NUS CORPORATION

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R-31-5-4-22
GM-11-F-I

WORK PLAN

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

GENERAL MOTORS CORPORATION
CENTRAL FOUNDRY DIVISION SITE
ST. LAWRENCE COUNTY
NEW YORK

EPA WORK ASSIGNMENT
NUMBER 75-2LA6
CONTRACT NUMBER 68-01-6699

NUS PROJECT NO. 0790.01

SEPTEMBER 1984

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1.0 WORK PLAN SUMMARY

This Work Plan has been prepared for the United States Environmental Protection Agency (EPA) prior to commencement of work at the General Motors Corporation, (GM) Central Foundry Division Site, in Massena, St. Lawrence County, New York. The purpose of the Work Plan is to provide a detailed scope of work and technical approach to successfully complete EPA Work Assignment No. 75-2LA6 dated March 1984. A detailed ~~budget necessary to accomplish the scope of work, and a~~ schedule of proposed activities are also developed in the Work Plan. *This Work Plan was prepared by marking-up the Work Plan prepared by NUS Corporation (NUS) for EPA, NUS Project No. 0790.*
The Work Plan format, as prepared by NUS Corporation (NUS), contains the following sections:

- Work Plan Summary - Section 1
- Problem Assessment - Section 2
- Technical Approach (RI/FS Scope of Work) - Section 3
- Management Plan - Section 4
- Costs and Schedule - Section 5

This Work Plan has been prepared for use by the EPA, *GM, and GM Contractor.* ~~or the responsible party. If the responsible party declines to undertake the RI/FS proposed in this Work Plan then the EPA will designate that the GM Central Foundry Division Site RI/FS will be performed jointly by NUS personnel from the Field Investigation Team (FIT) Office located in Edison, New Jersey, and the Remedial Planning Office (REMPO) located in Pittsburgh, Pennsylvania.~~

<u>FIT Phase I - Initial Activities</u>

Task 1 - Work Plan Preparation *(completed)*

<u>REMPO Phase IV - Support Activities</u>

Task 14 - Work Plan Preparation and Review *(completed)*
Task 15 - Overall Project Management, and Status Reporting

Task 16 - Technical Oversight

Task 17 - Community Relations Support

1.1 Objectives of the Remedial Investigation/Feasibility Study

The objectives of this Remedial Investigation/Feasibility Study (RI/FS) at the GM Central Foundry Division Site are as follows:

- To determine the nature and degree of contaminant migration off site and related environmental impacts and public health hazards.
- To more fully characterize the wastes deposited at the site and consequent onsite contamination.
- To better delineate the extent of the lagoons, sludge pits (since backfilled), and existing industrial landfill with respect to the local topographic and geologic settings.
- To determine the need for remedial measures to mitigate the existing and potential impacts of the contaminants on the air, groundwater, surface water, biota, and soil resources in the vicinity of the site.
- To develop a set of viable remedial actions for the GM Central Foundry Division Site and to evaluate the costs, appropriateness, and applicability of these control actions.
- To recommend the most appropriate remedial action alternative to mitigate the potential threats from those contaminants that are contained on site.
- To develop a workable conceptual design for the recommended remedial action.

During the Remedial Investigation, additional data will be collected to fully characterize the extent of contamination and to identify and evaluate potential remedial measures. The Feasibility Study will evaluate the appropriateness of various remedial measures and assess their cost-effectiveness.

1.2 Scope of Work

As mentioned in Section 1, ~~FIT~~ the contractor will perform the Initial Activities and Remedial Investigation Phases of the study. ~~REMPO~~ The contractor will perform the FS and will manage the overall project. Subcontracting may be required for various tasks, including drilling and other site work. Overall project management and coordination will be the responsibility of the ~~NUS Corporation~~ contractor. The ~~NUS~~ contractor's Project Management Work Plan is outlined in Section 4.

The proposed RI/FS for the GM Central Foundry Division Site has been divided into 4 general phases and 17 detailed tasks. The phases and tasks are as follows:

Phase I - Initial Activities (FIT)

Task 1 Remedial Investigation/Feasibility Study Work Plan Preparation (completed)
Task 2 Project Management
Task 3 Community Relations (EPA)
Task 4 Quality Assurance
Task 5 Technical Support
Task 6 Preoperational Planning

Phase II - Site Remedial Investigations (RI) ~~(FIT)~~

Task 7 Hydrogeologic Investigations
Task 8 Surface Water Investigations
Task 9 Sampling and Analysis
Task 10 Public Health and Environmental Assessment

Phase III - Site Feasibility Study (FS) ~~(REMPO)~~

Task 11 Treatability Study ~~(Optional)~~

Task 12 Feasibility Study

Task 13 Conceptual Design

Phase IV - Support Activities ~~(REMPO)~~

Task 14 Work Plan Preparation and Review (*completed*)

Task 15 Overall Project Management and Status Reporting

Task 16 Technical Oversight

Task 17 Community Relations Support

Tasks 1 through 13 included in this Scope of Work are described in Section 3, (Technical Approach), while Tasks 14 through 17 are described in Section 4, (Management Plan) of this Work Plan. ~~NUS has identified two additional tasks that were not covered by the EPA Work Assignment that may be necessary to complete the RI/FS. Task 11 -Treatability Study has been identified by NUS as an optional task that covers any waste for which treatability study needs to be done to assess the viability of waste treatment options. Task 13 (the other additional task identified by NUS) will cover the conceptual design of the selected alternative.~~

~~1.3 Manpower Estimates and Costs~~

~~The level of effort (man-hours) projected for each phase of the GM Central Foundry Division Site RI/FS is as follows:~~

- ~~Phase I - Initial Activities - 1660 man-hours~~
- ~~Phase II - Remedial Investigations - 2770 man-hours~~
- ~~Phase III - Feasibility Study - 1350 man-hours~~
- ~~Phase IV - Support Activities - 1800 man-hours~~

~~A total of 7580 man-hours will be required for all RI/FS work. These man-hour estimates do not include labor efforts for subcontractors.~~

~~The man-hours and costs estimated for the RI/FS are presented in Section 5. This estimate is for the Scope of Work described in Sections 3 and 4. The cost estimates were made based on existing data using assumptions for drilling, sampling, and analyses that could change with time. The costs presented will be valid for 90 days from the submittal of this plan.~~

~~The total cost for the implementation and performance of the RI/FS has been estimated at $610,892. Contract Laboratory Program (CLP) costs for the RI are estimated to be $232,175. A Cost of $42,780 for non-CLP analysis has been estimated for all PCB analyses. The above estimated cost for the RI/FS does not include the estimated costs for CLP and non-CLP analyses.~~

~~Higher levels of personnel protection than those anticipated during preparation of this Work Plan (Levels C and D) may result in a substantial increase in the cost of the Remedial Investigation.~~

1.4 Schedule

~~It is estimated that~~ T the RI/FS for the GM Central Foundry Division Site will take ~~19~~ 18 months to complete following approval of the Work Plan and authorization to begin work.

The RI/FS schedule has been developed assuming a 75-day turnaround and validation of analytical results from EPA's Contract Laboratory Program (CLP). GM, EPA and the New York State Department of Environmental Conservation (NYDEC) review time of draft and final reports must be no more than that shown on Figure 5-1 to allow for completion of the RI/FS within the designated time period. Additional review time may result in substantial increases in the budget and schedule for the RI/FS. This schedule also assumes expedient procurement of necessary permits and authorizations, favorable response times from subcontractors, and suitable weather conditions for the conduct of the site activities without excessive delays.

2.0 SITE HISTORY AND DESCRIPTION

2.1 Source of Information

The information presented in this section was compiled from:

- U.S. Environmental Protection Agency, Region II (EPA) files
- New York State Department of Health (NYDOH) - Saranac Lake Files and Massena files
- A general file search from New York State Department of Environmental Conservation (NYDEC) in Watertown, N.Y.
- General Motors Consultant Reports - Dames and Moore's January 1982, Closure Plan Reports for the North and East areas' inactive sludge deposits
- Reports by Environmental Studies Program, St. Lawrence University, Canton, N.Y.

Historical files from GM that ~~would~~ will detail site history, site description, foundry operations, ~~or~~ and treatment processess ~~were not available for research~~ will be a part of the RI/FS. No Remedial Action Master Plan (RAMP) has been prepared for this site.

2.2 Site Description and Foundry Background

2.2.1 Location and Setting

The GM Central Foundry Division is an aluminum casting plant, situated in the town of Massena, St. Lawrence County, New York. Massena is located in the northeastern region of New York, along the St. Lawrence River.

Figure 2-1 provides the location of the site, using the U.S. Geological Survey (USGS) Raquette River and Hogansburg 7.5 Minute Quadrangle maps as its base. The site is bordered on the north by the St. Lawrence River, on the east by the St. Regis Indian Reservation, on the south by the Raquette River, and on the west by the Massena-Cornwall International Bridge and roadway, and U.S. Customs property.

Figure 2-2 provides a site map. The property owned by GM is approximately 270 acres, which includes a parcel of land located between U.S. Route 37 and the Raquette River.

The northern area of the site contains a 10-million-gallon lagoon, an obsolete wastewater pump house, a 1.5-million-gallon lagoon, and an area that received sludge deposits. This sludge burial area consisted of two pits and an interceptor lagoon, which was backfilled when it was no longer used. The St. Lawrence River is approximately 300 feet north of this buried sludge area.

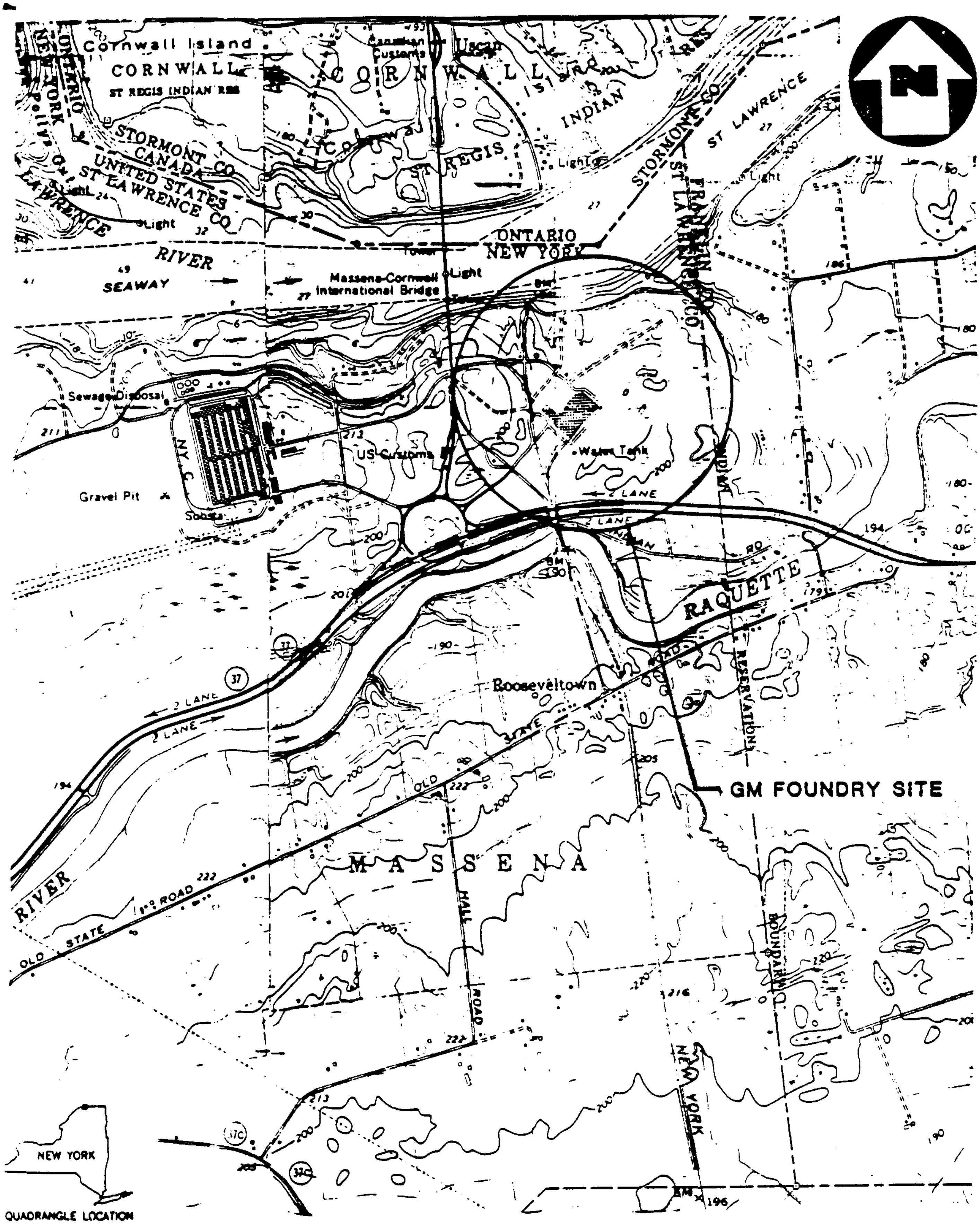
The northeast area of the site contains an 8-acre industrial landfill, of which 3 acres are still active. The landfill rises to an approximate height of 30 feet above natural ground level.

The eastern area of the site contains another excavated area where sludge was deposited. The St. Lawrence River is approximately 600 feet to the north of this area.

The remaining property to the south and southeast slopes gently upward to the south and is thinly forested.

2.2.2 Foundry Process and Operations

The plant, in operation since 1959, die-casts 4,000 tons per month of molten aluminum into various automotive parts, such as manifolds, transmission casings, and pistons. The aluminum parts are cast in conventional molding machines using



(QUAD) RAQUETTE RIVER, HOGANSBURG, NY

FIGURE 2-1

SITE LOCATION MAP

GM CENTRAL FOUNDRY SITE, MASSENA, NY

SCALE 1" = 2000'

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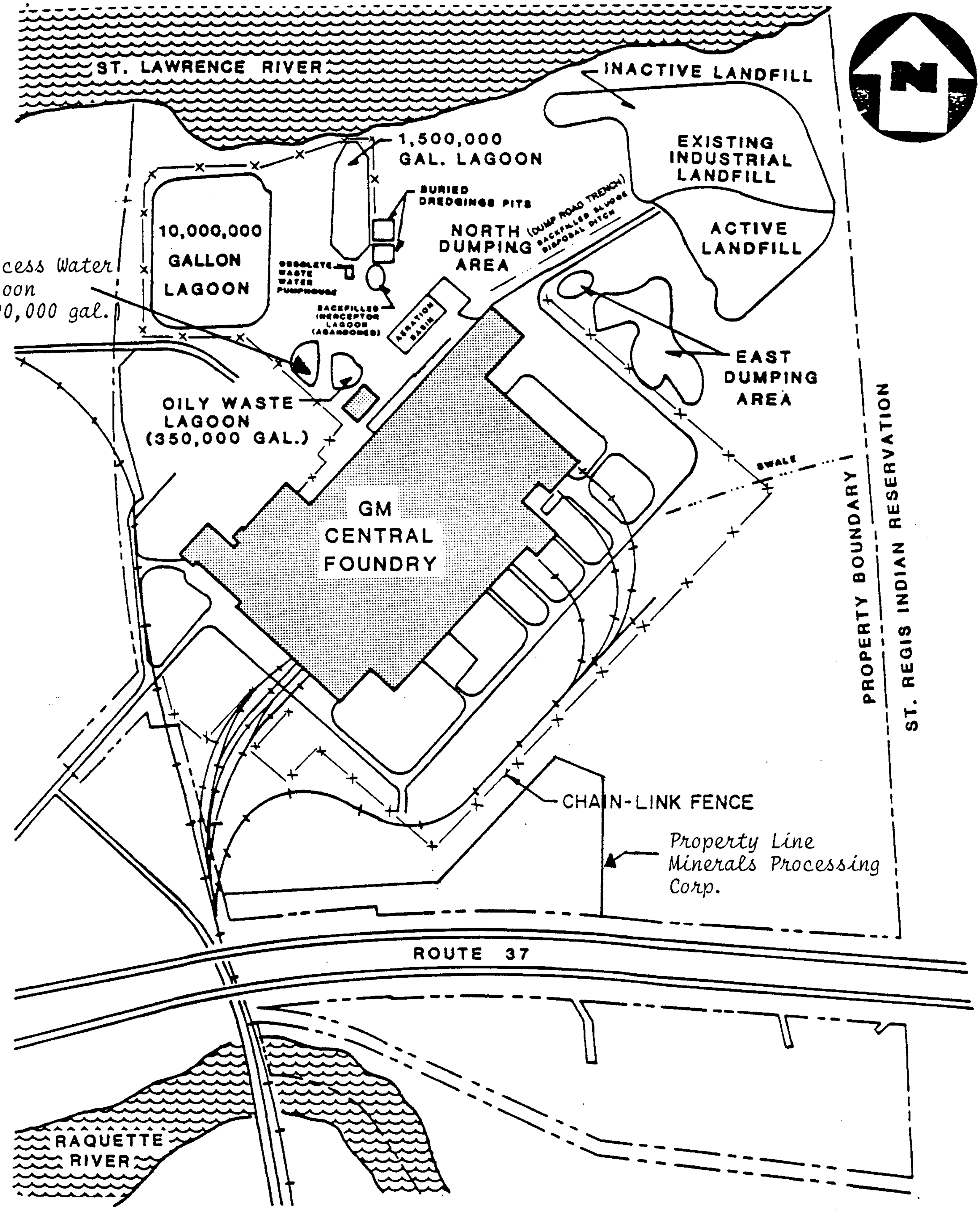


FIGURE 2-2

SITE MAP
GM CENTRAL FOUNDRY SITE, MASSENA, NY
NOT TO SCALE

NUS CORPORATION
A Halliburton Company

sand/resin molds, permanent molds, and die cast. A smaller prototype processing line, using styrofoam molds, is also in operation.

The plant uses approximately 56,000 gallons of hydraulic fluid in its die-casting machines. The die-casting machines generate 2,000 pounds per square inch (psi) of pressure at the maximum holding forces and 2,500 psi pressures upon the initial closing of the dies. These unusually high pressures cause more leakage of hydraulic fluid than would be expected. Versar, Inc., an EPA contractor, estimated that a typical leakage rate for the hydraulic systems was about two system volumes, or approximately 100,000 gallons, per year.

Each of the die-casting machines containing hydraulic fluid is surrounded by drains covered by grillework. Fluids leaking from the machines run into these drains. Pipes connect the drains to the wastewater treatment system, which also handles wastes from all facility floor drains. Hydraulic fluid that finds its way to the wastewater treatment operation is removed, ~~degritted~~, and disposed of. ~~returned to the hydraulic machines.~~

From 1959 to 1974 the plant used polychlorinated biphenyl (PCB)-based hydraulic fluids in its die-casting machines. The machines were drained in 1975, and non-PCB fluids were used instead in the machines from that time forth.

2.2.3 Wastewater Treatment System

A reclamation system was installed in the early 1960's to recover hydraulic fluid. At that time, the water removed from the hydraulic fluid reclamation process passed through the 1.5-million-gallon lagoon, through a weir system, and then to the St. Lawrence River. Periodically, the lagoon was drained and bottom deposits were landfilled in onsite burial pits and then covered.

In 1976, ~~During the late 1960's or early 1970's,~~ a wastewater treatment system was installed. The system was intended to be essentially closed-loop. The treatment used a physical/chemical process, followed by sand filtration. The effluent from the sand filters then entered a 500,000-gallon lagoon. ~~As there is no map to~~

~~confirm the existence or location of this lagoon, the 350,000 gallon oily waste lagoon shown in Figure 2-2 and Exhibit 2 should not be confused with the 500,000 gallon lagoon.~~ Overflow from the 500,000-gallon lagoon entered a new water cooling lagoon with a capacity of 10 million gallons. Water from this lagoon was then chlorinated and returned to the water tower, where it was stored for reuse in the facility. Infiltration from the potable water intake, as well as precipitation and runoff, added water to the overall treatment system. Intermittent discharges were required to maintain freeboard in the 10-million-gallon lagoon. This was accomplished by overflowing into the existing 1.5-million-gallon lagoon, which in turn would overflow, via an outfall, to the St. Lawrence River.

In the late 1970's, GM installed an activated sludge system and activated carbon columns to meet State Pollution Discharge Elimination System (SPDES) permit discharge limits. The activated sludge system consists of an aeration basin, followed by two clarifiers and a pump house. To effect a constant leaching of the PCB and organic content in the 10-million-gallon lagoon's sediment, GM circulated the contents through this activated sludge system for treatment before returning the water to the facility.

The effluent from the clarifiers enters two rapid sand filtration systems on site. Part of the sand filter effluent is softened and reused in the plant, and part enters the activated carbon columns for periodic blowdown to the St. Lawrence River to maintain the capacity of the system.

The St. Lawrence River is the source of water for the foundry and provides approximately 260,000 gallons of water per day. Of this quantity, approximately 175,000 gallons per day are returned to the St. Lawrence River as wastewater discharge. The difference is predominantly evaporative loss.

2.3 Environmental Setting

2.3.1 Land Use Adjacent to the Site

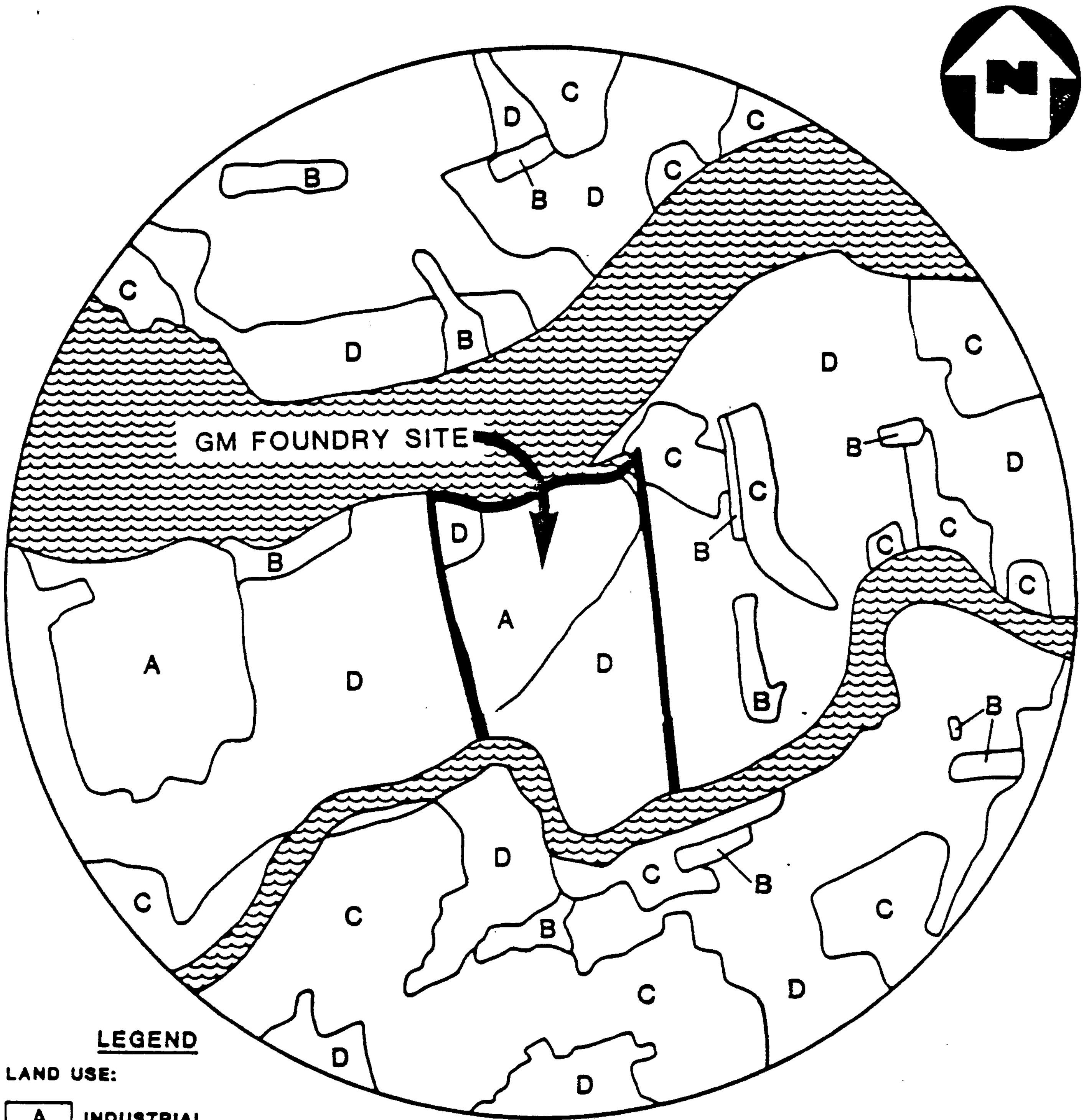
The area in the vicinity of the site is predominantly forest and agricultural lands, with widely scattered, small, low-density residential areas. Major water bodies bordering the site are the St. Lawrence and the Raquette Rivers. The Reynolds Aluminium facility ~~, is the only other manufacturer~~ and the minerals processing facility, are manufacturers in the immediate vicinity of the site. Figure 2-3 illustrates land use within an approximate one-mile radius of the site.

Low-density strip residential areas are located on the St. Regis Indian Reservation, along Indian Road, approximately 1,600 feet to the east of the site. Forested and inactive agricultural areas serve as a buffer zone between the residential area and the site. A low-density residential area is located approximately 350 feet to the north of the site on the Cornwall Island St. Regis Indian Reservation. The St. Lawrence River serves as a buffer between these homes and the site. Approximately 1,600 feet west of the site, a low-density residential area is located along the south shore of the St. Lawrence River. An area of forest and brush land serves as a buffer between these homes and the site.

Fishing areas are located near the shores of the St. Lawrence River and mouth of the Raquette River. The forested and inactive agricultural areas on Raquette Point are used for hunting.

2.3.2 Meteorology

The site is located in the Lowlands of the St. Lawrence River Valley. Meteorological data used to describe the climate for this site were recorded at the National Weather Service (NWS) Cooperative Station at the Massena Federal Aviation Administration (FAA) Airport located approximately 6 miles southwest of the site. Table 2-1 presents mean temperatures, and precipitation and snowfall values for this station. The following subsections describing temperature, precipitation and evapotranspiration reference this table.



LEGEND

LAND USE:

A	INDUSTRIAL
B	RESIDENTIAL
C	ACTIVE AND INACTIVE AGRICULTURE
D	WOODED, BRUSH, WETLANDS
(wavy pattern)	BODIES OF WATER
(heavy line)	SITE BOUNDRY

FIGURE 2-3

LAND USE
GM CENTRAL FOUNDRY SITE, MASSENA, NY
SCALE 1" = 2000'

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TABLE 2-1

MEAN TEMPERATURE, PRECIPITATION, AND
SNOWFALL AMOUNTS OBSERVED AT THE NWS COOPERATIVE STATION
MASSENA FAA AIRPORT BASED ON THE
PERIOD OF RECORD 1951 THROUGH 1973

Month	Temperature (°F)	Precipitation (in.)(1)	Snowfall (in.)(2)
January	14.4	2.06	14.9
February	16.6	2.29	17.9
March	27.7	2.09	10.3
April	42.6	2.62	1.6
May	54.3	2.71	0.4
June	64.1	2.97	0.0
July	68.5	3.04	0.0
August	66.1	3.47	0.0
September	58.3	3.02	0.0
October	47.7	2.52	0.4
November	35.5	2.99	5.8
December	20.3	3.23	19.5
Annual	43.0 (Avg)	33.01 (Total)	70.8 (Total)

NOTES:

(1) All precipitation values are in inches of precipitable water.
(2) Snowfall amounts indicated are included in the corresponding amount of precipitation listed.

2.3.2.1 Temperature

The weather systems that influence this area result in a considerable variation in temperature. Average monthly temperatures range from a low of 14.4°F in January to a high of 68.5°F in July.

Winters are generally long and cold, characterized by masses of cold, dry air frequently arriving from the northern and northwestern portions of Canada. Temperatures of 0°F or less are often recorded continuously for 30 days or more; minimum temperatures can reach -15°F. Winter daytime temperatures range from 30°F to 35°F.

The summer climate is moderate with daytime highs averaging 70°F to 80°F. During brief intervals of sultry conditions, temperatures of 90°F or higher occur. Minimum night time temperatures average 50°F and night time readings of 40°F or lower are not uncommon.

The average period of frost-free weather is approximately 120 days. The ground itself begins to freeze in late December and starts to thaw in late March and early April.

2.3.2.2 Precipitation and Evapotranspiration

Moisture for precipitation is primarily transported from the Gulf of Mexico and the Atlantic Ocean through circulation patterns and storm systems of the atmosphere. Precipitation distribution is fairly uniform during the year, ranging from an average of 2.06 inches in January to 3.47 inches in August. During the fall, winter and spring seasons, precipitation events are predominantly due to the direct influence of cyclonic disturbances passing over and nearby the St. Lawrence River Valley. In summer, however, a large portion of the precipitation is the result of convective activity resulting from passing frontal systems.

Snowfall has an annual total generally in excess of 70 inches. Continuous snow cover begins to develop by late November and early December and persists through March.

The mean annual evapotranspiration rate for the area is about 18 inches. Based on the average annual precipitation figure, the net precipitation is approximately 15 inches per year. This interpretation, however, assumes that the evapotranspiration rate is distributed evenly throughout the year. Actual measurements show that evapotranspiration almost entirely occurs during the summer months, with insignificant or no evapotranspiration occurring during the winter months. Generally, runoff can occur when, for a given period of time, the rate at which precipitation falls exceeds the rate of evaportranspiration plus the rate at which the ground can absorb moisture.

2.3.2.3 Winds

Winds are generally from the west. A southwest component is evident in winds during warmer months, while a northwest component is characteristic in the colder months of the year.

The annual average wind speed in the St. Lawrence River Valley area is about 10 miles per hour. Strongest winds are observed during the winter months, associated with the passing of cyclonic storm systems.

2.3.3 Geology

The GM Central Foundry Division Site property is part of the St. Lawrence Lowlands physiographic province. The Lowlands lie between the Canadian Shield and the Adirondack Mountains. The site elevation varies only by about 50 feet. The lowest elevation is 152 feet above Mean Sea Level (MSL) at the bank of the St. Lawrence, and the highest elevation is about 200 feet above MSL at Northwest and Southeast of the plant buildings. A typical cross section in the site area shows Precambrian metamorphics overlain by Paleozoic sedimentary rocks; a series of Pleistocene glacial sediments completes the sequence.

2.3.3.1 Bedrock Deposits

Bedrock in the Massena area consists of Precambrian crystalline rocks of the Grenville series overlain by the Ordovician-age Ogdensburg Formation. Crystalline bedrock includes metamorphosed sedimentary rocks with igneous intrusions. These metamorphic rocks are too deep to be of concern in this study due to the thickness of Ogdensburg dolostones.

The Ogdensburg Formation is a massive gray dolostone that reaches a thickness of 500 feet in the Massena area (Trainer and Salvas, 1962). Limestone, sandstone, and shale are present locally. The presence of thinly stratified and veined gypsum provides the potential for secondary solution porosity in the dolostone. Fault zones, joints, and fractures are additional sources of secondary porosity. Isolated faults trend northeast-southwest, while joints and fractures appear throughout the formation. These brittle features are often solution enlarged in the upper 50 feet of bedrock.

The bedrock surface is of low relief, and dips gently to the north. The literature presents evidence of a stream channel in the bedrock surface (MacClintock and Stewart, 1965). The channel trends east-west and lies directly below the facility's buried northern sludge pits.

2.3.3.2 Glacial Deposits

Pleistocene glacial sediments in the Massena area include till, stratified outwash, lacustrine deposits, and marine sands and clays. The unconsolidated sediments are approximately 100 feet in thickness. Glacial till is an unsorted array of sediments with a wide range of sizes, and, in general, has a high concentration of fines and low permeability values. The till is grouped into three categories (Trainer and Salvas, 1962). An upper till is late Wisconsinan in age, while middle and lower tills were deposited during early Wisconsinan time. The Wisconsinan is the age of the last Pleistocene glacial advance. The upper till is found in the subsurface and in smoothly rounded hills known as drumlins at the surface. Stratified outwash may overlie the upper till adjacent to drumlins. The middle till is often interbedded with stratified outwash, and is of prime interest as it offers the quickest route for groundwater to move off site. A massive lower till divides this middle till from bedrock. Outwash is a stratified, well-sorted deposit consisting of permeable sands and gravels. Outwash deposits with their ease to transmit water, offer a conduit for groundwater flow in the site area. Lacustrine deposits of very thinly laminated or "varved" clays are present in low-lying areas. Postglacial, marine clays, which often grade to sands, overlie the lake deposits.

2.3.3.3 Seismic Activity

The Massena, New York - Cornwall, Ontario area has historically been a region of relatively high seismic activity. This activity includes the most damaging earthquake in the New York State region in the twentieth century. The September 5, 1944 earthquake had a magnitude of 5.8 on the Richter Scale (Street & Tarcotte, 1977) and destroyed 90 percent of chimneys in Massena.

Earthquake sequences are clustered along a north-northwest band of seismicity extending from the Adirondacks in New York to the Baskatong reservoir in Quebec. According to Basham et al. (1979), an earthquake is expected to recur every 100 years in this western Quebec-northern New York seismic zone of a magnitude of 6 on the Richter Scale.

A study of the July 1981 earthquake sequence (Sfchliesinger-Miller et al., 1983) in the Massena-Cornwall area showed reverse faulting with some strike-slip motion. The hypocenter was located within precambrian basement rocks. These rocks may have a mylonite shear zone directly beneath the area responsible for earthquake occurrence.

2.3.4 Surface Waters

Exhibit 1 provides a map showing three surface waters of concern in the vicinity: the St. Lawrence River, the Raquette River, and an unnamed tributary in the St. Regis Indian Reservation.

The St. Lawrence River, which has its source at Lake Ontario, forms the northern boundary of the site. The average width of the St. Lawrence River near the site is 1800 feet. The St. Lawrence Seaway, the channelized portion of the river, has an average depth of 27 feet. Within 100 feet of the channel, seaway depth decreases to 6 feet. The mean annual stream flow is 242,700 cubic feet per second (cfs). The daily low flow is 139,000 cfs, based on 120 years of record.

The Raquette River, a tributary to the St. Lawrence River, originates in the Adirondacks. It flows easterly along the southernmost boundary of the site. The Raquette River flows east from the site for 3 miles to its confluence with the St. Lawrence River. The width of the Raquette River ranges from 250 to 300 feet, while depth varies from 3 to 6 feet. The mean annual stream flow is approximately 20 cfs. The daily minimum flow is approximately 7 cfs, based on 36 years of record.

A groundwater-fed, unnamed tributary parallels the eastern boundary of the site. The stream flows north to the St. Lawrence River. The unnamed tributary has a gravel bottom. No information is available on width, depth, or flow.

NYDOH and NYDEC studies have shown evidence of PCB contamination in the three surface water bodies. In the St. Lawrence River, sediment PCB levels of 0.011 to 57.7 parts per million (ppm) have been reported by the NYDEC.

2.3.5 Aquatic Ecology

Ecological studies conducted in the area by NYDEC have been primarily limited to PCB analysis in fish. St. Lawrence River fish analyzed for PCB content included rock bass, white perch, black crappie, fall fish, pumpkinseed sunfish, small mouth bass, northern pike, and black bullhead. Spottailed shiners from the Raquette River were also analyzed for PCB content.

Sampling for benthic macroinvertebrates has been conducted in the area, as part of an area-wide study of New York freshwaters. One sampling point was located in the St. Lawrence River channel opposite the site. These data are insufficient to characterize the biological community of the area.

2.3.6 Groundwater

Two major aquifers underlie the site. One aquifer is in the bedrock deposits; the other is in the glacial deposits. Bedrock aquifer is largely secondary fracture joints, some of which are solution enlarged. The glacial aquifer relies on intergranular porosity for its holding and transmission properties. Groundwater wells tap both the bedrock and glacial aquifers, although large-capacity wells must draw from the bedrock aquifer.

2.3.6.1 Bedrock Aquifer

The Ogdensburg dolostone is a massive rock and it does not have primary intergranular porosity or permeability. Porosity and permeability in the Ogdensburg dolostone is entirely secondary. Solution cavities, joints, and fractures allow the massive dolostone to hold and transmit water. The solution cavities, formed as gypsum veins and laminae, were preferentially leached. Joints and fractures connect the isolated cavities to increase the aquifer's effective porosity and permeability. These structural features are solution enlarged in the upper 50 feet of the formation. The porosity is almost 100 percent in the cavity, whereas it is almost zero where there is a massive material. The transmissivity for the dolostone varies between 1,000 and 10,000 gpd/ft, (gallons per day per foot) but values as high as 20,000 and 68,000 gpd/ft are documented in the literature. The value of transmissivity is the product of permeability times the aquifer saturated thickness. The bedrock rock aquifer is a confined aquifer. All major groundwater supply wells draw from the bedrock aquifer (Trainer and Salvas, 1962).

2.3.6.2 Glacial Aquifer

The glacial deposits on the site are mostly till and clay. The outwash and sands are interbedded with till and clay. The till and clay are very low-permeability material. Hence the permeability of the glacial aquifer on the site is low to moderate. Any significant groundwater flow would be through one of two routes. One route would be through outwash sands and gravels associated with the middle and upper tills. The other route is through marine sands at the surface. Some of these well-sorted deposits, though thin, are laterally quite extensive. Permeabilities for till, sand, and gravel in the Massena area are documented in literature (Trainer and Salvas, 1962.). Till permeability is 1.8 gpd/ft^2, soil permeability is 7.5 gpd/ft^2, and permeability of the gravel is 300 gpd/ft^2.

Recharge of the sediment aquifer is effected through the ground surface, where stratified clay does not act as a barrier to recharge. Rain waters percolate down to either the marine sands or the outwash sands and gravels. The interbedded till and outwash impart a complex hydraulic character to the aquifer, since both confined and unconfined conditions exist. Even with its lower permeabilities, the sediment aquifer provides a supply of groundwater for some domestic wells in the area (Trainer and Salvas, 1962).

2.3.7 Site Drainage

Surface runoff will flow to either the St. Lawrence or Raquette Rivers. An east-west trending drainage divide is located generally along Route 37. Surface water to the north of the drainage divide will flow to the St. Lawrence River. Runoff to the south of the divide drains into the Raquette River. Waters that exceed the infiltration capacity of the till will flow first to lowlands and then to their respective river.

2.4 Problem Assessment

The nature of the problem encompasses two major areas:

- The disposal of hazardous substances on site.
- The potential for migration of these substances.

Since the early 1950's, numerous areas were used for the disposal of PCB-contaminated sludges and other process waste byproducts, but no extensive onsite sampling of all these areas has been conducted. In regard to migration potential, Figure 2-4 shows a USGS piezometric contour map that indicates that groundwater in the site vicinity flows to the east where potable groundwater sources are located. An accurate description of groundwater flow is needed to determine the underground migration direction.

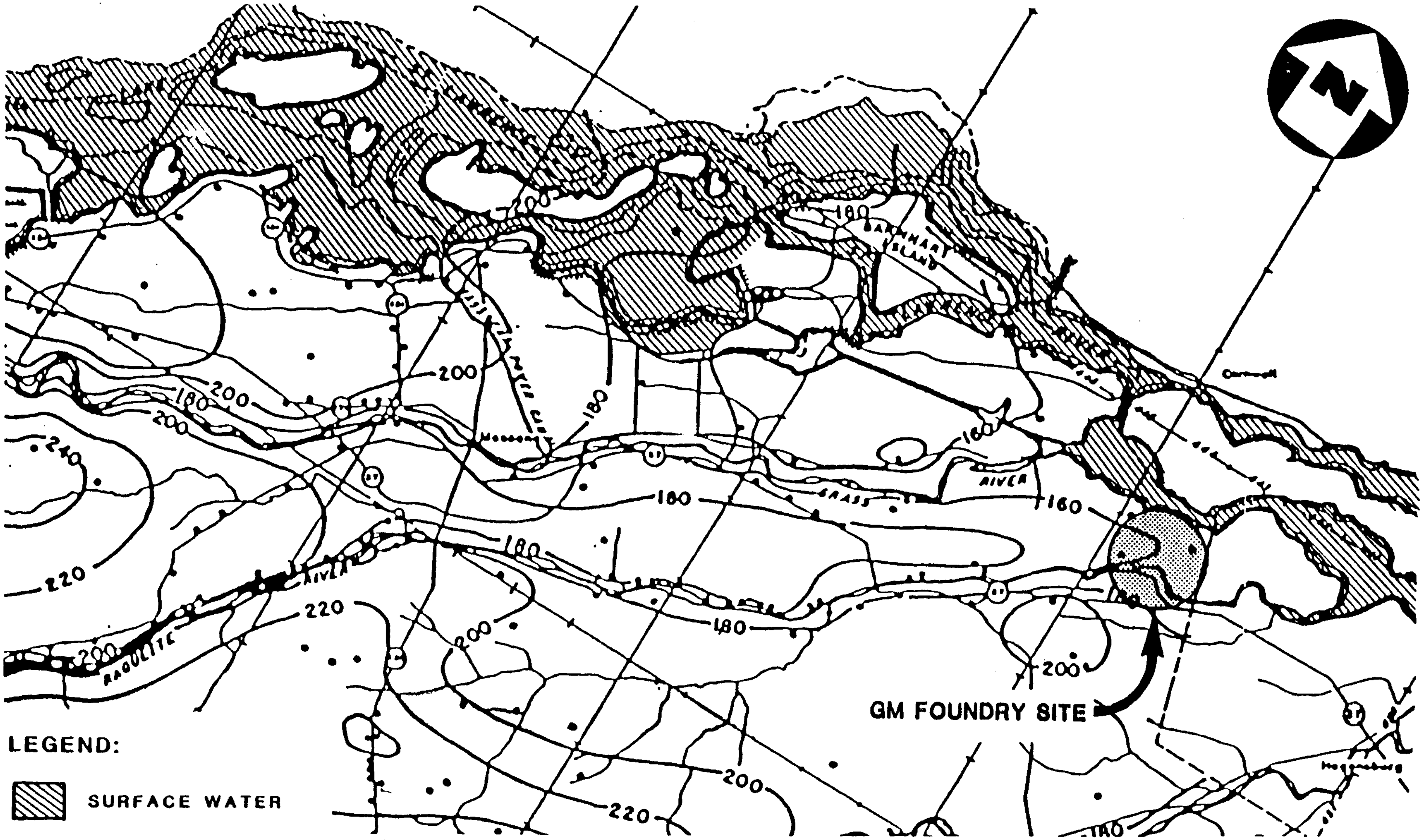
2.4.1 Extent of the Problem

The extent of onsite contamination and its contribution to offsite contamination has not been determined. The following subsections, detailing onsite and offsite sampling efforts, are derived from the general file review: North Dumping Area, East Dumping Area, industrial landfill, site surface runoff, river water quality, sediment studies, fish studies, and groundwater quality.

2.4.1.1 North ~~Dumping~~ Disposal Area

The North Dumping Area, as reported in the Dames and Moore North Area Closure Report, consists of four major components: two buried dredging pits, a backfilled interceptor lagoon, and an obsolete wastewater pumphouse. Figure 2-2 provides a map showing these details.

The two buried dredging pits contain approximately 10,000 cubic yards of soil/miscellaneous debris material, including an estimated 800,000 gallons of sludge. Each pit measures approximately 75 feet by 75 feet and is 24 to 27 feet deep. The ~~north~~ south pit was excavated in December 1971 and filled with sludge from



SOURCE: USGS BULLETIN GW #47 ALBANY, NY 1962

PIEZOMETRIC CONTOUR MAP OF ST. LAWRENCE COUNTY
GM CENTRAL FOUNDRY SITE, MASSENA, NY
NOT TO SCALE

FIGURE 2-4

NUS CORPORATION
A Halliburton Company

the 1.5-million-gallon lagoon. The ~~south~~ north pit was excavated in June 1972, and watery sludge was permitted to flow into it from the ~~north~~ south pit. Both pits were backfilled with tree stumps and various debris and covered with 5 to 7 feet of site soils. No liner was installed in either pit. The existing ground surface elevation is 180 to 185 feet above mean sea level. The current groundwater level is estimated to be 175 to 180 feet above mean sea level in the vincinity of the buried dredging pits. Total PCB concentrations in sludge and soil samples ranged from 0.1 to 36,000 ppm from 9 to 95 feet below the surface (Dames and Moore, 1982).

The backfilled interceptor lagoon contains approximately 2,000 cubic yards of sludge and debris. The lagoon measures approximately 60 by 90 feet and is from 7 to 13 feet deep. It ~~reportedly~~ has a gunite liner. It was closed in September 1976 and was backfilled with miscellaneous concrete rubble and covered with site soils. The ground surface elevation was approximately 185 feet above mean sea level until the construction in 1980 of the aeration basin, located to the south of the pit. The construction partially covered the pit with an earthen embankment. The current groundwater level is estimated to be from 180 to 185 feet above mean sea level in the vicinity of the interceptor lagoon. In 1971, a temporary interceptor pit was dug immediately to the east of the interceptor lagoon and filled with oily water when the 1.5 million gallon lagoon was drained. The oily water was later pumped back into the interceptor lagoon and then the temporary pit was filled with earth. Total PCB concentration in sludge and soil samples ranged from 3 to 1070 ppm from 12 to 22 feet below the surface (Dames and Moore, 1982).

The obsolete wastewater pumphouse is reported to have approximately 13,000 gallons of an ~~uncontained~~ uncontainerized mixture of PCB-contaminated hydraulic fluid, water and oil. The pumphouse is a metal-walled building, 20 by 30 feet, built upon a concrete vault basement.

Additional information on contents of the North ~~Dumping~~ Disposal Area is detailed in items 16, 18, and 19 in Table 2-2.

TABLE 2-2

ITEMS GENERAL MOTORS HAS IDENTIFIED AS BEING DISPOSED ON SITE

	Substance/Waste	Composition	Origin	Volume Disposed	Contained	Disposal Date	Onsite Disposal Location
1.	Core sand	Sand with phenol formaldehyde binder	Foundry sand used in sand cores for semi-permanent mold casting	Unknown	Not containerized	1959-1962	Industrial Landfill
1a.	Core sand	Sand with urea, urea formaldehyde, and furfural alcohol binder	Foundry sand used in sand cores for semi-permanent mold casting	Unknown	Not containerized	1962-1970	Industrial Landfill
1b.	Core sand	Sand with phenolic resin binder	Foundry sand used in sand cores for semi-permanent mold casting	Unknown	Not containerized	1977-1978	Industrial Landfill
1c.	Core sand	Sand with methyl diisocyanate and phenol formaldehyde, and triethylamine	Foundry sand used in sand cores for semi-permanent mold casting	Unknown	Not containerized	1978-ongoing	Industrial Landfill
2.	Oakite cleaners	Sodium hydroxide and phosphates	Various cleaning compounds	Unknown	Not containerized	1959-1980	Industrial Landfil
3.	Caustic waste	Sodium hydroxide (solid)	Used as caustic	Unknown	Not containerized	1959-1980	Industrial Landfill
4.	Ammonium bifluoride	Ammonium Bifluoride (solid)	Used to rinse caustic off parts after caustic bath	Unknown	Not containerized	1959-1980	Industrial Landfill
5.	Die lubricants (many varieties)	Primarily graphite-based lubricants	Used to lubricate dies	Unknown	Not containerized	1959-1980	Industrial Landfill

TABLE 2-2
ITEMS GENERAL MOTORS HAS IDENTIFIED
AS BEING DISPOSED ON SITE
PAGE TWO

	Substance/Waste	Composition	Origin	Volume Disposed	Contained	Disposal Date	Onsite Disposal Location
6.	Houghton LSC die lubricant (empty drums)	Aluminum pigment	Used to lubricate dies	Unknown	Not containerized	Unknown	Industrial Landfill
7.	Imprex fluid (empty drums)	Sodium silicate	Used to seal porous castings	Unknown	Not containerized	For about 2 unknown years during the 1960s and 1970-1980	Industrial Landfill
8.	Trichloroethylene degreaser (empty drums)	Trichloroethylene	Used as a degreaser	Unknown	Not containerized	Unknown	Industrial Landfill
9.	Misc. waste oils (empty drums)	Misc. oils	Lubricating and cutting oils	Unknown	Not containerized	1959-1976	Industrial Landfill
10.	Waste hydraulic fluids (empty drums)	Hydraulic fluids with PCBs	Hydraulic fluid used in die cast machines	Unknown	Not containerized	1959-1980	Industrial Landfill
11.	Wastewater treatment sludge	Oily sludge with PCBs	By-product from waste-water treatment operations and hy-draulic fluid recovery operations	Unknown	Not containerized	1976-1980	Industrial Landfill, East Area, and dump road trench
12.	Hydraulic fluid filters, hoses, pipes, cylinders, drums, equipment, and other misc. parts	PCB-contaminated articles	Articles used in the plant and on die-cast machines, contaminated with PCBs while in con-tact with PCB-laden hy-draulic fluid	Unknown	Not containerized	1959-1980	Industrial Landfill

TABLE 2-2
ITEMS GENERAL MOTORS HAS IDENTIFIED
AS BEING DISPOSED ON SITE
PAGE THREE

Substance/Waste	Composition	Origin	Volume Disposed	Contained	Disposal Date	Onsite Disposal Location
13. Tunnel sludge	PCB-contaminated sludges	Sludge and debris removed during utility tunnel cleaning operations	Unknown	Not containerized	1960-1980	Industrial Landfill and East Area
14 Dross	Aluminum impurities, chlorides, fluxing agents	Fluxing of aluminum furnaces raises the impurities to the surface for removal as dross	Unknown	Not containerized	1959-1981	Industrial Landfill
15. Misc. cleaning solvents and degreasers	Solvents and degreasers	Used for cleaning parts and equipment	Unknown	Not containerized	1959-1980	Industrial Landfill
16. PCB sludge from 1.5 mg lagoon	PCB sludge, hydraulic fluid, and water	Bottom sludge, hydraulic fluid, and water removed from 1.5 mg settling lagoon	Est. 800,000 gallons	Not containerized	1971	Buried dredgings pits (2) in North Area
17. PCB sludge from 1.5 mg lagoon	PCB sludge, hydraulic fluid, and water	Bottom sludge, hydraulic fluid, and water removed from 1.5 mg settling lagoon	Est. 1.5 million gallons	Not containerized	1973 & 1975	East Area

TABLE 2-2
ITEMS GENERAL MOTORS HAS IDENTIFIED
AS BEING DISPOSED ON SITE
PAGE FOUR

	Substance/Waste	Composition	Origin	Volume Disposed	Contained	Disposal Date	Onsite Disposal Location
18.	PCB hydraulic fluid in obsolete wastewater pump-house	PCB hydraulic fluid water and floating oil	PCB hydraulic fluid settled in pumphouse pits for reclamation	Est. 13,000 gallons	Inside concrete pits in obsolete waste-water	Not used after 1976	Obsolete wastewater pumphouse
19.	PCB hydraulic fluid in abandoned 350,000-gallon interceptor	PCB hydraulic fluid	PCB hydraulic fluid settled in interceptor lagoon for reclamation	Unknown	Gunite-lined lagoon	Not used after 1976	Abandoned interceptor lagoon
20.	PCB sludges in 350,000-gallon oily waste lagoon	PCB sludges	PCB sludges settled in lagoon during normal usage; also accumulated sludges from cleaning of adjacent process water lagoon	Est. 300,000 gallons	Not containerized	Not used after 1979	Oily waste lagoon
21.	PCB sludges under east road	PCB sludges	PCB sludges excavated during construction of east road; origin of sludges is from East Area	Unknown	Not containerized	1981	East Area

2.4.1.2 East ~~Dumping~~ Disposal Area

The East ~~Dumping~~ Disposal Area, as reported in the Dames and Moore East Area Closure Plan, consists of three major components: a backfilled sludge disposal ditch, a sludge landfill, and a former dredged sludge settling basin. Figure 2-2 provides a map showing these details.

The backfilled sludge disposal ditch, shown in Figure 2-2 as a dump road trench, is a shallow ditch along the north side of the haul road to the foundry sand landfill. It contains approximately 50 cubic yards of sludge and oily soil. The sludge was dumped between October 1976 and April 1978.

The sludge landfill contains approximately 8,000 cubic yards of sludge and contaminated soil. It consists of several pits excavated as low as 8 feet in depth. Some of the pits are uncapped and covered only with site soils. No liners were installed. The landfill was used between April 1978 and April 1980. The existing ground surface ranges from 195 to 200 feet above mean sea level. The groundwater level averages 195 feet above mean sea level. Total PCB concentrations in the sludge landfill ranged from 0.2 to 41,500 ppm, from the surface to 17 feet below the surface. Total phenol concentrations in the sludge landfill ranged from 54.3 to 890 ppm, from the surface to 17 feet below the surface (Dames and Moore, 1982).

The former dredged sludge settling basin contains approximately 6000 cubic yards of dredged sludge and contaminated soil. It was a repository for dredged soil, such as solids and liquids, and the cleanouts of the 1.5-million-gallon lagoon in 1973 and 1975. "Dredge water" covered an area of approximately 3 acres. The basin was originally excavated as a broad, shallow holding pond with an 8- to 10-foot-high berm on its eastern edge. In 1978 the sludge was bulldozed to the eastern portion of the pond (approximately east of the present chain-link fence) and covered with site soils. Sometime later additional sludge was ~~dumped~~ disposed in the basin area. This latter sludge is presently exposed. Total PCB concentrations ranged from 1.86 to 1180 ppm from 1.5 to 26 feet below the surface. Total phenol concentrations ranged from 2.2 to 96 ppm, from 1.5 to 26 feet below the surface (Dames and Moore, 1982).

Additional information on contents of the East ~~Dumping~~ Disposal Area is detailed in items 13, 17, and 21 in Table 2-2.

2.4.1.3 Industrial Landfill

The landfill covers approximately 8 acres and is about 30 feet high above natural ground level. Approximately 3 acres are active. The inactive portion is covered and vegetated.

The industrial landfill has not been investigated. Table 2-2 details materials that GM disposed in the landfill.

2.4.1.4 Site Surface Runoff

The threat of a flood by the St. Lawrence River to the site is unlikely. The river bank that borders the General Motors property is 15 to 20 feet high. Although runoff into the Raquette River may increase during the spring, the St. Lawrence River has the capacity to receive increased discharge.

Samples of bottom sediments and surface, mid-depth, and bottom waters in the 1.5-million-gallon lagoon showed concentrations of PCBs ranging from less than 5 parts per billion (ppb) to 3500 ppb. According to NYDEC records, lagoon overflows to the river occurred approximately seven times between January 1982 and September 1982.

Over the two-year period from 1982 to 1984, NYDEC records indicated that during periods of wet weather overflow, the discharge from the lagoon contained PCB levels ranging from 2.0 to 11.4 parts per billion (ppb).

2.4.1.5 River Water Quality

The NYDEC sampled the St. Lawrence River in the Massena area in September of 1982. Total PCBs were found in the water in concentrations ranging from 1.37 micrograms/liter (µg/l) downstream of the Reynold Metals Co. treated process wastewater discharge to 46.8 µg/l approximately 100 feet downstream of GM's treated wastewater discharge.

The NYDEC collected surface water samples from the St. Lawrence River in October 1983. These samples were part of the NYDEC Routine Toxic Surveillance Program. Total PCBs at concentrations of 0.77 µg/l and cadmium at 2.1 µg/l were detected in the unnamed tributary at its confluence to the St. Lawrence River, downstream of GM near the St. Regis Indian Reservation.

2.4.1.6 Sediment Studies

The NYDEC conducted limited sampling for PCBs in sediments in the St. Lawrence River near Massena, in October 1983. They found total PCB concentrations in the sediment ranging from 0.007 microgram/gram (µg/g) near the south shore of Cornwall Island between directional lights #10 and #4, to 62.0 µg/g approximately 100 feet downstream of GM's treated wastewater discharge. Total PCBs were detected at 20.9 µg/g in the unnamed tributary at its confluence with the St. Lawrence River, downstream of GM near the St. Regis Indian Reservation.

2.4.1.7 Fish Studies

The NYDEC collected and sampled fish from the St. Lawrence River in 1979 and 1980. They found residue concentrations of PCBs in three spottail shiners ranging from 212 nanograms/gram (ng/g) (wet weight) to 274 ng/g (wet weight) near the International Bridge. At the same location they found residue concentrations in four Yearling Perch ranging from 123 ng/g (wet weight) to 153 ng/g (wet weight).

Four Rock Bass and four Fall Fish were caught above Massena. The concentrations of PCBs in the Rock Bass ranged from 0.10 µg/g (wet weight) to 0.24 µg/g (wet weight). The concentrations in the Fall Fish ranged from 0.08 µg/g (wet weight) to 0.52 µg/g (wet weight).

Two Pumpkinseed, two Small Mouth Bass and one Black Crappie were caught below the Power Dam. The concentration of PCBs in the Pumpkinseed were 0.17 µg/g (wet weight) and 0.26 µg/g (wet weight). The concentration of PCBs in the Small Mouth Bass were 0.06 µg/g (wet weight) and 0.10 µg/g (wet weight). The concentration of PCBs in the Black Crappie was 0.52 µg/g (wet weight).

Six Rock Bass, one Northern Pike and one Fall Fish were caught at the Reynolds Aluminum outfall. The concentrations of PCBs found in the Rock Bass ranged from 1.60 µg/g (wet weight) to 3.82 µg/g (wet weight). The concentration in the Northern Pike was 7.10 µg/g (wet weight) and in the Fall Fish was 2.53 µg/g (wet weight).

2.4.1.8 Groundwater Quality

Dames and Moore installed 28 onsite monitoring wells in 1979 and 1980. The depths of these wells vary from 18.5 feet below the ground surface to 129.0 feet. Dames and Moore sampled these wells from 1979 through 1981 and report PCB concentrations ranging from 0.02 µg/l to 1500 µg/l and phenol concentrations ranging from 0.01 milligram/liter (mg/l) to 312 mg/l.

2.5 Health Risks

The identification of chemical contaminants disposed on the GM Central Foundry Division Site and the routes of offsite migration for these contaminants raise concerns for possible adverse health effects among the Akwesasne Mohawk community. These native Americans reside on the St. Regis Indian Reservation, which is adjacent to the eastern boundary of the GM Central Foundry Division Site. Of concern are direct and indirect exposures of the Mohawks to various organic, chlorinated organic, and heavy metal contaminants found onsite and present in environmental samples. Particular concern exists for exposure to PCBs.

Waterborne and airborne transmission potentially provides direct routes of exposure. The residents of the St. Regis Indian Reservation obtain their drinking water from a number of sources including

- Groundwater wells, either shallow, dug wells 10 to 30 feet deep, or deep, drilled wells 70 to 300 feet deep.

- Public surface water intakes on the St. Lawrence River located downstream of the GM Central Foundry Division Site. These include the St. Regis Mohawk public water supply and the St. Regis Village Quebec public water supply.

Contaminant burdens in dietary organisms provide the greatest contribution to PCB intake by the potential receptors. Although the Akwesasne Mohawks traditionally led a life of fishing, trapping, farming, and cattle husbandry, more recent environmental concerns have affected their reliance on this traditional way of life. Decreased consumption of fish taken from local waters has resulted. However, fish, fowl, and other wildlife caught or trapped locally still comprise a portion of the diet of some Mohawks. The water, sediment, and biota of the St. Lawrence and Raquette Rivers have been studied by various Canadian and New York State agencies since the 1970's. Study has focused on water and sediment quality and contaminant levels in biota. PCBs have been the major contaminants of concern. Hot spots of PCB contamination greater than 50 ppm have been found in the St. Lawrence River. Measurable levels of PCB in the low ppb range have been found in the water column of these waterways. PCB levels in fish approach the U.S. Food and Drug Administration's action level of 5 ppm.

The Mohawks from the St. Regis Indian Reservation have been the subject of a recent medical survey. This study focused on environmental exposure to contaminants, measurements of accumulated body burdens, and the identification of adverse health effects. Information was sought on exposure to fluorides, methyl mercury, Mirex, and PCB. The medical survey report was scheduled for release in late June of 1984.

In terms of a health risk assessment for the Mohawk people, exposure to contamination from the above-mentioned potential sources needs to be determined and evaluated. This is of importance for contaminants like PCBs, where body burdens accumulate with exposure.

2.6 Deficiencies in the Existing Data

The following data gaps have been identified after performing a general review of EPA and NYDEC files:

- A risk characterization has not been performed.

- Air quality data are not available.

- Information on food sources grown for consumption and wildlife consumed by the local residents is not available.

- Physical/chemical character and volume of all wastes ~~dumped~~ disposed in each area of the facility, including the active landfill area, are not available.

- The environmental transport and fate of contaminants have been inadequately addressed.

- Direction and velocity of groundwater flow have not been conclusively determined.

- Confining marine clay soil layer in the area has not been adequately investigated.

- Bedrock aquifer data is insufficient.

- The sandy subsurface layer at the eastern end of the property has not been conclusively assessed.

- A detailed history of the site is not available.

3.0 TECHNICAL APPROACH (RI/FS SCOPE OF WORK)

3.1 Introduction

Section 3 presents the technical approach to be implemented at the GM Central Foundry Site. The technical approach includes the Initial Activities, Remedial Investigation, and Feasibility Study, which are described in Sections 3.2, 3.3, and 3.4, respectively.

Initial activities at the site will include collection and assessment of pertinent site data prior to commencement of the Remedial Investigation and Feasibility Study tasks. The initial activities tasks are discussed in Section 3.2.

The Remedial (site) Investigation will determine the extent and nature of wastes on site and the environmental contamination resulting from these wastes. The Remedial Investigation will produce data of adequate technical quality for evaluation of remedial alternatives during the Feasibility Study. The Remedial Investigation is described in Section 3.3.

The Feasibility Study will identify and evaluate the appropriate remedial actions for the site, based on existing data and information gathered during the Remedial Investigation. The most cost-effective remedial alternative will be recommended. The Feasibility Study is described in Section 3.4.

3.2 Initial Activities (Phase I)

A total of 6 tasks have been identified for the initial activities phase.

Task 1 – Remedial Investigation/Feasibility Study Work Plan Preparation *(completed)*

The effort necessary to prepare this Work Plan is designated as Task 1 of the initial activities phase. This Work Plan outlines the initial activities phase and Remedial Investigation phase and briefly outlines the tasks currently perceived for the

Feasibility Study. A Work Plan for the Feasibility Study phase will be further developed in Task 11.

Task 2 – Project Management

This task will continue through the duration of the RI/FS. Project management costs will be charged to this task. ~~These charges~~ This task includes ~~costs related to~~ project coordination, budget and schedule oversight, monthly reporting on project progress to the EPA, and interface requirements with GM, the EPA and NYDEC and coordination of report preparation.

Task 3 – Community Relations (EPA)

Community relations support provided by the RI/FS Contractor ~~(NUS Corporation)~~ will be at the request of the EPA and may include logistical support for the planning and execution of the activities at the site, as well as technical support to ensure that all information is accurate and current. Due to the nature of public involvement, community relations input must be flexible to accommodate public interest and to complement technical progress at the site. ~~NUS will~~ The contractor may assist the EPA in presenting the findings of the RI/FS to the public. This task will continue throughout the duration of the RI/FS and will be a ~~REMPO~~ contractor's support under Task 17.

Task 4 – Quality Assurance

Quality assurance requirements will be based upon the ~~general NUS~~ EPA's Quality Assurance ~~Project Plan~~ requirements. These requirements will refer to or include site-specific details on sampling; field testing; surveying; chain-of-custody; sample handling, packaging, preservation, and shipping; and recordkeeping and documentation. Appropriate ~~NUS~~ contractor's quality assurance requirements will be imposed on all subcontractors. Analysis requirements, in addition to those listed ~~in the CLP~~, will be given along with any other procedures needed for RI/FS work or work related to the site. This task will continue throughout the duration of the RI/FS.

Task 5 - Technical Support

This task will include any effort required to support regional coordination and management of subcontracts. The task will continue through the duration of the RI/FS.

Regional Coordination

The above task covers also the efforts of the contractor ~~Region II Coordinator of the Remedial Planning Office (REMPO)~~ to maintain liaison with the EPA Regional Project Officer. This interface requirement is outlined in more detail in Section 4.1

Task 6 - Preoperational Planning

Collect and Evaluate Existing Data

All existing studies and data will be collected and evaluated so that gaps in the data can be identified. Once the significant gaps in the data are identified and their relevance to the RI/FS is assessed, the scope of the RI can be adjusted to obtain the necessary data.

Several studies have been conducted at the site. Dames and Moore has evaluated closure plan alternatives for the North and East Dumping areas. St. Lawrence University completed two community service reports for the St. Regis Mohawk Health Services. One report studied groundwater pollution by PCBs in the vicinity of Raquette Point and the other addressed environmental conditions created by the industrial landfill operated by GM (Bobrow et al., 1983, and Catlin et al., 1983). In addition to the reports mentioned, a general review of the following files was conducted:

- EPA Resource Conservation and Recovery Act (RCRA) Permit files
- EPA Toxic Substance Control Act (TSCA) Enforcement files
- NYDOH Massena files

- NYDOH Saranac Lake files
- NYDEC files

For reference purposes, all information will be initially screened, and relevant data will be summarized in a reference list. Major reports will be summarized to provide a brief overview of the report contents, source, status, and critical comments, etc. Analytical data will be reviewed and evaluated. Additional data requirements, not addressed by this Work Plan, will be identified at that time.

Health, Safety, and General Site Reconnaissance

An initial site reconnaissance will be conducted by an investigation team to verify and document present site conditions, and to gain first-hand insight into the degree of hazard-potential for future planning purposes. The site reconnaissance will achieve several specific goals, as follows:

- The investigation team will meet with personnel from GM, the EPA and the NYDEC to exchange site information and to discuss the nature of site conditions and hazards.

- Visually inspect the site to assess particular health and safety hazards, and to delineate contaminated zones where different levels of protection and/or site limitations may be required during subsequent field activities. Any such conditions will be located on a preliminary field plan drawing and will be photographically documented. Surface soil and/or water samples will be recommended if evidence of contamination is suspected.

- Conduct a preliminary air quality investigation using portable meters. These will include oxygen and lower explosive limit (LEL) meters to document any zones of oxygen deficiency and to monitor the explosive potential of the atmosphere. Organic vapor meters (OVM), flame ionization detectors (FID), and a photoionization detector (PID) will also be used to monitor organic vapors. A FID will be required at a minimum, since methane may be detected along with other volatile organics.

Colorimeteric tubes will also be used for specific gas detection, in particular vinyl chloride.

- Perform a preliminary geologic and hydrogeologic field reconnaissance to provide input to subsequent RI tasks. This would include an overview of the topographic conditions, drainage patterns, soils, groundwater discharge points, geologic patterns, etc., so as to refine the proposed locations of wells, borings, and sampling points.

Permits, Rights of Entry, and Other Authorizations

Site investigation activities, such as drilling and monitoring well installations within and beyond the GM Central Foundry Division Site property boundaries, may require permits, rights-of-entry, access, and other authorizations. The EPA is responsible for obtaining access and rights-of-entry onto the investigation locations. Field activities will not be initiated until appropriate site access has been authorized and obtained by EPA.

~~Subcontracting~~

~~The following elements of work are under consideration for subcontracting:~~

- ~~Topographic Mapping and Ground Surveying~~
- ~~Well Installation, Drilling, and Monitoring~~

~~Specifications for each subcontracting item will be prepared during this task. The subcontractors will be obtained using the procedure outlined in Section 4.3, Procurement. The process of advertising for and evaluating bids will begin upon receipt of EPA authorization.~~

Topographic Map (*May be provided by GM*)

Two topographic maps will be prepared by aerial photogrammetry, one for the site itself and one for the vicinity of the site. The approved subcontractor will establish horizontal and vertical ground control as required by the photogrammetrist. Field crews will establish and construct points that will be visible on the aerial photographs. The topographic survey for the vicinity should include the site, and all potential monitoring-well locations.

The site will be photographed in suitable weather and visibility by the approved subcontractor. Specific flight parameters, such as speed, number of flight lines, photographic exposure interval, and flight altitude, will be controlled by the photogrammetrist to provide for a proper and completely finished topographic map.

The topographic maps will be prepared on a single, scribed, double matte, 3 mil, washoff mylar with reversed image. The topographic map of the site and adjacent area (300 acres) will have a horizontal scale of 1 inch = 200 feet and a contour interval of 2 feet. The topographic map that is proposed to include the vicinity of the project (1210 acres) will have a horizontal scale of 1 inch = 400 feet and a contour interval of 10 feet. The topographic contour should be made to National Geodetic Vertical Datum (NGVD). A grid coordinate system will be established based on the highest order of accuracy control points available in the immediate vicinity of the site.

Control points to be considered include, but are not limited to, State plane coordinate system, USGS monuments, Army map service monuments, or County highway monuments. Mapping and ground surveying will be completed to the National Map Accuracy Standards for the scale indicated.

Site Operations Plan

A single Site Operations Plan (SOP) will be developed to serve as a detailed guide for all activities to be conducted at the site. The SOP will contain the following, at a minimum:

- Final Work Plan
- Site-Specific Health & Safety Plan
- Applicable Quality Assurance Protocols

- Applicable Operating Guidelines
- Standard Forms
- Maps & Plans
- Miscellaneous References

Operations will be conducted in accordance with the ~~NUS~~ EPA approved Superfund Operating Guidelines. Operational contingencies will be presented for many commonly experienced field problems, such as equipment breakage. The chain-of-command necessary for the approval of any other onsite contingency actions that represent a change of scope will be identified. A detailed anticipated schedule of field activities will also be included in the SOP. This schedule will be consistent with the master schedule contained herein.

Sampling locations will be identified for the soil, surface water, groundwater, and sediment samples. These locations will be based on site data obtained during the initial field reconnaissance and from the detailed review of existing reference sources and data.

The SOP will be submitted to, and will require the approval of, the EPA prior to the performance of site activities.

Field Equipment Mobilization

The equipment needed during the Remedial Investigation will be provided by ~~NUS~~ the contractor or by its subcontractors. Equipment scheduled for use may include~~s~~:

- Field office trailer with padlocks
- Surveying equipment
- Drill rig (Subcontractor)
- Geophysics equipment
- Sampling tools and equipment
- Health and Safety equipment
- Decontamination equipment

Small equipment will be stored in a secure field office trailer. The placement of the trailer and decontamination facilities will be specified in the SOP. The drill rig will remain on site in a secure location.

Prescreening Air Monitoring

Prescreening air monitoring for the entire site will be conducted using portable direct reading instruments. The monitoring pattern to be followed will be developed and documented in the SOP.

Monitoring for organic vapors will be conducted to determine their presence or absence. Organic vapor analyzers (OVAs) will be used to survey the study area to establish background and determine the presence of any "hot" spots of organic vapors on site.

Inorganic gases will be monitored specifically to determine the presence or absence of hydrogen sulfide and sulfur dioxide. These gases will be sampled with colorimetric dosimeter tubes and personal monitors. Sample results will be compared to worst-case meteorological and background conditions.

Air Sampling

Air sampling will be conducted as required to assess ambient air quality and to aid in recommending levels of respiratory protection for field crews during site activities. Air samples will be collected if potential "hot" spot areas are detected during prescreening air monitoring. Solid sorbent trapping methods will be used to collect air samples at each "hot" spot location identified. Guidance for solid sorbent trapping methodology is provided in Guidelines for Sampling of Organic Vapors in Ambient Air prepared by NUS for EPA.

Air samples will be collected and analyzed to determine the presence or absence of EPA volatile organic priority pollutants. Tenax and coconut activated charcoal sorbent collection tubes will then be used to collect grab samples. The traps will be field analyzed on a ~~Photovac~~ portable gas chromatograph ~~10A10~~. Absolute qualitative and quantitative analysis will not be possible in the field. However, comparison of hot spots and background samples will be indicative of any problem areas on the site.

3.3 Remedial Investigation (Phase II)

Task 7 - Hydrogeologic Investigation

Groundwater Monitoring Program
Existing groundwater monitoring data, as appropriate, will be utilized as background information.
A drilling program will be conducted to:

- Define the local geology of both bedrock and glacial aquifer
- Install monitoring wells so that groundwater can be sampled and hydraulic head can be measured
- Sample the unconsolidated material to define lithology, stratigraphy, physical properties, and nature of contamination
- Conduct permeability testing in the unconsolidated and bedrock material
- Determine the thickness and configuration of aquifers
- Determine the rate and the direction of groundwater flow, in both plan view and in cross section
- Define the nature of existing groundwater contamination
- Evaluate the potential for future groundwater contamination

Eleven
~~Ten~~ clusters of three monitoring wells per cluster are proposed for installation at this site as shown in Exhibit 1. A "cluster" is a group of monitoring wells installed in closely spaced holes and set to different depths. Clusters allow for examination of variations in hydraulic head and groundwater chemistry with depth.

The proposed well locations are preliminary and may be adjusted based on further definition of site conditions and on newly available data. Cluster locations are based upon a review of local geology and hydrology. Each monitoring well cluster location will consist of three separate monitoring wells: a deep bedrock system well, an intermediate depth unconsolidated sediment well, and a shallow depth unconsolidated sediment well. Construction details for the monitoring wells are provided in Figures 3-1. The deepest borehole will be drilled and installed first at each location.

Drilling

Borings drilled for the installation of deep monitoring wells should be advanced using the driven-casing drilling method. The hole will be advanced through a 6-inch-diameter steel casing. Standard Penetration Tests (ASTM D-1856) and split-spoon sampling should be performed every 5 feet or lithology change, as determined by the site geologist throughout the drilling process. An undisturbed sample of the till or clay will be obtained by using a thin-walled tube sampler (Shelby tube, ASTM D-1587). The split-spoon sample will be analyzed for grain-size distribution. The Shelby tube sample will be analyzed for grain-size distribution, and the laboratory hydraulic conductivity test will be performed on the samples.

The samples will be logged and stored in moisture-tight jars for future reference. The site geologist/hydrogeologist will provide a detailed log of all subsurface conditions encountered. The sampling will be completed at the bedrock surface. The 6-inch driven casing will be anchored at least one foot into the bedrock and a 4-inch, flush-joint, threaded, stainless-steel riser pipe will be anchored at least 1 foot into the bedrock and extend approximately 2 1/2 feet above ground surface. The annular space between the 4-inch stainless-steel casing and the 6-inch outer

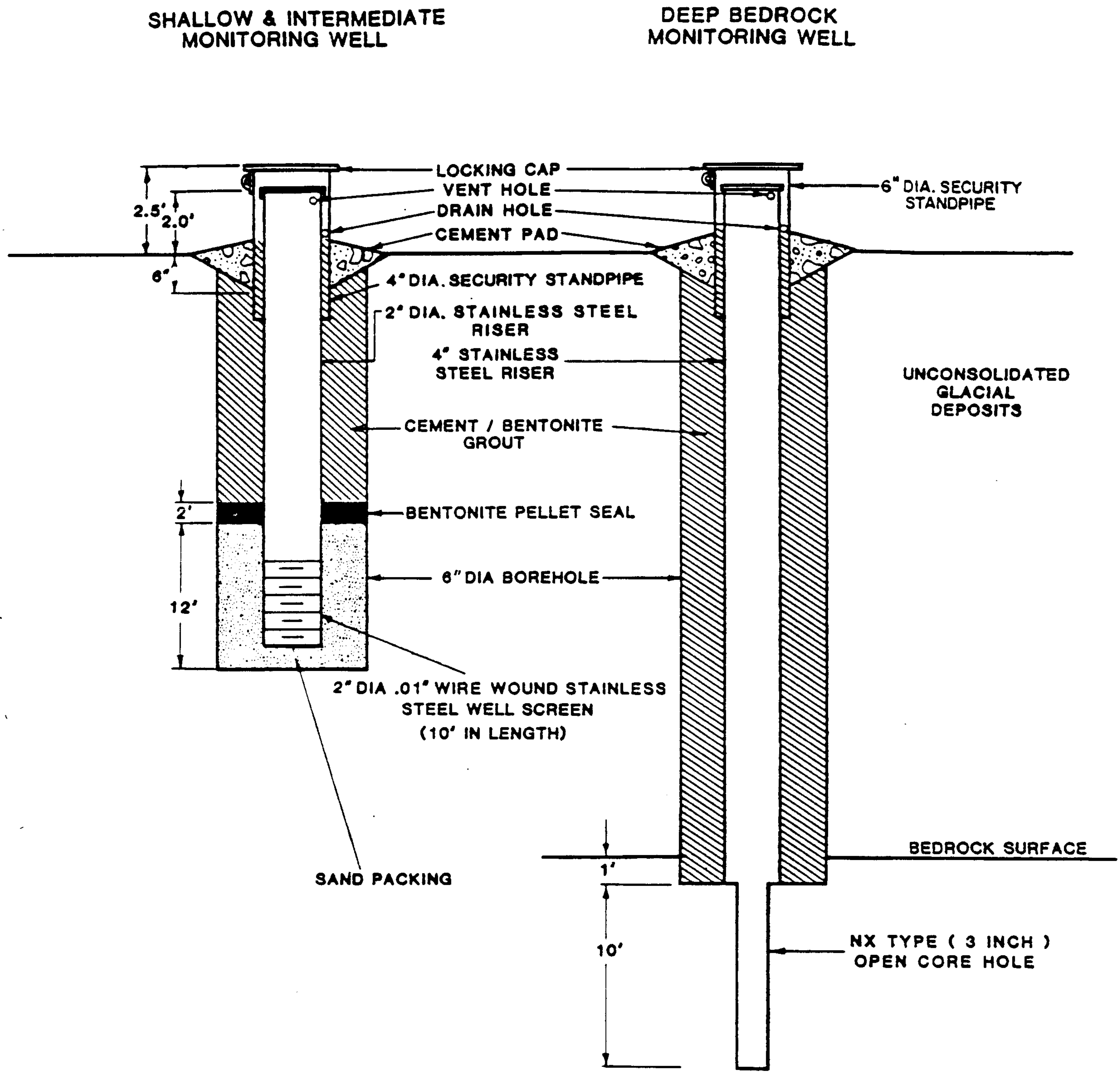


FIGURE 3-1

PROPOSED MONITORING WELL CONSTRUCTION DETAILS
GM CENTRAL FOUNDRY SITE, MASSENA, N.Y.
(NOT TO SCALE)

NUS CORPORATION
A Halliburton Company

casing will be tremie grouted with a cement/bentonite grout mixture. The 6-inch casing will then be removed in 5-foot sections to ensure a complete grout seal within the annular space between the 4-inch casing and the open borehole. All steel casings will be thoroughly decontaminated prior to reuse.

The boring will then be advanced through the 4-inch casing to at least 11 feet below the bedrock surface using an NX-type, 3-inch core barrel. At least a 10-foot length of rock core will be obtained for geological logging, which will include rock type, recovery, and joints or fractures.

A 6-inch-diameter protective steel security standpipe with locking cap will be installed over the 4-inch well casing and extend approximately 2 1/2 feet above ground surface.

One deep bedrock borehole will be sampled during drilling. The borehole will be logged for gamma ray borehole geophysical log prior to installing the 4" well casing and grouting. This gamma ray log will provide the lithology of the borehole. The geological information obtained from the gamma ray log and split-spoon soil sampling activities will be used to determine the screen settings of the intermediate and shallow wells. The remaining nine deep bedrock system monitoring wells will be drilled without sampling if results of the gamma survey are of sufficient quality to identify strata changes. The wells in unconsolidated material will not be sampled by split-spoon or Shelby Tube, or geophysically logged unless directed by the site geologist. During all the drillings, samples of cuttings will be examined and logged by the site geologist.

The unconsolidated well borings will be drilled with the same method as the bedrock well, drilling or using 6-inch ID auger rig. The depth of the unconsolidated hole will be determined based on the information obtained from the deep borehole. The shallow unconsolidated wells will extend deep enough to monitor the upper 10 feet of the saturated zone of the unconsolidated material.

Well Installation

The deep bedrock monitoring wells are open-borehole wells. The 2-inch monitoring wells will be installed in the unconsolidated material.

A 10-foot length of 2-inch diameter, bottom capped, stainless-steel, wire-wound well screen (0.010 inch slot aperture) and flush-joint, threaded, stainless-steel riser pipe will be installed to the base of the boring, and will extend to 2 feet above the ground surface.

A filter sand pack will be installed around the well screen and extend to approximately 2 feet above the top of the screen section. The 6-inch casing will be removed in 5 foot sections during the installation of the packing and grouting materials. All steel casings will be thoroughly decontaminated prior to reuse. A 2-foot-thick bentonite pellet seal will be installed on the filter sand pack. The annular space between the 2-inch-diameter casing and the open borehole will be tremie grouted with a cement/bentonite grout mixture. A 4-inch-diameter protective steel security standpipe with locking cap will be installed over the 2-inch well casing and will extend approximately 2 1/2 feet above ground surface. The protective casing will be marked with well identification number.

All monitoring wells will be surveyed for location and elevation. The data at each well will include elevations from ground surface, top of outer casing elevations (with cap removed) and top of inner casing elevation (where applicable).

As much information as possible on subsurface conditions will be collected during the drilling operation.

A portable photoionization detector will be used in the field to detect any contaminants in the subsurface layers.

Well Development

Monitoring wells will be developed after installation to remove fines and to clean the wellscreens.

They will be developed by pumping and surging. Each well will be pumped dry or until fines have been removed and water is visibly free of sediments. This process will clear the well screen and induce flow from the formation into the well. In the event that pumping does not prove effective, an air surge/lift method will be used to develop the well. This process involves pumping compressed air down the casing to lift the column of water to the surface. The quality of evacuated water will be checked to identify suitable storage or treatment.

Prior to development and after development, the water levels in the well will be measured and recorded.

In-Situ Hydraulic Conductivity Testing

Hydraulic conductivity tests will be performed on all completed monitoring wells. A rising-head, in-situ, hydraulic conductivity test will be conducted for each well in the 10 clusters. With the aid of an air-tight cap, compressed air will increase the pressure in the riser pipe and will force water back into the formation. A compressor or bottled air will be required to raise the casing pressure. Following a 2-foot drop in hydrostatic head, the pressure will be released. An Envirolabs DL 240 pressure transducer will measure the rising head and provide information to calculate a flow rate.

Water Level Measurement

Water levels will be measured in each well immediately after the well development. Water level in all the wells will be measured initially upon completion of the monitoring well installation program and monthly thereafter for a period of 8 months.

Water levels will be measured ~~with a SOILTEST water level indicator or chalk and steel tape method~~. *using an EPA approved method.* If a two-phase system is encountered, water levels will be measured with an oil-water recorder. A resistor-type water-level indicator will serve as a backup if problems arise with the more sensitive instruments.

<u>Interpretation</u>

After the wells have been surveyed and added to the site plan, water levels have been measured, and samples have been collected, a complete geologic and hydrogeologic interpretation will be made. This interpretation will include

- Geologic cross sections
- Aquifer isopach maps
- Water-table/piezometric-surface maps and cross sections
- Flow net construction and interpretation
- Isochemical maps and cross section
- Determination of the pattern of groundwater flow in three dimensions
- Determination of hydraulic gradients
- Calculation of hydraulic conductivity, storage coefficient, transmissivity and saturated thickness
- Calculation of rate of groundwater flow
- Interpretations of groundwater chemistry as it relates to groundwater flow
- Input for groundwater flow and contaminant transport simulation

The information will allow for the evaluation of the nature of existing groundwater contamination, impact on the nearby stream and supply wells, the potential for future groundwater contamination, and the magnitude of the overall problem.

Task 8 - Surface Water Investigations

The program has been designed using PCB as an indicator of site-specific contaminant input. PCB has a very low solubility in water. In natural aqueous systems, solid-particle PCB aggregates form rapidly and settle to the benthos. Concentrations of soluble PCB do not alone accurately characterize the environmental load. Intensive physical/chemical sampling of the area surface waters will be confined to sediments. Surface water samples will be taken at selected stations. No biological sampling will be done in the surface waters. Bioaccumulation of PCBs has been documented extensively in some of the literature listed in Section 2.1. With natural seasonal, spatial, and physiological variability, specific bioaccumulation pathways could not be defined within the scope of this study.

Sediment Sampling

The sediment sampling survey will be conducted in the St. Lawrence River, the Raquette River, and the unnamed tributary in the St. Regis Indian Reservation, as shown in Exhibit 1. Approximately 45 core samples will be taken.

Intensive sampling will be confined to the shoreline area off the General Motors site, in the St. Lawrence River. The discharge pipe from the 1.5-million-gallon lagoon discharges into this area. Current studies have shown that constant eddying occurs in this region. The flow conditions would tend to promote localized settling of PCB-sediment aggregates originating from the GM Central Foundry Division Site.

Core samples will also be taken at four additional stations in the St. Lawrence River, four stations in the Racquette River, and at six locations in the unnamed tributary, to provide information on background levels of contaminants. Single cores will be taken at the Raquette River and the unnamed tributary stations. At each of the St. Lawrence River control stations, a cluster of five core samples will be taken. The cluster refers to 5 core samples taken at the same general location and depth. The depths of core samples will be either five feet or until rock is reached, which ever is encountered first. At the other 15 stations in the St. Lawrence River, single core samples will be taken.

All survey work will be horizontally and vertically controlled. Horizontal positioning of the survey vessel will be established using an electronic navigation system such as the Motorola Miniranger III or Autotape DM 40 systems. The locations of the shore transmitters are shown in Exhibit 1. Transmitter locations will be tied into the USGS grid. The horizontal control will allow sampling point recovery and accurate mapping of the data. Vertical control during the surveys will be provided through continous readings of water level vertically tied in to USGS benchmarks.

Prior to final sampling point selection, an initial survey will be done including side scan sonar/magnetometer reading, high resolution bathymetry, and core sampling of sediments and sediment trap samples.

Side scan sonar/magnetometer runs will be done in the St. Lawrence River off the site. East-west transects will be spaced at 50- to 100-intervals. The data will be used to accurately define the benthic surface and locate discharge pipes from the site lagoons. High resolution bathymetry will be done along the same transects to establish the depth of unconsolidated sediments in the area.

The data will be used to determine the distribution of core samples needed to characterize inputs of contaminants from the GM Central Foundry Division Site. It will also allow predetermination of coring depths at each site.

Sediment cores will be taken using vibracoring equipment. Vibracoring will allow intact cores of the fine sediments expected in the area. The intact cores will be used to investigate whether temporal trends in contaminant loading of the St. Lawrence and Raquette Rivers have occurred. Sediment traps will be used to determine sedimentation rates. The traps will be left in situ for 8 months. Samples will be recovered monthly. This information will allow dating of subsamples taken along the sediment cores for PCB analysis. The same equipment will be used in the Raquette River. Sediment samples in the St. Regis Indian Reservation stream will be taken using conventional coring devices.

All core samples and subsamples will be analyzed for PCBs. Approximately 10 percent of the core sample will be run for Hazardous Substance List (HSL) pollutants.

Surface Water Samples

Surface water samples will be taken at the general locations shown in Exhibit 1. Final locations will be selected in the field and documented as described for sediment sampling. The samples will be grab samples taken at mid-depth. Sampling will be done with 1-liter Kemmerer samplers.

Task 9 - Sampling and Analysis

Table 3-1 summarizes the proposed environmental sampling and analysis program. All samples collected will be analyzed for the HSL pollutants. More specific collection procedures and analyses will be detailed in the SOP.

Sampling efforts are broken down into the following ~~six~~ *seven* categories:

- Groundwater Quality
- Lagoon Discharge
- Surface Waters
- Sediments
- Soil Borings
- Surface Soils (Onsite and offsite)
- Potable Water Supply

TABLE 3-1

SUMMARY OF PROPOSED ENVIRONMENTAL SAMPLING AND ANALYSIS PROGRAM
GENERAL MOTORS CENTRAL FOUNDRY DIVISION SITE

Medium	Analytical Parameters	Number of Samples
Groundwater	PCB	*126
	HSL	*126
Surface Water	PCB	* 28
River Sediment	PCB	45
	HSL	5
Lagoon Sediment	PCB	* 6
	HSL	* 2
Discharge from Lagoon	PCB	* 2
	HSL	* 2
Onsite Surface Soil	PCB	*160
	HSL	* 40
Offsite Surface Soil	PCB	40
	HSL	10
Subsurface Soil	PCB	300
	HSL	60
Potable Water Supply	PCB	* 6
	HSL	* 6

Summary
Total PCBs = 713 - Non CLP
Total HSL = 251 - by CLP
Grand Total = 964

NOTES:
HSL = Hazardous Substances List
PCB = Polychlorinated Biphenyl
* = Denotes Two Sampling Rounds

Groundwater sampling is from 33 newly installed groundwater wells and approximately 30 wells in the St. Regis Indian Reservation.

Groundwater Quality

In order to determine the groundwater quality in bedrock and overburden aquifers, water samples will be collected from the 33 (11 clusters of 3 wells each) newly installed monitoring wells and the private wells on the St. Regis Indian Reservation. The number of private wells on the St. Regis Indian Reservation is not determined at this time, but approximately 30 wells have been identified. Results of the initial sampling round will determine the necessity for further sampling on the Indian Reservation.

For the groundwater monitoring wells, three to five well volumes will be evacuated prior to sampling. The exact volume is dependent on well recovery time. For the St. Regis Indian Reservation residential wells, the water will be allowed to run for 15 to 30 minutes before sampling. These samples will be taken from a point closest to the well and before any treatment.

Monitoring wells will be sampled by a three-phase program in conjunction with the drilling plan. The three upgradient wells will be completed and sampled first. A 2-week turnaround will be requested for laboratory analysis. The three downgradient wells will be sampled next. Groundwater samples will be collected with stainless-steel or Teflon bailers. All sample collecting equipment will be thoroughly decontaminated before collecting each sample.

Two sampling rounds are anticipated for the onsite wells. The first round of sampling will include the following chemical parameters:

- HSL organics and inorganics, except dioxin
- PCBs
- Specific Conductance (field)
- COD

- pH (field)
- Major anions (HCO_3, CO_3, NH_3, NO_2, PO_4, SO_4)
- Major cations (Ca, Mg, Na, K)
- Acidity/alkalinity
- Total Dissolved Solids
- Primary drinking water standards not included in any of the above parameters.

The second round of sampling will be readjusted following receipt of validated analyses from the first sampling round. A reduced sample parameter list will probably be analyzed; however, the list may be expanded if contaminants other than those previously identified on site are suspected. For the purpose of costing, it is assumed that the second sampling round is identical to the first sampling round.

Lagoon Samples

Two sampling rounds are anticipated for each lagoon sample. Three sediment samples are to be taken in the 1.5-million-gallon lagoon, one sample each at three separate locations. Final locations will be selected in the field after a complete survey is performed.

A sample of the discharge from the 1.5-million-gallon lagoon will be taken during wet weather. The exact location of the discharge is not known at the present time. The location will be finalized after completely reviewing all files and after the site survey is performed.

In the event that well cluster #4 shows evidence of groundwater contamination, a sampling program for the 10 million gallon lagoon will be developed and implemented during the second sampling round.

Surface Water Samples

Fourteen surface-water samples will be taken during each of the two sampling rounds. Exhibit 1 provides approximate locations. The surface water sampling methodology is detailed in Task 8.

Sediment Samples

Sediment samples will be taken only once at the same locations as the surface water samples.
Further discussion of sediment sampling methodology is detailed in Task 8.

Soil Boring Samples

Exhibit 2 provides a site location map of the soil borings. One sampling round with a total of 40 to 50 borings is proposed. This shallow soil boring program will provide information on the nature and the extent of contamination.

Borings will be advanced by a drive-and-wash method. This procedure will diminish the possibility of cross-contamination. Steel casing is driven to a predetermined depth. Sediments inside the casing are drilled out with a roller bit and carried to the surface by circulating fresh water. The soil borings will extend beneath the dumped material into soils identifiable as natural deposits. Should extremely permeable deposits be encountered beneath the dumped materials (i.e., gravel, sand), the borings will extend to the shallowest less permeable deposit encountered (i.e., silt, clay, till) as determined by the onsite geologist.

Air monitoring will accompany the boring activities to assure the safety of the sampling personnel. Continuous split-spoon sampling will precede the boring. Sample frequency is subject to change by the site geologist. Each sample will be scanned with air monitoring equipment as it reaches the surface.

Upon completion of sampling, the borehole will be filled to the surface with cement/bentonite grout. The grout will seal the strata and prevent cross-contamination through the borehole. The riser pipe will be tremie grouted and immediately removed, leaving cement in contact with the borehole wall. Grout will be a mixture of six parts Portland type I cement to three parts water to one part bentonite. Proportions are subject to change by ~~the NUS~~ GM and EPA onsite coordinator.s.

A 4-inch Inner Diameter (I.D.) galvanized steel, flush-joint casing will be used. No grease or lubricants of any kind will be used when attaching the sections of pipe. A 2-inch O.D., split-spoon sampler will be used to collect all samples. All casing, spoons, and other equipment will be thoroughly decontaminated before moving to the next location.

All soil borings will be surveyed for location and ground elevations.

Onsite Surface Sampling

A survey will investigate locations which may not have been documented in site records or aerial photographs. A general surface inspection will be conducted in order to assure that the site is investigated completely. The inspection will consist of a walking reconnaissance of site properties to the north and south of Route 37, at which time sample locations will be decided. Samples will be collected from wetlands and any area which appears to have been excavated or filled. Areas of interest will include ponds, marshes, excavated areas, and areas where excavated material was stored in mounds. All of these features are located between Route 37 and the foundry. Two sampling rounds are anticipated.

Offsite Surface Sampling

Due to airborne and surface runoff contamination that may exist, offsite surface sampling will be conducted on the St. Regis Indian Reservation. As shown in Exhibit 1, an approximate 1000-foot wide section will be utilized for this task, within the following boundaries: the Reservation boundary line to the west, the St. Lawrence River to the north, the Raquette River to the south, and Indian Road to the east. When sampling is to begin, the section will be broken into a grid pattern and sample locations will be chosen at random.

The results of this sampling round will determine whether or not the study area needs to be increased with additional sampling.

Parameters for analysis of these surface soils, surface waters, sludges, and sediments will be as follows:

- Sludges -
  - HSL organics and inorganics, excluding dioxin
  - PCBs
  - BTU Content
  - Ash Content
  - EP Toxicity
  - Specific Gravity
  - Moisture Content
  - Sulphur Content
  - Halogen Content
  - *Extraction, ASTM Method D3987-8a*
- Shallow Surface Borings -
  - HSL organics and inorganics, excluding dioxin
  - PCBs
- Surface Waters and Sediments
  - HSL organics and inorganics except dioxin
  - PCBs

- Specific Conductance (field)
- COD
- pH (field)
- Major anions (HCO_3, CO_3, Cl, NO_3, SO_4)
- Major cations (Ca, Mg, Na, K)
- Alkalinity/acidity
- Total Dissolved Solids

St. Regis Indian Reservation Potable Water Supply

It is proposed to sample the Potable Water Treatment System serving the Indian Reservation. Samples wil be taken of the Raw Water, Treated Water, and the sludge for analyses of probable pollutants such as PCBs and the HSL organics and inorganics except dioxin. Results of the initial sampling round will determine the necessity of further sampling. Two sampling rounds are anticipated. The first round of sampling will include the following parameters:

- HSL organics and inorganics, except dioxin
- PCBs

Sampling Data Validation/Evaluation and Report Preparation

Samples for analysis will be submitted to a laboratory that is part of the Contract Laboratory Program (CLP). The CLP analyses reports will be validated by EPA, and following the applicable RI tasks, the data generated during the study will be reduced and evaluated. Past sampling and analysis data will also be tabulated and evaluated with consideration given to reliability, in accordance with appropriate QA/QC procedures. The evaluation will be used in the production of the analytical data section of the report, to be included in the RI report.

In addition, progressive data reduction and evaluation during the RI will also provide input for succeeding RI tasks. In some cases, such as analytical investigations, data evaluation can lead to cost savings by reducing the number of analytical parameters and samples required for subsequent analysis.

Task 10 - Public Health and Environmental Assessment

An ongoing study of the Mohawk community has focused on environmental exposure to contaminants, measurements of accumulated body burdens, and the identification of adverse health effects. Information was sought for fluorides, methyl mercury, Mirex, and PCB contamination.

While much of the U.S. population has been and is exposed to low levels of PCBs in water, air, and food, groups at particular risk from PCB exposure include individuals consuming large amounts of contaminated fish. Members of the Mohawk community that regularly consume fish taken from the St. Lawrence River and its tributaries comprise such a group.

A health risk assessment will be based on information of contaminant exposure routes from existing environmental data and from data collected during this investigation. Estimates of PCB exposure from drinking water will be obtained from existing data and surface water and downgradient well monitoring conducted during Phase I of this investigation.

Estimates of dietary PCB exposure will be obtained from existing data on PCB burdens in identified food-chain organisms and from consultation with the St. Regis Environmental Division. Information on the local species taken for consumption, the frequency of such meals in the diet, and the methods of preparing and cooking such meals will be obtained.

3.4 Feasibility Study (Phase III)

This section describes the procedures proposed for identifying and evaluating appropriate remedial measures to be implemented and for selecting a final remedial measure for conceptual design. An agreement between EPA and the State of New York is necessary concerning selection of a final remedial action for conceptual design. The Feasibility Study will depend on existing site information and information obtained during the Remedial Investigation.

A determination of the need for field or laboratory treatability studies will be made, based on the site assessment at the end of the Remedial Investigation. A work plan and cost estimates for laboratory and field studies will be prepared if such alternatives are warranted. The work plan will outline the laboratory and/or field studies necessary for the comprehensive evaluation of the possible remedial responses.

Task 11 - Treatability Study ~~(Optional)~~

After the Remedial Investigation has been completed and the remedial actions have been identified, it may be necessary to conduct pilot or bench-scale treatability studies to evaluate some of these actions. This work would include any studies required to evaluate the effectiveness of remedial actions and to establish engineering criteria necessary for design and implementation. These treatability studies will be used to evaluate remedial actions applicable to the potentially contaminated media at the site, including soils, groundwater, surface water, and sediments. Potential remedial technologies which may be investigated through pilot or bench-scale studies may include groundwater or surface water treatment, sorption and desorption properties of soil, or fixation/solidification processes for disposal of wastes. Literature review of treatment technologies will be used where possible. Sorption and desorption reactions of local soils to contaminants will be studied for evaluation of the no-action alternative. Two types of tests are proposed: adsorption isotherms and contaminant breakthroughs. The experimentation is proposed to evaluate the renovation/attenuation potential of the contaminated soil and the soil separating the contaminants from the receiving groundwater aquifer. The proposed experimentation will be based on the groundwater contamination results and the physical properties of the soils. Soil samples will be collected from test pits and Shelby tube sampling. *An in-situ and/or on-site biological treatment system(s) will be evaluated.*

~~Because these laboratory studies are linked directly to the prior performance of other RI task, a separate work plan for any proposed laboratory studies will be submitted to the EPA for approval if such studies are warranted. The costs presented herein include only the preparation of the work plan.~~

~~Technical memorandums or reports would be prepared presenting the results of any laboratory studies, should they be conducted.~~

Task 12 - Feasibility Study

During the Feasibility Study task, site-specific remedial action alternatives will be developed, screened, and evaluated. The remedial alternatives that pass the initial screening will be further developed and evaluated so that the most cost-effective alternative(s) can be recommended to the EPA, the State of New York, and the public. A preliminary FS report will be submitted to GM, the EPA, and the State for approval and final selection of a remedial action.

The following is a breakdown of the subtasks involved in the Feasibility Study:

Detailed Development of Alternatives

Alternatives that pass the initial screening step will be developed in greater detail. This development will include

- Description of appropriate treatment and disposal technologies.
- Special engineering considerations required to implement the alternative (e.g., pilot treatment facility, additional studies needed to proceed with final remedial design).
- Environmental impacts and proposed methods for mitigating any adverse effects.
- Operation, maintenance, and monitoring requirements of the remedy.
- Offsite disposal needs and transportation plans.
- Temporary storage requirements.

- Safety requirements for remedial implementation (including both onsite and offsite health and safety considerations).

- A description of how the alternative could be phased into individual operable units. The description should include a discussion of how various operable units of the total remedy could be implemented individually or in groups, resulting in a significant improvement to the environment or savings in cost.

- A description of how the alternative could be segmented into areas to allow implementation of differing phases of the alternative.

- A review of any offsite treatment, storage or disposal facilities to ensure compliance with applicable ~~RCRA~~ federal and state requirements ~~both current and proposed~~.

Environmental Assessment

An Environmental Assessment (EA) will be performed for each alternative. The EA will include an evaluation of each alternative's environmental effects, physical or legal constraints and regulatory requirements. In addition, the EA will include an analysis of measures to mitigate any adverse effects associated with an alternative.

Cost Evaluation

A cost evaluation will be developed for all feasible remedial alternatives (and for each phase or segment of the alternatives). The cost will be presented as a present-worth cost and will include the total cost of implementing the alternative and the annual operating and maintenance cost. Both monetary costs and associated nonmonetary costs will be included.

Identify Remedial Technologies

Approximate remedial technologies will be identified for the selected site objectives. These technologies will be evaluated singly and in combinations to determine how well they meet the established project criteria. One or more appropriate remedial technologies will be grouped together as required to constitute the remedial measure.

The identification process for remedial technologies will take into account the type of media contamination, the site-specific conditions (soils, geology, etc.), public health and safety concerns, and applicable federal and state ~~the existing EPA and NYDEC Hazardous Waste and related~~ regulations.

The remedial measures listed below represent a preliminary list of options based on existing site information. The list will be reduced or augmented, depending on the results of the site investigation. The prime remedial measures identified at this time include:

- Groundwater Collection and Treatment

  Based on the review of existing and new data, it may be determined that mitigation of the groundwater contamination is necessary despite the potential removal of drums or other waste sources from the site. A system for groundwater collection and treatment might be proposed using wells installed for this purpose.

  Past sampling and analyses of groundwater from monitoring wells at the site has shown the presence of volatile organics. Air-stripping technology may be applied for treatment of these wastes. Carbon absorption may be used for other organics, and chemical precipitation may be used for heavy metals.

o *In-situ Biological Treatment*

  Biodegradation methods for destroying PCBs may be used.

o *On-site Disposal*

  An on-site disposal facility meeting applicable federal and state requirements may be constructed.

- Constructing a Slurry Wall and Capping the Site

  Construction of a slurry wall to sufficient depth, either east of the site or surrounding the site, may also be effective in eliminating the potential of leaching of contaminants by the lateral movement of groundwater. A slurry wall is a subsurface barrier constructed by excavating a trench, several feet in width, down to an impervious layer and filling the trench with a slurry of bentonite clay and water in order to shut off lateral groundwater flow. The possibility of upward migration of groundwater from the Ogendsburg Formation, under artesian conditions, may negate the effectiveness of such an option. This option is used in conjunction with capping the site with an impervious layer to minimize the possibility of infiltration of rainwater into the site. Capping may also be used as a separate remedial measure.

- Regrading and Revegetation

  Regrading and revegetation is used to provide a stable final covering following closure of hazardous waste sites. Grading can be designed to divert and manage runoff at the site; revegetation of distrubed areas prevents erosion and inhibits uncontrolled runoff.

- Removal of Hazardous Substances

  Where concentrations of heavily contaminated materials are found, removal of these materials may be necessary. Contaminated materials could be contained or fixated on site and disposed of in an approved disposal facility (landfill or incinerator).

- Alternate Water Supply for the St. Regis Indian Reservation

  If the results of the initial drilling and a health and risk assessment of the analytical results of samples from residential and monitoring wells indicate that there is a threat to the public health posed by groundwater contaminated by the GM Site, then an alternate water supply for the residents immediately adjacent to the site will be considered and a cost-effective recommendation will be made.

- No-Action Alternative

  This alternative assumes that no remedial measures will be implemented to mitigate contamination. Associated with a no-action alternative is an assessment of the risks to the public health and environment resulting from low-level untreated wastes with continuous monitoring and observation.

Alternatives Evaluation and Final Recommendation

The above alternatives will be evaluated using technical, environmental, and economic criteria. At a minimum, the following areas will be used to evaluate the cost-effectiveness of each alternative:

- Reliability: Alternatives that minimize or eliminate the potential for release of wastes into the environment will be considered more reliable than other alternatives. Institutional concerns such as management requirements can also be considered as reliability factors

- Implementability: The requirements of implementing the alternatives will be considered, including phasing alternatives into operable units and segmenting alternatives into project areas on the site. The requirements for permits, zoning restrictions, rights-of-way, and public acceptance are also examples of factors to be considered.

- Operation and Maintenance Requirements: Other factors being equal, preference will be given to projects with lower Operation & Maintenance requirements.

- Environmental Effects: Alternatives posing the least impact on (or greatest improvement of) the environment will be favored.

- Safety Requirements: Onsite and offsite safety requirements during implementation of the alternatives will be considered. Alternatives with lower safety impact and cost will be favored.

- Cost: The remedial alternative with the lowest total present-worth cost will be favored. Total present-worth costs will include the capital cost of implementing the alternative and the cost of operation and maintenance of the proposed alternative.

Based on the above criteria and evaluations, an alternative(s) will be recommended. The recommendation will be justified by stating the relative advantages over other alternatives considered. Evaluative consideration will be applied uniformly to each alternative. The lowest cost alternative that is technologically feasible, reliable and that adequately protects (or mitigates damage to) public health, welfare and the environment will be considered the most cost-effective alternative.

Task 13 – Conceptual Design and Final Report

After (public comment) the EPA, NYDEC, and ~~the public~~ decide upon the remedial action to be employed at the site based upon the preliminary FS report, the conceptual design of the selected alternative will be prepared. The conceptual design will entail, but is not limited to the engineering approach, which includes implementation schedule, special implementation requirements, institutional requirements, phasing and segmenting considerations, design criteria, and preliminary site and facility layout; and a budget cost estimate, which includes the impact on cost of implementation. Any additional information required as the basis for the completion of the final remedial design will also be included.

The conceptual design will be submitted to GM, and GM will submit to EPA in conjunction with the final FS report presenting selection criteria and basis as well as the additional information listed below.

The appended information may include, but will not be limited to

- Site topographic map
- General arrangement drawings of the remedial action
- Typical geologic and design cross sections
- Detailed data analysis
- Conceptual design drawings (Process and Instrumentation Diagrams and general arrangements)
- Design report with supporting calculations
- Preliminary cost estimates
- Construction schedule
- Erosion and sedimentation control plan
- Data from treatability studies necessary for final design
- Summary of assessment of contamination
- Summary of remedial measures evaluation

4.0 MANAGEMENT PLAN

Section 4.0 of this Work Plan outlines the management plan that will be used to complete the G. M. Central Foundry Division Site RI/FS. ~~EPA has designated that Region II Field Investigation Team (FIT) will perform the Initial Activities and Remedial Investigation Phases of this project. The Remedial Planning Office (REMPO) will perform the Feasibility Study Phase. The overall technical and financial management of the project will be under the direction of a REMPO Project Manager~~.

~~The responsibility of the REMPO Project Manager and the assigned NUS project team, as well as the REMPO/FIT coordination requirements, are detailed below in the Project Management Work Plan.~~

~~4.1 Project Organization~~

~~The Remedial Planning Manager, Mr. E. Dennis Escher, through the REMPO Director of Superfund Projects, Mr. Donald R. Brenneman, provides overall guidance and administrative support to the project, and also serves as the primary liaison to the EPA Project Officer at EPA Headquarters. Assisting the Remedial Planning Manager will be a Regional Coordinator, Dr. Raul Deju, who serves as the primary liaison with the EPA Regional Project Officer, Mr. John Frisco.~~

~~The REMPO Project Manager, Mr. Stanley E. J. Mather, will work directly with the EPA Regional Site Project Officer (RSPO), Mr. Melvin Hauptman, and will be responsible for day-to-day management of all aspects of the project. The Region II FIT Office shall designate Mr. Nicholas Dmytryszyn as the FIT Project Manager. Mr. Dmytryszyn is responsible for those work activities being performed by the Region II FIT Office. The Project Management Organization Plan is illustrated in Figure 4-1.~~

~~The REMPO Project Manager will serve as the hub for all interface among the REMPO, the FIT, and EPA during the course of the project. Provisions will be~~

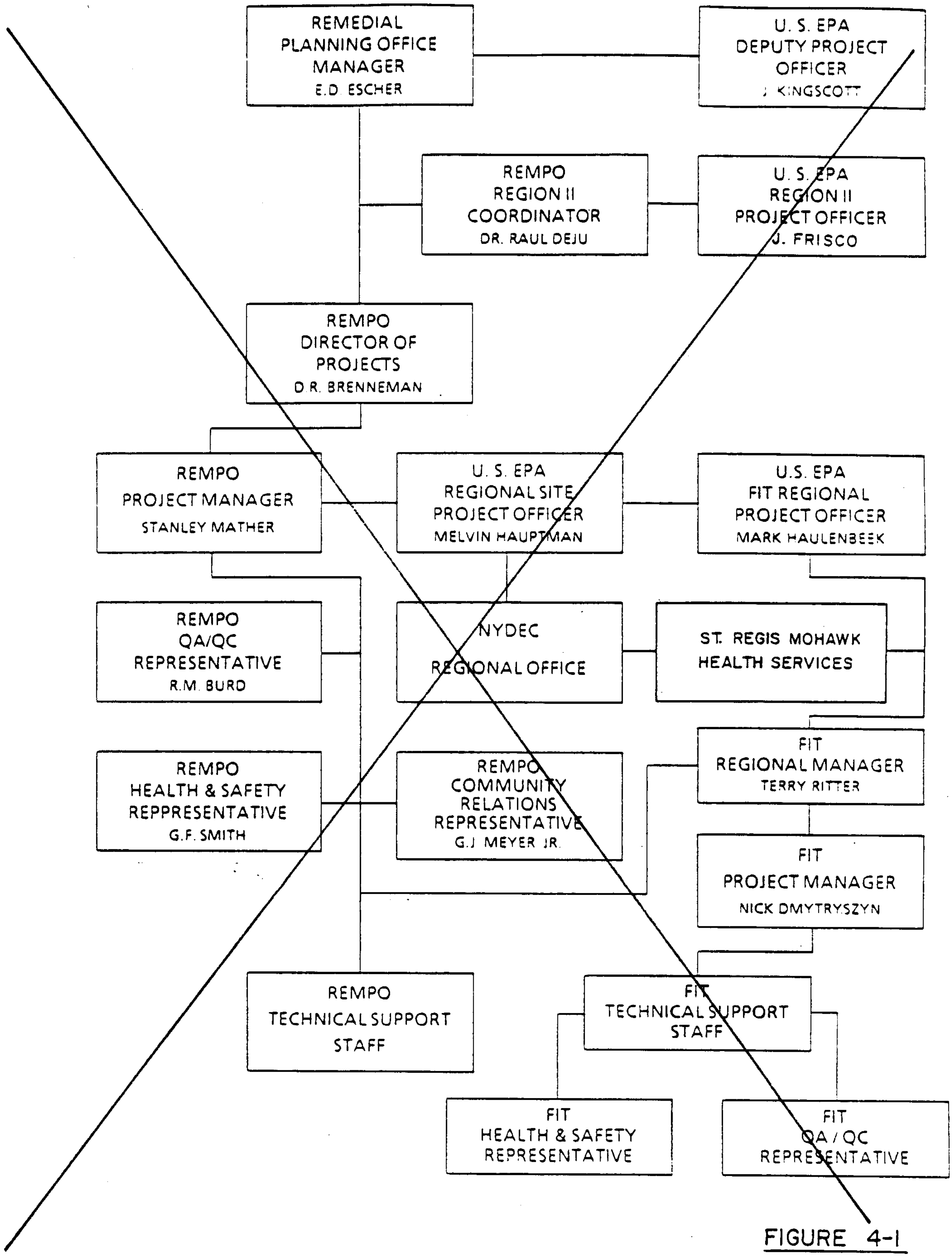


FIGURE 4-1

G.M. CENTRAL FOUNDRY DIVISION SITE
PROJECT ORGANIZATION

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~~made for direct interface opportunities between all team members in regard to completion of technical assignments. All communications which have a bearing on the scope of work, schedule, and financial commitments specified in the final Work Plan must be completed through the REMPO Project Manager.~~

~~The REMPO Project Manager will initiate all work assignments and will monitor REMPO and FIT performance with reference to the Final Work Plan scope of work~~, ~~schedule, and financial matters including conformation with the approved Quality Assurance/Control, Health and Safety, and Community Relations Programs~~.

4.2 Support Activities (Phase IV)

~~REMPO~~ *GM and the contractor* will oversee this RI/FS project utilizing a Work Plan consisting of the following tasks:

~~REMPO~~ Task 14 - Work Plan Preparation and Review *(completed)*
~~REMPO~~ Task 15 - Overall Project Management and Status Reporting
~~REMPO~~ Task 16 - Technical Support
~~REMPO~~ Task 17 - Community Relations Support

~~In addition, REMPO will be responsible for those tasks specified as REMPO tasks.~~

4.2.1 Work Plan Preparation and Review (~~REMPO~~ Task 14) *(completed)*

In accordance with the Work Assignment, this task has been performed in the development of this document. ~~Upon submittal and subsequent EPA approval, this Work Plan, which has a detailed description of the tasks to be performed, will be implemented by the REMPO and Region II FIT~~.

~~This plan has been prepared by a team of technical and managerial personnel representing the REMPO and Region II FIT.~~

4.2.2 Overall Project Management and Status Reporting (REMPO Task 15)

Contractor/GM/
~~REMPO/FIT~~/EPA Coordination

~~REMPO and Region II FIT will share~~ GM has responsibilities for work tasks described in Section 3 of this report ~~in the event that the responsible party declines to perform the RI/FS. The overall REMPO/FIT/EPA coordination of the project will be implemented at that time. However, in this Work Plan the overall cost includes this task~~.

Statement of Work

This Work Plan consists of a project schedule that indicates task durations and milestones for major events. The schedule will begin upon receipt of final written authorization to proceed from EPA. ~~Also included in this Work Plan is an estimate of man-hours to be expended for each task. The REMPO Project Manager will report the number of actual man-hours utilized versus the estimate.~~

~~Financial~~

~~The REMPO Project Manager, with input from the FIT Project Manager, will manage all financial aspects of the project. The FIT Project Manager will authorize payment of subcontractors for the Initial Activities and Remedial Investigation phases of the study. The REMPO Project Manager will authorize payment of subcontractors for the Feasibility Study phase. In all cases, invoices will be prepared in sufficient detail and will indicate man-hours for each category of personnel utilized on the project during the invoice period as well as hourly rate charged for each. Additionally, there will be adequate documentation for other expenses such as second-tier subcontractor services, equipment, travel and living, etc.~~

~~Procurement~~

~~The FIT Project Manager will initiate all procurement activities for the Initial Activities and Remedial Investigation phases of the study. This may include, but is not limited to, aerial photography and topographic mapping services, drilling and geophysics services, and special-case analytical analyses.~~

~~The REMPO Project Manager will initiate all procurement activities for the Feasibility Phase of the project. This may include treatability study support.~~

~~Both the FIT and REMPO will be supported in their procurement efforts by the ZPMO (Zone Project Management Office) staff located in Arlington, Virginia~~.

Project Status Reports

Monthly progress reports will include the following information:

- Work Assignment Status Reports
  - Identification of project tasks and milestones performed by the contractor ~~FIT and REMPO~~ during the reporting period.
  - Problems resolved and anticipated problem areas and recommended solutions.
  - Deliverables submitted during the period.
  - Activities planned and upcoming events for the next month.
  - ~~Subcontracting during the period.~~
  - ~~Travel during the period.~~
  - ~~Contract laboratory involvement during the period~~

- ~~Personnel changes~~

- Schedule changes

- ~~Financial Management Report~~

  - ~~Identification of project~~

  - ~~Actual expenditures, including fee and direct labor hours expended for this period for FIT and REMPO.~~

  - ~~Cumulative expenditures (including fee) and cumulative direct labor hours for FIT and REMPO~~

  - ~~Projection of expenditures for completing the project, including an explanation of any significant variation from the forecasted target.~~

Project status reports will be distributed monthly as follows:

Technical Progress Reports	~~Financial Management Reports~~	Addressee
~~2~~	~~2~~	~~EPA Contract Officer~~
2	~~2~~	~~Zone Manager (EPA Headquarters)~~ GM
2	~~2~~	EPA Project Officer (Region II)

Interim, Draft, and Final Reports

Interim reports will be submitted ~~to~~ GM and EPA by the ~~REMPO~~ contractor following the completion of Tasks 10 and 12. These interim reports will be considered first drafts and will be updated to include EPA and NYDEC comments. A draft final report (Task 13) will be submitted within 30 days after the completion of all technical work. The report will incorporate the interim reports and summarize the results of all activities at the site. A final report, including the error-free masters, will be submitted within 30 days, following draft approval.

Meetings

Monthly meetings are being proposed between *GM, EPA and the Contractor* ~~REMPO and FIT~~ to monitor the progress of activities for the RI. Four of these meetings will be tied in to major project milestones and the EPA will participate.

Meeting No. 1 will take place to review the Work Plan. The purpose of this meeting will be to review and verify the objectives and priorities of the investigation at the site. Planning activities for the RI will be reviewed in detail.

Meeting No. 2 will be held prior to completion of the RI. Results-to-date of the Remedial Investigation will be discussed to evaluate the program and to determine whether additions to the proposed plan are required. The focus of the preliminary remedial alternatives will be discussed.

Meeting No. 3 will be held after EPA has received and reviewed the RI Report. The purpose of this meeting is to discuss the findings of the RI and to set the stage for performance of the FS. Requirements of the FS will be reviewed.

Meeting No. 4 will be held after the Draft FS Report has been submitted. At that time all aspects of the project will be reviewed and finalized in anticipation of preparation of the Final FS Report.

The scheduling and content of any or all of the above-mentioned meetings depend on project needs.

4.2.3 Technical Support (REMPO Task 16)

The *Contractor* ~~REMPO~~ will be responsible for the technical quality of the products of the RI/FS. A deviation from the procedures set forth in this Work Plan must be presented to and reviewed by the *EPA* ~~REMPO~~ prior to implementation. The need for technical steering or consultation throughout the duration of the project will be addressed during routine contact *among GM, EPA, and the Contractor.* ~~between the REMPO and the FIT Project Manager. Project needs may also require the attendance of REMPO technical~~

~~personnel at any of the routine project monitoring meetings described in Section 4.2.2. In addition, all reports and other deliverables will undergo a REMPO technical review prior to submittal to EPA.~~

4.2.4 Community Relations Support (~~REMPO~~ Task 17)

A community relations (CR) program will be carried out concurrent with implementation of the Work Plan. EPA will provide the lead in this program, and *GM and the Contractor* ~~REMPO and FIT~~ will provide support services as requested. The program will have the following objectives:

- Implementation of an effective plan for public involvement
- Solicitation of available information and comments on site operations and conditions
- Dissemination of information to the community on current and proposed actions
- Maintenance of a dialogue with the community
- Analyses of community attitudes toward proposed actions

~~The first step in the program will be the designation of a REMPO project Community Relations Coordinator who will organize support services for the CR program. This community relations specialist will remain on the project for its duration and will provide services as requested which may include organizing public meetings and news conferences, preparing public notices and new releases, receiving available information and comments, and disseminating information to the proper parties. The activities of the REMPO CR Coordinator will be directed and approved by the project management team. The REMPO CR Coordinator may be aided in these duties by a community relations coordinator from the FIT, particularly during the Initial Activities and Remedial Investigations phases of the study.~~

4.3 Change Orders

The monthly progress report will identify any unusual problems that may be upcoming in the project.

If forecasts predict that the work assignment ~~budget or~~ scope will change, written approval of the EPA ~~Contracting Officer~~ must be obtained. A written request for change will initiate this process.

4.4 Scope of Work Modifications

Major changes in the scope of work are possible during the performance of this study. However, if review of additional data indicates that Work Plan modifications are necessary, then the scope of work can be modified in the Work Plan. Prior to initiating additional work or changes to the scope, the Contractor ~~REMPO~~ Project Manager must provide written documentation to GM and ~~the~~ EPA ~~RSPO~~ explaining the reasons for modifications, including an estimate of labor-hours and cost involved. However, additional work will not be performed until GM and the EPA authorization is received.

4.5 Quality Assurance

The EPA approved quality assurance program must be followed. ~~to be applied to this project is a comprehensive program based on the quality assurance philosophy adopted by NUS when it was founded. The NUS President and Chief Executive Officer has promulgated a Corporate Quality Assurance Policy Statement that identifies the philosophy. This policy statement is the basis for the NUS Corporate Quality Assurance Policy Manual and for other manuals that direct each operating unit in the implementation of the quality assurance policy. Quality assurance is applied, as required, to all NUS projects.~~

~~A general Quality Assurance Project Plan has been developed to delineate the quality assurance activities for Superfund RI/FS activities, particularly for~~

~~environmentally related measurements. Other documentation established relative to quality assurance includes~~

- ~~The project Quality Assurance Management Plan~~
- ~~The project Quality Assurance Manual~~

~~Site-specific Quality Assurance Requirements will be developed for the G. M. Central Foundry Division Site. The quality assurance requirements (QARs) applicable to the G. M. Central Foundry Division Site include:~~

QAR 2.5	Work Plans
QAR 3.0	Design Control
QAR 4.0	Data Acquisition
~~QAR 5.0~~	~~Procurement Document Control~~
QAR 6.0	Instructions and Procedures
QAR 7.0	Document Control
~~QAR 8.0~~	~~Control of Purchased Items and Services~~
QAR 9.0	Identification and Control of Laboratory Samples (Includes Chain-of-Custody)
QAR 11.0	Inspection
QAR 12.0	Control of Measuring and Test Equipment
QAR 13.0	Handling, Storage, and Shipping of Hazardous Substances
QAR 14.0	Control of Nonconformances
QAR 15.0	Corrective Action
QAR 16.0	Quality Assurance Records
QAR 17.0	Audits

The implementing procedures associated with the above QARs are also applicable, as are standard instructional procedures (Operating Guidelines) for sampling, chain-of-custody, shipping, and the like.

Validation of CLP laboratory data will be provided by EPA. Validation will address the following:

- The data reduction scheme for collected data, including all equations used to calculate the concentration or volume of the measured parameter and reporting units.

- The principal criteria used to validate data integrity during collection and reporting data.

- The methods used to identify and treat outliers.

4.6 Health and Safety

Site-specific Health and Safety Requirements will be developed for the G. M. Central Foundry Division Site. ~~The requirements will be based on the guidelines in the latest revision of the NUS Health and Safety Manual and will be included as an integral part of the Site Operations Plan.~~

The purpose of the requirements will be to

- Provide minimum safety protection requirements and procedures for onsite field crews and subcontractors

- Provide ongoing site monitoring to verify preliminary safety requirements and review specific protection levels as required

5.0 COSTS AND SCHEDULE

5.1 Project Schedule

The schedule for the GM Central Foundry Division Site RI/FS activities is shown in Figure 5-1. The schedule indicates that approximately 19 months (82 weeks) are required to complete the total RI/FS.

Completion of the RI/FS on schedule is contingent upon a 75-day turnaround of analytical results from the EPA's Contract Laboratory Program (CLP). Also, EPA and NYDEC review time must be no more than four weeks to allow for completion of the RI/FS within the designated time period.

~~5.2 Cost and Budget~~

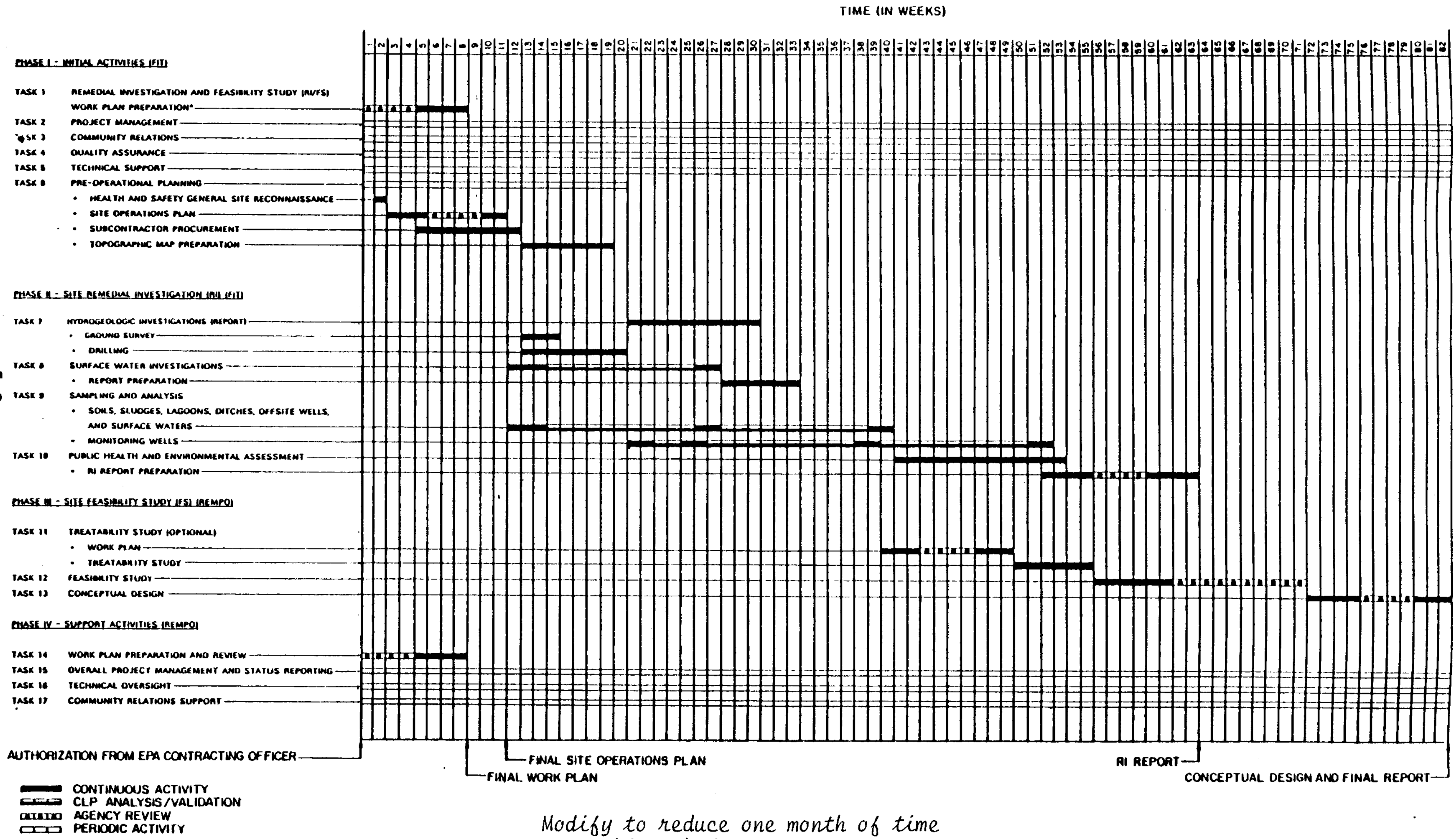
~~The total estimated cost of the Remedial Investigation and the Feasibility Study is $578,552.~~

~~Initial activities will require a total of 1,660 man-hours. The Remedial Investigation and Feasibility Study will require 2,770 and 1,350 hours, respectively. Support Activities will require a total of 1,800 man-hours, making a total a 7,580 man-hours for the entire study. Manpower estimates for the major project phases and the tasks are provided in Table 5-1. Subcontractor manpower estimates are not included in the estimates shown in Table 5-1.~~

~~The necessity for higher levels of personnel protection than those anticipated during preparation of this Work Plan might result in a substantial increase in the cost of the Remedial Investigation.~~

~~Results of the Remedial Investigation might increase the scope of the Feasibility Study, resulting in possible increases in required manpower and funds. A separate~~

Work Plan for any treatability studies will be submitted to the EPA and NYDEC for approval, should the studies prove necessary in order to adequately evaluate the potential remedial actions.



Modify to reduce one month of time from this schedule.

FIGURE 5-1

REMEDIAL INVESTIGATION / FEASIBILITY STUDY - SCHEDULE
G.M. CENTRAL FOUNDRY DIVISION, MASSENA, NY

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TABLE 5-1

MANPOWER PROJECTIONS FOR
INITIAL ACTIVITIES AND
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
G.M. CENTRAL FOUNDRY DIVISION
MASSENA, NEW YORK

Phase	Task	Description	Manhours
	1	Work Plan Preparation	600
I. Initial Activities (FIT)	2	Project Management	400
	3	Community Relations - EPA & REMPO LEAD	*
	4	Quality Assurance	100
	5	Technical Support	240
	6	Pre-operational Planning	320
	Subtotal		1,660
II. Remedial Investigation (FIT)	7	Hydrogeological Investigations	1,450
	8	Surface Water Investigations	300
	9	Sampling and Analysis	420
	10	Public Health and Environmental Assessment & RI Draft Report Preparation	600
	Subtotal		2,770
III. Feasibility Study (REMPO)	11	Treatability Study	400
	12	Feasibility Study	500
	13	Conceptual Design	450
	Subtotal		1,350
IV. Support Activities (REMPO)	14	Work Plan Preparation and Review	400
	15	Overall Project Management and Status Reporting	800
	16	Technical Oversight	450
	17	Community Relations Support	150
	Subtotal		1,800
FIT PROJECT TOTAL			4,430
REMPO PROJECT TOTAL			3,150
FIT/REMPO PROJECT TOTAL			7,580

* Please see Task 17

EXHIBIT 1

EXHIBIT 2