United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-93/230
September 1993

EPA

Superfund Record of Decision:

Adams Plating, MI

50272-101

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4. **Title and Subtitle**
SUPERFUND RECORD OF DECISION
Adams Plating, MI
First Remedial Action - Final

5. **Report Date** 09/29/93

6.

7. **Author(s)**

8. **Performing Organization Rept. No.**

9. **Performing Organization Name and Address**

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U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

13. **Type of Report & Period Covered**
800/800

14.

15. **Supplementary Notes**
PB94-964121

16. **Abstract (Limit: 200 words)**

The 1-acre Adams Plating site is an active electroplating operation in Lansing Township, Ingham County, Michigan. Land use in the area is mixed commercial, industrial, and residential. The estimated 1,800 residents per square mile around the site receive their water from the municipal system which serves Lansing, and no private wells exist in the area of the site. Before 1965, the Adams Plating Company (APC) building was occupied by a dry cleaning establishment, which stored solvents in a 500-gallon underground storage tank at the site. APC removed this tank in the 1950s because of leakage. In 1965, APC purchased the site and primarily has been involved in chrome, nickel, copper, tin, and brass electroplating and anodizing. This process includes degreasing and removing dirt from metal using solvents and acids, and rinsing off the film after electroplating. Prior to 1971, wastewater from the electroplating process was discharged to an underground clay tile drain system. In this process, wastewater was discharged near a partially buried drum, referred to as the "green water" drum, then flowed through a clay tile drain into the municipal sewer system. In 1971, APC was connected directly to the municipal sewer system. Prior to 1980, APC was cited several times for violations of city codes regulating discharge of untreated

(See Attached Page)

17. **Document Analysis** **a. Descriptors**
Record of Decision - Adams Plating, MI
First Remedial Action - Final
Contaminated Media: soil, debris
Key Contaminants: VOCs (TCE, toluene), other organics (PAHs), metals (arsenic, chromium)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 58
	20. Security Class (This Page) None	22. Price

Abstract (Continued)

waste to the municipal sewer and, as a result, began pretreatment of onsite wastewater. The wastewater was stored onsite in a partially buried metal dipping tank, and pumped through an onsite pretreatment system prior to discharge to the municipal sewer system. This 800-gallon tank was removed at an unknown date because of leakage. Wastewater is now held in two 1,000-gallon holding tanks at the southwest corner of the APC building. In 1980, the owner of an adjacent property received "green water" in his basement as a result of a broken clay pipe. The State investigated the site and documented that wastewater and plating waste had migrated from the former tile drain, contaminating the site. In 1981, at the State's suggestion, APC pumped wastewater from the basement and later installed a subsurface collection drain system to reduce the concentration and volume of contamination reaching the adjacent house. In 1984, EPA inspected the site and found contamination of soil by metals, VOCs, and PAHs originating from site electroplating activities, by past fuel or coal storage and disposal, and possibly from the former dry cleaner. This ROD addresses the onsite contaminated soil and debris as the first and final action for the site. Ground water was not evaluated as a drinking water source because ground water at the site was not found in useable quantities for drinking water purposes and all residents and businesses in the neighborhood are connected to municipal water. The primary contaminants of concern affecting the soil and debris are VOCs, including TCE and toluene; other organics, including PAHs; and metals, including arsenic and chromium.

The selected remedial action for this site includes constructing a temporary fence around the site and demolishing onsite buildings as needed; excavating approximately 4,700 yd^3 of contaminated soil from around the buildings to a depth of 10 feet; testing the soil using TCLP for metals; pretreating the soil offsite by fixation and/or stabilization, if necessary, to a level below LDR requirements; disposing of excavated and any pre-treated soil offsite in a RCRA landfill; removing onsite subsurface debris, including clay tiles, PVC pipe, collection systems, and underground storage tanks, followed by offsite disposal of these materials in a RCRA landfill; backfilling excavated portions of the site with clean soil and reseeding; installing vertical barrier walls around the buildings to isolate the residual low-level contamination under the buildings; collecting, treating, and disposing of approximately 10,000 gallons of water collected during excavation offsite; monitoring ground water and air, if necessary; and implementing institutional controls, including deed and land use restrictions. The estimated present worth cost for this remedial action is $1,800,000, which includes an estimated annual O&M cost of $34,400 for 30 years.

PERFORMANCE STANDARDS OR GOALS:

Chemical-specific soil and debris cleanup goals are based on background levels, and include chromium 26.1 mg/kg and arsenic 6.7 mg/kg. Soil will be excavated to a maximum depth of 10 feet because the Risk Assessment assumed a maximum construction depth of current/future buildings to 10 feet. Final soil remedial concentrations will attain a site-specific health-based risk of 10^{-6} carcinogenic risk or an HI of 1 or less.

DECLARATION
SELECTED REMEDIAL ALTERNATIVE
for the
Adams Plating Company Site

Site Name and Location

Adams Plating Company Site
Lansing, Ingham County, Michigan

Statement of Basis and Purpose

This decision document represents the selected remedial action for the Adams Plating Company (the site), in Lansing, Michigan, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This decision is based on the Administrative Record for the site.

Assessment of the Site

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

Description of Remedy

The selected remedy is the final remedy for the site. The remedy addresses the threats posed by contaminated soils at the site.

The major components of the selected remedy include:

- Excavation of contaminated soils and off-site disposal in a Michigan Act 641/RCRA Subtitle D landfill.
- Collection and treatment of water from excavation/dewatering activities.
- Replacement of the excavated soil with clean fill and installation of vertical barriers to reduce the potential for recontamination of clean fill.

- Land use restrictions including deed restrictions on installation of wells and excavation of contaminated soils if necessary.
- Groundwater monitoring to evaluate the effectiveness of the soil remediation and to monitor for continuing sources.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State environmental requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. This remedy may not satisfy the statutory preference for treatment as a principle element of the remedy since soils will only be treated if determined to be characteristic hazardous waste. Treatment of excavated soils may be required if it is determined they are RCRA, or Michigan Act 64, characteristic hazardous wastes. U.S. EPA determined excavation and off-site disposal of contaminated soils is a cost effective remedy which will be protective of human health and the environment and which will meet legally applicable or relevant and appropriate Federal and State environmental requirements.

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

for Valdas V. Adamkus
Regional Administrator

9/29/93
Date

STATE OF MICHIGAN

JOHN ENGLER, Governor
DEPARTMENT OF NATURAL RESOURCES
Stevens T. Mason Building, P.O. Box 30028, Lansing, MI 48909
ROLAND HARMES, Director

September 29, 1993

Mr. Valdas V. Adamkus, R-19J
Administrator, Region 5
U.S. Environmental Protection Agency
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Dear Mr. Adamkus:

The Michigan Department of Natural Resources (MDNR), on behalf of the State of Michigan, has reviewed the Record of Decision (ROD) for the Adams Plating Company Superfund site, Ingham County, Michigan, which we received on September 23, 1993. We are pleased to inform you that we concur with the remedy outlined in the ROD for this site.

The major components of the final site remedy as specified in the ROD include:

* Excavation of contaminated soils to eliminate site-specific health risks and off-site disposal of the soils in a Michigan Act 641/RCRA Subtitle D landfill.

* Replacement of the excavated soil with clean fill and installation of vertical barriers to reduce the potential for recontamination of the clean fill from remaining sources.

* Collection and treatment of groundwater from construction/dewatering activities.

* Land-use restrictions which prohibit installation of wells and preclude direct contact exposure to contaminated soils remaining on site.

* Groundwater monitoring to evaluate the effectiveness of the soil remediation and to check for continued migration from remaining sources.

The MDNR also concurs with the analysis of the legally applicable or relevant and appropriate requirements (ARARs) that are contained in the Statutory Determinations section of the ROD. However, additional ARARs will need to be considered during implementation of the remedial action and include the Michigan Water Resources Commission Act, 1929 PA 245, as amended, and the Mineral Well Act, 1969 PA 315. Other applicable state regulations include the Michigan Occupational Safety and Health Act, 1974 PA 154, and the Michigan Vehicle Code (MCLA 257.722). The U.S. Environmental Protection Agency (EPA) has informed staff of the MDNR that even though these regulations are not specifically listed in the ROD, if they are an ARAR, they will be complied with during implementation of the remedial action.

If you have any questions regarding this site, please contact Ms. Sally Beebe, Superfund Section, Environmental Response Division, at 517-373-4110, or you may contact me.

Sincerely,

Russell J. Harding
Deputy Director
517-373-7917

cc: Mr. James Mayka, EPA
Mr. Steve Padovani, EPA
Mr. Alan J. Howard, MDNR
Mr. William Bradford, MDNR
Mr. Scott Cornelius, MDNR
Ms. Sally Beebe, MDNR

RECORD OF DECISION

DECISION SUMMARY

ADAMS PLATING COMPANY SUPERFUND SITE

LANSING, MICHIGAN

Prepared by:

U.S. Environmental Protection Agency

Region V

Chicago, Illinois

September, 1993

ROD SUMMARY
ADAMS PLATING COMPANY SUPERFUND SITE
LANSING, MICHIGAN

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RECORD OF DECISION
ADAMS PLATING COMPANY SITE

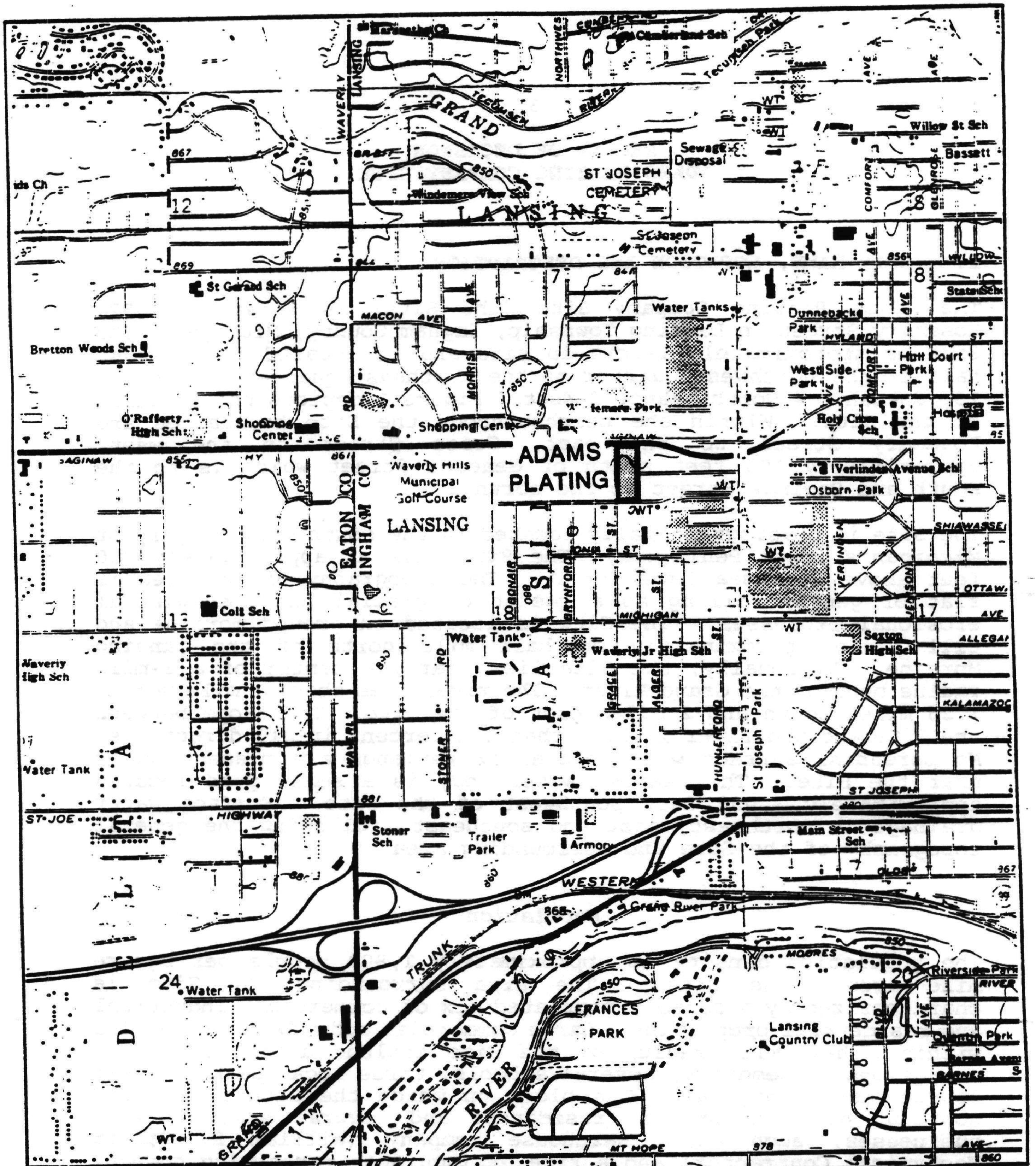
I. SITE NAME, LOCATION AND DESCRIPTION

The Adams Plating Company Site (the Site) is located at 521 Rosemary Street in Lansing Township, Ingham County, Michigan. The Site is approximately 1-acre in size and is located in the east half of the northwest quarter of the northeast quarter of Section 18, Township 4 North, Range 2 West. Figure 1 depicts the location of the Site. Within the neighborhood, the Site boundaries are Rosemary Street to the east, Grace Street to the west, approximately 100 feet south of Genesee Street which is to the south and Saginaw Street to the north.

The Site is physiographically located in the south-central part of Michigan's Lower Peninsula. The Site lies at approximately 850 feet above mean sea level (MSL). The topography of the area is flat or gently rolling as a result of glacial and post-glacial erosional processes. The Site is located on ground moraine and till plain approximately one-half mile north of the Lansing Moraine. Regionally, the Site lies near the center of a 1-mile radius bend of the Grand River. The river lies about 1 mile north, 1.25 miles south and 2 miles east of the Site. The slope between the Site and the river is less than one percent in all directions. No perennial surface water bodies or wetlands are present on or near the Site. The nearest water body is a small pond located approximately 3,000 feet southwest of the Site. Surface water drainage is northeast, east and southeast, following the general topography of the Site and surrounding area.

Population

The population density is approximately 1,800 people per square mile around the Site. The area surrounding the Site is characterized by a densely-populated mix of commercial, industrial and residential properties. Large commercial and public properties within a half-mile radius of the Site include automobile plant operations, a cemetery, several schools, three local parks, a golf course and a hospital. The block on which the Site is located contains numerous private residences and several small service businesses, such as a warehouse company (William E. Walter Mechanical Contractor) and a fire extinguisher recharging company (De Lau Fire and Safety Company). The nearest private dwelling is within 25 feet of the Site. Directly across the street from the Site and to the east lies the General Motors Oldsmobile Production and Assembly Plant #2.



SOURCE: USGS, Lansing North and Lansing South, MI, 7.5 minute topographic quadrangle, 1973.

