.

Oral Commentary Received at the Public Meeting

Comment 1a- "...I would hope that there were a lot more money available to get going on this site since it's been really thirty years since there was documented contamination and really nothing has effectively been done to clean up the site except for removal of some of the most hazardous substances..."

Response 1a: U.S. EPA notes that upon completion of design activities for the first operable unit for this site, remedial action funds should be available if no means of private performance of that action are available. U.S. EPA does not rule out the possibility of settlement with PRPs for the second operable unit. However, if this is not possible, U.S. EPA believes funds will stand behind the remedial actions identified embodied in the Record of Decision for this site. U.S. EPA notes without further comment the speaker's view that past site contaminant control efforts were ineffectual.

Comment 1b- "...I would like to say that I'm absolutely appalled by the stance that the Companies are taking... these [EPA] staff members are answering questions instead of doing what really needs to be done. I think it's absolutely disgraceful and I think people in this community ought to be outraged..."

Response 1b: U.S. EPA notes that it has not in the past agreed with many of the comments submitted on behalf of the PRPs with regard to this site. While U.S. EPA supports the right of the public, including PRPs, to comment, U.S. EPA is appreciative of this citizen's views.

Comment 2a- "...Unfortunately it [the Proposed Plan] is much too late and at horrendous expense to all taxpayers..."

Response 2a: If U.S. EPA is unable to reach a settlement with the private parties over conduct of whatever action may be selected as a result of this Plan, then Superfund monies will be used to finance needed remedial action. However, U.S. EPA will attempt to

been done..."

Response 9: As in Response 8, U.S. EPA consulted with ATSDR in preparing this response. ATSDR informs U.S. EPA that a preliminary health assessment for the OSC site has been developed by MDPH, and that a version proposed to be the final health assessment is expected to be available for public comment in a couple of months. ATSDR suggests that the speaker contact the MDPH Lansing office for information on other area health assessments.

Comment 10- "...you'd like to get someone to take care of our pollution problem? When you go to vote in November if it says incumbent I would suggest that gentleman is not doing his job..."

Response 10: U.S. EPA believes no response is necessary to the comment other than to include it in the administrative record.

Comment 11a- "...I would like to see the site secured somehow and controls so that they could not do that [pollute the site] because I don't trust them..."

Response 11a: If U.S. EPA believed that immediate action was necessary to limit access as a means providing security with regard to releases of hazardous substances such action could be taken.

Comment 11b- "...I would want to be informed about any health survey...going on in my area..."

Response 11b: As with certain previous comments, U.S. EPA consulted with ATSDR in preparing a response. U.S. EPA understands that MDPH staff have been out to the speaker's residence and that they will continue efforts to keep the commenter informed of survey progress and results.

Comment 11c- "...I live very close to the creek...and I have breathing problems when I'm exposed to a fog coming off that creek..."

Response 11c: From the address given by the speaker, the creek in question may not be Little Bear Creek but rather Green Creek. U.S. EPA's action for the first operable unit would involve the interception of contaminated groundwater prior to stream entry and would offer relief from the type of problem the speaker describes, but only with regard to Little Bear Creek.

Comment 11d- "...I would like to see some sort of survey done of the pollutants in the bottom downstream in the lakes and in Bear Creek, because there is more people living over there..."

Response 11d: U.S. EPA agrees that monitoring efforts are an important part of remedial efforts, and will take this comment under advisement.

rewrite laws so that this doesn't continue to escalate..."

Response 6: As noted earlier (see Response 2b), U.S. EPA believes that vigorous enforcement of environmental statutes and regulations will help prevent instances like this from recurring.

U.S. EPA observes that under Superfund a new owner or operator may incur liability for site conditions pending release or threatened release of hazardous substances.

Comment 7- "...the biggest concern I have is the cop out that Companies appear to be, one cop out they appear to be using is that Bear Creek and perhaps some of the other smaller tributaries in the area are not used that much for the public or perhaps their uses are limited. But obviously these are part of a larger water shed including Lake Michigan and Muskegon Lake...Ultimately everything that gets put in upstream is going to come downstream ...you can't simply say that this stream isn't used for much. That is not a valid analysis..."

Response 7: U.S. EPA agrees with the speaker's points about the interrelationship of bodies of water. U.S. EPA also notes that according to MDNR stream classification, Little Bear Creek is considered a high quality body of water, specifically a cold water fishery, if left in its natural state. U.S. EPA does not necessarily agree that what goes into one stream will be received by the next body of water in sequence. Physical and biological forces may change the composition of contaminants received upstream; their concentrations may indeed be reduced at a downstream location. However, the manner in which the reduction took place could also have an effect upon the community. An example might be the volatilization of certain materials into the air from the stream, or the buildup of sludges along a stream's banks.

Comment 8- "...my concern [is] for the people that live at...the trailer park...[the] area is not in the clean up...we lived there from 1979 to 1981 and we did not drink the water. The smell was so bad...I had many skin conditions when I lived there...and my nine year old daughter has bone cancer...I would like to have the health study included to that area..."

Response 8: In preparing this response, U.S. EPA consulted with the Federal Agency for Toxic Substances and Disease Registry, (ATSDR). ATSDR informed U.S. EPA that MDPH staff have been in contact with the speaker, and that MDPH study efforts will attempt to include that area. U.S. EPA notes that a monitoring well located in the vicinity of the trailer park and used in conjunction with the OSC RI effort in April 1988 did not reveal the presence of volatile organic contaminants.

Comment 9- "...I would like to be involved in, invited to, be part of any further health assessments that are done in this County...I would also like input into the health assessment that has already

are high at this site. U.S. EPA will determine if those who may be potentially liable for site conditions are willing to undertake cleanup measures. If there is no such willingness, U.S. EPA will undertake necessary action itself and ultimately seek cost reimbursement through the courts.

Comment 14- A letter received September 24, 1990 from an area resident; the letter states in part:

"...The Ott/Story/Cordova site is one of the priorities. It looks really bad on these people that they have been responsible for contamination for so many years and want to drag their feet about cleaning up their poisons...Everyone knows that the contamination does not go away on its own...It would seem that they would want to take this as a challenge and clean it up as soon as possible..."

Response 14: Issues of responsibility and liability with regard to certain persons are now before the Court. U.S. EPA concurs with other portions of this comment.

Comment 15- A letter received September 24, 1990 from an area resident; the letter states in part:

"...According to the Michigan DNR, this site is the worst hazardous waste site in the entire state...The proposed "phased" removal and treatment of groundwater contaminants will not protect the public and restore the environment in an effective and timely manner. The site requires a massive effort at cleanup, regardless of the cost...Most importantly, the lawsuit launched against the EPA and DNR by CPC, International...must be dropped...A lawsuit aimed at environmental agencies and officials who are attempting to clean up this site very effectively slows the entire process...It is an insult to the public that is unnecessarily exposed to the many dangers of the...site...I am particularly concerned about the high incidence of childhood cancer and other illnesses..."

Response 15: U.S. EPA concurs that the site is of high priority to the State of Michigan. U.S. EPA disagrees that the remedy is not protective of the public since the goal of the preferred alternative is to collect and treat all known contaminated groundwater, working in conjunction with the first operable unit. Given that cost is one of the nine criteria by which U.S. EPA is to evaluate alternatives, U.S. EPA also disagrees with the statement that the remedy should proceed "regardless of the cost...". U.S. EPA recognizes the commenter's concerns over cleanup progress and the possible effect of lawsuits on that progress. However, the choice of dropping a lawsuit rests with the party initiating that action.

Comment 16- A letter received September 24, 1990 from an area resident; the letter states in part: "...I am concerned that the cleanup at the Ott/Story/Cordova...site...will take much too long under the proposed "phased" plan...No one knows how the groundwater will flow- which way or how far...Many people...are at risk...[Are

Written Commentary Received During the Public Comment Period

Comment 12- A letter received August 20, 1990 from an area resident. The letter states in part:

Comment 12a- "...my comments simply put are as follows: to first research the effects of all the airborne chemicals in the impact area on both plant and animal life..."

Response 12a: As with certain oral comments listed earlier in this document, U.S. EPA consulted with ATSDR in preparing this response. ATSDR has available to it various reports on toxicological profiles of certain chemicals, and ATSDR will explore this literature as a means of research into effects of chemicals on animal and plant life. U.S. EPA will reference the following toxicological profiles as a part of the administrative record for the OSC site: 1,1-dichloroethene; 1,2-dichloroethane; vinyl chloride; and benzene. The first two reports were prepared for the ATSDR and U.S. Public Health Service by Clement Associates in December 1989; the third by Syracuse Research Corp. in August 1989, and the report on benzene was prepared in May 1989 by the Oak Ridge National Laboratory.

Comment 12b- "...to keep the...population ...informed...as to the health dangers...associated with the creek..."

Response 12b: It is U.S. EPA's understanding from ATSDR that MDPH staff visited and spoke with the writer. Also, U.S. EPA notes that the administrative record for the OSC site, notably with regard to the first operable unit, speaks to this point and is available locally at the Walker Memorial Library in North Muskegon. U.S. EPA will continue efforts to keep the public informed as new information becomes available.

Comment 12c- "...to eliminate any phase of treatment that would risk more exposure to animals, namely surface water location..."

Response 12c: Should U.S. EPA select a remedy involving groundwater collection, treatment, and discharge to surface water, U.S. EPA anticipates the need to have the resultant effluent meet appropriate limitations as established by MDNR. It is likely that monitoring of such effluent will include both chemical and toxicity monitoring as a means of safeguarding the surface water.

Comment 13- A letter received September 24, 1990 from an area resident; the letter states in part:

"...the pollution at this place is very bad for you, and I think the people that are making that pollution should clean it up right now. Why don't they just start today..."

Response 13: U.S. EPA agrees that groundwater contamination level

pond usage continued to 1978.

Response 17d: U.S. EPA notes that lagoon sludges were an apparent target of the 1977-1978 removal action. In that sense, the ponds remained a continuing source of contamination at the site.

Comment 17e- The commenter provides discussion to refute the FS statement that "...various configurations of purge wells were operated between 1965 and 1972..." and notes that there was very little operation of purge wells during those years. The commenter notes that some production wells operated as purge wells, and the "so-called interceptor wells...installed in the mid-1960s, were rarely operated at any time..." Further, the commenter notes that "...all the purge wells had severe operational problems...". Again the commenter notes that "...contamination continued to migrate because of the poor operating conditions of the purge wells...there is no evidence that the entire plume was within the capture zone of the purge wells..."

Response 17e: U.S. EPA notes with interest the above discussion. U.S. EPA notes that the FS was prepared prior to some of the considerable discovery effort made as a result of the on-going litigation involving this site. Should it be necessary to do so, U.S. EPA would be willing to add documentation to the administrative record to accommodate an expanded base of facts. The degree to which these wells were operated and their success, however, does not alter the present situation in regards to remedy selection.

Comment 17f- The commenter notes that CPC Inc. was not the sole contributor of funds for a new water supply.

Response 17f: U.S. EPA notes the above comment, and believes no further response is necessary.

Comment 17g- The commenter disputes the FS' assertion that there are incinerators in the vicinity of the site which could handle sludges generated from remedial action outlined for OU 2.

Response 17g: The FS meant that there would be no need for a cross country shipment. U.S. EPA notes that incinerator capability is present in the Chicago area approximately 160 miles away where there are RCRA/TSCA licensed incinerators.

Comment 17h- "...Neither the analyses nor the conclusions reference in any way the human health risk evaluation for a current land use scenario."

Response 17h: U.S. EPA disagrees. Please note page 7-87 of the RI report for the site which discusses this matter.

Comment 17i- "...The FS inexplicably fails to include an evaluation

we] worse off having the Superfund than if the responsible parties were made to pay for immediate and total clean up?..."

Response 16: It is true that U.S. EPA projects many years to accomplish clean up goals under any of the active restoration alternatives. This is due in part to the large amount of groundwater involved, the relatively high levels of contamination, and the need to evaluate total extent of contamination. U.S. EPA notes that it is possible to make certain predictions as to where groundwater will flow, although all conceivable knowledge of the groundwater system at the site is not known. In general, U.S. EPA believes that area residents are better off having the Superfund program available for at least two basic reasons: Superfund establishes certain liability criteria within the law so that it may be determined who potentially responsible parties may be. Without such criteria, it might be much more difficult to determine responsibility. Furthermore, Superfund provides a fall back so that some action may be taken if private parties are not willing to do so.

Comment 17a- "...Cordova/Michigan, Cordova/California, and Aerojet request that U.S. EPA place these comments on the Administrative Record..."

Response 17a: U.S. EPA will do so.

Comment 17b- [the persons noted above]"...hereby incorporate by reference...comments submitted...on the Focused Feasibility Study...those comments should be considered repeated here..."

Response 17b: U.S. EPA placed all such comments and responses thereto into the Administrative record for OU 1. U.S. EPA's index for the record for OU 2 notes the incorporation of the record for OU1 into OU2, as well as particular documents added for OU2.

Comment 17c The commenter notes at length that its operations and products are distinct from Ott and Story, and that organic compounds detected in the soil and groundwater are the result of operations of Ott and Story, and not the operations of Cordova/Michigan.

Response 17c: U.S. EPA notes that the commenter may misinterpret the FS phrase which says "...throughout much of its history...". Given that site operations began about 1957, the phrase is literally true as to the chemical operations noted. However, U.S. EPA does not mean to imply that that phrase applies to Cordova operations. U.S. EPA has no response at this time to the statement that organics detected in the soil and groundwater are the result of Ott/Story operations. It is not the intent of either the FS or the Proposed Plan to make findings as to possible liability.

Comment 17d- The commenter notes as inaccurate an FS statement that

groundwater was not evaluated ...[it] would provide the benefit of flushing to reduce the time necessary for completing the remediation..."

Response 17m: U.S. EPA observes that the site is near the headwaters of two relatively small surface water bodies- the unnamed tributary of Little Bear Creek to the east and Green Creek to the west. A possible concern with regard to groundwater injection is that of inadvertently creating a groundwater mounding effect that might cause a shift in movement patterns, and impact a water body not previously thought to be affected by the site. Please see page A-22 of the FS for further discussion of this issue.

Comment 17n- "...The FS fails to adequately evaluate the possible use of certain Cordova/Michigan facilities, including the force main line, equalization basin..."

"Response 17n: U.S. EPA has no reason to believe that such devices would be not reserved for private usage. The discharge point from the equalization basin (the force main) goes to the POTW. As noted in Response 17i, U.S. EPA thinks such discharge is not appropriate.

Comment 17o- "...Several options for soil remediation were either eliminated without justification or were not considered at all..."[for example]...biological treatment of soils..."

Response 17o: U.S. EPA notes several papers placed in the record on the subject of biological treatment of materials. Topics include biodegradation studies using white-rot fungus and bioremediation of hazardous wastes. In addition, the management of soils will be a component of OU 3 for the site. As the commenter noted, they will have further opportunity at a later time to comment on alternatives for OU 3.

Comment 17p- "...Another option for soil remediation that apparently was not considered is removal of highly contaminated soils, or "hot spots" combined with capping and containment..."

Response 17p: U.S. EPA notes this as a prudent comment and will give this consideration as information necessary for operable unit 3 is developed.

Comment 17q- "...While the FS makes that statement [that the alternative selected should be consistent and compatible with the first operable unit]...there appears to have been no attempt to design a cost-effective treatment system that would encompass both the operable unit and the remedy selected in the FS..."

Response 17q: It is not the function of an FS to actually perform design. U.S. EPA does note correspondence between it and its designer for the first operable unit in which U.S. EPA stated "...should it be necessary to adopt other measures to deal with the

of discharge of groundwater to the POTW...the failure to adequately consider a discharge to the POTW is particularly inexplicable in view of the ongoing litigation in the case of Muskegon Charter Township v. County of Muskegon (Muskegon County Circuit Court, Case No. 90-26094-CE..."

Response 17i: U.S. EPA notes a document dated 8/31/90 denying a request from U.S. EPA's treatability study contractor for permission to discharge treated groundwater to the POTW even on a limited basis as would be the case with treatability study discharge volume. The ability to implement a POTW discharge would appear to be in serious doubt considering the on-going litigation. Given this position, and recalling the comments received on this subject in December 1989 from Muskegon POTW, discharge to the POTW is not a matter which should have been seriously considered in the FS.

Comment 17j- The commenter notes that a lack of pilot testing prevents a proper evaluation of remedial alternatives.

Response 17j: U.S. EPA notes that in late 1989 results of limited pilot testing were received and subsequently placed in the record for this site. The FS refers to this on page 4-14.

Comment 17k- "...The FS blatantly fails to consider less-costly remedial measures, such as supplementing the operable unit with a more modest purge operation..."

Response 17k: Please note page 4-14 of the FS wherein it is stated "...placement of wells for this alternative would be such as to avoid unnecessary duplication of efforts associated with the first operable unit...". The placement and operation of wells selected under OU 2 are to be done in a manner that will capture the entire Groundwater plume, ensuring prevention of further migration and treatment to remediate the groundwater. A purge operation that is not designed to do this is not acceptable.

Comment 17l: "...The FS eliminates deep-well injection as a disposal alternative because there would be no access to [a] permitted facility. This basis makes no sense..."

Response 17l: U.S. EPA notes that the record for the site indicates that in the mid- to- late 1960s the concept of deep well injection was given consideration. However, the developers of those concepts abandoned deep well injection in favor of stream and POTW discharge. Employment of an on-site deep-well injection facility would not appear to be consistent with OU 1. Injection without prior treatment would not appear to meet CERCLA's preference for treatment. U.S. EPA questions whether deep -well injection would be an appropriate technique given the expected significant volumes.

Comment 17m- "...The discharge of treated groundwater to the

Response 17t: 40 CFR 300.430 notes NCP direction on conducting an RI/FS and the selection of a remedy. This direction states in part: "...The purpose of the remedial investigation/feasibility study is to assess site conditions and evaluate alternatives to the extent necessary to select a remedy...". The phased approach noted with regard to location of extraction wells seems particularly advisable when one considers OSWER Directive No. 9355.4-03 which says in part:

...it will be beneficial at most sites to implement the groundwater remedy in stages. This might consist of operating an extraction system on a small scale that can be supplemented incrementally as information on aquifer response is obtained....

Comment 17u- "...The data to date suggests that there are other upgradient sources, which have not been properly identified...". The commenter discusses monitoring well OW-3, and states that the source of groundwater contamination at this point (south of former production areas) is unknown. The commenter further states that this point is 2400 feet south of the Site and is not hydraulically downgradient from any site source area.

Response 17u: U.S. EPA notes the presence of N,N-dimethyl benzeneamine in the groundwater at OW-3 during RI sampling. U.S. EPA notes that this compound appears associated with raw materials and products utilized during the Ott and Story periods. Figure 4-3 of the RI indicates that well OW-3 is downgradient of the Site and well 103. U.S. EPA also notes figures 2-2 and 2-4 in the FS, which indicate that OW-3 is south of plant areas designated as where three feet of heavily contaminated soil were removed in 1978. U.S. EPA further notes that well cluster W103 is located about half way between the former production areas and OW-3. At W103 vinyl chloride, 1,2-DCA, and benzene are all revealed at concentrations greater than 1000 ppb.

Comment 17v- The commenter disputes an estimate in the FS that groundwater would be cleaned up in 30 years. The commenter also suggests that the FS does not consider remediation of soils as a source of contamination.

Response 17v: The FS uses 30 years as an estimate, in part because cost projections beyond 30 years begin to lose significance. On page A-24, the cautionary statement is made that the 30-year design life may not be adequate to achieve the remedial objective. Because of the high concentrations of contaminants, the large volume of water involved, and the possibility of "bleed-off" of contaminants from silt-clay layers at depth, it is sufficient to note that groundwater cleanup at the site will require long-term commitment. U.S. EPA disagrees with another statement made by the commenter at this point, namely that the FS did not consider elimination of source materials, i.e., contaminated soils at the site. The FS did indeed consider such materials, and these materials will be

concept of aquifer restoration, we urge that such measures proceed in the most cost-effective manner possible so as to supplement- but not unnecessarily duplicate- extraction and treatment efforts made with regard to the Little Bear Creek problem..."

Comment 17r- "...The FS indicates that biological sludges will be initially disposed of as hazardous waste. The FS further provides for delisting of sludges if appropriate....none of the soils or solid wastes at the Site, including the residuals from the biological treatment operations, will be listed hazardous wastes...."

Response 17r: Residuals created must be managed in accordance with appropriate regulations. Residuals involved may not be listed hazardous wastes, but 25 organic compounds were added to the list of what may make a waste hazardous through the characteristic of toxicity. It would appear prudent to monitor residuals created through water treatment for such characteristics. The sludge will be tested prior to disposal. If the sludge tests positive under the TCLP analysis it will be considered as hazardous waste and treated as appropriate before disposal in a RCRA landfill.

Comment 17s- "...The extent of groundwater contamination has not been defined, and hence the design and selection of a particular remediation alternative is inappropriate...This [area near monitoring wells W25 and W26] is a sizable area which has not been investigated in terms of groundwater contamination and hydrogeological characteristics, making the selection of a remedy inappropriate..."

Response 17s: The extent of groundwater contamination is not fully known; however, U.S. EPA believes what is known justifies selection of a groundwater treatment remedial alternative. The NCP, at 40 CFR 300.430(a), provides that remedial actions are to be implemented as soon as site data and information make it possible to do so. U.S. EPA believes an important remedy component is the development of a sound groundwater monitoring program to evaluate effectiveness and to determine if there are other areas of groundwater contamination which are not being adequately controlled. One program management principle established under that Section of the NCP is that operable units should be used when early activities are necessary or appropriate to achieve significant risk reduction quickly.

Comment 17t- "...Both the NCP and the U.S. EPA RI/FS guidance documents clearly state that one of the primary goals of the RI/FS is to define the nature and extent of groundwater contamination. Neither the nature or extent of contamination at the Site has been defined...the evaluation of the various purge well scenarios presented in the FS are highly speculative and were completed premature to defining the true extent of contamination..."

"conservative" used in connection with purge rates, and notes that there is a disparity between estimated capture boundaries north and south of purge well points.

Response 17aa: By "conservative" it is meant usage of the higher range of permeability values found in RI well slug tests, so that the model would account for faster water travel rates. U.S. EPA is not aware of pump tests done at the site that have stressed the aquifer over a prolonged period. One obvious reason for this is the problem of what to do with the large volumes of contaminated groundwater that would result from such a test. U.S. EPA notes that south of the wells is in a downgradient direction and it is normal to expect a larger capture zone to the upgradient side of a well.

Comment 17bb- "...Influent calculations were not carried through for the preferred option...concentrations would be significantly different [less than] indicated in Appendix B..."

Response 17bb: U.S. EPA disagrees. The preferred alternative is expected to have at least one well location in a relatively high level contaminant area. Thus, not all wells in this alternative are anticipated to be at "fringe" locations.

Comment 17cc- "...The RI did not incorporate much of the data from the many previous investigations..."

Response 17cc: Unfortunately, U.S. EPA cannot determine what data the commenter is referring to, and therefore cannot respond to this comment. However, U.S. EPA did generate a large volume of quality assured data sufficient to characterize the extent and magnitude of the contamination and to select a remedy for OU 2.

Comment 17dd- Considerable analyses yield results falling into the broad classification of tentatively identified compounds.

Response 17dd: U.S. EPA believes this point was raised and discussed adequately in FFS commentary; see pages 19 and 20 of the Responsiveness Summary for OU 1.

Comment 17ee- "...A waste is not hazardous under RCRA merely because it contains a hazardous constituent..."

Response 17ee: U.S. EPA concurs, but the FS statement was that soil contaminants may be "possibly indicative of RCRA listed waste", and not that it actually was RCRA listed waste. A substance may not be a hazardous waste but may trigger requirements that are relevant and appropriate.

Comment 17ff- "...There is no basis to conclude that soils would be characteristically hazardous under existing regulations..."

addressed for remedy in OU 3. However, the possibility of future soil remediation does not effect the need for groundwater remediation.

Comment 17w- "...it will be necessary to locate purge wells in the most highly contaminated areas to minimize actual cleanup time..."

Response 17w: U.S. EPA notes this comment, and believes that a phased approach offers sufficient flexibility to adopt such a strategy if warranted.

Comment 17x- "...A separate and complete report should be prepared to document the models. The report should include input/output parameters,...the calibration process, and details of the sensitivity analysis..."

Response 17x: Appendix A of the FS contains discussion of aquifer layer assumptions on page A-2, hydraulic conductivity assumptions on page A-3, defines boundary assumptions on pages A-4 and 5, and discusses calibration on page A-7. U.S. EPA believes such discussion is sufficient, but will add further information on input/output data to the administrative record.

Comment 17y- "...it would seem much more appropriate to first evaluate a line of purge wells along the central axis of the most contaminated portion of the plume prior to installing wells near the lateral edges of a plume...It may be that [such a line of wells]...in conjunction with the FFS purge wells...may provide an adequate capture zone to contain the entire plume..."

Response 17y: While these comments are directed at the FS, U.S. EPA notes that the Proposed Plan on page 8 describes the phased approach as "...supplementary extraction wells would be installed in both shallow and deeper zones of the aquifer such that, in conjunction with the first operable unit all known areas of contaminated groundwater would be addressed..." The goal expressed in the comment is very similar to that stated in the Proposed Plan.

Comment 17z- The commenter notes that there is no information on capture boundaries, and that they cannot evaluate effectiveness of purge wells.

Response 17z: U.S. EPA notes that boundary information is found on pages A-4 and 5. Figure A-3 also helps in evaluating effectiveness. This information was derived by plotting groundwater contour lines on a map and drawing perpendicular lines in order to project flow. By then noting whether a given perpendicular line reaches a projected well location, one can make a prediction as to capture zone. In the MODFLOW program, a change in well locations will change projected flow lines.

Comment 17aa- The commenter asks for a definition of the term

Comment 17jj- The Proposed Plan inaccurately states that if actual or threatened releases from the site are not addressed by the preferred alternative or one of the active measures considered there may be an imminent and substantial endangerment.

Response 17jj: U.S. EPA believes that the statement in the Proposed Plan is correct. A 5/7/90 MDNR memorandum states in part: "...Department staff have determined that significant amounts of contaminated groundwater continue to underflow the unnamed tributary and Little Bear Creek...". Therefore, groundwater contamination may threaten downgradient users or other surface water bodies. U.S. EPA does perceive that there is imminent and substantial endangerment, coupled with the many points in the contaminated portion of the aquifer which now exceed the 1×10^{-4} upper risk range.

Comment 18a- "...Neither...CERCLA nor the NCP empower the Agency to adopt and force compliance with a vague and incomplete remedy that lacks credible evidence that it will be effective in remediating groundwater at the site..."

Response 18a: Part 300.430 of the NCP provides U.S. EPA with direction on adoption of a remedy, while CERCLA Section 106 enables U.S. EPA to secure relief upon determination that there may be an imminent and substantial endangerment because of actual or threatened release of a hazardous substance from a facility. U.S. EPA is unsure of the meaning of "vague and incomplete" remedy, unless the commenter is objecting to the Proposed Plan's preference for a phased approach to extraction well installation. OSWER Directive 9355.4-03, dated 10/18/89 says in part: "...it is usually appropriate to design and implement the groundwater response action as a phased process. An iterative process of system operation, evaluation, and modification during the construction phase can result in the optimum system design...". An adoption of a remedy which calls for a phased approach is not therefore automatically "vague and incomplete". U.S. EPA believes that the Proposed Plan is solidly based upon the Administrative Record.

Comment 18b- "...the sole basis for EPA's decision to implement a second operable unit at the site is a belief that the plume of contamination has [also migrated to] an area located almost directly south of the plant...[this finding is] based upon a single set of sampling data taken from one isolated observation well (OW-3)...[and the substances found therein are not]...the signature chemicals associated with previous plant operations..."

Response 18b: U.S. EPA hereby incorporates Response 17u into this response. U.S. EPA disagrees that findings at well OW-3 are a sole reason for a decision to think in terms of operable units to address the site. As indicated in Response 17u, the presence of di-n-octyl phthalate is not the basis for OU 2. U.S. EPA declared

Response 17ff: There are at least three compounds (methoxychlor, hexachlorobenzene, and 1,4- dichlorobenzene) in site soils whose total concentrations exceed RCRA regulatory levels for hazardous waste by the characteristic of toxicity. 40 CFR 261.11 may require EPA to perform a leachate procedure test to see if soils need to be considered "hazardous waste" for OU 3 discussion purposes, and U.S. EPA intends to perform the TCLP test on those soils.

Comment 17gg- "...U.S. EPA's decision to delay a final evaluation of soil remediation alternatives is inconsistent with the decision to proceed with a groundwater remediation alternative... If the Act 307 rules require reevaluation of the soil remediation alternatives, then such reevaluation is required with respect to the groundwater remediation alternatives..."

Response 17gg: On page 8703 of the 3/8/90 "Federal Register" in which the revised NCP is given, it is stated that "....EPA... promotes making sites safer and cleaner as soon as possible...and addressing the worst problems first...." Since certain risks associated with groundwater ingestion are higher than risks posed by soils, it is appropriate that U.S. EPA consider groundwater remedial action first. Further, the technology utilized to meet groundwater ARARs is not apt to be appreciably different if cleanup requirements should change. However, a change in soil volumes estimated to undergo remediation due to different cleanup levels, would potentially exert a significant influence upon remedial alternatives.

Comment 17hh- "...It is well-known that city water presently serves the area served by that section of the aquifer and that simple institutional controls would preclude any groundwater ingestion from that portion of the aquifer..."

Response 17hh: Page 8706 of the 3/8/90 "Federal Register" notes this concept from the NCP: that institutional controls should not substitute for more active response measures unless such measures are not practicable. Further, U.S. EPA notes a 3/28/90 memorandum from the MDPH which questions the viability of enforcement measures to be taken regarding residential well installation in Muskegon County. Consequently, it is U.S. EPA's position that institutional controls alone would not be protective for the site.

Comment 17ii- U.S. EPA gives no basis for a goal of 1×10^{-6} excess cancer risk for groundwater.

Response 17ii: U.S. EPA refers to the 3/8/90 publication of the NCP in the "Federal Register", and notes the discussion on page 8716 of risk range. An excess cancer risk range of 1×10^{-4} to 1×10^{-6} is deemed acceptable, with 1×10^{-6} given as a point of departure. Given this NCP language and the numerous carcinogens in the groundwater, it is U.S. EPA's position the 1×10^{-6} is the appropriate cancer risk level for the protection of public health.

Response 18f: U.S. EPA hereby incorporates Response 17x into this response. U.S. EPA disagrees that it is in violation of CERCLA Section 113(k)(2). U.S. EPA observes in addition that it is incongruous for the commenter to declare that the Agency is in violation of this provision in light of the failure of CPC to provide its model to U.S. EPA. U.S. EPA believes that the proposed plan is solidly based upon the Administrative record.

Comment 18g- Proper identification of the scope and direction of the plume is critical to any effective groundwater remediation plan because EPA has chosen to break this site up into operable units and targeted the second unit for a specific portion of the plume.

Response 18g: OU 2 is not targeted for a specific portion of the plume. As the Proposed Plan for OU 2 states on page 8: "...in conjunction with the first operable unit, all known areas of contaminated groundwater would be addressed...." This plan will be implemented in phases. As previously stated, U.S. EPA believes that it is consistent with the NCP.

Comment 18h- "...Substantial evidence, including 1990 sampling data, demonstrate that EPA has based the second operable unit upon an erroneous plume mapping. Proceeding in light of this evidence would be wholly arbitrary and wasteful of time and resources that should be used to more accurately address contamination known to exist at the Site."

Response 18h: U.S. EPA hereby incorporates Responses 18b and 18d into this response. U.S. EPA contends that point OW-3 appears to be on the western edge of contaminated areas, and is not a central point in determining if further remedial action needs to be taken at the site. U.S. EPA is reluctant to classify one well sample (of which U.S. EPA has not received laboratory results as yet from MDNR's split sample) as "substantial evidence". Further, the commenter's phrase "proceeding...would be...arbitrary..." is too vague to make further response.

Comment 18i- CPC asserts that insufficient data exists to proceed to remedial action.

Response 18i- U.S. EPA believes that there is sufficient data to begin a phased approach to remediate contaminated groundwater at the Site.

Comment 18j- "...there is only a generalized discussion of the places where the groundwater extraction wells will be located, appropriate pumping rates, projected contaminant removal efficiencies, and the potential impact that second unit wells could have on wells required in the first unit..."

Response 18j: That is the function of an FS; more detailed specifics on well placement, pumping rates, etc., are a function of

in the ROD for OU 1 that a second operable unit would consider "...possible remediation of the downgradient contaminant plume...." U.S. EPA also declared in the Proposed Plan for OU 2 that OU 2 would consider "...components of contaminated groundwater flow which were not addressed by the first operable unit...and to seek restoration..." of the overall groundwater situation, in conjunction with work for OU 1. U.S. EPA notes that there are other monitoring wells (for example, B-1 and OW-8) that indicated considerable contamination south of the plant and sufficiently west of Little Bear Creek such that capture by extraction wells serving OU 1 is very doubtful.

Comment 18c- Geraghty and Miller, at the request of CPC, has developed and is refining a groundwater flow model for the site, which will be submitted for the record. "...When this model was run using site-specific parameters, it found that groundwater from the plant could not have migrated to OW-3 from the plant site..."

Response 18c: U.S. EPA is unable to consider a model which has not been submitted for inclusion into the Administrative record or otherwise to U.S. EPA for review. U.S. EPA disagrees with CPC's migration contention, at least until it is known how far to the west CPC's model's projections may have started. The administrative record for the site indicates many instances of releases to the environment at several site locations. It is not inconceivable that OW-3 may have been downgradient of such a release, especially when one considers the presence of N, N-dimethyl benzeneamine in the RI sample for this well.

Comment 18d- "...If OW-3 is properly excluded...then...the plume is much smaller in total area..."

Response 18d: U.S. EPA disagrees. Please see FS Appendix A, Figure A-6. Note that in this scenario for the preferred alternative, that the farthest new extraction well west of Little Bear Creek was projected to be in the vicinity of well B-1. This scenario did not envision placement of an extraction well at OW-3, although in keeping with a phased approach, U.S. EPA expects operation and monitoring efforts to determine the necessity of adding other wells.

Comment 18e- "...Both EPA and MDNR were invited to sample OW-3 with the ES&S representative. A representative of MDNR participated and split samples with ES&G..."

Response 18e: U.S. EPA wrote to MDNR and requested that MDNR participate on U.S. EPA's behalf. This was done. Once again, data from OW-3 is not part of the basis for OU 2.

Comment 18f- "...The EPA groundwater model has not been placed in the administrative record. CPC maintains that EPA is in violation of CERCLA Section 113(k)(2)..."

Comment 18n- U.S. EPA is required under CERCLA to support remedial decisions with a sound record of factual information. This information should be developed prior to, not after, the selection of a preferred remedial alternative. EPA's proposal violates CERCLA Section 113(j)(2) and 40 CFR 300.430(e) and (f) of the NCP and is not sufficiently well defined to be capable of implementation.

Response 18n: CERCLA Section 113(j)(2) has to do with judicial review, and indicates that a response action shall be upheld unless the objecting party can show that the decision was arbitrary and capricious based on the record. U.S. EPA disagrees with CPC's conclusion that its Proposed Plan violates these Sections. U.S. EPA believes that sufficient information has been obtained to make a groundwater remedial selection consistent with 40 CFR 300.43. See discussion in Response to Comment 17s.

Comment 18o- "...As currently drafted, the proposed remedy is far too vague to be turned over to a technical expert for implementation..."

Response 18o: A selected remedial action decision by U.S. EPA is not a detailed design document. Technical design of the remedy's components is left to the remedial design phase under the NCP. 40 CFR 300.430(f)(1) provides that remedies selected shall reflect the scope and purpose of the actions being undertaken and how the action relates to long term comprehensive response at the Site. Section 300.435(a) provides that the "remedial design/remedial action (RD/RA) stage includes the development of the actual design of the selected remedy and implementation of the remedy through construction." The NCP clearly did not expect the Record of Decision to be a design document. The ROD is meant to select response actions that will achieve long term cleanup at the site. It is clear that significant groundwater contamination exists at the Site and a groundwater pump and treat program must be implemented to clean it up. Sufficient information exists on the nature of contamination to select technologies capable of treating this groundwater. It is possible that in the field work may require some alteration or refinement of the pumping or treating program, but that should not delay getting into the field. The groundwater extraction wells will be installed in phases building upon knowledge gained in implementation. Sufficient information exists on groundwater flow and contamination now to determine where wells must go to capture the mass of the plume of contamination efficiently. Information gained in installation and operation of those wells (operation of which may effect the plume and thus selection of other extraction well locations) will be used to select other locations needed to capture the entire plume.

Comment 18p- "...EPA has failed to show that its preferred alternative will be effective in remediating groundwater..."

the remedial design efforts. Presently, the remedial design for OU 1 is ongoing.

Comment 18k- "...a recovery well network is proposed for pumping the semi-confined aquifer at the site, even though the extent of contamination has not been characterized in the aquifer and the effect of pumping on the shallower aquifer has not been determined...."

Response 18k: U.S. EPA appreciates the suggestion with respect to the need to acquire more data on the extent of contamination in the semi-confined aquifer. U.S. EPA will ensure that this zone will be monitored as part of the Proposed Plan's groundwater monitoring program. U.S. EPA refers to a 4/25/90 memorandum from one of the Agency's Environmental Research laboratories which states in part: "...the installation of one well in the lower aquifer may not be adequate to effectively recover the entire plume in the lower aquifer...the well in the lower aquifer should be placed in the heart of the plume to optimize ...recovery..." U.S. EPA also observes that excess cancer risk to a well user at one point in the semi-confined aquifer has been calculated to be 9×10^{-4} , which is outside the acceptable risk range. In addition, the phased approach in the selected remedy will allow the flexibility to design ultimately the most efficient configuration for groundwater extraction.

Comment 18l- The commenter states that there is no basis to the estimate that groundwater cleanup efforts may go on for 30 years or more.

Response 18l: U.S. EPA hereby incorporates Response 17v into this response. The 30 years estimate was used as a basis for cost analysis. Frankly, given the severity of the contamination at the site it will more than likely be longer to cleanup the aquifer.

Comment 18m- "...treatability studies still must be completed before the Agency has any idea of whether the proposed treatment train for the groundwater will work..."

Response 18m: U.S. EPA has conducted a treatability study with respect to the proposed use of Ultraviolet Oxidation as a treatment technology: Please refer to the January 1990 "SITE Program Demonstration of the Ultrox International Ultraviolet Radiation/Oxidation Technology" report. On page 2 the report indicated: "...the...system achieved removal efficiencies as high as 90% for the total VOCs present in the groundwater. The removal efficiencies for TCE were greater than 99%....maximum removal efficiencies for 1,1-DCA and 1,1,1-TCA under optimal...conditions were about 65 and 85%, respectively...." In addition, U.S. EPA is presently conducting a site specific treatability study for the OSC site, which is a remedial design component for OU 1.

(Further comments with regard to Comment 18 come from a technical appendix which accompanied the letter from counsel for this PRP. U.S. EPA will highlight those comments from the appendix which are not repetitive of comments within the letter.)

Comment 18t- "...the FS did not recognize the practicality of the potential utilization of the upper aquifer remediation wells to also remediate the lower semi-confined aquifer..."

(U.S. EPA note: this comment is discussed further in an attachment section dealing with the semi- confined aquifer.)

Response 18t: U.S. EPA expresses reservation about this approach primarily due to the silt/clay layer that separates the unconfined and semi-confined aquifer portions. Extraction wells in the upper portion may make only very slow progress compared to a well in the deeper portion.

Comment 18u- "...the contaminant transport model used by the USEPA appears to be inappropriate for use with the USEPA flow model...it appears that the contaminants transport model used in the FS cannot accurately predict the dispersion of contaminants in the groundwater..."

(U.S. EPA note: this comment is discussed further in an attachment section dealing with solute transport modeling.)

Response 18u: The MOCFLOW modeling effort had as its goal a worst case look at where the plume may go. U.S. EPA notes that such a two-dimensional model is indeed inadequate to precisely predict cleanup time. However, the key point is that U.S. EPA is not aware of any model that could accurately predict this. U.S. EPA believes an investigator could spend thousands of dollars and a great deal of time in attempting to calibrate a three-dimensional model, and not have it be particularly accurate until extraction wells were actually turned on and one began to get feedback on such important site issues as "how quickly will the silt/clay layers yield the contaminants now adsorbed to them?"

Comment 18v- "...USEPA's technical rationale for lumping together different organic compounds into a single measurement for the purpose of estimating the extent of the plume is not well conceived...organic compounds with different adsorption characteristics migrate at different rates...USEPA fails to provide evidence that all contaminants in the plume have the same retardation characteristics..."

Response 18v: U.S. EPA hereby incorporates Response 18u into this response. It is true that different organic species will have different retardation coefficients. However, there are so many organic compounds associated with the OSC site that it would be a herculean effort to have a model account for the movement of individual species. Further, U.S. EPA is unaware of how such a model may account for biodegradation effects within the aquifer.

