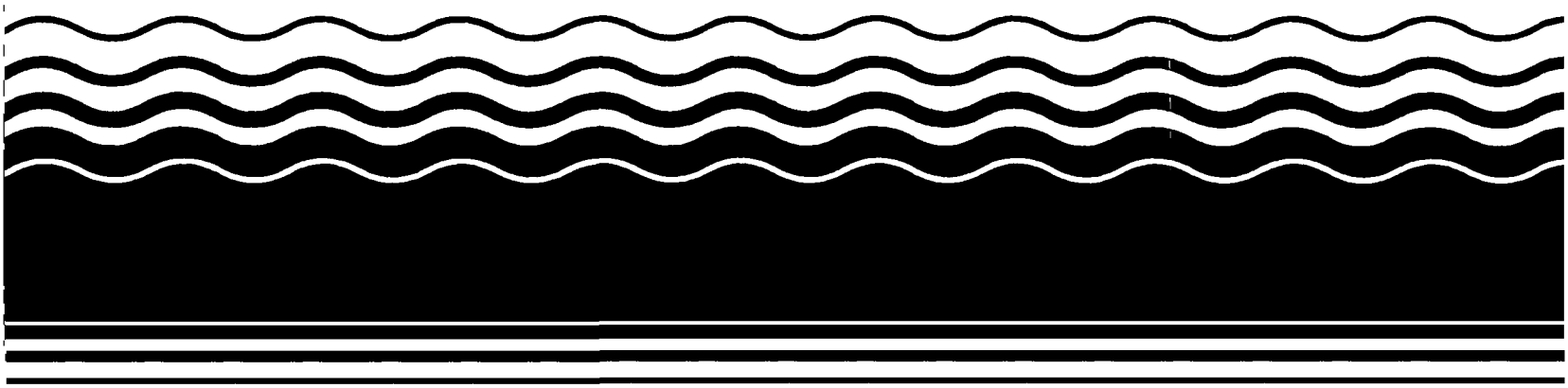
PB98-964101
EPA 541-R98-024
September 1998

EPA Superfund Record of Decision:

North Bronson Industrial Area, OU 1
Bronson, MI
6/19/98



DECLARATION
SELECTED REMEDIAL ALTERNATIVE
FOR THE NORTH BRONSON INDUSTRIAL SITE
OPERABLE UNIT I
CITY OF BRONSON, BRANCH COUNTY, MICHIGAN

STATEMENT OF BASIS AND PURPOSE

This document presents the selected remedial action for the North Bronson Industrial Area Superfund site (the site), Operable Unit I (OU 1). This remedial action was chosen in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act, 1980 PL 96-510, as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on documentation contained in the Administrative Record for the site.

The United States Environmental Protection Agency concurs with the selected remedy.

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), present a potential threat to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This ROD addresses OU 1 at the site. OU 1 is an interim action that addresses the eastern and western sludge lagoons, groundwater impacted by the sludge lagoons, exposure to area-wide groundwater contamination, and County Drain #30 (CD #30). A second and final OU (OU 2) will be developed to address secondary source areas of groundwater contamination. The secondary source areas are related to releases from an industrial sewer that was used to convey waste to the sludge lagoons.

The major components of the selected remedy for OU 1 include the following:

- Excavating contaminated eastern lagoon sludge and soil and filling the excavated area with clean soil.
- Dredging sediment from CD #30.
- Consolidating contaminated waste from the eastern lagoon and CD #30 into the western lagoons.
- Covering the western lagoons to control risks to human health and the environment associated with exposure to contaminants.
- Installing a French Drain between the western lagoons and CD #30 to capture contaminated groundwater.

- Pumping contaminated water from the French Drain.
- Constructing a treatment wetland to treat contaminated water collected by the French Drain. The goal for groundwater extraction and treatment is to reduce the concentration of contaminants to comply with state and federal surface water discharge criteria.
- Discharging treated water from the treatment wetland to CD #30.
- Monitoring groundwater and surface water quality to assess the effectiveness of the remedy.
- Marking the western lagoon area and the treatment wetland with permanent site markers.
- Fencing in the western lagoon area and the treatment wetland to control risks to human health and the environment associated with exposure to contaminants.
- Placing enforceable restrictions on future land and groundwater use.

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 uses permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment of the principal threats of the site (eastern and western lagoon sludge) was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. The consolidation and capping of lagoon sludge within one portion of the area of contamination, combined with containment and treatment of groundwater impacted by lagoon sludge below the water table, was determined to be protective of human health and the environment and significantly more cost-effective than excavation and treatment of the lagoon sludge.

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

Wm. E. Muno — 6/19/98

William E. Muno, Director — Date
Superfund Division
United States Environmental Protection Agency

ACTING — 5/28/98

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

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

PAGE

TABLE OF CONTENTS (continued)

FIGURES

TABLES

APPENDICES

DECISION SUMMARY

1. SITE NAME, LOCATION, AND DESCRIPTION

The North Bronson Industrial Area Superfund site (the site) is located in the city of Bronson, Branch County, Michigan. The site is located in portions of the northeast quarter of Section 11 and the northwest quarter of Section 12, Township 7 South, Range 8 West, and occupies the northern (industrial) area of the city of Bronson. The site is bounded to the east by Lincoln Street as projected northward to County Drain #30 (CD #30), to the north by CD #30, to the west by Burr Oak Road as projected north to CD #30, and to the south by Fillmore and Union Streets (Figure 1). These boundaries reflect the general area that was studied during the Remedial Investigation (RI).

The site encompasses an area of 220 acres with a maximum topographic relief of approximately 12 feet. Topography varies little between the northern and southern portions of the site, ranging from a high of 915 feet above mean sea level (MSL) to a low of approximately 903 feet above MSL. The lowest point on the site is the bottom of CD #30. The topography north of CD #30 gently rises to the north.

The site is zoned by the city of Bronson for industrial use only. Land use in the larger area consists of a mixture of industrial, residential, and agricultural. Based on the 1990 census, 2,342 people live within a one-mile radius of the site.

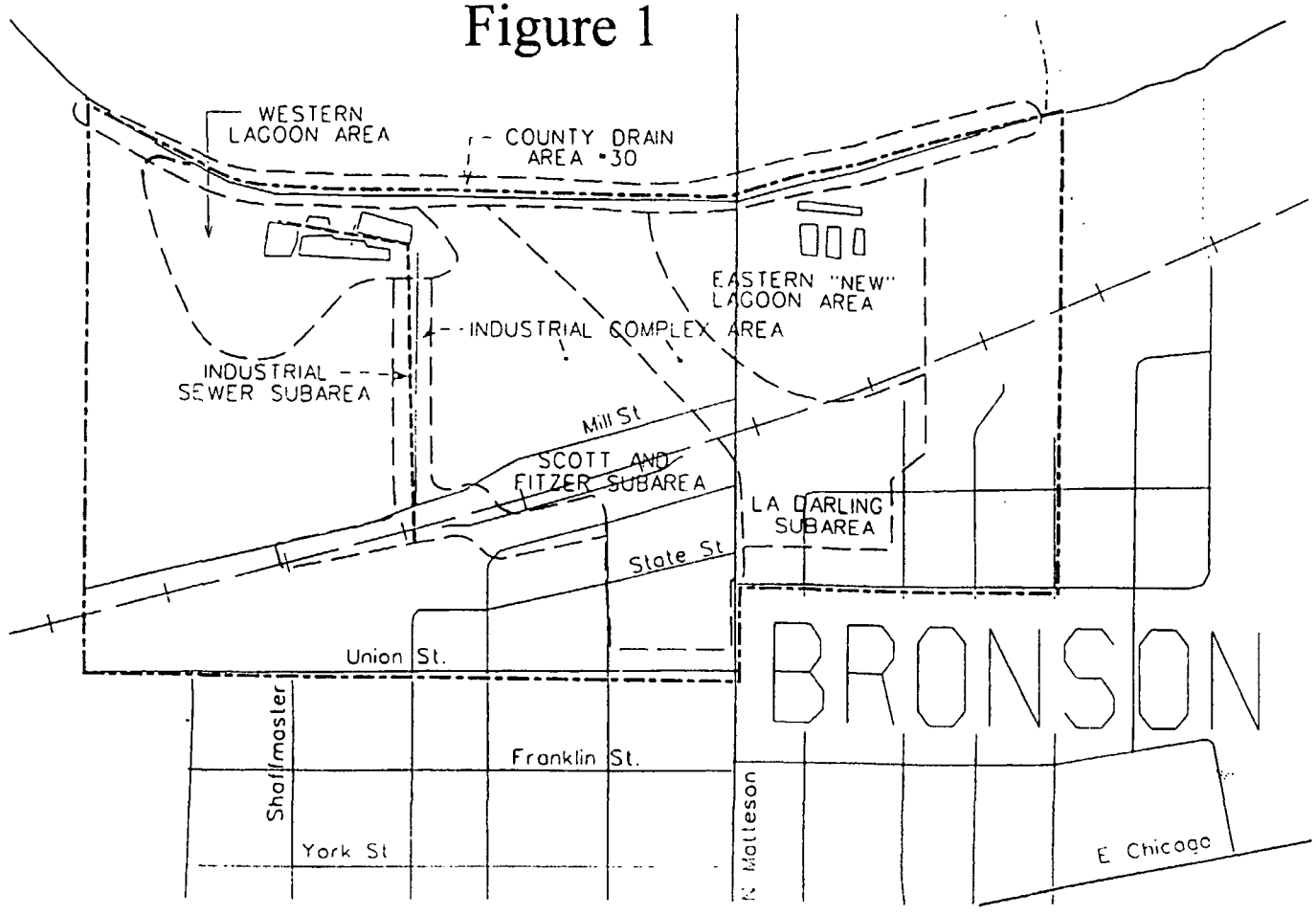
Two predominant features and contaminant source areas of concern are the two sets of lagoons located in the northeast and northwest sections of the site, just south of CD #30.

CD #30 is the major surface water feature within the site and defines the northern site boundary. CD #30 is a drain approximately 0-6 feet wide and 3-6 feet deep . Water depth varies from 1-10 inches with an average surface flow of approximately 1-2 feet per second. The origin of the drain is a small marsh area about one-half mile east of the site. The drain flows east to west eventually discharging to Swan Creek about 1.5 miles northwest of the site. Swan Creek is a tributary of the St. Joseph River.

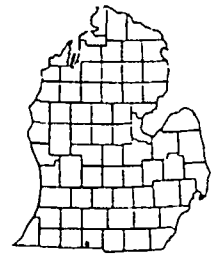
The site geology consists of surficial silt, clay, and sands to a depth of 0-17 feet, fine to coarse sand and gravel from 7 to 63 feet (upper aquifer), silt and a clay layer from 17 to 50 feet (assumed aquitard), and sand and gravel from 50 to 100 feet (lower aquifer).

There appear to be two sand and gravel aquifers separated by an aquitard at the site. The aquitard is assumed to be continuous across the site. The depth to the water table at the site ranges from 3-9 feet below ground surface. Local groundwater flow is affected by CD #30 within the site area. Groundwater flow direction in the upper aquifer up to approximately 600 feet south of the drain appears to be north-northwest. Immediately north of the drain, the flow direction appears to be south-southwest.

Figure 1



NORTH BRONSON INDUSTRIAL AREA
BRANCH COUNTY
T07S / R06W



LOCATION MAP

SOURCE

SUPERFUND SITES ARE UNDER THE AUTHORITY OF THE US ENVIRONMENTAL PROTECTION AGENCY AND THE MDNR PURSUANT TO THE COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT (CERCLA) 1980.

ALL SITES LOCATIONS AND BOUNDARIES HAVE BEEN DETERMINED FROM PREVIOUSLY PRODUCED SITES MAPS DIGITIZED ONTPO THE MIRIS BASE MAPS.

miris
MICHIGAN RESOURCE INFORMATION SYSTEM
LAND AND WATER MANAGEMENT DIVISION

DNR

SGDB
STATEWIDE GROUNDWATER DATA BASE
GEOLOGICAL SURVEY DIVISION
LAND AND WATER MANAGEMENT DIVISION

ERD
Final Map Compiled by
Environmental Response Division
Mi. Department of Natural Resources

Private wells located within the site boundary and screened in the upper aquifer were found to be contaminated with site-related contaminants. All of the impacted wells have been removed from service and all of the affected homes have been connected to the municipal water system (private well survey). A public water supply well is screened in the lower aquifer. No contaminants were ever found in this well, but because of the proximity of this well to the site and because of its low yield, this well was taken out of service by the city.

2. SITE HISTORY AND ENFORCEMENT ACTIVITIES

Contamination detected at the site is the result of industrial activity and waste handling practices in the North Bronson area since the early 1900's. Initially, several industries discharged plating and other industrial wastes directly into CD #30. To reduce the amount of contaminants entering the drain, the city of Bronson constructed seepage lagoons to retain the waste generated by industry. An industrial sewer system was also constructed and used to convey waste from the facilities to the lagoons.

2.A. Construction of the Lagoons and the Industrial Sewer System

Douglas Components Corporation (DCC Plant #1) began operations in 1910, L.A. Darling in the early 1900s, and Bronson Reel Company (BRC) in 1922. In the 1930s cattle and fish kills were reported from ingestion of cyanide-contaminated water from CD #30. It was believed the contaminated water was due to direct discharge of industrial waste to CD #30. This prompted the city of Bronson to construct lagoons to reduce the amount of contaminants entering CD #30 from direct discharges.

The western and eastern lagoons were built in 1938 and 1949, respectively, to contain metal-laden plating and other industrial waste generated by several industries in the area. An industrial sewer system was used to transport waste from the industrial facilities to the lagoons. Between 1930 and 1970, the city of Bronson owned and operated both sets of lagoons. The western lagoons, which the city owns today, were used until 1980.

Three western lagoons were excavated between 1938 and 1950. By 1955 a fourth western lagoon had been added. Between 1930 and 1955, the western lagoons were interconnected with piping and valves to control water levels and discharges to CD #30. From approximately 1939 to 1949, BRC, DCC Plant #1, L.A. Darling, and Bronson Plating Company (BPC) reportedly discharged wastes to the western lagoons. BRC reportedly discharged wastes to the western lagoons from 1939 until approximately 1960.

In 1949 the city of Bronson constructed two new lagoons 1,500 feet due east of the western lagoons to meet the increased demand for disposal. L.A. Darling, BPC, and the Douglas Division-Scott Fetzer Company were connected to the new eastern lagoons via an industrial sewer line. By 1955 aerial photos reveal a third eastern lagoon east of the two original eastern lagoons. By 1958 a fourth eastern lagoon was

evident north of the three existing lagoons, and by 1967 a fifth eastern lagoon was added due east of the other four lagoons. Scott Fetzer Company, L.A. Darling, and BPC ceased use of the eastern lagoons in 1951, 1967, and 1981, respectively.

In 1970 BPC purchased the eastern lagoons from the city (BPC had moved its operations to this location in 1953). Between 1970 and 1974, BPC expanded by constructing a building which apparently was located where three of the five eastern lagoons had previously been. By 1981 BPC reportedly stopped discharging waste to the two original eastern lagoons, and by 1988 expanded to cover more of the area where the other three eastern lagoons were located. Sludge and waste material was reportedly removed from the three eastern lagoons and the lagoons backfilled prior to BPC constructing buildings over them. Only the dry remnants of two original eastern lagoons have been located.

2.B. County Drain #30

CD #30 begins in a marsh area about one-half mile northeast of the site. It flows in a westerly direction and empties into Swan Creek approximately 1 1/2 miles northwest of the site. CD #30 defines the northern boundary of the site.

In the 1930s and then again in the 1950s, reports of events appeared in the local newspapers describing cattle dying after drinking the water from CD #30. The western lagoons were, reportedly, constructed in response to the 1930's events, in an effort to reduce the amount of contaminants from local industry entering CD #30.

There are currently six outfalls discharging into CD #30 within the site boundaries. These include two BPC outfalls, the wastewater treatment plant outfall, the city of Bronson stormwater discharge, and two agricultural field outfalls on the north side of the drain.

In 1983/1984 BPC dredged CD #30 from their most eastern outfall to the Matteson Street overpass. BPC reportedly contacted an unnamed waste hauler to remove the dredged material. Within the same general time frame, Branch County dredged CD #30 from the Matteson Street overpass to the wastewater treatment plant outfall. This dredged material was left stockpiled on the north bank of CD #30 and not removed. BPC dredged CD #30 to improve its flow.

2.C. History of Industrial Operations

2.C.1. L.A. Darling - The L.A. Darling Company operated from the early 1900s until 1967. L.A. Darling manufactured display fixtures and retail shelving, which included chromium and cadmium plating operations. The company disposed of liquid wastes in its own lagoons until 1939, at which time L.A. Darling was connected via an industrial sewer line to the western lagoons operated by the city of Bronson. The location of the L.A. Darling lagoons was not identified during the RI.

L.A. Darling switched disposal to the eastern lagoons (via an industrial sewer line) in 1949 and continued to use these lagoons until 1967 when they ceased operations in Bronson. The facility reportedly remained vacant from 1967 until 1983 when the city bought the property from L.A. Darling for back taxes. As part of the purchase agreement, L.A. Darling demolished the existing structures leaving only the foundations in place.

2.C.2. Douglas Components Corporation - H.A. Douglas began operating in 1910. This company designed and manufactured automobile electrical parts. Metal plating operations were part of the manufacturing process which included cadmium, chromium, silver, tin, and zinc. At this time, the company was located at the southwest corner of West Railroad and Matteson Streets. This plant was later referred to as Plant #1 when a second plant was built in 1953.

In 1939 Plant #1 was connected to the western lagoons via the industrial sewer pipe. In 1940 H.A. Douglas Manufacturing merged with Kingston Products and became Kingston Products-Douglas Division. In the late 1940s, Kingston Products-Douglas Division manufactured automobile electrical products, military products including track links and electrical switches, and consumer products including appliance timers and vacuum cleaners. In 1949 Plant #1 reportedly stopped discharging wastes to the western lagoons and began discharging to the eastern lagoons via a separate sewer pipe.

In 1951 a cyanide destruction facility (CDF), was constructed on State Street. At this time, Plant #1 reportedly stopped discharging to the eastern lagoons because wastewater was being treated at the CDF and discharged directly to the storm sewers. In 1960 Kingston Products-Douglas Division was sold to the Scott Fetzer Corporation, Cleveland, Ohio, which continued operations at Plant #1 as the Douglas Division of Scott Fetzer.

The CDF operated until 1973. Beginning in 1973 the Plant #1 plating processes included zinc and tin. Consequently, cyanide destruction processes ended and the facility was modified to remove metals and phosphate from the waste stream. In 1977 or 1978 the acid-tin process line was stopped, and in 1981 the alkaline-zinc process line was stopped.

In January 1984 investors representing the Douglas Component Corporation bought the Douglas Division from the Scott Fetzer Corporation. By 1987 the zinc-phosphate line stopped, which meant all plating at Plant #1 had ceased. According to employees at the time of the RI, Plant #1 had been used for storage of equipment and supplies. In 1988 approximately 325 gallons of polychlorinated biphenyl (PCB) oil (from electric transformers) were reportedly removed from the site by Great Lakes Environmental Services, Inc. No documentation was available to confirm this removal.
Douglas Division Plant #2, was built in 1953. This facility had a paint line, and reportedly produced machined metal parts, but did not have any plating operations.

2.C.3. BRC - BRC began manufacturing fishing reels in 1922. BRC was originally located at 123 North Matteson. A new building was constructed at Douglas and State Streets between 1920 and 1929. BRC had a machine shop to make their own dies, tools, and fixtures. They also did their own plating and anodizing. In 1945 BRC stopped making reels and began making bomb parts.

BRC reportedly discharged liquid wastes to the western lagoons via the industrial sewer pipe from 1939 until 1960. In 1963 BRC was purchased by Bronson Specialties. Bronson Specialties sold BRC in 1960 to True Temper, which moved operations to Anderson, South Carolina. Successor companies at the BRC building reportedly continued to use the industrial sewer through 1980 discharging small amounts of nonplating wastes to the western lagoons.

2.C.4. BPC - BPC, established in 1946, was originally located at West Matteson Street and Railroad Street. In 1953 BPC moved its operation to their present location at 135 Industrial Avenue.

BPC performs nickel and chrome plating, buffing, and polishing operations. Liquid wastes from BPC were reportedly discharged via the industrial sewer line to the western lagoons from 1946 to 1949. After the first two eastern lagoons were constructed in 1949, BPC switched over and discharged their waste to them.

In 1970 BPC purchased the eastern lagoons from the city of Bronson. Between 1970 and 1974, BPC expanded by constructing a building over three of the five eastern lagoons. BPC stopped using the eastern lagoons in 1981.

In 1988 BPC had expanded again, covering more of the eastern lagoons. Remnants of the remaining two eastern lagoons, still visible, are overgrown with vegetation. BPC currently discharges process wastewater to CD #30 via two outfalls under one National Pollutant Discharge Elimination System (NPDES) permit.

2.C.5. Bronson Specialties, Inc. - Bronson Specialties, Inc., located at 404 Union Street, was established in 1956. Three divisions were identified: Bronson Plastics, Bronson Tool, and Bronson Products. The building occupied by Bronson Specialties, Inc. was built in the 1940s. Bronson Specialties, Inc. purchased the building in 1950. Ownership history prior to Bronson Specialties, Inc. is unknown.

The Bronson Plastics Division was formerly Bronson Fiberglass, which produced fiberglass seats and front end parts for commercial trains. Bronson Plastics Division started blow-molding operations in the late 1960s, which continued until at least 1988. They produced custom-molded products including fuel tanks for pick-up trucks. Bronson Plastics had used and stored methyl ethyl ketone (MEK) as well as other unknown chemicals at this location.

Bronson Tool Division began in 1956 as a tool and die shop. By 1988 they manufactured specialty machines. Degreaser chemicals were provided by Safety-Kleen, which supplied and disposed of the solvent. It is not known when Safety-Kleen began providing this service. How Bronson Tool Division handled their degreaser chemicals prior to Safety-Kleen is unknown.