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FIGURE 1
SITE LOCATION MAP

Adams Plating

Plating Operations

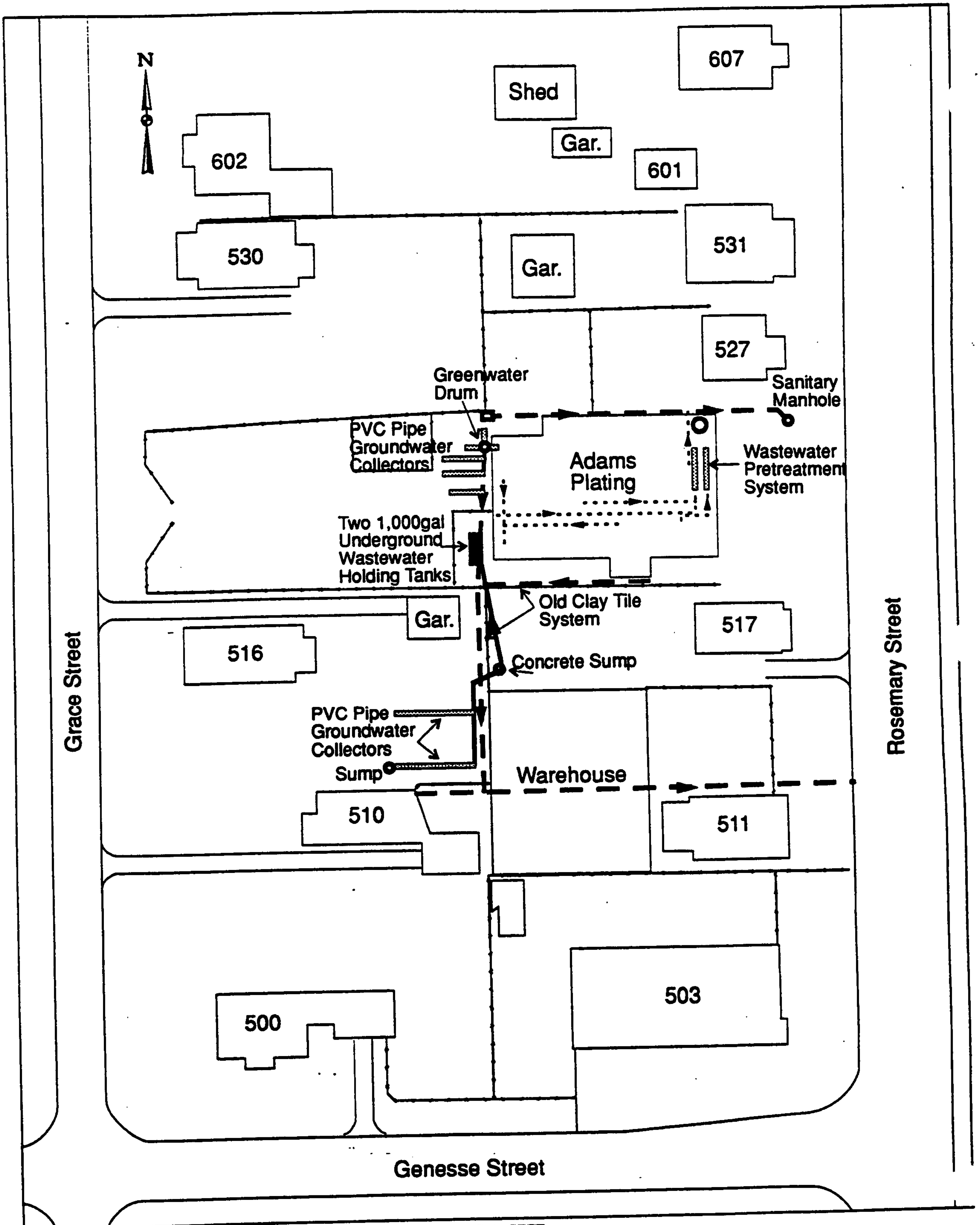
The Adams Plating Site (the Site) is an active electroplating operation. The plating building at the Site consists of a one-story building that houses the office, plating process lines and wastewater pretreatment system. Figure 2 shows the Site layout and features surrounding the plating building. The office and metal polishing area are located along the north wall of the plating building. The wastewater pretreatment system is located near the east wall.

Outside the building, a gravel parking area is situated to the east. Another gravel parking area is located behind the building to the west. Two 1,000-gallon underground wastewater holding tanks are located near the southwest corner of the building. A ground water collection system exists just north of the Meyer house at 510 Grace Street. Ground water in this area is collected by perforated polyvinyl chloride (PVC) pipes. Ground water drains by gravity in these pipes from west to east to another PVC pipe that runs north and drains to a concrete sump located in the backyard of a house located at 517 Rosemary Street. Ground water collected in the concrete sump is pumped northward into the underground wastewater holding tanks before disposal through the pretreatment system. After pretreatment, the water is discharged to the sanitary sewer.

Another ground water collection system exists near the northwest corner of the plating building. A partially buried drum referred to as the "green water" drum is located near the northwest corner of the building. Slotted PVC drain pipes connect to this drum from all directions. The exact location and configuration of the PVC drain pipe is unknown. However, based on conversations with the owner, it appears that two or three short sections of PVC pipe extend westward in the vicinity of the green water drum. The purpose of this system is apparently to collect ground water near the northwest portion of the plating building. The ground water in the drum is also routed through the wastewater pretreatment system and discharged to the sanitary sewer.

The nature of the activities and operations and the chemicals used in the electroplating process have changed from time to time. In the recent past, the plating shop has primarily been involved in chrome, nickel, copper and occasionally tin electroplating and anodizing. Currently, chromium, brass, nickel and copper electroplating are all performed. The electroplating process consists of three basic steps:

1. <u>Pretreatment</u> includes the removal of dirt and oil from the surface of the piece to be plated and preparation of the piece for electroplating. Typical pretreatment solutions include alkaline cleaners and acids.



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0 20 40 60 80 100

Figure 2 Adams Plating Layout

2. Electroplating involves the application of metal to the piece. A direct current is passed between an anode and the metal part (the cathode), resulting in the deposit of metal ions onto the piece.

3. Post-Treatment consists of rinsing, converting, and drying the electroplated pieces. The rinse water is used to remove film that is left on the surface of the piece.

The spent plating baths are subject to electroplating categorical pretreatment standards for facilities discharging less than 10,000 gallons per day (gpd). The pretreatment system is designed for a 28,800 gpd effluent and discharges to the City of Lansing POTW. The pretreatment system is designed to treat for chromium, tin, copper, zinc, nickel and cyanide. The pretreatment system was not designed to treat for organic compounds. The most current estimate of flow through the pretreatment system was 4,512 gpd. Approximately 978 gpd (.68 gpm) was estimated to be from the ground water collection systems. The pretreatment system generates approximately one and one-half 55-gallon drums of pretreatment solids per month. Due to the generation of these solids, Adams Plating Company has provided notification that it is a small quantity generator for RCRA-listed waste resulting from wastewater treatment sludges from electroplating operations (waste code F006). Limited information is available on how wastes were managed in the past and how these management practices led to contaminant releases at the Site. The contamination at the Site is believed to have originated as a result of the electroplating process. It is not clear from which step in the electroplating process the contamination originated. In addition, no information indicates RCRA listed wastes were released along with the waste stream from the electroplating process.

In conjunction with the electroplating process, degreasing of pieces to be electroplated is also conducted. Although the pretreatment step is designed to clean pieces before plating, the pieces also may require an initial cleaning in order to improve the efficiency of the pretreatment process and prolong the life of the solutions. Over the years, a number of volatile organic compounds (VOC) have been used in the degreasing process, although no used solvents are listed on the RCRA hazardous waste notification form, such as acetone, methylene chloride, carbon tetrachloride, and 1,1,1-trichloroethane (1,1,1-TCA). The owner had reportedly stopped using 1,1,1-TCA 3 years ago; however, containers of spent 1,1,1-TCA were still located on Site during the last Site visit on July 26, 1992. Approximately 4 gallons per year of acetone are currently used at the facility for degreasing operations. Currently, solvent wastes are not produced because they are spent in the process or reused. No information is available on how solvent wastes or rinse water were managed in the past.

Area Water Use

All residents and businesses in the vicinity of the Site receive their water from the municipal system, which serves the Lansing area. Municipal water is supplied by the Lansing Township Water District wells or by the City of Lansing Board of Water and Light wells. Municipal wells are installed within the bedrock aquifer (Saginaw Formation) and are typically at least 300 to 400 feet deep. The Lansing Township Well No. 4 is the water supply well closest to the Site and is located approximately 1,200 feet northwest of the Site. Records indicate that no private wells exist in the area of the Site. Surficial deposits of sand and gravel are used for private wells in isolated residential areas of Lansing Township, but not within a 2-mile radius of the Site. All private wells screened in the surficial deposits are located beyond the Grand River.

Geology/Hydrogeology

There are two shallow saturated sand units approximately 0.5 to 9 feet thick which are located approximately 10 and 20 below ground surface (bgs). These sand units are continuous under the Site, but appear to pinch out to the west of the Site. The upper sand unit exhibits unconfined to semi-confined characteristics, and the lower sand unit exhibits confined aquifer characteristics. A third sand unit is located approximately 30 feet bgs, but this sand unit is not water bearing and is referred to as the "dry" sand unit. Silts and clays are consistently located between and interbedded with the sand units. Bedrock was encountered at approximately 70 feet bgs. The bedrock encountered was the very upper portion of the sandstone in the Saginaw Formation. The top of this formation was encountered in all deep borings, but ground water at this level was not observed.

A vertical hydraulic connection between the upper and lower saturated sand units was not observed by direct measurements. However, the presence of contaminants in the lower saturated sand unit indicated that leaky confining conditions or preferentially induced flow paths may be present. The saturated sand units are not hydraulically connected to the bedrock aquifer at the Site because of the thick clay deposits, up to 50 feet thick, between the sand units and the bedrock. The presence of the "dry" sand unit between the saturated sand units and bedrock also indicates the existence of a hydraulic barrier that separates the two in the vicinity of the Site.

The depth to ground water in both saturated sand units ranges from 4 to 18 feet bgs. Ground water in the upper sand unit flows away from the highest elevation near the southwest corner of the APC building in a semi-radial pattern to south, southeast, east, northeast and north. Groundwater flow in the lower saturated sand unit is to the northeast and northwest. The average ground water flow velocity in the upper sand unit ranges from 0.025 to 0.134 feet per day (ft/day). The average ground water flow velocity in the lower sand unit ranges from 0.012 to 0.89 ft/day.

Based on a computer model, the potential ground water yield from the saturated zones in the immediate vicinity of the Site is insufficient to reasonably support the installation and use of private wells. Based on this predicted yield, neither the upper or lower sand units will likely be used in the future for domestic water supply wells in the immediate vicinity of the Site. Therefore, contamination at the Site is primarily a source control problem.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

Before 1965, the APC building was occupied by a dry cleaning establishment, Verrakleen, which was owned and operated by Norris and Irene Williams. A dry cleaning fluid known as Stoddard Solvent, which consists of a mineral spirit that contains chlorinated hydrocarbons, paraffins, and aromatic hydrocarbons, was reportedly stored in a 500-gallon underground storage tank (UST) at the site, but the tank was removed in the mid-1950s because of leakage. The former location of the tank is not known; however, based on results of soil analyses conducted in 1981, the tank may have been located immediately south of the existing APC building.

In 1964, the property was transferred to James and Sheila Adams, and they began to operate the plant as an electroplating business. In 1984, ownership was transferred to the current owner, Steve Adams, their son.

Before 1971, wastewater was discharged to a clay tile drain system. The wastewater apparently was discharged near the green water drum located near the northwest corner of the building (see Figure 2). From the green water drum area, wastewater flowed south through the old clay tile drain. Near the Meyer house, the tile drain turned east and connected to the municipal sewer system along Rosemary Street. In 1971, APC reportedly was connected directly to the municipal sewer east of the building beneath Rosemary Street. Wastewater apparently flowed from the green water drum area through the clay tile drain, which runs east to west just north of the APC building (see Figure 2).

In the early 1980s, pretreatment of wastewater began. Wastewater was then stored before treatment in a plank-covered, partially buried, metal dipping tank immediately south of the APC building. This 800-gallon tank was removed on an unknown date because of leakage. Wastewater, primarily from the PVC collection system, is now held in two 1,000-gallon holding tanks beneath a concrete slab at the southwest corner of the APC building. Collected wastewater is pumped through an on-site pretreatment system before being discharged to the municipal sewer.

Before 1980, APC was cited several times for violations of city codes regulating the discharge of untreated wastes to the municipal sewer.

In late July 1980, the owner of the property 50 ft south of the site, hired a backhoe operator to remove a tree from his property in preparation for placing the foundation slab for a new warehouse. An old tile drain was broken as the tree was uprooted. The old tile drain was not repaired and the hole was backfilled. Later that month, green water began to enter the basement of the Meyer house at 510 Grace Street through a drain being used to discharge sanitary wastewater. The green water flow into the basement recurred during periods of heavy rainfall in the autumn and winter of 1980. The green water flow rate reached a maximum of 500 gallons per day (gpd) in February 1981. Initially, the water was pumped out of the basement and discharged to a small fruit and vegetable garden immediately south of the Meyer house.

ICHD inspected the Meyer basement and collected samples of the green water for analysis. The analyses indicated 130 to 150 parts per million (ppm) of total chromium in the water. At the suggestion of ICHD, James Adams arranged to pump the water from the basement and transfer it by tank truck to the underground wastewater holding tanks at the APC building for pretreatment.

In the following months, the ICHD and the Michigan Department of Natural Resources (MDNR) implemented a limited boring and hand-auger program to investigate the site area. On March 2 and 3, 1981, James Adams excavated a hole in the Meyer backyard to expose the tile drain. James Adams had the tile drain exposed in order to plug it to prevent wastewater from entering the Meyer basement. James Adams then installed a collection and pumping device in the trench. He plugged the end of the tile drain near the Meyer house and periodically pumped the water out of the trench into a tank truck. Samples of this liquid were found to contain up to 160 ppm total chromium. It was suggested to Mr. Meyer that any liquid pumped from his basement in the future be pumped directly into the collection device in the trench.

ICHD subsurface investigations indicated that plating waste had migrated through a sand lens to some extent and was not confined entirely to the tile drain system. ICHD therefore urged James Adams to install a subsurface interceptor and collector system between the APC building (the suspected source area) and the basement of the Meyer house. In October 1982, Adams installed a subsurface collection drain immediately north of the Meyer house. The collection system was designed to collect seepage from both the broken tile drain and the contaminated sand lens. The collection system drained by gravity to a 20-cubic-foot (ft^3) concrete sump in the backyard at 517 Rosemary Street about 30 ft south of the APC building. From that point the wastewater was pumped directly to the two 1,000-gallon concrete wastewater holding tanks. This collection system is still in operation.

While the collection system appears to reduce the concentration and volume of contamination reaching the Meyer house, local and state agencies continued to express concern over the extent of contamination and the integrity of the wastewater holding tank system. In response to this concern, U.S. EPA conducted a detailed site review and filed an inspection report in October 1986. The Site was proposed for the National Priorities List (NPL) in June 1988. The Site received a Hazard Ranking System (HRS) score of 35.57.

On April 14, 1988, SAIC inspected the APC site to determine its compliance with U.S. EPA Categorical Standards and the City of Lansing Industrial Pretreatment Program. The inspection was conducted for U.S. EPA, and representatives of MDNR and the City of Lansing attended. The report prepared by SAIC included several recommendations to bring APC's activities into compliance with the requirements of its National Pollutant Discharge Elimination System (NPDES) permit.