Response 18p: U.S. EPA has stated in the Proposed Plan that all known areas of contaminated groundwater should be collected by extraction wells usage. U.S. EPA does not dispute that the task of cleaning site groundwater will require long term commitment.

Comment 18q- The commenter asserts that EPA's usage of a Section 106 order was "draconian", and that there is no immediate and substantial hazard.

Response 18q: U.S. EPA's issuance of an order regarding OU 1 to CPC is not relevant to the selection of this remedial action for OU 2.

Comment 18r- "...The record before the Agency indicates that there is no benefit associated with the adoption of piecemeal or stopgap measures..."

Response 18r: On page 5 of its Proposed Plan, U.S. EPA notes that OU 2 "...is intended to consider the whole area of contaminated groundwater...". U.S. EPA disagrees that this is a piecemeal approach to site management. U.S. EPA believes that the phased approach is the most effective means in remedying the site groundwater contamination. It is consistent with the directives of 40 CFR 300.430(a) for taking action as soon as site data and information make it possible to do so.

Comment 18s- "...CPC stated as early as 1981, and continues to believe, that no achievable means exists whereby contaminants in this aquifer can be removed...to the point of restoring groundwater at this site to the rigorous potability standards required for public water systems..."

Response 18s: U.S. EPA contends that one of the main reasons for the belief posited above is the very high levels of contaminants found in the aquifer below and downgradient of the site. Surely the high degree of contamination is not sufficient reason to refrain from considering the undertaking of remedial measures.

The goal of this operable unit is to restore the aquifer to its beneficial use. U.S. EPA will do everything in its ability to achieve this goal.

Comment 18t- "...Unless and until EPA can present a plan of remedial action that is sufficiently definite to evaluate whether its ends can be achieved and describes the means that must be designed and implemented to meet these ends, CPC would decline all participation in EPA's proposal..."

Response 18t: It is impossible for U.S. EPA to compose a Proposed Plan with, in essence, all remedial design work included therein. U.S. EPA contends that it has appropriately characterized the OSC site in regard to the OU 2 and has provided sufficient detail to select a remedy.

unnamed tributary. Consequently, river cells are an acceptable choice.

Comment 18aa- "...cells along the southern constant head model boundary are too close to the NOR-AM extraction wells..."

Response 18aa: There is a distance of some 2000' from the model's southern boundary to the NOR-AM wells. U.S. EPA believes that it is important to note that there are indeed area groundwater users.

Comment 18bb- "...USEPA has no clear-cut remediation goal for the OU 1...extraction wells in terms of a definite zone of capture..."

Response 18bb: The goal of OU 1 is quite explicit. It is remediation of the Little Bear Creek system, not aquifer remediation. Such wells will be of assistance in an overall aquifer remediation program. Design flow rates may indeed vary from FS projections, but it is not the function of an FS to provide all design details necessary to undertake remedial action, it is to explore if certain alternatives may be feasible for site remedy.

Comment 18cc- "...restoring the aquifer to its highest beneficial use...provides no measurable benefit...since no biota are affected by the groundwater plume and the aquifer is not being used for any purposes..."

Response 18cc: This portion of the aquifer once served as a drinking water supply. Further, in light of the evidence from MDNR as to creek underflow by groundwater, U.S. EPA believes there may be a threat to downgradient users. U.S. EPA believes it is incorrect to think in terms of the aquifer "ending" at Little Bear Creek. In addition, the NCP is quite clear in stating Superfund's goal to return usable groundwaters to their beneficial uses.

Comment 18dd- "...protection of Little Bear Creek is a valid remedial objective since at that point migration of the plume was identified..."

Response 18dd: U.S. EPA concurs. The goal of OU 1 is the protection of Little Bear Creek.

Comment 18ee- "...It has been shown that no water quality criteria have been exceeded due to the plume's discharge into the surface water..."

Response 18ee: U.S. EPA disagrees. Please see corrected and revised RI pages 7-26, 7-27; and revised FFS pages 1-5, 2-9, and 3-4.

Comment 18ff- "...The FS proposed groundwater system inconsistent with more typical arrays of unit treatment processes..."

creation of "daughter" compounds, etc. In plain terms, there comes a time when it is time to say "Ready...Set...Go", and do some cleanup. U.S. EPA is confident that it has accurately enough characterized the extent and magnitude of contamination at the OSC site to select a remedy.

Comment 18w- "...During the RI, only one well...was tested using slug injection and slug extraction methods...numerous slug tests are necessary to evaluate the spatial variability...of the hydraulic conductivity field...no pumping stress was applied to a well..."

Response 18w: A primary reason as to why no pump tests have been done to date is that to yield meaningful results the aquifer must be stressed over a substantial period. To stress this productive aquifer would require the extraction of a large volume of water. However, it should be noted that U.S. EPA does not believe this type of information would at all have any effect on the selection of remedy. In addition, as a part of remedial design for OU 1 a pump test will be conducted.

Comment 18x "...it is probable that USEPA's flow model for the site is a three-dimensional application using MODFLOW, a program developed by the USGS..."

Response 18x: Appendix A of the FS declares that this is indeed the case. U.S. EPA notes the comment concerning USGS, and notes further that this would indicate the model is in the public domain.

Comment 18y- "...All modeling performed by USEPA neglects regional components of groundwater flow...USEPA's modeling analysis extrapolates onsite hydraulic gradients to the boundaries of the model...this technique is subject to large uncertainties..."

Response 18y: Hopefully, a model is to be some representation of what is actually happening out at a site. The course of the RI study yielded specific site information on hydraulic conductivity, groundwater levels, thickness of soil layers, stream flow, etc. It seemed prudent to utilize such data in helping to calibrate the model. U.S. EPA questions whether the extra expenditure of resources would have been justified to calibrate using regional components of flow. U.S. EPA is confident in the degree of calibration for the model and notes that with any model, until actual pumping occurs, model predictions are subject to error.

Comment 18z- "...the river cells used to simulate the unnamed tributary...are inappropriate for a stream supplied mainly by groundwater base flow...drain cells offer a more appropriate boundary condition for the simulations..."

Response 18z: In model efforts for the OSC site, it is more important to describe effects upon Little Bear Creek, and not the

Response 18jj: U.S. EPA cannot determine what is meant by "unexpressed factors or policy", and cannot respond further to this portion of the comment. The contamination problems at the OSC site are severe, and in that sense remedy is expensive. However, the preferred alternative U.S. EPA identified in the Proposed Plan for OU 2 is the most cost effective of the active restoration alternatives. U.S. EPA disagrees that a phased approach to the site is a piecemeal approach.

Comment 18kk- Appendix 3

Response 18kk: U.S. EPA observes that Appendix 3 is a technical literature review assembled by counsel for CPC. The papers cited therein point to the complexity and difficulty of fully remediating groundwater through pump and treat remediation. U.S. EPA concurs that groundwater remediation is a complex task. U.S. EPA does not agree on certain specific points made by counsel. These include:

"...risks allegedly posed by a contaminated aquifer that has not been used since the 1960s...". U.S. EPA notes "1960s" is surely in error, since the record for the site notes residential well complaints, sampling, and concern throughout the 1970s.

"...actual field evidence shows that the techniques currently available for pumping and treating groundwater to these low levels are not implementable...". U.S. EPA notes that the techniques surely are implementable, but rather their ultimate success in bringing about complete restoration may be difficult. U.S. EPA notes that simply because the ultimate success of a given course of action may be subject to question, that is not sufficient reason to refrain from seeking relief through the techniques currently available.

"...In the proposed remedy and FS, EPA does not cite or make any comment upon the large body of literature casting doubt upon the effectiveness of attaining the major goal of Operable Unit No. 2, i.e., groundwater remediation...". U.S. EPA notes however that the administrative record for OU 2 has several recent papers on groundwater literature. These works include:

Groundwater research involving Superfund -- specifically pp. 20-22 on Superfund Aquifer Remediation Research, "EPA's Approach to Evaluating and Cleaning Up Groundwater Contamination Problems at Superfund Sites", "Superfund Groundwater Issue-Facilitated Transport", "In-Situ Aquifer Restoration of Chlorinated Aliphatics by Methanotrophic Bacteria", "A Guide on Remedial Actions for Contaminated Groundwater", "Federal Glossary of Selected Terms-Subsurface Water Flow and Solute Transport", the SITE UV Oxidation bulletin noted earlier in this Responsiveness Summary, "A Catalog of Research-New Technology Under Study", "Remediation through Groundwater Recovery and Treatment", "Groundwater Cleanup at Several Superfund Sites", "Predicting the Fate and Transport of Organic Compounds in Groundwater"

Comment 19- A letter received September 24, 1990 from the West

Response 18ff: FS sequencing of treatment units does not mean that a designer does not have some flexibility to optimize the system. The remedial design is the appropriate stage to develop plans and specifications for the implementation of the remedy.

Comment 18gg- "...a filter is usually placed before the carbon unit and/or backwash and chlorination system is installed in conjunction with the carbon system in order to remove the inorganic particulates that would otherwise accumulate onto the carbon..."

Response 18gg: U.S. EPA appreciates these comments on maintenance aspects, and will place them in the record and route them to its design and treatability study contractors for their consideration. In like manner, U.S. EPA will inform its treatability study contractor of views expressed by G & M on UV oxidation. (In a like manner, U.S. EPA will transmit comments on soil characterization and soil remediation technologies to the ARCS contractor who will be performing tasks necessary for the development of OU 3.) U.S. EPA would like to add that this comment in no way affects the selection of remedy for OU 2.

Comment 18hh- "...The USEPA...[FS] proposes a complex groundwater system that includes as many as four unit treatment processes..."

Response 18hh: U.S. EPA notes that the number and high concentrations of contaminants in the groundwater system present a complex treatment task, as well. The on-going treatability study in conjunction with the remedial design will ultimately determine the appropriate combination of treatment processes necessary to adequately treat the contaminated groundwater. This is not an issue for the selection of remedy process.

Comment 18ii- "...No analysis exists that completely and conclusively relates the source of contamination to the impacts on the environment and thereby to the degree of cleanup that should be achieved in each environmental medium..."

Response 18ii: The degree of cleanup that should be achieved in a given environmental medium is established through compilation of ARARs and the development of a risk assessment. How the contaminants may be impacting the environment is one function of the risk assessment process. Both the FS and Proposed Plan noted important ARARs for the site, and the RI contained an assessment of risk. U.S. EPA notes that the risk assessment demonstrated that the risks to public health from ingestion of contaminated groundwater is several orders of magnitude above U.S. EPA's acceptable risk range. The OSC site is considered one of the most hazardous sites in Michigan due to the severity of groundwater contamination.

Comment 18jj- "...due to unexpressed factors or policy, the USEPA may continue to propose an expensive, piecemeal approach to remediating the Site..."

ADMINISTRATIVE RECORD INDEX
OTT/STORY/CORDOVA, MI: OPERABLE UNIT #2
(The AR and indices for Operable Unit #1 are
hereby incorporated by reference into the 2nd Operable Unit)

ICHB/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
3		90/02/20	Letter re: confirmation of 2/22/90 meeting to discuss settlement	G. Quist, CPC International	US DOJ/BPA/MI Atty. Gen.	Correspondence	1
2		90/03/02	Letter re: Ott/Story/ Cordova Site State ARARs	R. Hart, USEPA	R. Taszreak, MDNR	Correspondence	2
4		90/03/00	Fact Sheet: "Toxicity Characteristic Rule Finalized"	USEPA		Fact Sheet	3
11		86/12/24	Memo re: Interim Guidance on Superfund Selection of Remedy (Dir. 9355.0-19)	J. Winston Porter, USEPA		Memorandum	4
7		89/09/29	Memo re: J-Qualified CLP Data and Recommendations for its Use	H. Pribush, USEPA	S. Wells, USEPA	Memorandum	5
7		89/10/18	Memo re: Considerations in Ground Water Remediation at Superfund Sites (Dir. 9355.4-03)	J. Cannon, USEPA	USEPA	Memorandum	6
3		90/02/08	Memo re: Draft Work Plan Ott/Story/Cordova Pilot Testing - December 1989	J. Heinzman, MDNR	R. Taszreak, MDNR	Memorandum	7
6		90/02/14	Memo re: OSWER Directive 9355.0-28, Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites (Attachment)	A. Weismann, USEPA	USEPA RPMs	Memorandum	8
1		90/03/08	Memo re: Request for Background Soils Data at Duell-Gardner Site ("3 miles from Ott/Story)	R. Hart, USEPA	M. Yang, USEPA	Memorandum	9
1		90/03/16	Handwritten note to file, re: 9/22/61 item in the Admin. Record	R. Hart, USEPA	File	Memorandum	10
4		00/00/00	"Analysis of RCRA	Cunningham and Berg,		Other	

Michigan Region Environmental Network in regards to the OSC site. The letter states in part:

Comment 19a- "...upon reviewing the Administrative Record...it appears that the site has been adequately and responsibly studied..."

Response 19a: U.S. EPA concurs that study has now been adequate to decide upon remedies for the site.

Comment 19b- "...the levels of contaminants reported in the groundwater are tremendously high...all evidence suggests that a serious health threat to the public health exists..."

Response 19b: U.S. EPA concurs.

Comment 19c- "...When will the actual cleanup begin?"

Response 19c: It is U.S. EPA's goal that work be under way by mid 1991 to install devices needed to serve the first operable unit.

Comment 19d- "...We understand that the chosen plan for groundwater cleanup, a phased approach, appears prudent and cost-effective. Unfortunately, such a plan cannot provide the speed and thoroughness required at this site..."

Response 19d: U.S. EPA notes that the groundwater contamination levels at the site are severe enough, and the volume of groundwater affected large enough, that groundwater remediation must of necessity require a long-term commitment.

Comment 19e- "...we would also like to request a meeting with the appropriate EPA officials in order to find out what actions that Muskegon County citizens can take..."

Response 19e: U.S. EPA would be pleased to cooperate.

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OTT/STORY/CORDOVA, MI: OPERABLE UNIT #2
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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			Variance for Remedial Actions				
2		89/11/00	USEPA Directive 9200.5-251PS Innovative Technology In-Situ Vitrification (Guidance)	USEPA		Other	20
2		89/12/00	Superfund LDR Guide #7 Determining When Land Disposal Restrictions(LDR) Are Relevant and Appro- priate to CERCLA Response Actions - USEPA OSWER Publication #9347.3-08FS (Guidance)	USEPA		Other	21
5		90/01/00	"Superfund Records of Decision Update"	USEPA		Other	22
22		90/02/00	"Questions and Answers Regarding the 1990 NCP"	USEPA		Other	23
3		83/11/10	"Calculation of an Acceptable Level for PCBs in Soils and Surfaces Where the Potential for Human Contact Exists"	M.Clark,Ph.D.,USEPA		Reports/Studies	24
6		83/11/10	"Risks from PCBs"	M.Clark,Ph.D.,USEPA		Reports/Studies	25
137		86/07/00	Mobile Treatment Technologies for Superfund Wastes Interim Edition	USEPA		Reports/Studies	26
19		88/04/12	Ott/Story/Cordova Site Ground Penetrating Radar Survey	USEPA		Reports/Studies	27
12		89/03/14	"Metals in Soils: A Brief Summary", with transmittal memo	B.Barrett,USEPA (author of paper);M.Berg, USEPA(author of memo)	EPA Toxics Coordinators	Reports/Studies	28

ADMINISTRATIVE RECORD INDEX
OTT/STORY/CORDOVA, MI: OPERABLE UNIT #2
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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			Closure Options for Superfund Sites*	USEPA			
5	00/00/00		Ground-Water Research Description	USEPA		Other	12
4	87/07/00		Superfund LDR Guide #4 Complying With the Hammer Restrictions Under Land Disposal Restrictions (LDRs)	USEPA - Dir.9347.3-05PS		Other	13
7	89/00/00		Paper: "EPA's Approach to Evaluating and Cleaning Up Ground Water Contamination at Superfund Sites"	J.Haley,D.Lang, L.Herrinton		Other	14
5	89/06/15		OSWER Directive 9355.0-28: Control of Air Emissions From Superfund Air Strippers at Superfund Groundwater Sites (Guidance)	USEPA		Other	15
2	89/07/00		Superfund LDR Guide #2 Complying With the California List Restrictions Under Land Disposal Restric- tions (LDRs)	USEPA - Dir.9347.3-92PS		Other	16
4	89/07/00		Superfund LDR Guide #3 Treatment Standards and Minimum Technology Requirements Under Land Disposal Restrictions(LDRs)	USEPA-Dir.9347.3-03PS		Other	17
4	89/07/00		Superfund LDR Guide #5 Determining When Land Disposal Restrictions (LDRs) Are Applicable to CERCLA Response Actions	USEPA - Dir.9347.3-05PS		Other	18
6	89/07/00		Superfund LDR Guide #6A Obtaining a Soil and Debris Treatability	USEPA - Dir.9347.3-06PS		Other	19

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REPOSITORY, BUT MAY BE REVIEWED AT USEPA, REGION V CHICAGO

PICHB/FRAMB PAGES DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
89/08/00	Superfund Groundwater Issue - Facilitated Transport. OSWER - EPA/540/4-89/003. "facilitated transport" is defined as any process that has the potential to speed the transport of a pollutant beyond what is expected under idealized flow, and is an issue of potential concern to Superfund decision makers	USEPA		Other	
89/10/00	RCRA ARARs - Focus on Closure Requirements. USEPA OSWER Directive 9234.2-04 PS. This Fact sheet addresses CERCLA compliance with RCRA Subtitle C	USEPA		Other	
89/04/00	Superfund Innovative Technology Evaluation. EPA/540/55-89/007. Shirso Pilot Scale Infra-red Incineration System at the Rose Township Demode Road Superfund Site	USEPA		Other	
00/00/00	Performance Evaluation of Pump-and-Treat Remediations. OSWER-EPA/540/4-89/005	USEPA		Other	
89/08/00	In-Situ Aquifer Restoration of Chlorinated Aliphatics by Methanotrophic Bacteria. - Field experimentation involving introducing methane and oxygen into aquifer to encourage growth of bacterial community to	R.Kerr, USEPA; Environmental Research Lab, EPA/600/52-89/033		Other	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
56	89/09/00	Evaluation of Groundwater USEPA Extraction Remedies Volume I Summary Report				Reports/Studies	29
2	89/11/00	Superfund Innovative Technology Evaluation Demonstration Bulletin Ultraviolet Radiation and Oxidation	USEPA			Reports/Studies	30
103	89/11/09	MDNR Natural Resources Commission - Environmental Contamination Response Activity	MDNR			Reports/Studies	31
69	89/12/20	Evaluation of Advanced Oxidation Process Including UV/Oxidation and the Ultror Process (Transmittal letter attached)	Black & Veatch	USEPA/CH2M Hill		Reports/Studies	32

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GUIDANCE DOCUMENTS INDEX
OTT/STORY/CORDOVA, MI: OPERABLE UNIT #2
Guidance Documents are available for review at
USEPA Region V-Chicago IL

TITLE	AUTHOR	DATE
"Verification of PCB Spill Cleanup By Sampling and Analysis"	Midwest Research Inst. for USEPA	85/08/00
"Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup"	Midwest Research Inst. for USEPA	86/05/00
"Development of Advisory Levels for Polychlorinated Biphenyls(PCBs) Cleanup"	USEPA	86/05/00
Polychlorinated Biphenyls Spill Cleanup Policy	Federal Register Vol.52, No.63	87/04/02
Project Summary Development of Advisory Levels for Polychlori- nated Biphenyls(PCBs) Cleanup	USEPA	87/06/00
"A Guide to Developing Superfund Proposed Plans"	USEPA	88/07/00
Record of Decision for Upjohn Site, Puerto Rico	USEPA	88/09/00
Record of Decision for Reich Farms Site, NJ	USEPA	88/09/00
Risk Assessment Guidance for Superfund Volume II Environmental Evaluation Manual - Interim Final	USEPA	89/03/00
"A Guide on Remedial Actions for Contami- nated Ground Water"	USEPA	89/04/00
Federal Glossary of Selected Terms-Subsurface- Water Flow and Solute	US DOI	89/08/00

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ICHE/FRANE PAGES DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
	help degrade chlorinated aliphatic solvents.				
89/08/00	Bioremediation of Con- taminated Surface Soils	R.Kerr, USEPA; Research Laboratory, EPA/600/9-89/073		Other	

ADMINISTRATIVE RECORD
ACRONYM LIST
OTT/STORY/CORDOVA, MI REMEDIAL SITE
(OPERABLE UNIT #2)

ARARS *Applicable or Relevant & Appropriate
Requirements*

CERCLA *Comprehensive Environmental Response,
Compensation & Liability Act*

MDNR *Michigan Department of Natural Resources*

NCP *National Contingency Plan*

OSWER *Office of Solid Waste & Emergency Response*

PCBs *Polychlorinated Biphenyls*

RCRA *Resource Conservation & Recovery Act*

RPM *Remedial Project Manager*

USEPA *United States Environmental Protection
Agency*

US DOI *United States Department of Interior*

US DOJ *United States Department of Justice*

GUIDANCE DOCUMENTS INDEX
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Guidance Documents are available for review at
USEPA Region V-Chicago IL

TITLE	AUTHOR	DATE
Transport*		
Record of Decision for Fairchild Semiconductor Site, California	USEPA	89/09/00
Record of Decision for Fulton Terminal Site, NY	USEPA	89/09/00
"Groundwater Research" (Note esp. pp.20-22 on 'Superfund Aquifer Remediation Research') by USEPA Office of Technology Transfer and Regulatory Support	EPA 1600-9/89/088	89/10/00
"Determining Soil Response Action Levels Based on Potential Contaminant Migration to Ground Water: A Com- pendium of Examples" by USEPA Office of Emergency & Remedial Response	EPA 540/2-89/057	89/10/00
Michigan Act No.307 (Proposed Version as of 11/9/89) to-be- considered material promulgation pending; consider ARAR status		89/11/09
Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A) Interim Final	USEPA	89/12/00

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			for 38 Inorganic and Organic Drinking Water Contaminants				
3	89/09/14		Memo re: Notification of Out-of-State Shipments of Superfund Site Wastes	J. Cannon, USEPA	USEPA Regions I-X	Guidance	12
6	89/10/00		CERCLA Compliance with Other Laws Manual RCRA ARARs: Focus on Closure Requirements	USEPA		Guidance	13
5	89/12/00		CERCLA Compliance With Other Laws Manual Overview of ARARs: Focus on ARAR Waivers	USEPA		Guidance	14
16	89/12/15		Memo re: Accelerated Response at NPL Sites Guidance (OSWER Dir. No. 9200.2-02)	D. Clay, USEPA	USEPA Regions I-X	Guidance	15
4	90/02/15		Memo re: Final Revisions to the National Contin- gency Plan	H. Longest II, USEPA	USEPA Regions I-X	Guidance	16
2	90/03/27		Memo re: screening review of treatment technologies for soils and sediments at the St. Louis River site	P. dePercin, USEPA	D. Siebers, USEPA	Guidance	17
13	90/04/00		Drinking Water Regulations and Health Advisories	USEPA Office of Drinking Water		Guidance	18
2	90/04/06		Memo re: Water Division Review of draft proposed plan	D. Bryson, USEPA	D. Ullrich, USEPA	Memorandum	19
1	90/04/10		Memo stating that Unilateral Administrative Order for 1st operable unit was issued; no response has been received from FRPs with intention	R. Bart, USEPA	S. Nathan, USEPA	Memorandum	20

ADMINISTRATIVE RECORD INDEX - UPDATE #1
OTT/STORY/CORDOVA, MI: OPERABLE UNIT #2
(The AR and indices for Operable Unit #1 are
hereby incorporated by reference into Operable Unit #2)

PICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
1	90/03/30	Form letter in response to citizens' questions and concerns, re: health surveys to be conducted	B.Boyle, Interagency Center for Health and Environmental Quality	Citizens	Correspondence	1	
4	90/03/30	Letter commenting on review of draft proposed plan, concurring with Water Supply Division's support for the preferred groundwater treatment alternative	J.Filpus,MDPH	D.Jordan-Izaguirre,A TSDR	Correspondence	2	
2	90/04/10	Letter re:2/14/90 correspondence from USEPA to MDNR discussing draft ROD language for the site	W.Bradford,MDNR	J.Dikinis,USEPA	Correspondence	3	
1	90/05/04	Letter transmitting the ROD and PPS for the 1st operable unit	R.Hart,USEPA	J.Palenski,US Army COB	Correspondence	4	
1	90/05/08	Letter re:review of USEPA's ARARs submittal	R.Faszreak,MDNR	R.Hart,USEPA	Correspondence	5	
5	89/12/00	CERCLA Compliance with State Requirements; Quick Reference Fact Sheet	USEPA		Fact Sheet	6	
4	90/03/00	Environmental Fact Sheet: Toxicity Characteristic Rule Finalized	USEPA		Fact Sheet	7	
4	00/00/00	The Final National Contingency Plan: New Directions for Superfund	USEPA		Guidance	8	
7	88/03/03	DRAFT Water Quality Criteria Summary Chart	USEPA		Guidance	9	
12	88/12/05	Memo re:Table of Drinking Water Standards and Health Advisories	R.Idanowicz,USEPA	USEPA personnel	Guidance	10	
8	89/00/00	Proposed Requirements	USEPA		Guidance	11	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			Rot Fungus				
79	00/00/00		Vacuum-Assisted Steam Stripping to Remove Pollutants from Contaminated Soil: A Laboratory Study	Geosynthetic Research Institute & USEPA		Reports/Studies	30
27	00/00/00		A Field Demonstration of the UV/Oxidation Technology to Treat Ground Water Contaminated with VOCs	USEPA and PRC Environmental Management, Inc.		Reports/Studies	31
10	89/04/14		Preliminary Health Assessment	ATSDR		Reports/Studies	32
15	89/10/00		1989 Report on Great Lakes Water Quality Appendix A Progress in Developing and Implementing Remedial Action Plans for Areas of Concern in Great Lakes	Great Lakes Water Quality Board		Reports/Studies	33
139	90/01/00		Superfund Technology Evaluation Report: SITE Program Demonstration of the Ultrax International Ultraviolet Radiation/Oxidation Technology	USEPA		Reports/Studies	34
	90/05/07		Work Plan Treatability Pilot Study	Waste Science & Technology Corp.	USEPA	Reports/Studies	35

ADMINISTRATIVE RECORD INDEX - UPDATE #1
OTT/STORY/CORDOVA, MI: OPERABLE UNIT #2
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hereby incorporated by reference into Operable Unit #2)

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			to comply with the Order				
1	90/04/16		Memo re: review of draft proposed plan for the second of two planned operable units	Xuan-Mai Tran, USEPA	R. Hart, USEPA	Memorandum	21
1	90/05/08		Memo re: Comments on Feasibility Study for the site	B. Blaney, USEPA Office of R&D	D. Yeskis, USEPA	Memorandum	22
2	00/00/00		Treatability Assessment Planning Guide for Solidification/Stabilization of Contaminated Soils	Center Hill Solid and Hazardous Waste Research Facility, OH		Other	23
6	00/00/00		RPM's note to reviewers of the first draft proposed plan, discussing soils alternatives	R. Hart, USEPA		Other	24
2	89/04/00		Superfund Innovative Technology Evaluation Demonstration Bulletin Organic Extraction Utilizing Solvents	USEPA		Other	25
1	89/06/21		Telephone Conversation between USEPA and CH2M Hill re: Mor-Am Chemical Production Wells	B. Rundell, Black & Veatch		Other	26
2	90/02/00		Superfund Innovative Technology Evaluation Demonstration Bulletin In-Situ Steam/Hot-Air Soil Stripping	USEPA		Other	27
10	00/00/00		Abstract: Removal of Soluble Toxic Metals from Water	Various Authors		Reports/Studies	28
13	00/00/00		Bench-Scale Biodegradation Studies With Organic Pollutants Using a White	Various Authors	USEPA	Reports/Studies	29

ADMINISTRATIVE RECORD INDEX (ATTACHMENT)-UPDATE #1
OTT/STORY/CORDOVA OPERABLE UNIT #2

USEPA BELIEVES THAT CERTAIN ARTICLES APPEARING IN VARIOUS ENVIRONMENTAL JOURNALS MAY BE OF INTEREST IN HELPING TO UNDERSTAND TECHNOLOGY ISSUES WHICH MAY BE OF RELEVANCE TO SITE DECISIONS. HOWEVER, USEPA DOES NOT WISH TO WRONGFULLY COPY SUCH MATERIAL. THEREFORE, USEPA LISTS BELOW ARTICLE TITLES AND JOURNAL SOURCES AND WILL MAKE INFORMATION AVAILABLE AT ITS REGION V CHICAGO OFFICE.

1. From Hazardous Materials Journal, Vol. 3, Number 2, March-April 1990.

"A Field Evaluation of the UV/Oxidation Technology to Treat Contaminated Groundwater" by N. Lewis, K. Topudurti, and R. Foster - p. 42.

"A Catalog of Research-New Technology Under Study"-p. 56

"Hazardous Waste Decontamination with Plasma Reactors" by L. J. Staley - p. 67.

2. From Hazardous Materials Journal, Vol. 3, Number 1, January-February 1990.

"ATSDR Update: Goals for Implementing the Health Provisions of CERCLA" by B. L. Johnson - p. 30.

"Using an Organophilic Clay to Chemically Stabilize Waste Containing Organic Compounds" by R. Soundararajan, E. P. Barth, J. J. Gibbons - p. 42.

3. From Pollution Engineering, Volume XXI, Number 5, May 1989.

"Biological Treatment of Hazardous Waste" by M. F. Torpy, H. F. Stroo, and G. Brubaker - p. 80.

4. From Pollution Engineering, Volume XXI, Number 7, July 1989.

"Remediation through Groundwater Recovery and Treatment" by G. J. Ziegler - p. 75.

"Status of Contaminated Soil/Sediment Cleanup Criteria Development" by J. Fitchko, PhD - p. 90.

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ADMINISTRATIVE RECORD INDEX - UPDATE #1
OTT/STORY/CORDOVA, MI, OPERABLE UNIT #2
(the following documents are not copied,
but are available for review in USEPA Region V Chicago Office

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
-	00/00/00		Cordova generator ID, Part A & Part B, inspection and closure related correspondence in the RCRA files (several hundred pages)	Various	Various	Other	
199	90/03/08		Federal Register containing the revised Final National Contin- gency Plan(pp.8666-8865)			Other	
126	88/12/21		Federal Register Containing the proposed Revised National Contin- gency Plan(pp.51394-51520) (Note:the preamble of the final MCP refers back to certain parts of the proposed MCP)			Other	

13. From Chemical and Engineering News, April 30, 1990,
pp.10-15, Volume 68, Number 18.

"Chemical Management, Communities Tussle with Hazardous
Waste Rules".

14. From Chemical and Engineering News, December 24, 1988,
pp.24-25.

"Low-cost Cleanup of Petrochemicals".

15. From Chemical and Engineering News, September 14, 1987,
pp.17-19.

"Fungus Shows Promise in Hazardous Waste Treatment".

16. From Pollution Engineering, February 1987, pp.66-68.

"Vacuum VOCs from Soil" by M.Bennedsen.

17. From Chemical and Engineering News, December 22, 1986,
pp.20-21.

"Plasma Technology to Tackle Toxic Wastes".

18. From Hazardous Materials Control, March/April 1989,
pp.8-12 and 70-74.

"Part 1: Choosing a Treatment for VHO-Contaminated
Soil" by D.Towers, et al.

|bid - pp.14-19, "Part 2: In Situ Heating to Detoxify
Organic-Contaminated Soils" by K.Ohma and J.Buelte.

19. From Hazardous Materials Control, November/December
1988, pp.15-18 and 30-31.

"Part 2: Groundwater Cleanup at Several Superfund
Sites" by L.Haiges and R.Knox.

5. From Pollution Engineering, Volume XXI, Number 13, December 1989.

"New Way to Measure Landfill Clay Liner Conductivity"
by J. Uppot and C.L. Rauser - p.52.

6. From Pollution Engineering, Volume XXI, Number 8, August 1989.

"On-Site Incineration as a Remedial Action Alternative"
by R.J. McCormick and M.L. Duke - p.68.

7. From Hazardous Materials Control, Volume 2, Number 5, September-October 1989.

"Bioremediation of Hazardous Waste" by A.Q. Bourquin -
p.16.

8. From Hazardous Materials Control, Volume 1, Number 4, July-August 1988.

"Industrial Waste Remediation" by C.R. Brunner - p.26.

9. From Pollution Engineering, Volume XXI, Number 11, October 1989.

"Thermal Treatment Technologies for Hazardous Waste Remediation" by N.P. Johnson and M.G. Cosmos.

10. From Chemical and Engineering News, February 19, 1990, pp.5-6.

"Benzene in Perrier found by North Carolina Lab".

11. From Chemical and Engineering News, March 12, 1990, p.4.

"Hazardous Wastes: EPA Adds 25 Organics to RCRA List".

12. From Chemical and Engineering News, December 5, 1988, p.14.

"Contaminated Wells Create Headache for Kodak".

ADMINISTRATIVE RECORD INDEX
OTT/STORY/CORDOVA, MI, OPERABLE UNIT #2 - UPDATE #2
MUSKEGON COUNTY, MICHIGAN

CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
1		90/05/15	Letter re: Response to a request for all the information and studies concerning the Ott/Story/Cordova site; forwarded to the repository to review the information	R.Yaszreak-MDNR	M.Jeminez	Correspondence	1
1		90/05/17	Letter re: Inquiry concerning how many cubic yards of soil are to be treated at Ionia and what are the captial cost?	R.Hart-USEPA		Correspondence	2
1		90/06/05	Letter re: Questions forwarded to RCRA concerning items to be included in the Proposed Plan	R.Hart-USEPA	J.Kleinman-USEPA	Correspondence	3
1		90/06/18	Letter forwarding a copy of the work plan developed to guide a proposed onsite treatability study effort	R.Hart-USEPA	D.Peden-Cordova Chem. Co.	Correspondence	4
7		90/02/00	CBRCLA Compliance with Other Laws Manual CBRCLA Compliance with the CWA and SDWA	USEPA		Fact Sheets	5
6		90/04/00	Meeting Notes from the Cincinnati ORD Meeting held April 1990	R.Hart-USEPA		Meeting Notes	6
6		90/04/25	Memo re: Technical Review of the Ott/Story/Cordova Superfund Site RI/PS	Dr.D.Sternitzke & S.Buling-USEPA	R.Hart-USEPA	Memorandum	7
10		90/05/15	Letter forwarding a memo with information re: Contaminant Plume	R.Yaszreak-MDNR	R.Hart-USEPA	Memorandum	8

ACRONYM LIST FOR
OTT/STORY/CORDOVA OPERABLE UNIT #2-UPDATE #1
ADMINISTRATIVE RECORD INDEX

ATSDR	Agency for Toxic Substances & Disease Registry
ARARS	Applicable and/or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
FFS	Focused Feasibility Study
MDNR	Michigan Department of Natural Resources
MDPH	Michigan Department of Public Health
OSWER	Office of Solid Waste and Emergency Response
PRP	Potentially Responsible Party
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

24:30

ADMINISTRATIVE RECORD INDEX
OTT/STORY/CORDOVA, MI: OPERABLE UNIT #2 - UPDATE #2
MUSKEGON COUNTY, MICHIGAN

CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			Ott/Story/Cordeva Site				
427	90/06/29		Public Comment Feasibility Study Report Ott/Story/Cordova site Muskegon, Michigan	CH2M Hill/Black&Veatch	USEPA	Reports/Studies	17
15	90/07/00		Proposed Plan by U.S.EPA for Final Groundwater Cleanup at Ott/Story/Cordova Superfund Site and Invites Public Comment	U.S.EPA		Reports/Studies	18

ADMINISTRATIVE RECORD INDEX
OTT/STORY/CORDOVA, MI: OPERABLE UNIT #2 - UPDATE #2
MUSKEGON COUNTY, MICHIGAN

CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			Underflow of Little Bear Creek and the Unnamed Tributary, Ott/Story/Cordova site				
1	90/06/08		Memo re: Ott/Story/Cordova Proposed Plan	J.Kleinman-USEPA	R.Hart-USEPA	Memorandum	9
1	90/06/14		Memo re: Water Division of the Revised Proposed Plan for the Ott/Story/Cordova Site, Winnebago County, Illinois	D.Bryson-USEPA	D.Ullrich-USEPA	Memorandum	10
19	00/00/00		Table 1. Properties of Contaminants Commonly Found at Superfund Sites	S.Huling-USEPA	R.Hart-USEPA	Reports/Studies	11
6	88/05/00		WMD/NDNR Draft Guidance titled, "How Clean is it?"	WMD/NDNR	R.Hart-USEPA	Reports/Studies	12
89	89/09/22		Memo forwarding a copy of the Guidance to-be considered material on Selecting Remedies for Superfund Sites with PCB Contamination	B.Hanson-USEPA	Superfund Branch Chiefs	Reports/Studies	13
15	90/03/26		Conducting Field Tests for Evaluation of Soil Vacuum Extraction Application forwarded by Scott Huling of USEPA	D.DiGiulio&J.Soo Cho, Ph.D.-USEPA R.Dupont,Ph.D.& M.Kenblowski,Ph.D.- Dept. of Civil & Environmental Engr. Utah State University	R.Hart-USEPA	Reports/Studies	14
54	90/05/21		DNR of Natural Resources Commission Environmental Contamination Response Activity	NDNR		Reports/Studies	15
19	90/06/05		Interagency Agreement/Amendment Part 1 - General Information, with attachment A: Scope of Work for the Remedial Design at the	R.Hart-USEPA & W.Mulligan-USACE	Adams-USEPA, Hagen- USACE	Reports/Studies	16

GUIDANCE DOCUMENTS INDEX
OTT/STORY/CORDOVA, MI: OPERABLE UNIT #2 - UPDATE #2
Guidance Documents are available for review at
USEPA Region V-Chicago IL

TITLE	AUTHOR	DATE
Handbook on In-Situ Treatment of Hazardous Waste-Contaminated Soils	USEPA/Risk Reduction Laboratory	90/01/00
Michigan Act No. 307 rule		90/05/00

03/90

ADMINISTRATIVE RECORD INDEX
OTT/STORY/CORDOVA, MI: OPERABLE UNIT #2 - UPDATE #2
THE DOCUMENTS LISTED ARE NOT FOR THE REPOSITORY,
BUT MAY BE REVIEWED AT USEPA, REGION V, CHICAGO, IL

CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
12	90/04/16	Article titled: "Troubled Waters" re: The Mississippi River faces all of the nation's environ- mental problems	Newsweek	USEPA	Other		
5	90/04/23	Article titled: "Chemical, Democracy and a Response to the Environment"	Chemical & Engineering News, Vol.68, No. 17	USEPA	Other		
12	90/05/00	FOCUS Newsletter re: EPA/Industry Lock In Post-Closure Permit Court Battle	Hazardous Materials Control Research Institute	USEPA	Other		
27	90/05/00	Article titled: "Predicting the Fate and Transport of Organic Compounds in Groundwater - Part I" May-June 1990	R.Olsen & A.Davis Hazardous Materials Control Vol.3-No.3	USEPA	Other		
2	90/05/28	Article titled: "EPA, Environmentalists Feud Over Land Ban Waste Rule"	D.Hanson-Chemical & Engineering News	USEPA	Other		

ADMINISTRATIVE RECORD INDEX
OTT/STORY/CORDOVA, MI: OPERABLE UNIT #2 - UPDATE #3
MUSKEGON COUNTY, MICHIGAN

E-TRANS	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBERS
8		90/07/31	Letter re: Request for pages from the FS for Ott/Story/Cordova to be added to the information repository with pages attached	R.Hart-USEPA	M.Hittle-Dalton Township C.Knowlton-Walker Memorial Library	Correspondence	1
1		90/08/01	Letter re: Effective immediately, Mr. Paul Gauthier is assigned as Project Manager for the Ott/Story/Cordova site	P.Ollila-MDNR	D.Balotti-USEPA	Correspondence	2
2		90/08/03	Letter re: Request for 30 day extension of the comment period on the Q.S.C Groundwater Cleanup Plan and FS	R.Mott-Mott, Williams & Lee, P.C.	P.Schutte-USEPA	Correspondence	3
6		90/07/00	EPA Proposes Ground Water Cleanup Plan for Ott/Story/Cordova	USEPA-Region V		Fact Sheets	4
46		90/07/26	Letter forwarding a copy of Director's Order No. DPL 101.90, Designated Trout Streams for the State of MI	P.Ollila-MDNR	R.Hart-USEPA	Reports/Studies	5
3		90/08/03	Revision No. 1 Ott/Story/Cordova RI Report	USEPA		Reports/Studies	6
4		90/08/03	Revision No. 1 Ott/Story/Cordova Focused FS	USEPA		Reports/Studies	7

ACRONYM GUIDE for the Administrative Record
Ott/Story/Cordova, MI: Operable Unit #2 - Update #2
Muskegon County, Michigan

ACRONYM	DEFINITION
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CWA	Clean Water Act
MDNR	Michigan Department of Natural Resources
MDNR	Michigan Dept. of Natural Resources
PCB	Polychlorinated Biphenyls
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/ Feasibility Study
SOWA	Safe Drinking Water Act
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency