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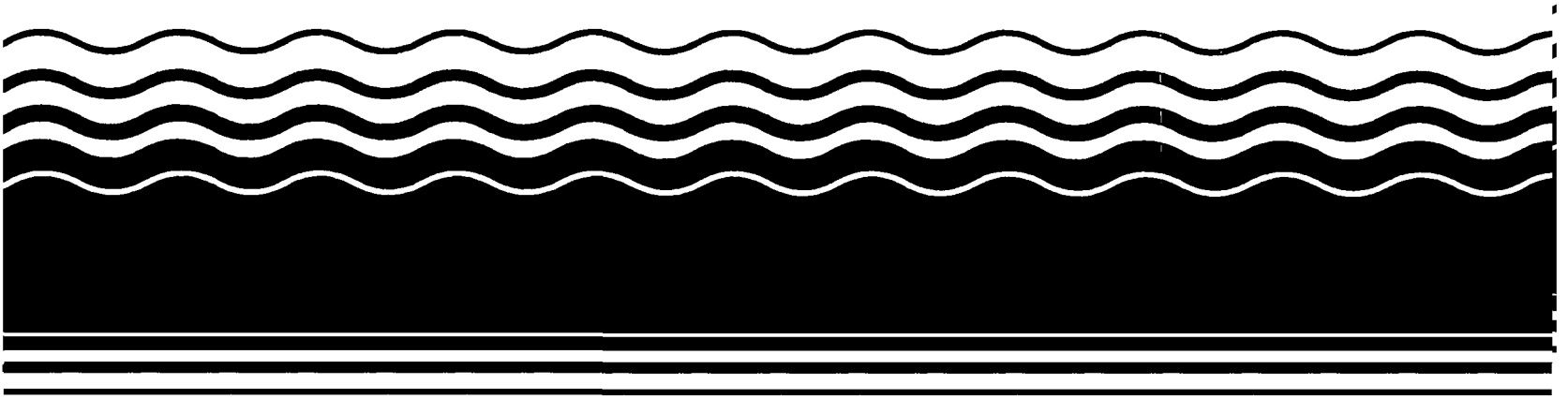
EPA Superfund Record of Decision:

Parsons Chemical Works, Inc.
Grand Ledge, MI
9/30/1997



Declaration
Selected Remedial Alternative
For The
Parsons Chemical Works, Inc. (Parsons) Site
Oneida Township, Eaton County
Michigan

Statement of Basis and Purpose

This decision document presents the selected Remedial Action (RA) for the Parsons site, Oneida Township, Eaton County, Michigan which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 1980 PL 96-510, as amended by the Superfund Amendments and Reauthorization Act of 1986, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300). This decision is based on 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 in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare or the environment.

Description of the Selected Remedy

The selected remedy utilizes long-term monitoring with a contingency plan to assure protection of public health. The long-term monitoring consists of the development and implementation of a program to monitor the water quality in private water supply wells located within approximately 1/4 mile of the site for a period of 15 years. Concentrations of some metals and the pesticide dieldrin were detected at concentrations above applicable health-based drinking water criteria in Remedial Investigation (RI) site monitoring wells. While no private water supply wells sampled during the RI were contaminated, they are installed in the same aquifer as the site bedrock monitoring wells, although deeper. The threat posed by the site is the potential for chemicals detected in the site bedrock monitoring wells to migrate vertically downward and horizontally in the direction of groundwater flow eventually impacting private water supplies at some future date. This unquantified potential threat to private water supplies necessitates the remedy. The heterogeneous nature of the soils at this site does not allow for precise definition of all components of lithology and potential migration pathways. Therefore, it is prudent to exercise caution by implementing a long-term monitoring program to assure continued protection of public health. In addition to sampling point-of-consumption private water supply wells, selected RI monitoring wells will be included in the program to provide data for tracking post-investigation conditions. Trend analysis of the analytical results will be performed to detect groundwater degradation in advance of drinking water criteria exceedances in the private wells. Specific threshold levels for dieldrin and arsenic, two site chemicals of concern, have been established. Unacceptable groundwater degradation as determined by trend analysis or by confirmed detection of either arsenic or dieldrin in excess of the threshold levels, will trigger implementation of the

contingency plan. The contingency plan consists of providing the public with an alternate water supply such as bottled water, if threshold levels are exceeded in the private wells, while the existing Grand Ledge municipal water supply system is extended into the area and all private wells are connected to the system.

The monitoring plan will focus on the bedrock aquifer where private water supply wells are installed to assure the continued acceptable quality of groundwater in water supply wells. Primary components of the remedy are as follows:

- long-term monitoring of private water supply wells;
- long-term monitoring of selected on-site monitoring wells;
- trend analysis of analytical results to identify indications of groundwater degradation and potential threat to human health;
- monitoring for exceedance of threshold levels for dieldrin or arsenic; and,
- contingency plan alternate water supply in event of unacceptable groundwater degradation while the existing Grand Ledge municipal water supply system is extended and private wells are connected.

Statutory Determinations

The selected RA is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the RA, and is cost effective. The selected RA constitutes a Final Groundwater Remedy under CERCLA and complies with the requirements of Part 201 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, for an Interim Response. The statutory preference for remedies that reduce the toxicity, mobility, or volume as a principal element is not achieved with this action. However, unless or until indications that groundwater degradation is occurring and contamination threatens private water supplies, extension of the municipal water supply system is not supportable.

This RA will result in potentially hazardous substances remaining on site above health-based levels. A review will be conducted within five years after commencement of the RA alternative implementation. This will ensure that the remedy continues to provide adequate protection of human health and the environment.

Wm. E. Muno — 9/30/97

William E. Muno, Chief/Superfund Division
U.S. Environmental Protection Agency — Date

4/2/97

Russell J. Harding, Director
Michigan Department of Environmental Quality — Date

TABLE OF CONTENTS

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

A. SITE NAME, LOCATION, AND DESCRIPTION

Parsons Chemical Works, Inc.
Oneida Township
Eaton County, Michigan

The Parsons Chemical Works, Inc. site (Parsons) is located at 3562 West Jefferson Street, in Oneida Township, on the western fringe of the city of Grand Ledge, in northeastern Eaton County, Michigan. The Parsons site occupies a parcel of land approximately six acres in size. The site, which is generally flat with little vegetation other than grass and a few small trees, is bounded by Jefferson Street to the north, Oneida Street to the east, Lawson Road/Millbrook Printing Company's driveway to the west, and Millbrook Printing Company, to the south. The entire study area encompasses approximately 775 acres. The Grand River is located approximately 3/4 of a mile north of the former Parsons plant. In the immediate vicinity of the former Parsons plant, in addition to Millbrook Printing to the south, the Church of the Nazarene, and its associated parsonage, is located immediately to the west. Businesses are located to the north across Jefferson Street, and two residential subdivisions, Russell Subdivision and Fairview Subdivision, are located to the east across Oneida Street. See Figures 1-4 in the Appendix for details.

The city of Grand Ledge has a municipal water system which supplies Grand Ledge residences and businesses as far west as Kennedy Place, a city street. West of Kennedy Place, a four-inch municipal line continues from the 12-inch municipal line and provides municipal water to residences, businesses and industries with frontage on West Jefferson Street west to Lawson Road. See Figure 5 in the Appendix for details. Millbrook Printing, the Church of the Nazarene, its parsonage, all of the residences and businesses in the two subdivisions with the exception of those fronting West Jefferson Street, and any residences located outside the above-described municipal system boundaries, rely on private wells for their water supply. Approximately 50 private wells are located within 1/4 mile of the site.

Beyond Millbrook Printing to the south, west of the Church of the Nazarene, and north of the businesses along West Jefferson is primarily agricultural property, natural area and sparse rural population.

B. SITE HISTORY *(See Glossary for definitions of terms used in this section)*

Parsons occupied the site and operated from 1945 through mid 1979. Their operation consisted of mixing, manufacturing and packaging agricultural chemicals including pesticides, herbicides, and solvent and mercury-based compounds. Floor drains in the Parsons plant discharged into a septic tank and leach field, which were connected to a catch basin leading to a county drain system. The county drain discharges into an unnamed creek located northwest of the site, which ultimately discharges into the Grand River approximately 0.75 miles to the north, within the boundaries of Fitzgerald Park, a large county park. The stream bank on the west side of Lawson Road where the drain outfall is located, eroded over time until the conduit at the drain outfall was washed out. Once the conduit washed out, the drain discharged onto the ground on the west side of Lawson Road and contaminated the soil bank above the creek bed. In addition to the discharge of liquid wastes, activities at the plant resulted in the deposition of agricultural chemicals on soil around the perimeter of the building, particularly behind the plant to the south covering an area of approximately three quarters of an acre.

Various government agencies received reports about discharges from the plant, and investigated. Concerns arose when soil and sediment samples, collected in the late 1970's from the drainage ditch and unnamed creek, were found to contain pesticides and elevated concentrations of heavy metals. In 1980, the current owner, ETM Enterprises, Inc. (ETM), moved into the building and began a fiberglass parts manufacturing operation. ETM contracted with a consulting firm to conduct a limited study to try to find sources of the contamination. Following the study, ETM excavated, removed and disposed of the septic tank and leach field.

Between the late 1970s through the mid 1980s, several soil sampling events took place at the site. The analytical results revealed the presence of elevated concentrations of mercury, arsenic and chromium. Pesticides including dieldrin, chlordane and DDT and its breakdown products, DDD and DDE, were also detected in the soil samples. The Parsons site was also included in a U.S. Environmental Protection Agency (EPA) funded dioxin study during this time period. Low concentrations of dioxin were detecte ' in soil samples in two areas; the first was on ETM property in a small area on the south side of Jefferson Street and the second was on the unnamed creek bank where the drain conduit had washed out. These two areas were fenced to prevent direct contact with the contaminated soils. This soil was subsequently addressed by the Non Time-Critical Removal (NTCR) discussed below.

The Parsons site was proposed for inclusion on the National Priorities List (NPL) by the EPA in 1988, and officially placed on the NPL in 1989, designating it a Superfund site. The state of Michigan conducted a Remedial Investigation/Feasibility Study (RI/FS) via a cooperative agreement with the EPA to determine the extent of environmental contamination, to assess the risks the contamination posed to human health and the environment, and to determine the most appropriate remedy for the contamination. Also in the late 1980s, the state of Michigan and the EPA initiated a cooperative effort to conduct a NTCR utilizing an innovative soil remediation technology, known as In-Situ Vitrification (ISV), to remediate some of the site soil known to be contaminated. The NTCR began in 1990, when the EPA contracted with Geosafe Corporation to

perform ISV to remediate 3,000 cubic yards of contaminated soil at the Parsons site. The ISV NTCR field work began in October 1990 and concluded in early summer 1994. The post-treatment investigation was completed in fall 1995. A complete description of the Parsons ISV project is available in the Information Repository located in the Grand Ledge Public Library, 131 East Jefferson Street, Grand Ledge, Michigan.

The field work portion of the RI/FS was initiated in March 1993, and placed in the Administrative Record in June 1996.

C. COMMUNITY PARTICIPATION

Section L, the Responsiveness Summary, discusses the involvement of the community during the RI/FS and remedy selection process and shows that the public participation requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 1980 PL 96-510, Sections 113(k)(2)(i-v) and 117 have been met at this site. The decision is based on the Administrative Record located in the Information Repository.

D. SUMMARY OF CURRENT SITE CONDITIONS

The RI report documents the results of the RI at the site. For additional details concerning site conditions, please refer to the complete report.

Hydrogeologic Study:

Groundwater quality: A total of 18 borings were drilled into the shallow saturated zone in the unconsolidated glacial deposits overlying the bedrock and as deep as 20 feet into the bedrock. The bedrock consists of fractured, weathered sandstone beginning at approximately 30 feet below ground level within the study area. Seventeen monitoring wells were subsequently installed in the borings. Figure 6 shows the location of all of the borings/monitoring wells.

The work was performed in three phases. Groundwater samples were collected from different combinations of the 17 monitoring wells in 1993, 1994 and 1995. Figure 7 in the Appendix contains a summary-table of the groundwater sampling data from the RI. The RI revealed the presence of elevated concentrations of metals and the pesticide dieldrin in some samples from wells screened in both the shallow saturated zone and in the top 20 feet of the bedrock aquifer. Because the bedrock aquifer is the only useable aquifer at this site, the following discussion is limited to contamination detected in the bedrock aquifer.

Metals in all of the filtered groundwater samples collected from the bedrock aquifer complied with Maximum Contaminant Levels (MCLs) as specified in 40 CFR 141 of the Safe Drinking Water Act (SDWA) with the exception of the first of three samples collected from monitor well (MW) 8. The filtered groundwater sample collected in 1993 from MW8 contained cadmium at a concentration of 8.2 parts per billion (ppb). The MCL for cadmium is 5 ppb. The same sample had a lead concentration of 598 ppb. The MCL Action Level for lead is 15 ppb. The analyses of

two subsequent samples collected from MW8 did not detect cadmium or lead. The non-detection of lead and cadmium in two successive sampling episodes suggests that the high results in the 1993 sample were anomalous or at least no longer typical of groundwater in the vicinity of the well.

The concentration of manganese in filtered groundwater samples was elevated in five of the bedrock wells. There is no MCL for manganese. However, pursuant to Part 201 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Part 201), the generic residential health-based drinking water criterion for manganese is 860 ppb. Part 201 also stipulates an aesthetic criterion for manganese of 50 ppb. One sample from MW8 exceeded the health-based drinking water criterion. Subsequent samples from this well contained concentrations less than 860 ppb.

No organic compounds were detected in site monitoring wells in excess of MCLs or non-zero MCL Goals (MCLGs). No MCL has been promulgated for dieldrin. However, the Part 201 generic health-based drinking water criterion for dieldrin is 0.053 ppb. The Part 201 criterion was exceeded in some of the groundwater samples from wells screened at the top of the bedrock aquifer. No detections of dieldrin were found in deeper groundwater samples. In the wells where the concentration of dieldrin initially was detected in excess of the Part 201 criterion, subsequent sample results were found to be less than the criterion.

The lead concentration in the unfiltered sample from MW11, a background well screened in the bedrock aquifer, was elevated at 100 ppb. The lead concentrations in unfiltered samples from on-site bedrock monitoring wells ranged from 2 ppb to over 600 ppb. This suggests that while some of the on-site wells appear to have been impacted by site contamination, lead in area groundwater is elevated for reasons apparently not connected to the Parsons site.

The groundwater was determined to be moving in a north-northeasterly direction. Groundwater is estimated to be moving at a velocity ranging from less than one foot per year to 100 feet per year.

Approximately 50 private wells located within 1/4 mile of the site obtain groundwater from the bedrock aquifer. Approximately 45 of these wells are located directly east of the site. The private wells are all believed to be installed at least 100 feet into the bedrock. Five private water supply wells were selected for sampling during the RI based on their proximity to the site. All of the samples were found to be in compliance with MCLs and applicable generic residential health-based drinking water criteria pursuant to Part 201. The table in Figure 8 in the Appendix compares the highest concentrations of arsenic, dieldrin, lead and manganese detected in any residential well to the most stringent applicable health-based criterion.

To summarize, with the exception of one sample result, believed to be anomalous, metals in the filtered groundwater samples from site monitoring wells comply with MCLs and non-zero MCLGs. The pesticide dieldrin for which there is no MCL, was detected in some samples but does not exceed the Part 201 criterion in bedrock wells based on the most current round of

samples. Manganese concentrations, for which there is no MCL, exceed the Part 201 generic health-based drinking water criterion in site monitoring wells, but not in residential wells. It is also significant to note that unfiltered samples from the site monitoring wells were turbid and not suitable for drinking water. No residential well samples exceeded MCLs, non-zero MCLGs or health-based Part 201 drinking water criteria.

Soil: Currently, an estimated 3,000 cubic yards of soil contaminated with elevated concentrations of metals and pesticides remain on the site pending a second EPA-lead NTCR. This contaminated area was identified during the ISV project and prior to the RI. Because the soil would be addressed in a NTCR, the EPA and the Michigan Department of Environmental Quality (MDEQ) agreed this contaminated soil would not be addressed further in the RI. The depth of the contamination is generally estimated at not more than two feet with the highest concentrations in the top six inches. This, combined with the fact that the highest contamination detected in the bedrock aquifer was found hydraulically upgradient from the contaminated soil area, indicates that the contaminated soil in this area is not contributing to groundwater contamination. The soil is fenced to avoid accidental contact. Figure 9 depicts the general location of the soil.

With respect to the rest of the site soil, during the RI, 83 soil samples from 44 locations were collected at selected depths across the site and analyzed for Target Compound List (TCL) organics, Target Analyte List (TAL) inorganics, dioxins, furans and cyanide. With the exception of the above-mentioned contaminated soil, no additional soil was identified on ETM property that poses an unacceptable direct contact hazard. Again, the contamination was detected in relatively shallow soils indicating that the contamination was not contributing to the groundwater degradation. The table in Figure 10 in the Appendix shows the average site soil concentrations and the associated direct contact standards pursuant to Part 201.

One soil sample collected from a monitor well auger cutting on the north side of West Jefferson Street, in the area identified as Area 2 on Figure 11 in the Appendix, contained 408 parts per million (ppm) of arsenic. This sample is discussed further in Section E, Summary of Risk.

Sediment and Surface Water: Sediment and surface water samples were collected and analyzed for TCL organic compounds, TAL inorganic analytes, dioxins, furans and cyanide. No unacceptable levels of contaminants were detected. The table in Figure 12 summarizes the sediment and surface water data.

Summary of RI:

The groundwater in the shallow saturated zone and the top portion of the bedrock aquifer beneath the site was found to be contaminated with varying concentrations of elevated metals and the pesticide dieldrin. The volume of water in the shallow saturated zone is insufficient to sustain useable wells, even for intermittent watering of lawns and gardens. Therefore, while potential risk associated with exposure to chemicals in the site bedrock monitoring wells was a concern, exposure to water in the shallow saturated zone was not a significant consideration. Five of the approximately 50 private water supply wells located within 1/4 mile of the site were selected for

sampling based on their proximity to the contaminated site monitoring wells. None of the private wells sampled were found to have been impacted by Parsons' contaminants.

The results of the soil sampling conducted as part of the RI revealed that, with the exception of the soil previously identified as pending a second NTCR, minimal unacceptable levels of contamination remain on the site. The Baseline Risk Assessment (BRA), summarized in Section E, indicated that there is no unacceptable level of risk from direct contact with soils on the Parsons site itself. The soil that is to be addressed as a NTCR was not evaluated in the BRA so no level of potential risk has been established. There *is* risk associated with exposure to one of the three soil samples collected on the north side of Jefferson Street which contained a high concentration of arsenic. This soil will be quantified and addressed as part of the second NTCR. Risks posed by the site are further discussed in Section E.

At the date of the Record of Decision (ROD), the current property owner continues to operate the ETM company. The site has been restored to its pre-ISV condition. As described in Section A, the property immediately surrounding the Parsons site is mostly developed. The exception is the parcel of property owned by Millbrook Printing south of the site which is largely vacant. Millbrook has indicated an interest in developing this property into a light industrial park.

E. SUMMARY OF RISK *(See Glossary for definitions of terms used in this section)*

Based on analytical data collected during the RI, a BRA was performed using site-related chemicals. The BRA assumes no corrective action will take place and that no site-use restrictions or institutional controls such as fencing, groundwater-use restrictions or construction restrictions will be imposed. The BRA determines actual or potential carcinogenic risks and/or toxic effects the chemical contaminants at the site pose under current and future land-use assumptions using a four step process. The four step process includes: contaminant identification, health effects assessment, exposure assessment and risk characterization.

1. CONTAMINANT IDENTIFICATION

The levels of contamination found in different media at the site can be found in Chapter 6 of the RI. Indicator parameters of chemicals of potential concern were selected for evaluation in the BRA based on their toxicities, level of concentration and widespread occurrence. The chemicals of potential concern detected in all media sampled are listed in Table 6-1 in the RI. The chemicals detected in groundwater constitute the primary concern at this site. A list of these chemicals is found in the table in Figure 13 in the Appendix.

2. HEALTH EFFECTS ASSESSMENT

The potential health effects for the contaminants of concern are calculated in the BRA. Summaries of the results may be found in Figures 14 for Chronic Non-Carcinogenic Effects, Figure 15 for Subchronic Non-Carcinogenic Effects, and Figure 16 for

Carcinogenic Effects. In Section 6 of the RI report, this information is in Tables 11, 12 and 13.

3. EXPOSURE ASSESSMENT

The BRA examined potential pathways of concern to human health under both current and future land-use scenarios for the immediate site property and surrounding area. The following major pathways were selected for detailed evaluation under the current-use and future-use conditions. The assumption was made that future use will be residential except for the utility worker:

- ingestion of surface and subsurface soil;
- dermal contact with surface and subsurface soil;
- inhalation of fugitive dust;
- ingestion of groundwater;
- dermal contact with groundwater;
- dermal contact with sediments;
- ingestion of sediments; and
- utility worker exposure.

4. RISK CHARACTERIZATION

For each potential human receptor, site-specific contaminants from all relevant routes of exposure were evaluated. Both non-carcinogenic health risk effects and carcinogenic health risks were estimated.

a. Non-Carcinogenic Health Risks

Soil: Three soil samples were collected during the drilling of MW6. The location from which these samples were collected is identified as Area 2 on Figure 11 in the Appendix. The concentration of arsenic found in one of these samples was 480 ppm which is significantly higher than the Part 201 Generic Residential Direct Contact criterion for arsenic of 5.3 ppm. The chronic Hazard Index (HI) for humans contacting or ingesting soil with this arsenic concentration equals or exceeds the acceptable HI of 1 for dermal contact with, or ingestion of, the soil. The HI values for dermal contact and ingestion are 1 and 2, respectively.

The subchronic HI for humans contacting or ingesting soil with arsenic at this concentration equals or exceeds the acceptable HI of 1 for dermal contact with, or ingestion of, the soil. The HI values for dermal contact and ingestion are 1 and 7, respectively.

The HI for humans contacting or ingesting soil from all other areas of the site was less than one, indicating the potential risks associated with contacting or ingesting soil from the site is within acceptable levels under the applicable statutes.

Groundwater: The chronic HI for humans ingesting groundwater from the site bedrock monitoring wells, which are screened in the top 20 feet of the bedrock aquifer, exceeds the acceptable HI of 1. The HI value for ingestion of site groundwater from the RI monitoring wells is 30. The concentration of manganese found in some of the monitoring wells accounts for about 66 percent of the HI value. The zinc concentrations in some of the wells account for 20 percent of the HI value. To a much lesser extent, minimal impacts can be associated with exposure to chromium, antimony and cadmium.

The subchronic HI for humans ingesting groundwater from site monitoring wells exceeds the acceptable HI of 1. The HI value for ingestion of site groundwater is 70. Again, the potential health effects associated with exposure to this groundwater are primarily attributable to manganese which accounts for about 67 percent of the HI while zinc accounts for 23 percent. The balance of the HI is the result of potential impacts from antimony, vanadium and cadmium.

The chronic and subchronic risks associated with dermal contact with groundwater from the bedrock aquifer are both within acceptable limits.

The results of the investigation revealed that no contaminants in excess of the health-based drinking water standards, pursuant to Part 201 were present in water from private water supply wells sampled which are installed much deeper in the aquifer than the on-site monitoring wells. However, the manganese concentration in two of the residential wells slightly exceeded the aesthetic standard of 50 ppb. Note that the Part 201 health-based drinking water criterion for manganese is 860 ppb. See Figure 8 in the Appendix for a summary of the highest concentrations of arsenic, lead and manganese detected in any of the private wells sampled. Dieldrin, the pesticide detected in site monitoring wells, was *not* detected in any private drinking water wells.

b. Carcinogenic Health Risks

Groundwater: The BRA process determined that there is no unacceptable carcinogenic risk associated with use of groundwater from this site.

Soil: Area 1 - The potential excess lifetime cancer risk posed by the site soil in Area 1 as depicted in Figure 11 falls within the EPA's acceptable risk range of one in 1,000,000 to one in 10,000. Risks from ingestion of, and/or dermal contact with, the soil in Area 1 present carcinogenic risks in the range of four in one

million to six in one million. The calculated risk posed by the soil in Area 1 is acceptable under Part 201.

Soil: Area 2 - Three soil samples were collected during the drilling of MW6. The location of these three samples is identified as Area 2 on Figure 11 in the Appendix. The concentration of arsenic found in one of these samples was 480 ppm which exceeds the Part 201 Generic Residential Direct Contact criterion for arsenic of 5.5 ppm. The potential excess lifetime cancer risk posed by exposure to this concentration of arsenic falls within the EPA's acceptable risk range of one in 1,000,000 to one in 10,000. However, the risk exceeds the Part 201 acceptable risk level of one in 100,000. The risk from dermal contact or ingestion ranges from two in 100,000 to four in 100,000. The risk is almost entirely attributable to the high concentration of arsenic found in the soil sample.

The volume of soil contaminated with arsenic at high concentrations will be quantified during the second NTCR so that it can be determined how to address the contamination.

F. RATIONALE FOR ACTION AND SCOPE OF THE SELECTED REMEDY

This ROD addresses the final remedy for groundwater at the Parsons site under CERCLA. The selected remedy meets the Part 201 criteria for an Interim Response. The threat posed by the site is the potential for unacceptable concentrations of contaminants found in the top 20 feet of the bedrock aquifer in on-site monitoring wells to migrate downward and horizontally in the direction of groundwater flow ultimately degrading the groundwater quality in the off-site private drinking water wells. The scope of the investigation did not identify the original source or sources of the contamination nor was the full vertical and horizontal extent of groundwater contamination defined. Therefore, it is not known how widespread an area is impacted by elevated metals concentrations. Extensive additional investigation efforts would be required to definitely determine whether the private water supply wells will, or are likely to, become contaminated at some future date.

The water in the private water supply wells sampled during the RI was in compliance with all applicable health-based drinking water standards. The RI did not determine whether groundwater deeper than 20 feet into the bedrock aquifer, where water supply wells are installed, will become impacted by the concentrations of contaminants found in the top 20 feet of the aquifer in the future. Contamination resulting from operations at the Parsons plant has probably been present since the 1950's and it is reasonable to infer that if impact is going to occur in the private wells adjacent to the site, it would have been detected by now.

However, to provide an additional level of assurance it has been determined that the private water supply wells and selected site monitoring wells should be sampled periodically for 15 years for indications of groundwater degradation. If groundwater degradation as defined in Sections G and I occurs, the contingency plan, also defined in Sections G and I, will be invoked.

G. GROUNDWATER ALTERNATIVES

ALTERNATIVES

Prior to the RI/FS, the EPA and the MDEQ agreed that any additional contaminated soil identified during the RI will be addressed by the second NTCR to take place in the late 1990s. Therefore, no remedial alternatives were evaluated for soil remediation. The following alternatives are specific to addressing groundwater.

Alternative 1: No Action

Alternative 2: Control Alternatives Not Requiring Groundwater Remediation

- 2A: Long Term Monitoring of Residential Wells and Selected RI Monitoring Wells, With Contingency
- 2B: Plume Delineation Followed by Alternative 2A
- 2C: Residential Well Replacement Followed by Alternative 2A
- 2D: Municipal Water

Alternative 3: Groundwater Collection-Precipitation-Granulated Activated Carbon (GAC)-Discharge

Alternative 4: Groundwater Collection-Filtration-Electrolytic Recovery-GAC-Discharge

Alternative 5: Groundwater Collection-Filtration-Ion Exchange-GAC-Discharge

Alternative 6: Groundwater Collection-Filtration-Mixed Bed GAC and Metal Adsorption Resin-Discharge

Alternative 7: Groundwater Collection-Filtration-Reverse Osmosis-GAC-Discharge

DESCRIPTION OF ALTERNATIVES

Alternative 1: No Action - No remediation or monitoring.

Alternative 2: Control Methods Not Requiring Groundwater Remediation - Four options were considered to prevent exposure to unacceptable concentrations of contaminants of concern:

Alternative 2A: Long Term Monitoring of Residential Wells and Selected RI Monitoring Wells, With Contingency - consists of sampling private water supply wells directly to monitor for the site contaminants of concern and document any trends which may indicate deterioration in the groundwater quality. Unacceptable deterioration in groundwater quality

would result in implementation of the contingency plan described below. Sampling of selected RI monitoring wells will also be included in the long-term monitoring plan to detect changes in the water quality since the RI. The monitoring program will continue for 15 years. In addition to tracking trends which may indicate deterioration in the groundwater quality, threshold criteria have been established for two of the chemicals of concern which, if exceeded and confirmed by a second sampling event, will trigger invocation of the contingency plan. All of the private water supply wells will be sampled during the first year of the monitoring program. After the first year, the monitoring program may be modified as appropriate. The specific monitoring program will be designed during Remedial Design (RD). The Eaton County Health Department enforces a private water well permitting policy which is expected to assure prevention of installation and use of new drinking water wells in zones of contamination. An agreement will be pursued whereby the Eaton County Health Department notifies the MDEQ in the event County Health Department permits are issued for new wells in the area of concern so that they can be incorporated into the monitoring program. The contingency plan is as follows: If trend analysis of the monitoring results indicates groundwater degradation is occurring in the zone where private wells are installed; or, confirmed exceedances of the stipulated threshold values are observed; an alternate water supply such as bottled water will be provided, as necessary, while the existing city of Grand Ledge municipal water system is extended and all businesses and residences are connected to the municipal system. The threshold values are as follows: Detection of dieldrin or detection of fifty percent or more of the MCL for arsenic. To constitute a threshold exceedance in a private well a detection must be confirmed by a second sample. The MCL for arsenic is 50 ppb.

Alternative 2B: Plume Delineation Followed by Alternative 2A - consists of drilling additional borings to a minimum depth equaling that of the private wells and employing vertical aquifer sampling (VAS) to completely define the horizontal and vertical extent of contamination in the aquifer. Following the VAS, permanent monitoring wells would be installed at selected depths and a long-term monitoring plan would be developed to track the contamination. Refer to Alternative 2A for a description of the contingency plan to be implemented if unacceptable groundwater degradation occurs.

Alternative 2C: Residential Well Replacement Followed by Alternative 2A- consists of sampling all of the private water supply wells in the vicinity which could potentially become impacted by migrating chemicals and analyzing for chemicals of concern. Wells would be replaced as necessary by redrilling into an unimpacted portion of the aquifer. To assure

continued safe drinking water availability, a monitoring program similar to the one described in Alternative 2A would need to be implemented in conjunction with this alternative.

Alternative 2D: Municipal Water - consists of extending the existing Grand Ledge municipal water supply system into the areas potentially impacted by the chemicals and connecting all of the private wells to the municipal system. In order to assure protection of human health, all private wells would have to be abandoned and there would have to be a moratorium on the installation of new wells.

GROUNDWATER COLLECTION AND TREATMENT

Five groundwater collection and treatment alternatives were evaluated in detail. All five of the alternatives include groundwater collection, filtration, use of GAC and discharge following treatment. Each alternative employs one additional treatment technology in addition to the steps listed above. The five individual treatment technologies considered are listed below with the respective Alternative number:

Alternative 3: Groundwater Collection-Precipitation-GAC-Discharge - A process whereby a substance in solution is transformed into a solid phase, typically, by the use of a flocculent added to the contaminated water. The resulting agglomerated particles settle and can be filtered from the water.

Alternative 4: Groundwater Collection-Filtration-Electrolytic Recovery-GAC-Discharge - An electrolytic reduction process for metals removal based on the oxidation-reduction reaction which takes place at the surface of conductive electrodes (cathode and anode). The electrodes are immersed in an aqueous solution under the influence of an applied direct current electrical potential. At the cathode, the metal ion is reduced to its elemental form.

Alternative 5: Groundwater Collection-Filtration-Ion Exchange-GAC-Discharge - A technology that removes inorganic compounds from contaminated liquids by introducing an ion exchanger (in the form of an insoluble, solid salt) into a contaminated solution. The ion exchanger attracts all contaminants possessing an affinity for it until the resin becomes saturated and breakthrough of the contaminants occurs. The contaminated media is then regenerated.

Alternative 6: Groundwater Collection-Filtration-Mixed Bed GAC and Metal Adsorption Resin-Discharge - Filters the water through a mixed bed of granular activated carbon and metal adsorption resin such as tricalcium phosphate resin to remove organics and inorganics simultaneously.

Alternative 7: Groundwater Collection-Filtration-Reverse Osmosis-GAC-Discharge - A method of organic and inorganic contaminants removal that works through a process of forcing water through a semipermeable membrane with microscopic pores thus using hydrostatic pressure to overcome the osmotic pressure of the contaminated solution. In essence, the contaminants are removed by filtration.

H. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The relative performance of each remedial alternative was evaluated in the FS and below using the nine criteria set forth in the National Contingency Plan (NCP) at 40 CFR §300.430. An alternative providing the "best balance" of trade-offs with respect to the nine criteria is determined from this evaluation. The nine criteria can be divided into three general categories: Threshold Criteria, Primary Balancing Criteria, and Modifying Criteria.

Threshold Criteria

The following two threshold criteria, overall protection of human health and the environment, and compliance with Applicable or Relevant and Appropriate Requirements (ARARs) are criteria that must be met in order for an alternative to be selected.

1. Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether a remedy eliminates, reduces, or controls threats to human health and to the environment.

Alternative 1 does not satisfy the requirement for overall protection of human health and the environment.

Alternatives 2A through 2D all provide protection to human health. Alternative 2A is protective because it will provide advance warning of indications of groundwater degradation and provides a contingency for an interim alternate water supply until the existing municipal system can be extended, if it becomes necessary. The contingency plan is invoked if specified threshold concentrations are exceeded in private drinking water wells; or trend analysis indicates degradation is occurring. Alternative 2B will also provide advance warning for groundwater degradation and have the same contingency plan. Alternative 2C will provide non-contaminated wells to businesses and residences relying on private water supplies. Continued protection will be dependent upon continued long-term monitoring as described in 2A. Alternative 2D will provide a permanent source of safe drinking water but a local moratorium on continued use of existing private wells will be necessary to assure continued protection of human health.

Alternatives 3, 4, 5, 6 and 7 provide protection to human health by treating the groundwater to health-based levels for a 1 x 10-5 risk level for carcinogens and to a HI of less than one for non-carcinogens, pursuant to Part 201.

The impact by the site chemicals on the environment, if any are deemed so minimal that it was determined that a complete ecological assessment was not warranted. .

2. Compliance with ARARs

This criterion evaluates whether an alternative meets ARARs set forth in federal, or more stringent state, environmental standards pertaining to the site or proposed actions.

With the exception of Alternative 1, all of the alternatives are expected to comply with ARARs. The selected remedy constitutes a final remedy for groundwater under CERCLA. The selected remedy complies with Michigan ARARs for an Interim Response pursuant to Part 201 of Act 451.

Primary Balancing Criteria

3. Long-Term Effectiveness and Permanence

This criterion refers to expected residual risk and the ability of an alternative to maintain reliable protection of human health and the environment over time once cleanup levels have been met.

Alternative 1 provides no long-term effectiveness and will not mitigate possible future health risks from potential ingestion, inhalation, and/or dermal contact with impacted groundwater.

Alternatives 2A and 2B will not eliminate existing or future potential health risks, however, they can provide advance warning if the impact will become a threat and provide time to implement the interim alternate water supply contingency until the municipal water supply can be extended into the area and residences and businesses are connected. Alternative 2C initially mitigates existing and future health risks from potential ingestion, inhalation, and/or dermal contact with impacted groundwater by providing a new water source if wells are impacted. However, for the mitigation to remain effective, the long-term monitoring program similar to Alternative 2A would need to be implemented. Alternative 2D will mitigate existing and future health risks from potential ingestion, inhalation, and/or dermal contact with impacted groundwater. Alternatives 3, 4, 5, 6 and 7 are expected to reduce risks to human health and the environment.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

This criterion evaluates treatment technology performance in the reduction of chemical toxicity, mobility, or volume. This criterion addresses the statutory preference for selecting Remedial Alternatives which include, as a principal element, treatment that permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants.

Alternative 1 will not reduce the toxicity, mobility or volume of contamination. Alternatives 2A through 2D, will not reduce the toxicity, mobility, or volume of groundwater contaminants because these alternatives are designed to **prevent** exposure to site chemicals, **in the event they migrate to** zones where private water supply wells are installed, rather than remediate contaminants.

Alternatives 3 through 7 will reduce the toxicity, mobility, and volume of contaminants present in the groundwater.

5. Short-Term Effectiveness

Short-term effectiveness considers the time to reach cleanup objectives and the risks an alternative may pose to site workers, the community, and the environment during remedy implementation until cleanup goals are achieved.

Alternative 1 provides no short-term effectiveness.

Alternative 2A will be effective as quickly as the long-term monitoring plan can be designed and implemented. Since the remedy utilizes existing wells, no risks during implementation are anticipated. Alternative 2B will be effective, although not as quickly, because it entails drilling additional wells, VAS, and evaluation of analytical results to aid in well location selection prior to developir the sampling plan. Risks associated with implementation are minimal but could include the potential of cross contamination of the deeper portion of the aquifer during VAS and physical hazards associated with well drilling. Alternative 2C involves minimal potential risk to site workers as well, but could pose risks similar to Alternative 2B. Alternative 2D will cause temporary disruption to the community, will pose physical hazards associated with construction activities to workers, and will take longer to implement than 2A, 2B and 2C. However, it will be a permanent solution to the threat to local private drinking water wells. To assure continued effectiveness, Alternative 2D will also necessitate a local moratorium on private water supply wells.

Alternatives 3 through 7 will be effective once on-line. Construction of treatment equipment and extraction wells will be disruptive and pose remedy specific construction-related physical hazards.

6. Implementability

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

Alternative 1 requires no implementation.

Alternatives 2A through 2C can be easily implemented.

Alternative 2D will be more complex but still relatively easy to implement.

Of the groundwater treatment alternatives, all are implementable but there are increasing degrees of complexity associated with their implementation. In all the groundwater treatment cases, it will be preferable to utilize a hazardous waste landfill as close to the site as possible to minimize costs for the transportation of the residual materials associated with each respective treatment technology. The precipitation processes as described in Alternative 3 tend to be proprietary in nature and thus the availability of the services and materials required for the implementation of an on-site precipitation system may be uncertain. Alternatives 4 and 5, the electrolytic recovery system and the conventional ion exchange system, respectively, may require relocation of underground utilities.

7. Cost

This criterion compares the capital, Operation & Maintenance (O&M), and present worth costs of implementing the alternatives at the site. The Table in Figure 17 in the Appendix shows the Cost Summary.

Modifying Criteria

8. Support Agency Acceptance

The EPA is in agreement with the selection of Alternative 2A for addressing the site chemicals in groundwater detected during the RI at the Parsons site. The alternative represents a Final Groundwater Remedy under CERCLA. The alternative constitutes an Interim Response under Michigan Act 451, as amended, Part 201.

9. Community Acceptance

Comments have been submitted by the community, local and state government officials and adjacent property owners. Comments and responses to those comments are described in the Responsiveness Summary.

I. THE SELECTED REMEDY

Based upon considerations of the requirements of CERCLA, the NCP and balancing of the nine criteria, the state of Michigan, as an agent of the EPA, has determined that Alternative 2A , Long Term Monitoring of Residential Wells and Selected Remedial Investigation Monitoring Wells With Contingency is the most appropriate remedy for addressing the groundwater at the Parsons site. This alternative constitutes a Final Groundwater Remedy under CERCLA. The remedy complies with Michigan Part 201 for an Interim Response. The components of the selected remedy are described below.

Alternative 2A: Long Term Monitoring of Residential Wells and Selected Remedial Investigation Monitoring Wells With Contingency - The data collected during the RI indicate that the threat posed by the site is the potential for unacceptable concentrations of chemicals found in the top 20 feet of the bedrock aquifer **in on-site monitoring wells** to migrate downward and horizontally in the direction of groundwater flow ultimately degrading the groundwater quality in the off-site private drinking water wells. The heterogeneous nature of the soils at this site prevented precise definition of all components of lithology and potential migration pathways. Therefore, the likelihood of this occurring could not be determined without greatly expanding the scope of investigation. It is possible that the chemicals found in the top 20 feet of the bedrock aquifer will never impact the deeper private wells. Therefore, extending the existing municipal water system based on the known conditions, is not supportable. It was determined that returning to the site and conducting further extensive investigation of the hydrogeological unit to completely define the full horizontal and vertical extent of contamination and determine more clearly the migration pathway of the chemicals of concern could cost more than extending the municipal system. In lieu of further investigation, a long term monitoring alternative with a backup contingency plan has been selected as a reliable means to assure a continued safe drinking water source for residences and businesses around the Parsons site.

The long-term groundwater monitoring program will consist of the design and implementation of a plan to sample private water supply wells in the immediate vicinity of the site for a period of 15 years. Trend analysis will be utilized to identify signs of groundwater quality degradation in the aquifer where private wells are installed. In addition, selected RI monitoring wells will be included in the monitoring program to further aid in the trend analysis. If trend analysis indicates that groundwater used for private water supply is being adversely impacted by chemicals from the Parsons site, the contingency plan, defined below, will be invoked. In addition to trend analysis, "action threshold values" have been established for two of the chemicals. If confirmed analytical results indicate that either of these threshold values are exceeded, the contingency plan will be invoked.

All of the approximately 50 private wells located within 1/4 mile of the site will be sampled the first year and the samples will be analyzed for all potential chemicals of concern as described

below. Following the first year of sampling, the program will be evaluated and modified as appropriate. Specific sampling intervals and frequencies will be determined in the RD.

Site Chemicals of Concern: Assessment of the analytical data from the RI indicates the primary chemicals of concern at the site are three metals, lead, manganese and arsenic, and the pesticide dieldrin. Arsenic was selected because it was detected in unfiltered monitoring well samples at elevated concentrations but was not detected in background monitoring wells at elevated concentrations. This suggests that impact by arsenic detected in private water supply wells would be attributable to the site.

Lead was identified as a chemical of concern because lead was detected in some RI monitoring well samples at elevated concentrations and lead was a constituent in some of the Parsons' products. As previously stated, the concentration of lead in the upgradient bedrock well was also elevated suggesting that elevated lead levels in groundwater in the area may not all be attributable to the Parsons site. One sample from a private water supply well was found to contain 3 ppb of lead which is 75% of the Part 201 health-based drinking water criterion of 4 ppb. Although this could be attributable to other sources such as regional elevated lead concentrations or the plumbing in the residence, the unknown nature of the source of the lead renders it a chemical of concern.

In addition to the Part 201 health-based drinking water criterion for manganese of 860 ppb, there is an aesthetic criterion for manganese of 50 ppb. Manganese was detected in high concentrations in some of the site monitoring wells during the RI. The high concentrations of manganese in the site monitoring wells account for nearly all of the potential chronic and subchronic noncarcinogenic health risks measured in the BRA. This potential risk is present only if someone were to consume the water from the monitoring wells. Manganese concentrations in all five of the private wells are well below the health-based criterion and pose no health risks to users of the private wells. However, two private wells had concentrations of manganese that were at or near the aesthetic criterion of 50 ppb. The concentrations of manganese in some of the background monitoring wells were also elevated, which indicates that elevated manganese may not be strictly attributable to the site. Manganese was selected for long-term monitoring because of its high concentrations in some monitoring wells on the site. While the concentration in private wells may never approach the health-based criterion, an increase in the concentrations may indicate that manganese is migrating vertically and horizontally.

The final chemical to be monitored is the pesticide dieldrin. Dieldrin is a carcinogen. It was detected in very low concentrations in some of the RI monitoring wells but was not detected in any of the private water supply wells. Because it poses serious health risks at very low concentrations and was detected in site wells, it was selected for monitoring.

Action Threshold Values: Action threshold values have been established for arsenic and dieldrin. Arsenic was detected at elevated concentrations in RI site monitoring wells. However, it was not detected at elevated concentrations in background wells, suggesting that the elevated arsenic is directly site related. Arsenic was not detected at elevated concentrations in private water well

samples. The MCL for arsenic is 50 ppb. If arsenic is detected in two successive sampling events at 25 ppb, or 1/2 of the MCL, where it was previously not detected or significantly lower, the contingency plan will be invoked. If the pesticide dieldrin is detected in a private water supply well and the detection is confirmed in a second analysis, the contingency plan will be invoked.

Figure 8 in the Appendix is a table which compares the Part 201 health-based drinking water standard and/or the MCLs to the highest concentration of each chemical of concern detected in the private water wells sampled.

Contingency Plan: If trend analysis indicates the quality of the drinking water in the private wells is degrading, or indicates that MCLs are likely to be exceeded, the existing Grand Ledge municipal water supply system will be extended. All of the businesses and residences will be connected to the system. An alternate water supply, such as bottled water, will be provided to all affected businesses and residences if the water is determined to be unacceptable until construction is completed. Likewise, if either of the chemicals for which threshold levels have been established are confirmed to be present at the threshold level, the contingency plan would also be implemented.

The monitoring program is expected to operate for a period of 15 years. In the event that municipal water becomes available during this time period independent of the conditions in this ROD, the monitoring program could be terminated.

The selected remedy will result in potentially hazardous substances remaining on site above health-based levels. A review will be conducted within five years after commencement of this alternative. This will ensure that the remedy continues to provide adequate protection of human health and the environment.

The existing Eaton County Health Department private water well permitting policy for the installation of new private drinking water wells will aid in assuring any new wells are incorporated into the long term monitor g plan. At the county level, a panel reviews each application for a private well. A decision to permit the installation of a well is made based on the county-wide groundwater quality mapping network in effect in the county. Depending upon the location under consideration, the county invokes specific construction conditions, monitoring requirements and periodic evaluation. A cooperative agreement will be pursued to arrange for the Eaton County Health Department to notify the MDEQ of any applications for new wells in the vicinity of the Parsons site. Any new wells permitted in the vicinity of the site will be incorporated into the monitoring program, as appropriate.

J. STATUTORY DETERMINATIONS

The EPA's primary responsibility at Superfund sites is to undertake RAs that protect human health and the environment. Section 121 of the CERCLA has established several statutory requirements and preferences. These include the requirement that the selected remedy, when completed, must comply with ARARs imposed by federal and state environmental laws, unless the invocation of a

waiver is justified. The selected remedy must also provide overall effectiveness appropriate to its costs, and use permanent solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable. Finally, the statute establishes a preference for remedies which employ treatment that significantly reduces the toxicity, mobility or volume of contaminants.

1. Protection of Human Health and the Environment

Implementation of the selected remedy will protect human health and the environment by reducing the risk of exposure to hazardous substances present in groundwater.

2. Compliance with ARARs

The selected remedy will comply with all identified federal ARARs, and with those state requirements which are more stringent. The selected remedy constitutes a Final Remedy for groundwater under CERCLA. The selected remedy complies with Part 201 requirements for an Interim Response. With the exception of two parameters in the initial sample collected from one bedrock monitoring well, MCLs in filtered samples are met. The metals detected were cadmium which slightly exceeded the MCL, and lead which was detected at 598 ppb. However, analytical results from two subsequent sampling episodes did not detect these two parameters. Therefore, the current status of compliance with MCLs in bedrock wells is demonstrated. There are no exceedances of non-zero MCLGs in the filtered bedrock groundwater samples.

See Tables 8-1 and 8-2 of the FS report for complete lists of federal and state ARARs. Below is a discussion of the key ARARs for the selected remedy.

Federal SDWA
40 CFR 141 - Federal Drinking Water Standards promulgated under the SDWA include both MCLs and MCLGs. The NCP at 40 CFR 300.430 (e)(2)(i)(B) provides that MCLGs established under the SDWA that are set at levels above zero, shall be attained by RAs for ground or surface waters that are current or potential sources of drinking water.

At the Parsons site, MCLs and non-zero MCLGs are applicable, and relevant and appropriate, because the bedrock aquifer below the site is presently being used by residences surrounding the site and will continue to be used in the future as a drinking water source. The selected remedy shall assure that MCLs and non-zero MCLGs continue to be met in the private water supply wells around the site.

Natural Resources and Environmental Protection Act, 1994 PA 451, as amended
This code incorporates the former Michigan Environmental Response Act, 1982 PA 307, as amended, and establishes health-based drinking water criteria for residential use.

3. Cost Effectiveness

Cost effectiveness compares the effectiveness of an alternative in proportion to its cost of providing environmental benefits. The Table below lists the costs associated with the implementation of the selected remedy.

TABLE

Total estimated costs for the selected remedy at the Parsons site:

Alternative	Total Capital Cost	Total O&M, 15 Yr.	Total Present Worth
2A	$7,250	$201,544	$208,794

The selected remedy for this site is cost effective because it provides the greatest overall effectiveness proportionate to its costs when compared to the other alternatives evaluated, the present net worth being $208,794.

4. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The most appropriate response to the contamination found at the Parsons site was determined to be long-term monitoring. However, if groundwater degradation is detected as defined in the ROD text, the contingency plan will provide a permanent solution.

5. Preference for Treatment as a Principal Element

Based on current information, the EPA and the state of Michigan believe that the selected remedy is protective of human health and the environment and is cost effective. The statutory preference for treatment of the hazardous substances present at the site as a principal element was not applicable as groundwater extraction and treatment was not the most appropriate remedy.

K. SUMMARY

The selected remedy will satisfy the statutory requirements established in Section 121 of the CERCLA, as amended by Superfund Amendments and Reauthorization Act, to protect human health and the environment, will comply with ARARs, will provide overall effectiveness appropriate to its costs, and will use permanent solutions and alternate treatment technologies to the maximum extent practicable. The remedy constitutes a final groundwater remedy under CERCLA and complies with the Michigan Part 201 ARARs for an interim remedy.

Treatment is not a component of the selected remedy because it cannot be demonstrated that the chemicals detected in the upper 20 feet of the bedrock aquifer will migrate vertically downward and laterally sufficiently to cause groundwater degradation in excess of applicable health-based drinking water standards. The interpretation of site-specific hydrogeologic conditions indicate that if groundwater is going to be degraded by the site chemicals of concern, it would likely be detected within 10 years. As an added level of protection, the monitoring program will be maintained for a period of 15 years. If degradation is detected, an alternate water supply will be provided, if necessary, while the existing Grand Ledge municipal water supply system is extended and the affected businesses and residences are connected.

L. RESPONSIVENESS SUMMARY

The public participation requirements of CERCLA Sections 113 (k)(2)(i-v) and 117 have been met during the remedy selection process. Section 113 (k)(2)(B)(iv) and 117(b) requires the EPA to respond "...to each of the significant comments, criticisms, and new data submitted in written or oral presentations." on a proposed plan for an remedial action (RA). The Responsiveness Summary addresses concerns expressed by the public, potentially responsible parties, and governmental bodies in written and oral comments received by the EPA and the state regarding the proposed remedy for the Parsons site.

Background

The MDEQ issued Progress Report #1 to the public in February 1993, at the beginning of the RI. The Department also hosted a public meeting on February 18, 1993, to provide background information on the Parsons site, explain the Superfund process, and provide details of the upcoming investigation. Phase I of the RI was completed in October 1993. Progress Report #2 was issued in July 1994, announcing Phase II of the RI which was completed in 1994. The third and final phase of field work, Phase IIA, was completed in January 1995.

The RI/FS report and the Proposed Plan for the Parsons site were released to the public for review in May 1996. An information repository was established at the Grand Ledge Public Library, 131 East Jefferson Street, Grand Ledge, Michigan. A copy of the RI/FS report was provided to the Oneida Township Offices located at 11041 Oneida Road, Grand Ledge, Michigan. The Administrative Record was made available to the public at the Lansing, Michigan, office of the Superfund Section, Environmental Response Division, MDEQ, 301 South Capitol Avenue, and at the information repository.

A public meeting was held on June 6, 1996, to discuss the FS and the Proposed Plan. At this meeting, representatives from the MDEQ and the EPA answered questions about the site and the remedial alternatives under consideration. Formal oral comments on the Proposed Plan were documented by a court reporter. A verbatim transcript of this public meeting was placed in the information repository and Administrative Record and written comments were also accepted. The meeting was attended by approximately 15 persons, including local residents.

The FS and Proposed Plan were available for public comments from May 14, 1996, through June 14, 1996. Comments received during the public comment period and the MDEQ's responses to those comments are included in Section L, Responsiveness Summary, which is a part of this ROD. An advertisement announcing the availability of the Proposed Plan and start of the comment period was published in the Grand Ledge Independent Newspaper which was delivered to all residents of the greater Grand Ledge, Michigan, area. In addition, copies of the Proposed Plan were mailed to all persons on the site mailing list. Over 350 copies of the Proposed Plan were mailed.

During the comment period, the MDEQ received six significant oral comments concerning the Proposed Plan.

Summary of Significant Comments

Comment 1: Several commenters expressed a strong preference for Alternative GW2D which is to extend the existing Grand Ledge municipal water supply out to this area and have all the residences and businesses connected to municipal water. It was pointed out that if the contaminants of concern do end up contaminating the potable water supply, by monitoring it for years, we will have only delayed the necessity of extending the municipal system and will have spent the money and time and still end up at the same end point.

Response 1: Because nearly all those parties commenting on the Proposed Plan expressed a preference for Alternative GW2D, MDEQ staff carefully reevaluated the proposed RA of long-term monitoring of residential wells. The Department concluded that the proposed remedy remains the most appropriate alternative for the site. The chemicals present in the groundwater, although having existed for many years, have not impacted the adjacent residential wells. The RI revealed no evidence that the chemicals of concern were moving vertically downward as well as laterally to the extent that an impact will be expected.

In addition, by developing and implementing a monitoring plan that actually monitors the point-of-consumption quality of the private water supplies, the degree of protection of human health is most confidently assured. Monitoring with trend analysis should allow implementation of an interim remedy in advance of standard exceedance at the well. In the event that groundwater degradation is detected in excess of applicable standards, immediate actions as needed, such as bottled water, can be implemented until the municipal system can be extended.

Comment 2: One company owner from the area commented that he has to purchase bottled water for his employees because even though they have their water tested every six months and it's supposedly safe, his employees are afraid to drink it. He further stated that fire protection will be greatly improved with a municipal system.

Response 2: The water supply well at Millbrook Printing Company, the company owned by the commenter, will be included in the monitoring program. Increased fire protection, while certainly important, is beyond the scope of the Superfund program.

Comment 3: A local health department official stated that it has been known for some time that homes in the area east of the site are situated over a fragile aquifer and that there is a shallow overburden on top of sand rock. He advised that they've had wells contaminated in the area quite easily from their own sewage system. He further stated that they put restrictions on developments within 1,000 feet of the site as it is.

Response 3: No pursuit of deed restrictions to prevent or limit the installation of new water supply wells in this area beyond the requirements currently imposed by local ordinance, are anticipated by the state at this time.

Comment 4: One citizen is very concerned about the area of contaminated soil that is to be addressed during a second NTCR at an unknown future date. The citizen expressed concern that during the process of pollination, contamination will become airborne and cause health problems. She further expressed concern that the Department was too casual in their attitude about the integrity of the fence and signs restricting access. She felt better protection against accidental contact with the contamination was needed.

Response 4: Pursuant to Part 201, current criteria for direct contact with specific contaminants in soil on industrial and commercial property have changed considerably since the cleanup criteria were established for the ISV removal project. For example, the cleanup criterion for dieldrin for the ISV project was 80 ppb. The current direct contact criterion for dieldrin in soil on industrial property is 31,000 ppb. This concentration is the maximum amount of dieldrin detected in soil samples collected from the area awaiting action under a second NTCR. Therefore, according to the current criteria, the risk posed by the contaminants in the soil is considerably less than originally appeared. In addition, a recent site visit revealed that the area is very heavily vegetated and remains fenced so that exposure as a result of accidental direct contact is very unlikely. With respect to the concern over chemicals in pollen, a MDEQ toxicologist has advised that, while information concerning plant uptake of organic chemicals is limited, her opinion is that levels of contaminants in the pollen of plants growing in the affected area will likely be very low. These levels in pollen are not expected to present a significant health risk. The area should be monitored to assure the integrity of the fence until the EPA returns to implement the NTCR.

Comment 5: One citizen commented that she did not feel that monitoring was any different from doing nothing. She stated that, if some problem was found during monitoring, it will probably take at least another five to ten years before anything could be done about it. She also expressed concern for the environment and property owners who want to expand into the Grand Ledge area.

Response 5: Long-term monitoring will be protective of human health because the groundwater quality will be confirmed at the point-of-consumption and in the event quality degradation is

detected, immediate steps can be taken to provide temporary alternate water supplies until a permanent solution can be determined. The text of the Parsons ROD states that an alternate water supply will be provided immediately upon observation of unacceptable groundwater degradation or exceedance of either threshold concentration. Development of the Grand Ledge area is not expected to be adversely impacted by the selected remedy. No impact on the environment by site contamination was observed.

Comment 6: The Michigan Department of Community Health (MDCH) commented that the proposed monitoring program should be adequately protective of public health. Replacement of the private wells in the site area with connections to the municipal water system might be required some day, but the available evidence does not indicate that step is required at this time. Further groundwater sampling to fully identify the area of elevated contaminant concentrations will contribute to a more complete evaluation of the potential threat to public health.

With respect to the soil sample found to contain elevated arsenic, the MDCH commented that sampling and analysis of surface soil from the off-site area where the elevated arsenic concentration was found in the subsurface soil will contribute to a more complete evaluation of the potential threat to public health and permit the development of appropriate interim responses.

Response 6: The MDEQ acknowledges that the MDCH supports the selected remedy for groundwater as the most appropriate remedy for the site at this time. With respect to the comments on the elevated arsenic concentration in the off-site soil sample, the MDEQ agrees with this observation. The MDEQ plans to pursue additional soil sampling as an interim measure in the vicinity to preliminarily quantify the volume of soil similarly contaminated, and to take actions as indicated to prevent direct contact with the soil until the EPA can return and implement the second NTCR on the remaining contaminated soil.

PARSONS CHEMICAL WORKS, INC.
SUPERFUND SITE
SUPPLEMENT to the RESPONSIVENESS SUMMARY

September 1997

Following are a series of comments and requests for further explanation submitted to the Michigan Department of Environmental Quality, Environmental Response Division (MDEQ, ERD) by the U.S. Environmental Protection Agency (EPA) and the Department's responses. Where possible, the ERD has condensed the EPA comment. A copy of the full text of EPA's comments is available in the Administrative Record for the site.

Introductory Comment

A limited extent of contamination investigation was completed by the MDEQ at the Parsons site. Based upon the results of this investigation the EPA determined that the data collected from on-site monitoring wells and existing residential wells was sufficient to determine the most appropriate response action at the site without performing a further extent-of-contamination investigation off-site as was recommended by the MDEQ. The MDEQ determined that the selected remedy is adequate to protect public health from exposure to unacceptable levels of chemicals of concern and to provide advance indication of groundwater quality degradation. It is uncertain whether contamination of adjacent private water supply wells is likely to occur. Therefore, long term monitoring of private water supplies was included in the ROD for the Parsons site with a contingency for providing alternate water supply.

Item #1: Please expand upon your discussion of how the Eaton County Health Department's (ECHD) private water supply well permitting process will interface with the selected remedy for the site to enhance the protectiveness of the remedy. In addition explain whether ECHD's program is integral to the site remedy.

Response to Item #1: Informal discussions with the county sanitarian revealed that county officials implement a process for evaluating well permit applications to attempt to assure drinking water wells are not installed in zones of contamination. Eaton County's Environmental Health Policies and Procedures states that it is unlawful for any person to construct any new water supply system unless the owner or his representative has obtained a construction permit issued by the Health Officer to construct same. Their process consists of having a panel of three officials review the application and jointly determine whether or not to issue a permit to the driller; or if to issue a permit with special conditions attached to assure protection of human health. The MDEQ

anticipates developing an agreement between the two agencies whereby, in the event the ECHD issues a well permit within a specified area surrounding the Parsons site, to be determined during the remedial design phase, they will notify the MDEQ. If a permit is issued within this area, special conditions such as minimum depth will be imposed. Upon notification the MDEQ will incorporate the well into the long term monitoring program to confirm that the quality of the well's water is acceptable. This additional notification measure adds a dimension of assurance that any new potentially impacted private water supply wells are incorporated into the monitoring program. This information is in the ROD so that interested parties will be aware of all the measures being taken by the agencies to protect public health. This process when viewed collectively with the actions by the MDEQ and interaction with the county is an additional tool for protection of public health.

Item #2: Discuss Section 300.430(a)(1)(iii)(F) of the NCP that states in part, "EPA expects to return usable groundwater to their beneficial uses wherever practicable": Include in the discussion an explanation of the apparent conflict posed by the presence of elevated concentrations of some chemicals in groundwater which in some cases pose a potential unacceptable risk, and the fact that the remedy is for monitoring with contingency rather than actual groundwater restoration.

Response to Item #2: Adjacent to the Parsons site, private wells supply drinking water to approximately 50 homes and businesses. These wells are completed in the bedrock aquifer. Data from the RI indicate that dieldrin, manganese and lead are present at the top of the bedrock aquifer in concentrations in excess of applicable drinking water criteria. The contamination appears to be contained in a narrow zone of weathered bedrock that is at the top of the bedrock and below a thick clay layer. The water is very turbid in this interface zone and is not useable as a drinking water source even if it was free of the contaminants contained in this narrow zone. Filtered and unfiltered samples from permanent monitoring wells that were installed during Phase 3 of the RI to 20 feet into the bedrock, while still somewhat turbid, were found to be in compliance with applicable MCLs and Part 201 generic residential health-based drinking water criteria. Still deeper in the aquifer, where the private wells are installed, the turbidity is much lower and the groundwater is useable as a source of drinking water. Private wells sampled during the RI were in compliance with the drinking water criteria.

While the referenced NCP expectation is applicable at the site, the groundwater in the useable portion of the aquifer does not require restoration. Section 300.430(a)(1)(iii)(F) does not apply to the contaminated portion of the aquifer at this site because it is not useable due to its high natural turbidity.

Item #3: Describe any additional protective measures that will be implemented to prevent someone from drinking the contaminated groundwater at the Parsons site

property. An example would be a deed notice. Discuss whether the state of Michigan has the authority to place a deed notice on the property.

Response to Item #3: The MDEQ agrees to pursue the issuance of a deed notice to the property owner of record for the parcel of property located at 3562 West Jefferson Street, address of the former Parsons Chemical Works, Inc. plant, on which ETM Enterprises currently exists and where most of the RI was performed. The purpose of the deed notice will be to notify the owner that groundwater contamination was detected in portions of the aquifer during the RI and to recommend that the property owner utilize the municipal water supply that is available to property owners on Jefferson Street. The notice will also advise that in the event water supply wells are contemplated on this property, special care must be taken to assure that the wells are installed in safe portions of the aquifer. It is not anticipated that a deed notice would become part of the chain-of-title for the property. A copy of the deed notice will be submitted to the Eaton County Register of Deeds with a request that it be filed with the deed to this parcel of property.

Item #4: Please explain in more detail how the state of Michigan concluded that a complete ecological assessment was not warranted at the Parsons site. In particular, address protection of the nearby Grand River from Parsons contaminants. Address potential future risk to the environment in light of a monitoring-with-contingency remedy.

Response to Item 4: The RI report, Section 4-Nature and Extent of Contamination and Section 7-Summary and Conclusions presents the surface water environment data and conclusions regarding release to surface water.

Sediment samples were collected from the Grand River, the unnamed creek and the county drain connecting the Parsons site to the creek and analyzed for volatile organic compounds, semi-volatile organic com ɔunds, pesticides and PCBs, dioxins and furans and inorganic constituents. No promulgated sediment criteria exist. In lieu of criteria, the MDEQ uses low and severe effect values generated by the State of New York Department of Environmental Conservation, Department of Fish and Wildlife, Division of Marine Resources in the document "Technical Guidance for Screening Contaminated Sediment" (November 22, 1993) or the Province of Ontario Ministry of the Environment Water Resources Branch document "Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario" (March 1993) as guidelines for assessment of potential impact on the ecosystem by contaminated sediments. It was determined, upon evaluation of chemical concentrations detected in sediment samples, that one of two conditions were present: Either the concentrations were near or less-than the lowest effect level listed in the above-referenced documents; or, if the concentrations were indicative of greater potential impact, it was observed that similar concentrations of the detected chemicals were found in samples collected upstream of the confluence of the unnamed creek and the Grand River. This would indicate that the origin of these chemicals is not the Parsons site but rather a source further upstream from the site.

With no measurable exceedances of surface water criteria and no indication of site-related contamination at a concentration likely to cause significant impact in sediment . impact to aquatic populations is not indicated and therefore, the determination was made not to pursue evaluation of local ecosystems and aquatic populations beyond this point.

The contaminated soil at the Parsons site and on the stream bank above the drain discharge, was removed and remediated during the In-Situ Vitrification project, further reducing the risk of site contaminant migration. The county drain connecting the site to the unnamed creek was examined as part of the RI/FS for evidence of a continuing source of discharge. The drain was found to be visually intact and clean. Again, it was concluded that no evidence existed to suggest a continuing source of contamination to surface water via soil.

As detailed in the RI report, the selected remedy will not prevent potential migration of the chemicals detected in groundwater. Therefore, the potential exists for the groundwater contamination to migrate to surface waters. However, it is the opinion of the MDEQ that off-site migration of site contaminants via groundwater significant enough to have impact upon the surface water environment is unlikely. In the event that migration of significance does occur, the residential well sampling to be conducted as part of the remedy will detect evidence of it and the potential for impact to surface water can be addressed as appropriate. Following is a brief discussion of the logic used to reach this decision: The direct discharge of chemicals of concern from the former Parsons plant dates back to the 1940's. Yet, the surface water and sediment samples showed no evidence of site-related residual impact on the environment. Also, both filtered and unfilterd groundwater samples were submitted for analysis during the RI. A comparison of the filtered sample analytical results to the unfiltered sample results indicates that the concentrations of chemicals of concern are directly related to the degree of turbidity in the samples suggesting that the chemicals adsorb to soil particles. Since soil particles in groundwater are less mobile than the groundwater, combined with the distance the groundwater must migrate to reach the surface water, it is reasonable to conclude that the potential for migration of the chemicals of concern to surface water is not significant.

Item #5: Please provide a discussion on the statutory requirement for remedies that utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable {NCP 300.430(f)(5)(ii)(E)} compared to the remedy selected for the Parsons site.

Response to Item #5: The RI indicated that no exposure to contaminated groundwater has occurred and there is no data to indicate that exposure at a future date will occur There is no data to suggest that the contamination detected in a narrow band at the top of the bedrock is migrating. Furthermore, because the groundwater at the top of the

bedrock aquifer is naturally turbid, it is not anticipated that a water supply well would be installed in this zone. Since it is uncertain whether an exposure to the general public may occur, cleanup of the affected groundwater at this time is not justifiable. Therefore, it is not practicable to satisfy the statutory requirement for remedies that utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable
[NCP 300.430(f)(5)(ii)(E)] at the Parsons site.

Item #6: Section 300.430(f)(5)(ii)(F) of the NCP establishes a preference for remedies employing treatment which permanently and significantly reduces the toxicity, mobility or volume of the contaminants as a principal element. Please discuss whether the proposed remedy satisfies this statute, and if not, explain why.

Response to Item #6: The statutory preference for remedies employing treatment which permanently and significantly reduces the toxicity, mobility or volume of the contaminants as a principal element does apply to this site. It is not satisfied for the reasons identified in the response to comment number 5.

Item #7: The text in several places in the FS suggests that the remedy will not achieve the remedial action objectives (RAOs) developed for the site while the ROD states that it will. Please explain this inconsistency and discuss how the RAOs will be achieved.

Response to Item #7: Remedial action objectives 1, 4, 5, 6 and 7 are achieved by the proposed remedy. Objective 3 is achieved additional discussion is included in the response to alleviate your concerns.

As stated in the FS, Remedial Action Objective (RAO) #2 (prevention of migration of contaminated groundwater to surface water) is nc achieved by the proposed remedial action. However, as indicated in the response above to comment number 2 and number 4, it is uncertain whether contaminant migration is occurring and the potential for migration significant enough to impact surface waters is minimal. In retrospect, it may nave been more appropriate to word this objective to the effect that the remedy will prevent migration or be designed to detect unexpected migration (via monitoring program) should it occur.

Remedial Action Objective #3 refers to complying with specific State and Federal ARARs. In the FS on pages 10-10 and 11-4, the text states the alternative does not comply with contaminant-specific ARARs, particularly those which govern drinking water standards and Part 201 Generic Residential Health-Based Cleanup Criteria. It is true that the selected remedy will not reduce the concentration of manganese in all of the site monitoring wells to the Part 201 generic residential health-based criterion for manganese. However, as stated in above responses to comments 2 and 3, the criterion is applicable only for groundwater that is a useable source of drinking water.

The exceedances of manganese that were measured in bedrock aquifer wells were detected in wells screened at the top of the bedrock where the high natural turbidity would preclude designation of this zone as a useable drinking water source. The analytical results from groundwater samples collected from monitoring wells installed as shallow as 20 feet into the bedrock, both unfiltered and filtered, reveal compliance with the applicable health-based drinking water criterion for manganese. Therefore, the useable portion of the aquifer is in compliance with the ARARs. This holds true for the other identified chemicals of concern.

Refer to the response for Item #4 for a discussion regarding the statement that location-specific ARARs may be violated.

Item #8: Please explain why the FS states that the site ARARs will not be met and the ROD states that they will. Also discuss which is correct.

Response to Item #8: The concerns expressed in item #8 are all discussed and explained in the discussions of previously raised issues. The only items not already discussed relate to the reference to MCLs as "to be considered" in Table 8-1 of the FS and whether or not hazardous waste is going to be generated as part of the proposed remedy.

The ROD clearly identifies the MCLs as ARARs. This response serves as a clarification to the FS in the record.

The selected remedy will not generate hazardous waste. Therefore, closure and post closure requirements are not applicable. Wastes might have been generated for some of the groundwater treatment alternatives and the closure and post closure requirements may have been applicable to some of those remedies.

Item #9: Please address any inconsistency between the FS and the ROD with respect to long term residual risks associated with the groundwater.

Response to Item #9: Again, this item asks for discussion that is covered in previous items. The MDEQ feels the requested explanations are all addressed adequately in the above item discussions. See Items #4 and #7 for discussion on potential impact on surface water. See Item #3 for discussion of additional protective measures. See Items #5 and #6 for discussions on permanent remedies. This response serves to clarify the RI/FS in the record.

The MDEQ sincerely hopes that the responses and discussions provided in this submittal successfully allay the remaining concerns of the EPA and respectfully requests that the EPA sign and thereby demonstrate concurrence on the Parsons Record of Decision so that the selected remedy can be implemented.

APPENDIX

STATE OF MICHIGAN

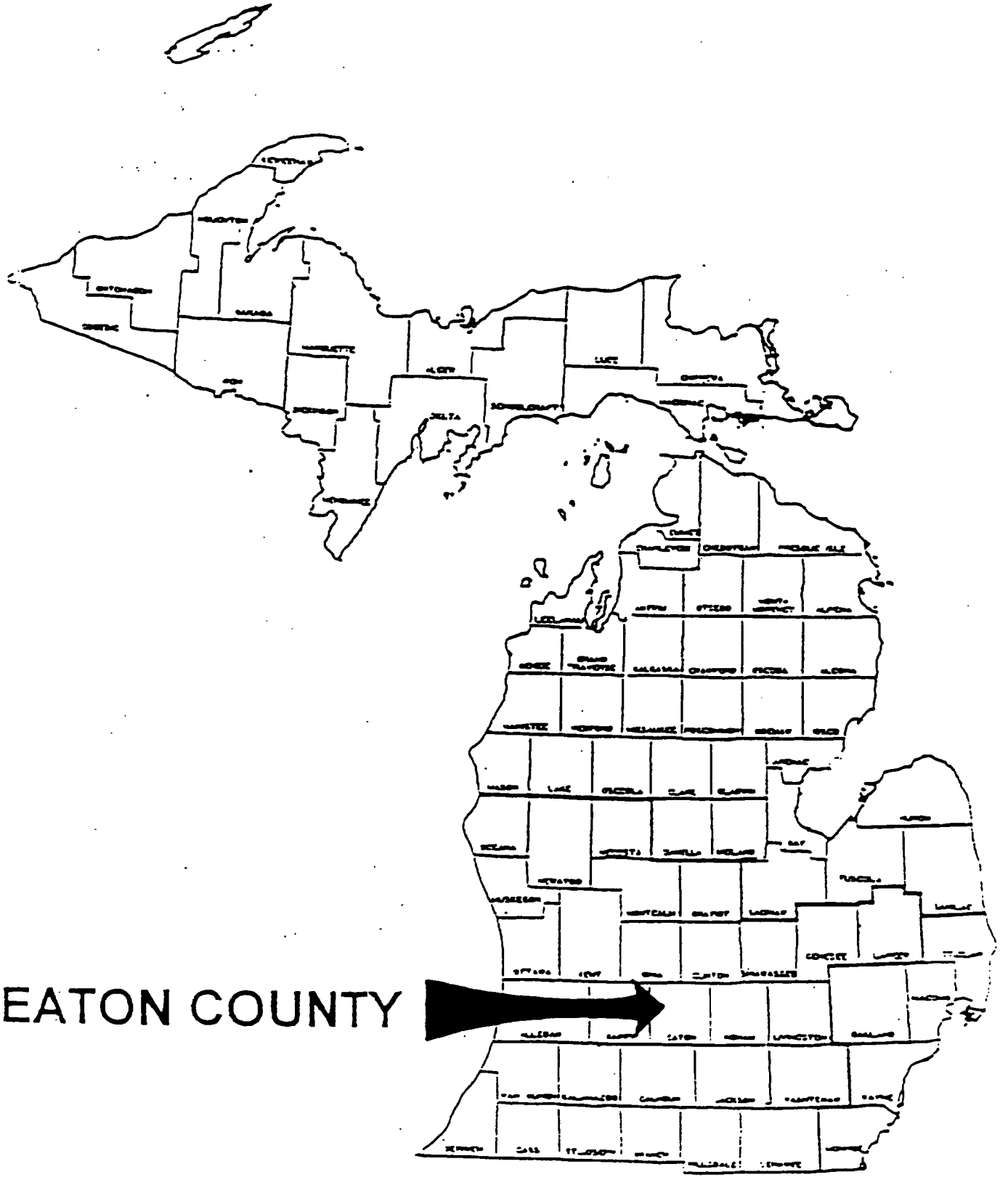


Figure 1

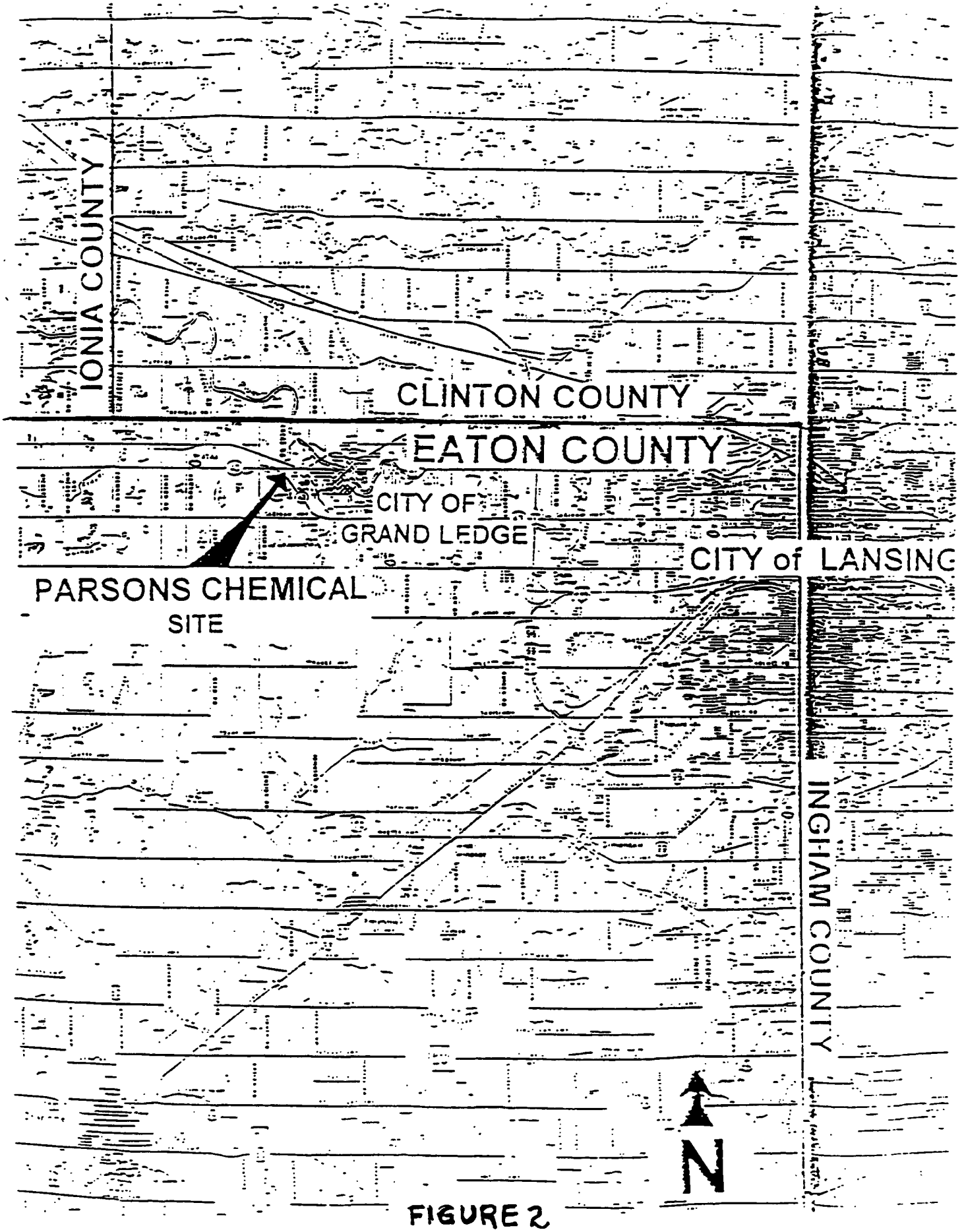

IONIA COUNTY
CLINTON COUNTY
EATON COUNTY
CITY OF
GRAND LEDGE
CITY of LANSING
PARSONS CHEMICAL
SITE
INGHAM COUNTY
N

FIGURE 2

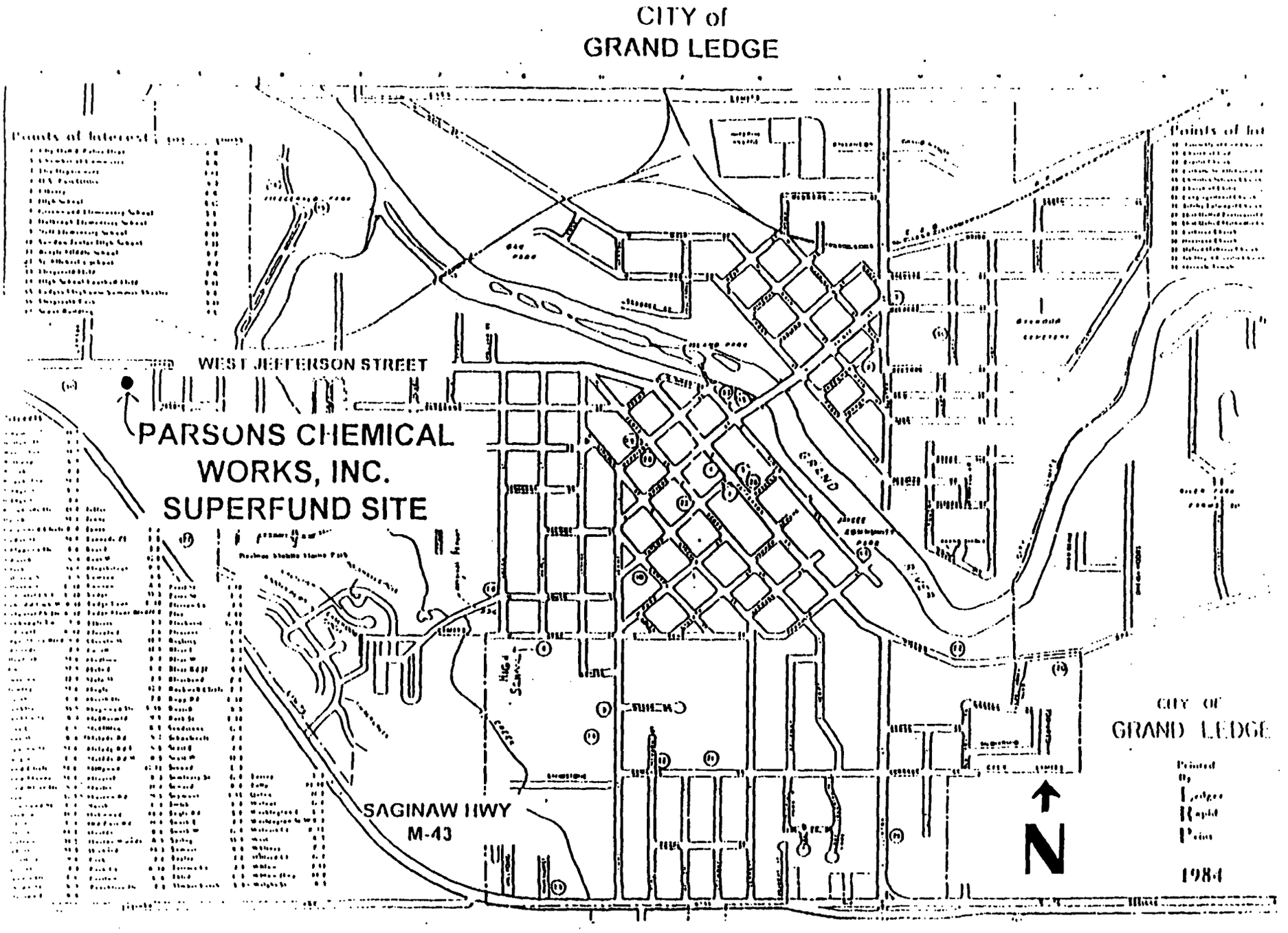

CITY of
GRAND LEDGE
WEST JEFFERSON STREET
PARSONS CHEMICAL
WORKS, INC.
SUPERFUND SITE
SAGINAW HWY
M-43
N
CITY OF
GRAND LEDGE
1984

FIGURE 3

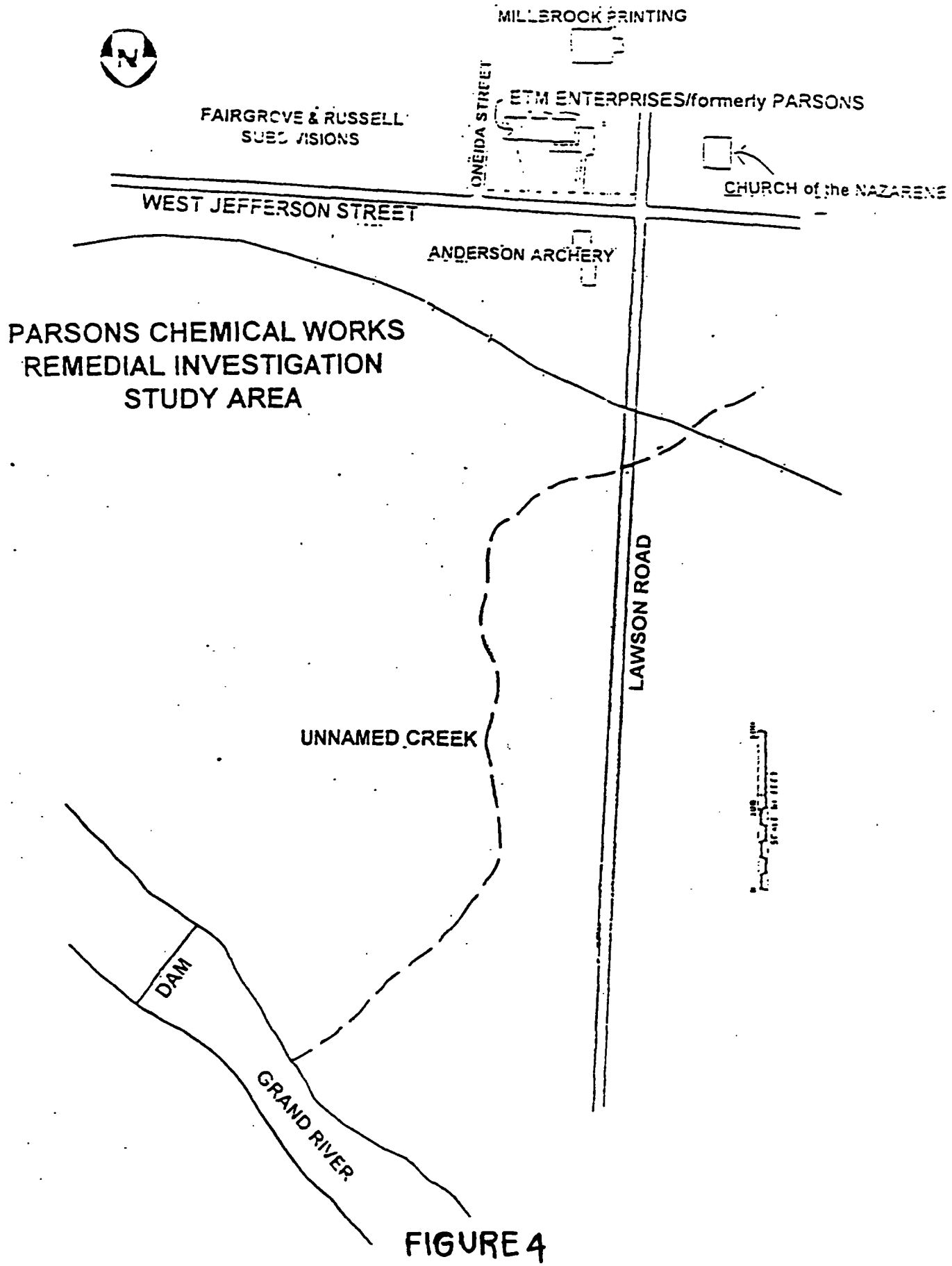

MILLBROOK PRINTING
N
ONEIDA STREET
ETM ENTERPRISES/formerly PARSONS
FAIRGROVE & RUSSELL
SUBDIVISIONS
CHURCH of the NAZARENE
WEST JEFFERSON STREET
ANDERSON ARCHERY
PARSONS CHEMICAL WORKS
REMEDIAL INVESTIGATION
STUDY AREA
LAWSON ROAD
UNNAMED CREEK
DAM
GRAND RIVER

FIGURE 4

CITY OF GRAND LEDGE
EXTENT OF MUNICIPAL WATER SUPPLY

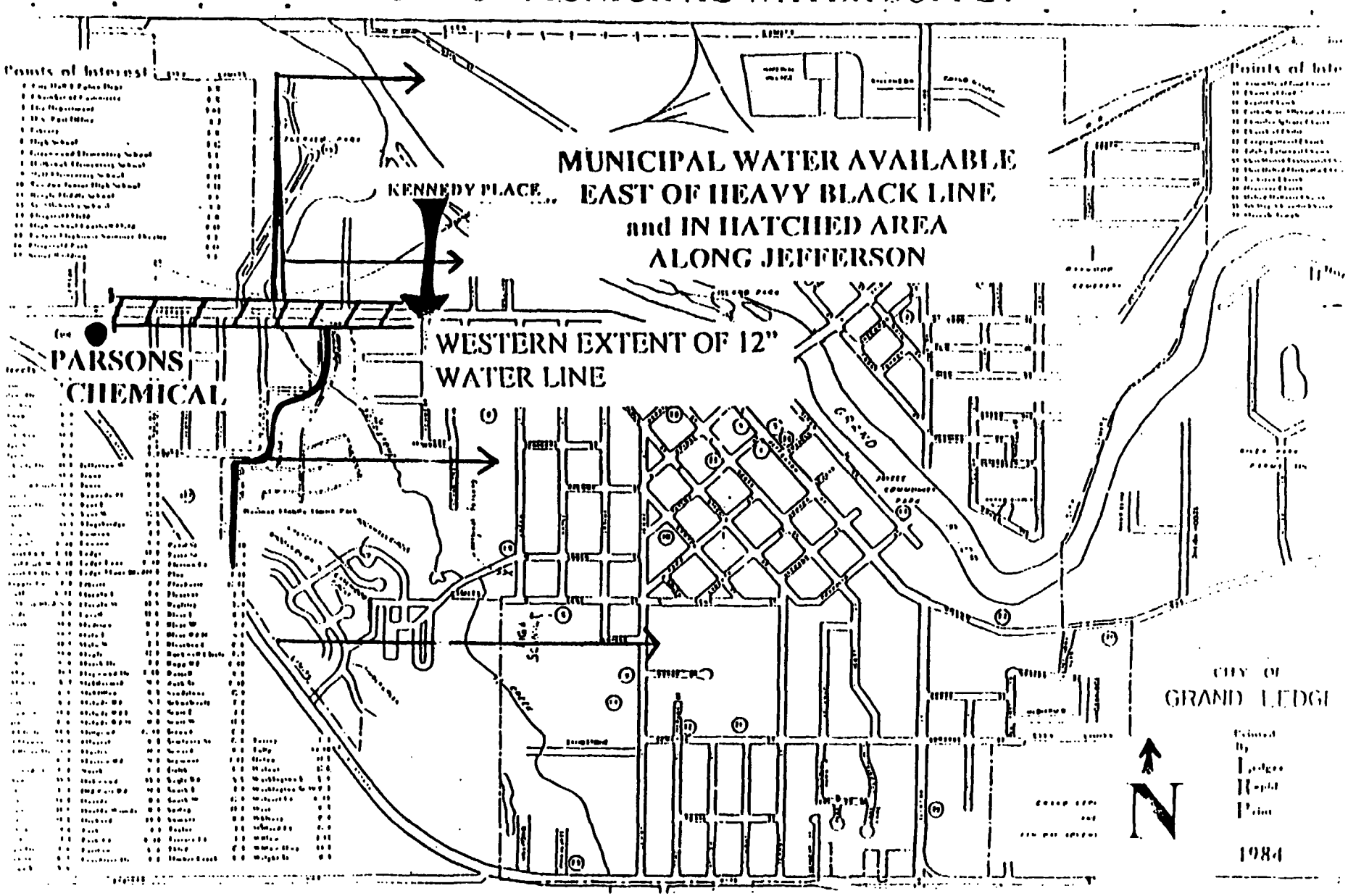
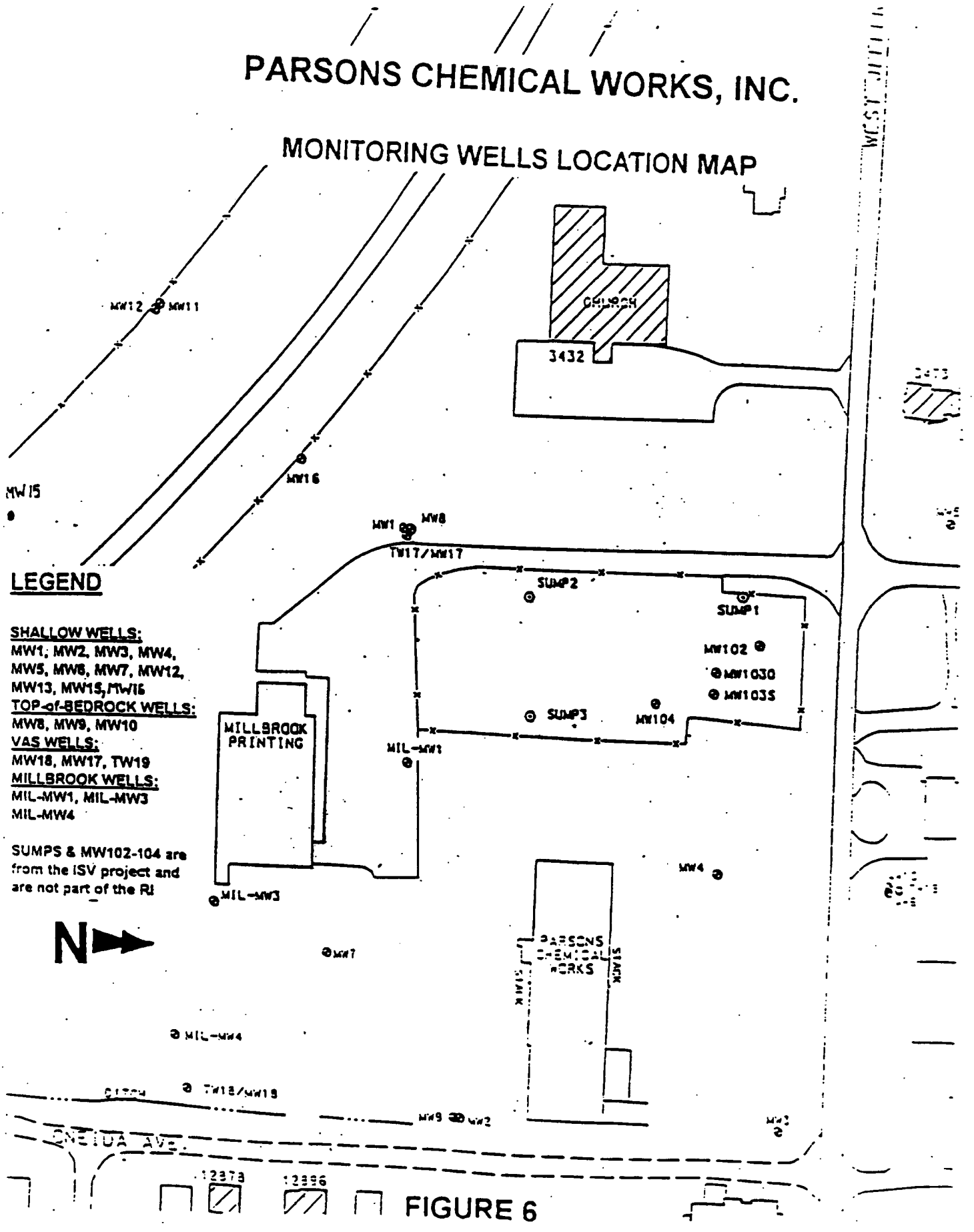


FIGURE 5

PARSONS CHEMICAL WORKS, INC.

MONITORING WELLS LOCATION MAP



LEGEND

SHALLOW WELLS:
MW1, MW2, MW3, MW4, MW5, MW6, MW7, MW12, MW13, MW15, MW16

TOP-of-BEDROCK WELLS:
MW8, MW9, MW10

VAS WELLS:
MW18, MW17, TW19

MILLBROOK WELLS:
MIL-MW1, MIL-MW3
MIL-MW4

SUMPS & MW102-104 are from the ISV project and are not part of the RI

FIGURE 6

TABLE 3-1

FREQUENCIES OF DETECTIONS - GROUNDWATER
PARSONS CHEMICAL WORKS SITE

ANALYTE	CLEANUP CRITERIA (ug/l)	FREQUENCY OF POSITIVE DETECTIONS[1]	FREQUENCY OF EXCEEDANCE	MAXIMUM CONC. (ug/l)	SAMPLE NUMBER	DATE SAMPLED
VOLATILE ORGANIC COMPOUNDS (APRIL 1993 SAMPLING ROUND)						
Trichloroethene	5.0	1/12 (8%)	NONE	5 (J)	PCW-GW-MILMW03	04/15/93
SEMI-VOLATILE ORGANIC COMPOUNDS (APRIL 1993 SAMPLING ROUND)						
Di-n-butylphthalate	330	4/12 (33%)	NONE	0.7 (J)	PCW-GW-MW08-101	04/13/93
bis-(2-Ethylhexyl) phthalate	6.0	7/12 (58%)	NONE	2.0 (J)	PCW-GW-MW03-101, PCW-GW-MW07-101, & PCW-GW-MW08-101	04/13/93 04/14/93 & 04/13/93
Di-n-octylphthalate	130	1/12(8%)	NONE	0.90	PCW-GW-MW05-101	04/13/93
PESTICIDES (APRIL 1993 SAMPLING ROUND)						
Aldrin	0.05	8/18 (44%)	NONE	0.0069 (JP3)	PCW-GW-MW09-102	08/30/93
alpha Chlordane	2.0	1/18 (6%)	NONE	0.001 (JP)	PCW-GW-MW01-101	04/13/93
gamma Chlordane	2.0	7/18 (39%)	NONE	0.0025 (JP)	PCW-GW-MW02-102	08/30/93
Dieldrin	0.053	16/18 (89%)	8/18 (44%)	0.39	PCW-GW-MW08-101	04/13/93
4,4'-DDE	2.5	1/18 (6%)	NONE	0.001 (JP)	PCW-GW-MW09-102	08/30/93
4,4'-DDT	2.5	1/18 (6%)	NONE	0.003 (JP)	PCW-GW-MILMW3-101	04/15/93
Endosulfan II	1.7	1/18 (6%)	NONE	0.002 (JP)	PCW-GW-MILMW3-101	04/15/93
Endosulfan sulfate	NA	1/18 (6%)	NONE	0.00068	PCW-GW-MW02-102	08/30/93
Endrin	2.0	1/18 (6%)	NONE	0.0013 (JP)	PCW-GW-MW01-102	08/30/93
Endrin aldehyde	NA	NONE	NONE	-	-	-
Endrin ketone	NA	4/18 (22%)	NONE	0.012 (J)	PCW-GW-MW01-101	04/13/93
Heptachlor	0.4	3/18 (17%)	NONE	0.0032 (JP3)	PCW-GW-MW02-102	08/30/93
Heptachlor epoxide	0.2	1/18 (6%)	NONE	0.001(JP)	PCW-GW-MW04-101	04/14/93
alpha-BHC	0.2	3/18 (17%)	NONE	0.002 (JP)	PCW-GW-MW01-101	04/13/93
beta-BHC	0.2	1/18 (6%)	NONE	0.008 (JP)	PCW-GW-MW04-101	04/14/93
delta-BHC	0.2	1/18 (6%)	NONE	0.001 (JP)	PCW-GW-MILMW1-101	04/15/93

NOTES:

1 - Ratio and percentage of number of positive detections per total number of samples

2 - Ratio and percentage of number of exceedances per total number of samples

3 - Analyte is found in the associated blank as well as the sample.

4 - Pesticide identification has been confirmed by gas chromatography-mass spectrometer

5 - Concentration of analyte exceeded the calibration range of the GC/MS instrument for the specific analysis. Sample was diluted and re-analyzed.

J - Reported analytical result is an estimated value.

P - Used for a pesticide/aroclor target analyte where there is a greater than 25% difference for detected concentrations between the two columns.

U - Analyte was analyzed for but not detected.

FIGURE 7

TABLE 4-2 (CONTINUED)
PARSONS CHEMICAL WORKS SITE
FREQUENCIES OF DETECTIONS - GROUNDWATER

ANALYTE	CLEANUP CRITERIA (ug/l)	FREQUENCY OF POSITIVE DETECTIONS[1]	FREQUENCY OF EXCEEDANCE	MAXIMUM CONC. (ug/l)	SAMPLE NUMBER	DATE SAMPLED
TOTAL INORGANICS (APRIL 1993 SAMPLING ROUND)						
Aluminum	100	12/12 (100%)	12/12 (100%)	172,000	PCW-GW-MW08-101	04/13/93
Antimony	5.0	2/12 (17%)	2/12 (17%)	22 (B)	PCW-GW-MW08-101	04/13/93
Arsenic	50	10/12 (83%)	NONE	25	PCW-GW-MW08-101	04/13/93
Barium	2,000	12/12 (100%)	NONE	1,380	PCW-GW-MW08-101	04/13/93
Beryllium	4.0	11/12 (92%)	2/12 (17%)	11.4	PCW-GW-MW08-101	04/13/93
TOTAL INORGANICS (APRIL 1993 SAMPLING ROUND)						
Cadmium	5.0	3/12 (25%)	NONE	2.5 (B)	PCW-GW-MW03-101	04/13/93
Calcium	NA	12/12 (100%)	-	1,710,000	PCW-GW-MW08-101	04/13/93
Chromium	100	12/12 (100%)	4/12 (33%)	858	PCW-GW-MW08-101	04/13/93
Cobalt	37	12/12 (100%)	5/12 (42%)	233	PCW-GW-MW08-101	04/13/93
Copper	1,000	12/12 (100%)	NONE	410	PCW-GW-MW08-101	04/13/93
Iron	300	12/12 (100%)	12/12 (100%)	685,000	PCW-GW-MW08-101	04/13/93
Lead	4.0	12/12 (100%)	12/12 (100%)	552	PCW-GW-MW08-101	04/13/93
Magnesium	420,000	12/12 (100%)	1/12 (8%)	554,000	PCW-GW-MW08-101	04/13/93
Manganese	50	12/12 (100%)	12/12 (100%)	13,300	PCW-GW-MW08-101	04/13/93
Mercury	2.0	2/12 (17%)	NONE	0.19 (B)	PCW-GW-MILMW3-101	04/15/93
Nickel	100	12/12 (100%)	4/12 (33%)	581	PCW-GW-MW08-101	04/13/93
Potassium	NA	12/12 (100%)	-	32,700	PCW-GW-MW08-101	04/13/93
Selenium	50	NONE	NONE	-	-	-
Silver	34	1/12(8%)	NONE	28.2	PCW-GW-MW08-101	04/13/93
Sodium	160,000	12/12 (100%)	1/12 (8%)	296,000	PCW-GW-MW05-101	04/13/93
Thallium	2.0	NONE	NONE	-	-	-
Vanadium	84	12/12 (100%)	6/12 (50%)	397	PCW-GW-MW08-101	04/13/93
Zinc	2,400	12/12 (100%)	8/12 (75%)	25,400	PCW-GW-MW08-101	04/13/93

NOTES:
1 - Ratio and percentage of number of positive detections per total number of samples.
2 - Ratio and percentage of number of exceedances per total number of samples.
3 - Analyte is found in the associated blank as well as the sample.
4 - Pesticide identification has been confirmed by gas chromatography/mass spectrometer.
5 - Concentration of analyte exceeded the calibration range of the GC/MS instrument for the specific analysis. Sample was diluted and re-analyzed.
J - Reported analytical result is an estimated value.
P - Used for a pesticide/aroclor target analyte where there is a greater than 25% difference for detected concentrations between the two columns.
U - Analyte was analyzed for but not detected.

TABLE 4-2 (CONTINUED)
PARSONS CHEMICAL WORKS SITE
FREQUENCIES OF DETECTIONS - GROUNDWATER

ANALYTE	CLEANUP CRITERIA (ug/l)	FREQUENCY OF POSITIVE DETECTIONS[1]	FREQUENCY OF EXCEEDANCE	MAXIMUM CONC. (ug/l)	SAMPLE NUMBER	DATE SAMPLED
DISSOLVED INORGANICS (APRIL 1993 SAMPLING ROUND)						
Aluminum	100	10/10 (100%)	2/10 (20%)	2,640	PCW-GW-MW08-101	04/13/93
Arsenic	50	3/10 (30%)	NONE	5.9 (B)	PCW-GW-MW08-101	04/13/93
Barium	2,000	10/10 (100%)	NONE	196 (B)	PCW-GW-MW08-101	04/13/93
Beryllium	4.0	1/10 (10%)	NONE	0.33 (B)	PCW-GW-MW08-101	04/13/93
Cadmium	5.0	3/10 (30%)	1/10 (10%)	8.2	PCW-GW-MW08-101	04/13/93
DISSOLVED INORGANICS (APRIL 1993 SAMPLING ROUND)						
Calcium	NA	10/10 (100%)	-	213,000	PCW-GW-MW08-101	04/13/93
Chromium	100	2/10 (20%)	NONE	27.9	PCW-GW-MW08-101	04/13/93
Cobalt	37	2/10 (20%)	NONE	5.4 (B)	PCW-GW-MW08-101	04/13/93
Copper	1,000	6/10 (60%)	NONE	29.1	PCW-GW-MW08-101	04/13/93
Iron	300	10/10 (100%)	1/10 (10%)	21,000	PCW-GW-MW08-101	04/13/93
Lead	4.0	10/10 (100%)	5/10 (50%)	538	PCW-GW-MW08-101	04/13/93
Magnesium	420,000	10/10 (100%)	NONE	59,400	PCW-GW-MW08-101	04/13/93
Manganese	50	10/10 (100%)	8/10 (80%)	902	PCW-GW-MW08-101	04/13/93
Nickel	100	9/10 (90%)	NONE	35.3	PCW-GW-MW08-101	04/13/93
Potassium	NA	10/10 (100%)	-	2,220	PCW-GW-MW06-101	04/14/93
Selenium	50	2/10 (20%)	NONE	5.5	PCW-GW-MW06-101	04/14/93
Sodium	160,000	10/10 (100%)	2/10 (20%)	298,000	PCW-GW-MW05-101	04/13/93
Vanadium	64	2/10 (20%)	NONE	8.5 (B)	PCW-GW-MW08-10[illegible]	04/13/93
Zinc	2,400	10/10 (100%)	4/10 (40%)	34,700	PCW-GW-MW08-101	04/13/93
VOLATILE ORGANIC COMPOUNDS (JULY 1994 SAMPLING ROUND) : NONE DETECTED						
SEMI - VOLATILE ORGANIC COMPOUNDS (JULY 1994 SAMPLING ROUND) : NONE DETECTED						
PESTICIDES (JULY 1994 SAMPLING ROUND)						
Dieldrin	0.053	4/9 (44%)	2/9 (22%)	0.12	PCW-GW-MW08-102	04/13/93

NOTES:
1 - Ratio and percentage of number of positive detections per total number of samples.
2 - Ratio and percentage of number of exceedances per total number of samples.
3 - Analyte is found in the associated blank as well as the sample.
4 - Pesticide identification has been confirmed by gas chromatography/mass spectrometer.
5 - Concentration of analyte exceeded the calibration range of the GC/MS instrument for the specific analysis. Sample was diluted and re-analyzed.
6 - Reported analytical result is an estimated value.
7 - Used for a pesticide/aroclor target analyte where there is a greater than 25% difference for detected concentrations between the two columns.
8 - Analyte was analyzed for but not detected.

TABLE 4-2 (CONTINUED)
PARSONS CHEMICAL WORKS SITE
FREQUENCIES OF DETECTIONS - GROUNDWATER

ANALYTE	CLEANUP CRITERIA (ug/l)	FREQUENCY OF POSITIVE DETECTIONS[1]	FREQUENCY OF EXCEEDANCE	MAXIMUM CONC. (ug/l)	SAMPLE NUMBER	DATE SAMPLED
TOTAL INORGANICS (JULY 1994 SAMPLING ROUND)						
Aluminum	100	9/9 (100%)	9/9 (100%)	325,000	PCW-GW-MW15-101	07/23/94
Antimony	6.0	2/9 (22%)	2/9 (22%)	75.8	PCW-GW-MW08-102	07/27/94
Arsenic	50	8/9 (89%)	1/9 (11%)	113	PCW-GW-MW10-102	07/27/94
Barium	2,000	9/9 (100%)	NONE	1,520	PCW-GW-MW15-101	07/23/94
Beryllium	4.0	1/9 (11%)	1/9 (11%)	12.7	PCW-GW-MW16-101	07/23/94
Cadmium	5.0	2/9 (22%)	2/9 (22%)	24.2	PCW-GW-MW08-102	07/27/94
TOTAL INORGANICS (JULY 1994 SAMPLING ROUND)						
Calcium	NA	9/9 (100%)	-	3,590,000	PCW-GW-MW15-101	07/23/94
Chromium	100	9/9 (100%)	4/9 (44%)	570	PCW-GW-MW16-101	07/23/94
Cobalt	37	8/9 (89%)	5/9 (56%)	196	PCW-GW-MW16-101	07/23/94
Copper	1,000	8/9 (89%)	NONE	615	PCW-GW-MW15-101	07/23/94
Iron	300	9/9 (100%)	9/9 (100%)	496,000	PCW-GW-MW16-101	07/23/94
Lead	4.0	9/9 (100%)	9/9 (100%)	816	PCW-GW-MW08-102	07/27/94
Magnesium	420,000	9/9 (100%)	1/9 (11%)	1,530,000	PCW-GW-MW16-101	07/23/94
Manganese	50	9/9 (100%)	9/9 (100%)	9,750	PCW-GW-MW16-101	07/23/94
Mercury	2.0	1/9 (11%)	NONE	0.52	PCW-GW-MW16-101	07/23/94
Nickel	100	8/9(89%)	7/9 (78%)	931	PCW-GW-MW16-101	07/23/94
Potassium	NA	9/9 (100%)	-	72,100	PCW-GW-MW16-101	07/23/94
Selenium	50	NONE	NONE	-	-	-
Sodium	160,000	9/9 (100%)	1/9 (11%)	222,000	PCW-GW-MW05-102	07/27/94
Silver	34	NONE	NONE	-	-	-
Thallium	2.0	5/9 (56%)	5/9 (56%)	19 (B)	PCW-GW-MW08-102	07/27/94
Vanadium	64	8/9 (89%)	6/9 (67%)	715	PCW-GW-MW16-101	07/23/94
Zinc	2,400	9/9 (100%)	6/9 (67%)	71,000	PCW-GW-MW08-102	07/27/94

NOTES:
1 - Ratio and percentage of number of positive detections per total number of samples.
2 - Ratio and percentage of number of exceedances per total number of samples.
3 - Analyte is found in the associated blank as well as the sample.
4 - Pesticide identification has been confirmed by gas chromatograph-mass spectrometer.
5 - Concentration of analyte exceeded the calibration range of the GC/MS instrument for the specific analysis. Sample was diluted and re-analyzed.
6 - Reported analytical result is an estimated value.
7 - Used for a pesticide/arochlor target analyte where there is a greater than 25% difference for detected concentrations between the two columns.
8 - Analyte was analyzed for but not detected.

TABLE 4-2 (CONTINUED)
PARSONS CHEMICAL WORKS SITE
FREQUENCIES OF DETECTIONS - GROUNDWATER

ANALYTE	CLEANUP CRITERIA (µg/l)	FREQUENCY OF POSITIVE DETECTIONS[1]	FREQUENCY OF EXCEEDANCE	MAXIMUM CONC. (µg/l)	SAMPLE NUMBER	DATE SAMPLED
DISSOLVED INORGANICS (JULY 1994 SAMPLING ROUND)						
Aluminum	100	NONE	NONE	-	-	-
Arsenic	50	2/9 (22%)	NONE	30.2	PCW-GW-MW10-102	07/27/94
Barium	2,000	9/9 (100%)	NONE	153 (B)	PCW-GW-MW06-102	07/27/94
Beryllium	4.0	NONE	NONE	-	-	-
Cadmium	5.0	NONE	NONE	-	-	-
Calcium	NA	9/9 (100%)	-	172,000	PCW-GW-MW06-102	07/27/94
Chromium	100	NONE	NONE	-	-	-
Cobalt	37	NONE	NONE	-	-	-
DISSOLVED INORGANICS (JULY 1994 SAMPLING ROUND)						
Copper	1,000	NONE	NONE	-	-	-
Iron	300	5/9 (56%)	NONE	63	PCW-GW-MW15-101	07/25/94
Lead	4.0	1/9 (11%)	1/9 (11%)	5.2	PCW-GW-MW11-101	07/25/94
Magnesium	420,000	9/9 (100%)	NONE	45,800	PCW-GW-MW13	07/25/94
Manganese	50	8/9 (89%)	6/9 (67%)	499	PCW-GW-MW06-102	07/27/94
Nickel	100	2/9(22%)	NONE	32.9 (B)	PCW-GW-MW15-101	07/25/94
Potassium	NA	7/9 (78%)	-	3,320	PCW-GW-MW06-102	07/27/94
Selenium	50	NONE	NONE	-	-	-
Sodium	160,000	9/9 (100%)	1/9 (11%)	209,000	PCW-GW-MW06-102	07/27/94
Vanadium	64	NONE	NONE	-	-	-
Zinc	2,400	9/9 (100%)	2/9 (22%)	8,750	PCW-GW-MW11-101	07/25/94
VOLATILE ORGANIC COMPOUNDS (JANUARY 1995 SAMPLING ROUND) : NONE DETECTED						
SEMI-VOLATILE ORGANIC COMPOUNDS (JANUARY 1995 SAMPLING ROUND) : NONE DETECTED						
PESTICIDES (JANUARY 1995 SAMPLING ROUND)						
Dieldrin	0.053	5/19 (25%)	1/19 (5%)	0.066 (J)	PCW-GW-MW03	01/24/95

NOTES:
1 - Ratio and percentage of number of positive detections per total number of samples.
2 - Ratio and percentage of number of exceedances per total number of samples.
B - Analyte is found in the associated blank as well as the sample.
C - Pesticide identification has been confirmed by gas chromatograph/mass spectrometer.
E - Concentration of analyte exceeded the calibration range of the GC/MS instrument for the specific analysis. Sample was diluted and re-analyzed.
J - Reported analytical result is an estimated value.
P - Used for a pesticide/aroclor target analyte where there is a greater than 25% difference for detected concentrations between the two columns.
- - Analyte was analyzed for but not detected.

TABLE 4-2 (CONTINUED)
PARSONS CHEMICAL WORKS SITE
FREQUENCIES OF DETECTIONS - GROUNDWATER

ANALYTE	CLEANUP CRITERIA (µg/l)	FREQUENCY OF POSITIVE DETECTIONS[1]	FREQUENCY OF EXCEEDANCE	MAXIMUM CONC. (µg/l)	SAMPLE NUMBER	DATE SAMPLED
TOTAL INORGANICS (JANUARY 1995 SAMPLING ROUND)						
Aluminum	100	19/19 (100%)	19/19 (100%)	408,000	PCW-GW-TW17-40	01/10/95
Antimony	6.0	2/19 (11%)	2/19 (11%)	73.9	PCW-GW-TW17-55	01/10/95
Arsenic	50	13/19 (95%)	2/19 (11%)	55	PCW-GW-TW19-38	01/15/95
Barium	2,000	19/19 (100%)	1/19 (5%)	2970	PCW-GW-TW17-40	01/10/95
Beryllium	4.0	13/19 (68%)	6/19 (32%)	46.1	PCW-GW-TW19-38	01/15/95
Cadmium	5.0	14/19 (74%)	12/19 (63%)	47.2	PCW-GW-TW17-40	01/10/95
Calcium	NA	19/19 (100%)	–	3,760,000	PCW-GW-TW17-40	01/10/95
Chromium	100	18/19 (100%)	5/19 (25%)	943	PCW-GW-TW19-38	01/15/95
TOTAL INORGANICS (JANUARY 1995 SAMPLING ROUND)						
Cobalt	37	16/19 (84%)	7/19 (37%)	516	PCW-GW-TW17-40	01/10/95
Copper	1,000	18/19 (95%)	NONE	801	PCW-GW-TW17-40	01/10/95
Iron	300	19/19 (100%)	19/19 (100%)	1,590,000	PCW-GW-TW17-40	01/10/95
Lead	4.0	19/19 (100%)	17/19 (89%)	402	PCW-GW-TW17-40	01/10/95
Magnesium	420,000	19/19 (100%)	1/19 (5%)	1,340,000	PCW-GW-TW17-40	01/10/95
Manganese	50	19/19 (100%)	19/19 (100%)	33,600	PCW-GW-TW17-40	01/10/95
Mercury	2.0	3/19 (16%)	NONE	1.1	PCW-GW-TW17-40	01/10/95
Nickel	100	17/19 (89%)	7/19 (37%)	1,060	PCW-GW-TW17-40 & PCW-GW-TW19-38	01/10/95 & 01/15/95
Potassium	NA	19/19 (100%)	–	57,000	PCW-GW-TW17-40	01/10/95
Selenium	50	1/19 (5%)	NONE	13.5	PCW-GW-TW19-38	–
Silver	34	3/19 (15%)	NONE	10.5	PCW-GW-TW17-40	01/10/95
Sodium	160,000	19/19 (100%)	2/19 (10%)	[illegible]30,000	PCW-GW-MW05	01/23/95
Thallium	2.0	1/13 (5%)	1/19 (5%)	2.3 (B)	PCW-GW-TW19-38	01/15/95
Vanadium	54	17/19 (89%)	7/19 (37%)	1,080	PCW-GW-TW17-40	01/10/95
Zinc	2,400	19/19 (100%)	13/19 (68%)	40,300	PCW-GW-MW02	01/24/95

NOTES:

1 - Ratio and percentage of number of positive detections per total number of samples.

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C - Pesticide identification has been confirmed by gas chromatograph/mass spectrometer.

E - Concentration of analyte exceeded the calibration range of the GC/MS instrument for the specific analysis. Sample was diluted and re-analyzed.

J - Reported analytical result is an estimated value.

P - Used for a pesticide/aroclor target analyte where there is a greater than 25% difference for detected concentrations between the two columns.

U - Analyte was analyzed for but not detected.

TABLE 4-2 (CONTINUED)
PARSONS CHEMICAL WORKS SITE
FREQUENCIES OF DETECTIONS - GROUNDWATER

ANALYTE	CLEANUP CRITERIA (ug/l)	FREQUENCY OF POSITIVE DETECTIONS[1]	FREQUENCY OF EXCEEDANCE	MAXIMUM CONC. (ug/l)	SAMPLE NUMBER	DATE SAMPLED
DISSOLVED INORGANICS (JANUARY 1995 SAMPLING ROUND)						
Aluminum	100	9/19 (47%)	7/19 (37%)	844	PCW-GW-MW05	01/23/95
Arsenic	50	10/19 (53%)	NONE	32.5	PCW-GW-TW17-48	01/10/95
Barium	2,000	19/19 (100%)	NONE	181	PCW-GW-TW17-55	01/10/95
Beryllium	4.0	NONE	NONE	-	-	-
Cadmium	5.0	NONE	NONE	-	-	-
Calcium	NA	19/19 (100%)	-	146,000	PCW-GW-MW06	01/24/95
Chromium	100	1/19 (5%)	NONE	11.9	PCW-GW-TW17-48	01/10/95
Cobalt	37	6/19 (32%)	NONE	14.4 (B)	PCW-GW-TW17-48	01/10/95
DISSOLVED INORGANICS (JANUARY 1995 SAMPLING ROUND)						
Copper	1,000	10/19 (53%)	NONE	6.2 (B)	PCW-GW-MILA	01/24/95
Iron	300	19/19 (100%)	1/19 (5%)	495	PCW-GW-TW18-41	01/10/95
Lead	4.0	2/19 (11%)	1/19 (5%)	4.8	PCW-GW-MW05	01/23/95
Magnesium	420,000	19/19 (100%)	NONE	44,000	PCW-GW-MW02 & PCW-GW-MW03	01/24/95
Manganese	50	19/19 (100%)	15/19 (79%)	583	PCW-GW-MILA	01/24/95
Nickel	100	6/19 (32%)	NONE	31.2	PCW-GW-MILA	01/24/95
Potassium	NA	19/19 (100&)	-	13,000	PCW-GW-TW19-38	01/16/95
Selenium	50	NONE	NONE	-	-	-
Sodium	160,000	19/19 (100%)	2/19 (11%)	291,000	PCW-GW-MW05	01/23/95
Vanadi...	64	NONE	NONE	-	-	-
Zinc	2,400	19/19 (100%)	4/19 (21%)	4,370	PCW-GW-MW09	01/24/95

NOTES:
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U - Analyte was analyzed for but not detected.

PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE

MAXIMUM CONCENTRATION of CONTAMINANTS-OF-CONCERN detected in PRIVATE WATER-SUPPLY WELLS

CONTAMINANT IN RESIDENTIAL WELL	HIGHEST CONCENTRATION DETECTED	PART 201 DRINKING WATER STANDARD
ARSENIC	9.4 ppb*	50 ppb
LEAD	2.9 ppb	4 ppb
MANGANESE	63 ppb	860 ppb**
DIELDRIN	not detected	0.053 ppb
	*parts per billion	** aesthetic conc. 50 ppb

FIGURE 8

PARSONS CHEMICAL WORKS, INC.

LOCATION OF CONTAMINATED SOIL TO BE ADDRESSED AS A NON TIME-CRITICAL REMOVAL

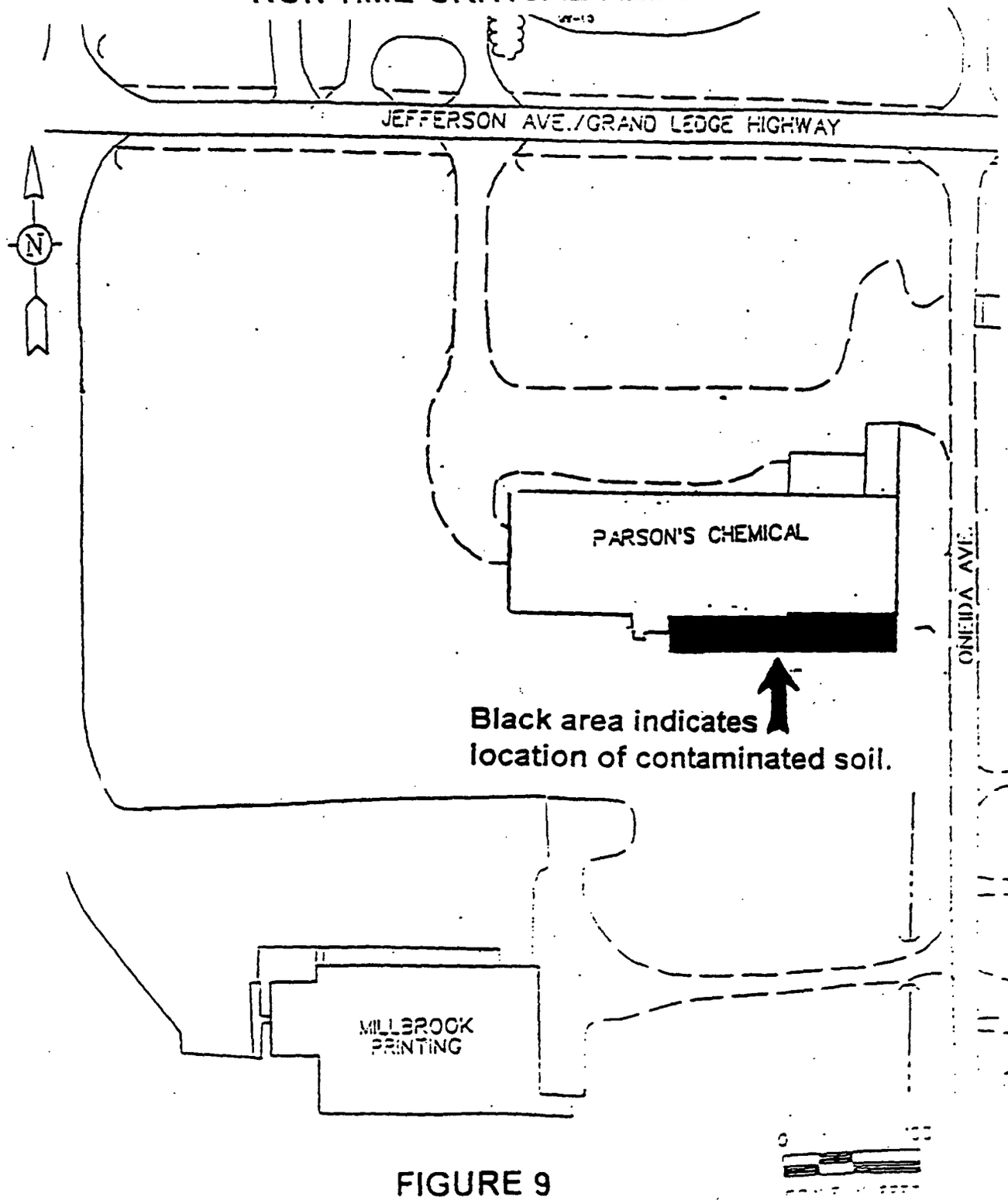


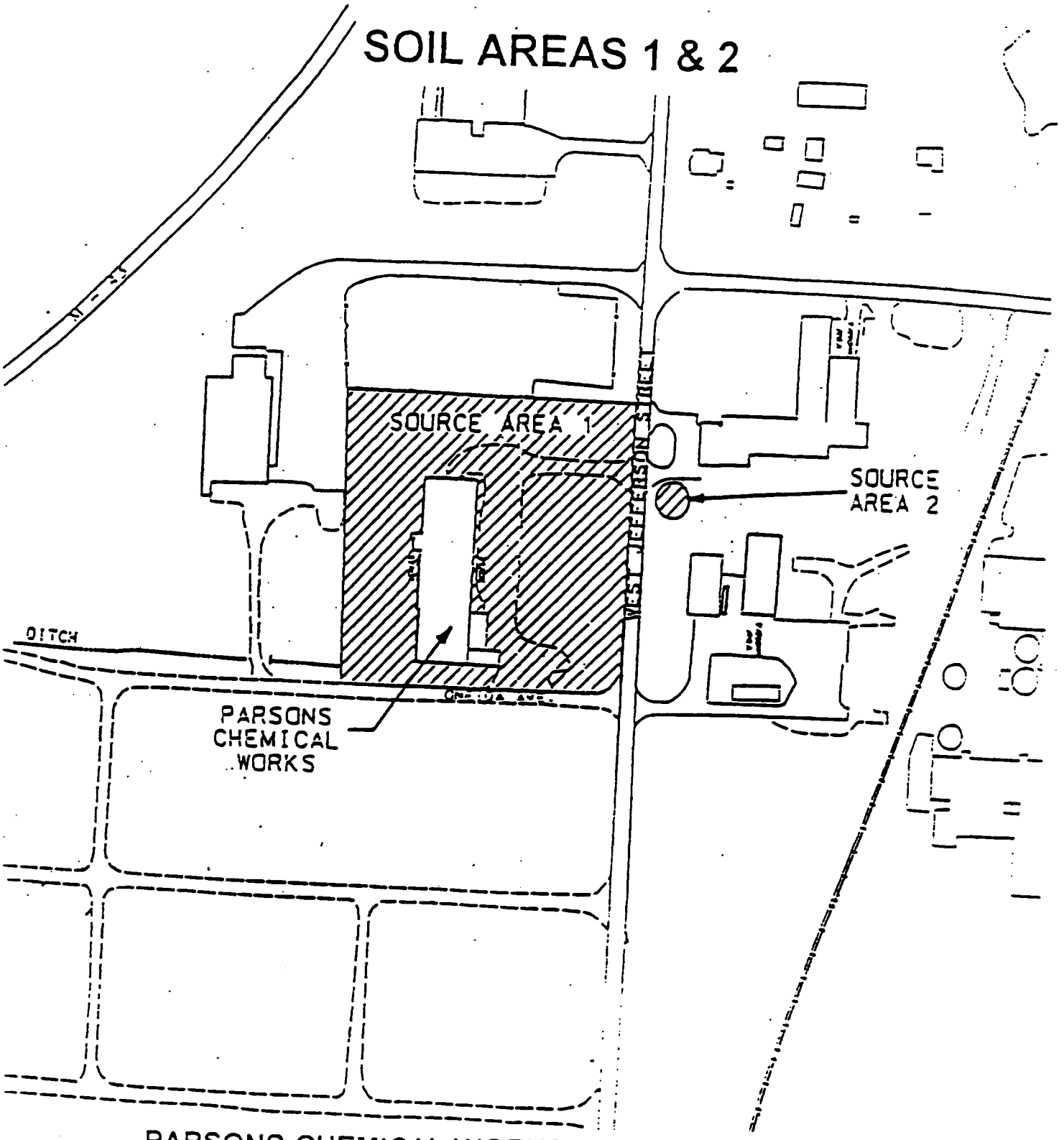
FIGURE 9

PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE

AVERAGE SOIL CONCENTRATIONS IN AREA 1 and the ASSOCIATED DIRECT CONTACT STANDARDS

CHEMICAL	AVERAGE SOIL CONCENTRATION	RESIDENTIAL DIRECT CONTACT STANDARD
Chlordane	5.1	7,600
Dieldrin	25	620
Endrin	6.1	72,000
Lindane	1.8	7,600
Methoxychlor	34	2,100,000
Antimony	6,100	150,000
Arsenic	6,500	6,600
Barium	64,000	30,000,000
Chromium	21,000	630,000,000
Cobalt	9,300	2,100,000
Copper	16,000	15,000,000
Lead	11,000	400,000
Manganese	500,000	2,000,000
Mercury	490	130,000
Nickel	15,000	32,000,000
	All figures are in parts per billion	

FIGURE 10



PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE

FIGURE 11

TABLE E-13a
POSITIVE DETECTIONS OF TOTAL INORGANIC CONSTITUENTS (µg/l)
SURFACE WATER
PARSONS CHEMICAL WORKS SITE

SAMPLE #	DATE SAMPLED	INORGANIC #	ALUMINUM		ARSENIC		BARIUM		CALCIUM		CHROMIUM		COPPER		IRON	
GSI VALUE*			N/A		11		630		N/A		77-total		18		N/A	
PCW-SW-CD1-101	08/27/93	METM61	388		3.0	U	98.1	B	106,000		3.7	B	2.0	U	268	
PCW-SW-DR1-101	08/26/93	METM33	181	B	3.0	U	86.0	B	70,800		6.8	B	3.4	B	613	
PCW-SW-DR2-101	08/26/93	METM42	268		3.0	U	86.2	B	80,000		3.7	B	3.6	B	670	
PCW-SW-DR2-101-DUP	08/26/93	METM46	260		3.0	U	87.7	B	72,900		6.9	B	3.8	B	670	
PCW-SW-DR3-101	08/26/93	METM40	221		3.0	U	84.2	B	87,900		6.1	B	3.7	B	620	
PCW-SW-RBLANK-101	08/26/93	METM48	143	B	3.0	U	0.00	U	160	U	3.0	U	2.0	U	6.4	B
PCW-SW-UC1-101	08/27/93	METM47	78.1	B	3.0	U	47.6	B	81,000		3.0	U	2.0	U	510	
PCW-SW-UC2-101	08/26/93	METM59	177	B	4.2	B	68.9	B	102,000		3.0	U	2.0	U	5700	
PCW-SW-UC3-101	08/26/93	METM58	141	B	3.0	U	62.4	B	87,800		3.3	B	2.0	U	288	
PCW-SW-UC4-101	08/26/93	METM56	193	B	3.0	U	61.0	B	88,200		3.0	U	2.0	U	283	
PCW-SW-UC5-101	08/26/93	METM52	423		3.0	U	68.0	B	87,900		6.9	B	2.0	U	351	
PCW-SW-UC6-101	08/26/93	METM50	358		3.0	U	62.8	B	87,600		3.8	B	2.0	U	218	

*Part 4 of Part 31 of the Natural Resources and Environmental Protection Act, 1994 PA 451 or, National Toxics Rule; Federal Register, December 22, 1992 Groundwater/Surface Water Interface Value

TABLE E-13b
POSITIVE DETECTIONS OF TOTAL INORGANIC CONSTITUENTS (µg/l)
SURFACE WATER
PARSONS CHEMICAL WORKS SITE

SAMPLE #	DATE SAMPLED	INORGANIC #	LEAD		MAGNESIUM		MANGANESE		POTASSIUM		SODIUM		ZINC		TOTAL CYANIDE	
GSI VALUE*			8.8		N/A		N/A		N/A		N/A		81		5.2	
PCW-SW-CD1-101	06/27/93	METM61	1.8	B	37,200		44.3		2,460	B	9,780		74.4		10	U
PCW-SW-GR1-101	06/26/93	METM33	2.8	B	24,800		87.8		3,880	B	28,400		8.8	B	10	U
PCW-SW-GR2-101	06/26/93	METM42	2.2	B	24,600		92.3		3,880	B	28,000		7.8	B	10	U
PCW-SW-GR2-101-DUP	06/26/93	METM46	1.8	B	28,400		86.2		4,140	B	28,800		8.7	B	10	U
PCW-SW-GR3-101	06/26/93	METM40	3.1		24,100		82		3,340	B	27,800		8.7	B	10	U
PCW-SW-RBLANK-101	06/26/93	METM48	1	U	112	B	1	U	828	B	770	B	3.7	B	10	U
PCW-SW-UC1-101	06/27/93	METM47	1	U	28,600		80.6		3,140	B	28,600		2.8	B	10	U
PCW-SW-UC2-101	06/26/93	METM59	1	U	32,700		484		3,030	B	41,000		2	U	10	U
PCW-SW-UC3-101	06/26/93	METM58	1	U	27,800		74.1		3,270	B	29,600		5.2	B	12.6	
PCW-SW-UC4-101	06/26/93	METM56	1	U	26,700		70.6		2,460	B	23,100		2.4	B	10	U
PCW-SW-UC5-101	06/26/93	METM52	1	U	27,700		83.7		3,810	B	21,100		2.3	B	10	U
PCW-SW-UC6-101	06/26/93	METM50	1	U	27,000		86.3		2,310	B	22,000		3.3	B	10	U

*Part 4 of Part 31 of the Natural Resources and Environmental Protection Act, 1994 PA 451 or,
National Toxics Rule; Federal Register, December 22, 1992
Groundwater/Surface Water Interface Value

TABLE E-14a
POSITIVE DETECTIONS OF SEMI-VOLATILE ORGANIC COMPOUNDS (µg/kg)
SEDIMENTS
PARSONS CHEMICAL WORKS SITE

SAMPLE #	DATE SAMPLED	CLP #	ACENAPHTHENE		ACENAPHTHYLENE		ANTHRACENE		BENZO(a) ANTHRACENE		BENZO(b) FLUORANTHENE		BENZO(g,h,i) PERYLENE		BENZO(a) PYRENE		BUTYLBENZYL PHTHALATE	
PCW-SD-GR1-101	05/24/93	ETX37	880	U	880	U	880	U	300	J	380	J	140	J	190	J	2,100	
PCW-SD-GR2-101	05/24/93	ETX38	30	J	420	U	44	J	270	J	830		180	J	140	J	420	U
PCW-SD-GR3-101	05/24/93	ETX39	440	U	440	U	61	J	380	J	700		190	J	300	J	87	J
PCW-SD-GR4-101	05/25/93	ETX40	410	U	410	U	410	U	47	J	130	J	410	U	410	U	410	U
PCW-SD-GR6-101	05/25/93	ETX41	100	J	28	J	88	J	930		1,600		400	J	490		130	J
PCW-SD-GR7-101	05/25/93	ETX42	650	U	36	J	67	J	830		,300		330	J	610	J	200	J
PCW-SD-GR7-101-DUP	05/25/93	ETX43	48	J	680	U	38	J	800		1,200		330	J	360	J	170	J
PCW-SD-GR8-101	05/25/93	ETX48	42	J	44	J	34	J	780		1,400		410	J	410	J	180	J
PCW-SD-UC1-101	05/25/93	ETX48	400	U	400	U	400	U	100	J	88	J	400	U	61	J	400	U
PCW-SD-UC2-101	05/25/93	ETX49	400	U	400	U	400	U	400	U	400	U	400	U	400	U	400	U
PCW-SD-UC3-101	05/26/93	ETX67	380	U	380	U	380	U	380	U	380	U	380	U	380	U	380	U
PCW-SD-UC4-101	05/26/93	ETX64	420	U	420	U	420	U	48	J	110	J	420	U	38	J	420	U
PCW-SD-UC6-101	05/26/93	ETX60	390	U	390	U	390	U	390	U	48	J	390	U	390	U	390	U
PCW-SD-UC6-101-DUP	05/26/93	ETX61	400	U	400	U	400	U	400	U	24	J	400	U	400	U	400	U
PCW-SD-UC7-101	05/26/93	ETX68	420	U	420	U	420	U	420	U	420	U	420	U	420	U	420	U

TABLE E-14b
POSITIVE DETECTIONS OF SEMI-VOLATILE ORGANIC COMPOUNDS (µg/kg)
SEDIMENTS
PARSONS CHEMICAL WORKS SITE

SAMPLE #	DATE SAMPLED	CLP #	CARBAZOLE		DIETHYLENE		PHENANTHRENE (A/H ANTHRACENE		DIBENZOFURAN		di-n-BUTYL PHTHALATE		DIETHYL-PHTHALATE		bis(2-ETHYLHEXYL) PHTHALATE	
PCW-SD-GR1-101	05/24/93	ETX37	590	U	280	J	79	J	590	U	590	U	590	U	2,600	BU
PCW-SD-GR2-101	05/24/93	ETX38	44	J	280	J	88	J	21	J	420	U	420	U	140	BU
PCW-SD-GR3-101	05/24/93	ETX39	81	J	380	J	440	U	440	U	83	J	440	U	220	BU
PCW-SD-GR4-101	05/20/93	ETX40	410	U	88	J	410	U	410	U	410	U	410	U	77	BU
PCW-SD-GR6-101	05/25/93	ETX41	88	J	640		130	J	48	J	420	U	420	U	190	BU
PCW-SD-GR7-101	05/25/93	ETX42	87	J	870	J	650	U	650	U	650	U	650	U	740	BU
PCW-SD-GR7-101-DUP	05/25/93	ETX43	38	J	480	J	170	J	38	J	38	J	680	U	340	BU
PCW-SD-GR8-101	05/25/93	ETX44	34	J	610		190	J	28	J	46	J	180	U	860	BU
PCW-SD-UC1-101	05/25/93	ETX45	400	J	83	J	400	U	400	U	400	U	400	U	400	U
PCW-SD-UC2-101	05/25/93	ETX46	400	U	400	U	400	U	400	U	400	U	400	U	37	BU
PCW-SD-UC3-101	05/20/93	ETX47	390	U	390	U	390	U	390	U	17	J	390	U	80	BU
PCW-SD-UC4-101	05/24/93	ETX64	420	U	60	J	420	U	420	U	32	J	420	U	40	BU
PCW-SD-UC5-101	05/20/93	ETX60	390	U	37	J	390	U	390	U	390	U	390	U	82	BU
PCW-SD-UC6-101-DUP	05/20/93	ETX61	400	U	400	U	400	U	400	U	400	U	41	J	40	BU
PCW-SD-UC7-101	05/20/93	ETX62	420	U	420	U	420	U	420	U	420	U	420	U	43	BU

TABLE E-14c
POSITIVE DETECTIONS OF SEMI-VOLATILE ORGANIC COMPOUNDS (µg/kg)
SEDIMENTS
PARSONS CHEMICAL WORKS SITE

SAMPLE #	DATE SAMPLED	CLP #	FLUORANTHENE		FLUORENE		INDENO(1,2,3-cd)PYRENE		2-METHYL NAPHTHALENE		NAPHTHALENE		PHENANTHRENE		PYRENE	
PCW-SD-SR1-101	08/24/93	ETX37	800		980	U	89	J	980	U	980	U	350	J	720	
PCW-SD-SR2-101	08/24/93	ETX38	880		38	J	170	J	420	U	420	U	840		860	
PCW-SD-SR3-101	08/24/93	ETX39	730		22	J	140	J	440	U	440	U	370	J	710	
PCW-SD-SR4-101	08/25/93	ETX40	130	J	410	U	39	J	410	U	410	U	87	J	110	J
PCW-SD-SR6-101	08/26/93	ETX41	1,800		78	J	330	J	24	J	48	J	1,200		1,800	
PCW-SD-SR7-101	08/26/93	ETX42	1,400		83	J	230	J	880	U	34	J	840		1,300	
PCW-SD-SR7-101-DUP	08/26/93	ETX43	1,100		83	J	220	J	880	U	28	J	800		1,100	
PCW-SD-SR8-101	08/26/93	ETX46	1,200		88	J	280	J	25	J	34	J	770		1,200	
PCW-SD-UC1-101	08/25/93	ETX45	120	J	400	U	400	U	400	U	22	J	180	J	180	J
PCW-SD-UC2-101	08/25/93	ETX48	20	J	400	U	400	U	400	U	400	U	27	J	21	J
PCW-SD-UC3-101	08/26/93	ETX47	390	U	390	U	420	U	390	U	390	U	28	J	390	U
PCW-SD-UC4-101	08/26/93	ETX44	97	J	420	U	400	U	420	U	24	J	120	J	100	J
PCW-SD-UC6-101	08/26/93	ETX50	21	J	390	U	420	U	390	U	390	U	25	J	21	J
PCW-SD-UC6-101-DUP	08/26/93	ETX51	20	J	400	U	390	U	400	U	18	J	28	J	24	J
PCW-SD-UC7-101	08/26/93	ETX68	420	U	420	U	420	U	420	U	420	U	420	U	420	U

TABLE E-16a
POSITIVE DETECTIONS OF PESTICIDES and PCBs (µg/kg)
SEDIMENTS
PARSONS CHEMICAL WORKS SITE

SAMPLE #	DATE SAMPLED	QLP #	ALDRIN		alpha BHC		delta BHC		gamma CHLORDANE		alpha CHLORDANE		4,4'-DDD		4,4'-DDE		4,4'-DDT		DIELDRIN		ENDOSULFAN II	
PCW-SD-GR1-101	06/24/93	ETX37	3	U	3	U	2.8	JP	3	U	4	P	140	PE	680	EX	9.8	P	5.8	U	5.8	U
PCW-SD-GR2-101	06/24/93	ETX38	2.3	U	2.3	U	2.3	U	2.3	U	0.23	JP	2.3	JP	3.7	JP	2.1	JP	0.29	JP	0.39	JP
PCW-SD-GR3-101	06/24/93	ETX39	2.3	U	2	U	2.3	U	2.3	U	0.71	JP	7.1	P	6.4		1.8	JP	0.69	JP	0.24	JP
PCW-SD-GR4-101	06/25/93	ETX40	2.1	U	2.1	U	0.32	JP	1.2	PJ	2.4		14		9.2		3	JP	3.8	PJ	4.1	U
PCW-SD-GR6-101	06/25/93	ETX41	2.2	U	2.2	U	2.2	U	2.2	U	1.2	JP	4.8	P	9.7		3.4	JP	0.89	JP	0.83	JP
PCW-SD-GR7-101	06/25/93	ETX42	3.3	U	3.3	U	3.3	U	3.3	U	3	JP	33	P	10		21	P	3	JP	8.8	U
PCW-SD-GR7-101-DUP	06/25/93	ETX43	3	U	3	U	3	U	3	U	3	P	36	P	20		180	E	2.7	JP	1.8	JP
PCW-SD-GR8-101	06/25/93	ETX46	3.6	U	3.6	U	3.6	U	3.6	U	4		33	P	10	P	9.9	P	0.95	JP	4.9	U
PCW-SD-UC1-101	06/25/93	ETX48	0.88	JP	2	U	2.1	U	4.4	P	8	P	32	P	12		28	P	30		4	U
PCW-SD-UC2-101	06/25/93	ETX49	2	U	2	U	2.0	U	1.4	JP	1.8	JP	16		8		180	E	4	U	4	U
PCW-SD-UC3-101	06/28/93	ETX87	0.21	JP	2	U	2.0	U	0.33	JP	0.77	J	3	JP	1.4	J	2.1	J	1.3	JP	3.8	U
PCW-SD-UC4-101	06/28/93	ETX84	3.1	P	0.34	JP	2.2	U	8.2	P	11	P	88		33		30	P	4.2	U	4.2	U
PCW-SD-UC6-101	06/28/93	ETX82	2.1	U	2.1	U	0.84	JP	0.84	JP	0.89	J	3.8	JP	1.7	J	4.1	P	0.18	JP	4.1	U
PCW-SD-UC8-101	06/28/93	ETX80	2	U	2	U	2.0	U	0.31	JP	0.88	JP	3.7	JP	1.3	J	11	P	13		3.8	U
PCW-SD-UC8-101-DUP	06/28/93	ETX81	2	U	2	U	2.0	U	1.1	JP	1.7	J	10		3.8	J	21		13		4	U
PCW-SD-UC7-101	06/28/93	ETX69	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U

TABLE E-15b
POSITIVE DETECTIONS OF PESTICIDES and PCBs (µg/kg)
SEDIMENTS
PARSONS CHEMICAL WORKS SITE

SAMPLE #	DATE SAMPLED	CLP #	ENDOSULFAN SULFATE		ENDRIN		ENDRIN ALDEHYDE		ENDRIN KETONE		HEPTACHLOR		HEPTACHLOR EPOXIDE		METHOXYCHLOR		PCB 1016		PCB 1254	
PCW-SD-OR1-101	06/24/93	ETX37	1.2	JP	4.1	JP	8.0	U	8.0	U	2.2	JP	3	U	1.3	JP	130		680	X
PCW-SD-OR2-101	06/24/93	ETX38	4.2	U	1.1	J	4.2	U	4.2	U	2.2	U	2.2	U	0.74	JP	42	U	11	
PCW-SD-OR3-101	06/24/93	ETX39	0.23	JP	2.5	JP	4.8	U	4.8	U	2.7	P	2.3	U	1.1	JP	46	U	38	
PCW-SD-OR4-101	06/25/93	ETX40	4.1	U	1.1	PJ	4.1	U	4.1	U	2.1	U	2.1	U	21	U	41	U	41	U
PCW-SD-OR6-101	06/26/93	ETX41	4.2	U	4.3	P	4.2	U	4.2	U	0.24	JP	2.2	U	22	U	42	U	83	
PCW-SD-OR7-101	06/26/93	ETX42	0.61	JP	8.1	JP	3.4	JP	8.6	U	2.9	JP	0.10	JP	4	JP	86	U	84	
PCW-SD-OR7-101-DUP	06/26/93	ETX43	8.8	U	4.8	JP	8.8	U	8.8	U	3	U	0.14	JP	3.4	JP	88	U	88	P
PCW-SD-OR8-101	06/26/93	ETX44	0.38	JP	3.8	JP	4.8	U	4.8	U	2.8	U	2.8	U	3.3	JP	48	U	94	
PCW-SD-UC1-101	06/28/93	ETX45	4	U	8.7	P	4	U	4	U	2.1	U	0.71	J	3.4	JP	40	U	40	U
PCW-SD-UC2-101	06/26/93	ETX46	4	U	0.32	JP	4	U	4	U	2	U	2	U	20	U	40	U	40	U
PCW-SD-UC3-101	06/28/93	ETX47	3.8	U	0.2	JP	3.8	U	3.8	U	2	U	2	U	20	U	38	U	38	U
PCW-SD-UC4-101	06/28/93	ETX84	4.2	U	1.4	JP	2.4	JP	4.2	U	2.8	P	0.28	J	22	U	42	U	42	U
PCW-SD-UC5-101	06/28/93	ETX83	4.1	U	0.18	JP	4.1	U	4.1	U	2.1	U	2.1	U	0.28	JP	41	U	41	U
PCW-SD-UC8-101	06/28/93	ETX80	3.8	U	0.35	JP	3.8	U	3.8	U	2	U	2	U	20	U	38	U	38	U
PCW-SD-UC8-101-DUP	06/28/93	ETX81	4	U	0.34	JP	4	U	0.31	J	2	U	2	U	0.39	JP	40	U	40	U
PCW-SD-UC7-101	06/28/93	ETX88	4.2	U	0.23	JP	4.2	U	4.2	U	2.2	U	2.2	U	22	U	42	U	42	U

TABLE E-16
POSITIVE DETECTIONS OF DIOXINS and FURANS (µg/kg)
SEDIMENTS
TEF-ADJUSTED CONCENTRATIONS
PARSONS CHEMICAL WORKS SITE

SAMPLE #	DATE SAMPLED	CLP #	2,3,7,8-TCDD		2,3,7,8-TCDF		PeCDD (TOTAL)		PeCDF (TOTAL)		HxCDD (TOTAL)		HxCDF (TOTAL)		HpCDD (TOTAL)		HpCDF (TOTAL)		OCDD (TOTAL)		OCDF (TOTAL)		TOTAL
PCW-SD-OR1-101	06/24/93	PE760	0.0	U	0.0	U	0.0	U	0.0	U	0.008	JB	0.0	U	0.04		0.02		0.01		0.0	U	0.15
PCW-SD-OR2-101	06/24/93	PE761	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0001	JB	0.0	U	0.0001
PCW-SD-OR3-101	06/24/93	PE762	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0006	J	0.0003	JB	0.00028	J	0.0	U	0.0011
PCW-SD-OR4-101	06/25/93	PE763	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.00012	JB	0.0	U	0.00012
PCW-SD-OR5-101	06/25/93	PE764	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.00014	JB	0.0	U	0.00014
PCW-SD-OR7-101	06/25/93	PE765	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.00083	J	0.0	U	0.00083
PCW-SD-OR7-101-DUP	06/25/93	PE766	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.00073	J	0.0	U	0.0073
PCW-SD-OR8-101	06/25/93	PE767	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.0023	J	0.0014	J	0.0018		0.0	U	0.0063
PCW-SD-UC3-101	06/25/93	PE765	0.01		0.0	U	0.016	J	0.0	U	0.0	U	0.003	J	0.0	U	0.0003	J	0.00011	J	0.00007	J	0.032
PCW-SD-UC8-101	06/25/93	PE761	0.0	U	0.0	U	0.0	U	0.0	U	0.0	U	0.12	J	0.0	U	0.0	U	0.0	U	0.0	U	0.12

TABLE E-17a
POSITIVE DETECTIONS OF TOTAL INORGANIC CONSTITUENTS (mg/kg)
SEDIMENTS
PARSONS CHEMICAL WORKS SITE

SAMPLE #	DATE SAMPLED	TOTAL INORGANIC #	ALUMINUM		ANTIMONY		ARSENIC		BARIUM		BERYLLIUM		CADMIUM		CALCIUM		CHROMIUM	
PCW-SD-SA1-101	05/24/93	METM34	6,610		9.00	U	14.2		499		0.70	B	10		48,600		295	
PCW-SD-SA2-101	05/24/93	METM35	1,730		8.90	U	3.40		34.6	B	0.26	U	1.3		22,300		14.6	
PCW-SD-SA3-101	05/24/93	METM36	1,520		8.70	U	1.60	B	11.1	B	0.26	U	0.70	U	38,700		4.70	
PCW-SD-SA4-101	05/25/93	METM37	1,310		8.70	U	3.60		12.0	B	0.26	U	0.90	U	7,200		8.10	
PCW-SD-SA5-101	05/25/93	METM38	1,490		8.80	U	2.80		20.6	B	0.26	U	0.90	U	16,600		12.6	
PCW-SD-SA7-101	05/25/93	METM39	3,780		10.3	U	7.10		83.3		0.46	U	1.3	U	28,700		26.9	
PCW-SD-SA7-101-DUP	05/25/93	METM40	3,030		8.30	U	4.20		67.9	B	0.38	U	1.1	U	17,900		18.1	
PCW-SD-SA9-101	05/25/93	METM41	2,790		7.10	U	6.00		55.1	B	0.31	U	1.1	B	27,900		21.3	
PCW-SD-UC1-101	05/25/93	METM43	2,000		8.70	U	4.10		23.8	B	0.32	B	0.70	U	8,880		8.80	
PCW-SD-UC2-101	05/25/93	METM44	2,250		8.90	U	3.20		20.8	B	0.26	U	0.90	U	7,390		8.20	
PCW-SD-UC3-101	05/25/93	METM90	3,540		8.80	U	6.80		24.8	B	0.38	B	1.2	B	4,060		7.70	
PCW-SD-UC4-101	05/25/93	METM87	4,160		8.10	U	3.30		35.8	B	0.28	B	0.80	U	36,700		8.30	
PCW-SD-UC5-101	05/26/93	METM86	2,090		8.90	U	3.40		16.2	B	0.26	U	0.80	U	26,600		6.50	
PCW-SD-UC6-101	05/26/93	METM83	5,040		7.10	B	3.80		28.7	B	0.34	B	0.70	U	83,300		12.5	
PCW-SD-UC6-101-DUP	05/26/93	METM84	4,830		8.80	U	4.20		33.7	B	0.33	B	0.70	U	83,300		10.6	
PCW-SD-UC7-101	05/26/93	METM81	1,460		9.00	U	1.80	B	10.7	B	0.24	U	0.80	B	23,600		4.30	

TABLE E-17b
POSITIVE DETECTIONS OF TOTAL INORGANIC CONSTITUENTS (mg/kg)
SEDIMENTS
PARSONS CHEMICAL WORKS SITE

SAMPLE #	DATE SAMPLED	TOTAL INORGANIC #	COBALT		COPPER		IRON		LEAD		MAGNESIUM		MANGANESE		MERCURY		NICKEL	
PCW SD-SR1-101	05/24/93	METM34	6.7	B	413		21,000		207		8,830		505		0.20		138	
PCW SD-SR2-101	05/24/93	METM35	2.9	B	10.8		8,480		20.1		5,780		287		0.13	U	13.9	
PCW-SD-SR3-101	05/24/93	METM36	1.8	U	2.10	B	3,880		3		6,430		228		0.12	U	3.90	B
PCW-SD-SR4-101	05/25/93	METM37	2.8	B	4.80	B	8,440		8.80		2,240		141		0.12	U	4.70	B
PCW-SD-SR6-101	05/25/93	METM38	2.5	B	10.7		8,740		10.7		3,430		203		0.13	U	11.8	
PCW-SD-SR7-101	05/26/93	METM39	4.4	B	37.7		14,800		48.8		7,830		448		0.22	U	18.7	
PCW-SD-SR7-101-DUP	05/26/93	METM40	3.2	B	24.4		10,400		28.0		6,400		290		0.18	U	14.8	
PCW-SD-SR9-101	05/26/93	METM41	3.0	B	26.8		10,400		48.8		8,940		367		0.16	U	13.9	
PCW-SD-UC1-101	05/26/93	METM43	4.8	B	8.60	B	11,700		9.40		3,880		308		0.12	U	8.90	B
PCW-SD-UC2-101	05/26/93	METM44	2.8	B	3.80	B	8,710		8.80		2,810		197		0.13	U	5.80	B
PCW-SD-UC3-101	05/26/93	METM80	8.10	B	4.10	B	10,000		9.40		2,850		265		0.12	U	10.8	
PCW-SD-UC4-101	05/26/93	METM87	4.16	B	8.80		10,200		12.3		8,000		483		0.13	U	7.60	B
PCW-SD-UC5-101	05/26/93	METM88	3.50	B	3.10	B	8,880		4.40		6,780		234		0.13	U	4.30	B
PCW-SD-UC6-101	05/26/93	METM83	4.40	B	10.3		10,100		8.00		33,100		273		0.12	U	12.2	
PCW-SD-UC6-101-DUP	05/26/93	METM84	4.70	B	11.4		10,600		7.40		30,000		278		0.12	U	13.3	
PCW-SD-UC7-101	05/26/93	METM81	1.50	U	1.80	U	3,810		3.00		7,890		243		0.12	U	3.00	B

TABLE E-17c
POSITIVE DETECTIONS OF TOTAL INORGANIC CONSTITUENTS (mg/kg)
SEDIMENTS
PARSONS CHEMICAL WORKS SITE

SAMPLE #	DATE SAMPLED	TOTAL INORGANIC #	POTASSIUM		SELENIUM		SILVER		SODIUM		THALLIUM		VANADIUM		ZINC		TOTAL CYANIDE	
PCW-SD-GR1-101	05/24/93	METM34	601	B	0.84	U	0.1		344	B	0.84	U	14.4	B	891		1.80	
PCW-SD-GR2-101	05/24/93	METM35	197	B	0.51	U	1.8	U	133	B	0.51	U	5.50	B	58		0.63	U
PCW-SD-GR3-101	05/24/93	METM36	178	B	0.50	U	1.7	U	111	B	0.50	U	6.30	B	11.5		0.62	U
PCW-SD-GR4-101	05/26/93	METM37	197	B	0.50	U	1.7	U	128	B	0.50	U	4.90	B	30.8		0.62	U
PCW-SD-GR6-101	05/26/93	METM38	183	B	0.50	U	1.6	U	123	B	0.50	U	4.30	B	84.5		0.63	U
PCW-SD-GR7-101	05/26/93	METM39	404	B	0.90	U	3.1	U	307	B	0.90	U	8.70	B	154		1.1	U
PCW-SD-GR7-101-DUP	05/26/93	METM40	378	B	0.72	U	2.6	U	171	B	0.72	U	8.00	B	108		0.90	U
PCW-SD-GR8-101	05/26/93	METM41	284	B	0.62	U	2.2	U	148	B	0.62	U	7.70	B	105		0.77	U
PCW-SD-UC1-101	05/26/93	METM43	330	B	0.50	U	1.7	U	107	B	0.50	U	8.30	B	32.4		0.62	U
PCW-SD-UC2-101	05/26/93	METM44	374	B	0.53	U	1.8	U	127	B	0.53	U	7.00	B	26.3		0.66	U
PCW-SD-UC3-101	05/26/93	METM80	307	B	0.48	U	1.7	U	124	B	0.48	U	10.0	B	30.6		0.59	U
PCW-SD-UC4-101	05/26/93	METM87	812	B	0.53	U	1.8	U	167	B	0.53	U	11.8	B	37.4		0.66	U
PCW-SD-UC5-101	05/26/93	METM88	240	B	0.51	U	1.8	U	118	B	0.51	U	8.00	B	16.8		0.64	U
PCW-SD-UC6-101	05/26/93	METM83	972	B	0.47	U	1.6	U	141	B	0.47	U	18.2		24.8		0.59	U
PCW-SD-UC6-101-DUP	05/26/93	METM84	670	B	0.47	U	1.7	U	132	B	0.66	B	14.6		27.3		0.59	U
PCW-SD-UC7-101	05/26/93	METM81	198	B	0.48	U	1.7	U	98.7	B	0.60	B	8.80	B	10.1		0.61	U

METALS AND PESTICIDE IDENTIFIED for EVALUATION in the BASELINE RISK ASSESSMENT as CONTAMINANTS of CONCERN in GROUNDWATER

CHEMICAL	FREQUENCY OF DETECTION[a]	PRACTICAL QUANTITATION LIMITS	RANGE OF DETECTED CONCENTRATIONS	APPLICABLE CLEANUP CRITERIA
GROUNDWATER, LOWER AQUIFER, CONCENTRATIONS IN ug/L:				
ALUMINUM[c]	6(6)	19.2	1,250 - 31,900	100
ANTIMONY[c]	1(6)	5.3	15.3	5.0
CADMIUM[c]	4(6)	0.4	3.2 - 27.9	5.0
CHROMIUM[c]	6(6)	4.1	21.5 - 127	100
IRON[c]	5(6)	20	3,530 - 172,000	300
LEAD[c]	6(6)	1.3	2.0 - 536	4.0
MANGANESE[c]	5(5)	0.3	151 - 3,540	50
VANADIUM[c]	6(6)	0.4	3.3 - 104	84
ZINC[c]	6(6)	10	1,550 - 75,100	2,400
GROUNDWATER, SHALLOW AQUIFER, CONCENTRATIONS IN ug/L:				
DIELDRIN	5(8)	0.1	0.013 - 0.12	0.052
ALUMINUM[c]	8(8)	19.2	3,250 - 89,400	100
ANTIMONY[c]	1(8)	5.5	21.3	5.0
CADMIUM[c]	5(8)	0.4	5.7 - 18.1	5.0
CHROMIUM[c]	2(8)	3.0	120 - 122	100
COBALT[c]	7(8)	4.5	5.1 - 49.4	37
IRON[c]	8(8)	20	4,310 - 111,000	300
LEAD[c]	8(8)	1.3	34.8 - 346	4.0
MANGANESE[c]	8(8)	0.3	208 - 2,730	50
NICKEL[c]	8(8)	4.2	22.3 - 133	100
SODIUM[c]	8(8)	37	10,200 - 290,000	150,000
VANADIUM[c]	8(8)	0.4	5 - 154	84
ZINC[c]	8(8)	8.0	88 - 40,300	2,400

NOTES

[a] NUMBER OF SAMPLES IN WHICH THE ANALYTE WAS DETECTED/TOTAL NUMBER OF SAMPLES CONSIDERED

[b] SAMPLES WERE ANALYZED USING TER-ADJUSTED DIOXIN METHOD. THEREFORE A SAMPLE QUANTITATION LIMIT IS NOT AVAILABLE.

CONCENTRATIONS DESIGNATED FOR FIGURE 12

TABLE 6-11

CHRONIC HAZARD INDEX ESTIMATES
PARSONS CHEMICAL WORKS SITE

EXPOSURE PATHWAY	POPULATION CHRONIC HAZARD RISK ESTIMATE		
	ADULT	CHILDREN 6 +	INDUSTRIAL
DERMAL CONTACT WITH SOIL - SURFACE SOIL AREA 1	5.0 E-2	1.0 E-1	2.0 E-2
INGESTION OF SOIL - SURFACE SOIL AREA 1	2.0 E-1	1.0 E-1	1.0 E-1
DERMAL CONTACT WITH SOIL - SURFACE SOIL AREA 2	1.0 E-0	1.0 E-0	NA
INGESTION OF SOIL - SURFACE SOIL AREA 2*	2.0 E-0	2.0 E-0	NA
DERMAL CONTACT WITH SEDIMENT	3.0 E-3	8.0 E-3	NA
INGESTION OF SEDIMENT	3.0 E-3	7.0 E-3	NA
DERMAL CONTACT WITH GROUNDWATER - LOWER AQUIFER	7.0 E-1	7.0 E-1	NA
INGESTION OF GROUNDWATER - LOWER AQUIFER	3.0 E-1	3.0 E-1	NA
INHALATION OF FUGITIVE DUST	4.0 E-7	4.0 E-7	1.0 E-7
TOTAL POPULATION CHRONIC HAZARD RISK ESTIMATE	3.0 E-1	3.0 E-1	1.0 E-1

NOTES

NA - NOT APPLICABLE AS A RESULT OF NO EXPOSURE TO THIS SCENARIO.

FIGURE 14

TABLE 5-12

SUBCHRONIC HAZARD INDEX ESTIMATES
PARSONS CHEMICAL WORKS SITE

EXPOSURE PATHWAY	POPULATION SUBCHRONIC HAZARD RISK ESTIMATE	
	CHILDREN 1-4	COMMERCIAL
DERMAL CONTACT WITH SOIL - SURFACE SOIL AREA 1	2.0 E-1	9.0 E-4
INGESTION OF SOIL - SURFACE SOIL AREA 1	5.0 E-1	NA
DERMAL CONTACT WITH SOIL - SURFACE SOIL AREA 2	1.0 E-0	1.0 E-2
INGESTION OF SOIL - SURFACE SOIL AREA 2	7.0 E-0	NA
DERMAL CONTACT WITH SEDIMENT	4.0 E-3	NA
INGESTION OF SEDIMENT	3.0 E-2	NA
DERMAL CONTACT WITH GROUNDWATER - SHALLOW AQUIFER	NA	2.0 E-2
DERMAL CONTACT WITH GROUNDWATER - LOWER AQUIFER	1.0 E-0	NA
INGESTION OF GROUNDWATER - LOWER AQUIFER	7.0 E-1	NA
INHALATION OF FUGITIVE DUST	2.0 E-6	3.0 E-9
DERMAL CONTACT WITH SOIL - SUBSURFACE SOIL AREA 1	NA	3.0 E-6
DERMAL CONTACT WITH SOIL - SUBSURFACE SOIL AREA 2	NA	1.0 E-3
DERMAL CONTACT WITH SOIL - SUBSURFACE SOIL AREA 3	NA	2.0 E-4
DERMAL CONTACT WITH SOIL - SUBSURFACE SOIL AREA 4	NA	3.0 E-3
DERMAL CONTACT WITH SOIL - SUBSURFACE SOIL AREA 5	NA	5.0 E-5
DERMAL CONTACT WITH SOIL - SUBSURFACE SOIL AREA 6	NA	0
TOTAL POPULATION SUBCHRONIC HAZARD INDEX ESTIMATE	8.0 E-1	4.0 E-2

NOTES

NA - NOT APPLICABLE AS A RESULT OF NO EXPOSURE TO THIS SCENARIO.

FIGURE 15

TABLE 6-13

CANCER RISK ESTIMATES
PARSONS CHEMICAL WORKS SITE

EXPOSURE PATHWAY	POPULATION PATHWAY CANCER RISK ESTIMATE				
	ADULTS	CHILDREN 6 -	CHILDREN 1-6	INDUSTRIAL	COMMERCIAL
DERMAL CONTACT WITH SOIL - SURFACE SOIL AREA 1	4.0 E-6	3.0 E-6	1.0 E-6	1.0 E-6	9.0 E-10
INGESTION OF SOIL - SURFACE SOIL AREA 1	5.0 E-6	5.0 E-6	4.0 E-6	4.0 E-6	NA
DERMAL CONTACT WITH SOIL - SURFACE SOIL AREA 2	2.0 E-4	2.0 E-4	3.0 E-5	NA	5.0 E-8
INGESTION OF SOIL - SURFACE SOIL AREA 2	4.0 E-4	3.0 E-4	2.0 E-4	NA	NA
DERMAL CONTACT WITH SEDIMENT	3.0 E-9	6.0 E-9	9.0 E-10	NA	NA
INGESTION OF SEDIMENT	3.0 E-9	7.0 E-9	6.0 E-9	NA	NA
DERMAL CONTACT WITH GROUNDWATER - SHALLOW AQUIFER	NA	NA	NA	NA	7.0 E-10
DERMAL CONTACT WITH GROUNDWATER - LOWER AQUIFER	0	0	0	NA	NA
INGESTION OF GROUNDWATER - LOWER AQUIFER	0	0	0	NA	NA
INHALATION OF FUGITIVE DUST	1.0 E-10	1.0 E-10	9.0 E-11	3.0 E-11	3.0 E-14
DERMAL CONTACT WITH SOIL - SUBSURFACE SOIL AREA 1	NA	NA	NA	NA	0
DERMAL CONTACT WITH SOIL - SUBSURFACE SOIL AREA 2	NA	NA	NA	NA	8.0 E-10
DERMAL CONTACT WITH SOIL - SUBSURFACE SOIL AREA 3	NA	NA	NA	NA	1.0 E-9
DERMAL CONTACT WITH SOIL - SUBSURFACE SOIL AREA 4	NA	NA	NA	NA	3.0 E-9
DERMAL CONTACT WITH SOIL - SUBSURFACE SOIL AREA 5	NA	NA	NA	NA	8.0 E-10
DERMAL CONTACT WITH SOIL - SUBSURFACE SOIL AREA 6	NA	NA	NA	NA	3.0 E-11
TOTAL POPULATION CANCER RISK ESTIMATE	6.0 E-4	5.0 E-4	2.0 E-4	5.0 E-6	6.0 E-8

NOTES

NA - NOT APPLICABLE AS A RESULT OF NO EXPOSURE TO THIS SCENARIO.

PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE

ESTIMATED COSTS of REMEDIAL ALTERNATIVES

Alternative	Capital Cost	Total O & M *	Total Remedy Cost *
GW2A	$ 7,250	$ 201,544 (15 yrs sampling)	$ 208,794
GW2B	$545,925	$ 100,772 (15 yrs sampling)	$ 646,697
GW2C	$393,501	- 0 -	$ 393,501 + long-term monitoring
GW2D	$662,891	- 0 -	$ 662,891
GW3	$436,247	$1,172,315 (10 yrs)	$1,608,562
GW4	$443,497	$1,141,412 (10 yrs)	$1,584,909
GW5	$564,775	$2,046,301 (10 yrs)	$2,611,076
GW6	$285,447	$1,809,125 (10 yrs)	$2,094,573
GW7	$505,847	$5,553,170 (10 yrs)	$6,059,017

* Figures represent present worth

FIGURE 17

GLOSSARY

Administrative Record
A file which contains all information used by the lead agency to make its decision on the selection of a response action under CERCLA. This file is available for public review.

Applicable or Relevant and Appropriate Requirements (ARARS)
Section 121 (d) of CERCLA requires that remedial actions meet legally ARARs of other environmental laws. Legally "applicable" requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location , or other circumstances at a CERCLA site. "Relevant and appropriate" requirements are those requirements that, while not legally applicable to the RA, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the RA.

Non-promulgated advisories or guidance documents issued by federal or state governments ("to-be-considered or TBCs") do not have the status of ARARs; however, where no ARARs exist, or for some reason may not be sufficiently protective, non-promulgated advisories or guidance documents may be considered in determining the necessary level of clean up for protection of human health and the environment.

Aquifer
An underground rock formation composed of sand, soil, or gravel that can store and supply groundwater to wells and springs. Most aquifers in the United States are within 1000 feet of the earth's surface.

Baseline Risk Assessment (BRA)
The BRA is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases. The BRA assumes no corrective actin will take place and no site-use restrictions or institutional controls such as fencing, groundwater use restrictions or construction restrictions will be imposed. There are four steps in the BRA process: data collection and analysis; exposure assessment; toxicity assessment; and risk characterization.

Cleanup
Actions taken to deal with a release or threatened release of hazardous substances that could affect public health and/or the environment. The term "cleanup" is used broadly to describe phases of responses, such as the *Remedial Design* or *Remedial Action* (see separate entries).

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (also known as "Superfund")
A Federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA) to investigate and clean up abandoned and uncontrolled hazardous waste sites. The Acts created a tax placed on chemical and petroleum industries that provides revenues to a Trust Fund. The Fund is used when those responsible for contamination at Superfund sites cannot be found, or cannot perform or pay for the cleanup work.

Contaminants of Concern
Any of a number of organic compounds or inorganic substances that were detected at a concentration near the current regulatory standard for that particular substance. The material would be "of concern" because if the concentration increases enough to exceed the regulatory limit, it could be a potential risk to human health or the environment.

Degradation
Worsening in quality or acceptability.

Dioxin Study
As part of its Dioxin Strategy, the U.S. Environmental Protection Agency (EPA) conducted the National Dioxin Study, an investigation in the 1980's to determine the extent of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) contamination in the environment. The EPA categorized potential sites into groups called "Tiers" according to the operations that took place at the location. For example, the Parsons site was grouped into Tier 3-Formulators, blenders and packagers of 2,4,5-trichlorophenol (2,4,5-TCP)-based pesticides.

Feasibility Study (FS)
Process of evaluating alternative methods for cleaning up a site. It generally is performed at the same time as the *Remedial Investigation (see separate entry)*.

Groundwater
Water found beneath the earth's surface that fills pores between materials, such as sand, soil, or gravel. In aquifers, groundwater occurs in sufficient quantities that it can be used for drinking water, irrigation, and other purposes.

Hazard Index (HI)
The HI, an expression of non-carcinogenic toxic effects, measures whether a person is being exposed to adverse levels of non-carcinogens. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across multiple media. The HI for non-carcinogenic health risks is the sum of all contaminants for a given scenario. Any HI value greater than 1.0 suggests that a non-carcinogen potentially presents an unacceptable health risk.

Hazardous Substance
Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.

Hydraulically Downgradient
In the direction of lower water level elevation. Water would move toward this point from an "upgradient" point.

Hydraulically Upgradient
In the direction of increasing water level elevation.

Information Repository
A file containing current information, technical reports, and reference documents regarding a Superfund site. It is usually located in a public building that is convenient for local residents, such as a public school, city hall, or library.

Institutional Controls
Under CERCLA: Institutional Controls are actions taken that limit human activities at or near facilities as a means to protect health and environment and assure the continued effectiveness of a response other than engineered controls or actual hazardous materials cleanup. Institutional Controls can be used in conjunction with engineered controls or actual cleanup. Examples include notice letters, warning letters, deed restrictions, land use restrictions, land use agreements, warning signs and local private well permitting policies.
Under Part 201: Institutional Controls under Part 201 are actions taken that adequately limit human activities at or near facilities as a means to protect health and environment and assure the continued effectiveness of a response other than engineered controls or actual hazardous materials cleanup. Institutional Controls can be used in conjunction with engineered controls or actual cleanup. However, the actions that constitute Institutional Controls under Part 201 are significantly more limited in number and scope than under CERCLA. Mechanisms that may be considered include an ordinance that prohibits the use of groundwater or an aquifer in a manner or to a degree that protects against unacceptable exposures as defined by the applicable cleanup criteria. An ordinance that serves as an exposure control must be published and maintained in the same manner as zoning ordinances and must include a requirement that the local unit of government notify the department at least 30 days prior to adopting a modification to the ordinance, or to the lapsing or revocation of the ordinance.

In-Situ Vitrification
An innovative soil remediation technology which electrically melts soil at high temperatures. During the process most organic compounds are destroyed and inorganic materials are permanently encapsulated into the solidified obsidian-like rock which forms upon cooling.

Lead
A heavy metal commonly found in soils near ore manufacturing plants. High levels of lead in the human bloodstream can impair fetal development and negatively impact the central nervous system, and tends to be correlated with lower intelligence quotient (IQ) scores in children.

MCL
Maximum Contaminant Level: The maximum permissible level of a contaminant in water which is delivered to any user of a public water system. The MCLs are reviewed and updated by the Office of Water; the U.S. Environmental Protection Agency.

MCLG
Maximum Contaminant Level Goal: A non-enforceable concentration of a drinking water contaminant that is protective of adverse human health effects and allows an adequate margin of safety.

Migrate
To move from one point to another, with the speed and direction determined by local conditions.

Monitoring Wells
Special wells drilled at specific locations on or off of a hazardous waste site where groundwater can be sampled at selected depths and studied to determine the direction which groundwater flows and the types and amounts of contaminants present.

National Contingency Plan (NCP)
The National Oil and Hazardous Substances Pollution Contingency Plan. The plan provides the organizational structure and establishes procedures for responding to discharges and releases of hazardous substances, pollutants, and contaminants.

National Priorities List (NPL)
The NPL is a published list of hazardous waste sites in the country that are eligible for extensive long-term cleanup action under the Superfund program.

Non Time-Critical Removal (NTCR)
Removal response actions are actions taken by the U.S. Environmental Protection Agency and their contractors to address hazardous substances that are released or whenever there is a release of any pollutant or contaminant that may present an imminent and substantial danger to the public health or welfare. There are several categories of Removal Actions. A Non Time-Critical Removal is a removal where, based on the site evaluation, the lead agency determines that a removal action is appropriate and that there is a planning period of more than six months available before on-site activities must begin.

Operation and Maintenance (O&M)
O & M activities are conducted at a site after it is cleaned up to ensure that the cleanup or containment system is functioning properly.

Part 201 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended
Formerly known as Act 307, the Michigan Environmental Response Act.

Parts Per Billion (ppb) / Parts Per Million (ppm)
Units of measurement commonly used to express low concentrations of contaminants. For example, a drop of contaminant mixed in a competition-size pool would represent about 1 ppb of the contaminant.

Record of Decision
A public document that explains the cleanup method that will be used at a Superfund site. The ROD is based on technical data gathered and analyses performed during the *Remedial Investigation* and *Feasibility Study* (see separate entries), as well as public comments and community concerns.

Remedial Action (RA)
The RA phase is the actual construction or implementation of the cleanup method. It follows the *Remedial Design* (see separate entry) of the selected cleanup alternative at a Superfund site.

Remedial Design (RD)
The RD is an engineering phase during which technical drawings and specifications are developed for the selected cleanup remedy that will be implemented during the subsequent *Remedial Action* phase (see separate entry) at a Superfund site.

Remedial Investigation (RI)
The RI is an analysis phase, during which and investigation is conducted including assessments and numerous studies into the nature and extent of the contamination on site. During the RI data is collected through sampling and monitoring to characterize the site. It generally is performed at the same time as the *Feasibility Study* (see separate entry). Ultimately, the information gathered will help to evaluate cleanup alternatives.

Remedial Investigation/Feasibility Study (RI/FS)
The RI and FS are typically referred to together as often they are performed at the same time. The RI portion of the study examines the nature and extent of the contamination; the FS considers and evaluates different methods to address or resolve the contamination problems or conditions found during the RI.

Responsiveness Summary
A summary of oral and/or written public comments received during a public comment period on key documents prepared by the EPA or state agency and the agency's responses to those comments. A responsiveness summary is required as part of a *Record of Decision* (see separate entry) at Superfund sites.

Superfund
The common name used for the *Comprehensive Environmental Response, Compensation, and Liability Act* (see separate entry)

Superfund Amendments and Reauthorization Act (SARA)
Modification to CERCLA enacted on October 17, 1986

Surface Water
Bodies of water that are above ground, such as rivers, lakes, and streams.

Volatile Organic Compound (VOC)
An organic (carbon containing) compound that evaporates (volatilizes) readily at room temperature.

ADMINISTRATIVE RECORD INDEX
PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE
GRAND LEDGE, MICHIGAN

DATE	TITLE/DESCRIPTION	AUTHOR	RECIPIENT	LOCATION
8/9/74	Parsons Chemical Sampling Data	MDNR	MDNR	Information Repository Administrative Record
8/13/75	Memo re: results of samples collected near Parsons	Jim Miller, MDNR	Jim Rossio, MDNR	Information Repository Administrative Record
5/1/79	Telecon re: Anonymous tip	Karl Zollner, Jr., MDNR	Andrew Hogarth, MDNR	Information Repository Administrative Record
5/7/79	Letter re: Sanitary Survey -Oneida Township, Eaton County	John Cosens, MDNR	Al Howard, MDNR	Information Repository Administrative Record
11/7/79	Letter re: Parsons Chemical Co. - Mercury in runoff	Frank Baldwin, MDNR	Jack Bails, MDNR	Information Repository Administrative Record
6/26/80	Letter re: Fluid Discharge from Ground to Grand River	James Kent, MDPH	Durwood Zank, Barry-Eaton CHD	Information Repository Administrative Record
2/16/81	Phase I Hydrogeologic Investigation	KECK	MDNR	Information Repository Administrative Record
5/4/82	Proposed Work Plan for Removal of Contaminated Soils	KECK	MDNR, ETM Enterprises, Inc.	Information Repository Administrative Record
2/14/83	Interim Report Phase III Hydrogeologic Investigation	KECK	William Iverson, MDNR	Information Repository Administrative Record
12/6/84	Preliminary Assessment	MDNR - Barry-Eaton CHD & Company Contractor	MDNR	Information Repository Administrative Record
5/6/85	Letter re: Parsons Chemical Tier 3 Dioxin Study Site	Barb Grabowski, MDNR	Andrew Hogarth, MDNR	Information Repository Administrative Record
5/14/85	Request for immediate removal	Andrew Hogarth, MDNR	Richard Bartelt, U.S. EPA	Information Repository Administrative Record
5/23/85	Letter re: Site Contamination	Robert Bowden, U.S. EPA	Andrew Hogarth, MDNR	Information Repository Administrative Record

ADMINISTRATIVE RECORD INDEX
PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE
GRAND LEDGE, MICHIGAN

DATE	TITLE/DESCRIPTION	AUTHOR	RECIPIENT	LOCATION
6/5/85	Request for assistance	Andrew Hogarth, MDNR	Richard Bartelt, U.S. EPA	Information Repository Administrative Record
6/17/85	Interview Notes & Site Inspection Notes	Richard Dagnall, E & E	File	Information Repository Administrative Record
5/6/86	Site Inspection Report	E & E	Pat Donovan, Barry-Eaton CHD	Information Repository Administrative Record
5/28/86	Final report on tier 3 dioxin screening	E & E	U.S. EPA	Information Repository Administrative Record
7/23/86	Letter reviewing "tier 3 dioxin screening" report	Thomas Rohrer, MDNR	Gary Klepper, MDNR	Information Repository Administrative Record
8/8/86	Letter re: Former Parson Chemical Site, Eaton County	Daniel Cummins, MDNR	David Mohnke, ETM Enterprises, Inc.	Information Repository Administrative Record
1/16/87	Letter re: construction and site study request	Patrick Donovan, Barry-Eaton CHD	Daniel Cummins, MDNR	Information Repository Administrative Record
2/87	The National Dioxin Study Tiers 3,5,6, & 7 - excerpts	U.S. EPA	Various	Information Repository Administrative Record
3/4/87	Toxicological Evaluation of Dioxins, Pesticides and Metals Data	Kirpal Sidhu, MDPH	Nancy Rottschafer, MDNR	Information Repository Administrative Record
2/2/89	Fish Consumption Advisory Below the Parsons Chemical Site	George Jackson, MDNR	Deborah Larsen, MDNR	Information Repository Administrative Record
4/89	Engineering Evaluation and Cost Analysis	U.S. EPA	MDNR	Information Repository Administrative Record
5/4/89	MDNR Borings	Deborah Larsen, MDNR	John Rodwan, MDNR	Information Repository Administrative Record
7/31/89	Soil cleanup levels for contaminants	MDNR	U.S. EPA	Information Repository Administrative Record

ADMINISTRATIVE RECORD INDEX
PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE
GRAND LEDGE, MICHIGAN

DATE	TITLE/DESCRIPTION	AUTHOR	RECIPIENT	LOCATION
8/10/89	Issues at site	MDNR	U.S. EPA	Information Repository Administrative Record
8/28/91	Fish contaminant Monitoring	MDNR	MDNR	Information Repository Administrative Record
10/90- 9/95	In-Situ Vitrification Removal at Parsons Chemical Site	US EPA	Interested Parties	Separate Administrative Record Exists. See NOTE**
5/93	Sampling Data & Chain of Custody forms	Various CLP labs	MDNR	MDEQ
2/92	Health and Safety Plan	Halliburton NUS	MDNR	Administrative Record Information Repository
9/92	Work Plan Phase I	Halliburton NUS	MDNR	Administrative Record Information Repository
11/92	Phase I Quality Assurance Project Plan Revision 2	Halliburton NUS	MDNR	Administrative Record Information Repository
11/92	Field Sampling Plan Phase I	Halliburton NUS	MDNR	Administrative Record Information Repository
6/94	Work Plan Phase II	Brown & Root Div. of Halliburton NUS	MDNR	Administrative Record Information Repository
6/94	Phase II Quality Assurance Project Plan Revision 3	Brown & Root Div. of Halliburton NUS	MDNR	Administrative Record Information Repository
6/94	Field Sampling Plan Phase II	Brown & Root Div. of Halliburton NUS	MDNR	Administrative Record Information Repository
12/94	Work Plan Phase IIA	Brown & Root Div. of Halliburton NUS	MDEQ	Administrative Record Information Repository

ADMINISTRATIVE RECORD INDEX
PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE
GRAND LEDGE, MICHIGAN

DATE	TITLE/DESCRIPTION	AUTHOR	RECIPIENT	LOCATION
1-96	REMEDIAL INVESTIGATION REPORT-final volumes 1-8	Brown & Root Div. of Halliburton NUS	MDEQ	Information Repository Administrative Record
[redacted]				
1/96	Feasibility Study Report-final volumes 1-8	Brown & Root Environmental	MDEQ-formerly MDNR	Information Repository Administrative Record
1/92	ARAR's summary Volume 1 RI/FS Report	Brown & Root Environmental	MDEQ	Information Repository Administrative Record
5/96	Proposed Plan	MDEQ	Community/Mailing List	Information Repository Administrative Record
[redacted]				
8-97	Comment Letter	U.S. EPA	MDEQ	Information Repository Administrative Record
9-97	ROD signed	MDEQ	U.S. EPA	Information Repository Administrative Record
[redacted]				
3/29/89	Letter re: MDNR's position on ETM's liability	James Truchan, MDNR	Marjorie Mohnke, ETM Enterprises	Information Repository Administrative Record
[redacted]				
12/11/86	Newspaper Article	Editor, Grand Ledge Independent	Community	Information Repository Administrative Record
3/7/89	Memo re: activities 2-14, 16 & 17, 1989 - local official call	Deborah Larsen, MDNR	file	Information Repository Administrative Record
8/13/91	Newspaper Article-Grand Ledge Independent	Bob Millbrook	Community	Information Repository Administrative Record
1/7/92	Memo re: citizen questions about Parsons potential emissions	Deborah Larsen, MDNR	file	Information Repository Administrative Record

ADMINISTRATIVE RECORD INDEX
PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE
GRAND LEDGE, MICHIGAN

DATE	TITLE/DESCRIPTION	AUTHOR	RECIPIENT	LOCATION
1/92	Community Relations Plan	MDNR	Community	Information Repository Administrative Record
2/9/93	Progress Report #1	MDNR	Community/Mailing List	Information Repository Administrative Record
2/9/93	Public Notice of Information Meeting - Grand Ledge Independent	MDNR	Community	Information Repository Administrative Record
2/18/93	Public Information Meeting-Kick-off of RI/FS: Meeting Agenda	MDNR	Community	Information Repository Administrative Record
2/23/93	Newspaper Article-Public Meeting Newspaper Report	Grand Ledge Independent	Community	Information Repository Administrative Record
3/12/93	Memo re: Citizen Inquiry	Deborah Larsen, MDNR	file	Information Repository Administrative Record
7/7/94	Progress Report #2	MDNR	Community/Mailing List	Information Repository Administrative Record
7/26/94	Newspaper Article-RI Status	Kim Horn-Grand Ledge Independent	Community	Information Repository Administrative Record
3/19/96	Newspaper Article	Staff Writer, Grand Ledge Independent	Community	Information Repository Administrative Record
5/14/96	Public Notice for 6-6-96 Public Meeting on the Proposed Plan and Start of Public Comment Period on Proposed Plan	MDNR	Grand Ledge Independent/ Community	Information Repository Administrative Record
	Mailing List for Parsons Chemical Site	MDNR	Interested Parties	MDEQ
6/11/96	Transcript of Public Meeting on 6-6-96 and Verbal Comments Received at Meeting	Dolman & Associates	Interested Parties	Information Repository Administrative Record
7/96	Responsiveness Summary	MDEQ	Interested Parties	Administrative Record

ADMINISTRATIVE RECORD INDEX
PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE
GRAND LEDGE, MICHIGAN

DATE	TITLE/DESCRIPTION	AUTHOR	RECIPIENT	LOCATION
[redacted]				
5/14/92	Interim Preliminary Public Health Assessment for Parsons Chemical Superfund Site	MDPH	Deborah Larsen, MDNR	Information Repository Administrative Record
8/22/96	Health Consultation	MDCH Division of Health Risk Assessment	Deborah Larsen, MDEQ	Information Repository Administrative Record
[redacted]				
12/29/80	Interim Guidelines & specifications for preparing Quality Assurance Project Plans	U.S. EPA	Various	MDEQ, U.S. EPA
04-04-84	Preparation of State -Lead Remedial Investigation Quality Assurance Project Plans for Region V	U.S. EPA	Various	MDEQ, U.S. EPA
1980	Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Superfund	U.S. EPA	Various	MDEQ, U.S. EPA
1986	Superfund Amendments and Reauthorization Act (SARA)	U.S. EPA	Various	MDEQ, U.S. EPA
10/88	Guidance for Conducting Remedial Investigations & Feasibility Studies under CERCLA	U.S. EPA	Various	MDEQ, U.S. EPA
6/95	Part 201 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended (formerly known as the Michigan Environmental Response Act)	State of Michigan	Various	MDEQ

ADMINISTRATIVE RECORD INDEX
PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE
GRAND LEDGE, MICHIGAN

DATE	TITLE/DESCRIPTION	AUTHOR	RECIPIENT	LOCATION
6/92 revised 3/93	Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario	D. Persaud, R. Jaagumagi and A. Hayton Water Resources Branch Ontario Ministry of the Environment	Various	MDEQ
11/22/93	Technical Guidance for Screening Contaminated Sediment	New York State Department of Environmental Conservation Div. of Fish and Wildlife Div. of Marine Resources	Various	MDEQ
6/05/95	Interim Environmental Response Division Operational Memorandum #8 Generic Residential Cleanup Criteria	MDNR at time of writing Currently MDEQ	Various	MDEQ
6/06/95	Environmental Response Division Operational Memorandum Revision 2: Remedial Action Plans Using Generic Industrial or Generic Commercial Cleanup Criteria and Other Requirements	MDNR at time of writing Currently MDEQ	Various	MDEQ
10/13/95	Memorandum from Michigan Department of Public Health to Michigan Department of Environmental Quality	Richard E. Benzie, P.E. Supervising District Engineer	Deborah Larsen Project Manager Environmental Response Div.	MDEQ
2/96	Drinking Water Regulations and Health Advisories	Office of Water U.S. EPA Washington, DC	Various	MDEQ

ADMINISTRATIVE RECORD INDEX
PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE
GRAND LEDGE, MICHIGAN

DATE	TITLE/DESCRIPTION	AUTHOR	RECIPIENT	LOCATION
7/88	Guide to Developing Superfund Proposed Plans	U.S. EPA	Various	MDEQ, U.S. EPA
7/88	Guide to Developing Superfund Records of Decision			

ADMINISTRATIVE RECORD INDEX
PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE
GRAND LEDGE, MICHIGAN

Acronyms Used:

MDEQ:	Michigan Department of Environmental Quality
MDNR:	Michigan Department of Natural Resources
MDPH:	Michigan Department of Public Health
MDCH:	Michigan Department of Community Health
CHD:	County Health Department
CLP:	Contract Laboratory Program
U.S. EPA	U.S. Environmental Protection Agency
E & E:	Ecology & Environment, Inc.
ARARs:	Applicable or Relevant and Appropriate Requirements

IF YOU HAVE ANY QUESTIONS REGARDING THE PARSONS CHEMICAL WORKS, INC. SUPERFUND SITE OR WOULD LIKE TO REVIEW THE REMEDIAL INVESTIGATION ANALYTICAL DATA, CHAIN OF CUSTODY FORMS OR GUIDANCE DOCUMENTS, PLEASE CONTACT THE SITE PROJECT MANAGER LISTED BELOW.

MDEQ CONTACT

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