In March 1989, the APC site was placed on the National Priorities List. The U.S. EPA conducted the RI in two phases. Phase I of the RI began in August 1989.

The Phase I RI included ambient air monitoring, a trench investigation, a soil investigation (surface and subsurface), monitoring well installation, a groundwater investigation (including groundwater sampling, preliminary groundwater flow determination, and hydraulic conductivity tests), a surface water investigation, and a basement investigation. Phase I RI field activities were conducted from August to September 1989.

After the Phase I RI field investigation, the Technical Assistance Team (TAT), a contractor to U.S. EPA's Emergency Response Section, was tasked by U.S. EPA to conduct an assessment of the residential area near the APC site. On November 28, 1989, TAT collected four basement water samples and one soil sample from nearby residences. The analytical results were forwarded to the Agency for Toxic Substances and Disease Registry (ATSDR) for evaluation of potential or existing health threats. Based on this evaluation, U.S. EPA determined that no emergency removal action was required.

In March 1991, U.S. EPA began work on Phase II of the RI and the FS. Phase II RI field activities were conducted from March to July 1992. The Phase II RI included a contaminant source investigation consisting of shallow soil, soil gas, and groundwater sampling, and a geologic and hydrogeologic investigation consisting of shallow and deep soil borings, temporary piezometer installation, monitoring well installation, groundwater sampling, slug tests, and water level measurements.

The RI was published in March 1993 and included a Baseline Risk Assessment. The FS was completed in July 1993 and provided to the public for review and comment on August 19, 1993. The FS contained ten remedial alternatives.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

A community relations plan was developed in 1989 and again in 1991 to address community concerns and to plan an information strategy for the Site. U.S. EPA has held four public meetings to keep the public informed about the activities at the Site and the MDNR generated a series of Progress Reports for the Site to assist U.S. EPA with community relations. The meetings occurred on the following dates:

- May 18, 1989 - information meeting to discuss the planned investigation;
- May 27, 1992 - information meeting to discuss phase I RI findings;
- April 21, 1993 - briefing on recently completed RI Report;
- September 8, 1993 - briefing on proposed plan.

U.S. EPA has also sent out fact sheets at various times during the RI/FS process.

As part of its community relations program, U.S. EPA has maintained two information repositories in Lansing, Michigan at the Lansing Public Library, 401 South Capitol and the Lansing Township Hall, 3209 West Michigan. Documents and reports regarding the Site prepared by U.S. EPA and the MDNR are contained in these repositories.

U.S. EPA notified the local community, by way of the Proposed Plan, of the recommendation of a remedial alternative for the Site. To encourage public participation in the selection of a remedial alternative, U.S. EPA scheduled a public comment period from August 19 through September 17, 1993. On September 8, 1993, U.S. EPA held a public meeting to discuss the recommended remedial alternative and the other alternatives identified and evaluated in the FS. A transcript of the meeting is included as part of the Administrative Record for the Site. U.S. EPA's responses to comments received during this public meeting and to written comments received during the public comment period are included in the Responsiveness Summary which is attached to this ROD.

Advertisements were placed in the Lansing State Journal concerning the public meetings and the comment period.

The public participation requirements of CERCLA Sections 113(k) (2) (B) (i-v) and 117 were met in the remedy selection process.

IV. SCOPE AND ROLE OF RESPONSE ACTION

U.S. EPA identified contaminated surface and subsurface soils as posing potential risks to human health. Potential exposure routes include ingestion, dermal contact and inhalation of contaminated soils at the Site by residents, trespassers, and construction workers. Soils contributing to risk ("hot spots") that are accessible to human contact around buildings on the Site represent a principal threat. Remediation of contaminated soils under buildings is not necessary because building foundations act as a cap and significantly reduce potential exposure routes to contaminated soils.

U.S. EPA developed remedial objectives to address these risks, namely prevent human ingestion, dermal contact and inhalation of contaminated soils contributing to unacceptable risk at the Site. The remedial objectives are based on the data obtained during the RI. The main component of this remedial action includes excavation of contaminated soils around buildings at the Site which contribute to Site specific risk, disposal of the excavated soils in an off Site landfill and ground water monitoring to monitor the migration of residual contamination from the Site in the direction of the public water supply wells.

V. SUMMARY OF SITE CHARACTERISTICS

In March of 1993, an RI Report was completed for the Site. The purpose of the RI was to determine the nature and extent of contamination and potential exposure pathways from surface soils, subsurface soils, ground water, surface water and basement water. Samples, referred to as "sediment samples" in the RI, were collected from a concrete sump and green water drum associated with the PVC pipe collection system and old tile drain system (see Figure 2). For simplicity, these samples are grouped into the category of surface soil samples throughout this ROD. Trench excavations, where soil samples were collected, were conducted to determine the location and condition of the old clay tile drain network suspected of being used for disposal of contaminated waste water. For simplicity, trench soil samples are grouped into the category of subsurface soil samples throughout this ROD. Surface water samples were collected from man-made ground water collection systems and standing puddles rather than from natural surface water bodies. The RI report should be consulted for a more thorough description of the Site characterization.

Metal Contamination

Metals are the most significant contaminant at the Site in terms of frequency of detection and highest concentrations in all media sampled. Metals selected in the RI to delineate the spacial distribution of contamination include chromium, copper, nickel and zinc. Selection of these metals was based on the history of the Adams Plating Facility operations and their consistently elevated levels (above background) throughout the Site. The following are the maximum concentrations of target metals in various media at the Site:

	(mg/kg) Surface Soil	(mg/kg) Subsurface Soil	(ug/l) Ground Water	(ug/l) Surface Water	(ug/l) Basement Water
Chromium	6,976	1,180	29,800	21,500	7,960
Copper	372	1,810	220	1,560	25
Nickel	229	880	852	387	74
Zinc	358	1050	872	567	93

The old tile drain system and the soils and ground water directly around it appear to be the areas most affected by inorganic contamination at the Site. Inorganic contaminant concentrations tend to decrease with distance radially from the old tile drain system. In general, the **highest** concentrations of inorganic contamination were also detected in soil and water samples relatively close to the old tile drain system. Chromium appears to be the most widespread. The concentrations are frequently elevated above background (11.4 mg/kg) and commonly at concentrations above other inorganics associated with the plating process. The highest chromium concentrations for the Site overall were detected in soil samples from the concrete sump (6,214 mg/kg) and green water drum (6,976 mg/kg) associated with the PVC pipe collection system and old tile drain system. In addition, the highest concentration of chromium in surface water (21,500 ug/l) was detected in a sample collected from the green water drum. The highest chromium concentrations in subsurface soils (1,180 mg/kg) and ground water (29,800 ug/l) were detected in samples collected relatively close to the "T" connection in the old tile drain system near the south west corner of the Adams Plating building. Elevated concentrations of inorganics also detected in subsurface soil samples include lead at 244 mg/kg, mercury at 2.1 mg/kg, and cyanide at 128 mg/kg.

Relatively high chromium concentrations were detected in water samples collected from two basements just southeast (3,610 ug/l) and southwest (7,960 ug/l) of the Adams Plating building (house 517 and 510 on Figure 2). Again, the house closest to the old tile drain system showed higher chromium, as well as copper (25 ug/l), nickel (74 ug/l) and zinc (93 ug/l), concentrations.

Two forms of chromium are present at the Site: trivalent chromium (Cr^{+3}) and hexavalent chromium (Cr^{+6}). Many chromium plating operations, including the Adams Plating Company, use hexavalent chromium baths. Hexavalent chromium was analyzed for in ground water samples at the Site. However, the analytical methods for analyzing hexavalent chromium do not provide reliable quantitative results. At the Adams Plating Site, for example, hexavalent chromium was detected in three monitoring wells. However, in one well the hexavalent chromium concentration was greater than the total chromium concentration. Although the analytical method for analyzing hexavalent chromium does not provide reliable quantitative results, it does confirm the presence of hexavalent chromium at the Site.

Organic Contamination

Volatile organic compounds (VOCs) were detected in all media sampled. VOCs detected in soils include 1,1-DCA (2 to 5,300 ug/kg), 1,1,1-TCA (0.7 to 5,300 ug/kg), chloromethane (2,700 to 4,200 ug/kg), 2-butanone (3 to 4,200 ug/kg), methyl ethyl ketone (MEK) (4,200 μg/kg), ethylbenzene (8 to 1,200 ug/kg), bromomethane (2,520 μg/kg), acetone (2 to 850 ug/kg), toluene (2 to 610 ug/kg), methylene chloride (3 to 26 ug/kg), 1,1-DCE (4 to 20 ug/kg), chloroethane (4 to 8 ug/kg), 2-hexanone (480 ug/kg) carbon tetrachloride (65 ug/kg), carbon disulfide (12 ug/kg), and trichloroethene (TCE) (2 ug/kg). Methylene chloride, acetone, and 1,1,1-TCA are three degreasing agents known to have been used at APC.

VOCs in ground water include 1,1-DCE; 1,1-DCA; 1,1,1-TCA; and toluene each in the range of 1 to 3,800 ug/l. The highest concentration of all the VOCs was that of 1,1,1-TCA at 3,800 ug/l, 1,1-DCA at 840 ug/l and 1,1-DCE at 30 ug/l. Other VOCs such as chloroethane, 1,2-DCA and 1,1,2-TCA were detected in low concentrations. Semi-VOC concentrations were generally low and ranged from 1 to 7 ug/l.

Distribution of Contaminants

The areal extent of inorganic and organic contamination at the Site is consistent, namely contamination was detected primarily around the old tile drain system, between the APC building and the warehouse just south of the APC building and just to the south of the warehouse. Contamination generally decreases in concentration with distance from these areas. The areal extent of contamination in ground water is also roughly defined by the same area as the soil contamination. However, the areal distribution of ground water contamination extends approximately 50 to 100 feet farther to the north, south, east and west than the area of soil contamination. For example, elevated ground water concentrations of chromium were detected in monitoring wells at the north, south, east and west edges of the Site, with the highest concentration of chromium (3,850 ug/l) being at the south edge. Concentrations of chromium in soil samples at these same locations were approximately the same as background levels. Concentrations of inorganic and organic contamination detected in wells around the perimeter of the Site were generally just above MCLs, but orders of magnitude less than wells located on-Site.

Vertically, the organic and inorganic contaminant distribution indicates that contaminants have migrated to the upper and lower sand units (10 to 20 feet bgs) and that these sand units are the preferred pathways of contaminant transport. Concentrations of organic and inorganic contaminants in ground water and soil generally decrease dramatically from the upper to the lower sand unit. Although both organic and inorganic contaminants are present in the sand units, organic contaminants, not inorganic contaminants are more frequently detected in the till units.

The upper 10 feet of soil, which includes the upper sand layer, is generally considered to contain the majority of Site related contamination. Below 10 feet, concentrations of contaminants were low and the frequency of detection of contaminants was limited. For example, chromium was detected an order of magnitude (10x) above background (11.4 mg/kg) at only three locations. These values are 189 mg/kg, 148 mg/kg and 112 mg/kg and are located next to one another along the southern wall of the Adams Plating building. Total VOCs ranged in concentration from 2 to 11,760 ug/kg in thirty-five soil samples below 10 feet. However, total VOCs above 1 mg/kg were detected at only one location near the northwest corner of the Adams Plating building (12 mg/kg). Total VOCs above 100 ug/kg were detected in nine samples from areas primarily close the perimeter of the Adams Plating building and warehouse. The following summarizes maximum contaminant concentrations below 10 feet:

Maximum Contaminant Concentrations (mg/kg)
in Soils Below 10 Feet

	TOTAL VOCs	TOTAL SVOCs	TOTAL METALS	CHROMIUM
Maximum Concentration	12	.02	224	1 8 9
Frequency of Detection	9*	1	3**	3***

* = Greater than 100 ug/kg

** = Greater than 100 mg/kg. Includes chromium, copper, nickel and zinc.

*** = 10x above chromium background (11.4 mg/kg)

Contaminant Sources

Based on the areal and vertical distribution of contaminants in soil and groundwater at the APC site, VOCs and inorganic analytes related to the electroplating operations most likely originated from the APC building and its associated former clay tile drains, most notably the clay tile drain that runs south to Meyer's house and turns east toward Rosemary Street, and the clay tile drain that runs east toward Rosemary Street adjacent to the north wall of the APC building. Other probable source areas include the green water drum area near the northwest corner of the APC building and the area beneath the warehouse where the tile drain was broken in 1980. Present operations at the APC facility and the two 1,000-gallon wastewater holding tanks may also be sources of contamination. VOCs and SVOCs may have also originated from the dry cleaning UST containing Stoddard Solvent, which consisted of a mineral spirit that contains chlorinated hydrocarbons, paraffins, and aromatic hydrocarbons. Other VOCs and SVOCs detected in this area may be related to storage and disposal of fuel oil and coal used in the past for heating purposes.

Contaminated Soil Areas and Volumes

Two different soil areas and volumes were estimated for soils requiring remediation. One estimate included only those contaminated soils that contribute to Site-specific health risks associated with inhalation, dermal contact and ingestion of contaminated soils (Site-specific risk approach) and assumes that Site related contaminated soils do not have the potential to adversely affect any ground water drinking source. The second estimate includes all Site related contaminated soils which have the potential to affect any ground water (i.e., ground water protection).

The estimate of volume for the Site-specific risk approach is 4,700 cubic yards (yd^3). The target area under this approach is shaded in Figure 3. This estimate includes only soils around the existing on-Site structures that contain contaminants exceeding Site-specific acceptable risk levels of $1x10^{-6}$ for carcinogenic risk and a hazard index ratio of 1 for noncarcinogenic risks. The maximum depth for potential exposure is considered to be 10 ft bgs based on what is determined to be a reasonable scenario in the risk assessment. The average depth for the Site, however, is considered to be 6.3 ft bgs based on the distribution of contaminants in soil. The area is estimated to be 20,000 ft^2 with the average estimated depth of 6.3 ft bgs yielding an estimated volume of 4,700 yd^3 of soil requiring remediation.

The volume estimate for the ground water protection scenario is approximately 37,500 yd^3. The target area under this approach is shaded in Figure 4. This estimate involves remediating

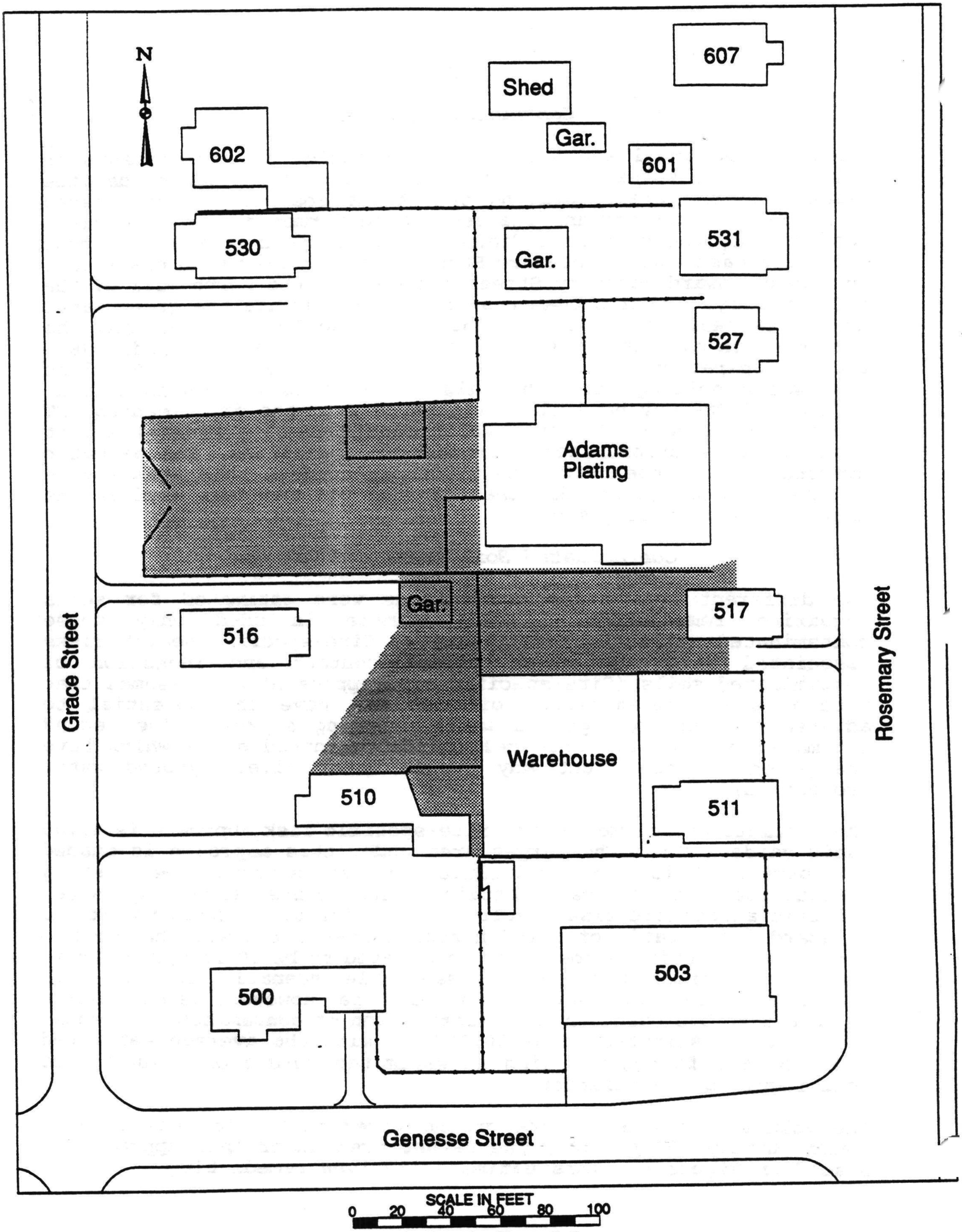

Figure 3 Area for Remediation
Alternatives 3-9
Adams Plating

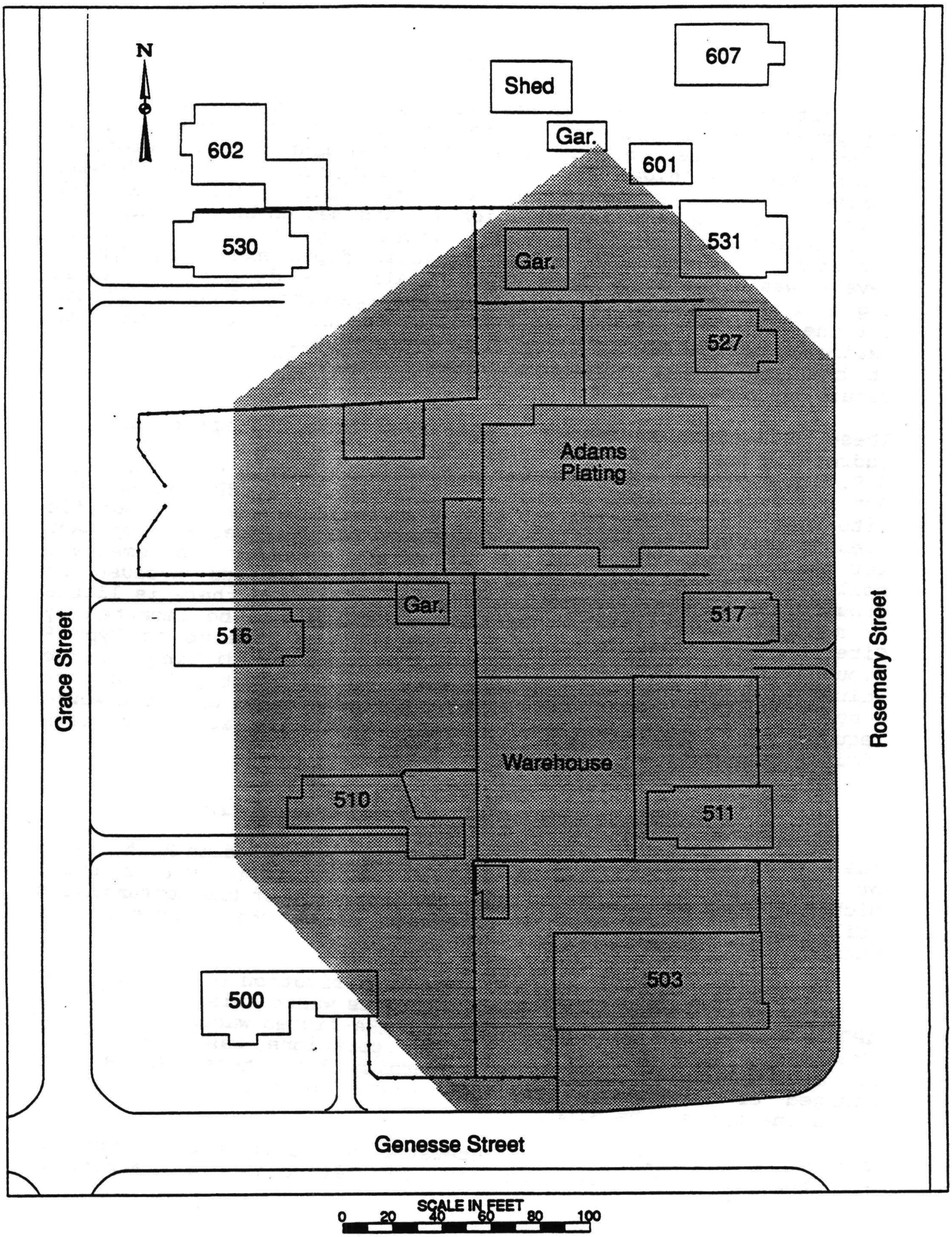

Figure 4 Area for Remediation
Alternative 10 - Michigan Type B
Adams Plating

all contaminated soils that have the potential to adversely affect any ground water. Soil areas were determined to have the potential to adversely affect ground water if contaminant concentrations in soils exceed Michigan Act 307 Type B cleanup levels which were derived using a standard exposure scenario. Soils under the existing on-Site structures, which are assumed to be contaminated, were included in this estimate. Vertically, at each RI boring location, the sample from the greatest depth exceeding Type B levels was used as a base depth. All base depths were added together and averaged to estimate an average depth of contamination for the Site. Under this scenario, contaminated soils include an estimated area of 90,720 ft^2 with an average estimated depth of 11.5 ft bgs yielding a volume of approximately 37,500 yd^3 of soil requiring remediation.

These volumetric estimates are derived from two approaches for addressing soil contamination at the Site. The State requested that U.S. EPA evaluate a groundwater protection approach using Michigan Act 307 Type B cleanup levels. In addition, U.S. EPA evaluated a Site-specific risk approach. U.S. EPA considers the Site-specific cleanup approach preferable to the ground water protection approach for three primary reasons: 1) it is not necessary to remediate soil to Type B groundwater protection standards because no groundwater ingestion exposure pathway exists and there is little or minimal potential for the bedrock aquifer to be impacted by Site-specific contamination, 2) cleaning the Site up to Type B ground water protection levels would require remediating a large volume of soils that U.S. EPA has determined currently do not pose a health hazard, and 3) the ground water protection approach would require the demolishing of buildings which are acting as caps limiting exposure to contaminated soils.

Hazardous Waste Classification of Soils

The Site contaminated soils have not been classified as RCRA listed or characteristic hazardous wastes, or hazardous wastes under Michigan's Act 64, to date. However, a portion of the contaminated soils at the Site have the potential to be characteristic for metals.

No conclusive proof to support the classification of contaminated soils at the Site as RCRA listed hazardous waste exists. While the APC is a small quantity generator of RCRA-listed waste (wastewater treatment sludges from electroplating operations, waste code F006), no information is available concerning how these wastes were managed or suggesting the F006 waste is the source of the contamination at the Site.

The RI defines the APC's wastewater as rinse water from the electroplating operations that was discharged into a preexisting drain tile system that apparently leaked. Despite its high chromium concentration, rinse water from electroplating operations is not a listed waste. It is possible other electroplating wastes such as plating baths (F007) and residual sludges from plating baths (F008) may have been improperly disposed of at the Site, but no information is available concerning the management of these types of wastes and nothing suggests that RCRA listed wastes were released along with the rinse water.

The RI also states that acetone, methylene chloride, carbon tetrachloride and 1,1,1-TCA were used as degreasing solvents at this Site although no used solvents are listed on the RCRA hazardous waste notification form. The presence of these constituents is not conclusive proof that listed solvents were improperly disposed of at the Site. It is not anticipated that the limits for volatile organic characteristic waste will be exceeded because most of the volatile constituents in the solvents used at the Site are not identified characteristic parameters under the Toxicity Characteristic Rule.

Neither the EP Toxicity or the Toxicity Characteristic Leaching Procedure (TCLP) analysis were performed on samples of Site soils. Because of this, it is uncertain whether contaminated soils at the Site can be classified as RCRA characteristic hazardous waste, or hazardous wastes under Michigan's Act 64. The contaminated soils in the tile drain system at the Site may contain chromium at concentrations high enough to be classified as hazardous waste based on the RCRA characteristic of toxicity for metals. Therefore, soils shall be tested under the TCLP for metals as part of any intrusive remediation approaches.

Soils at the Site are not likely to be characteristic for VOCs. In addition to acetone; methylene chloride; and 1,1,1-TCA; other VOCs detected in the subsurface soils at the Site include up to 1,200 μg/kg of ethylbenzene; up to 2,520 μg/kg of bromomethane; and 4,000 μg/kg or more of 1,1-DCA, methyl ethyl ketone (MEK), chloromethane, and 1,1,2-TCA. Of these VOCs, only MEK is a characteristic parameter, and the highest concentration of MEK detected in on-Site soils (4,200 μg/kg) is not likely to exceed the regulatory threshold. If the soils are not characteristic wastes because of the VOCs, then treatment of Site contaminated soils for VOCs will not be necessary prior to disposal in a solid waste (Subtitle D) landfill.

VI. SUMMARY OF SITE RISKS

In order to characterize the current and potential threats to human health and the environment that may be posed by the contaminants at the Site, a Baseline Risk Assessment (RA) was prepared according to U.S. EPA's Risk Assessment Guidance for Superfund (RAGS): Volumes 1 and 2 - Environmental Evaluation Manual.

Chemicals of Potential Concern

In order to calculate risks to human health and the environment posed by the Adams Plating Company Site, chemicals of potential concern were identified. Chemicals of potential concern are defined as chemicals that are potentially site-related and whose data are of sufficient quality for use in the quantitative risk assessment. Chemicals of potential concern were identified based on sampling of surface soil, subsurface soil and water in basements. The Site history, analytical methods, quantitation limits, data qualifiers, concentrations in blanks and background concentrations were evaluated as described in RAGS. A summary of chemicals of potential concern based on this evaluation is presented in Table 1. This is the same as Table 1-2 of the Baseline Risk Assessment.

The chemical database was further organized by grouping the data according to medium-specific exposure areas and identifying medium-specific background samples. The data for each exposure area were then evaluated according to the following four primary criteria: (1) identification of exposure areas and identifying background sample locations, (2) comparison with background levels, (3) frequency of detection, and (4) essential human nutrient value.

Based on the methods and criteria discussed above, chemicals of potential concern were identified. These chemicals generally include the following:

- Chemicals positively identified in at least one sample in a given medium and chemicals with certain identities but uncertain concentrations
- Chemicals detected at concentrations above their concentrations in blank samples
- Chemicals detected at concentrations above their naturally occurring concentrations

Exposure Assessment

The exposure assessment identifies potential receptors and complete exposure pathways, and estimates chemical intakes for potentially exposed populations.

Potentially exposed populations include on-Site residents, on-site trespassers, and construction workers. Subpopulations of particular concern are limited primarily to children who may trespass on Site or children, elderly individuals, or pregnant women who may be exposed to contaminants that migrate off Site.

TABLE 1

CHEMICALS OF POTENTIAL CONCERN AT THE APC SITE

MEDIA	SOIL	GROUND WATER
VOC		
1,1,2-TCA	–	X
ACETONE	X	X
CHLOROETHANE	X	X
1,1-DCA	X	X
1,2-DCA	–	X
1,2-DCE	X	X
1,2-DCE (Total)	X	X
1,2-DICHLOROPROPANE	X	–
ETHYLBENZENE	X	–
METHYLENE CHLORIDE	X	–
TOLUENE	X	X
1,1,1-TCA	X	X
TCE	X	X
EYLENES (Total)	X	X
SVOC		
ANTHRACENE	X	–
BENZO(a)ANTHRACENE	X	–
BENZO(a)PYRENE	X	–
BENZO(b)FLUORATHENE	X	–
BENZO(k)FLUORATHENE	X	–
BENZO(g,h,i)PERYLENE	X	–
BIS(2-ETHYLHEXYL)PHTHALATE	X	X
CHRYSENE	X	–
DI-n-BUTYL PHTHALATE	X	–
DI-n-OCTYL PHTHALATE	X	–
FLUORATHENE	X	–
FLUORENE	X	–
INDENO(1,2,3-c,d)PYRENE	X	–
2-METHYLNAPHTHALENE	X	–
NAPHTHALENE	X	X

TABLE 1 (Continued)

CHEMICALS OF POTENTIAL CONCERN AT THE APC SITE

MEDIA	SOIL	GROUND WATER
PHENANTHRENE	X	–
PYRENE	X	–
INORGANIC COMPOUND		
ANTIMONY	X	–
ARSENIC	X	X
BARIUM	–	–
BERYLLIUM	–	X
CADMIUM	X	–
CHROMIUM (III AND VI)	X	X
COBALT	X	X
COPPER	X	–
MANGANESE	X	X
MERCURY	X	–
NICKEL	X	X
SILVER	X	–
VANADIUM	–	X
ZINC	X	–

Notes:

– = Chemical is not of potential concern in this media

X = Chemical is of potential concern in this media

Potential receptors may be exposed to contaminants in soils, groundwater, and homegrown fruits and vegetables. Soil exposure include direct ingestion, dermal contact, and inhalation of soil particulate. Exposure to groundwater is assumed to take place when groundwater floods area basements during periods of heavy rain. Exposures include dermal contact and inhalation of VOCs released from the groundwater. Ingestion of groundwater was not evaluated because all residents and businesses in the vicinity of the Site receive their water from the municipal system, and the potential ground water yield from the saturated zones in the immediate vicinity of the Site is insufficient to reasonably support the installation and use of private wells. A maximum depth of 10 feet bgs was assumed for exposure to subsurface soils. A depth of 10 feet bgs was assumed to be a reasonable estimate of the depth to which soils would be excavated during construction activities. It was assumed that 10% of the total chromium present in samples consisted of chromium VI in order to evaluate risk from chromium VI because no reliable analytical methods for measuring chromium VI were available. Finally, potential receptors may be exposed through ingestion of contaminants in homegrown fruits and vegetables.

For each exposure pathway evaluated, carcinogenic and noncarcinogenic health risks were characterized for the reasonable maximum exposure scenario. In general, the standard and default exposure assumptions recommended by U.S. EPA guidance were used, as well as conservative estimates and best professional judgement. In general, exposure is averaged over a 70-year lifetime for cancer risk estimates, exposure duration for noncarcinogenic effects is assumed to be 30 years, contact rates for exposure to chemicals in soils are 200 mg soil/day for children and 100 mg/day for adults for the ingestion route, the daily contact rate for exposure to chemicals in air is 20 m^3/day for adults and 22 m^3/day for children, and the average body weight for an adult, a child 1- to 6-years old, and a child 7- to 15-years old is 70 kg, 15 kg and 37 kg respectively. In addition, the methods and assumptions used in the exposure assessment are presented in Section 7.2 of the RI report. Estimated exposure intakes are presented in Appendix H-5 of the RI report.

Toxicity Assessment

Available toxicity factors of carcinogenic and noncarcinogenic chemicals of potential concern are discussed and presented in Section 7.3 of the RI report. The chemicals of potential concern selected for the RA for the Site have a wide range of carcinogenic and noncarcinogenic effects associated with them. The reference dose (RfD) values and slope factors (SF) were key dose-response variables used in the quantitative RA. The RfD, expressed in units of milligrams per kilogram per day (mg/kg/day), for a specific chemical is an estimated daily intake rate that appears to pose no risk over a lifetime of exposure. The RfD value is used to assess noncarcinogenic effects. The SF, expressed in units of $(mg/kg/day)^{-1}$, provides a conservative estimate of the probability of cancer development from a lifetime of exposure to a particular level of a potential carcinogen. Brief toxicity summaries of the chemicals of potential concern that may present the greatest carcinogenic risks and are present at the highest concentrations at the Site are presented in Section 7.3 of the RI report. These chemicals include arsenic; carcinogenic PAHs; chromium; copper; 1,1-DCA; 1,1,1-TCA; and zinc. Risks from exposure to chemicals of potential concern without RfDs and SFs are not quantified in the RA. Instead, they are discussed in the RA qualitatively.

Toxicological profiles for all chemicals of potential concern are presented in Appendix H-3 of the RI report.

Risk Characterization

Because media at the Site were divided into exposure areas, several possible methods exist for combining medium-specific data to evaluate overall Site risk.

Exposure pathways for chemicals of potential concern associated with each pathway were evaluated quantitatively to estimate the risks associated with human exposure to chemicals of potential concern at the Site. As a part of this assessment, risks from noncarcinogenic and carcinogenic effects were estimated separately because they are thought to operate under different mechanisms of action and are not necessarily comparable. The noncarcinogenic and carcinogenic risks were estimated in terms of hazard index (HI) and excess lifetime cancer risk (ELCR) values, respectively.

The HI for noncarcinogenic risks is the ratio of an exposure level to an RfD. The ELCR for carcinogenic risks is obtained by multiplying the estimated exposure level by the SF. An HI of 1.0 or less is considered acceptable as the RfD represents a "an acceptable" exposure level. An ELCR of 1E-06 is considered as the point of departure for determining acceptable risks.

The possibility of exposure to multiple chemicals of potential concern was considered in the RA because such exposure is possible in various exposure scenarios. Under such a situation, chemicals of potential concern may affect a receptor in an additive, synergistic, or antagonistic manner. Additive impact of exposure to multiple chemicals of potential concern was assumed in the RA. HIs and ELCRs for individual chemicals of potential concern in an exposure area were summed to produce total HIs and ELCRs associated with exposure to all chemicals of potential concern in that scenario. Summaries of noncarcinogenic and carcinogenic risks by medium and route of exposure in terms of reasonable maximum exposure (RME) are presented in Tables 2 and 3, respectively.

Based on total estimated exposures and current toxicity information, total carcinogenic risk levels to exposed populations from chemicals of potential concern at the Adams Plating Company Site range from $3x10^{-6}$ to $5x10^{-4}$. These risk levels exceed the less stringent end of the target risk range ($1x10^{-4}$). These exceedances are primarily caused by resident, trespasser and construction worker inhalation of arsenic and chromium VI in subsurface soils during construction digging. The spacial distribution of the exceedance area is shown in Figure 5 as Area 1. Unacceptable risk was generally not associated with Area 2 in Figure 5. The only noncarcinogenic risks (HI) that exceed 1 are those related to residential ingestion of surface soil (child risk of 4.6) and dermal contact with surface soil (child risk of 4.6 and adult risk of 2.7). Again, these risks are within Area 1 of Figure 5. These risks from exposure to surface soil primarily result from the presence of antimony, chromium III, and chromium VI. Carcinogenic exposure from ingestion of homegrown fruits and vegetables ranges from 3E-06 to 1E-05. These risks primarily result from the presence of PAHs.

In Area 2 of Figure 5, a carcinogenic exposure from ingestion of homegrown fruit from a pear tree is 3E-06. However, this risk was based on uptake models from the agricultural industry and not on actual sample data from the fruit. U.S. EPA may evaluate the need for the chemical analysis of pears from the tree and its fate during the remedial design.

Based on sampling results and the Risk Assessment, U.S. EPA determined risks associated with the contaminated water in the basements were outside of the risk range; and therefore, not of concern.

Ecological RA

Currently, no data indicates that biological receptors are experiencing adverse effects from on-Site contaminants. On-Site vegetation may be uptaking and accumulating contaminants; however, no vegetative stress was observed on Site. Likewise, terrestrial species and birds may be exposed to contaminants through dermal contact with soils, ingestion of contaminated vegetation, or ingestion of soil indirectly. However, the Site is located in a developed residential and industrial area. No threatened, endangered, or sensitive environments were identified at or seen near the Site. Based on available information, it was assumed that chemicals of potential concern at the Site pose minimal risks to the environment in the Site area.

TABLE 2

SUMMARY OF NONCARCINOGENIC RISK BY MEDIUM AND EXPOSURE ROUTE

MEDIUM	ROUTE	RESIDENT		TRESPASSER		CONSTRUCTION WORKER
		CHILD	ADULT	CHILD	ADULT	
Surface Soil	Ingestion	4.6E+00	5.0E-01	2.7E-02	1.4E-02	NA
	Dermal Contact	5.7E+00	3.3E+00	2.3E-02	1.8E-01	NA
Subsurface Soil	Ingestion	NA	NA	NA	NA	6.4E-03
	Dermal Contact	NA	NA	NA	NA	1.5E-02
	Inhalation	3.8E-01	7.4E-02	1.9E-02	9.2E-03	1.9E-01
	Ingestion of Produce	2.9E-01	1.6E-01	1.3E-02	1.1E-02	NA
Groundwater	Dermal Contact	5.8E-03	9.8E-04	NA	NA	NA
	Inhalation	1.7E-04	1.4E-05	NA	NA	NA

TABLE 3

SUMMARY OF CARCINOGENIC RISK BY MEDIUM AND EXPOSURE ROUTE

MEDIUM	ROUTE	RESIDENT			TRESPASSER			CONSTRUCTION WORKER
		CHILD	ADULT	TOTAL	CHILD	ADULT	TOTAL	
Surface Soil	Ingestion	4E-11	2E-11	6E-11	3E-11	4E-13	7E-13	NA
	Dermal Contact	5E-11	1E-10	2E-10	3E-12	5E-12	8E-12	NA
Subsurface Soil	Ingestion	NA	NA	NA	NA	NA	NA	1E-08
	Dermal Contact	NA	NA	NA	NA	NA	NA	3E-08
	Inhalation	3E-04	2E-04	5E-04	1E-05	2E-05	3E-05	2E-05
	Ingestion of Produce	3E-06	8E-06	1E-05	2E-07	3E-07	5E-07	NA
Groundwater	Dermal Contact	1E-07	9E-08	2E-07	NA	NA	NA	NA
	Inhalation	4E-08	4E-08	8E-08	NA	NA	NA	NA

NOTES: NA = Not Applicable because receptor not expected to be exposed to medium

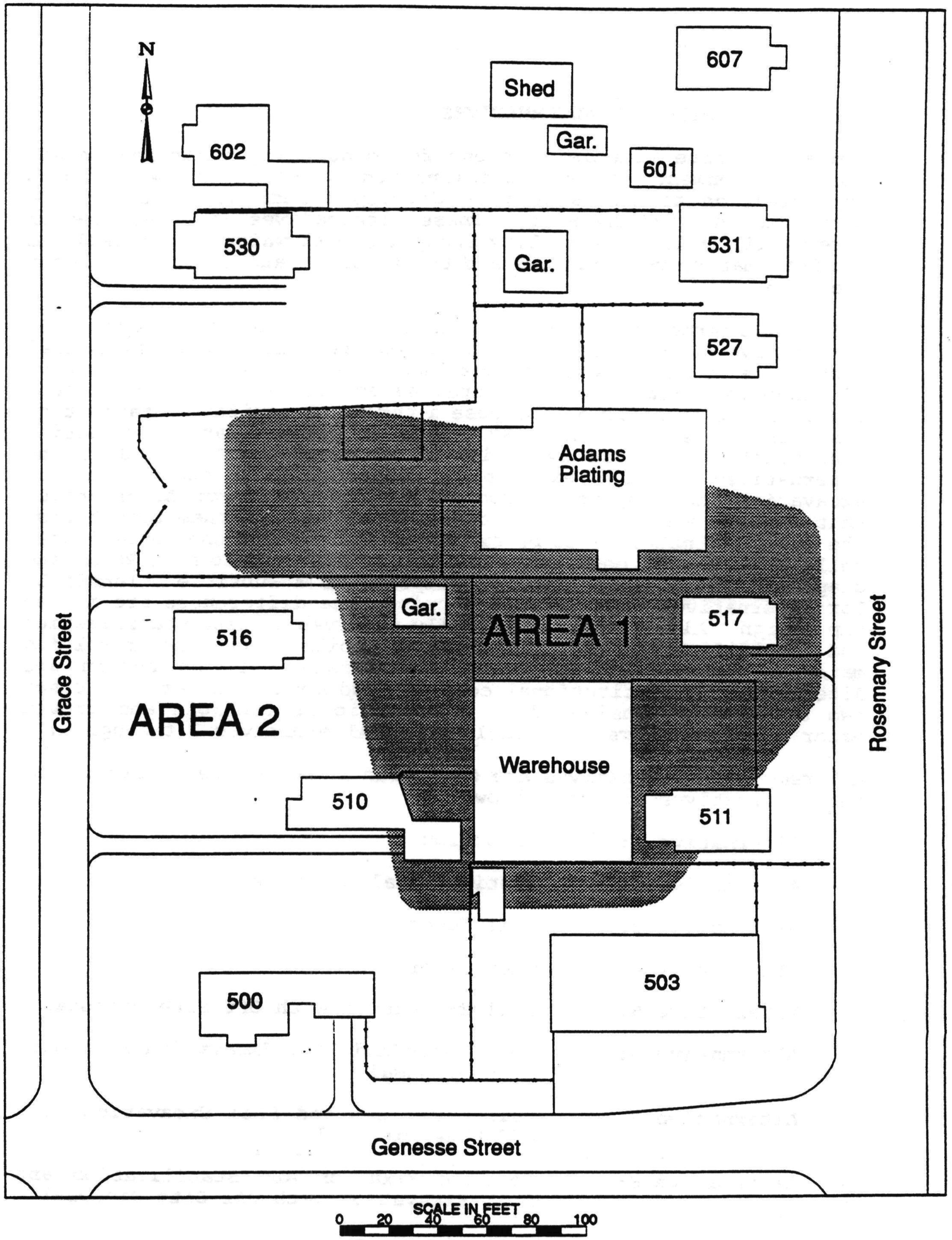

Figure 5 Soil Exposure Areas

Adams Plating

VII. DESCRIPTION OF ALTERNATIVES

Ten alternative remedial options for protecting human health and the environment from contamination associated with soil contamination at the Site were developed and evaluated for the Adams Plating Company Site. These alternatives are presented in more detail in the Feasibility Study document which is available in the information repositories and the Administrative Record file for the Site.

All the Alternatives involving an action, with the exception of Alternative 10, were developed to remediate contaminated soils that contribute to Site-specific risk identified in the RA. Alternative 10 involves remediating contaminated soils to assure that contaminants in soils do not pose a threat of aquifer contamination (cleanup to achieve Act 307 Type B ground water protection standards). With the exception of Alternatives 1, 2 and 9, the Alternatives involve excavation, capping or a combination of excavation and capping of contaminated soils. For Alternatives that include excavation, the differences between them result from the amount of material to be excavated and whether the contaminated soils will need to be treated in-situ or off-Site to meet RCRA land disposal restrictions prior to disposal in a Subtitle D landfill. For Alternatives that include capping, the differences are in the cap design. Alternative 9 primarily involves in situ stabilization and solidification of contaminated soils with the resulting material being left in place. Alternative 1: No Action and Alternative 2: institutional controls and monitoring are the other two approaches considered. Institutional controls and ground water monitoring are also included in Alternatives 3 through 9.

All remedial alternatives are described in more detail below. The ten alternatives are as follows:

Alternative 1:	No Action
Alternative 2:	Institutional Controls
Alternative 3:	Soil Cover
Alternative 4:	Multilayer Cap
Alternative 5:	Soil Excavation with Off-Site Disposal
Alternative 6:	Soil Cover and Soil Excavation with Off-Site Disposal
Alternative 7:	Multilayer Cap and Soil Excavation with Off-Site Disposal
Alternative 8:	In Situ Fixation and Stabilization and Soil Excavation with Off-Site Disposal

Alternative 9:	Partial Soil Excavation with Off-Site Disposal and In Situ Stabilization and Solidification with Soil Cover
Alternative 10:	Relocation of Residences and Businesses, Demolition of Buildings, and Soil Excavation with Off-Site Disposal

The costs presented for each alternative include capital costs (such as equipment, labor and other construction expenses to put the remedy in place) and operation and maintenance (O&M) costs (such as monitoring the ground water or maintaining the cap). These costs are then presented as a net present worth. This is a method of economic calculation that estimates the total amount of money which would need to be invested today, assuming a 30 year project life, in order to cover initial construction costs as well as future maintenance costs.

A summary of the major Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) which apply to the Site is provided in the Statutory Determinations Section of this ROD. Additional information concerning ARARs also is provided in the FS and the Proposed Plan previously issued. The two major ARARs for the Alternatives are: Michigan Act 307 and RCRA.

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Alternative 1: No Action

Superfund regulations contained in the National Contingency Plan (NCP) require that a "no action" alternative be considered at every site. This alternative serves as the baseline to which all other alternatives can be compared. Under this remedial alternative, no active remedial action or institutional action would be taken regarding the Site.

Timeframe:	Not Applicable
Capital Costs:	$0
O & M Costs:	$0
Net Present Worth:	$0

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Alternative 2: Institutional Controls

The primary objectives of institutional controls such as land use (deed) restrictions, access restrictions (fencing), and groundwater monitoring are to (1) prevent human exposure to on-Site chemicals by preventing intrusive type of activities such as digging or installing residential wells and (2) monitor groundwater quality for contamination.

This alternative may involve the following components utilizing State or local authorities to the degree they are appropriate:

- Restricting soil excavation in deeds for areas warranting remediation
- Restricting installation of residential water wells in deeds for areas warranting remediation
- Constructing permanent fences to prevent access to the contaminated areas
- Monitoring groundwater to characterize contaminant migration from soil to groundwater and to assess continued sources

Alternatives 3 through 9 may also include institutional controls. Institutional controls for Alternatives 3 through 9 are slightly modified as follows and would be used to the degree necessary:

- Restricting soil excavation in deeds for areas to be remediated
- Restricting installation of residential water wells in deeds for areas to be remediated and for some off-site residential areas
- Constructing temporary fencing around areas during remediation
- Monitoring groundwater to evaluate the effectiveness of soil remediation

Timeframe for remedial action:	2-3 weeks
Capital Costs:	$750
O & M Costs (Annual):	$34,400
O & M (30 yrs at 10%):	$324,250
Net Present Worth:	$325,000

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Alternative 3: Soil Cover

This alternative involves placing a soil cover over the contaminated soil area to prevent human contact with the contaminated soil (see area shaded in Figure 3). In backyard areas, the noncompacted soil cover would consist of 8 inches of clean fill overlain by 4 inches of topsoil. The topsoil would be reseeded with a mixture of grasses to limit wind and water erosion and to increase the transpiration of water from underlying soils. In the gravel parking area, new gravel would be placed over the soil cover. The soil and gravel in the parking area would be slightly compacted and would become more compacted as the parking area is used over time.

Timeframe for remedial action:	3-5 weeks
Capital Costs:	$ 19,000
O & M Costs (Annual):	$ 35,200
O & M (30 yrs at 10%):	$331,000
Net Present Worth:	$350,000

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Alternative 4: Multilayer Cap

This alternative involves constructing a multilayer cap over the contaminated soil areas (see shaded area in Figure 3). A multilayer cap consists of a single barrier layer in combination with other layers to secure the barrier layer or promote drainage. The barrier layer for a multilayer cap can consist of any number of different types of materials. An impermeable prefabricated clay liner composed of sodium bentonite clay with an extremely low hydraulic conductivity (2 x 10^{-10} centimeter per second) would be installed first. A 10-inch-thick concrete cap would be constructed on top of the prefabricated clay liner to minimize the infiltration of precipitation in the contaminated soil at the Site. In this case, the prefabricated clay liner would act as a backup for the concrete cap in case the cap is damaged. A temporary fence would be constructed during remedial activities and would be taken down upon completion of these activities.

This Alternative, and Alternative 3, assumes that contaminated soils at the Site are not classified as RCRA or Michigan Act 64 hazardous waste. Soils at the Site may be classified as RCRA characteristic hazardous waste during design (see Summary of Site Characteristics Section of this ROD). If soils are classified as RCRA hazardous waste, the described cap would not meet RCRA requirements. The construction of a RCRA cap at the Site would be extremely difficult to implement because of the Site's physical setting and its close proximity to residential areas. Therefore, a RCRA cap was not retained for further consideration as a remedial alternative.

Timeframe for remedial action:	6-8 weeks
Capital Costs:	$160,000
O & M Costs (Annual):	$ 35,000
O & M (30 yrs at 10%):	$340,000
Net Present Worth:	$500,000

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Alternative 5: Soil Excavation with Off-Site Disposal

Under this alternative, approximately 4700 yd^3 of contaminated soils contributing to Site specific risk would be excavated from the Site and disposed of in an off-Site solid waste (Subtitle D) landfill. Excavation and disposal would include old clay tiles, the PVC collection system which includes the 2-1,000 gallon underground tanks, and concrete sumps.

The estimated area requiring remediation is shaded in Figure 3. The area shaded in Figure 3 is the area estimated to contain the Site related contamination in soils above background based on the RI and all soils responsible for Site-specific carcinogenic risks greater than $1x10^{-6}$ or a hazard index ratio of 1.0 for exposure from ingestion, dermal contact or inhalation based on the RA. It is expected that the soil would be excavated to about 10 feet bgs in the area where the clay tile is located and only excavated to about 3 ft bgs along the edges of the area to be remediated. The excavated portion of the Site would be backfilled with clean soil, reseeded in the residential areas and covered by gravel in the parking area.

Vertical barrier walls would be installed along the west and south walls of the APC building and along the west and north walls of the warehouse to protect the clean backfilled soil from recontamination.

The excavated soil would be disposed of in a solid waste (Subtitle D) landfill, but may require treatment prior to disposal. Soils would be tested using the TCLP for metals prior to disposal. TCLP results would be used to determine if excavated soils are RCRA, or Michigan Act 64, characteristic hazardous wastes because of the metals in the soils. Soils which are found to be RCRA, or Michigan Act 64, characteristic hazardous wastes are subject to RCRA and would be treated before disposal in the Subtitle D landfill. If treatment for the characteristic wastes is necessary, the soils would be treated using fixation and stabilization methods to a level below LDR requirements such that the material no longer exhibits the characteristic which caused it to be a RCRA, or Michigan Act 64, hazardous waste.

Water collected during the excavation procedure would be containerized, tested, and treated off-Site before disposal. Off-Site treatment and disposal would be conducted at an NPDES permitted treatment facility in the Lansing area. The volume of water estimated to be encountered during excavation is about 10,000 gallons.

Material handling equipment would be used to diminish air dispersal of particulate matter and volatilization of organics when excavating contaminated soils. Dust suppressants and air monitoring may also be used during excavation.

A temporary fence would be constructed and will be in place during the time remediation activities are conducted and would be taken down upon completion of these activities.

Timeframe for remedial action:	6-8 weeks
Capital Costs:	$ 1,500,000
O & M Costs (Annual):	$ 34,400
O & M (30 yrs at 10%):	$ 325,000
Net Present Worth:	$ 1,800,000

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Alternative 6: Soil Cover and Soil Excavation with Off-Site Disposal

This alternative is a combination of Alternatives 3 and 5 and would involve placing a soil cover over less contaminated portions of the area shaded in Figure 3 and excavation of about 2,000 yd^3 of contaminated soil in the other areas. The depth of excavation is estimated to range from 3 to 10 feet bgs. The contaminated soils south of the APC building would be excavated and would include old clay tiles, the PVC collection system which includes the 2-1000 gallon underground tanks and concrete sumps. The excavated area would be backfilled with clean soil and reseeded. The soil cover would be placed over the parking area and along the east and west sides of the area requiring remediation. A vertical barrier, described in Alternative 5, would be installed along the west and south walls of the APC building and along the west and north walls of the warehouse to protect clean fill from recontamination.

Disposal of excavated materials would be addressed in the same way as described in Alternative 5. Water, and particulate and organic volatilization emissions resulting from excavation activities would also be addressed in the same way as described in Alternative 5. The water volume produced during excavation is estimated to be approximately 10,000 gallons.

A temporary fence would be constructed and will be in place during the time remediation activities are conducted and would be taken down upon completion of these activities.

Timeframe for remedial action:	6-8 weeks
Capital Costs:	$ 805,000
O & M Costs (Annual):	$ 35,400
O & M (30 yrs at 10%):	$ 335,000
Net Present Worth:	$ 1,150,000

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Alternative 7: Multilayer Cap and Soil Excavation with Off-Site Disposal

This alternative is similar to Alternative 6, but would involve a multilayer cap, as described in Alternative 4, instead of a soil cover over portions of the residential area and the gravel parking area. Under Alternative 7, about 2,700 yd^3 of soil would be excavated, which is slightly more than Alternative 6.

Disposal of excavated materials would be addressed in the same way as described in Alternative 5. Water, and particulate and organic volatilization emissions resulting from excavation activities would also be addressed in the same way as described in Alternative 5. The water volume produced during excavation is estimated to be approximately 10,000 gallons.

A temporary fence would be constructed and will be in place during the time remediation activities are conducted and would be taken down upon completion of these activities.

Timeframe for remedial action:	6-8 weeks
Capital Costs:	$ 1,200,000
O & M Costs (Annual):	$ 35,000
O & M (30 yrs at 10%):	$ 340,000
Net Present Worth:	$ 1,500,000

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Alternative 8: In Situ Fixation and Stabilization and Soil Excavation with Off-Site Disposal

As indicated in Alternative 5, soils which are RCRA characteristic wastes will be treated to meet land disposal restrictions prior to disposal. Alternative 8 was developed to evaluate the option of treating the soils on-Site prior to excavation and disposal.

Under Alternative 8, in situ fixation and stabilization would be performed on contaminated soils shaded in Figure 3 before excavation of the contaminated soils. After mixing, treated contaminated soils would be excavated and transported to an off-Site solid waste (Subtitle D) landfill for disposal. Approximately 6,000 yd^3 of treated soil would be excavated under this alternative. Old clay tiles, the PVC collection system which includes the 2-1000 gallon underground tanks, and concrete sumps would be excavated and disposed of along with the contaminated soil. A vertical barrier, described in Alternative 5, would be installed along the west and south walls of the APC building and along the west and north walls of the warehouse. The excavated area would be backfilled with clean soil, reseeded, or covered by gravel.

Volatilization of organics, air dispersal of dust particles and groundwater collection procedures during the excavation would be handled as described in Alternative 5. The ground water volume produced during excavation is estimated to be approximately 10,000 gallons.

A temporary fence would be constructed and will be in place during the time remediation activities are conducted and would be taken down upon completion of these activities.

Timeframe for remedial action:	10-15 weeks
Capital Costs:	$ 1,500,000
O & M Costs (Annual):	$ 34,400
O & M (30 yrs at 10%):	$ 342,000
Net Present Worth:	$ 1,850,000

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Alternative 9: Partial Soil Excavation with Off-Site Disposal and In Situ Stabilization and Solidification with Soil Cover

This alternative uses partial excavation (to 3 ft bgs) of approximately 2,200 yd^3 of soils with off-Site treatment (if necessary) and disposal in a solid waste (Subtitle D) landfill followed by in-situ stabilization and solidification of the remaining contaminated soils down to 10 feet bgs in the area shaded in Figure 3. The top 3 feet of soil would be excavated to allow enough room for the backfilling of clean soil. Old clay tiles, the PVC collection system which includes the 2-1000 gallon underground tanks, and concrete sumps would be excavated and disposed of along with the soil.

After excavation, soils to be stabilized and solidified would be replaced using injectors or tillers that simultaneously inject and mix stabilization reagents with the soils. After solidification, sample cores of the stabilized material would be collected for TCLP analysis to determine the success of the treatment process. Monitoring the stabilization and solidification process may be required for 5 years based on vendor specifications. One or 2 feet of soil cover would be placed over the solidified area to prevent surface erosion and to restore the area. The soil cover would be reseeded or covered by gravel as previously described in Alternative 5.

Volatilization of organics, air dispersal of dust particles and groundwater collection procedures during the excavation would be handled as described in Alternative 5. The ground water volume produced during excavation is estimated to be approximately 10,000 gallons.

A temporary fence would be constructed and will be in place during the time remediation activities are conducted and would be taken down upon completion of these activities.

Timeframe for remedial action:	10-15 weeks
Capital Costs:	$ 1,100,000
O & M Costs (Annual):	$ 37,400
O & M (30 yrs at 10%):	$ 390,000
Net Present Worth:	$ 1,500,000

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Alternative 10: Relocation of Residences and Businesses, Demolition of Buildings, and Soil Excavation with Off-Site Disposal

Under Alternative 10, contaminated soils that have the potential to adversely affect any ground water would be excavated, treated, if necessary, and disposed of in an off-Site solid waste (Subtitle D) landfill. The estimate of this area is shaded in Figure 4. About 37,500 yd^3 of soil would be excavated from the entire area down to an approximate depth of 10 feet. The excavation and disposal procedures would be similar to the procedure described in the discussion for Alternative 5.

Ten residences and three businesses in this area would be relocated and all buildings would be demolished. The procedure for building demolition would be typical construction demolition. The only precaution taken would be to separate aboveground components such as walls and roofs from below ground components such as basements, footings, and floor slabs. The below ground components would be steam cleaned and aboveground and below ground components would both be disposed of in a construction debris (MDNR-Type III) landfill.

All utility lines, fences, trees, and shrubs in the area would be removed. All old clay tiles, the PVC collection system which includes the 2-1000 gallon underground tanks, and concrete sumps would be excavated and disposed of along with the contaminated soil.

Volatilization of organics, air dispersal of dust particles and water collection procedures during the excavation would be handled as described in Alternative 5. The volume of water estimated to be encountered during excavation is about 50,000 gallons.

Excavation, treatment, and off-Site disposal for this alternative is preferred over in situ treatment of soils for several reasons. First, in situ treatment would require more equipment, staging, and curing time. Second, in situ solidification would essentially turn the entire area into a solidified mass that would not be suitable for the residential environment.

Timeframe for remedial action: (includes relocation and remediation)	12-28 weeks
Capital Costs:	$ 7,700,000
O & M Costs (Annual):	$ 0
O & M (30 yrs at 10%):	$ 0
Net Present Worth:	$ 7,700,000

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VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES: THE NINE CRITERIA

In accordance with the NCP, the relative performance of each alternative is evaluated using the nine criteria [Section 300.430(e) (9) (iii)] as a basis for comparison. An alternative providing the "best balance" of tradeoffs with respect to the nine criteria results from this evaluation.

Threshold Criteria

Overall Protection of Human Health and the Environment: determines whether an alternative eliminates, reduces, or controls threats to human health and the environment.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs): evaluates whether the alternative meets federal and state environmental laws pertaining to the site.

Balancing Criteria

Long-Term Effectiveness and Permanence: considers the ability of an alternative to protect human health and the environment over time.

Reduction of Toxicity, Mobility or Volume Through Treatment: evaluates an alternative's use of treatment to reduce the harmful nature of contaminants, their ability to move in the environment, and the amount of contamination present.

Short-Term Effectiveness: considers the length of time needed to implement an alternative and the risks it poses for workers, residents and the environment during implementation.

Implementability: considers the technical and administrative feasibility of implementing an alternative.

Cost: evaluates estimated capital and operation and maintenance (O&M) costs, as well as present-worth costs.

__Modifying Criteria__

State Acceptance: considers whether the state agrees with U.S. EPA's analysis and recommendations as presented in the RI/FS and the Proposed Plan.

Community Acceptance: considers the public's response to the alternatives described in the Proposed Plan and the FS. Specific responses to public comments are contained in the Responsiveness Summary attached to this ROD.

__EVALUATION OF THE ALTERNATIVES AGAINST THE NINE CRITERIA__

The following analysis evaluates the ten alternatives under each of the nine evaluation criteria.

1) **Overall protection of human health and the environment.** All Alternatives, with the exception of Alternatives 1 and 2, would be expected to provide protection of human health and the environment by reducing or eliminating exposure pathways. Alternatives 5, 8 and 10 would be expected to provide overall protection of human health and the environment through reduction in the accessibility and mobility of the contaminants through excavation and/or treatment. Alternatives 3, 4, 6, 7, and 9 would be expected to provided overall protection of human health and the environment through reduction in the accessibility and mobility of the contaminants through various combinations of excavation, treatment and/or cap placement.

2) **Compliance with ARARs:** With the exception of Alternatives 1 and 2, all alternatives would meet ARARs, unless it is determined that the contaminated soils are RCRA, or Michigan Act 64, characteristic hazardous wastes. RCRA LDR treatment requirements may be applicable under Alternatives 3 through 10 if it is determined that contaminated soils are RCRA, or Michigan Act 64, characteristic hazardous wastes. Soils will be tested to see if this is the case. If so, and placement is involved in the Alternative, they will be treated to comply with RCRA Subtitle C and Michigan Act 64 requirements. If the soils are RCRA characteristic hazardous wastes, then Alternatives 3, 4 and 6 would not meet RCRA or Michigan Act 64 requirements and a waiver would be required to implement these remedies. Michigan's Act 307 is a comprehensive law and regulation which applies to the Site. Alternatives 3 through 9 meet the Site-specific requirements in Act 307. Alternative 10 meets specific cleanup standards for the protection of ground water presented in Act 307.A further explanation of Michigan Act 307 and the other ARARs, including RCRA, for this Site can be found in the Statutory Determinations Section, the FS and the Proposed Plan.

3) **Long-term effectiveness and permanence:** Alternatives 5, 8 and 10 would be effective in the long-term. The Site contamination is located in a mixed residential and industrial neighborhood. Because residents live directly next to the contaminated soils, the potential is high for human contact with the contamination. Alternatives 5, 8 and 10 would reduce the amount of contamination on-Site via transportation off-Site to a secure landfill. Although the volume of contamination from the Site would not be reduced, the contamination in the soils would be effectively isolated from the environment and human contact by the secure off-Site landfill. Those soils which are determined to be RCRA, or Michigan Act 64, characteristic hazardous wastes would be treated prior to disposal as well to further limit their mobility and toxicity. In addition, even though Alternatives 5 and 8 would not remove soils assumed to be contaminated from under buildings located in the area affected by Site contamination, the contaminated soils under the buildings at the Site are effectively isolated from the environment and human contact by the buildings' foundations. Installation of vertical barriers would protect the clean backfilled soils from potential recontamination from any potentially contaminated soils under the buildings. If any of the buildings within the target area of contamination shown in Figure 3 are abandoned or demolished in the future, options for remediation of contaminated soils under the building(s) would be evaluated by U.S. EPA during a five year review of the Site. The long-term effectiveness of these alternatives would be a function of the long-term integrity of the off-Site landfill. The long-term integrity of an off-Site permitted secure landfill is expected to be greater than other containment options evaluated in this ROD.

Alternatives 1 and 2 do nothing to prevent exposure to soil contamination or mobility of the contaminants. Alternatives 3 and 4 offer some degree of long-term effectiveness by covering the problem with soil, but covers require perpetual maintenance. Overtime, the natural weathering process, as well as everyday residential and industrial activities may affect the integrity of the cover. Degradation of the covers' integrity may be accelerated if administrative controls, such as restrictions on digging, are not obeyed or become invalid. If the effectiveness of the cover fails, exposure to contaminated soils once again becomes a potential health concern. If the cover alternative fails, a new cover would need to be constructed or another remediation option evaluated. In either case, this would be disruptive to local residents and businesses, create another potential Short-Term health risk, and cost additional money.

Alternatives 6 and 7 offer better long-term effectiveness than Alternatives 1, 2, 3 and 4 because they require the elimination of some contaminated soils through excavation, similar to Alternative 5, 8 and 10. However, the same problems as indicated above would be encountered for the capped portions of the contaminated soils.

Alternative 9 would be effective over the long-term because the potential for inhalation of contaminated soils is reduced by treatment and covering. However, the permanence of the integrity of soils treated in-situ has not been determined.

4) Reduction in toxicity, mobility or volume through treatment:

For all alternatives, no treatment process is used to address soil contamination unless it is determined that they are RCRA characteristic hazardous wastes. There is no reduction in toxicity, mobility or volume through a treatment process for Alternatives 1, 2, 3, and 4. Varying degrees of treatment may apply to Alternatives 5 through 10 which would minimize the toxicity and mobility, but not volume, if it is determined that the contaminated soils are RCRA, or Michigan Act 64, characteristic hazardous wastes.

5) Short-term effectiveness: For Alternatives 5 through 10, there could be dust emissions during excavation activities to which workers and the surrounding community could be exposed. To address this threat, dust control measures would be implemented during excavation activities and workers would wear protective clothing to reduce the risks associated with remediation. There would also be a higher than usual volume of construction traffic because of the transport of materials either to or from the Site.

Alternatives 3 through 7 would take the least amount of time to implement (3-8 weeks). Alternatives 8 and 9 would take slightly more time to implement than Alternatives 3 through 7 (10-15 weeks). Alternative 10 would require a significantly greater amount of time than all other alternatives (12-28 months).

6) Implementability: All the alternatives are technically feasible in theory because the technology exists for the various remedy components including excavation, capping and in-situ solidification. In practice, Alternative 5 is fully implementable. Alternatives relying on a cap (Alternatives 3, 4, 6 and 7) for the primary remediation technology assume that contaminated soils at the Site are not classified as RCRA, or Michigan Act 64, hazardous waste. Soils at the Site may be classified as RCRA, or Michigan Act 64, characteristic hazardous waste (see Summary of Site Characteristics Section of this ROD). If soils are classified as hazardous waste, and the soils are not treated to render them non-hazardous, the cap design would need to follow RCRA and Michigan Act 64 specifications. The construction of such a cap at the Site would be extremely difficult to implement because of the Site's physical setting and close proximity to residential areas.

Alternatives 8 and 9 would be extremely difficult to implement because the work would require large support areas to operate on-Site equipment. On-Site equipment is also large and the equipment would require relatively accessible and open areas. Areas requiring remediation at the Site have limited accessibility and open space due to the close proximity of businesses and residential housing.

Administratively, Alternative 10 would be difficult to implement because it requires relocation of ten residences and three businesses and complete demolition of the buildings on Site. The area targeted for cleanup under Alternative 10 is based on State of Michigan standard cleanup levels which protect groundwater. U.S. EPA has determined that no groundwater drinking water pathway exists and the potential is extremely low for any off-site groundwater drinking sources to be affected by soil contamination at the site.

7) **Cost:** The capital costs, operation and maintenance costs and net present worth of each remedial alternative are listed after each alternative description above. Cost-effectiveness is discussed in the Statutory Determinations section below. In general, Alternative 1 is the cheapest $0, Alternatives 2 through 4 ranged from $325,000 to $500,000, Alternatives 5 through 9 ranged from $1.2 million to $1.9 million and Alternative 10 was the most expensive at $7.7 million. The cost for Alternative 5 ($1.8 million) was approximately in the mid range of these cost values.

8) **State Acceptance:** The State of Michigan concurs with the selected remedy for this Site.

9) **Community Acceptance:** Community acceptance is assessed in the attached Responsiveness Summary. The Responsiveness Summary provides a thorough review of the public comments received on the Proposed Plan, and the Agency's responses to those comments. Since issuance of the Proposed Plan for public comment, the general public views on the selected remedy ranged from appreciation to concern over leaving some contamination behind, the restrictions of institutional controls and depressed real estate values of homes in the area. In general, however, the public agrees that the action should be taken.

IX. THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, as amended by SARA, the NCP, the detailed analysis of alternatives and public comments, U.S. EPA has selected Alternative 5, as the remedial action for the Adams Plating Company Site. Given the available information, the Agency believes that this alternative is protective of human health and the environment, complies with ARARs, provides the best balance of trade-offs under the nine criteria and also represents a cost-effective solution.

Alternative 5 involves the excavation and off-Site disposal of an estimated 4,700 yd^3 of contaminated soils which exceed chemical specific levels from around the buildings on-Site. The chemical levels are described below, but, in general after completion of the remedial action the concentrations in soils will attain, for each contaminant, a Site-specific risk of $1x10^{-6}$ carcinogenic risk or a hazard index ratio of 1.0 or less for exposure due to ingestion, dermal contact or inhalation, as calculated in the RA or background, whichever is higher.

Excavated portions of the Site will be backfilled with clean soil. The installation of vertical barrier walls around building foundations that will be in direct contact with clean backfilled soil will protect the clean backfilled soils from potential recontamination, assuming that a continuing source of contamination exists beneath these buildings. Institutional controls limiting digging and restricting installation of water wells around the Site may be implemented.

A ground water monitoring program will be established to monitor the migration of contamination from the site in the direction of the public water supply.

The estimated capital costs are $1,500,000 and the net present worth is $1,800,000. Estimated Operation and Maintenance costs are $34,400 annually.

<u>Rationale for Selection</u>

Alternative 5, will provide a permanent, long-term solution which is protective of human health and the environment, is fully implementable and is cost effective. The contaminated soils removed from the Site will be placed in a secure landfill, where the potential for migration of the contaminants into the air is significantly reduced and the ability for direct contact with contaminants is reduced to acceptable levels. The other alternatives were not protective or not fully implementable and/or were not as effective over the long-term.

Alternatives 1, 2, 3, 4, 6, and 7 can be implemented relatively easily and quickly. However, these alternatives leave at least a portion of the contaminated soil untreated and in-place and therefore do not fully provide for long-term effectiveness. Alternatives 1 and 2 do nothing to prevent exposure to soil contamination or mobility of the contaminants. Alternatives 3 and 4 offer protection by covering the contamination with soil or cement, but covers require perpetual maintenance to maintain their integrity. Inadequate maintenance and industrial and residential activities over such a cap at the Site could compromise its integrity. This would possibly result in cap reconstruction or evaluation of another option sometime in the future. This would be disruptive to local residents and businesses, create another potential Short-Term health risk, and cost additional money.

Alternatives 6 and 7 eliminate some contaminated soils by excavation. However, the same problems as indicated above would be encountered for the capped portions of the contaminated soils.

Alternative 8 and 9 would be protective of human health and the environment because they reduce the potential for inhalation of contaminated soils, assuming soils are determined to require treatment. However, these alternatives would be extremely difficult to implement because the work would require large support areas to operate on-site equipment. In addition, for Alternative 9, the long-term effectiveness and permanence of a remedy involving soils treated in-situ has not been determined.

Alternative 10 would provide a permanent, long-term solution which is protective of human health and the environment. However, use of groundwater protection standards (Type B) was determined to not be appropriate for the Site for two primary reasons: 1) it is not necessary to remediate soil to Type B groundwater protection standards because no groundwater ingestion exposure pathway exists and because there is little or no potential for the bedrock aquifer to be impacted by Site-specific contamination and 2) cleaning the Site up to Type B ground water protection levels would require remediating a large volume of soils that pose a relatively limited health hazard. The buildings overlying contaminated soil act as a cap eliminating potential exposure routes to contaminated soil. The lack of exposure routes to soil contaminants under buildings is a Site-specific characteristic that makes the Site-specific approach appropriate in this case. In addition, Alternative 10 would be difficult to implement because it requires relocation of ten residences, three businesses and complete demolition of the buildings at a cost considerably more than Alternative 5 ($7.7 million for Alternative 10 versus $1.8 million for Alternative 5).

Performance Standards

The estimated area requiring remediation is shaded in Figure 6. The areas targeted for remediation contain Site related contamination in soils significantly above background and, based on the RA, are the areas contributing to unacceptable health risks at the Site.

Contaminated soils will be excavated vertically down to a maximum depth of 10 feet bgs, or to analyte specific levels (cleanup levels), whichever is encountered first based upon the average soil background level plus three times the standard deviation. Ten feet was determined in the RA to be the maximum exposure depth and is determined to be a reasonable exposure assumption. Therefore, contamination below 10 feet, as described in Section V of this ROD, will not be excavated. Horizontally, excavation limits will be based on analyte specific levels. The following are the anticipated analyte specific cleanup levels.

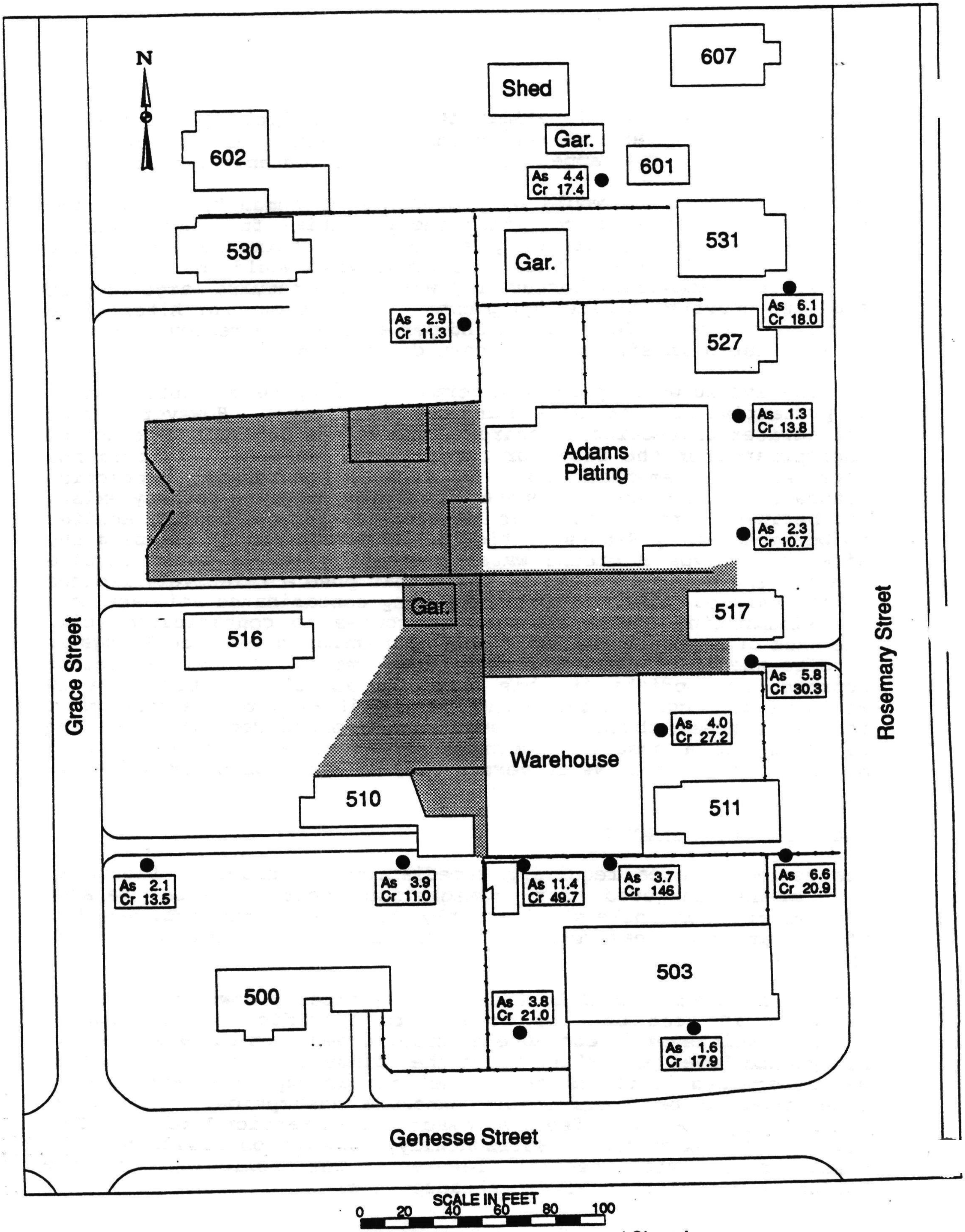

Figure 6 Soil Concentrations of Arsenic and Chromium Outside the Remediation Area Adams Plating

ANALYTE	CLEANUP STANDARD
Chromium (total)	26.1 mg/kg
Arsenic	6.7 mg/kg

These two analytes were chosen for two primary reasons: 1) based on the RI, they accurately represent the distribution of contamination at the Site, and 2) based on the RA, the majority of risk is driven by these two analytes. If chromium and arsenic cleanup levels are met through the remedial action described in Alternative 5, Site specific risk will be eliminated.

The cleanup levels for chromium and arsenic were based on the average soil background levels (chromium - 11.4 mg/kg, arsenic - 1.9 mg/kg) plus three times the standard deviation (chromium - 4.9, arsenic - 1.6), as presented in the RI. Background averages were limited to four samples. Therefore, additional background samples may be required during design in order to establish a more meaningful statistical average. In addition, based on data from the RI, Figure 6 shows concentrations of chromium and arsenic in subsurface soil samples collected outside the target cleanup area. Anomalous areas above the analyte specific cleanup levels, such as shown on the south edge of the warehouse, will require confirmatory sampling for arsenic and chromium at a minimum during design. Results of the confirmatory sampling will be used to evaluate and determine the necessity for excavating these areas and verify/establish excavation depths. Confirmatory soil sampling will also include qualitative analyses for hexavalent chromium to provide assurance that soils posing an unacceptable risk due to chromium are excavated and removed.

All old clay tiles, the PVC collection system, the 2-1000 gallon underground storage tanks connected to the PVC collection system and concrete sumps in the target remediation area will be excavated and disposed of along with the contaminated soil. Also, the garage at 516 Grace Street may need to be demolished so that the soil beneath it can be excavated. Demolition and reconstruction of the garage may be more cost effective than excavating around the garage and stabilizing its foundation. A temporary fence will be constructed and will be in place during the time remediation activities are conducted and will be taken down upon completion of these activities.

Soils assumed to be contaminated under buildings located in the area affected will not be removed because the contaminated soils under the buildings at the Site are effectively isolated from the environment and human contact by the buildings' foundations and will be isolated from clean backfill by vertical barrier walls. However, if any of the buildings within the target area of contamination shown in Figure 6 are abandoned or demolished in the future, or the remedy in general is no longer protective, options for remediation of contaminated soils under the building(s) would be evaluated by U.S. EPA during a five year review of the Site. Five year reviews will also include an evaluation of the effectiveness of deed restrictions, if needed, with an update on the business status of the Adams Plating Company, if still in operation.

Contaminated materials from the Site will be disposed of in a solid waste (Subtitle D) landfill. However, soils requiring remediation shall be tested using the TCLP for metals. Soils which are determined to be RCRA, or Michigan Act 64, characteristic hazardous wastes are subject to RCRA and/or Michigan Act 64 and will be treated before land disposal. If treatment is necessary, the soils will be treated using fixation and stabilization methods to a level below LDR requirements such that the material no longer exhibits the characteristic which caused it to be a RCRA, or Michigan Act 64, hazardous waste. Characteristic hazardous waste that has been treated to meet the treatment standard is no longer considered hazardous after the characteristic is eliminated. The waste can therefore be disposed of in a solid waste (Subtitle D) landfill.

Water collected during the excavation procedure will be containerized, tested, and treated off-Site before disposal. The volume of water estimated to be encountered during excavation is about 10,000 gallons.

Excavated areas will be backfilled with clean soil and vertical barrier walls will be installed at least along the west and south walls of the APC building and along the west and north walls of the warehouse. Backfilled material along with vertical barrier(s) will at least be capable of reducing the possibility of recontamination of the fill area. In addition, backfill material should limit downward migration of precipitation in order to reduce the potential for mobilization of residual contaminants that may be left below excavation depths. The type and hydraulic conductivity of backfill material and vertical barrier(s) will be established during design.

Ground water contamination was detected at this Site in exceedance of Michigan's Type B cleanup criteria. However, since the ground water was not found in useable quantities or quality and a connection to a drinking water aquifer was not established at the Site, it is not appropriate to remediate the ground water. To assess potential contaminant migration in what ground water is present at the Site, a ground water monitoring program will be established to monitor the migration of contamination from the Site in the direction of the public water supply wells. If U.S. EPA determines that contamination from the Site poses an unacceptable threat to the bedrock aquifer, or that the remedy is no longer protective of human health and the environment, additional alternatives will be evaluated. Ground water will be monitored for a period of 30 years, unless the trend in contaminant concentrations indicates that this specified length of time is not required.

Material handling equipment will be used to diminish air dispersal of particulate materials and volatilization of organics when excavating contaminated soils. Dust suppressants and air monitoring may also be used during excavation.

X. STATUTORY DETERMINATIONS

The selected remedy must satisfy the requirements of Section 121 (a-e) of CERCLA, as amended by SARA, to:

a. Protect human health and the environment;
b. Comply with ARARs;
c. Be cost effective;
d. Use permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable; and
e. Satisfy the preference for treatment as a principal element or provide an explanation as to why this preference is not satisfied.

The implementation of Alternative 5 at the Adams Plating Company Site satisfies the requirements of CERCLA, as amended by SARA, as detailed below:

a. Protection of Human Health and the Environment

This selected remedy provides for the protection of human health and the environment.

Implementation of the selected remedial alternative will reduce and control potential risks to human health and the environment posed by exposure to site contaminants by excavating waste materials, soils above human health-based criteria and containing this material in an off-site landfill. The risk will be reduced to a risk level less than $1x10^{-6}$ for carcinogens and a Hazard Index for non-carcinogens of one.

b. Compliance with ARARs

The selected remedy will comply with all Federal and/or State, where more stringent, ARARs. The following ARARs will be attained.

1. Chemical-specific ARARs

Chemical-specific ARARs regulate the release to the environment of specific substances having certain chemical characteristics. Chemical-specific ARARs typically determine the extent of clean-up at a site. By removal of the source and continued monitoring, U.S. EPA believes that all chemical-specific Federal and State ARARs will be met.

Federal ARARs

Resource Conservation and Recovery Act -- Land Disposal Restrictions (LDR) regulations (40 CFR 268) and waste characterization requirements (40 CFR 261) are applicable requirements for the contaminated soils if these are determined to be RCRA characteristic hazardous wastes. The Site contaminated soils have not presently been classified as RCRA listed or characteristic hazardous wastes. However, a portion of the contaminated soils at the Site have the potential to be characteristic for metals. The classification of RCRA listed and characteristic hazardous waste as related to the Site is discussed below.

No conclusive proof to support the classification of contaminated soils at the Site as RCRA listed hazardous waste exists. While the APC is a small quantity generator of RCRA-listed waste (wastewater treatment sludges from electroplating operations, waste code F006), no information is available concerning how these wastes were managed or suggesting the F006 waste is the source of the contamination at the Site. The RI defines the APC's wastewater as rinse water from the electroplating operations that was discharged into a preexisting drain tile system that apparently leaked. Despite its high chromium concentration, rinse water from electroplating operations is not a listed waste. It is possible other electroplating wastes such as plating baths (F007) and residual sludges from plating baths (F008) may have been improperly disposed of at the Site, but no information is available concerning the management of these types of wastes and nothing suggests that RCRA listed wastes were released along with the rinse water.

The RI also states that acetone, methylene chloride, carbon tetrachloride and 1,1,1-TCA were used as degreasing solvents at this Site although no used solvents are listed on the RCRA hazardous waste notification form. The presence of these constituents is not conclusive proof that listed solvents were improperly disposed of at the Site. It is not anticipated that the limits for volatile organic characteristic waste will be exceeded because most of the volatile constituents in the solvents used at the Site are not identified characteristic parameters under the Toxicity Characteristic Rule.

Neither the EP Toxicity or the Toxicity Characteristic Leaching Procedure (TCLP) analysis were performed on samples of Site soils. Because of this, it is uncertain whether contaminated soils at the Site can be classified as RCRA characteristic hazardous waste. The contaminated soils in the tile drain system at the Site may contain chromium at concentrations high enough to be classified as hazardous waste based on the RCRA characteristic of toxicity for metals. Therefore, soils shall be tested under the TCLP for metals prior to all intrusive remediation approaches. Soils which are characteristic hazardous wastes are subject to RCRA ARARs and will be treated before land disposal. For most characteristic waste with concentration-based treatment levels (such as the wastes at the APC site), the LDR treatment standards are set at the characteristic level that defines the waste as hazardous. For example, the TCLP treatment level for chromium is 5.0 milligram per liter (mg/L). Chromium-contaminated soils removed from the ground must be treated to the level at which the TCLP analysis is less than 5.0 mg/L before they can be land disposed. Characteristic hazardous waste that has been treated to meet the treatment standards is no longer considered hazardous after the characteristic is eliminated. The waste can therefore be disposed of in a solid waste (Subtitle D) landfill.

Soils at the Site are not likely to be characteristic for VOCs. In addition to acetone; methylene chloride; and 1,1,1-TCA; other VOCs detected in the subsurface soils at the Site include up to 1,200 μg/kg of ethylbenzene; up to 2,520 μg/kg of bromomethane; and 4,000 μg/kg or more of 1,1-DCA, methyl ethyl ketone (MEK) and chloromethane. Of these VOCs, only MEK is a characteristic parameter, and the highest concentration of MEK detected in on-Site soils (4,200 μg/kg) is not likely to exceed the regulatory threshold. If the soils are not characteristic wastes because of the VOCs, then treatment of Site contaminated soils for VOCs will not be necessary prior to disposal in a solid waste (Subtitle D) landfill. If so, then they will be needed to be treated first to eliminate the characteristic which made them a RCRA hazardous waste.

State ARARs

Michigan Act 307 -- The State of Michigan has identified the Michigan Environmental Response Act (referred to as "MERA", "the ACT" or "Act 307") and its implementing rules as ARARs for this Site. U.S. EPA finds that only Rules 705(2) and (3), 707 - 715, 717(2), 719(1) and 723 qualify as ARARs in compliance with Section 121(d)(2) of CERCLA. These rules provide for the selection of a remedy which attains a degree of cleanup which conforms to one or more of three levels of cleanup - Type A, B or C. A Type A cleanup generally achieves cleanup to background or non-detect levels (R299.5707); a Type

B level meets specific cleanup levels in all media (R299.5709-5715 and 5723) and a Type C cleanup is based on a site specific risk assessment [R299.5717 (2)] and 5719 (1)].

U.S. EPA's selected remedy will attain soil cleanup standards adopted on a Site-specific basis for this Site in compliance with Act 307 and its implementing rules in accordance with the Type C cleanup requirements[R299.5717(2) and 5719(1)]. It should be noted that the Site-specific cleanup standards meet the Type A requirements (background) for particular contaminants.

U.S. EPA does not consider the other provisions of Act 307 and its implementing rules identified by the State as ARARs because they are either procedural, not more stringent or do not establish cleanup standards. Additionally, U.S. EPA believes that even if certain of these provisions were considered ARARs [e.g. the considerations listed in Section 299.5717(3)], the remedial actions and cleanup standards selected for this Site are in compliance with these State-identified ARARs since they have been selected in accordance with CERCLA and the NCP.

Michigan Air Pollution Act 348 -- The selected remedy involves excavation and construction activities which may release contaminants or particulate into the air. This act is relevant and appropriate. This act is also referenced in Act 307 under a Type B (R299.5715) for air quality. Measures will be taken to ensure that these requirements are complied with during the excavation activities.

2. Location-Specific ARARs

Location-specific ARARs are those requirements that relate to the geographical position of a site. For example, federal and state ARARs exist for sites where remedial activities would impact wetlands, floodplains, critical habitats, wilderness areas, fault zones, or areas of historic or significant cultural artifacts. The nearest wetland is located about 1.5 miles southwest of the Site. Therefore, anticipated remediation activities at the Site will not impact this wetland and potential ARARs related to wetlands (Executive Order 11990 - Protection of Wetlands, and Section 404 of the Clean Water Act) are not applicable or relevant and appropriate. Potential ARARs relating to the impact or management of floodplains (Executive Order 11988 - Floodplain Management, 33 Code of Federal Regulations (CFR) 209 - Navigation and Navigable Waters; and Sections 1008 and 4004 of RCRA - RCRA Criteria for Classification of Solid Waste Disposal Facilities) are not ARARs as the Site is not located in a floodplain. None of the above-mentioned potential location-specific ARARs are applicable or relevant and appropriate to this Site.

3. Action-specific ARARs

Action-specific ARARs are requirements that define acceptable treatment and disposal procedures for hazardous substances.

Federal ARARs

Resource Conservation and Recovery Act -- Soils may be characteristically hazardous under RCRA. Soils which are RCRA characteristic hazardous wastes will be treated until the characteristic is eliminated. Characteristic hazardous waste that has been treated to meet the treatment standards is no longer defined as hazardous. Soils by definition or once treated will not be or will no longer be considered hazardous and will be disposed of in a RCRA Subtitle D landfill. The chosen remedy will comply with these requirements.

State ARARS

Michigan Hazardous Waste Management Act (Act 64 of 1979, as amended) -- To the degree, RCRA applies, Act 64 will apply as Michigan Act 64 parallels the requirements of RCRA. Act 641 which relates to solid waste landfills is an ARAR in any event. The chosen remedy will comply with both of these requirements.

c. Cost-effectiveness

A cost-effective remedy is one for which the cost is proportional to the remedy's overall effectiveness.

The selected remedy, Alternative 5, affords the highest degree of overall effectiveness when compared to Alternatives 1 through 10. Alternative 5 costs considerably less than Alternative 10 ($7.7 million for Alternative 10 versus $1.8 million for Alternative 5) while providing effective protection of human health and the environment.

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

U.S. EPA believes the selected remedy represents the maximum extent to which permanent solutions and alternative treatment technologies can be used in a cost-effective manner for the

Adams Plating Company Site. Of the alternatives that are protective of human health and the environment and comply with ARARs, U.S. EPA has determined that the selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, short-term effectiveness, implementability, cost and State and community acceptance.

Therefore, the selected remedy represents the maximum extent to which permanent solutions and treatment can be practicably used. The contamination in the soils can reliably be controlled over time at a secure landfill. Treatment may be required if soils are found to exhibit RCRA, or Michigan Act 64, hazardous waste characteristic properties.

e. Preference for Treatment as a Principal Element

Treatment options were evaluated for contaminated soils and were found to not be cost-effective or easily implementable based on Site-specific factors. Containment of treated contaminated materials, as well as contaminated materials not requiring treatment, in a secure landfill is considered a safe and reliable option when coupled with institutional controls and monitoring, particularly when the cost of other alternatives are factored in. Excavated materials will be treated if they are determined to be RCRA, or Michigan Act 64, characteristic hazardous wastes prior to disposal in the landfill. If the excavated material is not found to require treatment, this alternative will not meet the preference for treatment as a principal element.

XI. DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Adams Plating Site was released for public comment in August 1993. The Proposed Plan identified Alternative 5, soil excavation and off-site disposal, as the recommended alternative. U.S. EPA has reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.