Bronson Products Division operations included screw machines, casting machines, and a metal turning shop. The Bronson Products Division was sold to Bronson Precision Products in 1985. As of 1988 Bronson Precision Products continued to lease space from Bronson Specialties, Inc. who still owned the building and the land. Bronson Specialties, Inc. purchased BRC in 1963. In 1968 Bronson Specialties, Inc. sold BRC to True Temper. At that time True Temper moved BRC operations to South Carolina. Subsequent operations at the former BRC building are unknown.

In 1974 acetone and MEK (5 mg/L) were detected in a private well located at 442 Mill Street. The well is approximately 1,100 feet south of the western lagoons and 300 feet west of the access road to the city's wastewater treatment plant. During that time, construction dewatering wells were being used at the wastewater treatment plant located 800 feet northeast of the well. Elevated levels of acetone and MEK (1 mg/L) were also detected in the dewatering wells. Bronson Specialties was identified as a potential source of these contaminants because of their proximity to the contaminated well (approximately 200 feet south of the well). MEK was reportedly used by Bronson Fiberglass, and drums of MEK were stored at Bronson Specialties. As a result of the contamination detected, the contaminated well was abandoned and the residence was connected to the city of Bronson water supply in 1974. Subsequent studies conducted by the Michigan Department of Environmental Quality* (MDEQ) have failed to confirm the source of MEK found in the well.

Two investigations of groundwater and soils were conducted at Bronson Precision Products by WW Engineering & Science, Inc. (1990) and EDI Science and Engineering, Inc. (1988). As a result of these studies, a 250 ft x 200 ft x 5 ft deep area of contaminated soil was excavated and disposed of by Bronson Specialties at a Type II Landfill (unnamed), as the soils were tested and determined at the time not to be hazardous.

2.D. Assessment and Enforcement Activities

In 1978, the MDEQ installed six monitoring wells near the western lagoons. Groundwater sampling by the MDEQ in 1979 indicated detectable levels of trichloroethylene (TCE) and heavy metals. In addition, elevated concentrations of PCBs were detected in sediment samples taken from CD #30 downstream of the western lagoons.

*Note: On October 1, 1995 the environmental quality divisions were split from the Michigan Department of Natural Resources and placed in the new Michigan Department of Environmental Quality.

In 1981 seven monitoring wells were installed in the vicinity of the eastern lagoons as part of Keck Consultants Hydrogeologic Study of the New (eastern) Lagoon Area. The investigation detected volatile organic compounds (VOC) and metals contamination in the groundwater.

In 1984 the MDEQ sampled CD #30 and found heavy metal contamination downstream from the BPC. As a result, in 1985 the BPC dredged CD #30 from its eastern outfall to the Matteson Street overpass, dewatered the sediment on-site, and had the dredged material removed.

The United States Environmental Protection Agency (EPA) gave the site a hazard ranking score of 33.93 in June 1984 and the site was placed on the National Priorities List (NPL) in June 1986.

In 1988 the MDEQ required Bronson Specialties, Inc. to test and remediate contaminated soil and groundwater around its facility.

The EPA performed a site assessment of property located at 141 West Railroad Street on May 10, 1993. The assessment revealed numerous abandoned drums and vats of plating waste, acids, and caustic liquids. On March 10, 1994, the EPA issued an Administrative Order on Consent to clean up surface contamination to the Universal Components Corporation. Universal Components Corporation finished the cleanup on August 21, 1995.

The MDEQ completed a RI of Operable Unit I (OU 1) in September 1993 and a Feasibility Study (FS) for OU 1 in May 1995. In July 1997 the MDEQ completed a FS Addendum. This addendum updates the cleanup goals to reflect amendments to Michigan law in June 1995, presents an additional groundwater remediation alternative for the site, and identifies the industrial sewer as a potential source of contamination at the site requiring further study.

The proposed plan for OU 1 was released for public comment on August 6, 1997.

3. HIGHLIGHTS OF COMMUNITY PARTICIPATION

MDEQ community relations activities for the site began soon after the site was put on the NPL in June 1986. MDEQ personnel met with city officials and visited local neighborhoods to informally brief the community about the site. The MDEQ also established the site information repository at the Bronson Library and created a mailing list of interested parties. In July 1989 the MDEQ ran a public notice in the Bronson Journal. The notice, which ran for two weeks, updated the community on the RI/FS and reminded all interested parties to add their names to the site mailing list by calling or writing the MDEQ site project manager.

The MDEQ developed the Community Relations Plan for the site in August 1992. This plan identified community concerns, community relations objectives, and community relations activities to be conducted throughout the remedial action process.

On June 15, 1995, the MDEQ hosted an informal public meeting to present results of the RI and the FS. The MDEQ issued a fact sheet to provide the community with information regarding the status of the site. This meeting also explained the Superfund process and provided details of the upcoming investigations.

In October 1995 a letter from the state project manager was sent to the residents updating them on recent changes in the site boundaries and the new cleanup rules pursuant to Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA) and the need to amend the FS based on these changes. On September 17, 1996, an informational meeting was held to inform the public of a new alternative being developed in the amended FS.

In December 1996 the site was chosen by the EPA as a pilot for developing a Community Advisory Group (CAG). The CAG is an EPA public relations initiative designed to enhance community relation activities at Superfund sites. The CAG is a volunteer group of local citizens interested in the site. This group sets its own priorities and agendas. The agencies are there to assist in developing the organization and providing site information as requested by the CAG.

On December 10, 1996, the EPA and the MDEQ conducted a CAG orientation briefing and a group was formed. To date the CAG has held five meetings of which the MDEQ attended four. The MDEQ project manager presented to the group the site history, an outline of the Superfund process, and a review of the alternatives and the proposed plan developed for the site.

The proposed plan was released to the public on August 6, 1997. The MDEQ completed the site administrative record and made it available to the public in the information repository. The repository is located at the Bronson Public Library, 207 N. Matteson Street, Bronson, Michigan 49028. The Bronson Journal published the proposed plan on August 7, 1997. The proposed plan public comment period was from August 6, 1997 to September 8, 1997, and a proposed plan public meeting was held on August 19, 1997.

4. SCOPE AND ROLE OF RESPONSE ACTION

The MDEQ has organized the cleanup into two discrete response actions or OUs. This Record of Decision (ROD) addresses the first OU. OU 1 will address the eastern and western lagoons, contaminated groundwater migrating from the lagoons, contaminated sediment in CD #30, and exposure to area-wide contaminated groundwater. OU 2 will address the industrial sewer and media impacted by releases from the industrial sewer.

The threats to human health and the environment addressed by OU 1 are contaminated soil and sludge in and around the lagoons, sediment in CD #30, and groundwater impacted by contaminants in the lagoons venting to CD #30. OU 1 requires excavating approximately 26,000 cubic yards of soil or sludge from the eastern lagoons, and dredging approximately 2,000 cubic yards of sediment from CD #30. This material will be deposited into the western lagoons. The western lagoons will be covered with an engineered soil cover to prevent exposure to the hazardous waste material, and a French Drain will be installed between the western lagoon waste repository and CD #30 to capture contaminated groundwater before it vents to CD #30. The captured groundwater will be treated in a wetland to be constructed in the vicinity of the western lagoons. The treated water will be discharged from the wetland to CD #30.

Addressing contaminated soil, sludge, sediment, surface water, and groundwater in OU 1 will protect human health and the environment and is fully consistent with all future site investigations and cleanup work including OU 2. OU 2 will address the industrial sewer and media impacted by releases from the industrial sewer, which includes area-wide groundwater contamination.

5. NATURE AND EXTENT OF CONTAMINATION

5.A. Summary

Contamination detected at the site is the result of industry operating practices since the early 1900's. Industries in the area include plating operations, machine shops, agricultural supply, bulk petroleum storage, and manufacturing plants. Contaminants detected at the site were found in several media (soil, groundwater, surface water, sediments, lagoon water, and lagoon sludge) at numerous locations, and varying concentrations. Contaminants include TCE, 1,2-dichloroethylene (1,2-DCE), and vinyl chloride (chlorinated VOCs); PCBs; polyaromatic hydrocarbons (PAHs), arsenic, antimony, barium, cadmium, chromium, copper, nickel, and zinc (metals); nitrate-nitrite and cyanide. The primary locations, media, and contaminants are as follows:

Area	Media	Contaminant Group
Former Industrial Complex	Soil	Metals
Former Industrial Complex	Groundwater	VOCs, Metals
Western Lagoon Area	Surface water	Metals, VOCs
	Sludge	Metals, VOCs
	Soil	Metals
	Groundwater	Metals, VOCs
Eastern Lagoon Area	Soil	Metals
	Subsurface sludge	VOCs, PAHs, PCBs, Metals

	Groundwater	VOCs, Metals
CD #30	Surface Water	VOCs, Metals
	Sediment	VOCs, PAHs PCBs, Metals

5.A.1 Chlorinated VOCs - TCE, 1,2-DCE, and vinyl chloride are the predominant VOCs detected at the site. TCE is a common industrial solvent used for cleaning and degreasing metal parts and machining equipment. TCE was in the waste streams of most of the industrial facilities which discharged to the lagoons. 1,2-DCE and vinyl chloride are the likely by-products of TCE as TCE breaks down in the environment. In the groundwater TCE and related compounds are found at depth in the upper aquifer and downgradient of known source locations at concentrations that exceed Maximum Contaminant Levels (MCLs) or Residential Criteria pursuant to Part 201 of the NREPA. TCE and vinyl chloride also exceed mixing zone-based groundwater/surface water interface criteria pursuant to Part 201 of the NREPA at CD #30 (Figure 2).

5.A.2. Metals - High metal concentrations were detected in subsurface soils, lagoon berm soils, lagoon sludge, and groundwater at the eastern and western lagoons and along the industrial sewer. The predominant metals detected (cadmium, total chromium, copper, lead, nickel, and zinc) are common to the plating industry as well as other heavy industry. Cadmium was detected at hazardous concentrations pursuant to the Resource Conservation and Recovery Act (RCRA), 1976 PL 94-580, as amended, in lagoon sludge, and some subsurface soils at the eastern lagoons. In groundwater, cadmium, nickel, lead, manganese, zinc, chromium, and cyanide were detected at concentrations that exceed MCLs or Residential Drinking Water Criteria pursuant to Part 201 of the NREPA near the lagoons or along the industrial sewer (Figures 3 & 4).

5.A.3. PAHs and PCBs - PAHs were detected in soils and sludge at the eastern lagoons, CD #30 sediment, and in soils at L.A. Darling. PCBs were detected in CD #30 sediments downstream of the western lagoons, Swan Creek, and in the eastern lagoon sludge. Based on an investigation conducted by EPA, the primary source of PAHs and PCBs appears to be the Bronson storm sewer and not the lagoons. Apparently, PAHs and PCBs have not migrated from site sludge, soil, or sediment. Therefore, PAH and PCB contamination will not be used to define areas of CD #30 to be addressed by the remedy. However, sediments dredged from CD #30 will likely contain PAHs and PCBs and the potential presence of these compounds will be considered when selecting the remedy.

5.A.4. Source Areas - The primary source(s) of VOCs in the groundwater appears to be contaminated subsurface soils beneath the Scott Fetzer and possibly the L.A. Darling property. Contaminant concentrations in the groundwater in the upper aquifer also indicate the potential presence of a Dense Nonaqueous Phase Liquid (DNAPL)

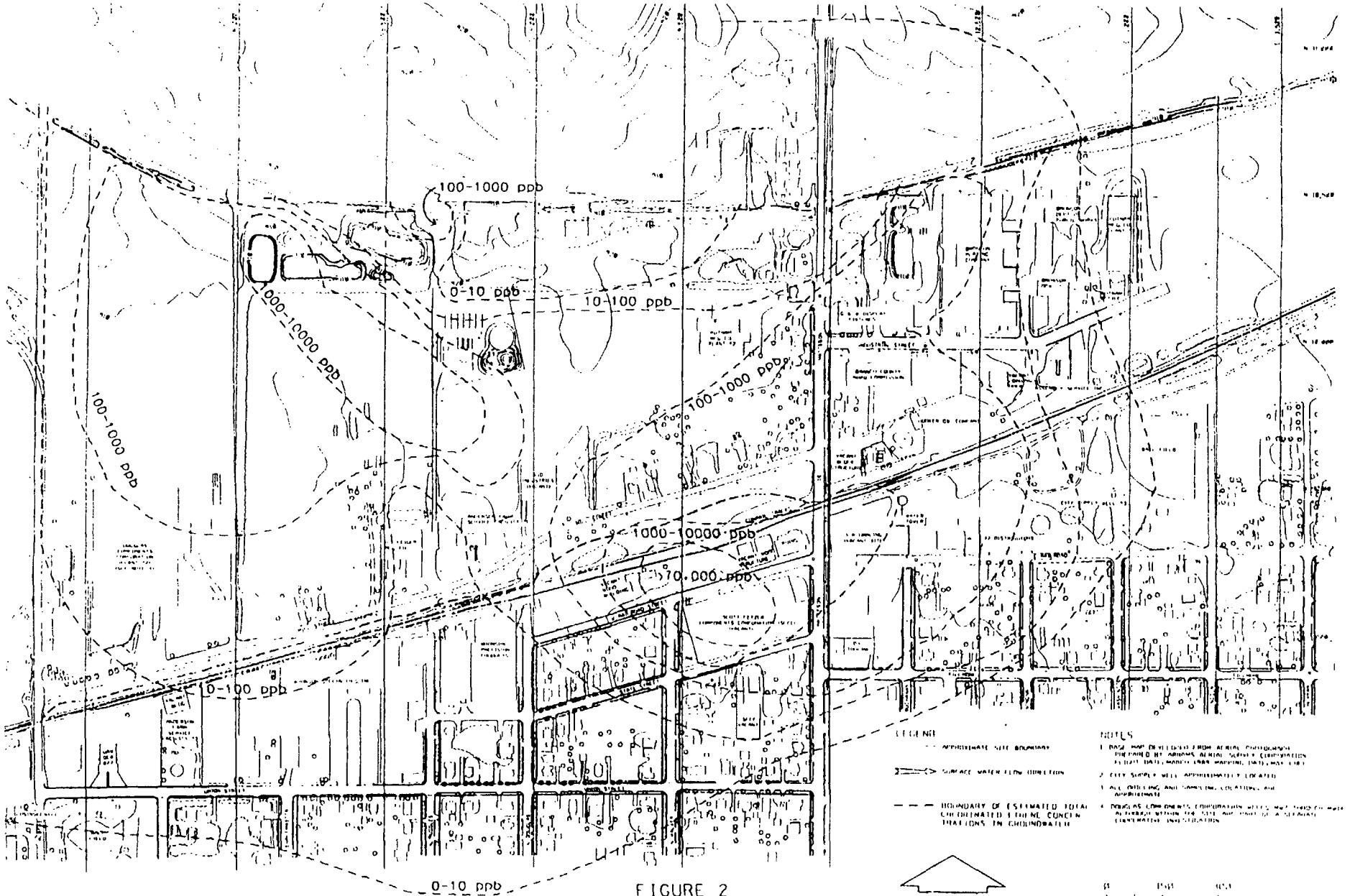


FIGURE 2

ORGANIC GROUNDWATER CONTAMINATION

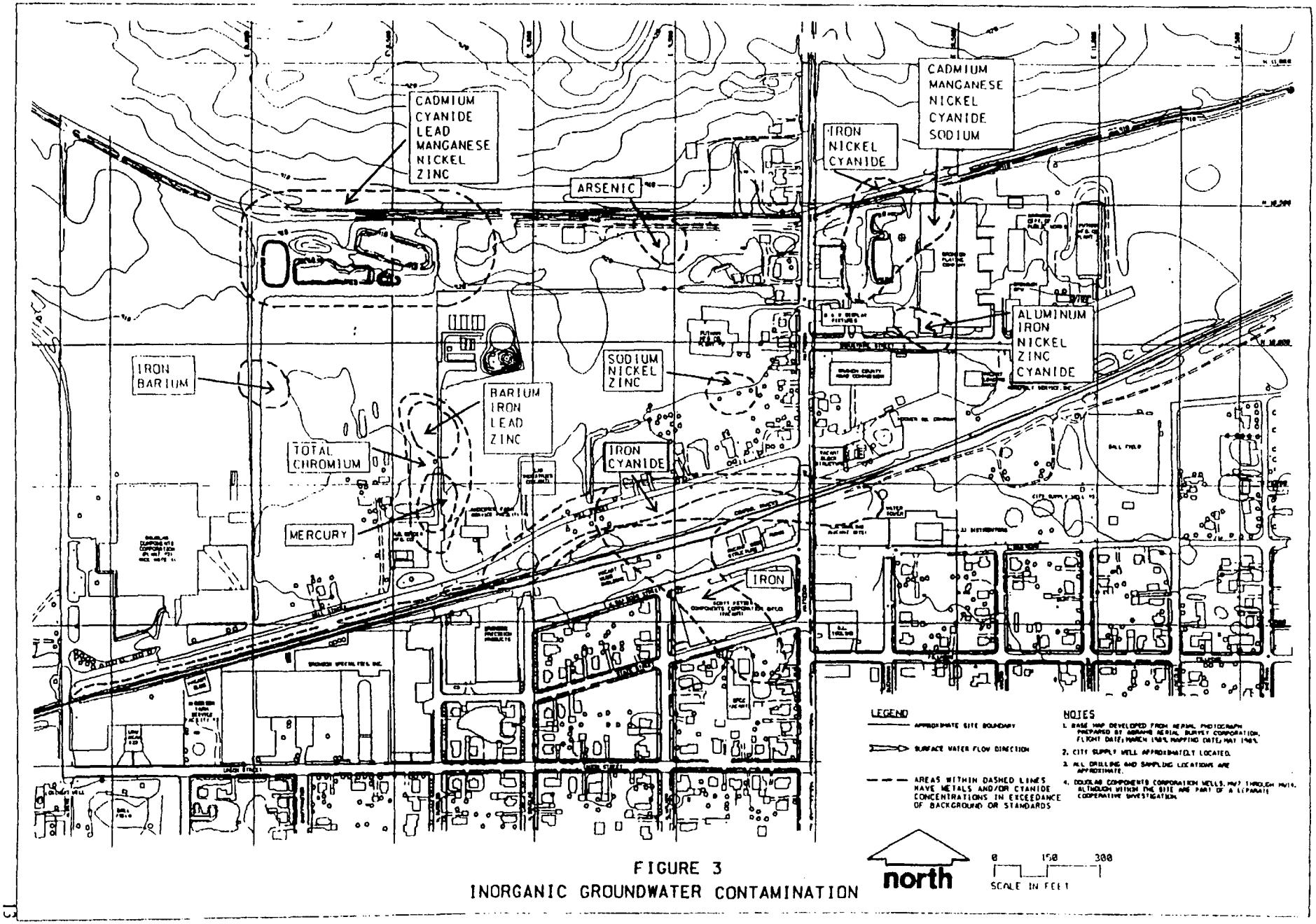


FIGURE 3
INORGANIC GROUNDWATER CONTAMINATION

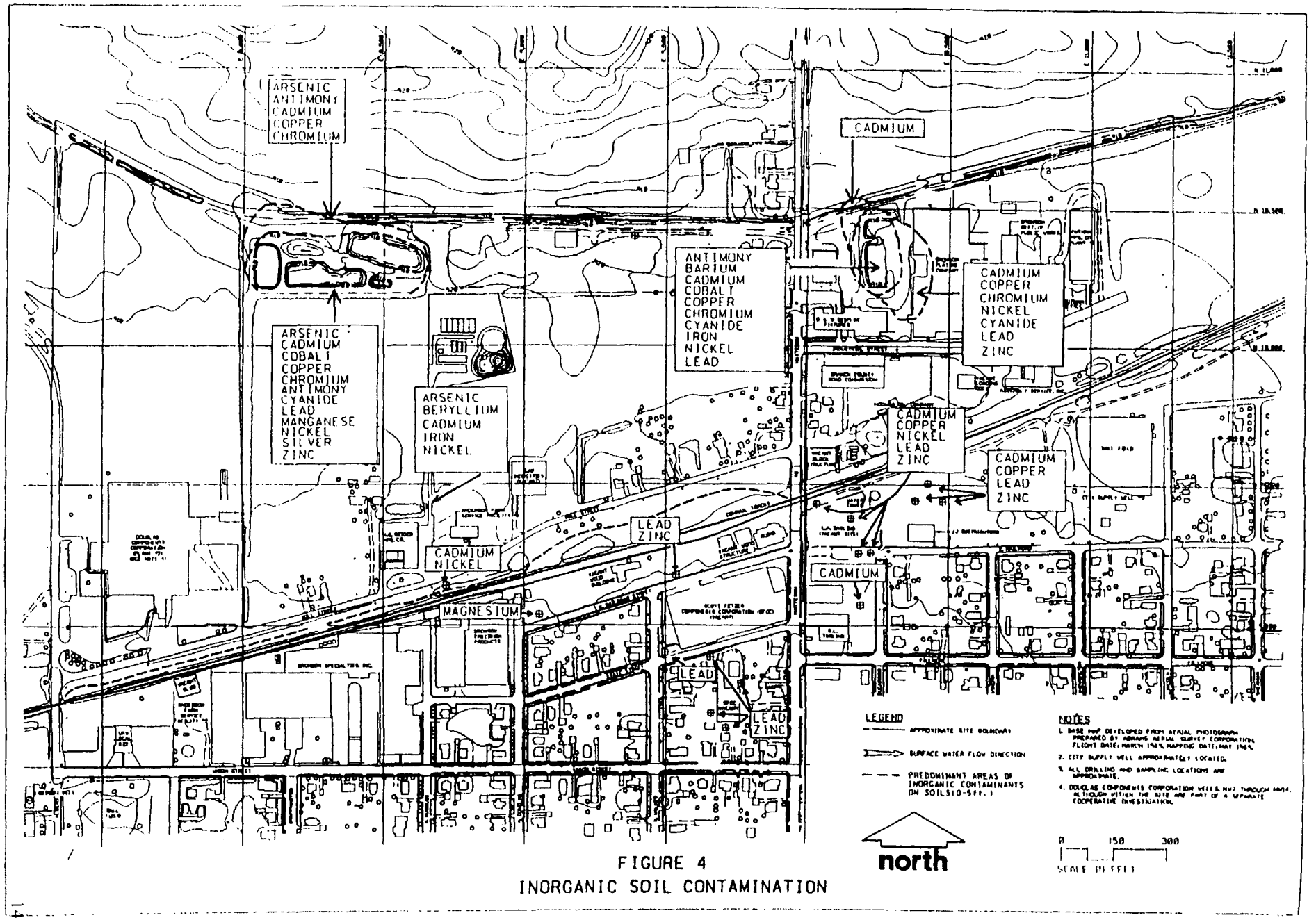


FIGURE 4
INORGANIC SOIL CONTAMINATION

(e.g. TCE) beneath one or both of these facilities. DNAPLs are heavier than water and will sink to the bottom of the aquifer. Other VOC sources may exist within the site boundaries.

The primary sources of metals at the site are lagoon sludge, surface and subsurface soils, and the soils around and below the industrial sewer.

5.B. Area Specific Overview of Site Contamination

The site was divided into five subareas of interest identified during the RI. These are shown on Figure 5 and include:

- L.A. Darling
- Scott Fetzer
- The Industrial Sewer
- The Eastern and Western Lagoons
- CD #30

These subareas were identified based on physical features present, the distribution of contaminants, and groundwater flow direction at the site.

5.B.1. The L.A. Darling Subarea - TCE and 1,2-DCE were detected at relatively high concentrations in wells in and downgradient of the L.A. Darling Subarea. The concentration of TCE in the groundwater indicates the L.A. Darling Subarea is a possible source of VOCs at the site. In addition, high concentrations of PAH compounds were detected in soils near the surface at the L.A. Darling Subarea. Cadmium, chromium, copper, mercury, zinc, and cyanide were the metals detected most frequently above background concentrations in soils.

5.B.2. The Scott Fetzer Subarea - TCE, 1,2-DCE, and 1,1,1-Trichloroethane were detected in soils at the Scott Fetzer Subarea; however, most compounds were detected in samples collected from below the water table. TCE, 1,2-DCE, and vinyl chloride concentrations in Monitoring Well 20 represented the highest concentrations detected in groundwater at any location at the site. The Scott Fetzer Subarea is a potential source area for VOCs at the site. While metals in groundwater at the Scott Fetzer Subarea did not exceed Residential Criteria pursuant to Part 201 of the NREPA, several were detected in soils and groundwater above background levels.

5.B.3 The Abandoned Industrial Sewer – Relatively high concentrations of TCE, 1,2-DCE, vinyl chloride, and metals were detected in subsurface soils and in the groundwater along the route of the abandoned industrial sewer pipe. The contamination detected in these areas is likely due to a combination of sources, but primarily from leaks in the industrial sewer pipe.

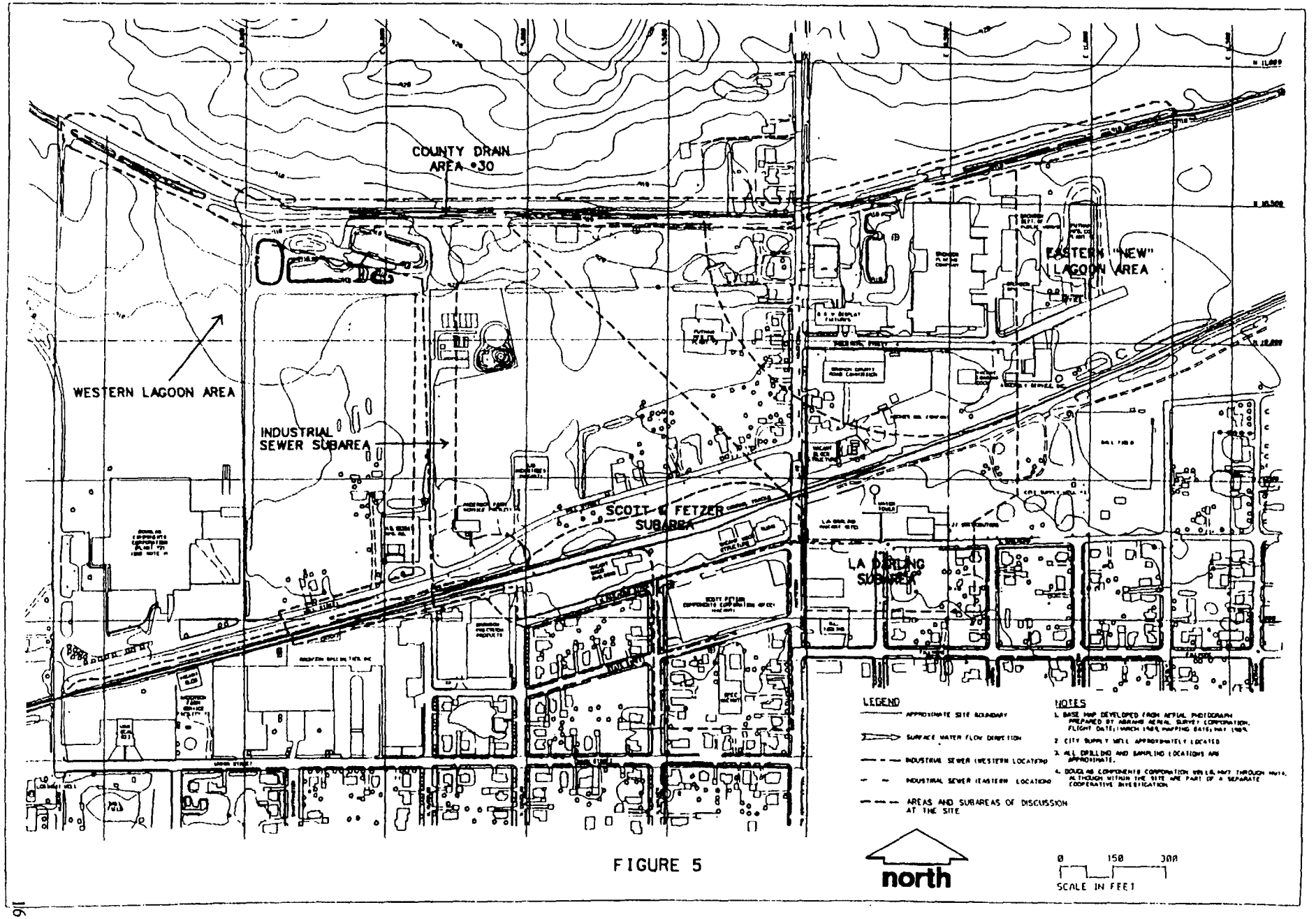

COUNTY DRAIN
AREA #30
EASTERN "NEW"
LAGOON AREA
WESTERN LAGOON AREA
INDUSTRIAL
SEWER SUBAREA
SCOTT & FETZER
SUBAREA
LA DARLING
SUBAREA
LEGEND
APPROXIMATE SITE BOUNDARY
SURFACE WATER FLOW DIRECTION
INDUSTRIAL SEWER (WESTERN LOCATION)
INDUSTRIAL SEWER (EASTERN LOCATION)
AREAS AND SUBAREAS OF DISCUSSION AT THE SITE
NOTES
1. BASE MAP DEVELOPED FROM AERIAL PHOTOGRAPH PREPARED BY ABRAMS AERIAL SURVEY CORPORATION. FLIGHT DATE: MARCH 1985, MAPPING DATE: MAY 1985.
2. CITY SUPPLY WELL APPROXIMATELY LOCATED
3. ALL DRILLING AND SAMPLING LOCATIONS ARE APPROXIMATE.
4. DOUGLAS CORPORATION WELLS MW7 THROUGH MW14, ALTHOUGH WITHIN THE SITE ARE PART OF A SEPARATE COOPERATIVE INVESTIGATION.
north
0
150
300
SCALE IN FEET

FIGURE 5

5.B.4. The Eastern and Western Lagoons - There were many VOCs, SVOCs, pesticides, and PCBs detected in soils and sludge at the eastern lagoons, but chlorinated ethene (TCE, 1,2-DCE, and vinyl chloride) compounds and bis(2-ethylhexyl) phthalate were the only organic compounds detected in groundwater at the eastern lagoons. Although chlorinated ethene compounds were not detected in soils or eastern lagoon sludge from the two accessible lagoons, it is possible the chlorinated ethene compounds were in the waste stream deposited in the three inaccessible lagoons because known users of these compounds (DCC Plant #2, L.A. Darling, and BPC) discharged to them.

High concentrations of TCE, 1,2-DCE, and vinyl chloride were detected in groundwater wells at and downgradient of the western lagoons, and in the immediate vicinity of the eastern lagoons. The same chlorinated ethenes detected in groundwater at the western lagoons were also detected in the western lagoon sludge. While the western lagoons are a likely source of VOCs in the groundwater, it is also likely that similar contaminants from the Scott Fetzer Subarea, the L.A. Darling Subarea, the abandoned industrial sewer line, DCC Plant #2, Bronson Precision Products, and possibly Bronson Specialties, are migrating in the groundwater to the downgradient eastern and western lagoons.

High concentrations of metals were also detected in lagoon sludge, subsurface soils, and groundwater at both the eastern and western lagoons. Metals appear to have migrated downward and horizontally in the soil and with the flow of groundwater. Wells in the immediate vicinity of the eastern and western lagoons show metal concentrations in excess of Residential Drinking Water Criteria pursuant to Part 201 of the NREPA.

5.B.5. CD #30 - Numerous organic compounds were detected in CD #30 surface water but most compounds were detected at relatively low concentrations and no organic compounds exceeded Ambient Water Quality Criteria (AWQC). Contaminants are entering CD #30 via the storm sewer outfall (OF5), the BPC Outfall (OF1), and groundwater discharge. Surface water runoff from the agricultural fields and land adjacent to CD #30 may also be impacting surface water and sediments in CD #30.

Cadmium and mercury are entering CD #30 surface water via outfalls OF5 and OF1 at levels above AWQC. Cadmium at 3.3 ug/L from OF5 and mercury at 0.27 ug/L from OF1. The remaining metals detected in surface water in exceedance of AWQC are attributable to releases from contaminated sediments in CD #30 and groundwater discharging to CD #30.

Relatively high concentrations of PAHs, PCBs, and metals were detected in CD #30 sediments. Arsenic, cadmium, and PCBs exceeded Residential Direct Contact Criteria pursuant to Part 201 of the NREPA. The PAHs, PCBs, and metals were detected at greatest concentrations adjacent to, and downstream of, the western lagoons. PCBs and metals were also detected in Swan Creek. The metal contamination is likely

attributable to the site. PCBs were not detected in western lagoon sludge samples but were detected in subsurface soils and sludge at the eastern lagoon. The major source of PCBs detected in CD #30 and Swan Creek is, or was most likely, the Bronson storm sewer or surface water runoff from the area.

5.C. Fate and Transport of Contaminants

At this time, conditions remain favorable for contaminant releases by infiltration and percolation of precipitation through the relatively porous sandy soils at the site. Once in the upper aquifer, contaminant transport is driven by horizontal and vertical gradients. The upper aquifer is a relatively permeable sand and gravel mix. An aquitard of silty sand and clay appears to divide the aquifer into upper and lower regions. This aquitard appears to be continuous across the site and between 17 feet and 50 feet thick (based on residential well logs, on-site borings, and the Hydrogeologic Atlas of Michigan [1981]). However, due to the large (220-acre) size of and limited data available regarding the aquitard, its continuity and thickness cannot be stated with certainty. The aquitard has relatively low permeability and, if it is continuous, serves as a barrier to the downward migration of contaminants in the upper aquifer. However, there are no wells in the lower aquifer located at or downgradient of the source areas to confirm this assumption.

Contaminants from the L.A. Darling Subarea, the Scott Fetzer Subarea, the eastern lagoons, and the western lagoons are migrating from sources in subsurface soils (possibly a DNAPL) and sludge from these areas. Other unidentified source areas may exist along the industrial sewer pipe.

TCE, 1,2-DCE, and vinyl chloride are the most mobile contaminants present and are likely to migrate the furthest from the source areas regardless of the media they are in (soils, sediments, sludge, or groundwater). TCE, 1,2-DCE, and vinyl chloride have mid to high range solubility (relative to metals and PCBs), low octanol/water coefficient values, and low retardation factors. The high migration potential for VOCs in groundwater is confirmed by the high concentrations of chlorinated organic compounds found in downgradient wells and wells screened at the top of the aquitard at the site. Metals are also migrating in groundwater. However, due to the relatively low solubility of metals in groundwater they have migrated to a lesser extent than the VOCs.

Contaminated groundwater is discharging directly to CD #30. Contaminated groundwater is also being intercepted by the Bronson storm sewer which flows into CD #30. Once contaminants are in CD #30, the VOCs are volatilized directly into the air and metals likely precipitate out into the sediment.

6. SUMMARY OF SITE RISKS

The MDEQ conducted a Human Health and Environmental Risk Assessment to determine how contaminants detected at the site may affect human health or the environment. The risk assessment compared contaminant levels found at the site to

state and federal standards or toxicity guidelines; considered how people, animals, or plants could be exposed to the contamination; and evaluated whether these contaminants posed a threat to human health or the environment. Refer to the Baseline Risk Assessment or Tables 1-4 and 1-5 of the FS for detailed risk estimates.
The MDEQ conducted this risk assessment following EPA guidance including "Risk Assessment Guidance for Superfund: Volume I Human Health Evaluation" (U.S. EPA 1989a), and "Risk Assessment Guidance for Superfund: Volume II Environmental Evaluation Manual" (U.S. EPA, 1989b), and where appropriate, State of Michigan Risk Assessment Guidelines. These documents provide the methodology and standard assumptions used for evaluating risk and developing appropriate cleanup standards.

6.A. Human Health

Human health risks are quantified by calculating the noncancer and the cancer risk factors for each chemical detected at the site. For noncancer risks, the contaminant concentration detected on-site must not exceed a reference dose concentration for that chemical. Numerically, this comparison is expressed as the hazard quotient (HQ) for the chemical or for multiple contaminants the hazard index (HI). An HQ or HI greater than 1.00 represents an unacceptable health risk.

The acceptable risk range for cancer causing chemicals established by the EPA is no more than one additional case of cancer for every 10,000 to 1,000,000 people exposed (CR = 1x10-4 to 1x10-6). The MDEQ manages cancer risk to no more than one additional case of cancer for every 100,000 people exposed to a chemical (CR = 1x10-5).

6.A.1. Western Lagoon Area - Risks were estimated for trespassers exposed to contaminants detected within the western lagoon area. Trespassers were assumed to be exposed to contaminated sludge, surface water, and air. Under these conditions, the western lagoon area presents both a noncarcinogenic and a carcinogenic health hazard. The majority of the noncancer risk (HI=6) is from skin contact with cadmium and chromium contaminated sludge. The majority of the cancer risk (CR=5X10-6) is from the ingestion of arsenic in surface water and sludge.

6.A.2. Eastern Lagoon Area - Risks were estimated for trespassers exposed to contaminants detected within the eastern lagoon area. Trespassers were assumed to be exposed to contaminated surface soil. Under these conditions tne eastern lagoon area appears to pose a noncancer health concern. The majority of the noncancer risk (HI=20) is from direct contact with the skin and the incidental ingestion of antimony, chromium, and nickel.

6.A.3. CD #30 - Risks were quantified for children playing in CD #30 and residents living near CD #30. Children who wade in CD #30 are assumed to be exposed to contaminated surface water, sediment, and organic vapors in the air. Residents are potentially exposed to VOC vapors in the air. Under these conditions there is a cancer risk to children exposed to sediment and residents exposed to volatile chlorinated organics. The majority of cancer risk (CR=1X10-5) to children playing in CD #30 was

associated with children eating sediment contaminated with arsenic. The majority of cancer risk (CR=2X10-5) to residents living near CD #30 is associated with residents inhaling vinyl chloride.

6.A.4. Groundwater - The most concentrated portion of the chlorinated organic plume lies below the industrial area near the former Scott Fetzer and L.A. Darling properties. The organic plume generally decreases in concentration as it flows west and north toward CD #30. Risks were quantified for residents assuming that they will use the contaminated shallow groundwater for their drinking water supply in the future. Health risks were developed separately for groundwater consumption and exposure to groundwater contaminants through skin contact and inhalation while showering. Based on the concentration of contaminants in the groundwater, residential use would pose a noncancer (HI=60) and cancer (CR=2X10-1) risk to future residents. The noncancer risk was associated with ingestion of 1,2-DCE. The majority of the cancer risk is associated with the ingestion of vinyl chloride in the groundwater.

6.B. Ecological Concerns

Currently, there is no available documentation that suggests protected or endangered species are present within the area of the site.

6.B.1. Terrestrial Ecosystem Plants and Animals - Signs of stressed vegetation were observed along the berms surrounding the western lagoons. Also, the diversity of plant species along the banks of the western lagoons appeared low. Adverse effects on terrestrial animals in the CD #30 area or the western lagoon area were not observed. However, without a thorough terrestrial survey or conducting bioassays on contaminated media, conclusions could not be drawn concerning adverse health effects on terrestrial species or their habitats in these areas.

6.B.2. Aquatic Ecosystem Plants and Animals - Based on the concentrations of contaminants in surface water, sediments, and sludge from either CD #30 or the western lagoons, sensitive aquatic species may be harmed or likely have been eliminated from these surface water bodies.

The MDEQ evaluated ecological risks to CD #30 by comparing the concentrations of site-related contaminants in CD #30 surface water and sediment to EPA and MDEQ criteria and guidance documents if agency standards were not available.

Impacts to CD #30 surface water were evaluated against EPA, AWQC, and MDEQ Groundwater/Surface Water Interface (GSI) criteria. Several VOCs or metals were detected in CD #30 surface water or in groundwater discharging to the drain at levels above AWQC or MDEQ-GSI values. Metals exceeding AWQC are cadmium, copper, lead, selenium, cyanide, and hexavalent chromium. Metals and organic contaminants that exceed MDEQ-GSI criteria are cadmium, lead, nickel, zinc, cyanide, vinyl chloride, and TCE.

CD #30 sediment was evaluated by comparing contaminant concentrations found in CD #30 to two sediment guidance documents and background conditions. The guidance documents are the Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario published by the Ontario Ministry of the Environment and The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program published by the National Oceanographic and Atmospheric Administration in Technical Memorandum NOS ONA 52. Background levels were used if they were higher than the lowest impact level established by either guidance, but did not exceed the severe impact level quantified in the Ontario guidelines.

6.B.3 Risk Summary Statement - Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

7. CLEANUP GOALS

Cleanup goals identified for each chemical of concern are based on the environmental media, the exposure pathway, the potential receptor(s), the risk associated with the exposure, and the use and zoning of the impacted property.

7.A. Soil or Sludge

Soil or sludge cleanup goals (Table 1) for each contaminant of concern are based on MDEQ health-based direct contact values or values that protect ground-water quality. MDEQ-approved leach tests may also be used to demonstrate compliance with soil or sludge criteria protective of groundwater. To protect against the runoff of contaminants into CD #30, background levels have been identified as cleanup goals for surface soils close (i.e., the 10 year flood plain) to the drain.

7.B. CD #30 Sediment

CD #30 sediment cleanup goals (Table 2) for each contaminant of concern are based on MDEQ health-based direct contact values, values identified in "To Be Considered" guidance documents that protect the quality of sediments, or back-ground levels.

7.C. Groundwater

Groundwater cleanup goals (Table 3) for each chemical of concern are based on the point of compliance. MCLs are the goals for contaminated groundwater within or at the site boundaries. MDEQ groundwater surface water interface criteria are the cleanup goals for contaminated groundwater discharging to CD #30.

TABLE 1				
NORTH BRONSON LAGOON SOIL, AND SLUDGE CLEANUP GOALS				
Chemical	Average EPC (ug/kg)	Pathway	Goal (ug/kg)	Reference or Guidance
Antimony	600,000	GSI	36,000	MDEQ GSI
		Soil to Surface Water	7000	BACKGROUND
Arsenic	14,000	GSI	70,000	MDEQ GSI
		Direct Contact	6,600	MDEQ DCV
		Soil to Surface Water	6,000	BACKGROUND
Barium	2,200,000	GSI	130,000	MDEQ GSI
		Soil to Surface Water	85,000	BACKGROUND
Cadmium	2,500,000	GSI	4,300	MDEQ GSI SWP
		Soil to Surface Water	1,200	BACKGROUND
Chromium VI	9000000*	GSI	3,300	MDEQ GSI SWP
		Soil to Surface Water	7000	BACKGROUND
Copper	2,500,000	GSI	4,000,000	MDEQ GSI
		Soil to Surface Water	32,000	BACKGROUND
Lead	1,100,000	GSI	1,000	MDEQ GSI
		Soil to Surface Water	21,000	BACKGROUND
Mercury	81	Soil to Surface Water	130	BACKGROUND
		GSI	170	MDEQ GSI
Nickel	38,000,000	GSI	88,000	MDEQ GSI
		Soil to Surface Water	20,000	BACKGROUND
Selenium	1,000	GSI	400	MDEQ GSI
Silver	28,000	GSI	67	MDEQ GSI
		Soil to Surface Water	1000	BACKGROUND
Vanadium	230,000	GSI	130,000	MDEQ GSI
		Soil to Surface Water	41,000	BACKGROUND
Zinc	2,600,000	GSI	190,000	MDEQ GSI
		Soil to Surface Water	72,000	BACKGROUND
Cyanide	2,600,000	GSI	100	MDEQ GSI
		Soil to Surface Water	400	BACKGROUND

EPC - Exposure Point Concentration
GSI - Groundwater to Surface Water Interface
DCV - Direct Contact Value
*** EPC = Total Chromium**

Table 2			
Determination of North Bronson County Drain #30 Sediment Cleanup Goals (ug/kg)			
Chemical of Concern	**Exposure Point Concentration.**	**Cleanup Goal**	**Reference or Guidance**
Antimony	5,000	2,000	NOAA Exposure Risk-Low
Arsenic	23,000	6,600	Part 201 Residential DCV
Barium	230,000	10,000	Background
Cadmium	200,000	5,000	NOAA Exposure Risk-Low
Total Chrom	1,900,000	80,000	NOAA Exposure Risk-Low
Copper	4,500,000	70,000	NOAA Exposure Risk-Low
Lead	510,000	35,000	NOAA Exposure Risk-Low
Manganese	330,000	97,000	Background
Mercury	130	200	Ontario Lowest Effect Level
Nickel	1,200,000	30,000	NOAA Exposure Risk-Low
Silver	7,500	1,000	NOAA Exposure Risk-Low
Vanadium	30,000	5,400	Background
Zinc	770,000	120,000	Ontario Lowest Effect Level
Cyanide	9,400	100	Ontario Lowest Effect Level
PAH (total)	15,000	4,000	Ontario Lowest Effect Level

NOAA - National Oceanic and Atmospheric Administration

DCV - MDEQ Direct Contact Value

PAH - Polynuclear Aromatic Hydrocarbon (total) is the sum of 16 PAH compounds: Acenaphthene, Acenaphthylene, Anthracene, Benzo(k)fluoranthene, Benzo(b)fluorene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(g,h,i)perylene, Chrysene, Dibenzo(a,h,)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3-cd)pyrene, Naphthalene, Phenanthrene and pyrene.

TABLE 3				
NORTH BRONSON LAGOON GROUNDWATER CLEANUP GOALS				
Chemical	Average EPC (ug/kg)	Risk	Goal (ug/kg)	Reference or Guidance
Cadmium	70	GSI	6.2*	MDEQ GSI
		Site Boundry	5	MDEQ DWV
Chromium	30	GSI	11#	MDEQ GSI
Lead	3	GSI	NA	MDEQ GSI
		Site Boundry	4	MDEQ DWV
Mercury	1	GSI	1	MDEQ GSI
		Site Boundry	1	MDEQ DWV
Nickel	550	GSI	168*	MDEQ GSI
		Site Boundry	100	MDEQ DWV
Silver	2	GSI	4	MDEQ GSI
		Site Boundry	34	MDEQ DWV
Zinc	5,000	GSI	382*	MDEQ GSI
		Site Boundry	2,400	MDEQ DWV
Cyanide	1,000	GSI	20	MDEQ GSI
		Site Boundry	200	MDEQ DWV
Nitrate+Nitrite	300,000	GSI	NA	MDEQ GSI
		Site Boundry	10,000	MDEQ DWV
Trichloroethylene	450	GSI	200	MDEQ GSI
		Site Boundry	5	BACKGROUND
cis 1,2 DCE	600	GSI	410	MDEQ GSI
		Site Boundry	70	MDEQ DWV
Vinyl Chloride	60	GSI	15	MDEQ GSI
		Site Boundry	2	MDEQ DWV
		Indoor Inhalation	110	MDEQ GW INDOOR AIR
		Groundwater Contact	290	MDEQ GW CONTACT

NA - Not applicable
EPC - Exposure Point Concentration
GSI - Groundwater Surface Water Interface

cis 1,2 DCE - cis 1,2 Dichloroethylene
DWV - Drinking Water Value

* Final Chronic Value @ 400 mg CaCO3/L
\# Based on Chromium VI

8. DESCRIPTION OF REMEDIAL ALTERNATIVES

Based on the results of the RI and the Risk Assessment, the MDEQ conducted an FS to identify, develop, and evaluate alternatives for reducing risks to human health and the environment. During the FS the MDEQ identified and screened potential remedial technologies appropriate for the site. Applicable technologies were assembled into area-specific and site-wide alternatives to address contamination problems. These alternatives were then screened on the basis of their effectiveness, implementability, and cost. Once this initial screening was completed, a detailed analysis was conducted on a limited number of alternatives that represented possible options to remediation. The detailed analysis consisted of evaluating the individual alternatives against nine evaluation criteria. This analysis is presented in Section 9.

8.A. Area-Specific Alternatives

Specific alternatives were developed in the FS for each area of concern (AOC) identified in the RI. The areas of concern were identified as the Eastern Lagoons (EL), Eastern Lagoon Groundwater (ELG), Western Lagoons (WL), Western Lagoon Groundwater (WLG), and CD #30. Refer to Section 4 of the FS for the detailed nine criteria analysis of each area-specific alternative. A summary of these alternatives and their cost is provided below.

8.A.1. No Action Alternatives (WL-1, WLG-1, EL-1, ELG-1 and CD-1) - The Superfund program requires that a "no action" option be considered at every site. Under a no action remedy the site would remain as it is today. This option is used as the benchmark for comparing and evaluating the effectiveness of all other alternatives.

The costs associated with a no action alternative are those related to the five year reviews and groundwater monitoring. Thirty year present worth estimates are $10,000 for reviews and $500,000 for groundwater monitoring. However, a no action remedy does not meet the cleanup objectives for the site, and would allow a continued unacceptable risk to human health and the environment.

8.A.2. WL Area Alternatives

a. Alternative WL-2: Type III Landfill Area Cap

WL-2 requires constructing a cap over the WL area. The purpose of the cap is to cover the waste to prevent exposures, and to stop rainwater from infiltrating and leaching contaminants into the groundwater. The cap, however, will not prevent the leaching of contaminants into the groundwater from waste deposited below the water table.
Capital Costs: $1,550,000 O & M: $5000 Present Worth: $1,600,000

b. Alternative WL-3: Soil Fixation

The intent of soil fixation is to slow the release of contaminants into the environment. This process involves a deep soil mixing technique that directly applies stabilizing agents to the soils. These agents are designed to reduce the mobility of the contaminants. An

area cap would also be required to prevent exposures and to reduce the infiltration of rainwater.
Capital Costs: $11,900,000 O & M: $40,000 Present Worth: $12,400,000

c. Alternative WL-4: Excavation With Treatment
The intent of excavation with treatment is to prevent exposure and the release of WL contaminants to the environment by removing, treating, and properly disposing contaminated sludge and soil.
Capital Costs: $52,300,000 O & M: $0 Present Worth: $52,300,000

8.A.3. WLG

a. Alternative WLG-2: Groundwater Pumping and Treatment
The intent of groundwater pumping is to capture and treat contaminated groundwater before it migrates from the site. This prevents the movement of contaminants into the surrounding environment. Pumped groundwater would be treated by chemical oxidation, precipitation/flocculation, and ion exchange process. Treated groundwater would be discharged to CD #30.
Capital Costs: $2,300,000 O & M: $170,000 Present Worth: $4,400,000

b. Alternative WLG-3: Containment By Slurry Wall, Groundwater Pumping, and Treatment
The intent of this alternative is to prevent the movement of contaminants via the groundwater by surrounding the lagoons with a subsurface wall. The wall would create a cell isolating the contaminants from the environment. Groundwater seeping into the cell would be pumped out and treated before discharging it to CD #30. Pumped groundwater would be treated by chemical oxidation, precipitation/flocculation, and ion exchange process. This alternative would not prevent groundwater contaminated by sources upgradient from the lagoons from moving around the cell and discharging to CD #30.
Capital Costs: $1,600,000 O & M: $100,000 Present Worth: $2,800,000

8.A.4 EL Area

a. Alternative EL-2: Area Cap
EL-2 requires the construction of a cap over the EL area. The purpose of the cap is to prevent direct contact to eastern lagoon contaminants and to slow the leaching of contaminants into the groundwater by preventing the infiltration of rainwater. The cap, however, will not prevent the leaching of contaminants into the groundwater from waste that is below the water table.
Capital Costs: $790,000 O & M: $5,000 Present Worth: $850,000

b. Alternative EL-3: Soil Fixation
The intent of soil fixation is to slow the movement of contaminants into the groundwater. This process involves a deep soil mixing technique that directly applies stabilizing agents to the soils. These agents are designed to reduce the mobility of the contaminants. An

area cap would also be required to prevent exposures and to reduce the infiltration of rainwater.
Capital Costs: $2,900,000 *O & M: $40,000* *Present Worth: $3,400,000*

c. Alternative EL-4: Source Removal, Treatment, and Disposal
The intent of excavation and treatment is to prevent direct contact exposure and the movement of contaminants into the surrounding environment by removing, treating, and properly disposing of contaminated sludge and soil.
Capital Costs: $10,400,000 *O & M: $5,000* *Present Worth: $10,400,000*

8.A.5 ELG

a. Alternative ELG-2: Groundwater Pumping and Treatment
The intent of groundwater pumping is to capture and treat contaminated groundwater before it migrates from the site. This prevents the movement of contaminants into the surrounding environment. Pumped groundwater would be treated by chemical oxidation, precipitation/flocculation, and ion exchange process. Treated groundwater would be discharged to CD #30.
Capital Costs: $1,700,000 *O & M: $125,000* *Present Worth: $3,250,000*

b. Alternative ELG-3: Containment Wall, Groundwater Pumping, and Treatment
The intent of this alternative is to isolate the contaminants beneath the BPC building by surrounding the building with a subsurface containment wall. Groundwater would be pumped from within the contained area and treated prior to discharge to CD #30. Pumped groundwater would be treated by chemical oxidation, precipitation/flocculation, and ion exchange process.
Capital Costs: $2,900,000 *O & M: $90,000* *Present Worth: $4,000,000*

c. Alternative ELG-4: Containment Wall, Slurry Wall, Groundwater Pumping, and Treatment
The intent of this alternative is to isolate the contaminants beneath the BPC building with a containment wall and to build a slurry wall around the remaining lagoons. Groundwater would be pumped from within the containment and slurry walls and treated to remove contaminants prior to discharge to CD #30. Pumped groundwater would be treated by chemical oxidation, precipitation/flocculation, and ion exchange process.
Capital Costs: $2,600,000 *O & M: $85,000* *Present Worth: $3,700,000*

8.A.6. CD #30

a. Alternative CD-2: Access Restrictions and Monitoring
The intent of access restrictions and monitoring is to prevent exposure to contaminants in CD #30 by institutionally controlling access to the drain.
Capital Costs: $300,000 *O & M: $45,000* *Present Worth: $860,000*

b. Alternative CD-3: Partial Sediment Dredging and Treatment

The intent of partial sediment dredging is to reduce exposure to contaminants and the movement of contaminants into the surrounding environment by removing and treating contaminated sediments from the drain near the lagoon areas.

Capital Costs: $500,000 *O & M: $45,000* *Present Worth: $600,000*

c. Alternative CD-4: Full Sediment Dredging and Treatment

The intent of full sediment dredging and treatment is to prevent exposure and movement of contaminants into the surrounding environment by removing and treating contaminated sediment from the entire length of CD #30.

Capital Costs: $2,000,000 *O & M: $45,000* *Present Worth: $2,600,000*

d. Alternative CD-5: Sediment Dredging with Channeling

This alternative would only redirect the path of groundwater and would spread the contamination downstream. This alternative was eliminated as a possible option.

e. Alternative CD-6: Full Sediment Dredging and Treatment/French Drain Along Selected Areas

The intent of this alternative is to prevent exposure to contaminated sediment and prevent the movement of contaminated groundwater into CD #30. To accomplish the goals of this alternative the entire length of the drain would be dredged. Also, contaminated groundwater emanating from the lagoon areas would be intercepted by a French Drain and treated before it could enter CD #30 and recontaminate that portion of the county drain.

Capital Costs: $3,600,000 *O & M: $45,000* *Present Worth: $4,200,000*

f. Alternative CD-7: Full Sediment Dredging and Full French Drain

The intent of this alternative is to prevent exposure to contaminated sediment and the movement of contaminated groundwater into the environment. To accomplish the goals of this alternative the entire length of the drain would be dredged. Also, contaminated groundwater along the entire length of the drain would be intercepted by the French Drain before it could enter CD #30 and recontaminate the drain.

Capital Costs: $8,300,000 *O & M: $45,000* *Present Worth: $8,900,000*

8.B. Site-wide Alternatives

To develop a comprehensive site-wide remedy that addresses OU 1, area-specific alternatives or components of the area-specific alternatives were assembled into potential site-wide alternatives. The detailed analysis of the area-specific alternatives described above and in the FS and the constructed wetland presented in the FS and FS addendum served as the basis for screening and assessing the site-wide alternatives. Many of the site-wide alternatives developed require the movement and consolidation of contaminated material. Because some of these activities may constitute disposal or placement of hazardous waste, several of the site-wide alternatives may trigger a number of significant requirements under the provisions of Subtitle C (Hazardous Waste Regulations) of RCRA. This is further discussed below.

8.B.1. RCRA Subtitle C Determination - Subtitle C requirements for the treatment, storage, and disposal of hazardous waste apply to a Superfund remedial action if the waste is a RCRA hazardous waste and either of the following conditions are met:

1. The hazardous waste was initially treated, stored, or disposed of after the effective date of the particular RCRA requirement.

2. The activity at the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 1980 PL 96-510, site constitutes the treatment, storage, or disposal of hazardous waste as defined by RCRA.

A solid waste becomes a hazardous waste when it meets the listing description on any of the four lists of hazardous waste under RCRA, or for mixtures of listed and solid wastes, when the listed waste is first added to the solid waste, or when the waste exhibits any one of the four characteristics of hazardous waste (i.e., ignitability, corrosivity, reactivity, or Extraction Procedure (EP) Toxicity).

Waste characterization established that lagoon sludge exhibits the characteristic of EP toxicity for cadmium. The waste is, therefore, a hazardous waste. In addition, the lagoon sludge appears to be a listed hazardous waste under 40 CFR 261.31. Wastewater treatment sludges from electroplating operations are generally designated F006 on the list of hazardous waste from nonspecific sources.

RCRA or specific requirements under RCRA will apply if the hazardous waste was treated, stored, or disposed of after the effective date of RCRA or the requirement. RCRA became effective in November 1980. The North Bronson waste disposal records indicate that no waste was disposed of on or after the effective date of RCRA. Therefore, RCRA regulations do not apply to waste deposited on-site before that date unless the CERCLA corrective action itself constitutes treatment, storage, or disposal.

Many of the site-wide alternatives developed for the North Bronson site require the treatment, movement, or consolidation of contaminated material. Disposal in particular triggers a number of significant requirements, including land disposal restrictions and closure requirements. The EPA has determined that disposal occurs when hazardous wastes are placed in a land based unit. However, movement within a unit does not constitute disposal, and at a Superfund site, an area of contamination can be considered to be comparable to a land based unit. At this site, the area includes the WLs, ELs, CD #30. Therefore, the movement of waste within this area does not constitute placement. Accordingly, site-wide remedies that require the movement of waste within the AOC will not trigger land disposal restrictions or closure requirements.

Therefore, although the waste is hazardous, RCRA Subtitle C requirements are not applicable because neither of the additional conditions of applicability are met. However, because the waste is hazardous and because some of the remedial activities proposed to

address the waste may constitute treatment, storage, or disposal, Subtitle C requirements are potentially relevant and appropriate.

Only those requirements found to be both relevant and appropriate are ARARs. A RCRA requirement may be relevant but not appropriate under certain site conditions. Moreover, it is possible for a portion of a requirement to be relevant and appropriate while other parts may not. However, once a requirement or part of a requirement is found to be relevant and appropriate it must be fully complied with or waived.

Land disposal restrictions (LDRs) and closure requirements under Subtitle C may be relevant and appropriate for activities involving the treatment, storage, or disposal of hazardous wastes at a Superfund site.

LDRs require hazardous waste to be treated prior to the disposal of the material on land. However, the minimum treatment technology required under LDR's is not appropriate for a CERCLA corrective action that leaves a majority of the waste in place below the water table. There is no practicable technology for achieving direct treatment and reduction of mobility in such a case. Instead, the CERCLA action addresses the contamination through containment and treatment of impacted groundwater. Therefore, LDRs are relevant but not appropriate for remedial alternatives requiring the on-site containment of waste material below the water table in pre-existing lagoons.

Depending on the site circumstances and the remedy selected, either clean closure, landfill closure, or a combination of both may be used when closure requirements are relevant and appropriate. Clean closure standards assume there will be unrestricted use of the site and require no maintenance after the closure has been completed. In contrast, disposal or landfill closure standards require post-closure care and maintenance of the unit for at least 30 years after closure and final covers.

A combination or hybrid closure allows more flexibility in designing closures to address site specific problems. Hybrid closures occur when certain requirements in the closure standards are physically or economically unattainable, or when only certain requirements are relevant and appropriate. For example, landfill closures require that the disposal unit be capped with a final Type C or impermeable cover to minimize the impact of leachate on the groundwater. While this requirement may be relevant to the site, it is not appropriate for remedies that leave most of the waste in place below the water table.

Therefore, a hybrid-landfill closure will be used at the site for remedies that leave most of the contamination in place below the water table. The hybrid landfill closure will consist of:

- Covers or caps to:
    1. Address direct contact threats
    2. Minimize maintenance requirements
    3. Promote channelage and minimize erosion

4. Accommodate settling and subsidence

- Institutional controls as necessary
- Post closure requirements which include:
    1. Maintenance of the cover
    2. The O & M of a groundwater capture and treatment system
    3. Maintenance of a groundwater monitoring system

8.B.2. The Treatment Wetland - In the FS addendum, the MDEQ and EPA evaluated the treatment or constructed wetland as potential groundwater treatment alternative. Traditional treatment systems generally require steel, concrete, chemicals, and energy to work. In contrast, the wetland relies on natural processes to treat contaminated groundwater requiring very little energy to operate. The wetland does, however, require substantially more land than traditional systems to function properly. Treatment wetlands are currently used to treat a variety of wastewater effluents, including municipal and mining waste water, urban and agricultural stormwater, sludge, leachates, and various industrial effluents. About 1,000 treatment wetlands exist in North America. Overall, the treatment wetland appears to be a highly effective option that promises substantial cost savings over the more traditional systems screened in the original FS.

The MDEQ and EPA consider the use of a treatment wetland at North Bronson to be innovative technology. Generally, treatment wetlands have been built and used to treat surface water discharges containing individual contaminants. Because of the limited amount of data available about a treatment wetland's ability to remove the large variety of contaminants found in the groundwater at the site, the MDEQ and the EPA had to make assumptions, generally concerning treatment efficiencies, in developing this specific alternative. However, based on these assumptions and the evaluation conducted in the FS addendum, the treatment wetland appears to be a technically feasible but untested option to address the lagoon contaminated groundwater at the site. The combination of apparent effectiveness and substantial cost savings for this technology over the other alternatives screened for the site makes a treatment wetland worth developing.

8.B.3. Capital Costs - Site-wide alternatives designed to address the entire site were developed by combining elements of several area-specific (e.g. lagoons, CD #30) alternatives. The capital cost for each site-wide alternative was estimated by summing the capital cost of the individual area-specific alternatives developed in the FS. Constructed wetland costs were developed in the FS addendum. Engineering, permitting, contingency, and management fees for each site-wide alternative were based on 65 percent of the capital cost of each site-wide alternative. The O&M cost for each alternative was estimated using the annual maintenance cost for the component specified, plus $35,000 for annual groundwater monitoring.

Only RCRA Type C or MDEQ Type III impermeable landfill caps were identified in the FS. However, an impermeable cap is not practical for remedies that leave waste on-site below the water table. Therefore, an engineered soil cover replaced RCRA Type C caps for site-wide alternatives not requiring an impermeable cap. The capital

cost of an engineered soil cover was based on landfill covers developed for similar projects.

The capital and O&M costs used to develop area-wide alternatives are as follows:

COSTS ESTIMATES

	COMPONENT	UNIT COST	O&M COST
1.	Excavation of the EL	$ 450,000	$ 0
2.	Dredging of CD #30	$ 150,000	$ 0
3.	Engineered Soil Cover (WL)	$ 500,000	$ 2,000
4.	Protective Barrier (EL)#	$ 200,000	$ 1,000
5.	French Drain (selected areas)	$ 100,000	$ 0
6.	French Drain (ELs and WLs)	$ 300,000	$ 0
7.	RCRA Type C cap (WL)	$ 1,000,000	$ 5,000
8.	RCRA Type C cap (EL)	$ 500,000	$ 5,000
9.	Slurry wall	$ 350,000	$ 2,000
10.	Treatment Wetland	$ 650,000	$ 35,000
11.	Traditional* groundwater treatment	$ 900,000	$100,000
12.	Dredging and treating CD #30	$ 1,000,000	$ 0
13.	Excavating & treating EL	$ 6,000,000	$ 0
14.	Excavating & treating WL	$31,000,000	$ 0
15.	Solidifying/stabilizing lagoons	$ 7,000,000	$ 0
16.	Annual groundwater monitoring		$ 35,000

* Traditional treatment of groundwater refers to chemical oxidation, precipitation/ flocculation, and ion exchange processes.
# This component was added in response to comment 3.3 in the Responsiveness Summary.

8.B.4. Common Elements - All the alternatives considered for OU 1 except "no action" have a number of common elements. These elements are:

1. **Institutional Controls/Access Restrictions** - This refers to fencing, warning signs, permanent markers, and deed restrictions on the property to control future site development and the use of impacted resources like groundwater.
2. **Further Characterization** - Further characterization of impacted areas will be required to specify the extent of soil, sludge, sediment, and groundwater contamination in the source areas. Further characterization will also be needed to specify the amount of soil and sludge to be removed from the EL area, and the amount of sediment to be removed from CD #30.
3. **Updating Groundwater Data** - Additional groundwater studies will be conducted during the pre-design phase of the project to update the groundwater data for the site. The new data will be used to confirm conclusions reached in the RI/FS and the Risk Assessment and to update groundwater data for design.

4. **Groundwater Monitoring** - Groundwater monitoring will be required to confirm the effectiveness of the selected remedy.
5. **Five Year Reviews** - A review will be conducted at least every five years to evaluate the protectiveness of the remedy as long as hazardous substances are present on-site and in the groundwater above health-based levels.

8.B.5. Alternative 1, No Action - The Superfund program requires that a "no action" option be considered at every site. Under a no action remedy the site would remain as it is today. This option is used as the benchmark for comparing and evaluating the effectiveness of all other alternatives.

The costs associated with a no action alternative are those related to the five-year reviews and groundwater monitoring. Thirty-year present worth estimates for reviews and for groundwater monitoring is $500,000. However, a no action remedy does not meet the cleanup objectives for the site, and would allow a continued unacceptable risk to human health and the environment.

8.B.6. Alternative 2 - Alternative 2 requires excavating soil and sludge from the EL area and depositing the material into the WLs without treating the waste (EL4 excavation without treatment), constructing an engineered soil cover over the WLs (WL2), dredging sediment along selected areas of CD #30, and depositing the waste into the WL. Installing a French Drain groundwater collection system between the WLs and the drain, and using traditional treatment technology to treat the groundwater intercepted by the French Drain (CD6), and institutional controls.
Capital Costs: $3,465,000 O & M: $137,000 Present Worth: $5,165,000

8.B.7. Alternative 3 - Alternative 3 requires excavating soil and sludge from the EL area and depositing the material into the WLs without treating the waste (EL4 excavation without treatment), constructing an engineered soil cover over the WLs (WL2), dredging sediment along selected areas of CD #30, and depositing the waste into the WL. Installing a French Drain groundwater collection system between the WL and CD #30, using an engineered wetland to treat groundwater intercepted by the French Drain (CD6), and institutional controls.
Capital Costs: $3,052,500 O & M: $72,000 Present Worth: $3,946,000

8.B.8. Alternative 4 - Alternative 4 requires excavating and treating soil, sludge, and sediment from the WL and EL areas and CD #30 (EL4, WL4 and CD6), installing a French Drain along selected areas of CD #30, and using traditional treatment technology to treat the groundwater intercepted by the French Drain, and institutional controls.
Capital Costs: $64,350,000 O & M: $100,000 Present Worth: $65,591,000

8.B.9. Alternative 5 - Alternative 5 requires dredging sediment along selected areas of CD #30 without treating the waste and depositing the material into the WLs. Installing a French Drain groundwater collection system along selected areas of the

drain, and using traditional treatment technology to treat groundwater intercepted by the French Drain (CD6), excavating soil and sludge from the EL area and depositing the material into the WLs without treating the waste (EL4 excavation without treatment), solidifying or fixing soil, sludge, and sediment in the WLs (WL3), constructing a Type C landfill cap over the WL area, and institutional controls.
Capital Costs: $15,097,500 O & M: $140,000 Present Worth: $16,835,000

8.B.10. Alternative 6 - Alternative 6 requires constructing a slurry wall around the WLs (WLG3), excavating soil and sludge from the EL area, without treating the waste, depositing the material into the WL (EL4 excavation without treatment), dredging sediment along selected areas of CD #30, and depositing the material into the WLs. Constructing a French Drain groundwater collection system between the WLs and CD #30, using traditional treatment technology to treat groundwater intercepted by the French Drain and pumped from within the slurry wall (CD6, WLG3), constructing a Type III landfill cap over the WLs (WL2), and institutional controls.
Capital Costs: $4,867,500 O & M: $145,000 . Present Worth: $6,667,000

8.B.11. Alternative 7 - Alternative 7 requires constructing a slurry wall around the WLs (WLG3), excavating soil and sludge from the EL area without treating the waste, depositing the material into the WLs (EL4 excavation without treatment), dredging sediment along selected areas of CD #30, and depositing the material into the WLs. Constructing a French Drain groundwater collection system between the WL and CD #30, using an engineered wetland to treat groundwater intercepted by the French Drain, and from within the slurry wall (CD6 WLG3), constructing a Type III landfill cap over the WLs, and institutional controls.
Capital Costs: $4,455,000 O & M: $77,000 Present Worth: $5,410,000

8.B.12. Alternative 8 - Alternative 8 requires dredging CD #30 sediment and depositing the material into the WLs. Constructing an engineered soil cover over WLs and a protective barrier over the EL area. Constructing a French Drain/pipe from the EL to the WL, using an engineered wetland to treat groundwater intercepted by the French Drain, and institutional controls. This alternative was added in response to the comment 3.3 in the Responsiveness Summary. Costs may vary depending on the size of the wetland required to treat the additional water captured by the EL French Drain.
Capital Costs: $3,135,000 O & M: $73,000 Present Worth: $4,041,000

9. SELECTION OF THE PREFERRED REMEDY

The preferred site-wide alternative presented in the Proposed Plan and here as the final remedy was selected on the basis of a comparative review of each site-wide alternative developed using the nine criteria specified in the National Contingency Plan (NCP) at 40 CFR Section 300.430 (e)(9): The analysis is based on two threshold criteria, five primary balancing criteria, and two modifying criteria. The results of this comparison are presented below.

9.A. Threshold Criteria

Remedial alternatives at Superfund sites must satisfy two "threshold" criteria specified in the NCP to be eligible for further review and selection:

9.A.1. Overall Protection of Human Health and the Environment - Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

All of the alternatives considered for the site are protective of human health and the environment by eliminating, reducing, or controlling risks at the site with the exception of the no action alternative. The no action alternative does not provide protection for human health and the environment. Alternatives 2 through 8 prevent contact with contaminated groundwater by enforcing groundwater use restrictions in the industrial area. Alternatives 2, 3, 6, 7, and 8 eliminate direct contact with hazardous materials through the use of soil covers or landfill caps. Alternative 4 prevents exposures and mitigates impacts to the groundwater by removing, treating (i.e. soil washing), and disposing wastes off-site. Alternative 5 mitigates the migration and the impact of lagoon contaminants on the groundwater by immobilizing hazardous constituents within the lagoons. Alternatives 6 and 7 mitigate migration and impact to the WL groundwater by enclosing the hazardous waste by surrounding the lagoons with a slurry wall. All of the area-wide alternatives prevent the migration of contaminants in the groundwater into surface water by intercepting and treating contaminated groundwater before it vents to CD #30.

9.A.2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) - Compliance with ARARs describes how the alternative complies with chemical-, location-, and action-specific ARARs, or other criteria, advisories, and guidance.

Each alternative complies with identified federal and state ARARs, except Alternative 1. Because Alternative 1 (no action) does not meet the threshold criteria, it will not be considered further.

9.B. Primary Balancing Criteria

The following five criteria are used to compare and evaluate the elements of one alternative to another that meet the threshold criteria.

9.B.1. Long-term Effectiveness and Permanence - Long-term effectiveness and permanence evaluates the effectiveness of alternatives in protecting human health and the environment after response objectives have been met, in terms of the magnitude of residual risk and the adequacy and reliability of controls.

Alternatives 2, 3, 6, and 7 would minimize long-term exposures by consolidating contaminated EL soil and sludge and CD #30 sediment into the WLs, covering the

material in the WL with an engineered soil cover or Type III landfill cap, maintaining the building in the EL area which is currently covering any hazardous material that may exist beneath the building, fencing off the WL disposal area, and establishing deed restrictions to prevent future development in the WL area. Excavating accessible contaminated soil and sludge from the EL area should reduce the migration of contaminants through the groundwater in that area to concentrations below regulatory concern. Contaminated groundwater migrating from the WL would be captured and contained or treated.

Alternative 8 would minimize long term exposure by covering both EL and WL areas, removing contaminated sediment from CD #30 and capturing and treating contaminated groundwater in both EL and WL areas.

Institutional controls such as a city ordinance or restrictive covenants would be established and enforced to prevent the use of contaminated groundwater in the upper aquifer for all of the alternatives.

Alternatives 4 and 5 would require the excavation, treatment, and off-site disposal of contaminated soil and sludge from the lagoons and CD #30 sediment. These alternatives would eliminate exposures and the migration of hazardous constituents in the area. Institutional controls such as a city ordinance would be established and enforced to prevent the use of contaminated groundwater in the upper aquifer.

9.B.2. Reduction of Toxicity, Mobility, or Volume (TMV) through Treatment - Reduction in TMV through treatment evaluates the treatment technologies by the degree of expected reduction in toxicity, mobility, or volume of hazardous material. This criterion also evaluates the irreversibility of the treatment process and the type and quantity of residuals remaining after treatment.

Alternatives 2, 3, 6, 7, and 8 do not reduce the TMV of contaminants in soils, sludge, or sediment through treatment. In alternatives 4 and 5 approximately 150,000 cubic yards of soil would be excavated and treated by soil washing, solidification, or stabilization. Alternatives 4 and 5 would provide a greater reduction in TMV through treatment of site-related contaminants than alternatives 2, 3,6, 7, and 8.

The reduction of TMV through treatment of contaminants in lagoon area groundwater will not occur in Alternatives 2, 4, 5, 6, and potentially 8 if the residual carbon is land disposed, because the contaminants will only be transferred to the carbon and not treated. If the residual carbon is regenerated, TMV will be reduced by treatment. Alternative 3, 7, and potentially 8 do not reduce the TMV of contaminants in groundwater through treatment.

9.B.3 Short-Term Effectiveness - Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until the remedial action objectives are achieved.

Alternatives 2, 3, 4, 6, 7, and 8 would create short-term impacts comparable to one another, including the release of dust and air pollutants during the excavation of contaminated soils, increased noise levels, and increased traffic around the site. Use of engineering controls would limit air emissions. Alternative 5 may have less of an impact if the stabilization or solidification process could take place without excavating the soil.

9.B.4. Implementability - Implementability assesses the ability to construct and operate the technology; the reliability of the technology; the ease of undertaking additional remedial actions; and the ability to monitor the effectiveness of the remedy. Administrative feasibility is addressed in terms of the ability to obtain approvals from other agencies. This criterion also evaluates the availability of required resources, such as equipment, facilities, specialists, and capacity.

Technical and administrative requirements for implementing Alternatives 2, 3, and 8 would be low. Technical and administrative requirements for implementing Alternatives 4 and 5 would be high. Technical and administrative requirements for implementing Alternatives 6 and 7 would be moderately high. Alternative 4 would have to comply with administrative requirements regarding transport of hazardous waste.

9.B.57. Cost - Cost evaluates the estimated capital, Operation & Maintenance (O&M), and total present worth cost of each alternative. The total present worth is the money that needs to be set aside now, at the prevailing interest rate, to pay for all capital and future costs. The present worth estimate assumes a 30-year project life.

Costs range from a low of approximately 4 million dollars for Alternative 3 to a high of over 60 million dollars for Alternative 4.

9.C. Modifying Criteria

The modifying criteria are used in the final evaluation of remedial alternatives after public comment on the RI/FS and Proposed Plan has been received.

9.C.1. EPA Acceptance - EPA acceptance addresses whether, based on its review of the RI/FS and Proposed Plan, the EPA concurs with, opposes, or has no comment on the proposed remedial alternative.

The EPA has provided comments on the RI/FS and the Proposed Plan and concurs with the selection of Alternative 3 for this Interim Action at the site. The EPA letter of concurrence is presented in Appendix A.

9.C.2. Community Acceptance - Community acceptance addresses whether the public concurs with the Proposed Plan. Community acceptance of the Proposed Plan was evaluated based on comments received at the Public Meeting and during the public comment period. Community response indicates that Alternative 3 is supported. This is documented in the Responsiveness Summary presented in Appendix A.

10. THE SELECTED REMEDY

After considering the requirements of CERCLA and the NCP, and based upon the evaluation of the RI/FS and the nine criteria, the MDEQ in consultation with the EPA, selected Alternative 3 for OU 1 at the site.

Alternative 3 - Alternative 3 requires the following actions for OU 1:

- Excavate EL contaminated soil and sludge.
- Dredge contaminated sediment from CD #30.
- Consolidate contaminated waste from the ELs and CD #30 into the WLs.
- Cover the WL area with an engineered soil cover.
- Install a French Drain between the WLs and CD #30 to capture contaminated groundwater.
- Construct a treatment wetland to treat contaminated water collected by the French Drain.
- Pump contaminated water from the French Drain to the treatment wetland.
- Discharge treated water to CD #30.
- Monitor groundwater and surface water quality to assess the effectiveness of the remedy.
- Install permanent warning markers or post signs.
- Fence off the WL and wetland area.
- Incorporate restrictions on land use through deed restrictions or local ordinances.
- Restrict the use of contaminated groundwater through passage and implementation of local ordinances.

10.A. The ELs

Contaminated soils and sludge in the EL area will be excavated (without treatment) and consolidated into the WLs. Contaminated sludge or soil, if present beneath the BPC building, is to remain in-place, capped by the building. Deed restrictions must ensure the building remains in place, in good condition. Additional investigations or response actions may be required to eliminate the need for the building to remain as a protective cover. The removal and capping of the most contaminated zone of soil in this area eliminates direct contact concerns and reduces the impact of the waste material on the groundwater. The highest concentrations of contaminants in the EL area are generally found in the upper ten feet of soil.

The estimated amount of contaminated sludge and soil to be excavated is 26,000 cubic yards. The exact volume which must be excavated to meet ARARs will be determined during predesign studies. Under this plan, the excavated material would not be treated. All excavated material would instead be consolidated and buried in the WLs. The excavated area will be backfilled with clean soil. Future excavations below ten feet in the removal area or beneath the building will be prohibited unless proper precautions are taken to maintain the integrity of the building, protect workers from potential exposure to contamination, and ensure contaminated soil is properly managed.

10.B. ELG

The removal of the accessible contaminated soil and sludge in the EL area, and the capping by the building of any residual material that may be beneath the building, should reduce the concentration of contaminants leaching into the groundwater. This should lower the concentration of contaminants detected in the EL groundwater to acceptable levels at the GSI for CD #30. After this action, groundwater monitoring will be required in the area to evaluate the effectiveness of the remedy.

10.C. CD #30

Sediment in CD #30 contaminated above the cleanup goals will be dredged from the drain. Dredged material would then be consolidated with wastes in the WLs. A French Drain will be installed along the WL area to intercept contaminated groundwater from the WLs. This action would prevent the recontamination of sediment in the drain and the release of contaminants from the WL area into the environment. A French Drain along the ELs should not be necessary. Removal of the source material in this area is expected to lower the concentration of contaminants in the groundwater to a level that is protective of human health and the environment.

10.D. The WL Area

The WL area will be covered with an engineered soil cover to prevent direct contact exposures to the hazardous waste.

After this action, contaminated waste will remain on-site to a depth of at least 20 feet below the ground. The amount of waste that will remain on-site is estimated at 150,000 cubic yards. The WL area will require deed restrictions, fencing, and must be identified with a permanent site marker to prevent future activities in the area other than maintenance requirements for the remedy.

10.E. Groundwater Treatment

Groundwater impacted by the waste material in the WL repository will be intercepted by a French Drain to prevent it from entering CD #30. Contaminated water will be pumped from the drain and discharged to a treatment wetland. Contaminated groundwater will flow through the wetland for treatment before being discharged to CD #30. The wetland will be fenced off and managed as part of the WL repository. The feasibility of using a treatment wetland as a technology for treating the groundwater at this site was evaluated in the FS addendum.

atment wetland is a technology that requires land and vegetation instead of mechanical devices to clean the water. In the FS addendum for the site, the size of the treatment wetland necessary to meet groundwater treatment goals was estimated at 11.3 acres. This estimate was based on capturing and treating groundwater from both the EL and WL areas. However, it should not be necessary to treat groundwater in the EL area if EL waste is excavated. As the volume of water requiring treatment is reduced, the size of the treatment wetland can be reduced. Current estimates indicate the size of the wetland may be reduced by 50 percent or around six acres.

10.F. Cost

The total present worth cost for Alternative 3 is estimated at approximately 4 million dollars.

Changes may be made to the preferred remedy during remedial design and construction. Such changes, in general, reflect modifications resulting from the engineering design process.

11. STATUTORY DETERMINATIONS

To satisfy the requirements of Section 121(a-e) of CERCLA the selected remedy must:

- Protect human health and the environment.
- Comply with ARARs (or justify an ARAR waiver).
- Be cost-effective.
- Use permanent solutions and alternative treatment technologies to the maximum extent practicable.
- Satisfy the preference for treatment that reduces TMV as a principal element of the remedy, or provide an explanation as to why this preference is not satisfied.

The implementation of Alternative 3 at the site satisfies these statutory requirements as detailed below:

11.A. Protection of Human Health and the Environment

Implementation of Alternative 3 will reduce and control risks to human health and the environment posed by direct contact with, ingestion of, or inhalation of contaminated soil, sludge, sediment, or groundwater. The carcinogenic risk will be reduced to 10^{-5} and the HI for noncarcinogens will be less than one.

Contaminated groundwater will be managed or intercepted before migrating beyond the boundaries of the waste management area (the site boundaries) and treated as needed to meet federal and state groundwater cleanup criteria. Institutional controls will be established and enforced to prohibit the use of contaminated groundwater within the managed area.

Accessible soil and sludge in the EL area will be excavated and consolidated into the WL area to reduce the cancer risk to 1 X 10E-5 and the HI for noncarcinogens to less than one. The cleanup will also mitigate the migration of contaminants to groundwater. MDEQ Industrial Cleanup Criteria will be used to establish cleanup standards for the EL area.

Sediment in CD #30 will be dredged and disposed of in the WLs to reduce the cancer risk to 1 X 10E-5 and the HI for noncarcinogens to less than one. MDEQ Residential Cleanup Criteria will be used to establish cleanup standards for CD #30.

The WL repository will be covered, fenced, and maintained to prevent direct contact with hazardous waste.

Alternative 3 could pose risks to the community and on-site workers from dusts and air emissions generated during excavation activities. Perimeter air monitoring will be needed during remedial activities to determine if steps are needed to protect the community from adverse air emissions. Workers conducting the remedial action will be required to monitor their activities and to wear the proper protective health and safety equipment. Truck routes will be established to maximize public safety and to minimize the inconvenience to local residents and businesses. Implementing the selected remedy will not result in unacceptable short-term risks to human health or unacceptable impacts on the environment.

11.B. Compliance With ARARs

Alternative 3 will comply with identified federal and state ARARs. Potential chemical, action and location-specific ARARs and other requirements to be considered (TBC) were identified, and summarized in Section 2.0 of the FS report and Section 5.0 of the FS addendum. The ARARs and TBCs for this interim action are listed below.

11.B.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 cleanup at a site.

11.B.1.a Soil/Sediments

State Regulatory Requirements

i. Part 201 of the Michigan Natural Resources and Environmental Protection Act 451 of 1994 as amended. Part 201 provides criteria for developing risk-based cleanup standards that consider site specific conditions and use. Site specific risk-based cleanup criteria were developed for soil and sediment pursuant to Part 201.

11.B.1.b. Groundwater/Surface Water

State Regulatory Requirements

i. Part 201 of the Michigan Natural Resources and Environmental Protection Act 451 of 1994 as amended. Part 201 provides criteria for establishing risk-based cleanup standards that consider site-specific conditions and use. Site specific cleanup criteria for groundwater and surface water were developed pursuant to Part 201.

ii. Part 31 of Public Act 451 (Part 4, Water Quality Standards). Part 31 regulates the direct and indirect discharge of any injurious substances to the waters of the state. All final effluent contaminant concentrations for any groundwater treatment system must comply with the requirements established under Part 31.

iii. Michigan Safe Drinking Water Act (Act 399 of 1976, as amended). Michigan's Safe Drinking Water Act adopts the Federal MCLs as acceptable concentrations for public drinking water supplies (see below).

Federal Regulatory Requirements

i. Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) and SDWA MCL Goals. MCLs and nonzero Maximum Contaminant Level Goals (MCLGs) promulgated under the SDWA, 1976 PA 399, as amended, apply to municipal water supplies servicing 25 or more people. At the North Bronson site, MCLs and MCLGs are not applicable, but are relevant and appropriate, because the sand and gravel aquifer is a groundwater source that was and could be used for drinking water within the area of concern (where the contaminant plume is located). MCLGs are relevant and appropriate when the MCLG standard is set at a level greater than zero (for noncarcinogens). Otherwise, MCLs are relevant and appropriate. If the groundwater standards are exceeded at the point(s) of compliance, groundwater remediation or exposure controls, or both, may be required to address potential off-site risks. Institutional controls will be required to prevent the use of contaminated groundwater within the site boundaries.

ii. The Clean Water Act (CWA) Ambient Water Quality Criteria (AWOC) (33 USC 1251). The CWA AWQC are health and ecological-based criteria developed for carcinogenic and noncarcinogenic compounds and water quality parameters. These standards were used to evaluate the extent of chemical contamination in surface water associated with CD#30.

11.B.2 To Be Considered (TBC) Requirements

TBCs are nonpromulgated advisories or guidance issued by the federal or state government that are not legally binding and do not have the status of potential ARARs. However, if there are no specific ARARs for a chemical or site condition or if existing ARARs are not deemed sufficiently protective then guidance or advisory criteria should be identified and used to protect human health and the environment.

Groundwater TBCs

i. MDEQ Operational Memorandum #17 (OPMEMO #17). OPMEMO #17 provides guidelines and describes the information regarding criteria to be met at the Groundwater/ Surface water interface for contaminated groundwater discharging to surface water.

Sediment TBCs

i. National Oceanic and Atmospheric Administration (NOAA) and Ontario sediment screening guidelines. NOAA and Ontario provide screening guidelines and concentrations for comparison to compounds detected in sediments. Because no promulgated standards for contaminants in sediment exist, these guidelines and concentrations were used to evaluate the extent of contamination in CD#30 sediments and to develop cleanup criteria for the impacted sediment.

ii. Also, background concentrations were used to evaluate the impact of the runoff of contaminants in surface soil to surface water and sediment. Background levels were used because no promulgated standards exist to evaluate this pathway.

11.B.3. Location-specific ARARs - Location-specific ARARs are those requirements that relate to the geographical position of a site. There are no location-specific ARARs for this site.

11.B.4. Action-specific ARARs - Action-specific ARARs are requirements that define acceptable handling, treatment, and disposal procedures for hazardous substances.

State Regulatory Requirements

i. Part 111, Hazardous Waste Management, of the NREPA. Part 111 applies when managing the treatment residuals from the groundwater treatment system (e.g., wetland substrate), or in designing the cover for the lagoons.

ii. Part 55, Air Pollution Control, of the NREPA. Part 55 contains specific regulations that pertain to allowable emissions of pollutants from various air containment source categories and processes (e.g., wetland, air stripper).

iii. Part 91, Soil Erosion and Sedimentation Control, of the NREPA apply to the site. Part 91 sets requirements for soil erosion and sedimentation control during construction activities.

iv. Part 31, Water Resources Protection, of the NREPA, (Part 21 & 22). Direct discharges to surface water or groundwater must meet the requirements of Part 31.

Federal Regulatory Requirements

i. CWA NPDES 40 CFR Parts 122, 125. Discharges to surface waters from CERCLA sites are required to meet the substantive CWA NPDES requirements.

ii. CWA - Pretreatment Standards for Publicly Owned Treatment Works (POTW) Discharge, 40 CFR Part 403. If treated groundwater from the site is discharged to the local POTW, the treated water must meet all discharge limitations imposed by the POTW.

iii. Clean Air Act - National Primary and Secondary Ambient Air Quality Standards. The National Ambient Air Quality Standard would apply to any invasive or construction activities with the potential of generating significant dust.

iv. United States Department of Transportation Rules for Transportation of Hazardous Materials (49 CFR Parts 107, 171.1 - 172.558) apply when transporting hazardous waste off-site. Also, federal and state RCRA land disposal restrictions governing off-site disposal apply to the disposal of treatment residuals. If residuals from groundwater treatment or soil, sludge, or sediment removed from the site are RCRA hazardous wastes, the materials will be managed and transported to a licensed off-site disposal facility in compliance with these regulations.

v. Solid Waste Disposal Act (SWDA) as amended by the RCRA.

1. Criteria for Classification of Solid Waste Disposal Facilities and Practices (40 CFR Part 257). Applicable if the alternative would involve the land disposal of solid waste.
2. Identification and Listing of Hazardous Wastes (40 CFR Part 261). Identifies substances considered to be hazardous.
3. Standards Applicable to Generators of Hazardous Waste (40 CFR Part 262).
4. Standards Applicable to Transporters of Hazardous Waste (40 CFR Part 263).
5. Standards for Treatment, Storage, and Disposal Facilities (40 CFR Part 264).

vi. Occupational Safety and Health Act (OSHA). Under 40 CFR Sect. 300.38, requirements of OSHA apply to all response activities under the NCP.

11.C. Cost Effectiveness

Cost effectiveness compares the overall effectiveness of an alternative to meet remedial action objectives in proportion to its cost. Alternative 3 was the least costly of the eight alternatives developed which met the remedial objectives. Therefore, it appears to be a highly cost-effective remedy.

11.D. Using Permanent Solutions and Alternate Treatment Technologies to the Maximum Extent Practicable

The selected remedy for OU 1 uses permanent solutions and treatment technologies to the maximum extent practicable. Determining the 'maximum extent practicable' involved assessing tradeoffs among the alternatives in terms of the five primary balancing criteria of the nine criteria. The selected remedy provides long-term effectiveness and permanence by using institutional controls to limit exposure and treating contaminated groundwater. This is a lesser degree of long-term effectiveness and permanence than could have been attained through removal or treatment of contaminated soils, because continued monitoring and maintenance will be required. However, removing and treating contaminated soil, sludge, and sediment at an estimated $60 million was prohibitively expensive. Consolidating the waste into one manageable unit and using a wetland as an alternate technology to treat groundwater provides a high level of short-term effectiveness. The selected remedy reduces the TMV of contaminated groundwater, while reducing the risk of exposure to other contaminated media. This remedy is also easily implemented, compared to the other alternatives considered. The combination of effective risk reduction, groundwater treatment, and relatively low cost make the selected alternative clearly preferable.

11.E. Preference for Treatment as a Principal Element

Excavating and consolidating soil, sludge, and sediment does not satisfy the statutory preference for treatment. The cost for treating this material made treatment impractical.

12. DOCUMENTATION OF SIGNIFICANT CHANGES

Five of the six area-wide alternatives (2, 4, 5, 6, and 7) presented in the ROD evolved during the development of the proposed plan. Although their components were in the proposed plan these consolidated area-wide alternatives were not presented in the proposed plan or at the public meeting. These alternatives are presented here in the ROD to help clarify and document the comparative analysis that was conducted between all of the potential alternatives developed for the site and the final proposed plan and remedy. The MDEQ developed Alternative 8 after receiving comment 3.3 from the City. The cost of this alternative is somewhat more speculative than the other alternatives. Capturing groundwater from the EL area would likely increase the volume of water needed to be treated. This would require constructing a larger wetland or resorting to a more traditional treatment method which could increase the cost over the estimate provided. The selection of Alternative 3 as the preferred remedy has not been affected by the above. Finally, the use of Bronson's Waste Water Treatment Plant will remain as a potential option to treat contaminated groundwater. Use of the treatment plant will be based on the capability of the treatment plant to treat contaminated groundwater, and ultimately the city's decision of whether or not to use the plant in this manner.

7.B.4. #6 **APPENDIX A**

RESPONSIVENESS SUMMARY

1. OVERVIEW

The Responsiveness Summary is a compilation of oral and written comments received by the MDEQ during the Proposed Plan public comment period and the MDEQ's responses to those comments.

The MDEQ released the Proposed Plan for the site to the public on August 6, 1997. The public comment period for the Proposed Plan ran from August 6, through September 8, 1997. The comment period is an opportunity for interested parties to comment on the Proposed Plan or any other document used to develop the remedy for the site.

The MDEQ and the EPA held a public meeting at 6:00 p.m. on August 19, 1997, at the Bronson Theater in Bronson, Michigan. The purpose of this meeting was to formally present the Proposed Plan for treating contamination at the site, and to provide the community an opportunity to address the agencies directly concerning the plan. Transcripts of this meeting are available for review in the Administrative Record.

The responsiveness summary is a key part of the ROD, identifying community concerns for the MDEQ and the EPA.

2. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

See Section 2C of the ROD.

3. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND THE MDEQ RESPONSES TO THOSE COMMENTS.

3.1 Comment: The city of Bronson comments that the Proposed Plan (the plan) presents a preferred remedy for the site, but purports to exclude from the cleanup any contamination associated with the industrial sewers. According to the Plan, any contamination from the industrial sewers will be addressed in the future, presumably in another OU. No explanation is given for dividing the site into separate OUs, and there is no rational basis for doing so.

The contamination has existed at this site for decades. Drinking water for the area is supplied by the city of Bronson. There certainly is no imminent hazard in connection with the contamination at the site. Nevertheless, the Plan inexplicably recommends a partial remedy of the site, indicating that the industrial sewer will be addressed at a later date.

If any additional remedy is required in connection with the industrial sewer, it should be handled as part of the proposed remedy. The industrial sewer should not be treated as a separate OU. This will only lead to inefficiency and increased costs. It is difficult to imagine why it is so important to move forward with a partial remedy at the site at this time, when the site has been under investigation for nearly 15 years. A single remedy should be performed for the entire site, and there should not be separate OUs. The remedy proposed in the Plan, which appears to be a separate OU, should be deferred until a final remedial action can be selected for the site.

MDEQ Response: *The Proposed Plan as presented controls the migration of groundwater impacted by the lagoons, prevents direct contact with the soil and sludge in and around the lagoons, and as an interim measure prevents exposure to the groundwater plume by prohibiting the use of contaminated groundwater. However, restoration of a contaminated aquifer, when technically feasible, is one of the primary objectives of Superfund.*

TCE is one of the predominant contaminants detected in the groundwater. The data that is available indicates that TCE, which is heavier than water, leaked from the industrial sewer and pooled or has contaminated soils above and below the water table beneath the former Scott Fetzer and LA Darling facilities. However, because of limited data there is a moderate to high level of uncertainty that exists regarding the locations of the TCE sources. Also, there is a moderate to high level of uncertainty regarding the potential for restoring an aquifer contaminated with TCE. Therefore, a phased or OU approach was adopted in the Proposed Plan. This approach allows us to address the lagoons while developing a better understanding of the restoration potential of the Bronson aquifer contaminated with TCE.

Further, all of the components of the Proposed Plan will be necessary regardless of the outcome of the TCE investigation or the "final" remedy selected for the site. The French Drain will be necessary to intercept contaminated groundwater from the lagoon, and the wetland will primarily be designed to treat groundwater contaminated with metals from the lagoons.

Whether or not further groundwater Remediation is needed to complete MDEQ response actions at the site, the Proposed Plan represents the most economical alternative developed for current or future contamination problems at the site.

3.2 Comment: The city of Bronson comments that the Plan proposes construction of a cap over the WL area. For many reasons, such a cap is unnecessary. Among other things, the Plan states:

Because the waste is below the water table, preventing the infiltration of rainwater through the waste is not an objective of the remedy. Under these conditions there is no legal or practical advantage to building a cap to strict hazardous waste requirements.

Nevertheless, the Plan proposes a very expensive cap over the WL area, even though there will be no environmental benefit. Apparently, the purpose of such a cap is to protect trespassers who may desire to come into regular contact with the contaminated sludge and soil. Contact by trespassers or others in that area, while extremely unlikely to occur under any circumstances, can be adequately controlled through other institutional measures, such as the fencing proposed in the Plan.

It is well known that the soil and sludge have existed in the WL area for decades, since at least the 1940s. The proposed fencing will be more than sufficient to address any concerns over trespassers or others who may be in the area. The amount allocated for the construction of the cap is $1 million. After adding the amount for the various contingencies, including construction management, engineering, permitting, and "contingencies," the total amount allocated for capital costs relating to the cap is $1,630,000. There would also be O & M costs relating to the cap. Construction of the cap is unnecessary and the cost far outweighs any benefit. In fact, the Plan does not articulate any realistic benefit that can be achieved by construction of the cap, particularly in view of the fencing and related institutional controls that will adequately prevent exposure. For these reasons, the cap should be eliminated from the remedy.

MDEQ Response: *The MDEQ does not agree that "fencing alone will be more than sufficient to address concerns over trespassers etc." Fences can be climbed or burrowed under, water levels in an open lagoon rise and fall with the rain, and seasonal groundwater elevation changes may expose or deposit contaminants on the banks of the lagoon. Further, an open water lagoon attracts and exposes wildlife to contaminants in the lagoons.*

All the alternatives developed for the site, except excavation and treatment, required the "capping" of a lagoon. Cap designs and estimated cost for these alternatives were based on using a Type III Landfill Cap in compliance with Part 115, Solid Waste Management, of the NREPA (pers. comm. MDEQ 1996b). As noted in the Proposed Plan, the remedy will not require a Type III Cap. Cost estimates for a Type III Cap were carried through the detailed evaluation of the alternatives for relative cost comparisons only. The MDEQ agrees and stated during the public meeting that the overall costs reported in the Plan are conservative and that the actual cost of implementing the Proposed Plan is likely to be lower than estimated. To avoid confusion over this issue the word "cap" will be replaced with "an engineered soil cover" in the ROD.

3.3. Comment: The city of Bronson comments that under the Plan, the sludge and soil from the ELs and the sediments from CD #30 would be excavated and deposited into the WLs. The city of Bronson is the owner of the property where the WLs are located. The governments have not requested approval from the city of Bronson for depositing the soil, sludge, and sediments on city property.

In view of the remedy proposed for the groundwater, excavation, and transportation of such materials creates an increased burden on property owned by the city of Bronson. In addition, the Plan does not state what happens with the displaced water as the sludge, soil, and sediment is deposited into the WLs. In any event, if the soil, sludge, and sediments from these two locations are excavated and deposited on the city of Bronson property, the city of Bronson should be provided appropriate consideration for the burden created on the city of Bronson property.

***MDEQ Response**: Excavating and consolidating the EL sludge and soil into the WLs simplifies the management of the waste on-site. Consolidating the material into one management unit eliminates the need for two French Drain systems (east and west) and the need to pump or pipe contaminated groundwater from two separate source locations. This should minimize the amount of groundwater requiring treatment, thereby reducing the size of the treatment system. Also, removing the waste from an area of industrial activity to an area that is relatively inactive reduces the risk of accidental exposure and potentially enhances the commercial value of the EL area. However, the MDEQ is willing to consider the possibility of leaving the EL waste in place, covering it with a protective barrier, capturing EL contaminated groundwater, and piping it to the treatment wetland, if this is shown to be a cost-effective and protective alternative during remedial design. Refer to site-wide Alternative 8 in the ROD.*

3.4. Comment: The city of Bronson comments that the "Plan states that the ELs and WLs were built in 1938 and 1949, respectively (p. 2). In fact, the WLs were built in 1939 and 1940, and the ELs were built in 1949."

***MDEQ Response**: The MDEQ acknowledges the typographical error made in the Proposed Plan.*

3.5. Comment: The city of Bronson comments that the Plan states that the city of Bronson owned both sets of lagoons between 1938 and 1960 (p. 2). The ELs were sold by the city of Bronson to Bronson Plating in 1969, rather than 1960.

***MDEQ Response**: The RI reports the ELs were purchased by Bronson Plating in 1960. Please provide the MDEQ with documentation showing the purchase of the lagoons in 1969.*

3.6. Comment: The city of Bronson comments that the Plan states that the ELs originally contained five lagoons (p. 2). The city of Bronson believes that there were no more than four lagoons in the ELs.

***MDEQ Response**: 1966 aerial photos indicate that there were five ELs.*

3.7. Comment: The city of Bronson comments that in defining the area of groundwater contamination, the Plan states that the area bounded by Mill Street to the west is contaminated with chlorinated organic compounds (p. 4). Mill Street is an

east-west road, and hence cannot be a western boundary. The city of Bronson presumes that the governments intended to identify Albers Road as a west boundary.

MDEQ Response: *The Plan should have referred to the residence at 422 Mill Street as the current western boundary of residential wells impacted by site related contaminants.*

3.8. Comment: The city of Bronson comments that the FS addendum states that the Part 201 cleanup criteria are potential ARARs for the site. Page 11 of the FS addendum states that the ARARs under Part 201, Environmental Remediation, of the NREPA, for lagoon soil and sludge include the following:

MDEQ Part 201 20 x drinking water values or Residential Soil/Water Partition (SWP) values, whichever is higher.

MDEQ Part 201 20 x groundwater/surface water interface (GSI) values or GSI SWP values, whichever is higher.

These descriptions are accurate applications of the Part 201 cleanup criteria for soil and sludge for use as an initial screening measure. The cleanup criteria applicable to soil and sludge under Part 201 also allow for the use of leaching tests to evaluate the potential of contamination in soil and sludge to impact groundwater. See Part 201 Administrative Rule 299.5611(2) and the Michigan Environmental Response Act (MERA), 1982 PA 307, as amended, Operational Memorandum #12, Revision #1 (September 9, 1994). Accordingly, even if the concentrations in the soil or sludge exceed the 20 x drinking water SWP values, a leaching test can be performed to evaluate the potential of the contaminants to leach into the groundwater or surface water.

The concentration of contaminants in the soil must not, of course, exceed the applicable direct contact criteria. For many of the contaminants at the site, however, the direct contact criteria are significantly higher than the 20 x drinking water and residential SWP values. Accordingly, in instances where the total concentration exceeds the 20 x drinking water and SWP values, but are below the applicable direct contact criteria, leaching tests should be performed to determine whether the soil or sludge is clean enough to meet the applicable criteria. The same rationale is true for total concentrations that exceed 20 x GSI or GSI SWP values. MERA Operational Memorandum #12, noted above, describes the various leaching test procedures that are acceptable for this purpose. In short, the criteria identified in the FS addendum are appropriate as screening measures but are not definitive in evaluating whether the cleanup criteria for soil and sludge have been met. The FS addendum should be modified to reflect that leaching tests can be performed as a follow-up to the screening mechanisms identified in the FS addendum.

***MDEQ Response**: The MDEQ does not agree with the statement that Part 201 cleanup criteria used in the FS addendum as cleanup goals are to be used as "an initial screening measure." Part 201 cleanup criteria are risk-based values driven by a defined level of risk. For carcinogens the risk is 10E-5 and for noncarcinogens a hazard quotient of 1. CERCLA (Superfund) identifies and manages risk at sites of contamination over a spectrum (10E-4 - 10E-6) of contaminant concentrations or risk. Screening levels under CERCLA are developed to identify the lower bound of this spectrum. Under CERCLA the lowest level of risk is 10E-6 for carcinogens and for noncarcinogens a hazard quotient of 1. Further, Part 201 cleanup criteria do not incorporate inhalation risks nor account for accumulative risks when there is more than one contaminant of concern. Therefore, criteria based on risk as defined by Part 201 may not be conservative enough to be used as initial screening values under CERCLA.*

Part 201 cleanup criteria, which offers a full range of generic criteria based on land use to site specific and remedy specific criteria, were identified as goals in this ROD only after a site-specific evaluation indicated that a remedy achieving Part 201 criteria is protective, complies with ARARs, and appropriately balances tradeoffs between cleanup options with respect to effectiveness and cost. The MDEQ does agree that leaching tests may be performed to demonstrate compliance with soil criteria protective of groundwater (Refer to the section 7.B.4. #6 "Common Elements, Performance Goals" in the ROD). However, regardless of the method used to demonstrate compliance, the cleanup goal will continue to be based on Part 201 cleanup criteria.

3.9 Comment: Geraghty & Miller and the North Bronson Potentially Responsible Party (PRP) Group comments that the Proposed Plan includes a combination of several alternatives and elements of alternatives which are not adequately described either in the Proposed Plan, the FS (Montgomery Watson 1995), or the FS Addendum (MDEQ 1996a). The scope, conceptual design details, and estimated costs for certain aspects of the proposed remedial action for the site are not clearly presented in the Proposed Plan, and thus cannot be properly evaluated by the public as required under Section 116(a) of CERCLA.

***MDEQ Response**: The MDEQ does not agree with the statement that "the scope, conceptual design details, and estimated costs for certain aspects of the proposed remedial action for the North Bronson Site are not clearly presented in the Proposed Plan, and thus cannot be properly evaluated by the public as required under Section 116(a) of CERCLA." Section 116(a) of CERCLA requires the notice and brief analysis of the proposed plan to include "sufficient information as may be necessary to provide a reasonable explanation of the proposed plan and alternative proposals considered." The scope, design details, and estimated cost presented in the FS, the FS addendum and the Proposed Plan provide a clear basis for understanding the overall intent of the cleanup plan and the relative effectiveness and costs associated with each alternative. The information also allowed the public to make reasonable comparisons between the proposed plan and other alternatives developed for the site. Scope, cost, and design*

refinements as recommended by the PRP Group would not affect the overall relative comparisons made between the alternatives developed for the site.

3.10 Comment Geraghty & Miller and the North Bronson PRP Group comments that the Proposed Plan does not address what sections of CD #30 may need to be dredged, whether the RI data will be used to delineate the sediments to be dredged or whether additional data collection activities will be necessary, and whether the sediments will need to be dewatered prior to consolidation.

MDEQ Response: *The MDEQ agrees that this information and any further studies needed to identify the precise requirements for dredging of CD #30 during remedial action, should be identified. However, these studies should be identified in the Statement of Work and not in the ROD.*

3.11. Comment: Geraghty & Miller and the North Bronson PRP Group comments that the Proposed Plan states that an estimated 26,000 cubic yards of soil and sludge would need to be excavated and consolidated. However, the Proposed Plan does not address whether the RI data is sufficient to delineate the extent of soil that needs to be removed (i.e., to predetermine the extent of soil to be removed), whether any saturated soils or sludge will need to be dewatered prior to consolidation, and whether any post-excavation confirmation sampling will be necessary.

MDEQ Response: *MDEQ agrees that this information and any further studies needed to identify the precise requirements for waste consolidation during remedial action, should be identified. However, these studies should be identified in the Statement of Work and not in the ROD.*

3.12 Comment: Geraghty & Miller and the North Bronson PRP Group comments that although the Proposed Plan states that the lagoon area cap does not need to meet MDEQ or RCRA standards for a hazardous waste landfill, the type of lagoon area cap required is not identified.

MDEQ Response: *See Comment 3.2 above, and MDEQ's Response to that Comment. Also, see Comment 3.18 below, and the MDEQ Response to that Comment.*

3.13 Comment: Geraghty & Miller and the North Bronson PRP Group comments that a dewatering of the WLs should not be conducted prior to consolidation of soil, sludge, and sediment, unless it is determined during the remedial design that dewatering is necessary to meet certain geotechnical requirements established for the subbase layers which will underlie the lagoon cover system. The WLs contain standing water because the water table in this area of the site is above the bottom of the lagoons. As a result, temporary removal of the standing water, if technically feasible, will not create a dry disposal cell. Thus, dewatering of the WLs prior to waste consolidation would not provide any long-term remedial benefits. Dewatering of the

lagoons should only be considered if the engineering design of the lagoon cover necessitates specific compaction requirements for the subbase layers. The ROD should state that the necessity for dewatering of the WLs will be determined during remedial design based on the subbase compaction requirements established for the lagoon cover.

***MDEQ Response**: MDEQ agrees that this information on dewatering of the lagoons and any further studies needed during remedial action should be identified. However, these studies should be identified in the Statement of Work not in the ROD.*

3.14. **Comment:** Geraghty & Miller and the North Bronson PRP Group comments that because the majority of the waste is below the water table in the WLs, dewatering of the sediments from CD #30 and any saturated soils removed from the EL area, prior to their consolidation in the WLs, would not provide any significant remedial benefits. The ROD should state that the necessity for dewatering the sediments and saturated soils prior to their consolidation into the WLs will be determined during remedial design based on the subbase compaction requirements established for the lagoon cover.

***MDEQ Response:** MDEQ agrees that information on possible dewatering of CD #30 sediment and saturated soils , together with information on any further study needed during remedial design to identify the precise requirements for dewatering during remedial action, should be identified in the Statement of Work not in the ROD.*

3.15 **Comment:** Geraghty & Miller and the North Bronson PRP Group comments that the Proposed Plan indicates that each alternative considered for the site includes further characterization of impacted areas which may be required to further refine the horizontal and vertical extent of soil, sludge, and groundwater contamination in the source areas. However, the scope of any such additional characterization activities, and the use of the additional characterization data in refining the site remedy as appropriate, is not addressed in the Proposed Plan. In this context, it is important to note that the Proposed Plan developed for the site is based on RI data collected between September 1988 and December 1991. Because the nature and extent of contamination in the subsurface can change over time as a result of various biological, chemical, and physical processes, the data collected six to nine years ago during the RI may no longer be representative of current site conditions, especially with respect to groundwater quality. To provide an appropriate level of environmental response, the remedial components required for a site must be designed to address current environmental conditions. It is probable that the groundwater data collected during the RI does not accurately represent current groundwater conditions.

Besides the fact that the available groundwater data is six to nine years old, the validity of the groundwater data from the RI must also be considered. As addressed previously by Geraghty & Miller in the "Assessment of Potential Surface Water Impacts Associated with Vented Groundwater," which was submitted to the MDEQ on March 14, 1996, there are significant inconsistencies in the groundwater analytical results for the WL

lagoon area collected during the RI. The maximum reported concentrations of cyanide and zinc in the WL area groundwater greatly influence MDEQ's estimated exposure point concentrations, which in turn are used by the MDEQ to support the need for active groundwater remediation measures. However, these maximum concentrations may not be valid. For example, cyanide was detected in Monitoring Well MW-6S at a concentration of 2,960 micrograms per liter (µg/L) in September 1989 (the first groundwater sampling event during the RI). Monitoring Well MW-6S was resampled in December 1991 during the second sampling event of the RI, and cyanide was found at a concentration of only 250 µg/L (a full order of magnitude lower than the concentration reported in 1989). The highest reported concentration of cyanide in the other wells comprising the WL area well network was 45.6 µg/L at Monitoring Well MW-5 in September 1989. Similar inconsistencies involving the analytical results reported for zinc are also evident. For example, zinc concentrations in Monitoring Well MW-4 (one of the pre-RI wells) were reported as 8,800 µg/L in September 1989 and 846 µg/L in December 1991. Yet in Monitoring Wells MW-8S and MW-8D, which were installed during the RI immediately adjacent to Monitoring Well MW-4, the highest reported concentration of zinc was only 102 µg/L (Monitoring Well MW-8D in September 1989). Based on these significant inconsistencies, the groundwater data for zinc and cyanide, as well as for other inorganics, in the WL area may not be reliable.

Based on the above discussion, it is apparent that additional groundwater monitoring should be conducted prior to remedy design and implementation. Additional groundwater monitoring should be conducted as part of a predesign investigation program. The results of the additional groundwater monitoring should be assessed relative to the groundwater cleanup objectives to determine if active groundwater remediation measures are warranted. If it is determined that the groundwater cleanup objectives are not exceeded at the point of compliance (i.e., at the groundwater/surface water interface), then active groundwater remediation measures will not be necessary. The ROD should identify the requirements for predesign groundwater monitoring, and state clearly that the necessity for active groundwater remediation measures will be re-evaluated based on the results of the predesign groundwater monitoring program.

***MDEQ Response**: The MDEQ agrees with the predesign study recommendations as presented in these comments, and agrees that these studies should be conducted prior to implementing the remedy.*

3.16. Comment: Geraghty & Miller and the North Bronson PRP Group comments that the Proposed Plan fails to qualify the validity of the estimated risk levels. As reflected by the comments on the Baseline Risk Assessment (BRA) submitted by Geraghty & Miller and Environmental Standards, Inc. (ES) on behalf of the North Bronson PRP Group on September 6, 1995, the conclusions reached from the BRA are technically flawed (Geraghty & Miller 1995). A detailed review of the BRA by ES revealed that the BRA is notably inconsistent with current regulatory policies and

agency guidelines and that the baseline risk levels were calculated based on inappropriate and significantly conservative assumptions.

Due to significant concerns over the technical validity of the BRA, the North Bronson PRP Group directed ES to conduct a site-specific risk assessment for site. The site-specific risk assessment was conducted using more scientifically valid methodology and realistic exposure assumptions than used in the BRA. The findings from the site-specific risk assessment (ES 1996) were submitted to the MDEQ on September 6, 1996. The conclusions reached from the site-specific risk assessment conducted by ES clearly indicate that the risk levels presented in the BRA, and summarized in the Proposed Plan, significantly overestimate the risks associated with current and potential future exposure to contaminated media at the site. The conclusions of the site-specific risk assessment (ES 1996) should be discussed and acknowledged in the ROD and relied upon to select the final remedy.

MDEQ Response: The MDEQ toxicology unit reviewed the site-specific risk assessment conducted by ES. In summary, the MDEQ concluded that the site-specific risk-based Remedial Action Objectives developed by ES were not appropriately derived, considering that some of the methods used by ES conflict with recommended EPA guidance. The review conducted by the MDEQ toxicologist will be incorporated into the administrative record. If data collected during the predesign studies indicates a different level of risk than found in the BRA, a review of the risk and the potential impact on the remedy will, of course, be considered.

3.17. Comment: Geraghty & Miller and the North Bronson PRP Group comments that implementation of the treatment wetland should proceed only if it is determined that groundwater treatment is necessary, and that other more cost-effective treatment methods cannot be utilized.

If the results of the predesign groundwater monitoring program substantiate the need for active groundwater remediation, the remedial design should include a re-assessment of groundwater treatment options. This assessment should include an evaluation of direct discharge to the Bronson POTW in comparison to wetland treatment technologies. Direct discharge to the Bronson POTW may be equally protective while providing more cost-effective treatment because it is unlikely that pretreatment would be required and because the POTW is located in close proximity to the WLs. This discharge arrangement would require the approval of the Bronson POTW. Representatives of the Bronson POTW have previously indicated that they would prefer not to accept direct discharge of the recovered groundwater. However, the Bronson POTW was upgraded in 1994 and now has excess treatment capacity of approximately 300 to 400 gallons per minute. In addition, the city of Bronson is a PRP for the site, and acceptance of direct discharge to the Bronson POTW would be one way for the city of Bronson to provide in-kind services for meeting its obligations as a PRP. An engineering evaluation to assess whether the direct discharge of recovered groundwater would adversely impact operations at the POTW has not be conducted. If

warranted, based on the predesign groundwater data, such an evaluation should be conducted and submitted to the Bronson POTW as part of the remedial design.

If it is determined that active groundwater remediation measures are warranted, and that direct discharge to the Bronson POTW is not a viable option, then the specific type of wetland treatment to be used should be evaluated as part of the remedial design. The evaluation of wetland treatment options presented in the FS Addendum (MDEQ 1996a) assumed the use of a subsurface flow wetland system. As part of the remedial design, the use of a free water surface wetland system should also be evaluated. The specific type of wetland treatment system to be used, if any, should be determined based on the groundwater conditions determined from the pre-design groundwater monitoring program and the corresponding treatment efficiencies necessary to meet the applicable discharge standards.

Based on the above discussion, it is recommended that the ROD include a provision for evaluating the necessity of active groundwater remediation measures based on the results of the predesign groundwater monitoring program. The ROD should also include a provision for evaluating and selecting a protective and cost-effective groundwater treatment method, including potential direct discharge to the Bronson POTW, if it is determined that active groundwater remediation measures are warranted. To accomplish this, the ROD should specify the requirements for conducting a predesign groundwater monitoring program and evaluating the need for active groundwater remediation based on the results of the monitoring program. The ROD should further state that, if active groundwater remediation is warranted based on the results of the predesign groundwater monitoring program, groundwater treatment will be achieved either by direct discharge to the Bronson POTW or through the use of a constructed wetland treatment cell. This dual provisional treatment option approach has been effectively incorporated into other RODs, including the Fort Wayne Reduction Site in Fort Wayne, Indiana, and should be incorporated into the ROD for this site.

MDEQ Response: *The MDEQ agrees with this assessment and the recommendations and is willing to consider the possibility of direct discharge to a POTW. However, a representative of Bronson POTW and the Bronson City manager have been, as members of the Community Advisory Group, informed participants of the decision making process. Up to this point, they have not been willing to use the POTW to treat lagoon contaminated groundwater.*

18. Comment: Geraghty & Miller and the North Bronson PRP Group comments that use of a Part 115, Type III Landfill Cap for the WL area is not appropriate given the required function of the lagoon area cover. The required function of the lagoon area cover is to prevent direct contact exposure to the buried material. Page 9 of the Proposed Plan states that, "because the waste is below the water table, preventing the infiltration of rainwater through the waste is not an objective of the remedy." As a result, the primary objective of the surface cover to be placed over the material to be consolidated in the WLs is to minimize the potential for direct contact with the buried

material. This objective can adequately be met by an engineered soil cover that could be implemented more cost-effectively than a Part 115, Type III Landfill Cap. An engineered soil cover can typically accommodate a certain degree of differential settlement without compromising its ability to minimize the potential for direct contact with buried waste material. Thus, certain geotechnical requirements, such as dewatering and compacting the lower subbase material (e.g., residual sludge within the WLs), may not be necessary if a soil cover is used for the lagoon area. Thus, the ROD should allow for the use of an engineered soil cover in lieu of a low permeability landfill cap.

MDEQ Response: *The MDEQ agrees with this assessment and the recommendations. To avoid confusion in the ROD, the "cap" will be referred to as an "engineered soil cover."*

3.19. Comment: Geraghty & Miller and the North Bronson PRP Group comments that for several constituents of concern, the listed cleanup goal for the protection of human health represents the soil background concentration, even though the MDEQ industrial direct contact criteria is higher than the soil background concentration (reference Table 2-2 of the FS Addendum). The use of background concentrations for soil and sludge cleanup objectives should only be used if the background concentration for a particular constituent exceeds either the cleanup goal for the protection of groundwater or MDEQ's direct contact criteria.

MDEQ Response: *The site is adjacent to CD #30 where there is a potential for contamination of surface water and sediments by erosion and overland flow into CD #30. Protection of surface water values and direct contact values typically exceed surface water or sediment protection values. Therefore, background concentrations were identified as surface soil cleanup goals for soils in close proximity to the drain (i.e. within the flood plain). This action will help prevent the off-site migration of contaminants via CD #30 surface water and, the recontamination of sediment in the drain.*

3.20 Comment: Geraghty & Miller and the North Bronson PRP Group comments that no documentation is provided to support the validity of the estimated costs (i.e., an itemized breakdown of estimated quantities and unit prices is not provided). Although some cost documentation is presented in the FS (Montgomery Watson 1995), it is not directly applicable to the proposed remedy because certain aspects of the proposed remedy differ from the remedial alternatives developed and estimated in the FS. For example, the Proposed Plan indicates the cost to excavate the EL area soil and consolidate the soils into the WLs, without treatment, is $450,000. However, there are no details provided in the Proposed Plan, FS, or FS Addendum to substantiate what items are included under this cost estimate. As a result, it is unknown whether the $450,000 cost estimate for the EL soils includes costs for soil delineation sampling and analysis, soil transportation, shoring to support the Bronson Plating building foundation, dewatering (if needed), backfilling, revegetation, etc.

Without the benefit of a fully documented cost estimate, the North Bronson PRP Group is unable to assess the validity of the estimated costs for implementing the proposed remedy. To facilitate such an assessment, it is requested that the MDEQ provide an itemized cost estimate for the remedial elements that comprise the Proposed Plan. It is further requested that the PRP Group be given an opportunity to comment on any issues raised by the PRP Group's review of the estimated costs prior to final remedy selection.

MDEQ Response: *Cost estimates for the Proposed Plan were extracted from the cost estimates for each alternative developed in the FS. For example, excavating and treating lagoon waste (EL4 & WL 4) was developed as an alternative for the site. Costs for this alternative were itemized in the FS. Included in the itemized costs were the estimated costs for excavating the lagoons. The cost developed for excavating the ELs in the FS (EL4) was used to estimate the cost for excavating the lagoons in the Proposed Plan.*

The MDEQ will provide a more detailed cost estimate based on the information available and will also include costs estimates for any element of the remedy that was not developed in the FS (i.e. soil cover). Refer to the section "Site-wide Alternatives, Cost" in the ROD. The MDEQ will not, however, delay the ROD. If post ROD cost estimates significantly exceed Proposed Plan estimates, or if another alternative appears more cost-effective, the MDEQ will consider amending the ROD.

3.21. Comment: Geraghty & Miller and the North Bronson PRP Group comments that the Proposed Plan does not state where the public can review the Administrative Record File. It is important for the public to know about the Administrative Record File because it contains, or should contain, all documents relating to the project, not just those documents prepared by the MDEQ and EPA. These include documents prepared under the direction of the North Bronson PRP Group. The Administrative Record Index has been reviewed to check if the applicable documents submitted on behalf of the North Bronson PRP Group have been incorporated into the Administrative Record. One document submitted on behalf of the North Bronson PRP Group, but not listed on the Administrative Record Index, is the "Development of Site-Specific Risk-Based Cleanup Goals for the North Bronson Superfund Site" (ES 1996). This is a very important and relevant document because it presents the findings from the site-specific risk assessment which was conducted using more scientifically valid methodology and realistic exposure assumptions than used in the BRA (Warzyn 1993). As a result, this document must be entered into the Administrative Record.

MDEQ Response*: The Administrative Record will be amended to correct this oversight. The index is available in the Bronson Public Library. Specific documents may be available for review in the library file or on file at the MDEQ, Superfund Section offices located at 301 S. Capitol, Lansing, Michigan.*

3.22. Comment: The LA Darling Company comments that although the RI data indicates that the main source, or sources, of chlorinated organics in groundwater at the site are located upgradient from the WL and EL areas, the available data is not sufficient to identify individual sources of these contaminants.

Only one groundwater sampling event, in December, 1991, was conducted during the RI in which chlorinated organics were analyzed for in groundwater samples collected from monitoring wells located at, or near, the LA Darling property. During the December 1991 sampling event, total chlorinated organics were measured at a concentration of 60,200 micrograms per liter (µg/L) in Monitoring Well MW-20 at the Scott Fetzer property. During this same sampling event, total chlorinated organics were measured at a concentration of 2,600 µg/L in Monitoring Well MW-21 at the LA Darling property. Thus, the concentration of total chlorinated organics measured at the LA Darling property monitoring well were more than one order of magnitude lower than the concentration of total chlorinated organics measured at the Scott Fetzer property monitoring well. Further, one groundwater sampling result is a wholly insufficient technical basis on which to conclude whether the former LA Darling property is a source of any contamination at the site.

Based on the water table elevation data collected during the RI, it appears that Monitoring Well MW-21 (the LA Darling property well) is currently either upgradient or side-gradient of Monitoring Well MW-20 (the Scott Fetzer property well) (reference Figure 3-6 in the RI report). However, due to historical groundwater pumpage across the site, the hydraulic gradients may have been different in years past. As a result, it is possible that the chlorinated organic contamination found in the groundwater underlying the Scott Fetzer property could have contributed to the chlorinated organic contamination found in the groundwater underlying the former LA Darling property. There are no monitoring wells between the Scott Fetzer property and the LA Darling property which could be used to assess the concentration gradients between these two areas. Absent such data, and together with the extremely limited groundwater data available, LA Darling strongly objects to and challenges the Proposed Plan's conclusion concerning the source status of the former LA Darling property.

Based on the above discussion, it is apparent that sufficient data is not available to definitively identify the LA Darling property as a source of chlorinated organic compounds at the site. Absent a sufficient technical basis, the Proposed Plan properly should not conclude that the main source of chlorinated organic compounds appears to be soils beneath the former LA Darling property. LA Darling was proud to be a member of the industrial community in Bronson, and to work with many of its residents, for several years. The MDEQ and the EPA should more carefully and soundly exercise its technical judgment before speculating in such a way which threatens to adversely effect LA Darling's reputation in the community.

LA Darling submits that the Proposed Plan properly should be revised to delete any conclusions concerning the former LA Darling property. Moreover, there is no apparent reason why any such conclusions concerning the source status of the former LA Darling property need to be included in the Proposed Plan. The subject property is located well outside of the boundaries of the site addressed in the Proposed Plan for purposes of selecting a final remedy. At the least, for purposes of the Proposed Plan or ROD, it is premature and unnecessary to attempt to determine whether or not the former LA Darling property is in any way a contributing source. This is not a finding that is or should be relied upon in the Proposed Plan as a supporting consideration for the proposed remedy. Hence, its deletion will not in any way affect this remedy selection process.

***MDEQ Response**: The MDEQ agrees that there is not enough data to definitively identify the former LA Darling property as a source of TCE at the site. However, based on the data and information that is available, the LA Darling property cannot be ruled out as a potential source of TCE either.*

LA Darling manufactured display fixtures and retail shelving, which reportedly included chromium and cadmium plating operations. It was also reported in the industrial survey that LA Darling disposed of liquid wastes in their own lagoons until 1939, at which time LA Darling was connected via an industrial sewer line to the western lagoons operated by the city of Bronson. LA Darling switched disposal to the eastern lagoons (via an industrial sewer line) in 1949 which continued until 1966 when they ceased operations in Bronson.

TCE is a very common industrial solvent that came into general use in the 1940s. LA Darling, along with several other companies in the area has been identified as having used TCE.

In the Proposed Plan, the MDEQ identified the industrial sewer as a potential source of contamination. The decision to carry out further investigation of the industrial sewer was based on (1) the type and concentrations of contaminants detected in the soil and groundwater around and beneath the sewer,(2) reports that the sewer would on occasion back up,(3) the likelihood that the sewer would leak during routine use, and (4) the certainty that the sewer would leak if overloaded.

Based on this information it is appropriate for the MDEQ to identify the former LA Darling property in the Proposed Plan as a potential source of contamination at the site because this identifies one of the areas which must be investigated further.

APPENDIX B

North Bronson Industrial Area Superfund Site
Administrative Record Index

Date: 2-13-97

Title: (Review of Bronson Plating Co.)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Gary Klepper
Recipient: Problem Evaluation Committee

Date 9-8-90

Title: (Groundwater Monitoring System Assessment)
Type: Correspondence
Category: A1 General Correspondence
Author:. Jennifer Daniels, Water Quality Division
Recipient: Ron Waybrant, Env. Enforcement Division

Date: 5-85

Title: (Polluter's Attempt to Skirt Law Foiled (magazine article))
Type: Correspondence
Category: A1 Gen Correspondence
Author: None
Recipient: None

Date: 5-10-85

Title: (Special Conditions for CD#30 Sediment Removal Plan)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Paul Zugger, SWQD
Recipient: Stanley Welch

Date: 12-20-84

Title:(CD #30 Cleanup)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Steve Eldridge, SWQD
Recipient: Bob Basch, Hazardous Waste Division

Date: 12-17-84

Title:(Analytical Results from CD#30 Sediment Samples)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Steve Eldridge, SWQD
Recipient: Stanley Welch

Date: 11-26-84

Title:(Approval to Consolidate Waste Material)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Thomas Bailey, Hazardous Waste Division
Recipient: Stanley Welch

Date: 11-14-84

Title:(CD#30 Observations)
Type: Correspondence
Category: A1 Gen Correspondence
Author: none
Recipient: None

Date: 10-26-84

Title:(Performance Evaluation Report)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Charles Sutfin, Water Division
Recipient: Stanley Welch

Date: 7-13-84

Title:(Performance Evaluation Report)
Type: Correspondence
Category: A1 Gen Correspondence
Author: None
Recipient: None

Date: 7-5-84

Title:(Comments and Recommendations on Hydrogeologic Study)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Daniel O. Commins, Geologist, GWQD
Recipient: Ron Kooistra, Supervisor, GWQD

Date: 4-84

Title:(Point Source Studies Inspection Sheet)
Type: Correspondence
Category: A1 Gen Correspondence
Author: None
Recipient: None

Date: 3-23-84

Title:(Compliance Evaluation Inspection)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Jeffrey Braunscheidel, water Quality Specialist, SWQD
Recipient: Stanley Welch, President, Bronson Plating

Date: 1-11-84

Title:(Effluent Guidelines for Metal Finishing)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Diane Carlson, Treatment Technology Unit
Recipient: Chang Bek, Chief, Industrial Permit Unit

Date: 1-4-84

Title:(Point Source Discharges to Long and Palmer Lakes)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Karl Hosford, Chief, Div. of Land Resource Programs
Recipient: Paul Zugger, Chief, SWQD

Date: 10-5-83

Title:(Summary of Compliance Evaluation Inspection)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Patricia McKay, SWQD
Recipient: Bronson Plating

Date: 7-15-83

Title:(EPA Regulations Impacting Metal Finishing Manufacturers)
Type: Correspondence
Category: A1 Gen Correspondence
Author: None
Recipient: None

Date: 7-82

Title:(Michigan Water Resources Commission Facility Inspection Report)
Type: Correspondence
Category: A1 Gen Correspondence
Author: None
Recipient: None

Date: 11-3-81

Title:(Comments from WQD to Scott Fetzer Co.)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Roger Jones WQD
Recipient: N.P. Strobel

Date: 8-4-81

Title:(Response to Mr. Welch's 7-29-81 letter)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Roger Jones, District II WQD
Recipient: Thomas Newell, Acting District Engineer

Date: 6-1-81

Title:(Response to Mr. Jones' Letter of March 10,1981)
Type: Correspondence
Category: A1 Gen Correspondence
Author: N.P. Strobel, Douglas Division
Recipient: Roger Jones, Water Quality Specialist

Date: 5-4-81

Title:(Report of an industrial Waste Water Survey and Point Source Studies Inspection Sheet)
Type: Correspondence
Category: A1 Gen Correspondence
Author: EPB Point Source Studies Section
Recipient: none

Date: 4-8-81

Title:(On-going TSCA Cooperative Agreement)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Carolyn Hesse, Health Effects Specialist
Recipient: Karl Bremmer, Toxic Materials Branch

Date: 3-12-81

Title:(Order to Withdraw Complaint)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Sandra S. Gardebring, Director, Enforcement Division
Recipient: EPA

Date: 1-27-81

Title:(Analyses of Waste Water Samples)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Thomas Newell, Acting District Engineer
Recipient: Stanley Welch

Date: 10-27-80

Title:(N. P. Stobel's letter to Thomas Newell and WQD)
Type: Correspondence
Category: A1 Gen Correspondence
Author: N.P. Strobel
Recipient: Thomas Newell

Date: 7-8-80

Title: (Recommended water quality based effluent limit objectives for facilities discharging to Swan Creek via CD #30)
Type: Correspondence
Category: A1 Site Background: General Correspondence
Author: John Wuycheck, Biology Section , Water Quality Division
Recipient: Comprehensive Studies Section, Environmental Services Division

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)ate 11-80

Title: (Summary of Results key)
Type: Correspondence
Category: A1 General Correspondence
Author: None
Recipient: None

Date: 11-18-80

Title: (Letter informing elimination of discharges through outlet #002)
Category: A1 General Correspondence
Type: Correspondence
Author: Stanley Welch, President, Bronson Plating
Recipient: Roger Jones, MDNR, water quality division

Date: 10-22-80

Title: (Bronson Plating Needs)
Type: Correspondence
Category: A1 General Correspondence
Author: R. Waybrant, Coordinator, Groundwater Contamination Task Force
Recipient: C. Weaver, W. Busby, & R. Jones

Date: 9-3-80

Title: (Visit to Union City Industries and Bronson Plating)
Type: Correspondence
Category: A1 Gen. Correspondence
Author: Roger Jones, District II, Water Quality Division
Recipient: Tom Hicks/ Tom Newell, District II, Water Quality Division

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Date: 8-80

Title: (Preliminary Permit Briefing Memo)
Type: Correspondance
Category: A1 Gen Correspondence
Author: None
Recipient: None

Date: 8-25-80

Title: (Analyses of Samples from Bronson Plating and Union City Industries)
Type: Correspondence
Category: Gen Correspondence
Author: Roger Jones, District II, WQD
Recipient: Tom Hicks/ Tom Newell

Date: 7-25-80

Title: (Sample results from Bronson Plating)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Roger Jones, WQD
Recipient: Stanley Welch, President, Bronson Plating

Date: 4-28-80

Title: (Survey of Swan Creek and CD#30 in Bronson, MI)
Type: Correspondence
Category: A1 Gen Correspondence
Author: MDNR office of Toxic Materials Control
Recipient: None

Date: 4-7-80

Title: (Comparison of Water Sample Results)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Stanley Welch, president, Bronson Plating
Recipient: Roger Jones, WQD

Date: 11-8-79

Title: (Report of an Industrial Waste Water Survey)
Type: Correspondence
Category: A1 Gen Correspondence
Author: None
Recipient: None

Date: 9-12-79

Title: (Interim Phase I Report, Electroplating Waste Water Sludge Characterization)
Type: Correspondence
Category: A1 Gen Correspondence
Author: None
Recipient: General Public

Date: 8-27-79

Title: (Results of Waste Water Survey At Bronson Plating)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Roger Jones, WQD
Recipient: Stanley Welch, President, Bronson Plating

Date: 3-26-79

Title: (Report of an Industrial Waste Water Survey)
Type: Correspondence
Category: A1 Gen Correspondence
Author: None
Recipient: None

Date: 11-78

Title: (Michigan Water Resources Commission Facility Inspection Report)
Type: Correspondence
Category: A1 Gen Correspondence
Author: None
Recipient: None

Date: 3-14-78

Title: (Report of an Industrial Waste Water Survey)
Type: Correspondence
Category: A1 Gen Correspondence
Author: None
Recipient: None

Date: 4-5-77

Title: (Report of an Industrial Waste Water Survey)
Type: Correspondence
Category: A1 Gen Correspondence
Author: None
Recipient: None

Date: 3-5-76

Title: (Late Results from Waste Water Survey)
Type: Correspondence
Category: A1 Gen Correspondence
Author: David Rymph
Recipient: Zollner and Harvey

Date: 11-14-74

Title: (Water Well Contamination Complaint)
Type: Correspondence
Category: A1 Gen Correspondence
Author: K.E. Childs, Geologist
Recipient: Robert Babcock, Bureau of Water Management

Date: 8-9-74

Title: (Compliance Monitoring Report)
Type: Correspondence
Category: A1 Gen Correspondence
Author: USEPA
Recipient: None

Date 8-7-74

Title: (EPA Results of field and laboratory analyses of samples)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Buckley
Recipient: Gary Guenther

Date:

Title:(Residential Water Supply Sample Results)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Joseph Lovato, Ground Water Quality Control
Recipient: Mike Stevens, District Health Dept.

Date:

Title:(Comments Regarding permit for Scott Fetzer Co.)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Office of Toxic Materials
Recipient: N.P. Strobel

Date:

Title:(Ground-water Contamination and Legal Controls in Michigan)
Type: Correspondence
Category: A1 Gen Correspondence
Author: Morris Deutsch, U.S. Department of Interior
Recipient: none

Date: 9-19-90

Title:(North Bronson Site Access Restrictions)
Type: Correspondence
Category: A4 -Site DesCriptions/Chronologies/Backgrounds
Author: Brady Boyce
Recipient: Kerbawy/ Bradford/ Hogarth

Date: 3-90

Title:(EPA North Bronson Industrial Area Site Description)
Type: Correspondence
Category: A4 -Site Descriptions/Chronologies/Backgrounds
Author: EPA
Recipient: None

Date: 10-6-88

Title:(Biological Survey of CD#30 and Swan Creek)
Type: Correspondence
Category: A4 -Site DesCriptions/Chronologies/Backgrounds
Author: SWQD
Recipient: none

Date: 3-22-85

Title:(Response to Letter Joseph Polito, Lawyer)
Type: Correspondence
Category: A5 -Act 307 Listings
Author: Denise Gruben, Site Assessment Unit, Remedial Action Section, GWQD
Recipient: Joseph Polito, Honigman, Miller, Swartz, and Cohn

Date: 4-9-85

Title:(Analytical Results for samples submitted by Bronson Plating)
Type: Correspondence
Category: B1 -Preremedial Site Indentification
Author: Snell Environmental Group
Recipient: Stanely Welch

Date: 3-18-85

Title:(County Drain #30 Project-Final Order of Abatement on Consent #2051- Excavation Summary)
Type: Correspondence
Category: A4 -Site Descriptions/Chronologies/Backgrounds
Author: Site Assessment Unit, Groundwater Quality Division
Recipient: none

Date: 7-84

Title:(Site Survey, Bronson Plating Co.)
Type: Correspondence
Category: A5 -Act 307 Listings
Author: None
Recipient: None

Date: 9-22-93

Title:(Site Assessment Report, North Bronson Industrial area site)
Type: Correspondence
Category: B4 -Preliminary Assessments and Site Inspection Reports
Author: Ecology and Environment Inc.
Recipient: Brady Boyce

Date: 9-13-93

Title:(Residential Well Sample Results, Organic and Inorganic Data)
Type: Correspondence
Category: B4 -Preliminary Assessments and Site Inspection Reports
Author: Joseph Crigier, Division of Water Supply
Recipient: Mary Tierney, Remedial Project Manager

Date: 7-7-93

Title:(Organic Data Quality Assurance Review)
Type: Correspondence
Category: B4 -Preliminary Assessments and Site Inspection Reports
Author: Phil Korzenecki, TAT-Chemist, E&E, Chicago, IL
Recipient: Raghu Nagam. Project Manager, E&E, Chicago, IL

Date: 5-6-93

Title:(Preliminary Report of 4 samples taken 4-28-93)
Type: Correspondence
Category: B4 -Preliminary Assessments and Site Inspection Reports
Author: E&E
Recipient: Mary Jane Ripp

Date: 6-15-84

Title:(HRS Report)
Type: Correspondence
Category: B4 -Preliminary Assessments and Site Inspection Reports
Author: John Tanaka
Recipient: USEPA Region V

Date: 2-7-84

Title:(North Bronson Site Inspection)
Type: Correspondence
Category: B4 -Preliminary Assessments and Site Inspection Reports
Author: Edward Dettmann, Ecology and the Environment
Recipient: U.S. EPA Region V

Date: 4-20-83

Title:(Preliminary Assessment)
Type: Correspondence
Category: B4 -Preliminary Assessments and Site Inspection Reports
Author: Tom Pachowicz
Recipient: USEPA Region V

Date: 2-20-96

Title:(Summary of the North Bronson Industrial Area Superfund Site General Information Meeting Between the Michigan Department of Environmental Quality, the U.S. Environmental Protection Agency, and the Site Potentially Responsible Party Group, Final)
Type: Correspondence
Category: C3 - PRP Specific Documents
Author: Bill Harmon, MDEQ
Recipient: EPA, MDEQ and Consultants

Date: 3-18-94

Title:(Administrative Order On Consent for the Universal Components Corporation)
Type: Enforcement
Category: C3 - PRP Specific Documents
Author: U.S. EPA
Recipient: Brady Boyce, MDEQ, Superfund; Mr. Al Potts, Universal Components; Mr. Charles Barbieri, Foster, Swift, Collins and Smith, P.C.

Date: 4-86

Title:(Letter from EPA, PRP Notification)
Type: Correspondence
Category: C3 - PRP Specific Documents
Author: U.S. EPA
Recipient: City of Bronson

Date: 9-7-93

Title:(Letter From Mary Tierney, EPA to Brady Boyce, MDEQ Re: Site Assessment Report North Bronson Industrial Area Site)
Type: Removal Action
Category: E3-Operational Documents
Author: U.S. EPA
Recipient: MDEQ

Date: 8-30-96

Title:(Development of Site-specific, Risk-based Cleanup Goals for the North Bronson Superfund Site)
Type: PRP or Agency Work Plans
Category: F4-Decumentation of Technical Discussions with PRP or Agency Work Plans
Author: Environmental Standards, Inc.
Recipient: North Bronson superfund Site PRP Group

Date: 8-14-81
Title:(Administrative Order On Consent)
Type: Enforcement
Category: F5-Negotiations/Legal Issues
Author: U.S. EPA
Recipient:

Date: 4-89

Title:(Phase II Scope of Work and Cost Estimate)
Type: Factual Information/Data
Category: F7-Cost Recovery/Scope of Work
Author: Warzyn Engineering, Inc.
Recipient: Brady Boyce, MDEQ, Superfund

Date: 8-15-86

Title:(Site Status)
Type: Factual Information
Category: F5-Negotiations/Legal Issues
Author: MDNR
Recipient:

Date: 11-8-91
Title:(Revised QAPP)
Type: Factual Information/Planning
Category: G2-Remedial Investigation Planning/ Technical Planning
Author: Warzyn Engineering, Inc.
Recipient: MDNR

Date: 9-23-91

Title:(Work Plan Addendum North Bronson Industrial Area RI/FS)
Type: Factual Information/Planning/Data
Category: G2-Remedial Investigation Planning/ Technical Planning
Author: Warzyn Engineering, Inc.
Recipient: MDNR

Date: 1-23-89

Industrial Survey Notes; Operation and Maintenance Manual for Wastewater; Treatment Plant Additions City of Bronson, Michigan)
Type: Factual Information/Planning/Data
Category: G2-Remedial Investigation Planning/ Technical Planning
Author: Warzyn Engineering, Inc.
Recipient: Brady Boyce MDEQ

Date: 7-21-88

Title:(North Bronson Industrial Area Site Health and Safety Plan)
Type: Factual Information/Data
Category: G3- Operational Planning Documents
Author: Warzyn Engineering, Inc.
Recipient: MDEQ

Date: 10-12-95

Title:(US EPA Personal Communication to MDEQ Re: North Bronson Industrial Area Superfund Site Boundaries incorporating the Industrial Sewer)
Type: Factual Information/Data/Planning
Category: H1 General Correspondence
Author: U.S. EPA
Recipient: Bill Harmon, MDEQ

Date: 8-2-95
Title:(MDEQ Personal Communication to U.S. EPA Re: MDNR delay of the proposed plan (CA#V00563401) for theNorth Bronson Industrial Area Superfund)
Type: Factual Information/Data/Planning
Category: H1 General Correspondence
Author: Bill Harmon, MDEQ
Recipient: Rosit Morena, U.S. EPA

Date: 9-89

Title:(Geotechnical Testing Report)
Type: Factual Information/Data/Planning
Category: H2-Sampling and Analysis Data
Author: CLP Sample Management Office U.S. EPA
Recipient: Viar and Co. Alexandria, Virginia

Date: 7-89

Title:(RI Field Investigation Analytical Result: Summary of VOC's and Metals results-All data (compounds detected and non-detected, Summary of VOC's and Metals results- detected compounds only, which were validated as useable.)
Type: Factual Information/Data/Planning
Category: H2-Sampling and Analysis Data
Author: Warzyn, Inc.
Recipient: Brady Boyce, MDEQ, Superfund

Date: 10-89
Title:(RI/FS Technical Memorandum Volumes I-III)
Type: Factual Information/Data/Planning
Category: H3-Interim Deliverables/Technical Memoranda
Author: Warzyn, Inc.
Recipient: MDNR/MDEQ

Date: 7-24-97

Title:(Review of the North Bronson Superfund Site: Review of the Development of Site-Specific, Risk-based Cleanup Goals)
Type: Correspondence
Category: H4- RI/Risk Assessment/Health Assessment Reports
Author: Jeffrey A. Crum, Toxicologist
Recipient: Bill Harmon, MDEQ

Date: 1-97

Title:(Public Health Assessment)
Type: Factual Information/Data/Planning
Category: H4- RI/Risk Assessment/Health Assessment Reports
Author: Michigan Department of Community Health (MDCH)
Recipient

Date: 9-9-96

Title:(Development of Site Specific, Risk-based Cleanup Goals for the North Bronson Superfund Site)
Type: Factual Information/Data/Planning
Category: H4- RI/Risk Assessment/Health Assessment Reports
Author: Environmental Standards, Inc.
Recipient: North Bronson Superfund Site PRP Group

Date: 9-6-95

Title:(Comments on the Remedial Investigation, Baseline Risk Assessment, and the Feasibility Study)
Type: Factual Information/Data/Planning
Category: H4- RI/Risk Assessment/Health Assessment Reports
Author: Geraghty&Miller
Recipient: MDNR/MDEQ

Date: 7-93

Title:(Baseline Risk Assessment)
Type: Factual Information/Data/Planning
Category: H4- RI/Risk Assessment/Health Assessment Reports
Author: Warzyn, Inc.
Recipient: MDNR/MDEQ

Date: 7-97

Title:(Final Feasibility Study Addendum)
Type: Factual Information/Data/Planning
Category: I5- Feasibility Studies
Author: MDEQ
Recipient:

Date: 5-97

Title:(Feasibility Study Addendum)
Type: Factual Information/Data/Planning
Category: I5- Feasibility Studies
Author: MDEQ
Recipient:

Date: 3-27-97

Title:(Constructed Wetlands for Treating Contaminated Groundwater)
Type: Factual Information/Data/Planning
Category: I5- Feasibility Studies
Author: Robert H. Kadlec, Ph.D., P.E., Wetland Management Services
Recipient: MDEQ

Date: 3-14-97

Title:(Recommended Revised Remedial Action Objectives Based on Part 201 Amendments)
Type: Factual Information/Data/Planning
Category: I5- Feasibility Studies
Author: Geraghty&Miller
Recipient: MDNR/MDEQ

Date: 3-14-97
Title:(Assessment of Potential Surface Water Impacts associated with Vented Groundwater)
Type: Factual Information/Data/Planning
Category: I5- Feasibility Studies
Author: Geraghty&Miller
Recipient: MDNR/MDEQ

Date: 3-14-96

Title:(Description and Evaluation of Alternate Groundwater Remedies)
Type: Factual Information/Data/Planning
Category: I5- Feasibility Studies
Author: Geraghty&Miller
Recipient: MDNR/MDEQ

Date: 5-95

Title:(Final Feasibility Study)
Type: Factual Information/Data/Planning
Category: I5- Feasibility Studies
Author: Warzyn, Inc.-Montgomery Watson
Recipient: MDNR/MDEQ

Date: 8-92

Title:(Community Relations Plan)
Type: Community-Public Participation
Category: P2- Community Relations Plans
Author: MDNR-MDEQ
Recipient: Community

Date: 12-26-96

Title:(Bronson Superfund Site Clean-up Options Still Being Investigated-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: -Public

Date: 12-19-96

Title:(CAG meets, Plans Tour of Superfund Site-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: MDNR-MDEQ

Date: 12-19-96

Title:(CAG meets, Plans Tour of Superfund Site-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: MDNR-MDEQ
Recipient: Bronson Journal-Public

Date: 12-12-96

Title:(Local Citizens Consider Fprming Advisory Group For North Bronson Superfund Site)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: Public

Date: 12-7-96

Title:(EPA to Present Superfund Idea-Bronson Journal Article)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: Public

Date: 12-6-96

Title:(Community Input Sought on Superfund Site- Bronson Journal Article)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: Public

Date: 12-6-96

Title:(Superfund Advisory Group Informational Meeting Dec. 10- Bronson Journal Article)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: Public

Date: 11-29-96

Title:(State Seeks Feedback on Health Report-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: -Public

Date: 11-21-96

Title:(EPA wants to form Community Advisory Group for North Bronson Superfund Site-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: -Public

Date: 10-17-96

Title:(Public Health Assessment Done for North Bronson-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: -Public

Date: 9-16-96

Title:(Bronson officials present Superfund options to public-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal-
Recipient: Public

Date: 8-1-96

Title:(Wetland could be constructed to clean contaminated groundwater in Bronson-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal-
Recipient: Public

Date: 5-9-96

Title:(MDEQ Supervises clean-up of part of Old Douglas Property in Bronson-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: -Public

Date: 11-9-95

Title:(EPA Proposes $105,000 Fine Against Bronson Plating Co.)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: -Public

Date: 7-13-95

Title:(More Water Testing Set for Cleanup Site-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: -Public

Date:6-22-95

Title:(State Officials Explain EPA Superfund Clean-up Process To Bronson Residents-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: -Public

Date:6-15-95

Title:(Public Meeting Scheduled for Thursday to Update the Bronson Superfund Site-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal-
Recipient: Public

Date:6-5-95

Title:(North Bronson Superfund Site gets smaller-Daily Reporter, Coldwater)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: -Public

Date: 6-1-95

Title:(Public Meeting Announcement)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: MDNR-MDEQ
Recipient: Bronson Journal-Public

Date: 1-14-93

Title:(City of Bronson Named in Third Party Lawsuit Over Contamination clean-up by Kuhlman-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: -Public

Date: 7-13-89

Title:(Public Notice, North Bronson Industrial Area Remedial Investigation/ Feasibility Study (newspaper ad))
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: MDNR-MDEQ
Recipient: Bronson Journal-Public

Date: 9-17-88

Title:(EPA orders Tests of Bronson water-Sturgis Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Sturgis Journal
Recipient: Bronson -Public

Date: 9-1-88

Title:(Toxic Waste Investigation to Begin Here Sept. 19-Bronson Journal)
Type: Community-Public Participation
Category: P4-Newspaper Clippings/ Press Releases/Public Notices
Author: Bronson Journal
Recipient: -Public

Date: 6-7-95

Title:(North Bronson Industrial Area Superfund Site Information Bulletin)
Type: Community-Public Participation
Category: P6-Newsletters/Factsheets
Author: MDNR-MDEQ
Recipient: Bronson Journal-Public

Date: 6-94

Title:(Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates)
Type: Technical Sources and Guidance Documents
Category: T1-EPA Headquarters and Regional Guidance
Author: EPA
Recipient:

Date: 2-97

Title:(Interoffice Memoranda to Bill Harmon From Sandra Kosek, Surface water Quality Division re: North Bronson Superfund Site Theoretical WQBEL for Trichloroethylene)
Type: Technical Sources and Guidance Documents
Category: T2- State Guidance
Author: SWQD
Recipient: Bill Harmon, MDEQ

Date: 2-96

Title:(Interoffice Memoranda to Bill Harmon From Sandra Kosek, Surface water Quality Division re: North Bronson Superfund Site Venting Groundwater Mixing Zone Review)
Type: Technical Sources and Guidance Documents
Category: T2- State Guidance
Author: SWQD
Recipient: Bill Harmon, MDEQ

Date: 1-21-94

Title:(Interoffice Memoranda Re: Chemical Analysis of Sediment Samples Collected from Reference Sites in Michigan's Various Eco-regions)
Type: Technical Sources and Guidance Documents
Category: T2-State Guidance
Author: Roger Jones, Great Lakes and Environmental Assessment Division
Recipient: Water Quality Appraisal Unit Staff

Date: 9-93

Title:(MDEQ Operational Memorandum 15, "Default Type A Clean-up Criteria")
Type: Technical Sources and Guidance Documents
Category: T2-State Guidance
Author: Alan J. Howard
Recipient: Environmental Response Division Staff

Date:

Title:(NOAA Technical Memorandum NOS OMA 52, "The Potential for Biological Effects of Sediment-Sorbed Contaminants tested in the National Status and Trends Program")
Type: Technical Sources and Guidance Documents
Category: T5-Technical Sources
Author: Edward Long and Lee Morgan
Recipient:

Date: 1998

Title:(Private Well Survey)
Type: Technical Sources and Guidance Documents
Category: T5-Technical Sources
Author:MDEQ
Recipient:

Date: 1996

Title:(Treatment Wetlands)
Type: Technical Sources and Guidance Documents
Category: T5-Technical Sources
Author: Robert H. Kadlec
Recipient: Published Book

Date: 1989

Title:(Constructed Wetlands for Wastewater Treatment)
Type: Technical Sources and Guidance Documents
Category: T5-Technical Sources
Author: Donald A. Hammer
Recipient: Published Book

Date: 5-93

Title:(Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario)
Type: Technical Sources and Guidance Documents
Category: T5 Technical Sources
Author: D. Persaud, R. Jaagumagi and A. Hayton, Water Resources Branch, Ontario Ministry of the Environment
Recipient: