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1993

EPA Superfund
Record of Decision:

BYPASS 601 GROUND WATER CONTAMINATION
EPA ID: NCD044440303
OU 02
CONCORD, NC
04/20/1993

BYPASS 601
GROUNDWATER CONTAMINATION SITE
CABARRUS COUNTY, NORTH CAROLINA

RECORD OF DECISION
OPERABLE UNIT TWO

AMENDMENT TO THE
APRIL 1990 RECORD OF DECISION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV
ATLANTA, GA

APRIL 1993

DECLARATION
FOR THE
RECORD OF DECISION

SITE NAME AND LOCATION

Bypass 601 Groundwater Contamination Site
Concord, Cabarrus County, North Carolina

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Bypass 601 Groundwater Contamination Site in Concord, Cabarrus County, North Carolina, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the administrative record file for this Site.

The State of North Carolina concurs with the selected remedy.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE SELECTED REMEDY

This remedy addresses the principle threats posed by this Site. The major threat is the contaminated groundwater emanating from beneath the Site. This remedial action will also address the threat from soil contamination.

The major components of the selected remedy include:

GROUNDWATER

Extraction of groundwater across the Site that is contaminated above Maximum Contaminant Levels or the North Carolina Groundwater Standards, whichever are more protective;

Onsite treatment of extracted groundwater via precipitation and air stripping;

Discharge of treated groundwater to the POTW; and

Continued analytical monitoring for contaminants in groundwater.

SOIL/SEDIMENT

Demolition of portions of the abandoned flea market and any standing buildings at the MSR facility; Disposal at a municipal landfill;

Temporary relocation of an occupied trailer located on Source Area #3;

Excavation of onsite soils contaminated above the performance standards;

Onsite treatment of excavated soils via solidification/stabilization;

TCLP testing of solidified material;

Onsite disposal of solidified material; and

Backfilling, grading, and revegetation of excavated area and solidified material.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technology to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Since this remedy may result in hazardous substances remaining onsite above health based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Patrick M Tobin
Patrick M. Tobin
Acting Regional Administrator

4-20-93
Date

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DECISION SUMMARY

I. SITE NAME, LOCATION AND DESCRIPTION

A. Introduction

The Bypass 601 Groundwater Contamination Site (Bypass 601 Site) is defined as an area located on the western edge of Concord, North Carolina, in which groundwater is contaminated by multiple sources (Figure 1-1). Previous investigations have indicated that the Martin Scrap Recycling (MSR) facility, which operated as a battery salvage and recycling facility from approximately 1966 to 1986, is one of the major sources of contamination. Ten other source areas of contamination related to battery disposal have been identified in the area (Figure 1-2).

B. Site Description

The MSR facility occupies approximately 13 acres of land and is currently inactive. The facility is bordered by US Highway 29/Route 601 on the west, a flea market and landfill to the north, to the east by Irish Buffalo Creek, and an unnamed tributary of the Irish Buffalo Creek to the south. Residences are located south and west of the MSR facility. The main facility contains several small buildings.

Source Area #1 is located adjacent to Unnamed Stream #1, west of Bypass 601. This area was comprised of one winding gully that contained cracked casings. The casings were deposited to a depth of 19 feet for a distance of approximately 500 feet in length and 30 feet in width. This area is located in a heavily wooded steep terrain behind an auto sales dealership.

Source Area #2 is located south of Montford Avenue and west of Bypass 601. This area was the previous site of the MSR facility and consists of surficial and buried battery casing debris. A mobile trailer is currently on this property along with various construction debris and buildings.

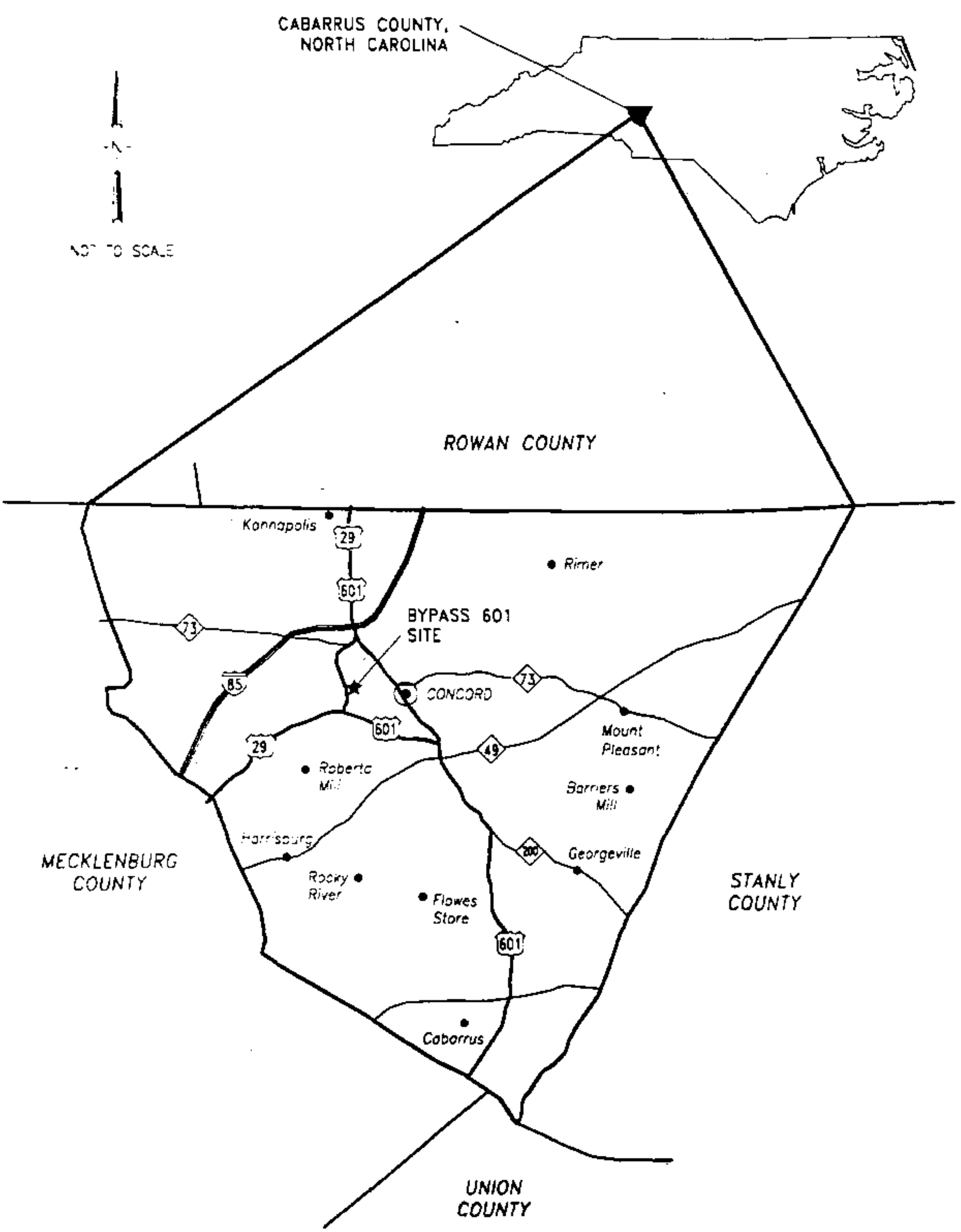
Source Area #3 is located at 72 Sumner Avenue. An occupied mobile trailer is currently on this property along with various construction debris. The visual extent of battery casing debris is approximately 8 feet by 8 feet.

Source Area #4 consists of the commercial property occupied by an abandoned flea market and is located north and adjacent to the MSR facility. An office building and an abandoned warehouse currently occupy this source area.

Source Area #5 is located at a private landfill along the eastern boundary of the MSR facility. This area is covered with miscellaneous construction debris, old rusted equipment, tanks, drums, vehicles, and other trash.

Source Area #6 is located behind a tire store on the corner of McGill and Bypass 601, and consists of two small piles of fill material containing battery casing debris along the western bank of Irish Buffalo Creek. The first pile is approximately 90 feet in length continuing south and extending up

5 9 0100



CDM FPC ARCS IV

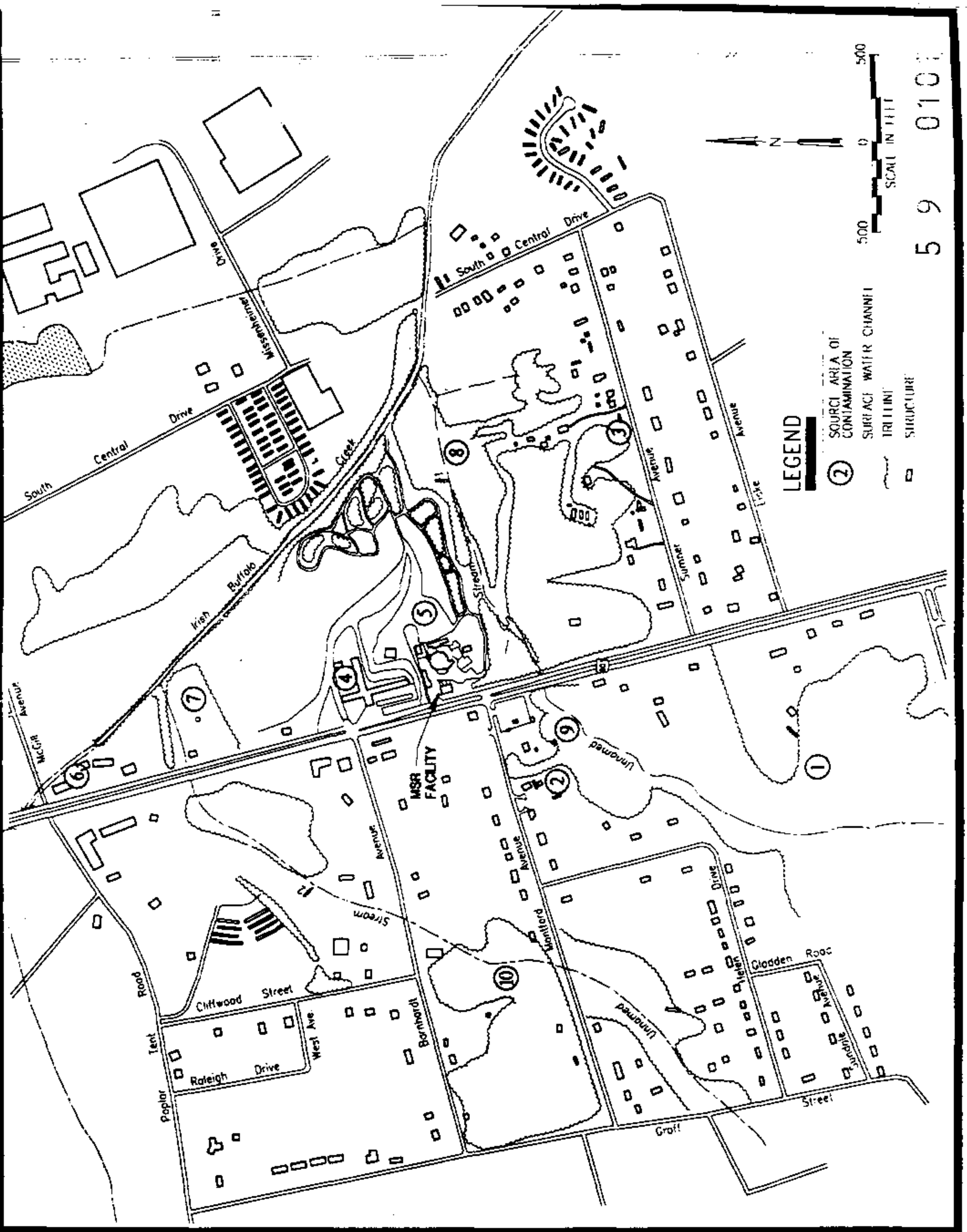
SITE LOCATION MAP

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

1-1



CDM FPC ARCS IV

SITE FEATURES MAP

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

1-2

the steep grade bank approximately 15 feet. There is a break in the casings of approximately 45 feet, then a second pile begins and extends another 45 feet in length and 15 feet up the bank.

Source Area #7 is the radio tower site located approximately 1/4-mile north of the MSR facility. The source area is bordered by Unnamed Stream #2 to the north and Irish Buffalo Creek to the east.

Source Area #8 consists of the floodplain area south of Unnamed Stream #1, presumably contaminated by surface water migration from the MSR facility.

Source Area #9 consists of an approximately 20 foot by 20 foot area adjacent to Unnamed Stream #1, approximately 200 feet west of Bypass 601. The source area is located south of Montford Avenue and lies southeast of Source Area #2. Cracked battery casings were found in this area.

Source Area #10 consists of an area where several piles of battery casing debris were both visible and buried. The area is adjacent to Unnamed Stream #2 and is bordered to the north, west and south by Barnhardt Avenue, Groff Street, and Montford Avenue, respectively. The source area is located in a heavily wooded steep terrain.

C. Topography

The Bypass 601 Site is in the Piedmont Plateau, characterized by rolling hills cut by many streams, which usually originate in the mountains. Drainage in the Piedmont Plateau is generally to the southeast because of the general northwest-southeast orientation of the stream valleys, which are controlled by the underlying bedrock.

The original topography at the Bypass 601 Site has been altered significantly in past years due to filling and borrowing activities. The Site is topographically divided by Bypass 601 .

The road bed in the vicinity of the Site has been artificially elevated by bringing in fill to "bridge" between two hills, one of which was apparently later leveled for construction of the MSR facility.

D. Geology

There are two distinct lithostratigraphic units underlying the Site. They include a surficial unit comprised of unconsolidated soil and saprolite material, and an underlying granitic/dioritic rock complex. The surficial unit consists primarily of residual soil derived from in situ chemical weathering of the underlying rock. Locally within stream basins, residual soil and/or rock have been chemically and mechanically eroded into alluvium. These alluvial deposits generally overlie the residuum along surface water features. In addition, there are localized zones of fill material which are part of the surficial unit.

Lithologic evaluations showed residual soils to be variable in composition ranging from sand to silt to clay. The dominant lithology is sandy clay. However, due to the interlayered nature of these sediments, zones of silty clay, clayey sand, and sand can pre-dominate. Sands are typically quartz and vary in grain size from fine to medium to coarse, and are subangular. Soil color ranged from gray to yellowish-brown to red to white.

Underlying the unconsolidated soil and saprolite material is consolidated granite and diorite rock. The granite is generally massive, with fracture frequency varying from 1 per 30 feet to 6 per 25 feet of rock cored, and averaged 1 per 10 feet. Fractures typically occurred at high angles. The color of the granite rock varied from white to grayish-green to gray with zones of white corresponding to veins of quartz.

E. Surface Water

The surface water features potentially affected by the Site include Irish Buffalo Creek, Unnamed Stream #1 , and Unnamed Stream #2. These surface waters have been classified as Class C by the State, which is the basic water quality classification for all surface waters in the State of North Carolina, and protects freshwaters for secondary recreation, fishing, and aquatic life. Irish Buffalo Creek provides the eastern border for the Site and flows in a southeastward direction into the Rocky River. The Rocky River, located about seven miles south of the Site, is an eastern flowing tributary of the Pee Dee-Yadkin River. Both unnamed streams are intermittent streams which flow eastward through the middle of the Site into Irish Buffalo Creek. Irish Buffalo Creek is approximately 30 feet wide and 1.5 feet deep while the unnamed streams are approximately 5 feet wide and 0.5 feet deep at the Site under normal flow conditions.

F. Hydrogeology

Groundwater at the Bypass 601 Site generally occurs in two zones. The uppermost zone consists of the unconsolidated soil and saprolite material. This zone is referred to as the water table, shallow aquifer, and soil overburden zone. Water in this zone generally moves through the pore spaces of the overburden material as well as the relict fractures with the saprolite.

The second zone of groundwater occurrence is the bedrock zone where groundwater moves through fractures and secondary openings. The upper part of the bedrock zone is fairly well fractured. However, in general, the size and frequency of fractures decrease markedly with increasing depth. Although the soil overburden and bedrock zones have often been referred to as different aquifers, they actually comprise one aquifer since the two zones are hydraulically connected.

Groundwater flow at the MSR facility is generally toward the confluence of Unnamed Stream #1 and Irish Buffalo Creek and is therefore intercepted by both these surface water pathways. Groundwater flow at Source Areas 1, 2, and 9 is intercepted by Unnamed Stream #1 on the western side of Bypass 601, while at Source Area #8, groundwater flow is intercepted by Unnamed Stream #1 on the eastern side of Bypass 601. Groundwater flow at Source Area #3 is intercepted by both Unnamed Stream #1 and Irish Buffalo Creek. Groundwater flow at Source Areas 4, 5,6, and 7 is intercepted by Irish Buffalo Creek. Groundwater at source area 10 is intercepted by Unnamed Stream #2.

G. Meteorology

The climate is characterized by cool winters and warm summers. Temperatures fall as low as the freezing point on approximately one-half of the days in the winter months. Winter weather is changeable, with occasional cold periods, but extreme cold is rare. Snow is infrequent, with the first snowfall of the season usually appearing in late November or December. Heavy snowfalls have occurred, but any appreciable accumulation of snow on the ground for more than a day or two is rare.

Summers are long and quite warm, with afternoon temperatures frequently in the low 90s (˚F). The growing season is also long, the average length of the freeze-free period being 216 days.

Rainfall is generally evenly distributed throughout the year, the driest weather usually occurring in the fall. Summer rainfall comes principally from thunderstorms, with occasional dry spells of one to three weeks duration.

H. Demography and Land Use

The City of Concord is within a four-mile radius of the Site. Concord has an estimated population of 27,347. Current land use around the Site is primarily light industrial and commercial, with local residential neighborhoods. Industries include sand and gravel operations, private landfill operations, and manufacturing related to the textile industry.

Commercial operations include convenience food stores and gas stations, auto sales and repair, retail shopping centers, fast food restaurants, and mobile home sales operations. Residential neighborhoods are interspersed with the light industrial/commercial areas which line the main roads within a three-mile radius of the Site. It is estimated that more than 1,400 people reside within a three-mile radius of the Site. The population in the vicinity of the Site obtains its potable water supply from either public water supply wells or from private wells. No users are known to be currently withdrawing water from the creeks in the area. Irish Buffalo Creek is used for fishing and swimming.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Site History

The MSR facility dealt in the recovery of scrap metal, most notably lead, which was recovered from scrap vehicle batteries. The batteries were "cracked" by sawing off the tops with an electric saw. Lead plates were then removed from the batteries for reclamation. The waste from this operation consisted of the sulfuric acid (contaminated with lead) from the batteries, and battery casings. Initially, the waste acid was collected and disposed of in a surface impoundment on the MSR property. Since rainwater and surface runoff could enter the impoundment causing it to overflow, a subsurface drain composed of perforated plastic pipe, surrounded by gravel, was installed downgradient of the surface impoundment. This was done to provide a "leach field" to prevent overflow to Unnamed Stream #1, which was approximately 150 feet from the impoundment. In early 1982, MSR reportedly stopped using the surface impoundment and began collecting the waste acid in stainless steel holding tanks. The facility reportedly operated from 1966 to 1986.

The additional ten source areas were discovered during the remedial investigation for Operable Unit #1. Source Area #2 was also reported to be the site of a reclamation operation operated by Mr. Martin before the facility moved to its present location.

B. Previous Investigations

From at least early 1975, several Site investigations were performed at the Bypass 601 Site. Sampling studies have been conducted by local, state, and federal agencies, as well as a consultant for MSR. These sampling studies, however, have been primarily limited to the MSR facility.

Most recently, an RI/FS at the Site, completed in 1990, identified metal contamination of soils throughout the MSR facility. The volume of soils contaminated with lead in excess of 500 milligrams per kilogram (mg/kg), the established soil remediation level for lead, was estimated to be approximately 57,000 cubic yards. The 1990 RI results also indicated that the contaminated soils and buried battery casings are continuing to release contaminants to downgradient soils, surface water, stream sediments, and groundwater. In addition, several additional contaminant source areas were identified but not investigated. The additional areas would be the focus of a subsequent investigation.

C. Enforcement Activities

From 1981 through 1986, the MSR facility was inspected, cited and fined for various violations under the Occupational Safety and Health Administration (OSHA), and the Resource Conservation and Recovery Act (RCRA) by the North Carolina Department of Environmental Management (DEM) and the North Carolina Division of Health Services (DHS).

In October 1984, the Bypass 601 Site was proposed for inclusion on the National Priorities List (NPL) and finalized in June 1986.

ERA sent notice letters to the following companies and individuals in September 1985, for conduct of the OU #1 RI/FS, and in November 1990, for conduct of the OU #1 RD/RA:

1. Oliver Martin
2. Carrie Martin
3. Bill Martin, President, Martin Scrap Recycling, Inc.

The notice letters also informed the PRPs of their potential liability for past costs.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Pursuant to CERCLA § 113(K)(2)(B)(i-v) and § 117, the RI/FS Report and the Proposed Plan for the Bypass 601 Site were released to the public for comment on December 17,1992. These documents were made available to the public in the administrative record located in an information repository maintained at the EPA Docket Room in Region IV and at the Charles A. Cannon Memorial Library in Concord, North Carolina.

The notice of availability for these documents was published in the Concord Tribune Newspaper on December 17, 1992. A public comment period on the documents was held from December 17, 1992 to February 18, 1993. A copy of the notice was mailed to the public. In addition, a public meeting was held on January 7, 1993. At this meeting, representatives from EPA answered questions about problems at the site and the remedial alternatives under consideration. Meetings with city and county officials were also held.

Other community relations activities included:

- Issuance of a Fact Sheet on the RI/FS process in September 1991.
- Issuance of a Fact Sheet on the RI results in September 1992.
- Issuance of a Fact Sheet on the Proposed Plan in December 1992.

IV. SCOPE AND ROLE OF RESPONSE ACTION WITHIN SITE STRATEGY

As with many Superfund Sites, the Bypass 601 Site is very complex. As a result, the Site was divided into units or phases, referred to as "operable units." The operable units (OUs) at this Site are:

OU One:	Addressed soil contamination at the MSR facility (interim containment)
OU Two:	Addresses soil contamination at other sources of contamination; and addresses groundwater contamination across the entire Site.

The ROD for the first OU was signed on August 31,1990. The interim containment remedy was never implemented (See Section XII). The intent of the remedial action presented in this ROD is to reduce future risks at the entire Site by removing the threat posed by contamination.

The ROD for OU 2 amends the OU 1 ROD to include the excavation and final cleanup envisioned by the OU 1 ROD. In addition, the groundwater remedy proposed as OU 3 on December 17, 1992 is also described in this ROD as a part of OU 2.

This ROD will present a final remedial action for both operable units.

V. SUMMARY OF SITE CHARACTERISTICS

The RI at the Bypass 601 Site included the characterization of the following routes of contaminant migration: groundwater, surface water, soil and sediment contamination. In addition, a removal was conducted during the RI. Results of all activities are summarized below.

An onsite laboratory was used during the investigation to perform lead analysis of all the samples collected. The onsite laboratory provided quick turnaround results which guided the field investigation by quickly providing analytical data to indicate where further sampling should occur. The onsite laboratory provided ERA Data Quality Objective (DQO) Level 3 data.

A. Soil Investigation

Twenty percent of the samples sent to the onsite laboratory were split and sent to a Contract Laboratory Program (CLP) laboratory for complete Target Compound List/Target Analyte List (TCL/TAL) and sulfate analyses. Selection of the samples to be split and sent to the CLP laboratory were field determined, with the most heavily contaminated samples being analyzed to characterize and define the extent of soil contamination at EPA DQO Level 4.

A total of 211 surface soil and 240 subsurface soil samples were collected during the soil investigation from the ten source areas. In addition, background samples were collected from five locations to provide data concerning the local chemical quality of the surface and subsurface soil.

The background sample locations are shown in Figure 5-1. Two surface soil samples and three soil boring samples were collected in areas that appeared to be unaffected by Site operations.

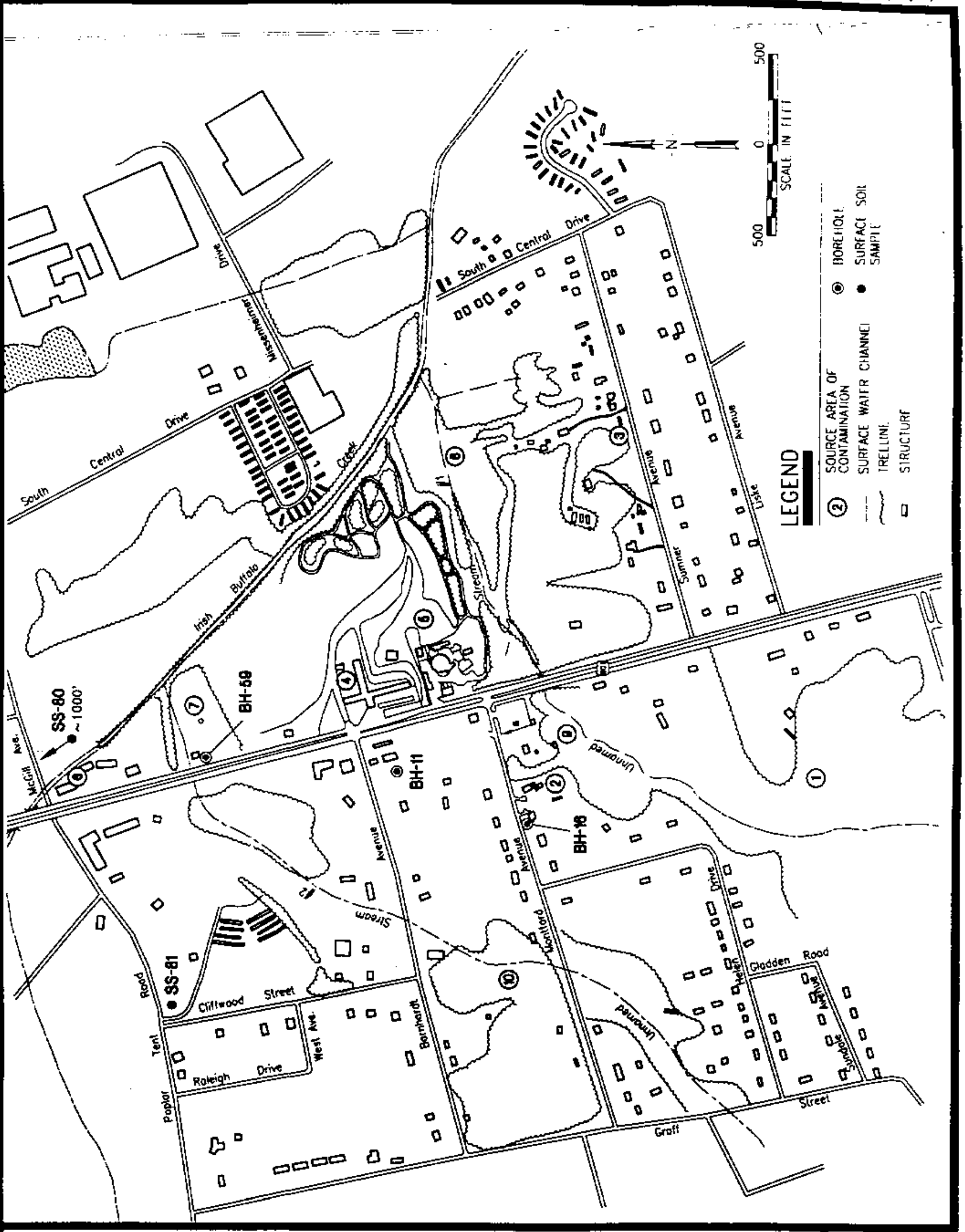
Figures 5-2 through 5-11 show the soil sample locations for source areas 1-10. Lead was the predominant contaminant found, with higher concentrations and greater frequency of occurrence than any other contaminant. Other metals found include antimony, barium, cadmium, copper, vanadium, zinc, and manganese. In addition, to a smaller extent, semi-volatile organic compounds such as phenanthrene, fluoranthene, pyrene, benzo(a) anthracene, and benzo(b & or k) fluoranthene were also found.

Contamination was not found in Source Area #7. In addition, no sign of battery casing debris or any other wastes or soil contamination could be visually identified in this Source Area.

Average background concentrations and maximum concentrations found for the contaminants of concern are shown in Table 8-1.

B. 1992 Immediate Removal

During the remedial investigation, four of the Source Areas (1,2,9,10) were found to present an immediate risk to human health. These areas were visually contaminated with battery casing debris. The areas also were easily accessible to the public. Toxicity Characteristic Leaching Procedure (TCLP) tests results indicated lead at 15 ppm, three times the regulatory limit of 5 ppm.



CDM FPC ARCS IV

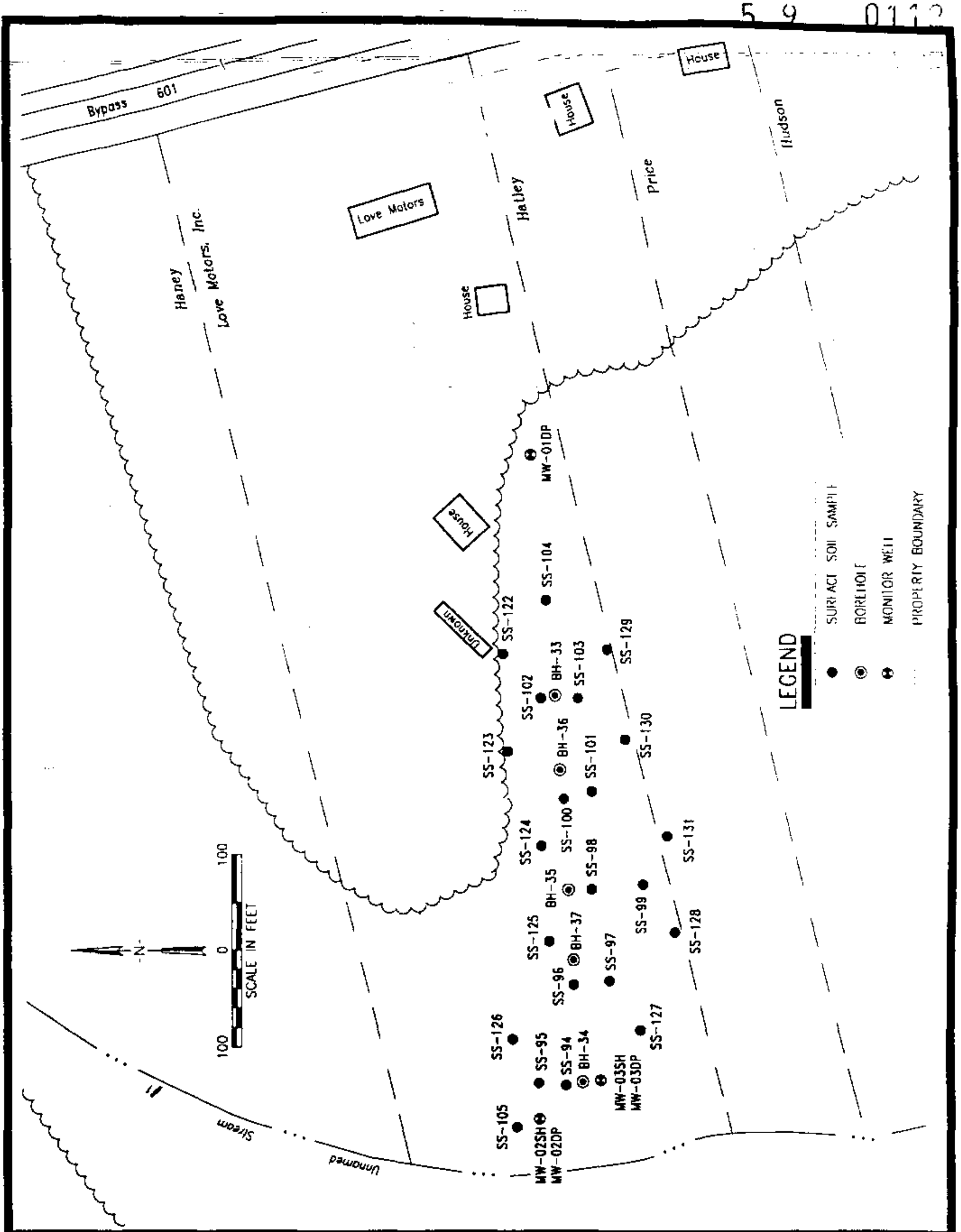
BACKGROUND SOIL SAMPLING LOCATIONS

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

5-1



CDM FPC ARCS IV

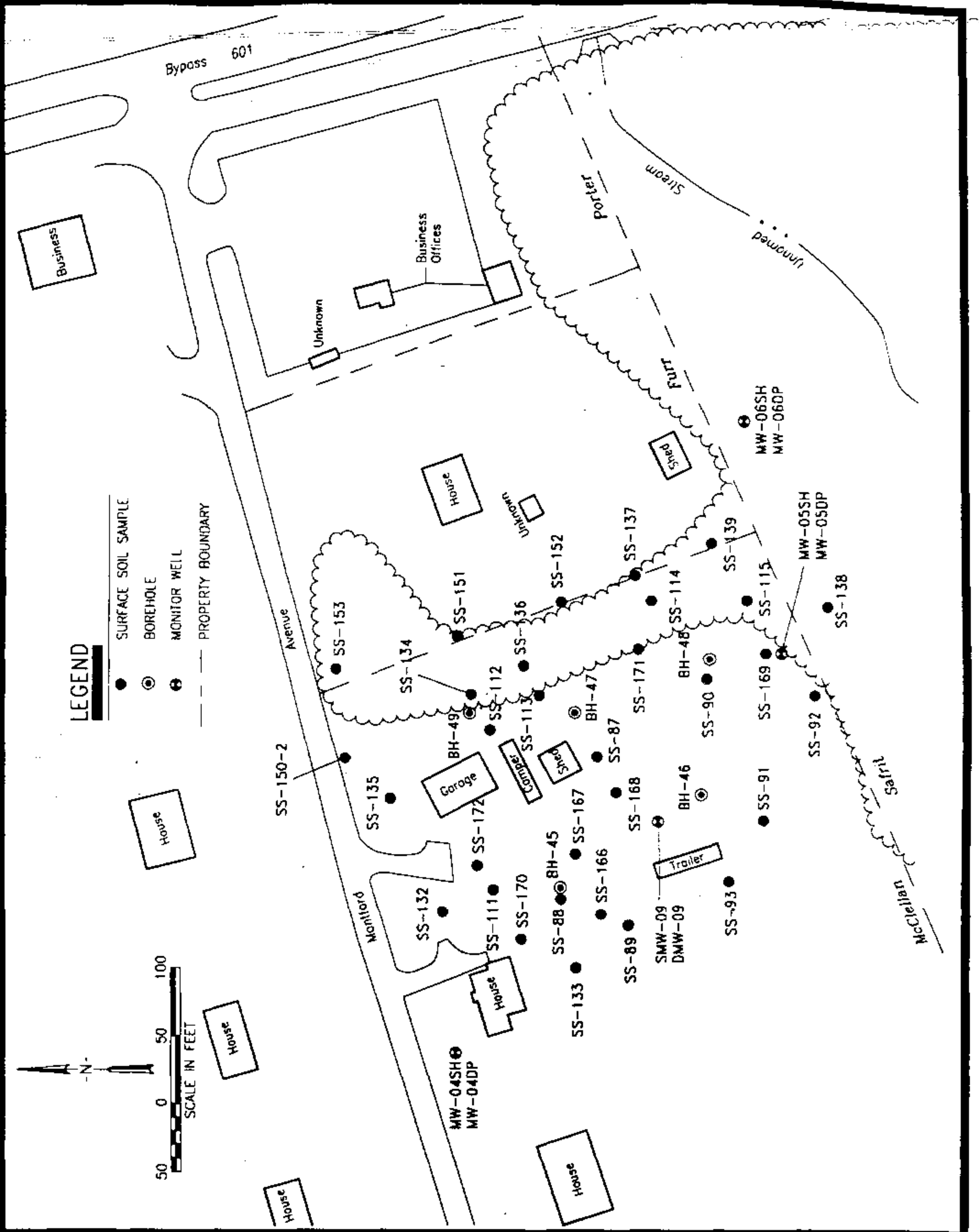
SOIL SAMPLING LOCATIONS - SOURCE AREA #1

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

5-2



CDM FPC ARCS IV

SOIL SAMPLING LOCATIONS - SOURCE AREA #2

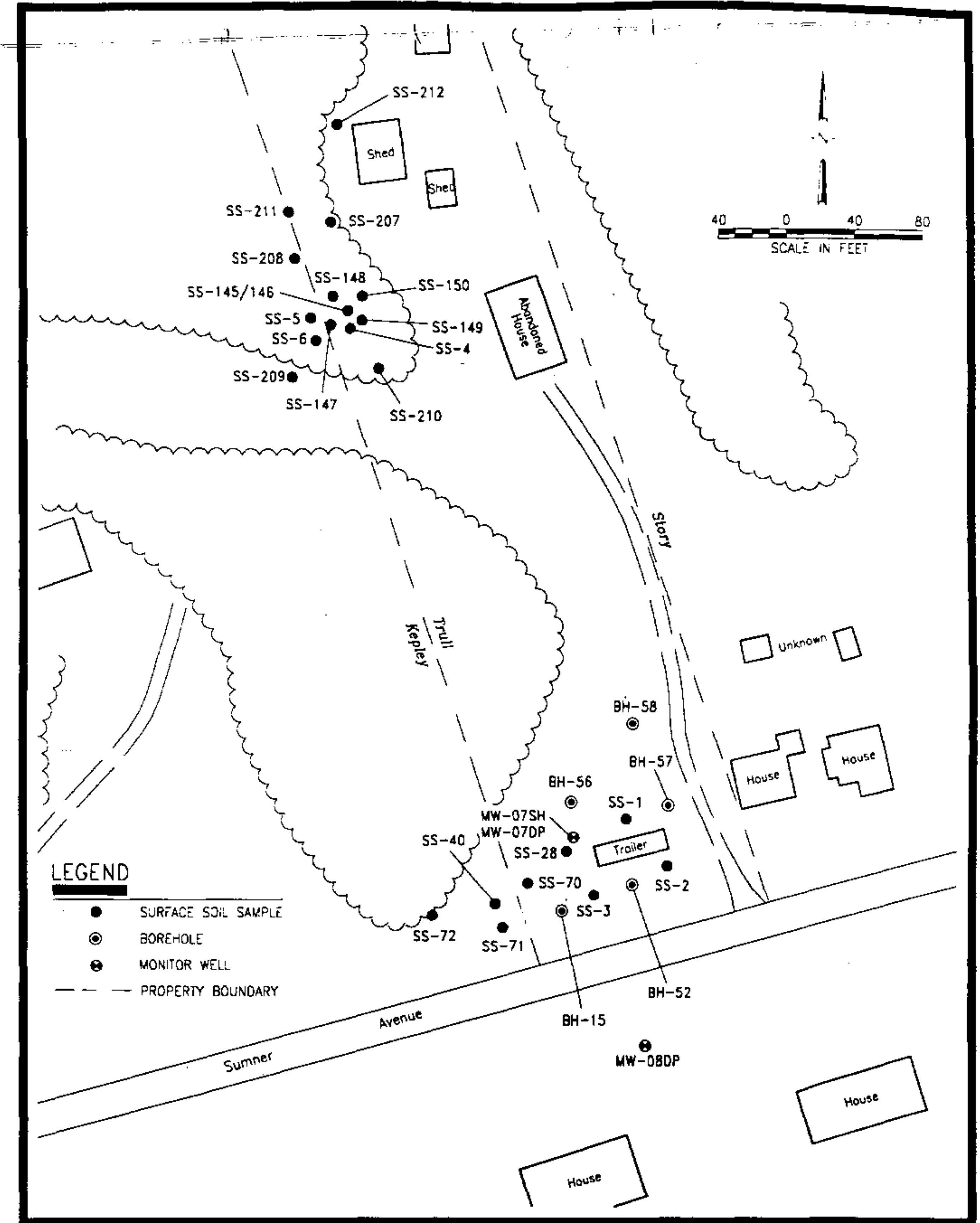
BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

5-3

5 9 0114



CDM FPC ARCS IV

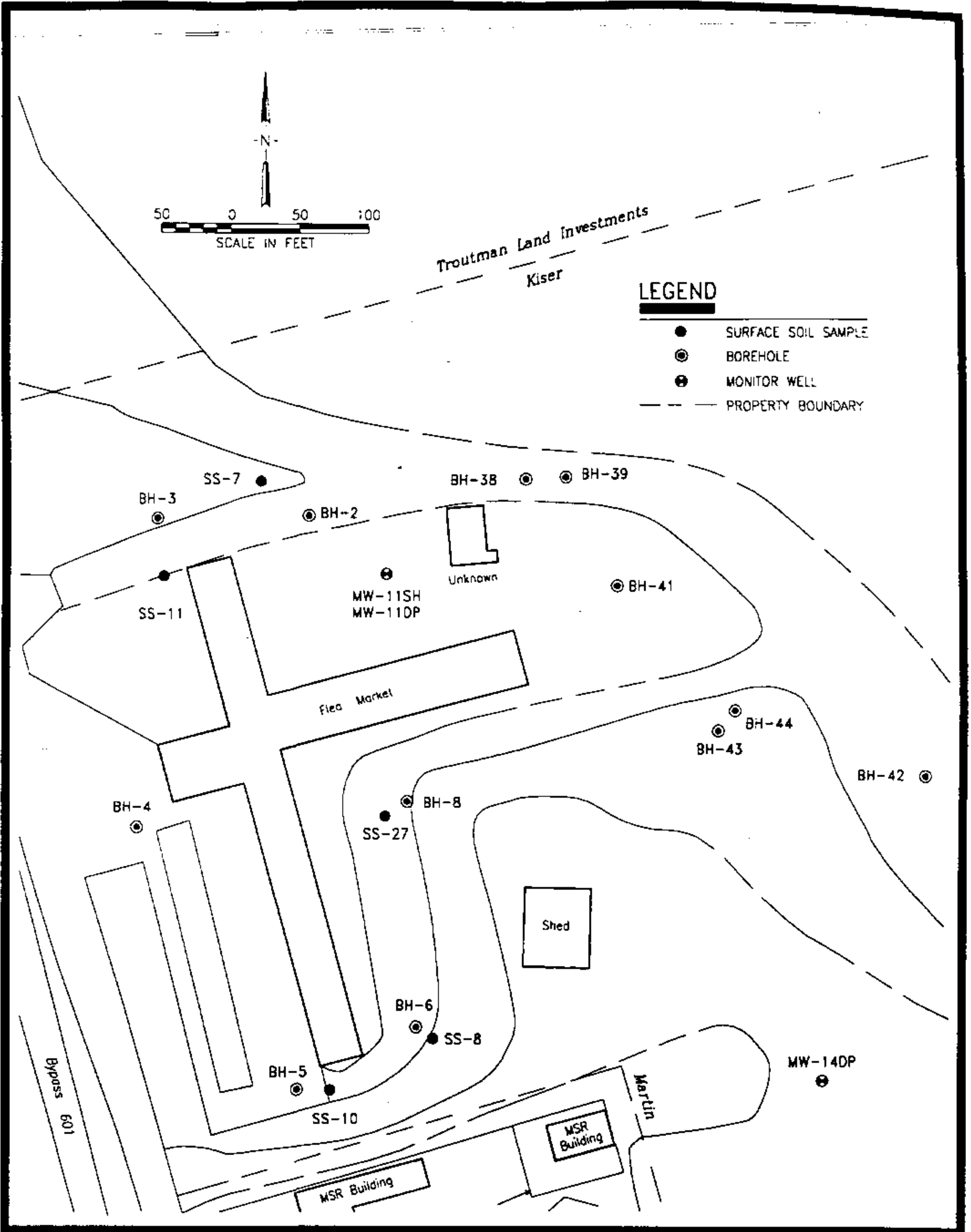
SOIL SAMPLING LOCATIONS - SOURCE AREA #3

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

5-4



CDM FPC ARCS IV

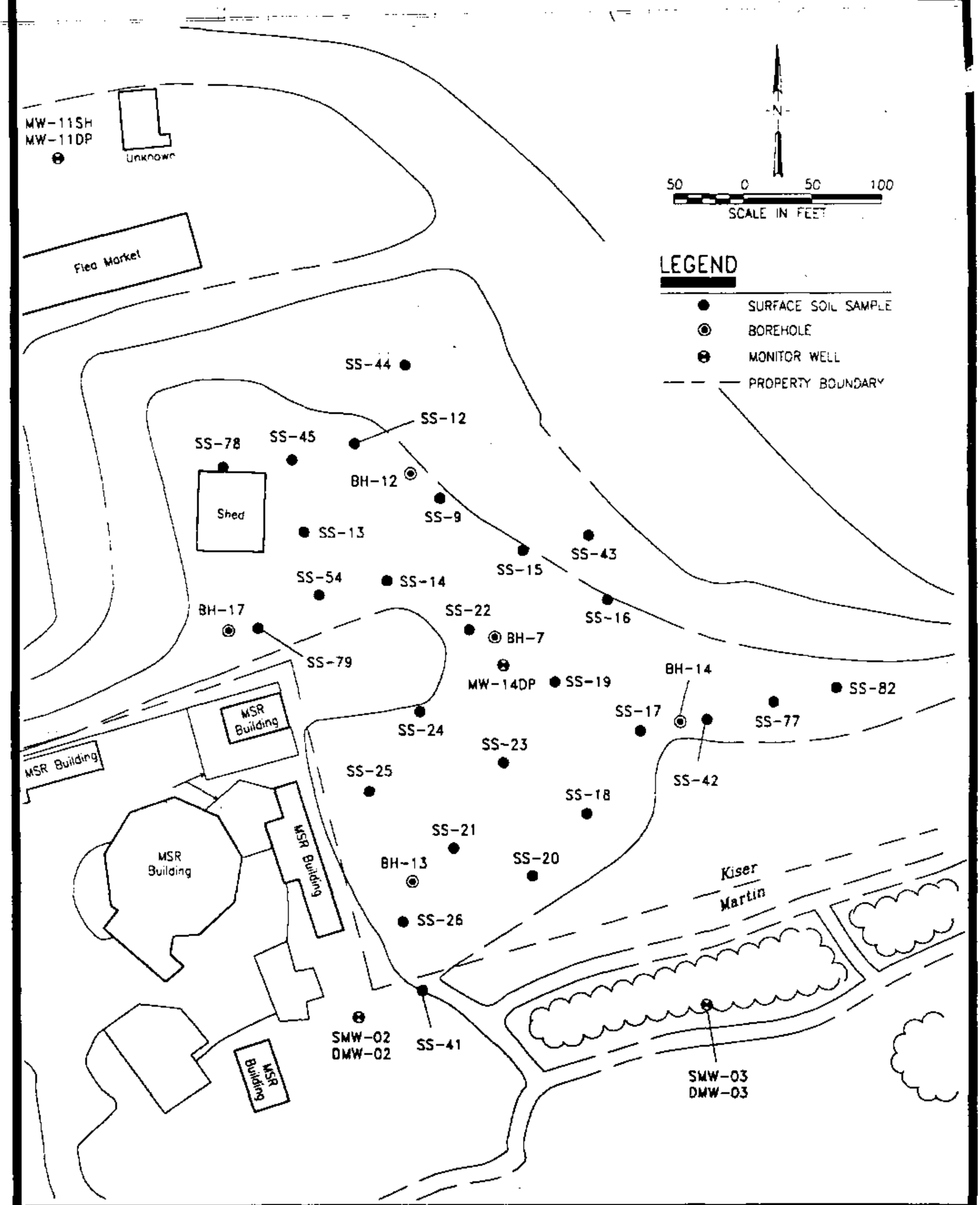
SOIL SAMPLING LOCATIONS - SOURCE AREA #4

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

5-5



CDM FPC ARCS IV

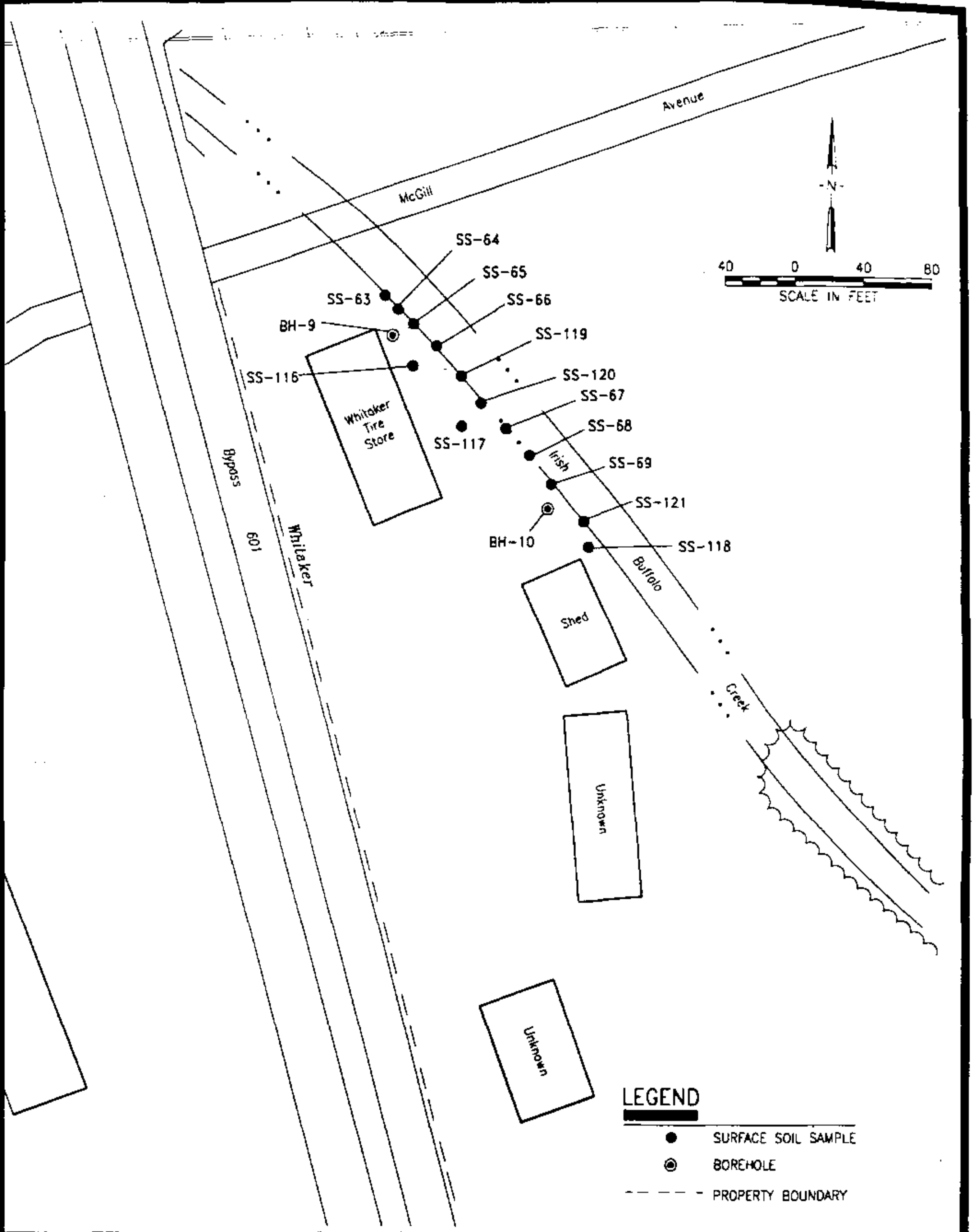
SOIL SAMPLING LOCATIONS - SOURCE AREA #5

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

5-6



CDM FPC ARCS IV

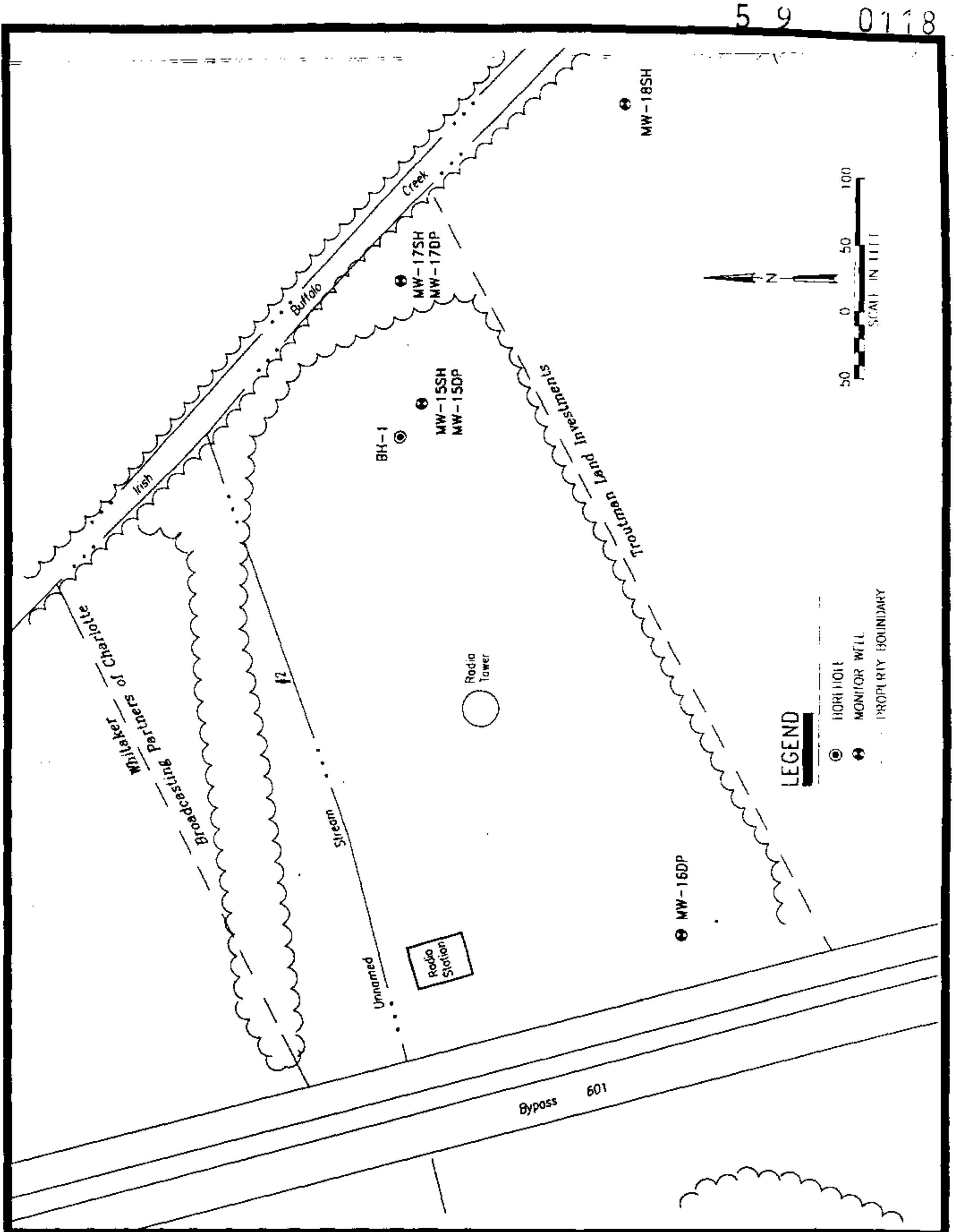
SOIL SAMPLING LOCATIONS - SOURCE AREA #6

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

5-7



CDM FPC ARCS IV

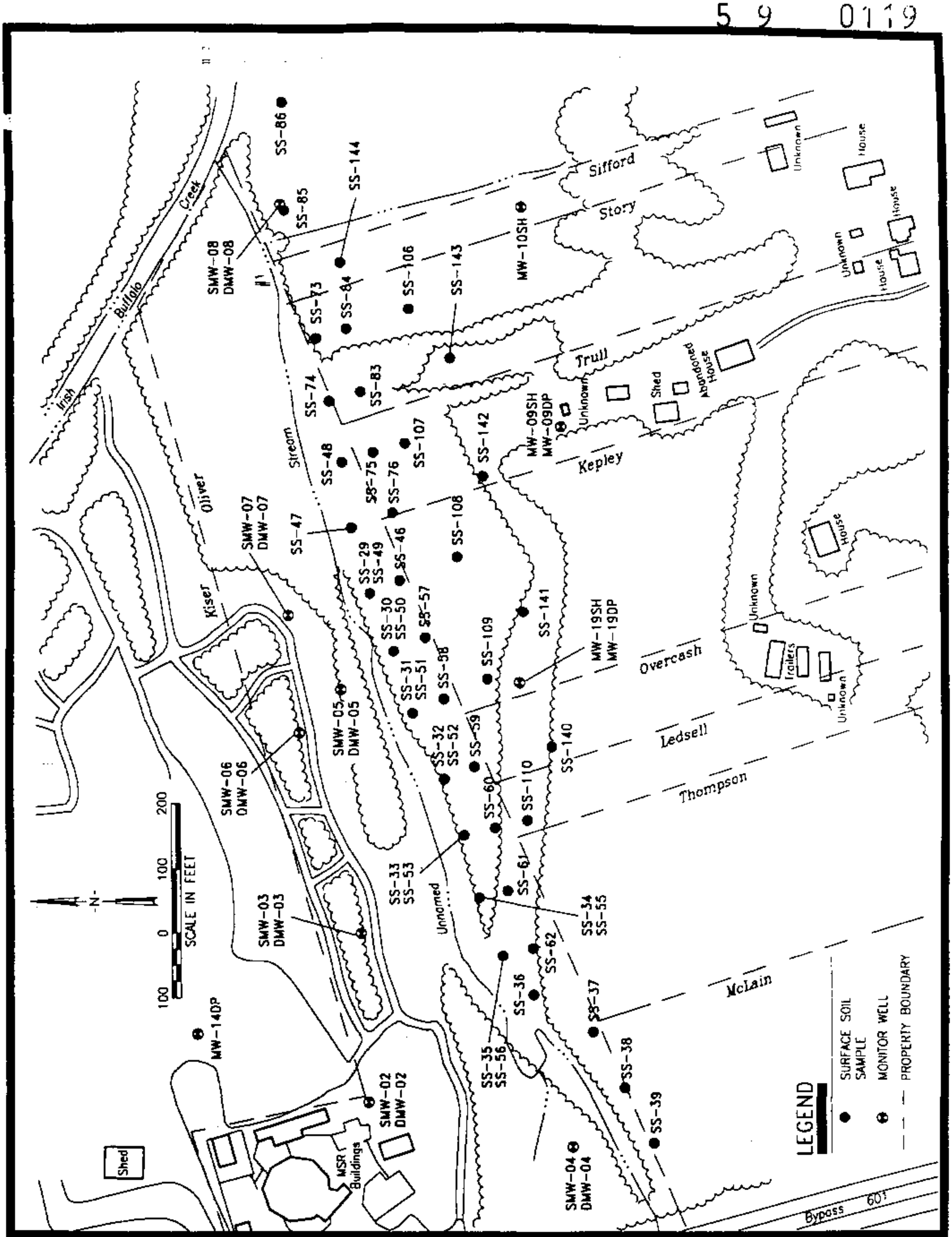
SOIL SAMPLING LOCATIONS - SOURCE AREA #7

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

5-8



CDM FPC ARCS IV

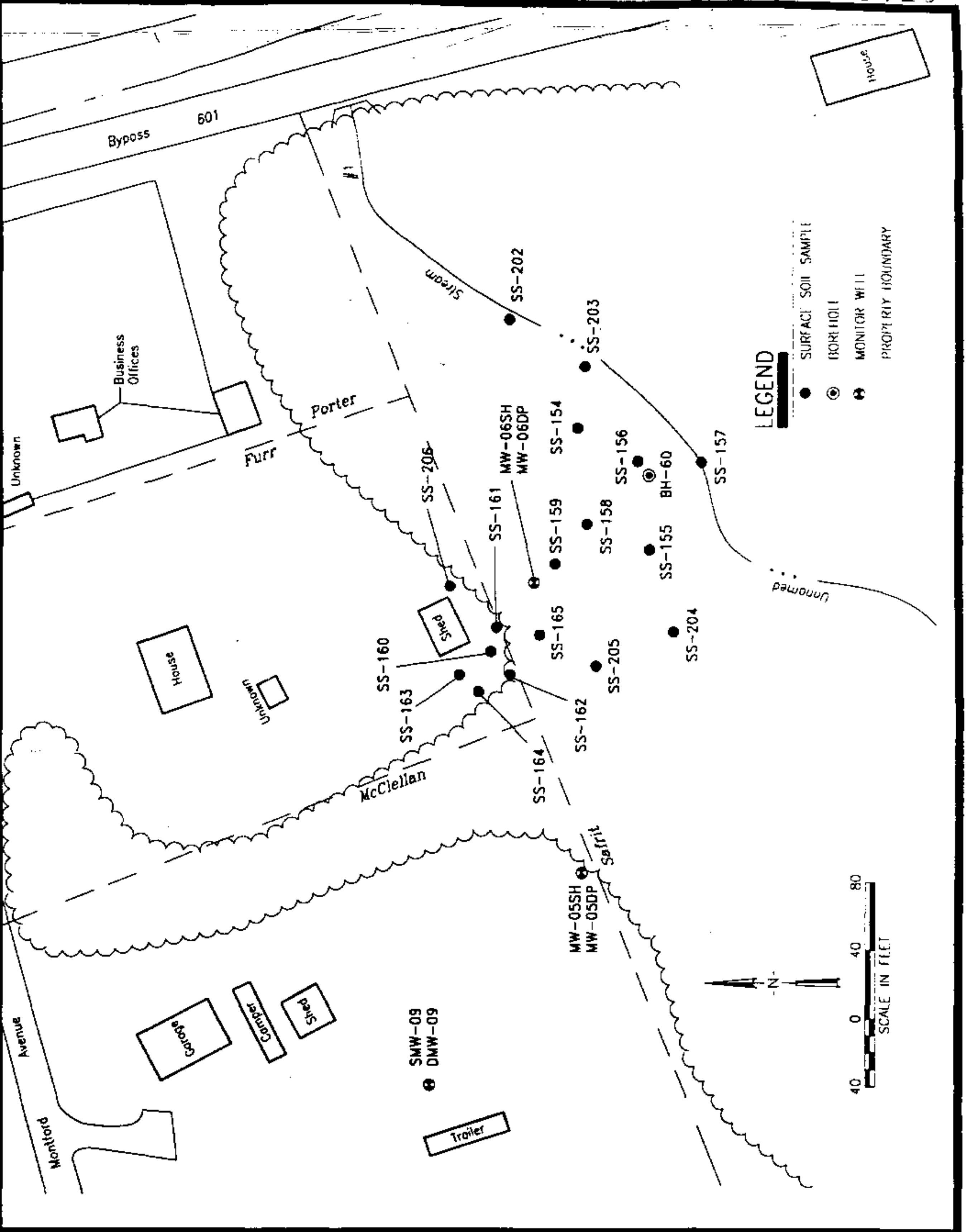
SOIL SAMPLING LOCATIONS - SOURCE AREA #8

BYPASS 601 SITE

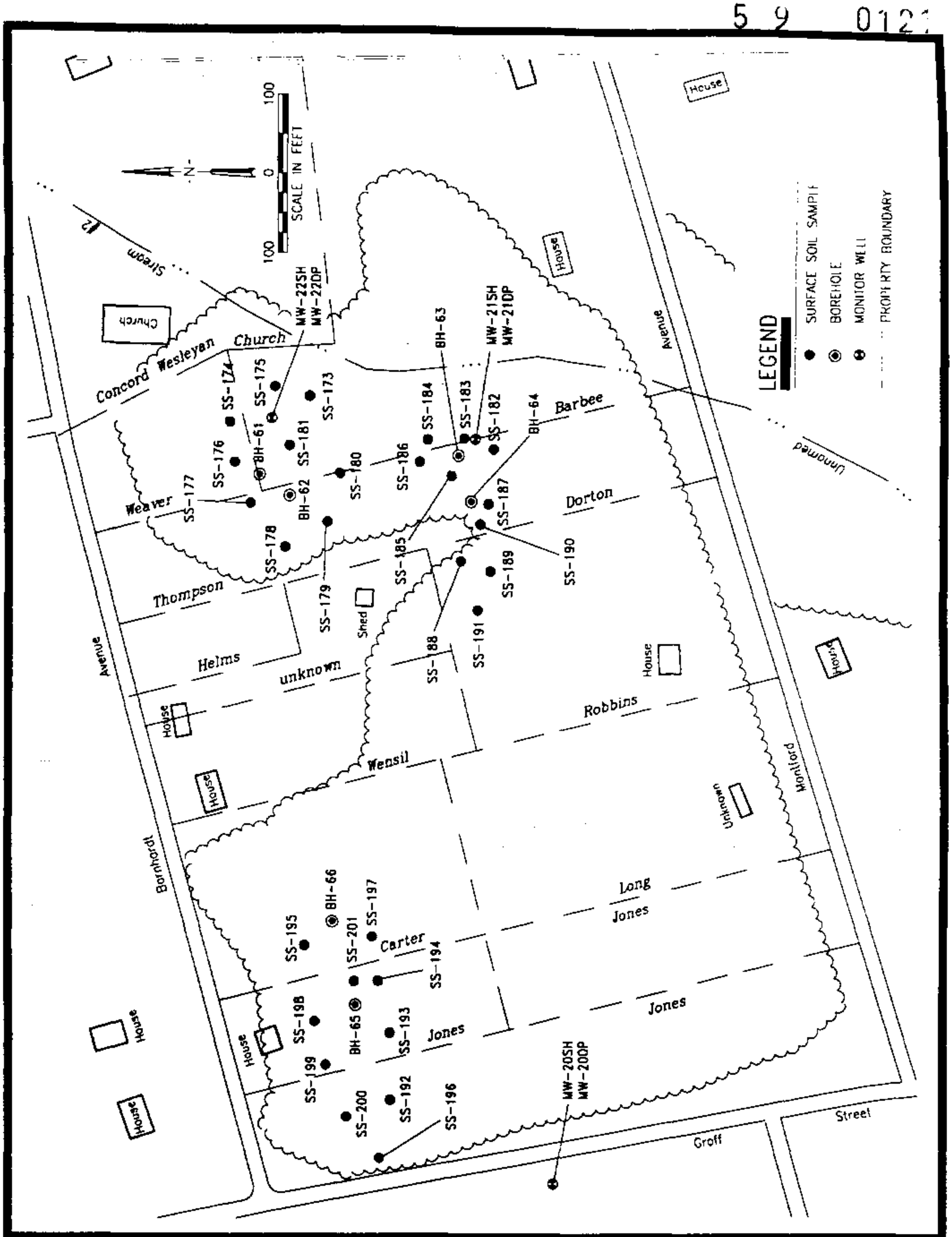
CONCORD, NORTH CAROLINA

FIGURE NO.

5-9



CDM FPC ARCS IV **SOIL SAMPLING LOCATIONS - SOURCE AREA #9**	**FIGURE NO.**
BYPASS 601 SITE **CONCORD, NORTH CAROLINA**	5-10



CDM FPC ARCS IV

SOIL SAMPLING LOCATIONS - SOURCE AREA #10

BYPASS 601 SITE
CONCORD, NORTH CAROLINA

FIGURE NO.
5-11

Battery casing debris and lead contaminated soil were removed from the four areas and transmitted to the MSR facility. A total of 9,587.3 tons or 14,075 cubic yards of material were stockpiled at the MSR facility and covered with a 20 mil liner. Two tin-roofed structures and a portion of a building were demolished to make room for the stockpile. Portions of the removal were performed during and after the RI sampling.

C. Groundwater Investigation

Groundwater sampling was conducted at the Site to fully assess the types and concentrations of contaminants present in the aquifer system, and to determine the extent and magnitude of groundwater contamination with regard to each of the Source Areas.

A total of 38 monitor wells (16 two-well clusters and 6 single wells) were installed at the Site to supplement the 20 existing monitor wells (10 two-well clusters) installed during the 1990 RI (Figure 5-12). All samples were sent to a CLP laboratory for TCL/AL and sulfate analyses.

Most of the metal contamination in groundwater appears to be associated with buried battery casing debris at the MSR facility, and Source Areas 1,2,3,4,5, and 10. In addition, the metals contamination appears to be limited mainly to the upper 30 feet of the aquifer. Concentrations of lead ranged from not detected (ND) to 2500 micrograms per liter (µg/l). Other metals found include barium, beryllium, cadmium, chromium, copper, nickel, vanadium, zinc, and manganese.

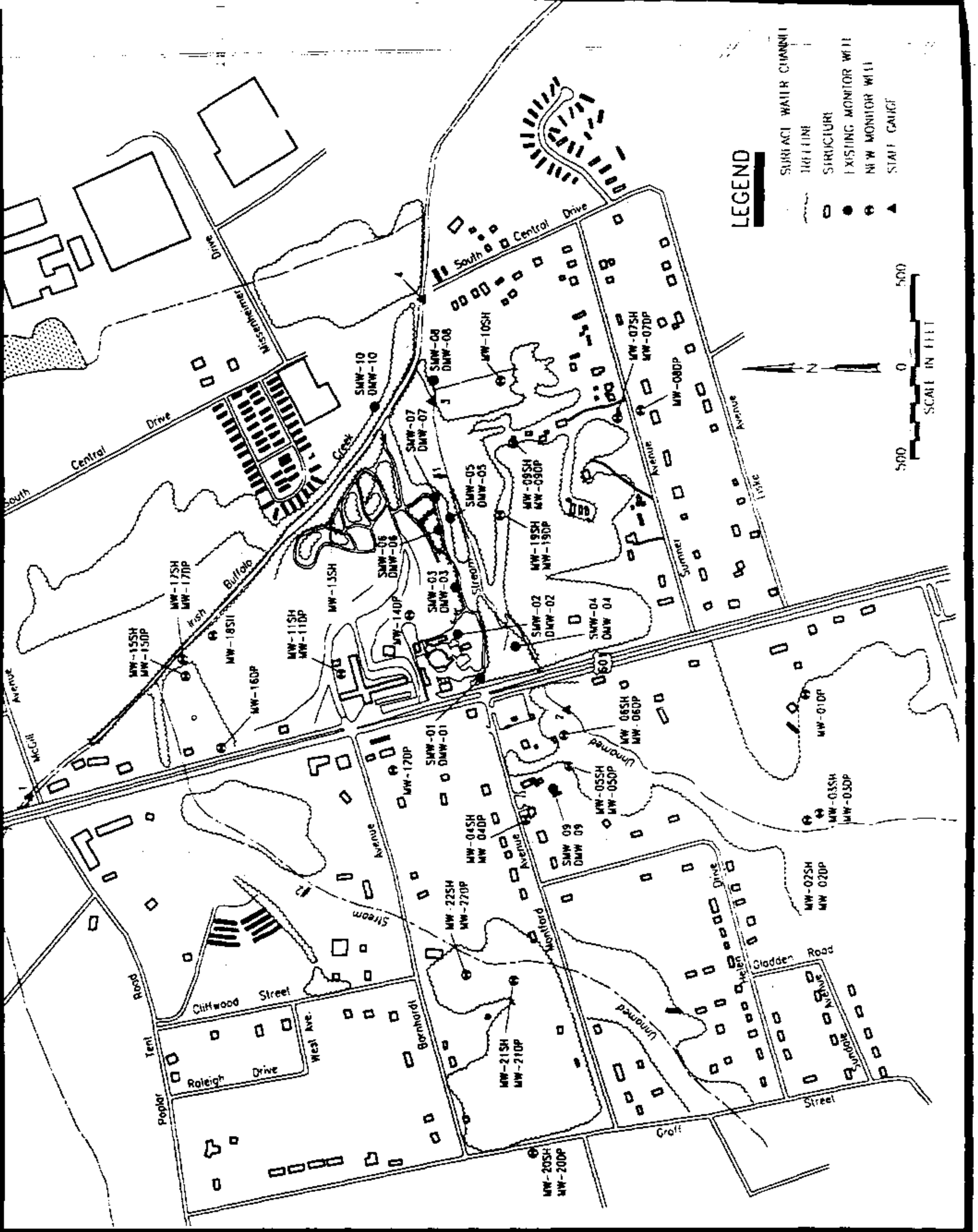
Volatile organic compounds (VOC), 1,2-dichloroethane, carbon tetrachloride and benzene, were found in groundwater in Source Areas 4 and 5 and the MSR facility. The VOC contamination was also limited to the upper 30 feet of the aquifer. The concentration of 1,2-dichloroethane ranged from ND to 69 µg/l.

Sulfate contamination appears to be limited mainly to the MSR facility and Source Area #2, which are the two areas of the Site where battery cracking operations are reported to have taken place in the past. The sulfate contamination appears to have moved into the deeper part of the aquifer.

D. Well Survey/Private Well Sampling Investigation

Two water use surveys have been conducted within a one-mile radius around the Site within the last three years. Those residences which rely on private wells for their source of potable water are shown in Figure 5-13. Most of the private wells are believed to be constructed to obtain water from the bedrock zone of the unconfined aquifer. The average well depth is approximately 186 feet below land surface, with an average yield of approximately 23 gallons per minute.

Twelve private wells were sampled during this investigation (Figure 5-14). Three of the private wells sampled (PW-01, PW-02, and PW-05) contained elevated levels of lead. These wells were later resampled and lead levels were found to be below health concerns.



CDM FPC ARCS IV

MONITOR WELL/STAFF GAUGE LOCATIONS

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO. 5-12

E. Surface Water/Sediment investigation

Samples of surface water and bottom sediments were collected both onsite and offsite to determine and evaluate surface water contaminant migration pathways and the extent and magnitude of surface water contamination with regard to each of the source areas identified at the site. In addition, shallow cores were collected from the stream sediments to determine the vertical extent of sediment contamination. The sampling locations are shown in Figure 5-15.

Samples were collected from six locations on Irish Buffalo Creek, and five locations each from Unnamed Streams #1 and #2. All surface water and 20% of sediment samples were sent to a CLP laboratory for TCL/TAL and sulfate analyses.

Lead, copper, and zinc were detected in the surface water samples. The concentration of lead ranged from ND to 36 µg/l. The metals detected in surface water appear to be associated with the MSR facility and Source Area #10.

In sediments, lead was the only metal detected in any significant concentration. The lead was detected in sediments downstream from the MSR facility and ranged in concentration from 48 to 69 milligrams per kilogram (mg/kg).

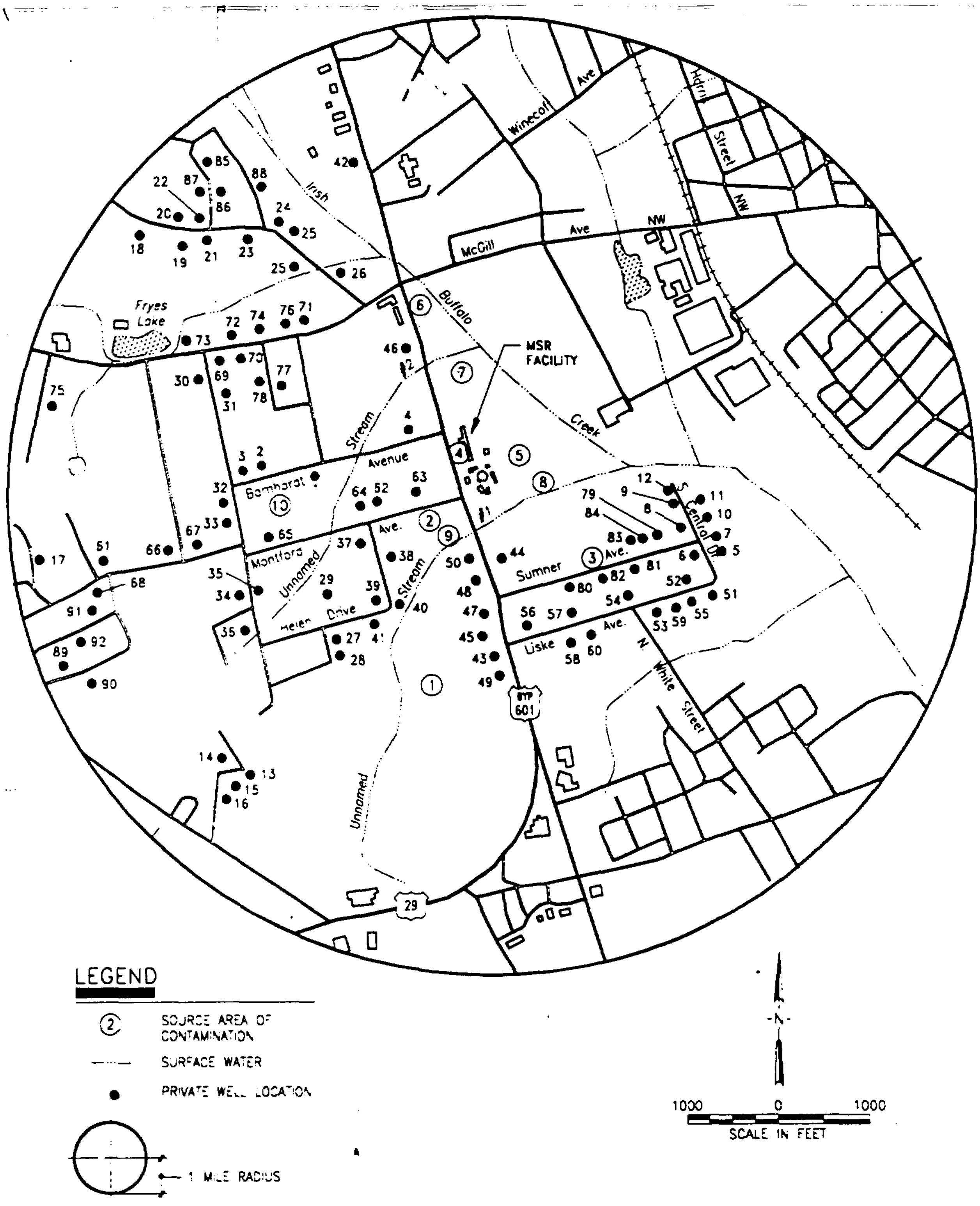
F. Ecological Investigation

A preliminary ecological sampling was conducted at the Site. It included benthic macroinvertebrate collection and identification, and fish whole body tissue sampling and analysis. This sampling was conducted to determine if the Site might have impaired the structure and function of the biological communities in the streams draining the Site. Benthic macroinvertebrates have limited migration patterns and therefore are good indicators of localized conditions and aid in the impact assessment of Site related contamination.

The benthic macroinvertebrate samples were collected at three locations in Irish Buffalo Creek and three locations in Unnamed Stream #1. Nine fish whole body tissue samples were collected from Irish Buffalo Creek and analyzed for lead (Figure 5-16).

The diversity results appear to show that stations 2 and 3 were the most impacted relative to station 1 (reference), while the equitability results show that stations 2, 3, and 5 were the most impacted. The relative abundance of chironomids, a pollution tolerant organism, shows that stations 2, 3, and 6 were the most impacted. These results suggest an impact to the aquatic communities of the streams located directly adjacent to the Site.

Low levels of lead were detected in predator level samples collected from all three locations, including the reference station 1. These results suggest that contamination from the Site is not impacting the fish communities in the adjacent streams.



See Appendix A for Well Survey Details

CDM FPC ARCS IV

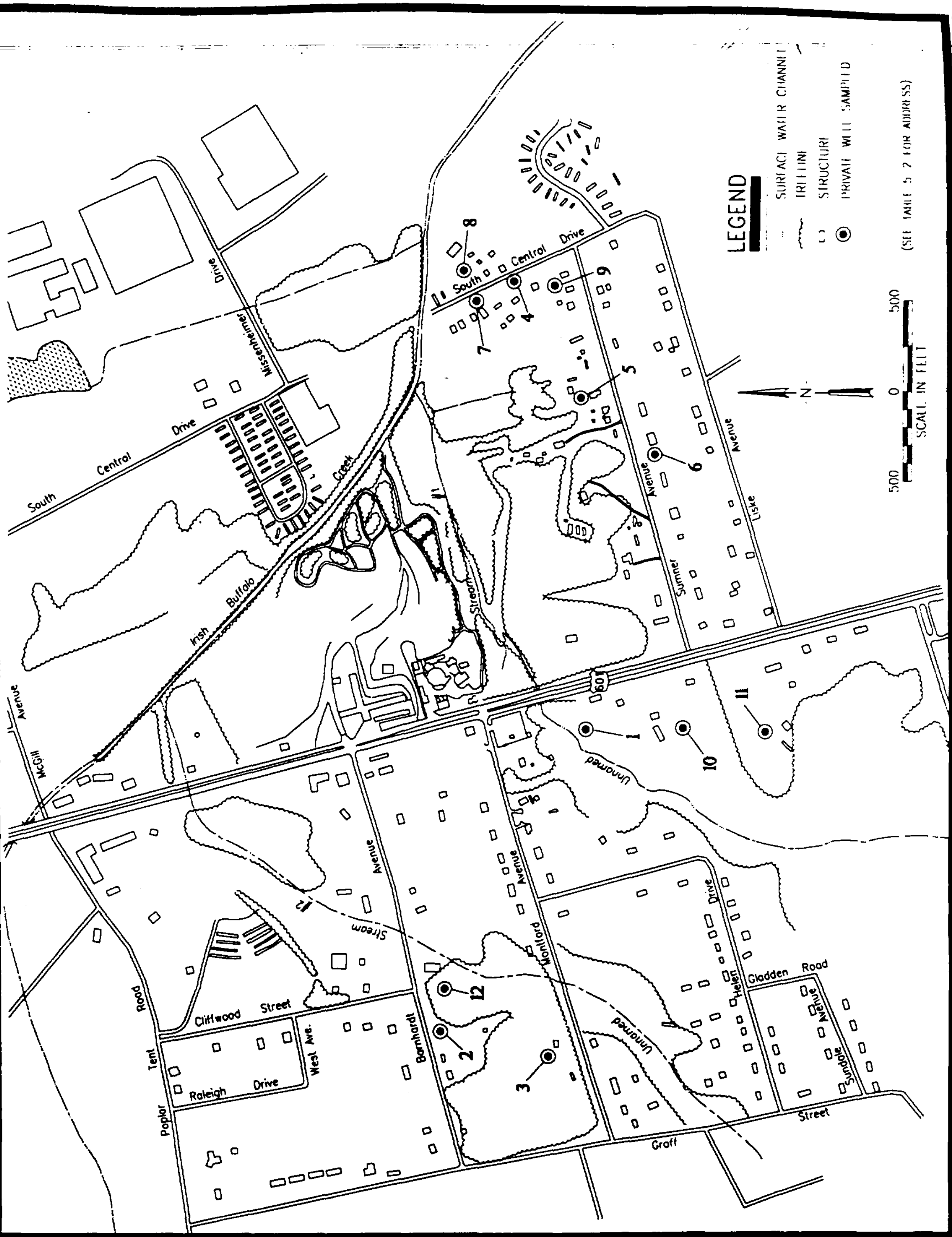
PRIVATE WELL SURVEY RESULTS

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

5-13



CDM FPC ARCS IV

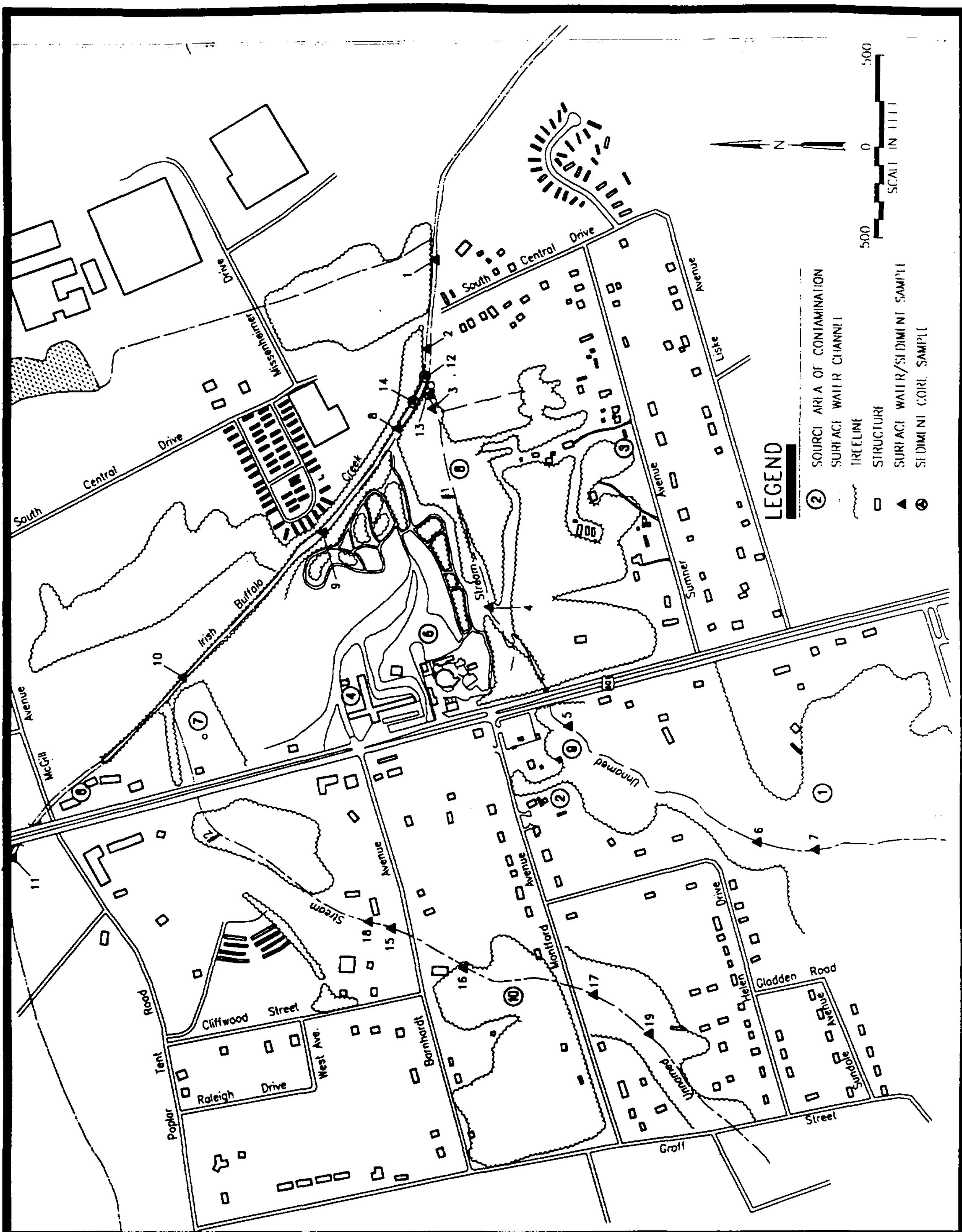
PRIVATE WELL SAMPLING LOCATIONS

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

5-14



CDM FPC ARCS IV

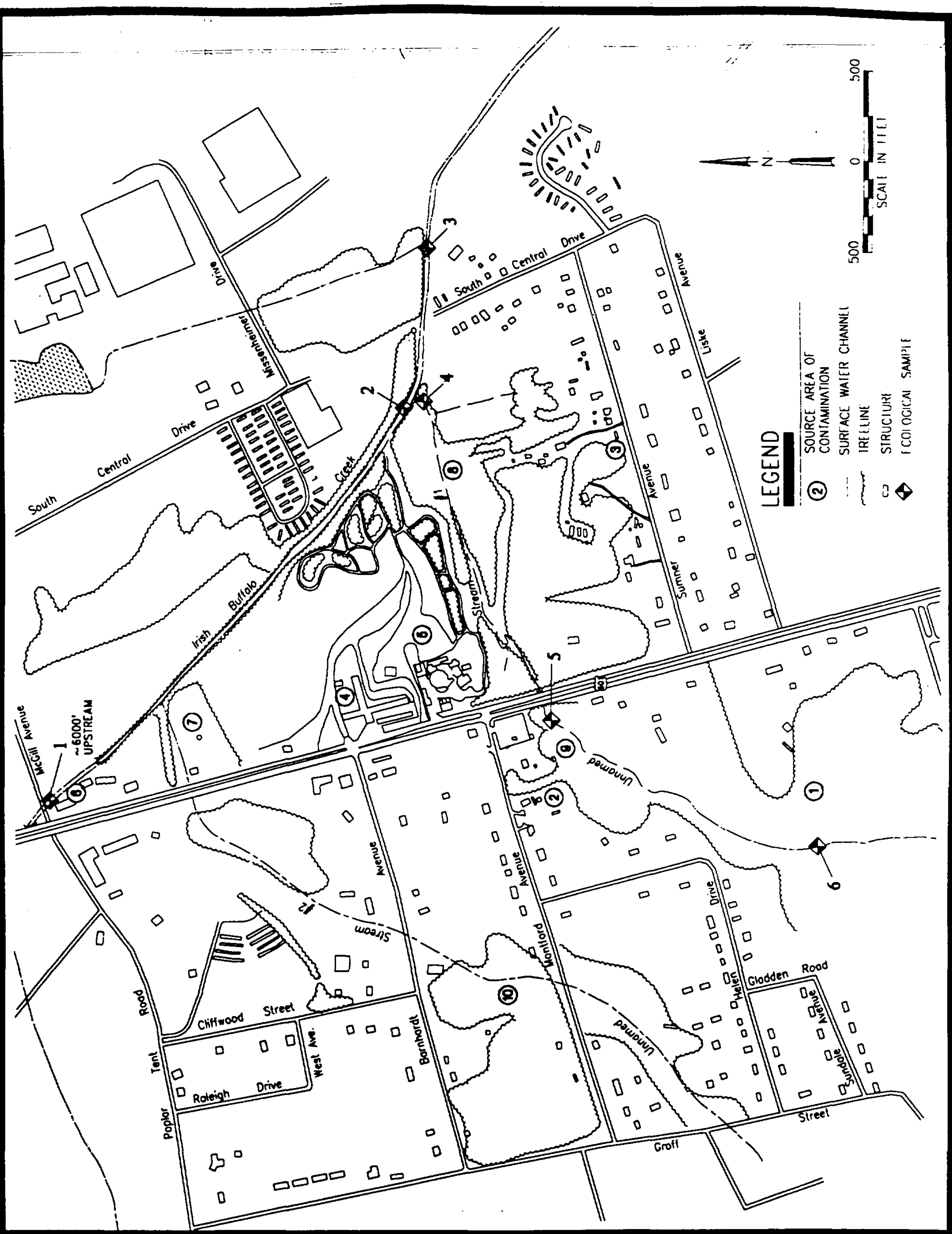
SURFACE WATER/SEDIMENT SAMPLING LOCATIONS

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

5-15



CDM FPC ARCS IV
ECOLOGICAL SAMPLING LOCATIONS
BYPASS 601 SITE
CONCORD, NORTH CAROLINA

FIGURE NO.
5-16

VI. SUMMARY OF SITE RISKS

The Bypass 601 Site is releasing contaminants into the environment. The Baseline Risk Assessment Report presents the results of a comprehensive risk assessment that addresses the potential threats to public health and the environment posed by the Site under current and future conditions, assuming that no remedial actions take place, and that no restrictions are placed on future use of the Site.

The Baseline Risk Assessment Report consists of the following sections: identification of chemicals of potential concern; toxicity assessment; human exposure assessment, risk characterization; and environmental assessment. All sections are summarized below.

A. Contaminants of Concern

Data collected during the RI were reviewed and evaluated to determine the contaminants of concern at the Site which are most likely to pose risks to the public health. These contaminants were chosen for each environmental media sampled.

Once these contaminants of concern were identified, exposure concentrations in each media were estimated. Exposure point concentrations were calculated for groundwater and surface soils using the lesser of the 95 percent upper confidence limit concentration or the maximum detected value as the reasonable maximum exposure (RME) point concentration. Exposure point concentrations for groundwater are shown in Table 6-1. Exposure point concentrations for each source area are presented in Table 6-2.

B. Exposure Assessment

The exposure assessment evaluates and identifies complete pathways of exposure to human population on or near the Site. Current exposure scenarios include exposure through incidental ingestion of soil; inhalation of fugitive dusts from soils; dermal contact with soils; and ingestion of water from private wells. Land use assumptions include residential, commercial/industrial and child visitor scenario.

Future use scenarios consider construction of a water supply well within the groundwater contaminant plume and ingestion of soil, inhalation of dusts and dermal contact with soils in Source Areas 4 and 5, which are currently used for commercial/industrial purposes, as a worse-case scenario. Possible exposure scenarios for groundwater include exposure to contaminants of concern from the groundwater plume in drinking water and through inhalation of volatiles evolved from water through household water use. Table 6-3 shows the exposure assumptions used to determine the risk at this Site. Further detail and mathematical calculations can be reviewed in the Baseline Risk Assessment.

TABLE 6-1
Reasonable Maximum Exposure Concentrations for a Future Hypothetical Groundwater User
Bypass 601 Site
Concord, North Carolina

COC	Mean of transformed data	Standard Deviation of data	H (statistic from table)	Sample size	UCL (ug/l)	Range of Detects (ug/l)	UCL or Maximum (ug/l)
BARIUM	4.70	1.46	2.881	47	586	10-3600	586
BERYLLIUM	-0.24	0.76	2.112	47	1	7-7	1
CADMIUM	0.57	1.18	2.580	47	6	3-100	6
CHROMIUM	2.30	1.68	3.200	47	90	6-290	90
COPPER	2.71	2.27	4.228	47	812	22-1400	812
NICKEL	2.77	1.44	2.881	47	82	5-1400	82
LEAD	1.76	1.99	3.533	47	117	3-2500	117
ANTIMONY				47	ND	ND(12-60)	NA
VANADIUM	2.67	2.16	3.533	47	451	5-1300	451
ZINC	3.45	2.06	3.533	47	767	27-4400	767
MANGANESE	5.46	3.03	4.947	47	211150	3-97000	97000
1,2-DICHLOROETHANE	1.69	0.51	1.876	47	7	2-69	7
CARBON TETRACHLORIDE	1.65	0.28	1.761	47	6	5-34	6
BENZENE	1.63	0.39	1.813	47	6	1-37	6
SULFATE	3.90	2.17	3.533	47	1600000	1600-5800000	1600000

COC Contaminant of Concern
UCL 95% Upper Confidence Limit
ND Not Detected
NA Not Applicable

TABLE 6-2
Summary of Reasonable Maximum Exposure Concentrations in Soil
Bypass 601 Site
Concord, North Carolina

COC	UCL or maximum Concentration (mg/kg)								
	Source Area 1	Source Area 2	Source Area 3	Source Area 4	Source Area 5	Source Area 6	Source Area 8	Source Area 9	Source Area 10
BARIUM	90	140	110	95	142	229	170	230	230
BERYLLIUM	0.42	NA	0.42	0.49	0.82	0.75	0.44	NA	0.8
CADMIUM	NA	3.2	NA	NA	2.3	0.76	NA	NA	NA
CHROMIUM	6.5	33	51	16	31.7	30.1	35	22	52
COPPER	NA	180	52	39	169	44.8	140	78	50
NICKEL	1.8	22.4	16	15	17.8	40	19	12	16
LEAD	294	62253	7998	96	55000	760.5	3055	11303	296
ANTIMONY	27	21	NA	NA	140	NA	48	53	NA
VANADIUM	39	220	230	33	57	125	135	89	190
ZINC	32	110	70	51	220	110	99	46	50
MANGANESE	1000	3100	1100	580	481	940	960	460	3900
1,2-DICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON TETRACHLORIDE	NA	0.130	NA	NA	NA	NA	NA	NA	NA
BENZENE	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1254	NA	NA	NA	NA	0.370	NA	0.770	NA	NA
PCB-1260	NA	0.085	NA	NA	NA	NA	NA	0.680	NA
NAPHTHALENE	NA	NA	NA	NA	1.900	NA	NA	0.460	NA
ACENAPHTHYLENE	NA	NA	NA	NA	0.040	NA	NA	0.059	NA
ACENAPHTHENE	NA	NA	NA	NA	0.950	NA	NA	0.560	NA
FLUORENE	NA	NA	NA	NA	0.850	NA	NA	0.360	NA
PHENANTHRENE	NA	NA	NA	NA	2.300	0.140	0.110	3.700	NA
ANTHRACENE	NA	NA	NA	NA	0.410	NA	NA	0.370	NA
FLUORANTHENE	NA	NA	0.074	NA	1.300	0.230	0.870	6.400	NA
PYRENE	NA	NA	0.064	NA	1.200	0.200	0.076	2.900	NA
BENZO(A)ANTHRACENE	NA	NA	NA	NA	0.400	0.110	NA	2.500	NA
CHRYSENE	NA	NA	NA	NA	0.420	0.110	NA	2.500	NA
BENZO(B &/OR K)FLUORANTHENE	NA	NA	0.120	NA	0.720	0.100	NA	2.400	NA
BENZO-A-PYRENE	NA	NA	NA	NA	0.240	0.094	NA	1.300	NA
INDENO (1,2,3-CD) PYRENE	NA	NA	NA	NA	0.260	0.069	NA	0.580	NA
DIBENZO(A,H)ANTHRACENE	NA	NA	NA	NA	NA	NA	NA	0.380	NA
BENZO(GHI)PERYLENE	NA	NA	NA	NA	NA	NA	NA	0.540	NA
2-METHYLNAPHTHALENE	NA	NA	NA	NA	1.200	NA	NA	0.200	NA
DIBENZOFURAN	NA	NA	NA	NA	0.880	NA	NA	0.340	NA
2-METHYLPHENOL	NA	NA	NA	NA	0.240	NA	NA	NA	NA
CARBAZOLE	NA	NA	NA	NA	0.340	NA	NA	0.610	NA
SULFATE	370	610	720	180	1600	61	940	700	34

COC Contaminant of Concern
UCL 95% Upper Confidence Limit
NA Not Applicable

TABLE 6-3
EXPOSURE ASSUMPTIONS

	Child Resident	**Adult Resident**	**Child Visitor**	**Adult Worker**
Body Weight (kg)	16	70	45	70
Exposure Frequency (days/year)	350	350	52	250
Exposure Duration (years)	6	24	12	25
Ingestion Rate (mg/day)	200	100	100	50
Inhalation Rate (m^3/day)	16	20	16	20
Ingestion Rate (GW) (liters/day)	2	2	---	1
Adsorption Factor (Organics)	1%	1%	1%	1%
Adsorption Factor (Inorganics)	0.1%	0.1%	0.1%	0.1%

C. Toxicity Assessment

Under current ERA guidelines, the likelihood of adverse effects occurring in humans from carcinogens and noncarcinogens are considered separately. These are discussed below. Tables 6-4 and 6-5 summarize the carcinogenic and noncarcinogenic toxicity criteria for the contaminants of concern.

Cancer slope factors have been developed by ERA for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. Slope factors, which are expressed in units of (kg-day/mg), are multiplied by the estimated intake of a potential carcinogen, in mg kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upperbound" reflects the conservative estimate of the risks calculated from the slope factor. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by ERA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media can be compared to the RfD.

RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied. These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

In the case of lead, ERA recommends the use of the Agency's Uptake Biokinetic model which predicts blood-lead levels for children ages 0.5-7 under various exposure scenarios and lead concentrations.

D. Risk Characterization

The risk characterization step of the Site risk assessment process integrates the toxicity and exposure assessments into quantitative and qualitative expressions of risk. The output of this process is a characterization of the Site-related potential noncarcinogenic and carcinogenic health effects.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ), or the ratio or the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose. By adding the HQs for all contaminants within a medium or across all media to which a given population may be reasonably exposed, the Hazard Index (HI) can be generated. Calculation of a HI in excess of unity indicates the potential for adverse health effects. Indices greater than one will be generated anytime intake for any of the chemicals of concern exceeds its Reference Dose (RfD). However, given a sufficient number of chemicals under consideration, it is also possible to generate a HI greater than one even if none of the individual chemical intakes exceeds their respective RfDs.

Carcinogenic risk is expressed as a probability of developing cancer as a result of lifetime exposure. Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. EPA's acceptable target range for carcinogenic risk is one-in-ten-thousand (1E-4) to one-in-one-million (1E-6).

Neither a cancer slope factor nor a reference dose is available for lead. Instead, blood lead concentrations have been accepted as the best measure of exposure to lead. The EPA has developed a biokinetic/uptake model to assess chronic and nonchronic exposures of children to lead. The uptake/biokinetic model estimates total lead uptake resulting from diet, inhalation, and ingestion of soil/dust, water, paint, and placental transport to the fetus. The uptake/biokinetic model calculates the uptake and blood lead levels for the most sensitive population, children ages 0 to 6 years old. EPA uses a blood lead level of 10 micrograms per deciliter (µg/dl) as the benchmark to evaluate lead exposure.

Current Use

Cancer and noncancer risks for the current use scenario are summarized in Table 6-6. Noncancer health effects are considered possible for a child resident in Source Areas 1, 2, 8, 9, and 10. Noncancer health effects are not expected for Source Areas 3 and 6, nor for adult residents, child visitors, or adult workers. Estimates of cancer risk for a child resident range from 3.5E-6 in Source Area #2 to 1.1E-4 in Source Area #9. The highest estimate of cancer risk was for an adult resident (1.9E-4).

TABLE 6-4
Cancer Slope Factors, Tumor Sites and EPA Cancer Classifications for Contaminants of Concern
Bypass 601 Site
Concord, North Carolina

COC	CSF(mg/kg/day)−1			Tumor Sites		EPA Classification
	Oral	Inhalation	Dermal (1)	Oral/Dermal	Inhalation	
BERYLLIUM	4.3E+00 (2)	8.4E+00 (2)	8.6E+01	total tumors	lung	B2
CADMIUM	NA	6.1E+00 (2)	NA	NA	NA	B1
NICKEL	NA	8.4E−01 (2)	NA	NA	liver	A
LEAD	NA	NA	NA	NA	liver	B2
1,2−DICHLOROETHANE	9.1E−02 (2)	9.10E−02 (2)	1.8E+00	circulatory system	circulatory system	B2
CARBON TETRACHLORIDE	1.3E−01 (2)	1.30E−01 (2)	2.6E+00	liver	liver	B2
BENZENE	2.9E−02 (2)	2.90E−02 (2)	5.8E−01	hematollogical changes	hematollogical changes	A
PCB−1254	7.7E+00 (2)	NA	1.5E+02	liver	NA	B2
PCB−1260	7.7E+00 (2)	NA	1.5E+02	liver	NA	B2
BENZO(A)ANTHRACENE	7.3E+00 (4)	6.1E+00 (4)	1.5E+02	NA	NA	B2
CHRYSENE	7.3E+00 (4)	6.1E+00 (4)	1.5E+02	NA	NA	B2
BENZO(B &/OR K)FLUORANTHENE	7.3E+00 (4)	6.1E+00 (4)	1.5E+02	NA	NA	B2
BENZO−A−PYRENE	7.3E+00 (2)	6.1E+00 (2)	1.5E+02	stomach	respiratory tract	B2
INDENO (1,2,3−CD) PYRENE	7.3E+00 (4)	6.1E+00 (4)	1.5E+02	NA	NA	B2
DIBENZO(A,H)ANTHRACENE	7.3E+00 (4)	6.1E+00 (4)	1.5E+02	NA	NA	B2
CARBAZOLE	2.0E−02 (3)	NA	NA	liver	NA	B2

(1) Derived from administered dose (oral) using 5% (default) conversion factor
(2) IRIS, 1992
(3) HEAST, 1992
(4) EPA, Region IV
COC Contaminant of Concern
CSF Cancer Slope Factor
NA Not Applicable
EPA Classifications:
A Human Carcinogen
B1 Probable Human Carcinogen - Limited Data
B2 Probable Human Carcinogen - Sufficient Evidence in Animals; Inadequate evidence in humans.
C Possible Human Carcinogen
D Not Classifiable as to Human Carcinogenicity

TABLE 6-5
Reference Doses, Target Sites, and Confidence Levels for Contaminants of Concern
Bypass 601 Site
Concord, North Carolina

COC	RfD (mg/kg/day)			Target Sites		Uncertainty Factor		
	Oral	Inhalation	Dermal (1)	Oral/Dermal	Inhalation	Oral	Inhalation	Dermal
BARIUM	5.0E−02 (2)	1.0E−04 (2)	2.5E−03	increased blood pressure	fetotoxicity	100	1000	High
BERYLLIUM	5.0E−03 (2)	NA	2.5E−04	none observed	NA	100	NA	High
CADMIUM	5.0E−04 (2)	NA	2.5E−05	kidney	NA	10	NA	High
CHROMIUM III	1.0E+00 (2)	5.7E−07 (2)	5.0E−02	liver	nasal mucosa	1000	300	High
COPPER	3.7E−02 (6)	NA	1.9E−03	gastrointestinal tract	NA	NA	NA	High
NICKEL	2.0E−02 (2)	NA	1.0E−03	decreased body weight	NA	300	NA	High
LEAD	NA	NA	NA	CNS, hematological changes	NA	NA	NA	High
ANTIMONY	4.0E−04 (2)	NA	2.0E−05	hematological changes	NA	1000	NA	High
VANADIUM	7.0E−03 (3)	NA	3.5E−04	none observed	NA	100	NA	High
ZINC	2.0E−01 (3)	NA	1.0E−02	anemia	NA	10	NA	High
MANGANESE	1.0E−01 (2)	1.1E−04 (2)	5.0E−03	none observed	CNS, respiratory symptoms	1	900	High
CARBON TETRACHLORIDE	7.0E−04 (2)	7.0E−04 (2)	3.5E−05	liver	NA	1000	NA	High
NAPHTHALENE	4.0E−02 (3)	NA	2.0E−03	decreased weight gain	NA	10,000	NA	High
ACENAPHTHYLENE	3.0E−02 (4)	NA	1.5E−03	NA	NA	NA	NA	High
ACENAPHTHENE	6.0E−02 (2)	NA	3.0E−03	liver	NA	3000	NA	High
FLUORENE	4.0E−02 (2)	NA	2.0E−03	hematological changes	NA	3000	NA	High
PHENANTHRENE	3.0E−02 (4)	NA	1.5E−03	NA	NA	NA	NA	High
ANTHRACENE	3.0E−01 (2)	NA	1.5E−02	none observed	NA	3000	NA	High
FLUORANTHENE	4.0E−02 (2)	NA	2.0E−03	hematological changes, liver	NA	3000	NA	High
PYRENE	3.0E−02 (4)	NA	1.5E−03	kidney effects	NA	3000	NA	High
BENZO(GHI)PERYLENE	3.0E−02 (4)	NA	1.5E−03	NA	NA	NA	NA	High
2−METHYLNAPHTHALENE	3.0E−02 (4)	NA	1.5E−03	NA	NA	NA	NA	High
DIBENZOFURAN	4.0E−03 (5)	NA	2.0E−04	kidney	NA	NA	NA	High
2−METHYLPHENOL	5.0E−02 (2)	NA	2.5E−03	decreased weight gain	NA	1000	NA	High
SULFATE	NA	NA	NA	gastrointestinal tract	NA	NA	NA	NA

(1) Derived from administered dose (oral) using 5% (default) conversion factor
(2) IRIS, 1992
(3) HEAST, 1992
(4) EPA Region IV
(5) Environmental Criteria and Assessment Office

RfD Reference Dose
NA Not Applicable

(6) There is no established RfD for copper. The RfD was back-calculated from the MCLG for copper of 1,300 ug/l.

Projected blood lead levels exceed EPA's benchmark of 10 µg/dl for all age groups in Source Areas 2 and 9 and some age groups in Source Area #8, as shown in Table 6-7.

Future Use

Cancer and noncancer risks associated with the future use scenario are summarized in Table 6-8. As measured by hazard indices, noncancer health effects are considered possible due to ingestion of groundwater obtained from within the contaminant plume.

Projected blood lead levels are given in table 6-9. The levels exceed EPA's benchmark in all source areas.

Contaminant Risk

The quantified carcinogenic risk and non-carcinogenic hazard indices for each contaminant of concern is given in Table 6-10 for soil and Table 6-11 for groundwater.

E. Environmental Assessment

Several source areas contained contaminants in surface soil at concentrations which may be toxic to wildlife if ingested. However, due to several factors, including lack of food and water sources, lack of suitable cover and extensive human activity, wildlife are not attracted to these areas and are therefore not placed at risk. Included in this group are Source Areas 2,4, and 5.

The remaining source areas are expected to support more diverse wildlife populations. Rodents may be exposed to contaminated soils through ingestion and direct contact. Transfer of contaminants up the food chain through predation on rodents by birds of prey or other carnivores is possible. The potential for adverse effects on such animals is difficult to measure, but would be expected to be small. The elevated concentrations of lead in surface water and sediment would be expected to affect fish and invertebrate communities at the Site. This assessment is consistent with the results of the benthic macroinvertebrate investigation, which concluded that an impact to the aquatic communities of the streams directly adjacent to the Site has occurred.

F. Conclusions

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

TABLE 6-6

Summary of Cancer and Noncancer Risks by Source Area
Current Use Scenario
Bypass 601 Site
Concord, North Carolina

	Child Resident (1)		Adult Resident (1)		Child Visitor (1)		Adult Worker (1)	
Source Area	Cancer	HI	Cancer	HI	Cancer	HI	Cancer	HI
Source Area 1 (2)	2.6E−06	1.4	2.4E−06	0.3	2.7E−07	0.1	NA	NA
Source Area 2	3.5E−06	2.3	5.7E−06	0.5	6.7E−07	0.1	NA	NA
Source Area 3	3.0E−06	0.8	3.1E−06	0.2	3.5E−07	0.0	NA	NA
Source Area 4	NA	NA	NA	NA	3.1E−07	0.0	3.7E−07	0.0
Source Area 5	NA	NA	NA	NA	6.1E−06	0.3	1.6E−06	0.2
Source Area 6	9.2E−06	0.6	1.2E−05	0.1	1.3E−06	0.0	NA	NA
Source Area 7 (3)	NA	NA	NA	NA	NA	NA	NA	NA
Source Area 8	3.3E−05	2.7	5.4E−05	0.6	6.1E−06	0.1	NA	NA
Source Area 9 (2)	1.1E−04	2.7	1.9E−04	0.6	2.1E−05	0.1	NA	NA
Source Area 10 (2)	4.9E−06	1.3	4.4E−06	0.3	5.1E−07	0.1	NA	NA
Average Site Risk (4)	1.9E−05	1.3	3.0E−05	0.3	4.1E−06	0.1	9.9E−07	0.1

(1) Risk based on exposure to soil
(2) Prior to removal action
(3) No evidence of surface soil contamination in Source Area 7 based on soil sample taken from borehole (0−2 ft)
(4) Assumes each source area equal in size
HI Hazard Index (noncancer risk)
NA Not Applicable

TABLE 6-7

Comparison of Lead Concentrations in Soil with Blood Lead Levels by Age Group
Current Use Scenario
Bypass 601 Site
Concord, North Carolina

Source Area	Soil/Dust Lead (mg/kg)	Water Lead (ug/l)	Blood Lead Levels (ug/dl) Year 0.5−1	Year 1−2	Year 2−3	Year 3−4	Year 4−5	Year 5−6	Year 6−7
1 (1)	217	28	4.06	4.46	4.75	4.91	5.12	5.22	5.29
2	3125	28	15.37	16.06	16.08	16.33	16.94	17.00	16.90
3	1259	28	8.11	8.61	8.80	8.99	9.34	9.43	9.43
6	242	28	4.16	4.56	4.85	5.00	5.22	5.32	5.39
7 (2)	NA								
8	1410	28	8.70	9.21	9.39	9.58	9.96	10.04	10.04
9 (1)	1932	28	10.73	11.29	11.42	11.63	12.08	12.15	12.12
10 (1)	196	28	3.98	4.37	4.67	4.82	5.04	5.14	5.21

Source: Uptake/Biokinetic Model, Version 0.5

Assumptions:
Air Concentration: 0.200ug Pb/m3 (default)
Diet (default)
Drinking Water: 28 ug Pb/l (average in private wells in area)
Paint Intake: 0.00 ug Pb/day (default)
Maternal Contribution: Infant Model (default)
Arithmetic Average Lead Concentrations

(1) Prior to removal action
(2) No evidence of surface soil contamination in Source Area 7 based on soil sample taken from borehole (0−2ft)

TABLE 6-8

Summary of Cancer and Noncancer Risks by Source Area
Future Use Scenario
Bypass 601 Site
Concord, North Carolina

	Child Resident (1)		Adult Resident (1)		Child Visitor (2)		Adult Worker (1)	
Source Area	Cancer	HI	Cancer	HI	Cancer	HI	Cancer	HI
Source Area 1 (3)	2.7E−05	28.4	1.4E−04	31.1	9.8E−08	0.1	NA	NA
Source Area 2	2.7E−05	29.3	1.4E−04	31.3	3.8E−08	0.1	NA	NA
Source Area 3	2.7E−05	27.8	1.4E−04	31.0	1.0E−07	0.0	NA	NA
Source Area 4	2.7E−05	27.1	1.4E−04	30.8	1.1E−07	0.1	5.2E−05	9.2
Source Area 5	5.8E−05	33.3	1.9E−04	32.2	5.1E−07	0.2	5.4E−05	9.4
Source Area 6	3.3E−05	27.6	1.4E−04	30.9	2.2E−07	0.0	NA	NA
Source Area 7 (4)	NA	NA	NA	NA	NA	NA	NA	NA
Source Area 8	5.7E−05	29.7	1.4E−04	31.4	4.3E−07	0.1	NA	NA
Source Area 9 (3)	1.4E−04	29.7	1.5E−04	31.4	1.3E−06	0.1	NA	NA
Source Area 10 (3)	2.9E−05	28.3	1.4E−04	31.1	1.9E−07	0.1	NA	NA
Average Site Risk (5)	4.7E−05	29.0	1.5E−04	31.3	3.3E−07	0.1	5.3E−05	9.3

(1) Risk based on exposure to soil and groundwater
(2) Risk based on exposure to soil
(3) Prior to removal action
(4) No evidence of surface soil contamination in Source Area 7 based on soil sample taken from borehole (0−2ft)
(5) Assumes each source area equal in size
HI Hazard Index (noncancer risk)
NA Not Applicable

TABLE 6-9

Comparison of Lead Concentrations in Soil with Blood Lead Levels by Age Group
Future Use Scenario
Bypass 601 Site
Concord, North Carolina

Source Area	Soil/Dust Lead (mg/kg)	Water Lead (ug/l)	Blood Lead Levels (ug/dl)						
			Year 0.5−1	Year 1−2	Year 2−3	Year 3−4	Year 4−5	Year 5−6	Year 6−7
1 (1)	217	105	6.28	8.88	10.22	10.70	11.33	11.67	11.85
2	3125	105	17.59	20.49	21.58	22.18	23.20	23.52	23.53
3	1259	105	10.33	13.03	14.28	14.80	15.57	15.90	16.02
4	51	105	5.63	8.22	9.57	10.05	10.65	11.00	11.19
5	10129	105	44.84	48.71	49.37	50.28	52.35	52.66	52.31
6	242	105	6.38	8.98	10.32	10.80	11.43	11.77	11.95
7 (2)	NA								
8	1410	105	10.92	13.63	14.87	15.40	16.19	16.52	16.63
9 (1)	1932	105	12.95	15.72	16.91	17.46	18.32	18.64	18.72
10 (1)	196	105	6.20	8.79	10.14	10.62	11.24	11.59	11.77

Source: Uptake/Biokinetic Model, Version 0.5

Assumptions:
Air Concentration: 0.200ug Pb/m3 (default)
Diet (default)
Drinking Water: 4.00 ug Pb/l (default)
Paint Intake: 0.00 ug Pb/day (default)
Maternal Contribution: Infant Model (default)
Arithmetic Average Lead Concentrations
(1) Prior to removal action
(2) No evidence of surface soil contamination in Source Area 7 based on soil sample taken from borehole (0−2ft)

TABLE 6-10
RISK ASSOCIATED WITH CHILD RESIDENT BY CONTAMINANT IN SOIL

CONTAMINANT	RISK OF CANCER OR HAZARD INDEX BY SOURCE AREA								
	#1	#2	#3	#4*	#5*	#6	#8	#9	#10
BARIUM[1]	NA	NA	NA	NA	NA	0.1	NA	0.1	0.1
BERYLLIUM[2]	1.9E-06	NA	1.9E-06	2.2E-06	3.6E-06	3.3E-06	1.9E-06	NA	3.5E-06
CADMIUM[1]	NA	0.1	NA	NA	0.1	NA	NA	NA	NA
COPPER[1]	NA	0.1	NA	NA	0.1	NA	NA	NA	NA
ANTIMONY[1]	1.1	0.9	NA	NA	5.9	NA	2.0	2.2	NA
VANADIUM[1]	0.1	0.6	0.6	NA	0.1	0.3	0.3	0.3	0.4
MANGANESE[1]	0.1	0.5	0.2	NA	0.1	0.1	0.1	0.1	0.7
PCB-1254[2]	NA	NA	NA	NA	2.9E-06	NA	6.1E-06	NA	NA
PCB-1260[2]	NA	NA	NA	NA	NA	NA	NA	5.4E-06	NA
BENZO(A)ANTHRACENE[2]	NA	NA	NA	NA	NA	NA	NA	1.9E-06	NA
BENZO(B &/OR K) FLUORANTHENE[2]	NA	NA	NA	NA	NA	NA	NA	1.8E-06	NA
BENZO-A-PYRENE[2]	NA	NA	NA	NA	1.8E-06	NA	NA	9.7E-06	NA
DIBENZO(A,H) ANTHRACENE[2]	NA	NA	NA	NA	NA	NA	NA	2.8E-06	NA

* - FUTURE RESIDENTIAL SCENARIO. CURRENTLY AREAS 4 AND 5 ARE CLASSIFIED AS COMMERCIAL/INDUSTRIAL
NA - The risk is less than 1E-06 or the hazard index is less than 0.1, therefore the number was not included.
Source Area #7 - This area is not included because no contaminants were found.
1 - Hazard index for noncarcinogens
2 - Risk for carcinogens

TABLE 6-11
RISK ASSOCIATED WITH GROUNDWATER BY CONTAMINANT

CONTAMINANT	CANCER RISK	HAZARD INDEX
BARIUM	NA	0.3
BERYLLIUM	5.0E-05	NA
CADMIUM	NA	0.3
COPPER	NA	0.6
NICKEL	NA	0.1
VANADIUM	NA	1.8
ZINC	NA	0.1
MANGANESE	NA	26.6
1,2-DICHLOROETHANE	3.55E-05	NA
CARBON TETRACHLORIDE	4.32E-05	0.2
BENZENE	9.7E-06	NA
SULFATE	NA	0.8

NA - The risk is less than 1E-06 or the hazard index is less than 0.1

VII. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

Section 121(d) of CERCLA, as amended by SARA, requires that remedial actions comply with requirements or standards set forth under Federal and State environmental laws. The requirements that must be complied with are those that are applicable or relevant and appropriate to the (1) potential remedial actions, (2) location, and (3) media-specific chemicals at the Site.

Applicable requirements are those requirements specific to the hazardous substance, location, and/or contemplated remedial action, that are, or will be, related to the Site. These requirements would have to be met under any circumstance. Relevant and appropriate requirements are those requirements that address problems or situations sufficiently similar to those encountered at the Site, so that their use is well suited to the Site, but for which the jurisdictional prerequisites have not been met.

This Section examines the cleanup criteria associated with the contaminants found and the environmental media contaminated.

A. Action-Specific ARARs

Action-specific ARARs are technology-based, establishing performance, design, or other similar action-specific controls or regulations on activities related to the management of hazardous substances or pollutants. Potential action-specific ARARs are presented in Table 7-1.

B. Location-Specific ARARs

Location-specific ARARs are design requirements or activity restrictions based on the geographical or physical positions of the Site and its surrounding area. Potential location-specific ARARs are presented in Table 7-2.

Federal classification guidelines for groundwater are as follows:

- Class I: Groundwater that is irreplaceable with no alternative source or is ecologically vital;
- Class II: A - Groundwater currently used for drinking water;

  B - Groundwater potentially available for drinking water;
- Class III: Groundwater not considered a potential source of drinking water due to natural contamination or insufficient yield.

The aquifer at the Site is considered Class IIA. State classification guidelines are based on best usage (NCAC 2L. 0201). The aquifer is therefore considered Class GA groundwater under the State system.

TABLE 7-1
POTENTIAL ACTION-SPECIFIC ARARs FOR SOILS
BYPASS 601 SITE
CONCORD, NORTH CAROLINA

Standard Requirement Criteria or Limitation	Citation	Description	Applicable or Relevant & Appropriate
FEDERAL			
Disposal - (Onsite or Offsite)			
Resource Conservation and Recovery Act (RCRA), as amended	42 USC Section 6901 et. seq.		
Classification of Hazardous Waste	40 CFR 261	Federal requirements for classification and identification of hazardous wastes.	Relevant & Appropriate
Land Disposal Restrictions	40 CFR 268.10-12 40 CFR 268 (Subpart D)	Disposal of contaminated soil and debris resulting from CERCLA response actions are subject to federal and disposal prohibitions.	Relevant & Appropriate
Department of Transportation (DOT) Hazardous Materials Transportation Act	49 USC 1801	Regulates offsite transportation of specific hazardous chemicals and wastes.	Relevant & Appropriate
Soil Treatment			
Resource Conservation and Recovery Act (RCRA), as amended	40 USC Section 6901 et. seq.		
Identification of Hazardous Waste	40 CFR 261	Federal requirements for classification and identification of hazardous wastes.	Relevant & Appropriate
Treatment of Hazardous Wastes in a Unit	40 CFR 264.601	Rules and requirements for the treatment of hazardous wastes.	Relevant & Appropriate
Requirements for Generation, Storage, Transportation, and Disposal of Hazardous Waste	40 CFR 264	Regulates storage, transportation, and operation of hazardous waste generators.	Relevant & Appropriate
Waste Piles	40 CFR 264 (Subpart L)	Regulates storage and treatment of hazardous waste in piles	Relevant & Appropriate
Tank Systems	40 CFR 264 (Subpart J)	Regulates storage and treatment of hazardous waste in tank systems	Relevant & Appropriate
Use and Management of Containers	40 CFR 264 (Subpart I)	Regulates storage of containers of hazardous waste	Relevant & Appropriate
Land Disposal Restrictions	40 CFR 268.10-12 40 CFR 268 (Subpart D)	Establishes treatment standards for hazardous wastes.	Relevant & Appropriate
Clean Air Act			
Air Use Approval	40 CFR 60 (Subpart A)	Requires notification and performance testing by owner or operator.	Relevant & Appropriate
Particulate Discharge Limitations and Performance Testing	40 CFR 60 (Subpart B)	Defines limitations for particulate emissions, test methods, and monitoring requirements for incinerators.	Relevant & Appropriate

TABLE 7· CONT)

POTENTIAL ACTION-SPECIFIC ARARs FOR SOILS (continued)
BYPASS 601 SITE
CONCORD, NORTH CAROLINA

Standard Requirement Criteria or Limitation	Citation	Description	Applicable or Relevant & Appropriate
<u>STATE</u>			
North Carolina Hazardous Waste Management Rules	NCAC - 15A-13A	Siting and design requirements for hazardous waste TSDs.	Relevant & Appropriate
North Carolina Solid Waste Management Rules	NCAC - 15A-13B	Siting and design requirements for disposal sites.	Relevant & Appropriate
North Carolina Air Pollution Control Requirements	NCAC - 15A-2D	Air pollution control, air quality, and emissions control standards.	Relevant & Appropriate
North Carolina Sedimentation Control Rules	NCAC - 15A-4	Requirements for prevention of sedimentation pollution.	Relevant & Appropriate

TABLE 7-. ONT)
POTENTIAL ACTION-SPECIFIC ARARs FOR GROUNDWATER
BYPASS 601 SITE
CONCORD, NORTH CAROLINA

Standard Requirement Criteria or Limitation	Citation	Description	Applicable or Relevant & Appropriate
<u>FEDERAL</u>			
<u>Groundwater Extraction and Treatment</u>			
Resource Conservation and Recovery Act (RCRA), as amended	42 USC Section 6901 et. seq.		
Identification of Hazardous Waste	40 CFR 261	Federal requirements for classification and identification of hazardous wastes.	Relevant & Appropriate
Hazardous Waste Determination	40 CFR 262.11	Rules and requirements for residue generated by a treatment system	Relevant & Appropriate
Treatment of Hazardous Wastes in a Unit	40 CFR 264.601 40 CFR 265.400	Rules and requirements for the treatment of hazardous wastes.	Relevant & Appropriate
Requirements for Generation, Storage, Transportation, and Disposal of Hazardous Waste	40 CFR 263 40 CFR 264	Regulates storage, transportation, and operation of hazardous waste generators.	Relevant & Appropriate
Safe Drinking Water Act (SDWA)	42 USC Section 3001 et. seq.		
Primary Maximum Contaminant Levels (MCL)	40 CFR 142	Primary MCLs are adopted for the protection of human health but include an analysis of feasibility and cost of attainment.	Relevant & Appropriate
Maximum Contaminant Level Goals (MCLG)	40 CFR 142 50 FR 46936 (November 13, 1985)	EPA has also established Maximum Contaminant Level Goals (MCLGs). The nonenforceable standards are based on health criteria. The MCLGs are goals for the nation's water supply.	Relevant & Appropriate
<u>Disposal - Discharge to Surface Water/POTW</u>			
Clean Water Act (CWA)	33 USC Section 1351-1376		
Requires use of Best Available Treatment Technology (BATT)	40 CFR 122	Use of best available technology economically achievable is required to control discharge of toxic pollutants to POTW.	Relevant & Appropriate
National Pollutant Discharge Elimination System Permit Regulations	40 CFR 122 Subpart C	Use of best available technology economically achievable for toxic pollutants discharged to surface waters.	Relevant & Appropriate
Discharge must be consistent with the requirements of a Water Quality Management Plan approved by EPA	40 CFR 122	Discharge must comply with EPA-approved Water Quality Management Plan.	Relevant & Appropriate
Discharge must not increase contaminant concentrations in offsite surface water.	Section 121 (d)(2)(B)(iii)	Selected remedial action must establish a standard of control to maintain surface water quality.	Relevant & Appropriate

TABLE 7-1)NT)
POTENTIAL ACTION-SPECIFIC ARARs FOR GROUNDWATER (continued)
BYPASS 601 SITE
CONCORD, NORTH CAROLINA

Standard Requirement Criteria or Limitation	Citation	Description	Applicable or Relevant & Appropriate
Superfund Amendments and Reauthorization Act (SARA)	42 USC Section 9801 et. seq.	Discharge must comply with Federal Water Quality Criteria.	Relevant & Appropriate
<u>STATE</u>			
North Carolina Water Quality Standards	NCAC - 15A-2B	Surface water quality standards.	Relevant & Appropriate
North Carolina Groundwater Standards	NCAC - 15A-2L	Groundwater quality standards, regulates injection wells.	Relevant & Appropriate
Wastewater Discharge to Surface Waters	NCAC - 15A-2H	Regulates surface water discharge and discharges to POTW.	Relevant & Appropriate
North Carolina Air Pollution Control Requirements	NCAC - 15A-2D	Air pollution control air quality and emissions standards.	Relevant & Appropriate

TABLE
POTENTIAL LOCATION - SPECIFIC ARARs
BYPASS 601 SITE
CONCORD, NORTH CAROLINA

Standard Requirement Criteria or Limitation	Citation	Description	Applicable or Relevant & Appropriate	Comment
FEDERAL				
Resource Conservation and Recovery Act (RCRA), as amended	42 USC 6901			
RCRA Location Standards	40 CFR 264.18(b)	A TSD facility must be designed, constructed, operated, and maintained to avoid washout on a 100-year floodplain.	Relevant & Appropriate	Potential remedial alternatives within the 100-year floodplain. Requirement is relevant and appropriate.
Fish and Wildlife Coordination Act	16 USC 661-666	This regulation requires that any federal agency that proposes to modify a body of water must consult with the U.S. Fish and Wildlife Services. This requirement is addressed under CWA Section 404 Requirements.	Relevant & Appropriate	Potential remedial alternatives may include stream redirection during sediment dredging activities. Potentially relevant and appropriate.
Floodplain Management Executive Order	Executive Order 11988; 40 CFR 6.302	Actions that are to occur in floodplain should avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial value.	APPLICABLE	Remedial actions are to prevent incursion of contaminated groundwater onto forested floodplain.
Endangered Species Act	16 USC 1531	Requires action to conserve endangered species or threatened species, including consultation with the Department of Interior.	Not an ARAR	No threatened or endangered species or critical habitats were identified in or near the site.
Clean Water Act	33 USC Section 1251			
Dredge or Fill Requirements (Section 404)	40 CFR 230	Requires permit for discharge of dredged or fill material into aquatic environment.	Not an ARAR	No alternative will be developed which will discharge dredge or fill material into an aquatic environment.
Rivers and Harbors Act of 1889 (Section 10 Permit)	33 USC Section 403	Requires permit for structures or work in or affecting navigable waters.	Not an ARAR	No alternative involves work that would affect a navigable waterway.
Wilderness Act	16 USC 1311	Area must be administered in such a way as will leave it unimpaired as wilderness and will preserve it as a wilderness.	Not an ARAR	No wilderness areas exist onsite or adjacent to the site.
National Wildlife Refuge System	16 USC 688 50 CFR 27	Restricts activities within National Wildlife Refuges.	Not an ARAR	No wildlife refuge area exist onsite or adjacent to the site.
STATE				
North Carolina Sedimentation Pollution Control Act	General Statistics of North Carolina, Chapter 113A, Article 4	Establishes mandatory standards for control of sedimentation and erosion in streams and lakes.	Not an ARAR	No alternative will be developed which discharges sediment into stream.

C. Chemical-Specific ARARs

Chemical-specific ARARs include those laws and regulations governing the release of materials possessing certain chemical or physical characteristics, or containing specified chemical compounds. These requirements generally set health or risk-based concentration limits or discharge limitations in various environmental media for specific hazardous substances, contaminants, and pollutants. Potential chemical-specific ARARs are listed in Table 7-3.

TABLE 7-3
POTENTIAL CHEMICAL-SPECIFIC ARARs
BYPASS 601 SITE
CONCORD, NORTH CAROLINA

Standard Requirement Criteria or Limitation	Citation	Description	Applicable or Relevant & Appropriate	Comment
<u>FEDERAL</u>				
Safe Drinking Water Act	40 USC Section 300			
National Primary Drinking Water Standards	40 CFR Part 141	Establishes health-based standards for public water systems (maximum contaminant levels).	APPLICABLE	The MCLs for organic and inorganic contaminants are applicable to the groundwater contaminated by the site since it is a drinking water source.
Maximum Contaminant Level Goals	Publication L. Nº 99-399, 100 Stat. 642 (1986)	Establishes drinking water quality goals set at levels of no known or anticipated adverse health effects.	APPLICABLE	Proposed MCLGs for organic and inorganic contaminants are applicable to the groundwater used for drinking water.
Clean Water Act	33 USC Section 1251-1376			
Water Quality Criteria	40 CFR Part 131	Sets criteria for water quality based on toxicity to aquatic organisms and human health.	Relevant & Appropriate	The AWQC for organic and inorganic contaminants are relevant and appropriate.
Resource Conservation and Recovery Act (RCRA), as amended	42 USC 6905, 6912, 6924, 6925			
RCRA Groundwater Protection	40 CFR Part 264	Provides for groundwater protection standards, general monitoring requirements, and technical requirements.	Relevant & Appropriate	The RCRA MCLs are relevant and appropriate for groundwater at the site.
Solid Waste Disposal Act	42 USC 6901 et. seq.			
Land Disposal	40 CFR Part 268	Establishes a timetable for restriction of land disposal of hazardous materials	APPLICABLE	May be applicable if hazardous materials are disposed of.

TABLE 7-3 (CONT)

POTENTIAL CHEMICAL-SPECIFIC ARARs (continued)
BYPASS 601 SITE
CONCORD, NORTH CAROLINA

Standard Requirement Criteria or Limitation	Citation	Description	Applicable or Relevant & Appropriate	Comment
Clean Air Act	40 USC 1857			
National Primary and Secondary Ambient Air Quality Standards	40 CFR Part 50	Sets primary and secondary air standards at levels to protect public health and public welfare.	Relevant & Appropriate	May be relevant or appropriate if onsite treatment units are part of remedial actions.
National Emissions Standards for Hazardous Air Pollutants (NESHAPs)	40 CFR Part 61	Provides emissions standard for hazardous air pollutants for which no ambient air quality standard exists.	Relevant & Appropriate	May be relevant or appropriate if onsite treatment units are part of remedial actions.
Occupational Safety and Health Administration	29 CFR 1910 Part 120	Provides safety rules for handling specific chemicals for site workers during remedial activities.	APPLICABLE	Health and safety requirements are applicable to all potential remedial actions.
<u>STATE</u>				
North Carolina Drinking Water Act	130A NCAC 311-327	Regulates water systems within the state that supply drinking water that may affect the public health.	APPLICABLE	Provides the state with the authority needed to assume primary enforcement responsibility under the federal act.
North Carolina Drinking Water and Groundwater Standards	15A NCAC Chapter 2L	Establishes groundwater classification and water quality standards. Applicable to groundwater at the site.	APPLICABLE	Guidelines for allowable levels of toxic organic and inorganic compounds in groundwater used for drinking water. Applicable to groundwater at the site.

VIII. REMEDIAL ACTION OBJECTIVES

Based on the results of the RI and the baseline risk assessment, the Bypass 601 Site is comprised of two contaminated media. One contaminated medium consists of a combination of soil, battery casings, and sediment, which are combined into one group because they are closely linked in terms of removal and treatment options. Groundwater is the other contaminated medium.

A. Soil/Sediment

Remediation levels for soil/sediment were developed to meet the following objectives:

- Prevent direct contact exposure to soil and sediment that contain levels of contaminants in excess of the remediation levels;
- Prevent migration of contaminants from the soil to groundwater;
- Prevent migration of contaminants from the soil or sediment to a surface water body; and
- Control future releases of contaminants to ensure protection of human health and the environment.

Table 8-1 presents the remediation levels for soil/sediment based on the health-based risk goals, values determined for "protection of groundwater", and contract required quantitation limits (CRQL). Maximum concentrations detected as well as average background concentrations are also included.

The final soil remediation levels are presented in Table 8-2. The remediation level was selected as the most conservative of the levels presented in Table 8-1. However, the average background concentration was selected as the remediation level if it exceeded the risk-based goal. In addition, Source Areas 4, 5, and the MSR facility were considered commercial/industrial because the probability of these areas becoming residential is low. All other areas were considered residential or future residential.

The areal extent of soil contamination above the remediation levels presented in Table 8-2 is presented in Figures 8-1 through 8-8. Source Areas 1,7, and 10 do not contain any contaminants above the remediation levels presented in Table 8-2. Figure 8-9 shows the areal extent of sediment contamination. The estimated volume of soil/sediment exceeding remediation levels is presented in Table 8-3.

B. Groundwater

The chemical specific ARARs, along with the maximum concentrations detected are presented in Table 8-4. The groundwater remediation levels are presented in Table 8-5, and represent the most conservative level. The estimated total extent of groundwater is shown in Figure 8-10 and Figure 8-11. The vertical extent of metals and VOC contamination is assumed to extend through the upper

TABLE 8-1
SUMMARY OF REMEDIAL ACTION OBJECTIVE LEVELS - SOIL

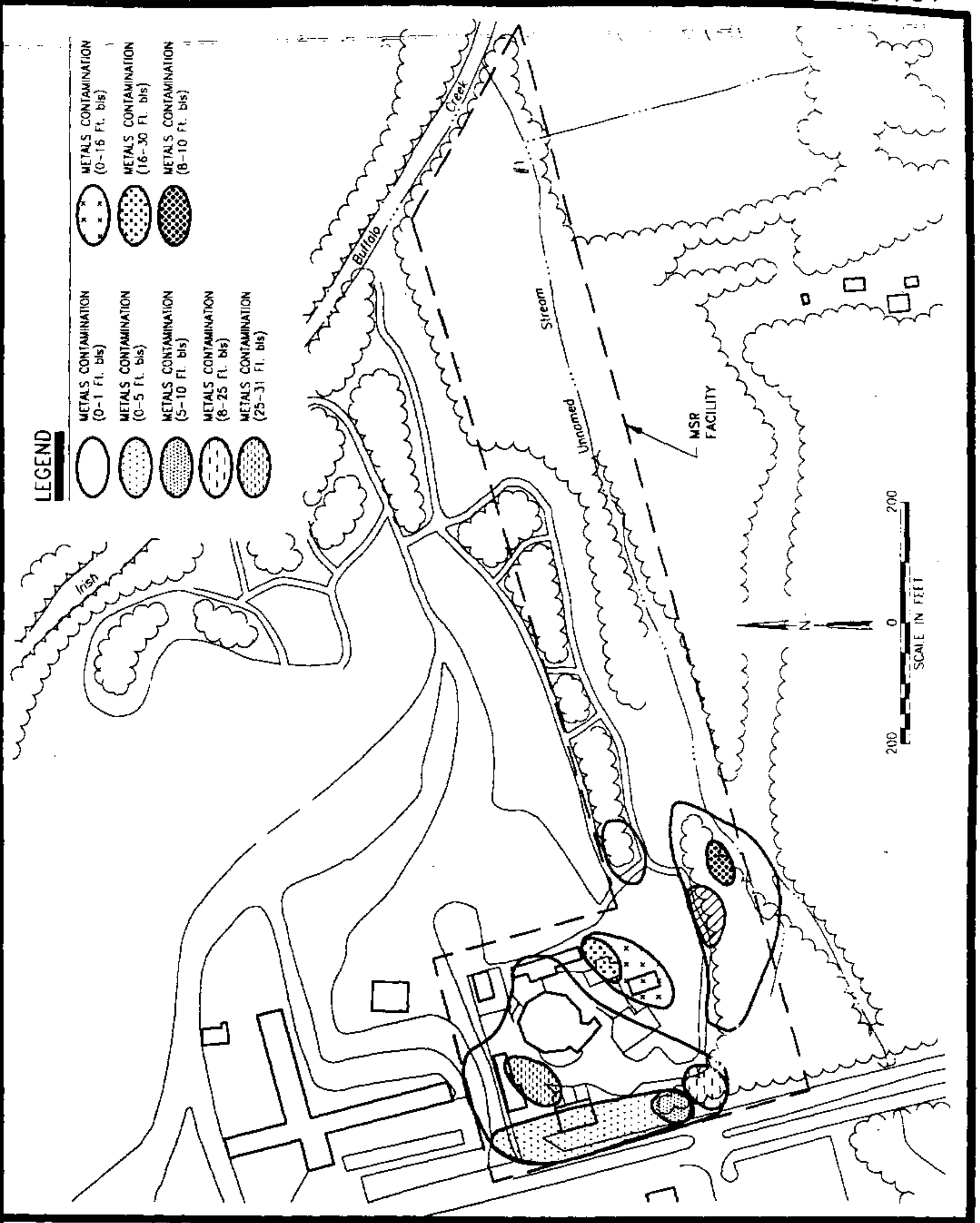
CONTAMINANT OF CONCERN	MAX FOUND	AVG BACK-GROUND	CANCER RISK-BASED GOAL	NON-CANCER RISK-BASED GOAL	PROTECTION OF GW
ANTIMONY	140	ND	NA	R - 24 C - 820	NA
BARIUM	620	153	NA	R - 3,000	1.6
CHROMIUM	160	56	NA	R - 2,600	15
LEAD	118,000	68	NA	500	580
MANGANESE	5,400	1,498	NA	R - 5,900	4,200
VANADIUM	250	87	NA	R - 420	8.6
CARBON TETRACHLORIDE	130	ND	R - 1,500	R - 12,000	0.58

ND - NOT DETECTED
NA - NOT APPLICABLE
R - RESIDENTIAL SCENARIO
C - COMMERCIAL/INDUSTRIAL SCENARIO
UNITS - INORGANICS (MG/KG); ORGANICS (UG/KG)

TABLE 8-2
REMEDIAL ACTION OBJECTIVES FOR SOIL/SEDIMENT

CONTAMINANT	REMEDIATION LEVEL		BASIS
	SA 2, 3, 6, 8, 9 (R)	SA 4, 5, MSR FACILITY (C)	
ANTIMONY	24	820	Based on Hazard Index value applied to residential scenario for (R) and commercial/industrial scenario for (C)
BARIUM	153	153	Average background concentration
CHROMIUM	56	56	Average background concentration
LEAD	500	500	OSWER Directive #9355.4-02
MANGANESE	4,200	4,200	Groundwater protection
VANADIUM	87	87	Average background concentration
CARBON TETRACHLORIDE	10	10	Contract Required Quantitation Limit (CRQL)
LEAD (SEDIMENT)	35	35	Based on NOAA risk-based value

Units - Metals (mg/kg); VOCs and PAHs (ug/kg)
C - Commercial
R - Residential
SA - Source Area



CDM FPC ARCS IV

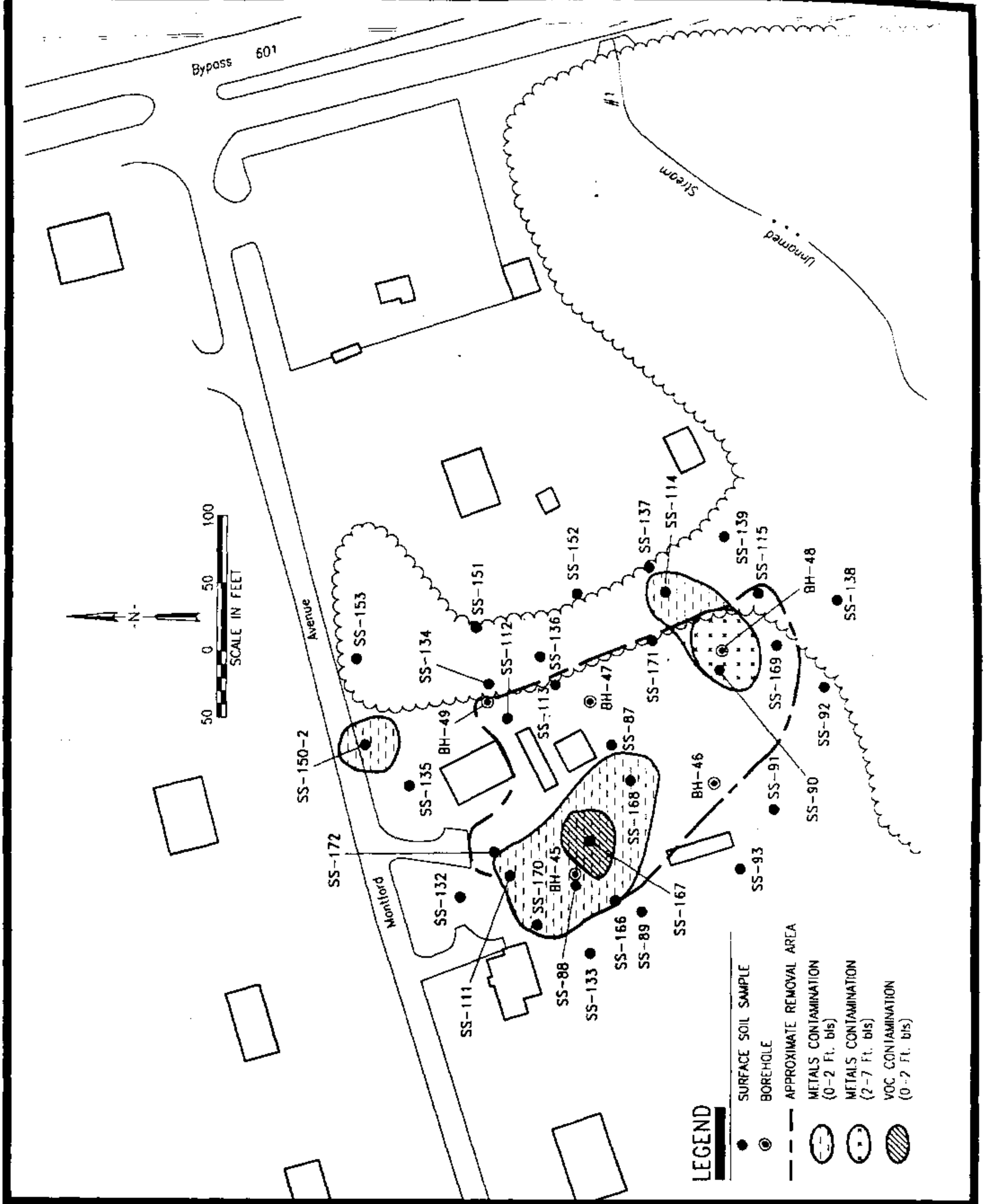
APPROXIMATE AREAL EXTENT OF SOIL CONTAMINATION ABOVE REMEDIATION LEVELS - MSR FACILITY

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

8-1



CDM FPC ARCS IV

APPROXIMATE AREAL EXTENT OF SOIL CONTAMINATION ABOVE REMEDIATION LEVELS - SOURCE AREA #2

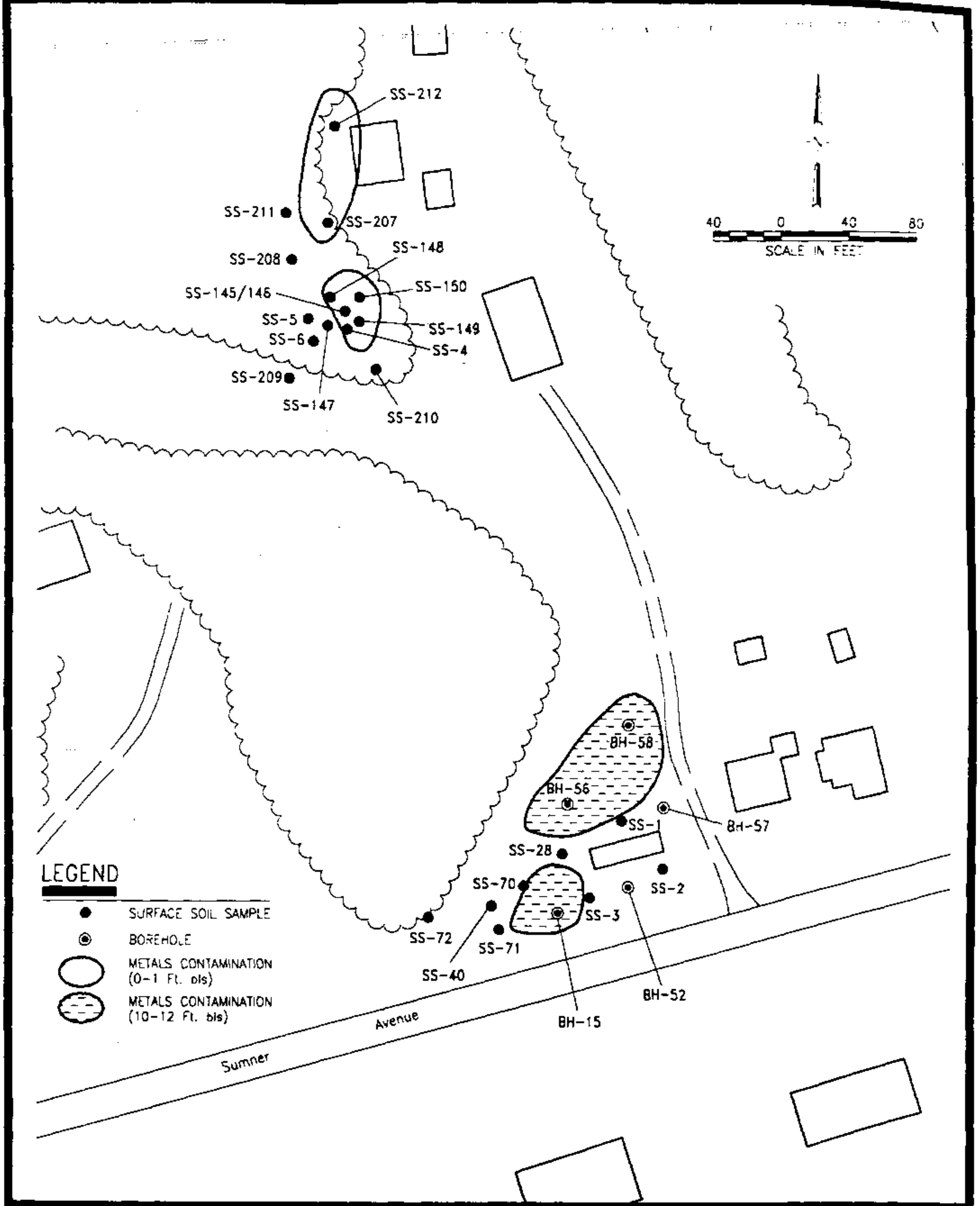
BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

8-2

5 9 0159



CDM FPC ARCS IV

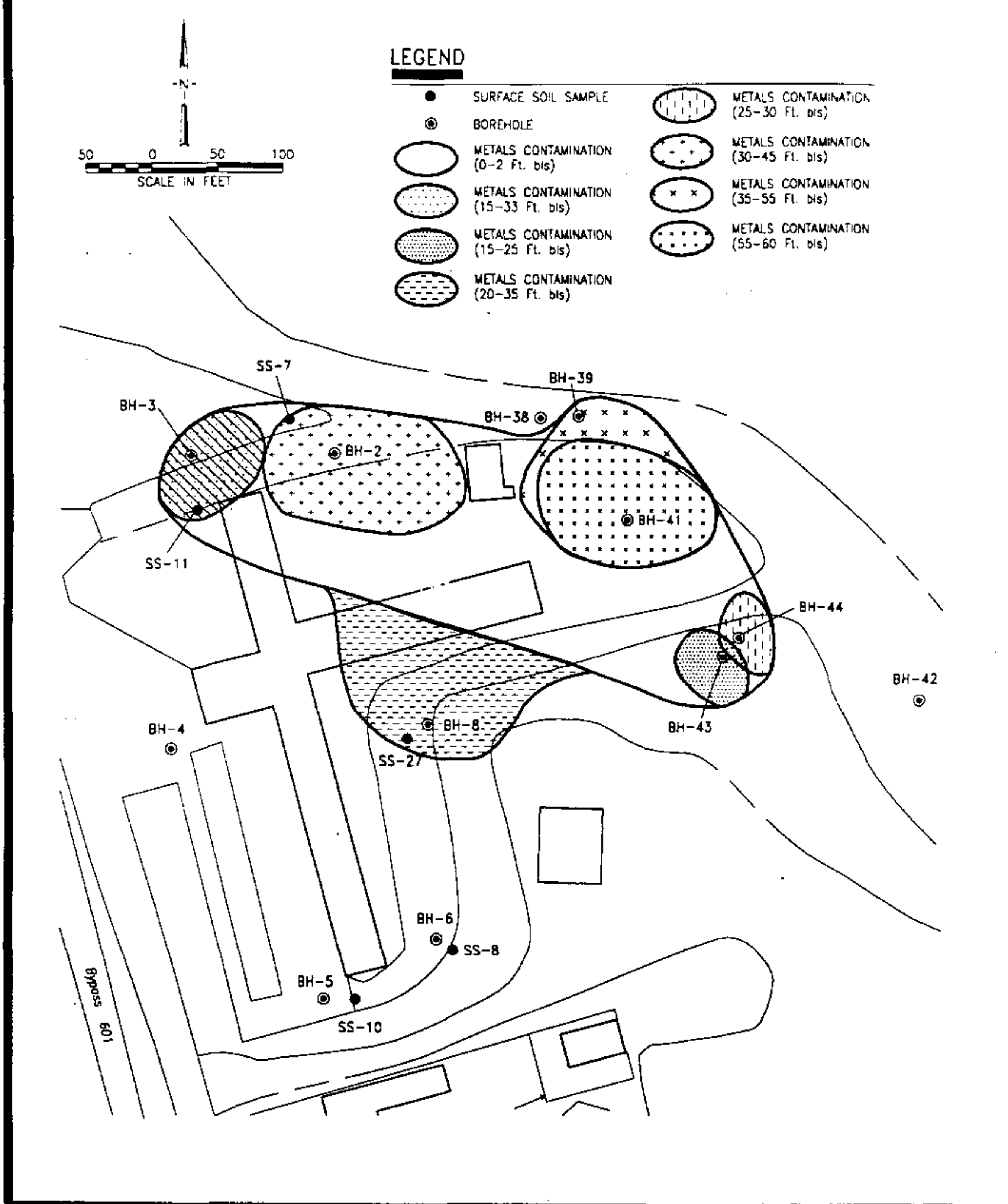
APPROXIMATE AREAL EXTENT OF SOIL CONTAMINATION ABOVE REMEDIATION LEVELS - SOURCE AREA #3

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

8-3



CDM FPC ARCS IV

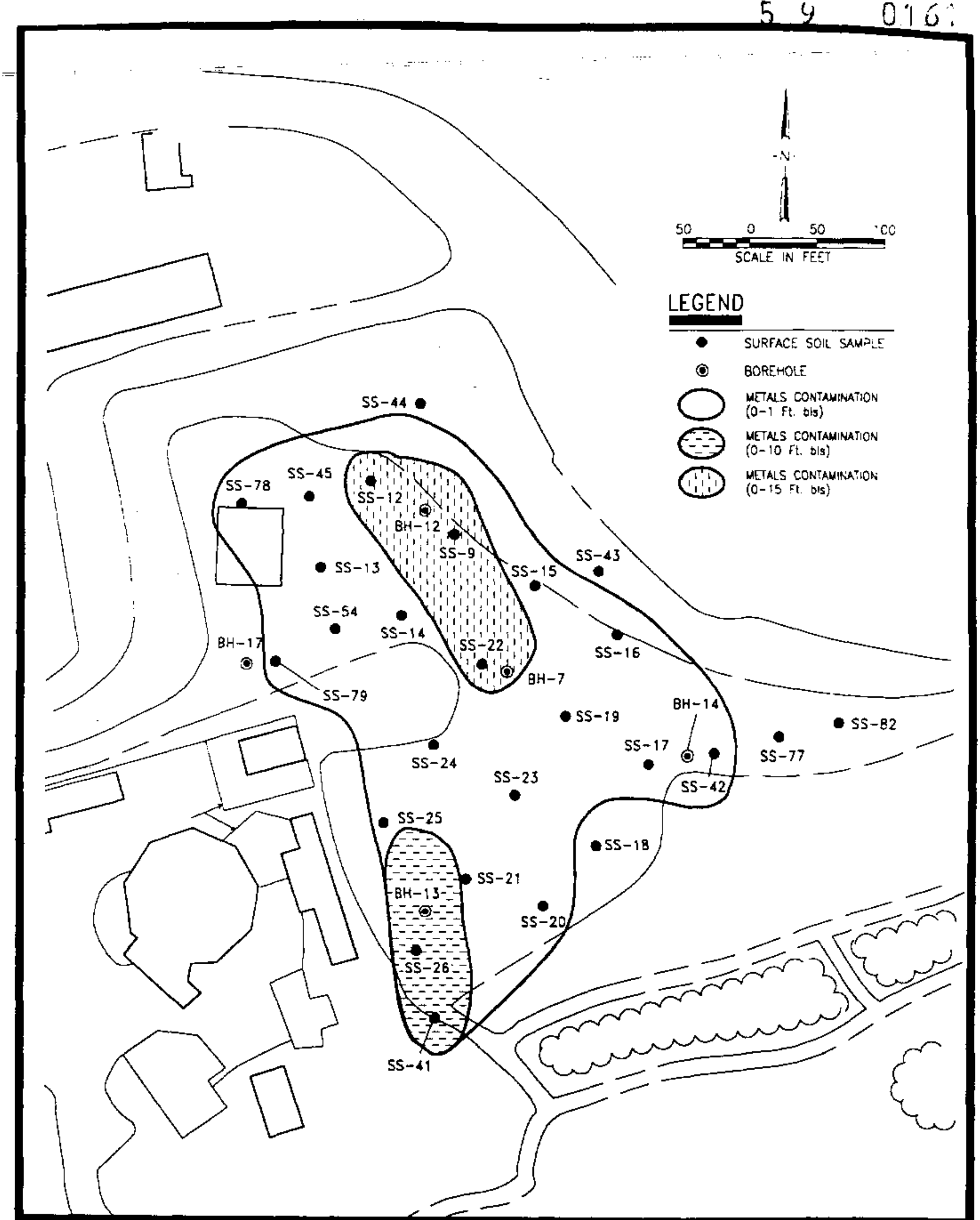
APPROXIMATE AREAL EXTENT OF SOIL CONTAMINATION ABOVE REMEDIATION LEVELS - SOURCE AREA #4

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

8-4



CDM FPC ARCS IV

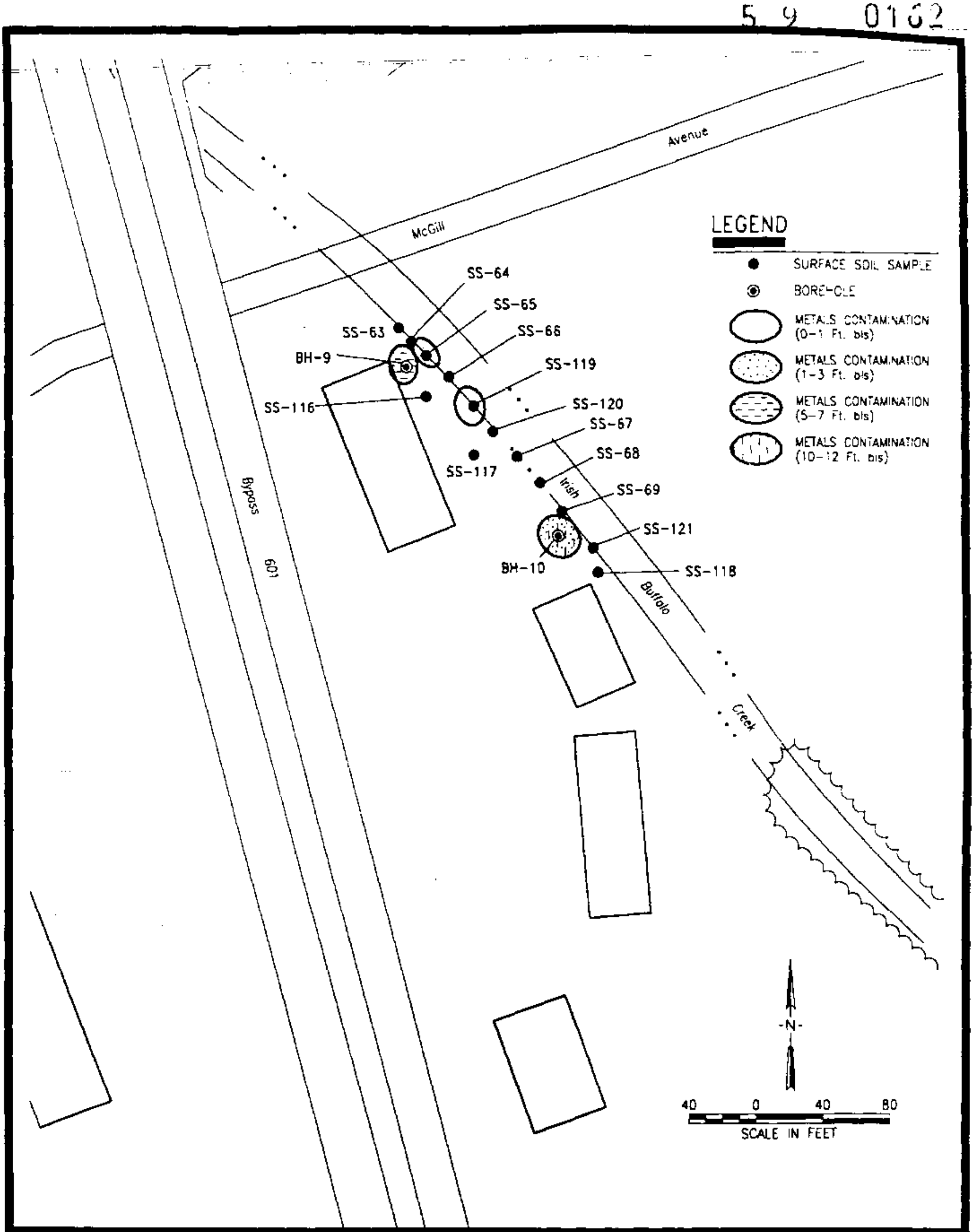
APPROXIMATE AREAL EXTENT OF SOIL CONTAMINATION ABOVE REMEDIATION LEVELS - SOURCE AREA #5

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

8-5



CDM FPC ARCS IV

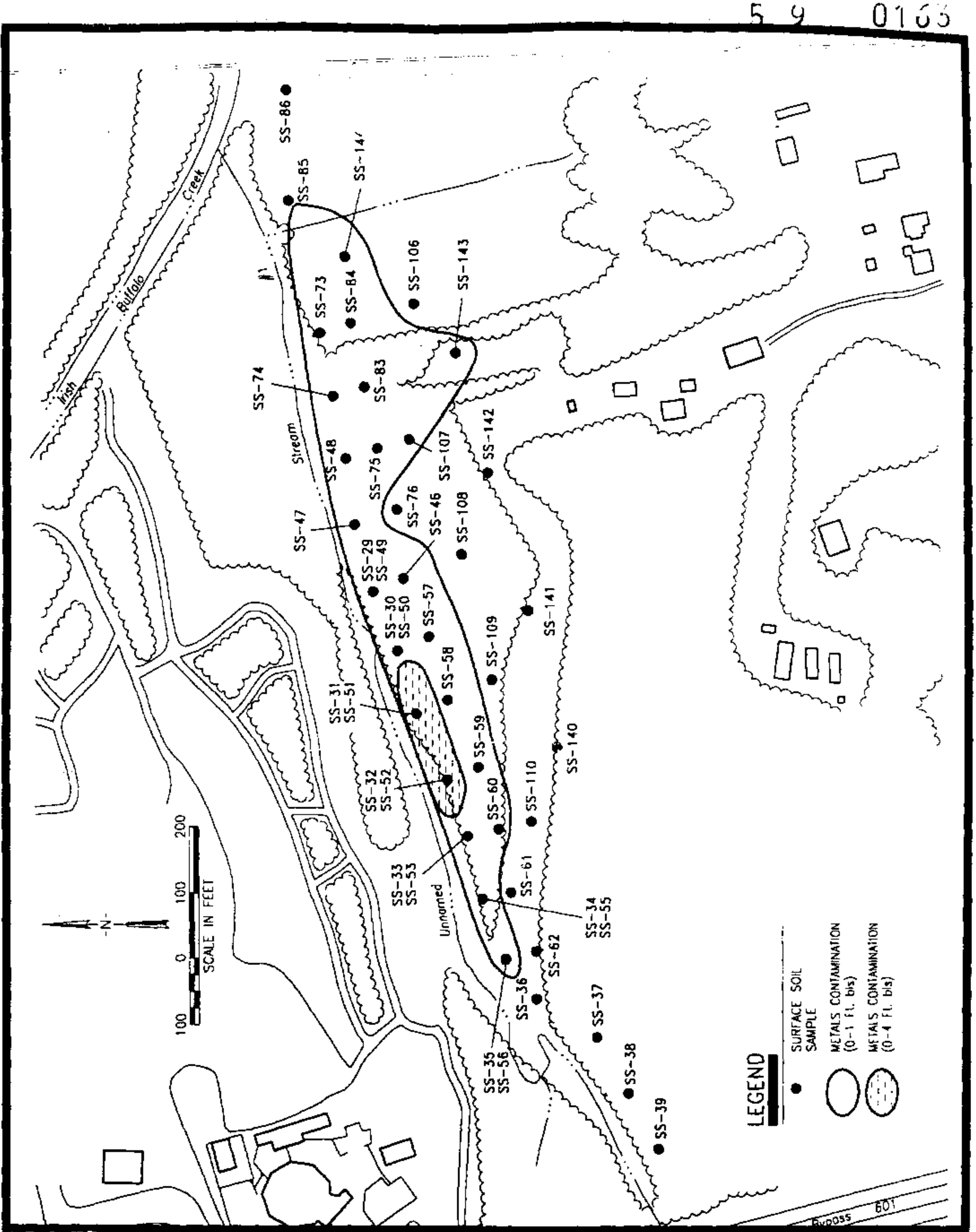
APPROXIMATE AREAL EXTENT OF SOIL CONTAMINATION ABOVE REMEDIATION LEVELS - SOURCE AREA #6

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

8-6



CDM FPC ARCS IV

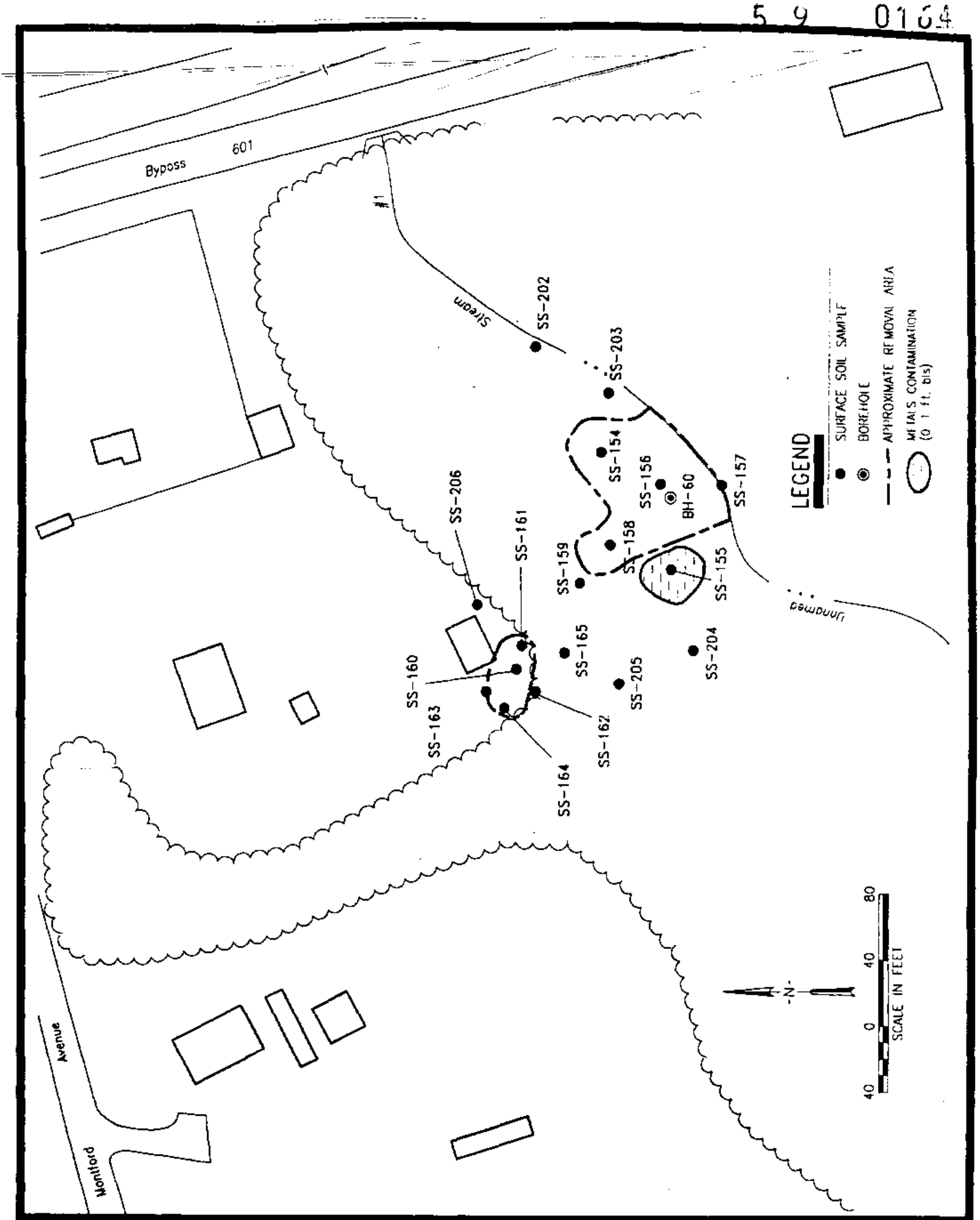
APPROXIMATE AREAL EXTENT OF SOIL CONTAMINATION ABOVE REMEDIATION LEVELS - SOURCE AREA #8

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

8-7



CDM FPC ARCS IV

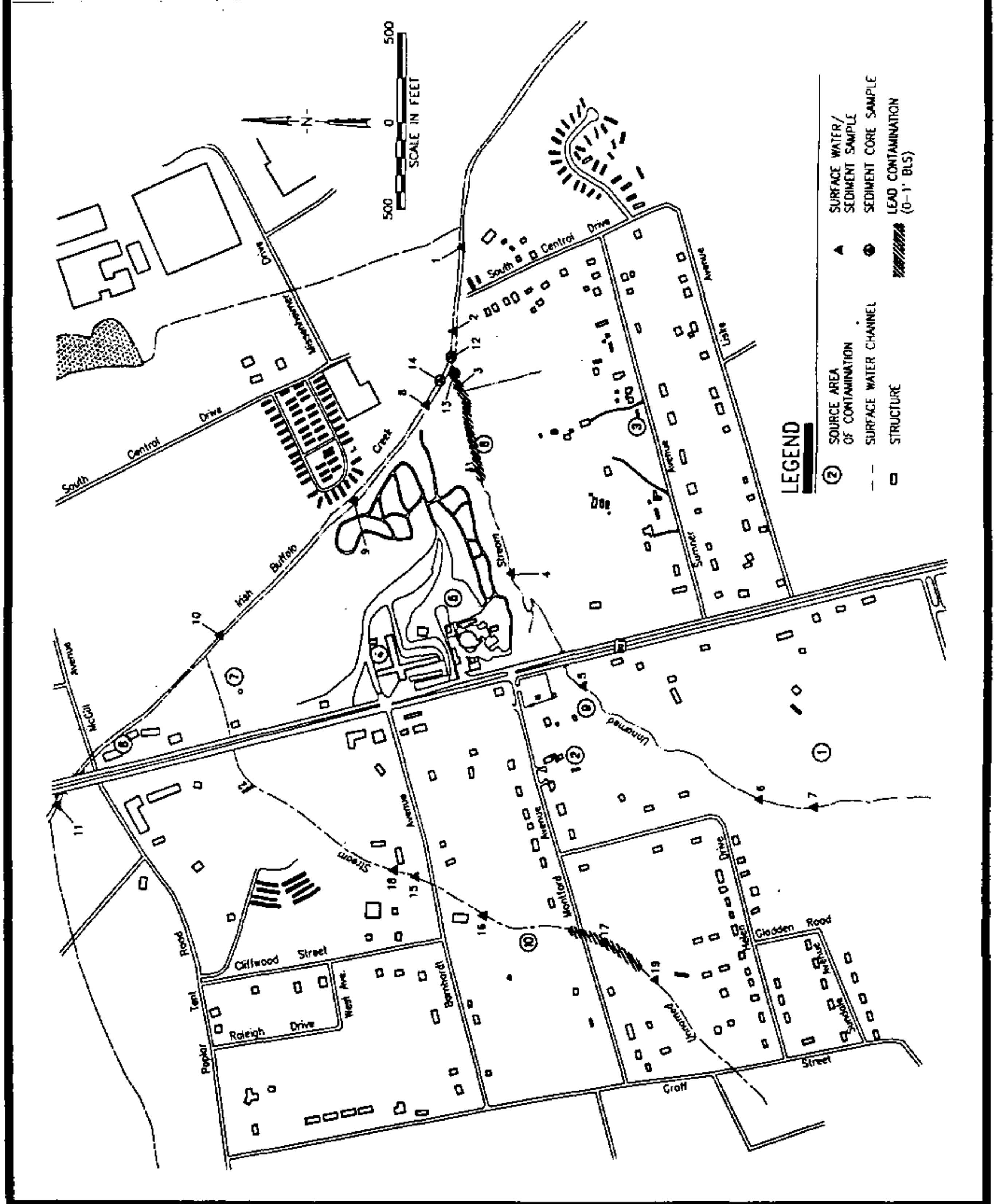
APPROXIMATE AREAL EXTENT OF SOIL CONTAMINATION ABOVE REMEDIATION LEVELS - SOURCE AREA #9

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

8-8



CDM FPC ARCS IV

APPROXIMATE AREAL EXTENT OF LEAD CONTAMINATION EXCEEDING REMEDIATION LEVELS IN SEDIMENT

BYPASS 601 SITE
CONCORD, NORTH CAROLINA

FIGURE NO.
8-9

TABLE 8-3
ESTIMATED VOLUMES OF SOIL/SEDIMENT EXCEEDING REMEDIATION LEVELS

SOURCE AREA	CONTAMINANT	VOLUME(CUBIC YARDS)
MSR FACILITY	METALS	20,849
STOCKPILE	METALS	14,074
NO. 1	CONTAMINATION REMOVED	---
NO. 2	METALS METALS AND VOCS	1,484 112
NO. 3	METALS	531
NO. 4	METALS DEBRIS	21,748
NO. 5	METALS	12,513
NO. 6	METALS	106
NO. 7	NO CONTAMINATION	---
NO. 8	METALS	6,708
NO. 9	METALS	35
NO. 10	CONTAMINATION REMOVED	---
NO. 8 (SEDIMENTS)	METALS	53
NO.10 (SEDIMENTS)	METALS	37

SUBTOTALS:		
	METAL-CONTAMINATED SOIL	78,028
	METAL/VOC-CONTAMINATED SOIL	112
	METAL CONTAMINATED SEDIMENTS	90
	DEBRIS	18,511

TOTAL VOLUME OF CONTAMINATED SOIL/SEDIMENT 96,741

30 feet of the surficial aquifer. However, sulfate contamination is assumed to extend throughout 60 feet of the surficial aquifer.

C. Surface Water

The Federal and State ambient water quality criteria (AWQC), along with the range of detection for the contaminants of concern in surface water are presented in Table 8-6. The surface water is not included as a medium of concern due to the fact that if groundwater feeding the surface water in the area is remediated, and contaminated sediments and surficial soil contamination are removed, surface water will be remediated. This approach is based on remediation of the source. Surface water quality would be monitored to determine the effectiveness of source remediation.

TABLE 8-4
SUMMARY OF REMEDIAL ACTION OBJECTIVE LEVELS - GW

COC	MAXIMUM	MCL	STATE STANDARD	CRQL
BARIUM	586	2,000	1,000	---
BERYLLIUM	1	4	NA	---
CADMIUM	6	5	5	---
CHROMIUM	90	100	50	---
COPPER	812	1,300 (1)	1,000	---
MANGANESE^2	97,000	NA	50	---
NICKEL	82	100	NA	---
LEAD	117	15 (1)	NA	---
VANADIUM	451	NA	NA	---
BENZENE	6	5	1	1
CARBON TETRACHLORIDE	6	5	0.3	1
1,2-DICHLOROETHANE	7	5	0.38	1
SULFATE	1,600,000	400,000	250,000	---

UNITS - UG/L
NA - NOT APPLICABLE
(1) - FEDERAL ACTION LEVEL
2 - The average background concentration for manganese was 1,900 ug/l, which is above the state standard.

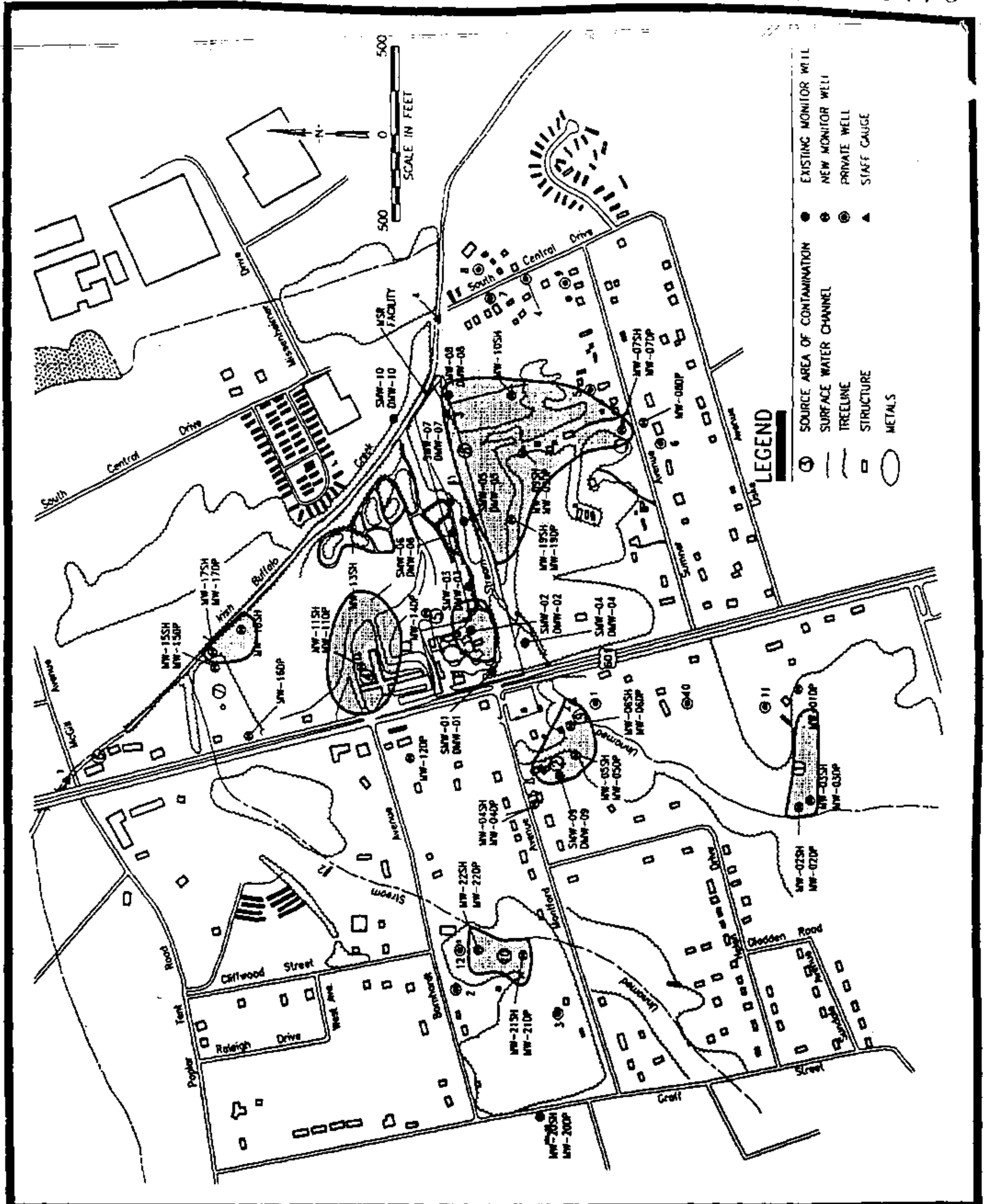
TABLE 8-5

REMEDIAL ACTION OBJECTIVES FOR GROUNDWATER
BYPASS 601 SITE
CONCORD, NORTH CAROLINA

Contaminant	Remediation Level	Basis
Metals		
Barium	1,000 μg/l	North Carolina MCL (15NCAC 02L)
Beryllium	4 μg/l	MCL
Cadmium	5 μg/l	North Carolina MCL (15 NCAC 02L)
Chromium	50 μg/l	North Carolina MCL (15 NCAC 02L)
Copper	1,000 μg/l	North Carolina MCL (15 NCAC 02L)
Manganese	1,900 μg/l	Background concentration (detected in MW-20DP); greater than 15 NCAC 02L Standard of 50 μg/L
Nickel	100 μg/l	MCL
Lead	15 μg/l	Treatment Technique Action Level
Vanadium	256 μg/l	Based on RfD value applied to residential scenario
Organics		
Benzene	1 μg/l	North Carolina MCL (15 NCAC 02L)
Carbon Tetrachloride	1 μg/l	Contract Required Quantitation Limit (CRQL) (15 NCAC 02L of 0.3 μg/l)
1,2-Dichloroethane	1 μg/l	Contract Required Quantitation Limit (CRQL) (15 NCAC 02L of 0.38 μg/l)
Sulfate	250,000 μg/l	North Carolina MCL (15 NCAC 02L)

NOTE:

MCL - Maximum Contaminant Level



CDM FPC ARCS IV

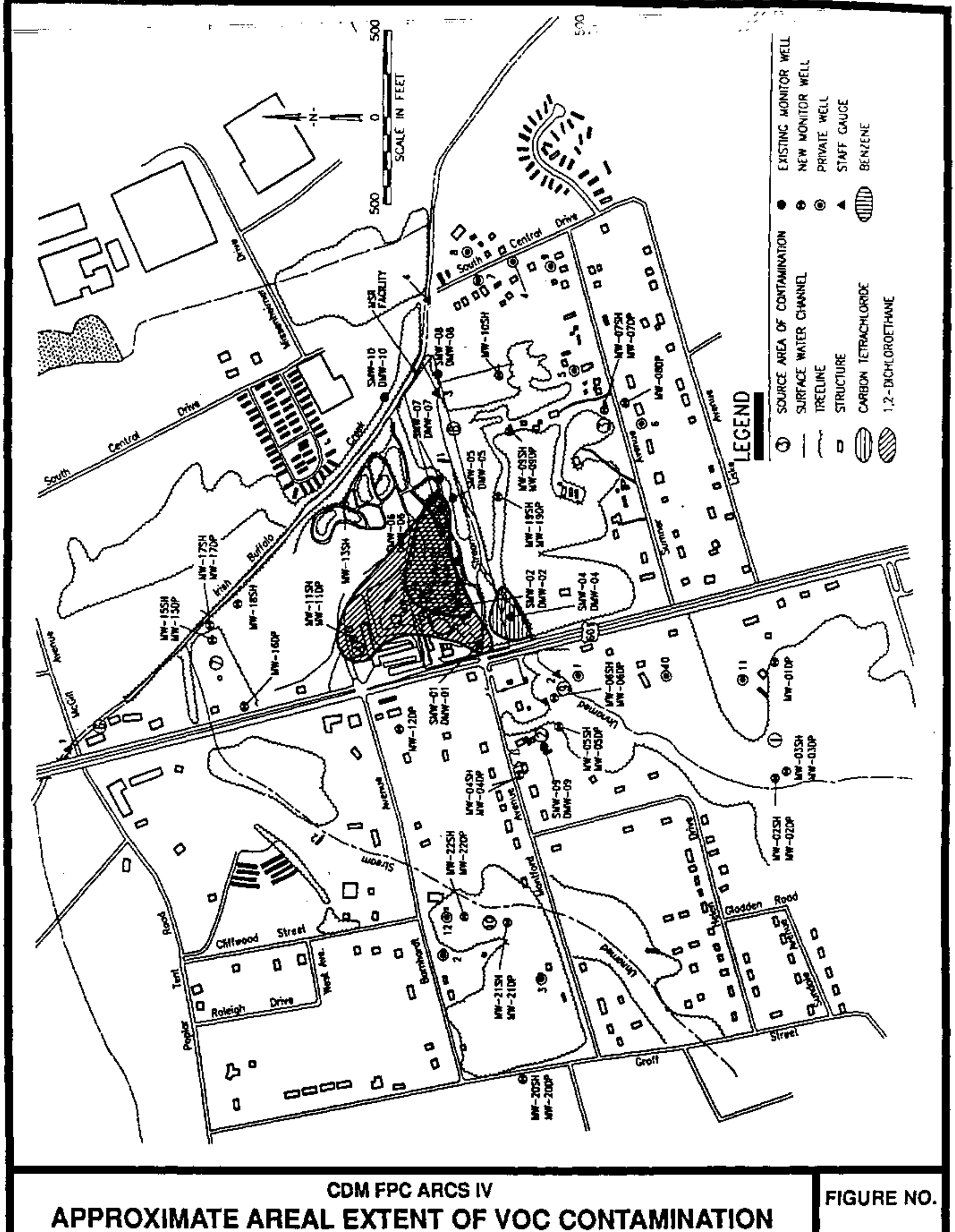
APPROXIMATE AREAL EXTENT OF METAL CONTAMINATION EXCEEDING REMEDIATION LEVELS IN GROUNDWATER

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

8-10



CDM FPC ARCS IV

APPROXIMATE AREAL EXTENT OF VOC CONTAMINATION EXCEEDING REMEDIATION LEVELS IN GROUNDWATER

BYPASS 601 SITE

CONCORD, NORTH CAROLINA

FIGURE NO.

8-11

TABLE 8-6

Contaminants of Concern in Surface Water Compared to Ambient Water Quality Criteria
Bypass 601 Site
Concord, North Carolina

		Federal Criteria (ug/l)	North Carolina Criteria (ug/l)
COC	Range of Detects (ug/l)	AWQC-AL	Fresh Waters, Class C
Copper	5	12	15
Lead	3-36	3.2	25
Zinc	6-46	65	-

COC Contaminant of Concern
AWQC-AL Ambient Water Quality Criteria-Protection of Aquatic Life
- Not established

IX. DESCRIPTION OF ALTERNATIVES

Tables 9-1 and 9-2 summarize the technologies considered for remediating the groundwater and soil contamination, respectively, at the Bypass 601 Site. These tables also provide the rationale as to why certain technologies were not retained for further consideration after the initial screening.

A. Remedial Alternatives to Address Groundwater Contamination

The following alternatives were developed to address groundwater contamination at the Site:

Alternative 1: No Action

Alternative 2: Limited Action

Alternative 3: Primary Source Area Pumping/Onsite Treatment
A. Discharge to Surface Water
B. Discharge to POTW

Alternative 4: Complete GW Extraction/Onsite Treatment
A. Discharge to Surface Water
B. Discharge to POTW

The remedial response actions to address groundwater contamination are discussed below.

Alternative 1: No Action

This alternative provides the baseline case for comparing remedial actions for groundwater and the level of improvement achieved. The only actions included in this alternative are groundwater sampling and analysis of 30 wells, and a data review every 5 years for 30 years. All samples would be collected and analyzed for the metals of concern, sulfates, benzene, 1,2-dichloroethane, and carbon tetrachloride.

There are no capital costs associated with this alternative. Operating costs are based on the review of Site conditions every five years. There would be no maintenance costs.

Total Capital Costs	$ 0
Present Worth O&M Costs	$170,036
Total Present Worth Costs	$170,036

Alternative 2: Limited Action

This alternative is identical to the no action alternative described above except that it includes supplying an alternate source of drinking water (i.e., by connecting residents to the Cabarrus County potable water supply) to any residents onsite with contaminated wells, and implementation of institutional controls to control, limit, and monitor activities onsite.

TABLE 9-1

EVALUATION OF GROUNDWATER PROCESS OPTIONS
BYPASS 601 SITE
CONCORD, NORTH CAROLINA

Groundwater General Response Actions	Remedial Technology	Process Option	Effectiveness	Implementability	Cost
No Action (Natural Attenuation)	None	Not applicable	May not achieve remedial action objectives	Readily implementable	None
Institutional actions	Access restrictions	Deed restrictions	Effectiveness depend on implementation in the future	Readily implementable	Negligible cost
	Monitoring	Groundwater monitoring	Effectiveness depend on implementation in the future	Readily implementable	Low capital and O&M
	Alternate water source	City water supply	Effective in supplying uncontaminated water to residents in contaminated area	Readily implementable	Moderate capital, low O&M
Containment	▨ Capping	▨ Clay and soil	Less reliable and effective than multimedia cap as an impermeable layer	Requires some time to implement	Low capital and O&M
		▨ Multimedia cap	Most reliable and effective as an impermeable layer	Requires more time to implement	Moderate to high capital, moderate O&M
	▨ Vertical barrier	▨ Slurry wall	Effective in containing contaminant plume; must be installed in conjunction with cap to prevent mounding	May be difficult to install, drilling equipment will be required	High capital, low O&M
Collection	Extraction	Extraction wells	Reliable and effective for containment of groundwater but may not achive remedial action objectives	Readily implementable although best location for extraction wells need to be predetermined	Low capital and O&M
Treatment *(see next page)*	Physical/chemical treatment	Precipitation	Effective when used in conjunction with flocculation/sedimentation	Readily implementable	Low capital, moderate O&
		Air stripping	Effective only for VOCs found in groundwater contaminated by the MSR facility; pretreatment required	Readily implementable	Moderate capital, low O&M
		▨ Carbon adsorption	Effective and reliable; pretreatment required. Disposal of spent carbon required.	Readily implementable	High capital and O&M
Discharge *(see next page)* → *(see next page)*					

▨ Process option eliminated from further consideration

TABLE 9-1 (Con't)

Groundwater General Response Actions	Remedial Technology	Process Option	Effectiveness	Implementability	Cost
Treatment *(see previous page)*	Physical/chemical treatment (see previous page)	▨ Reverse osmosis	Not as effective when influent concentrations are low (ppb range)	Readily implementable	High capital & O&M
		Ion exchange	Effective for sulfates and some inorganics	Readily implementable	High capital & O&M
		▨ UV/ozonation	Effective only for VOCs	Readily implementable	High capital & O&M
	▨ Offsite treatment	▨ Hazardous wastewater treatment facility	Reliable and effective given proper operation and maintenance	Readily implementable	Very high capital
Discharge	Offsite discharge	POTW	Reliable and effective given proper operation and maintenance	Pretreatment required to meet discharge limits. Permit required.	High capital & O&M
		Pipeline to surface water	Reliable and effective	Pretreatment required to meet NPDES discharge limits. May require NPDES permit.	Moderate capital, low O&M
	▨ Onsite discharge	▨ Spray irrigation	Not ideal for floodplain areas; reliable and effective in higher areas but limited space is available; would need uncontaminated area to spray over.	Readily implementable	Low capital & O&M

▨ Process option eliminated from further consideration

TABLE 9-2

EVALUATION OF SOIL/SEDIMENT PROCESS OPTIONS
BYPASS 601 SITE
CONCORD, NORTH CAROLINA

Soil General Response Actions	Remedial Technology	Process Option	Effectiveness	Implementability	Cost
No Action	None	Not applicable	Does not achieve remedial action objectives	Readily implementable.	None
Institutional actions	Access restrictions	Site fencing	Provides minimal protection against direct contact. Effectiveness depends on future maintenance.	Readily implementable.	Low Capital, low O&M
		Deed restrictions	Provides minimal protection against direct contact. Effectiveness depends on implementation and enforcement in the future.	Readily implementable. Legal requirements and authority needed	Negligible cost
	Monitoring	Groundwater monitoring	Effectiveness depends on implementation in the future	Readily implementable	Low capital, low O&M
Containment	Capping	▨ Clay and soil	Less reliable and effective than multimedia cap as an impermeable layer	Requires time to implement	Low capital, low O&M
		Multimedia cap	Most effective and reliable as an impermeable layer	Requires more time to implement	Moderate to high capital, moderate O&M
Removal		Excavation	Large-scale (heavy equipment) mechanical excavation is reliable and effective	Readily implementable	Moderate cost
		Dewatering	Removal of groundwater by lowering the water table is effective in facilitating excavation	Locations of dewatering wells need to be determined. Site-specific treatability study required.	Moderate cost
		Dredging	Dredging of sediments is reliable and effective	Readily implementable	Moderate cost
Treatment *(see next page)* Disposal *(see next page)*	Onsite treatment	▨ Bioremediation	Not effective in degrading PAHs in soils from Source Areas # 4,5, and 9 to low cleanup levels	Site-specific treatability study would be required	Moderate to high capital and O&M
		Soil washing	May be effective for all contaminants. Effective for sulfates in particular	Site-specific treatability study required	High capital and O&M
	(see next page)	Thermal desorption	Effective for PAH-contaminated soils from Source Areas # 4,5, and 9 only with low cleanup levels	Site-specific treatability study required	High capital and O&M
		Solidification/Stabilization	Effective for inorganics. Not as effective for PAHs	Site-specific treatability study required	High capital and moderate to low O&M

▨ Process option eliminated from further consideration

TABLE 9-2 (Con't)

Soil General Response Actions	Remedial Technology	Process Option	Effectiveness	Implementability	Cost
Disposal	Offsite disposal	Hazardous waste landfill	Reliable and effective given proper operation and maintenance	Readily implementable	High capital
		▨ Hazardous waste incineration facility	Reliable and effective given proper operation and maintenance	Readily implementable	Very high capital
	Onsite disposal	Staging/Consolidation	Reliable and effective in bringing contaminated soil & debris to one central location for treatment	Readily implementable	Moderate cost
		▨ Encapsulation	Effective given proper construction of onsite RCRA landfill; however contaminated soils are not treated but left at the site	Requires more time to implement than any other containment option; difficulty in handling excavated soils and placing them in new landfill	High capital, low O&M
		Backfill treated material	Reliable and effective as long as land disposal restrictions are met	Requires little time to implement	Low capital

▨ Process option eliminated from further consideration

Total Capital Costs	$ 16,250
Present Worth O&M Costs	$170,036
Total Present Worth Costs	$186,286

Alternative 3A: Primary Source Area Pumping/Onsite Treatment/Discharge to Surface Water

This alternative is identical to the limited action alternative described above, except that it includes groundwater extraction at the primary source areas (MSR facility, Source Areas 1, 2, 3,4,5,9 and 10); sulfate removal using ion exchange, metals removal using precipitation; VOC removal using air stripping; and discharge of the treated effluent to Irish Buffalo Creek.

Groundwater monitoring on at least an annual basis will be required to evaluate remediation as it progresses so that timely adjustments can be made, if determined appropriate. A period of 30 years is assumed for complete remediation.

One treatment system located on the MSR facility will be constructed. Contaminated groundwater from the other source areas will be pumped to this central location. The treated effluent must meet the surface water discharge criteria. The groundwater system will be designed to operate 24 hours per day. System controls would allow for complete automatic operation with minimal operator attention. Alarms and switches would be furnished for fail-safe operation.

To the extent possible, major equipment would be furnished skid-mounted and complete with all piping and controls mounted on structural steel support skids. For costing purposes, it is assumed that air quality control equipment would be needed to capture VOCs released from the air stripper and that the sludge produced from the metals precipitation process would be disposed of at a RCRA-approved hazardous waste landfill facility.

This alternative assumes that chromium is not present in its hexavalent state. If hexavalent chromium is detected during the RD phase, adjustments would need to be made to incorporate chromium reduction as a pretreatment step.

Total Capital Costs	$ 2,743,000
Present Worth O&M Costs	$ 7,284,145
Total Present Worth Costs	$10,027,145

Alternative 3B: Primary Source Area Pumping/Onsite Treatment Discharge to POTW

This alternative is identical to Alternative 3A except that instead of discharging the treated effluent to Irish Buffalo Creek, the treated effluent is discharged to the POTW. In addition, because the POTW will not require pre-treatment for sulfate, this alternative does not include sulfate removal using ion exchange.

Total Capital Costs	$2,018,250
Present Worth O&M Costs	$6,388,251
Total Present Worth Costs	$8,406,501

Alternative 4A: Complete Groundwater Pumping/Onsite Treatment Discharge to Surface Water

This alternative is identical to Alternative 3A except that it includes extraction of all contaminated groundwater, not just from the primary source areas. Therefore, in addition to the areas mentioned in Alternative 3A, groundwater would be recovered from Source Areas 7 and 8.

Total Capital Costs	$ 3,458,000
Present Worth O&M Costs	$ 7,284,145
Total Present Worth Costs	$10,742,145

Alternative 4B: Complete Groundwater Pumping/Onsite Treatment Discharge to POTW

This alternative is identical to Alternative 4A except that instead of discharging the treated effluent to surface water, the treated effluent is discharged to the POTW. In addition, because the POTW will not require pre-treatment for sulfate, this alternative does not include sulfate removal using ion exchange.

Total Capital Costs	$2,782,000
Present Worth O&M Costs	$7,039,522
Total Present Worth Costs	$9,821,522

B. Remedial Alternatives to Address Soil Contamination

The following alternatives were developed to address soil/sediment contamination at the Site:

Alternative 1:	No Action
Alternative 2:	Limited Action
Alternative 3:	Excavation/Onsite Disposal/Capping
Alternative 4:	Excavation/Onsite Treatment by Soil Washing, Thermal Desorption and Solidification/Stabilization/Onsite Disposal
Alternative 5:	Excavation/Onsite Treatment by Thermal Desorption and Solidification/Stabilization, Onsite Disposal
Alternative 6:	Excavation and Offsite Disposal
Alternative 7:	Excavation/Onsite Treatment by Solidification/Stabilization/Onsite Disposal
Alternative 8:	Excavation/Onsite Treatment by Solidification/Stabilization/Offsite Disposal

The remedial response actions to address soil/sediment contamination are discussed below.

Alternative 1: No Action

This alternative provides the baseline case for comparing remedial actions and the level of improvement achieved. This alternative consists of leaving the source areas and the MSR facility as they are without conducting any further remedial actions. The only actions included in this alternative are groundwater sampling and analysis of 30 wells, and a data review every 5 years for 30 years.

All samples would be collected and analyzed for the metals of concern, sulfates, benzene, 1,2-dichloroethane, and carbon tetrachloride. Groundwater concentrations exceeding remediation levels would indicate that soil contamination still exists.

There are no capital costs associated with this alternative. Operating costs are based on the review of Site conditions every five years. There would be no maintenance costs.

Total Capital Costs	$ 0
Present Worth O&M Costs	$170,036
Total Present Worth Costs	$170,036

Alternative 2: Limited Action

This alternative consists of leaving the source areas and the MSR facility as they are without conducting any further remedial actions. However, deed restrictions and Site fencing would be implemented along with 5-year reviews of the site, which consist of one round of groundwater sampling of 30 wells, over an estimated 30-year period.

Total Capital Costs	$133,250
Present Worth O&M Costs	$218,075
Total Present Worth Costs	$351,325

Alternative 3: Excavation and Onsite Disposal/Capping

This alternative involves excavating contaminated soil from all source areas and contaminated sediment from stream locations. Excavated or dredged soil/sediment would be transported to the MSR facility and spread over the surface where the majority of soil contamination occurs. At the same time, the existing stockpile at the facility (result of ERA emergency response action) would also be graded over the facility area. A multimedia cap would be constructed over the consolidated materials in accordance with RCRA guidelines to prevent rainfall infiltration and future leaching into the groundwater. Clean backfill would be applied to excavated areas, if necessary.

Depending on moisture content, soil/sediment would be dewatered to provide adequate structural stability for the cap at the MSR facility. The cap would be placed on approximately 3.2 acres of the MSR facility. Applying excavated soil/sediment over this surface area and grading the existing stockpile adds an approximate average of 15 feet in depth.

A 2-foot thick clay layer, with a hydraulic conductivity less than 1 x 10^{-7} cm/s would be placed over the existing soil to provide a foundation to support the surface cap. An impermeable membrane (40 mil HDPE liner) would be placed over the cover material and underlain by a geotextile fabric to protect the liner from puncture. A 1-foot drainage layer above the liner would be constructed of sand. The top 1-foot of the cap would consist of topsoil to provide a root zone for vegetative growth. In order to inhibit the clogging of the sand drainage layer, a filter fabric would be placed between the sand layer and the top soil. The fabric provides a barrier to soil particles sifting into the sand lens. The topsoil would be vegetated to prevent erosion. The cap would have a minimum slope of 2 percent. Surface runoff would be directed through appropriate drainage channels. Precipitation that percolates through the topsoil would flow laterally through the sand drainage layer and in to the drainage channels.

As part of Site preparation, the abandoned flea market at Source Area #4 and any standing buildings at the MSR facility would be demolished and disposed of offsite to make necessary space available for the cap. To be conservative, the structures are considered to be contaminated for disposal cost purposes. There would also be a relocation of one trailer home at Source Area #3.

Approximately one year would be required for the design and for contractor selection. Site preparation, construction of the multimedia cap, and excavation of contaminated soil/sediment is expected to require approximately one year. Therefore, assuming that weather conditions do not cause extreme delays, this alternative could be implemented in approximately two years.

Institutional controls consisting of access and use restrictions to protect the integrity of the cap system, and long-term groundwater monitoring, would apply. As required by SARA, five year reviews of the Site over an estimated 30-year period, would be conducted.

Total Capital Costs	$11,963,727
Present Worth O&M Costs	$ 792,620
Total Present Worth Costs	$12,766,347

Alternative 4: Excavation and Onsite Treatment by Soil Washing, Thermal Desorption, and Solidification/Stabilization, with Onsite Disposal

This alternative consists of excavating contaminated soil/sediment from all of the source areas, consolidating/staging the material in a central location (MSR facility), performing onsite treatment, and onsite backfilling with the treated material. For the purposes of the detailed analysis, it is assumed that soil washing is the main treatment; with a combination of thermal desorption and/or S/S to be used as post-treatment, if necessary. The final treatment scheme would depend upon the outcome of treatability testing and would be determined during the remedial design phase.

Preprocessing requirements would include screening to eliminate debris larger than 3 inches. The large volume of battery casing debris would be shredded to smaller than 1 inch in diameter. Approximately 18,511 cubic yards of debris will be mixed with calcium oxide to neutralize any remaining acid and/or lead, then stabilized. Soil/sediment washing would involve onsite treatment of contaminated soil and sediment with water and detergents and/or surfactants. With this alternative, approximately 79,908 cubic yards of soil/sediment exceeding remediation levels would be excavated and consolidated/staged at the MSR facility for treatment. Soil washing would be used as a volume reduction step. Because PAH cleanup criteria established for this site are low, thermal desorption of the washed soil/sediment still containing PAHs and carbon tetrachloride above remediation levels could be used as a post-treatment step. The volume of soil expected to be treated by thermal desorption is a maximum of 17,200 cubic yards. The offgases generated would be treated onsite by incineration or condensed and transported offsite.

The washed (and thermally processed, if required) soil/sediment that exceeds any of the cleanup criteria may be transported to an onsite cement batch plant where materials would be mixed with Portland cement and other aggregates. The fixed material must be subject to TCLP to determine if the treatment is effective. The fixed material would be replaced in onsite designated areas.

As part of Site preparation, the abandoned flea market at Source Area #4 and any standing buildings at the MSR facility would be demolished and disposed of offsite to make necessary space available for the cap. To be conservative, the structures are considered to be contaminated for disposal cost purposes. There would also be a relocation of one trailer home at Source Area #3.

The treatability study of the treatment technologies will require approximately six months and design of the treatment systems will require approximately six months. Approximately six months will be required for contractor selection. The actual implementation and treatment of all contaminated soil/sediment, including excavation, may take another two years. Therefore, assuming that weather conditions do not cause extreme delays, this alternative could be implemented in approximately 3.5 years.

Institutional controls consisting of access and use restrictions to protect the disposal area, and long-term groundwater monitoring, would apply. As required by SARA, five year reviews of the site over an estimated 30-year period, would be conducted.

Total Capital Costs	$55,224,415
Present Worth O&M Costs	$ 619,508
Total Present Worth Costs	$55,843,923

Alternative 5: Excavation and Onsite Treatment by Thermal Desorption, Solidification/ Stabilization, Onsite Disposal

This alternative consists of excavating contaminated soil/sediment from all of the source areas, consolidating/staging the material in a central location (MSR facility)/performing onsite treatment, and onsite backfilling with the treated material. For the purposes of the detailed analysis, it is assumed that S/S is the main treatment; with thermal desorption to be used as the pretreatment of PAH-and VOC-contaminated soils. The final treatment scheme would depend upon the outcome of treatability testing and would be determined during the remedial design phase.

Preprocessing requirements would include screening to eliminate debris larger than 3 inches. The large volume of battery casing debris would be shredded to smaller than 1 inch in diameter. Thermal desorption would involve onsite treatment of PAH- and VOC-contaminated soil and sediment at elevated temperatures. With this alternative, approximately 17,200 cubic yards of soil/sediment with concentrations above remediation levels would be excavated and consolidated/staged at the MSR facility for thermal treatment. The offgases generated would be treated onsite by incineration or condensed and transported offsite.

The thermally processed soil/sediment that does not meet remediation levels and all metal-contaminated soil may be transported to an onsite cement batch plant where materials would be mixed with Portland cement and other aggregates. The fixed material must be subject to TCLP to determine if treatment is effective. The fixed material would be replaced in onsite designated areas. The volume of soil expected to be treated by S/S is a maximum of 78,230 cubic yards.

As part of Site preparation, the abandoned flea market at Source Area #4 and any standing buildings at the MSR facility would be demolished and disposed of offsite to make necessary space available for the onsite disposal of the treated material. To be conservative, the structures are considered to be contaminated for disposal cost purposes. There would also be a relocation of one trailer home at Source Area #3.

The treatability study of the treatment technologies will require approximately six months and design of the treatment systems will require approximately six months. Approximately six months will be required for contractor selection. The actual implementation and treatment of all contaminated soil/sediment, including excavation, may take another two years. Therefore, assuming that weather conditions do not cause extreme delays, this alternative could be implemented in approximately 3.5 years.

Institutional controls consisting of access and use restrictions to protect the disposal area, and long-term groundwater monitoring, would apply. As required by SARA, five year reviews of the Site over an estimated 30-year period, would be conducted.

Total Capital Costs	$33,233,920
Present Worth O&M Costs	$ 619,508
Total Present Worth Costs	$33,853,428

Alternative 6: Excavation and Offsite Disposal

This alternative involves excavating contaminated soil/sediment from all source areas and the MSR facility and loading and transporting it to an offsite RCRA-permitted (Subtitle C) landfill. An estimated 98,419 cubic yards of material would require transportation and disposal. All DOT and RCRA transportation requirements, including proper completion of a manifest, would be followed. Dump trucks, lined and covered, would be utilized for transport.

Once the contaminated material had been removed, the affected areas would be backfilled with clean fill to the original elevations, graded, and vegetated. Since Land Ban Restrictions would apply to the contaminated soil/sediment, pretreatment by the facility would be required prior to disposal.

As part of Site preparation, the abandoned flea market at Source Area #4 and any standing buildings at the MSR facility would be demolished and disposed of offsite to make necessary space available for the cap. To be conservative, the structures are considered to be contaminated for disposal cost purposes. There would also be a relocation of one trailer home at Source Area #3.

Approximately one year would be required for contractor selection and obtaining necessary permits for offsite disposal. Site preparation and excavation is expected to require approximately one year. Therefore, assuming that weather conditions do not cause extreme delays, this alternative could be implemented in approximately two years.

Total Capital Costs	$75,585,015
Present Worth O&M Costs	$ 345,880
Total Present Worth Costs	$75,930,895

Alternative 7: Excavation and Onsite Treatment by Solidification/Stabilization, Onsite Disposal

This alternative is the same as Alternative 5 above, except that thermal desorption of PAH- and VOC-contaminated soil is not included. S/S would be used to treat all contaminated material, with onsite backfilling of the fixed material for final disposal.

In addition, the treated material would be placed on the flea market property (Source Area #4), the portion of the landfill identified as Source Area #5, as well as the MSR facility. The total area is approximately 8.6 acres. The height of the final disposal unit would be approximately 7 feet (treatment of 98,419 cubic yards).

However, since the S/S process could increase the volume of the treated material by a significant factor (10 to 100 percent), the height of the final unit could be as high as 14 feet.

Institutional controls consisting of access and use restrictions to protect the disposal area, and long-term groundwater monitoring, would apply. As required by SARA, five year reviews of the Site over an estimated 30-year period, would be conducted.

Total Capital Costs	$30,029,014
Present Worth O&M Costs	$ 619,508
Total Present Worth Costs	$30,648,522

Alternative 8: Excavation and Onsite Treatment by Solidification/Stabilization, Offsite Disposal

This alternative is the same as Alternative 7, except that the treated material will be disposed of offsite in an industrial landfill. Transportation by a licensed hauler would be arranged and all Department of Transportation (DOT) transportation requirements would be followed. It is conservatively assumed that 200,000 cubic yards of treated material would have to be disposed of at the facility, since the S/S process could increase the volume.

Total Capital Costs	$42,736,514
Present Worth O&M Costs	$ 587,604
Total Present Worth Costs	$43,324,117

X. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The remedial alternatives to address groundwater and soil/sediment contamination were evaluated using the nine evaluation criteria as set forth in the NCR, 40 CFR § 300.430(e)(9). A brief description of each of the nine evaluation criteria is provided below.

THRESHOLD CRITERIA

1. Overall Protection of Human Health and the Environment addresses how an alternative as a whole will protect human health and the environment. This includes an assessment of how the public health and the environmental risks are property eliminated, reduced, or controlled through treatment, engineering controls, or controls placed on the property to restrict access and (future) development. Deed restrictions are examples of controls to restrict development.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) addresses whether or not a remedy complies with all state and federal environmental and public health laws and requirements that apply or are relevant and appropriate to the conditions and cleanup options at a specific site. If an ARAR cannot be met, the analysis of the alternative must provide the grounds for invoking a statutory waiver.

PRIMARY BALANCING CRITERIA

3. Long-term Effectiveness and Permanence refers to the ability of an alternative to maintain reliable protection of human health and the environment over time once the cleanup levels have been met.

4. Reduction of Toxicity, Mobility, or Volume are the three principal measures of the overall performance of an alternative. The 1986 amendments to the Superfund statute emphasize that, whenever possible, ERA should select a remedy that uses a treatment process to permanently reduce the level of toxicity of contaminants at the site; the spread of contaminants away from the source of contaminants; and the volume, or amount, of contamination at the Site.

5. Short-term Effectiveness refers to the likelihood of adverse impacts on human health or the environment that may be posed during the construction and implementation of an alternative until cleanup levels are achieved.

6. Implementability refers to the technical and administrative feasibility of an alternative, including the availability of materials and services needed to implement the alternative.

7. Cost includes the capital (up-front) cost of implementing an alternative, as well as the cost of operating and maintaining the alternative over the long-term, and the net present worth of both the capital and operation and maintenance costs.

MODIFYING CRITERIA

8. State Acceptance addresses whether, based on its review of the RI/FS and Proposed Plan, the State concurs with, opposes, or has no comments on the alternative EPA is proposing as the remedy for the Site.

9. Community Acceptance addresses whether the public concurs with EPA's proposed plan. Community acceptance of this proposed plan will be evaluated based on comments received at the public meetings and during the public comment period.

These evaluation criteria relate directly to requirements in Section 121 of CERCLA, 42 USC Section 9621, which determine the overall feasibility and acceptability of the remedy. Threshold criteria must be satisfied in order for a remedy to be eligible for selection. Primary balancing criteria are used to weigh major trade-offs between remedies. State and community acceptance are modifying criteria formally taken into account after public comment is received on the proposed plan. Table 10-1 provides a summary of all the alternatives along with the total present worth costs. The evaluation of the potential remedial alternatives to address soil and groundwater were developed as follows.

A. Groundwater Remediation

The following alternatives were subjected to detailed analysis for groundwater remediation:

Alternative 1: No Action

Alternative 2: Limited Action

Alternative 3A: Primary Source Area Pumping/Onsite Treatment Discharge to Surface Water

Alternative 3B: Primary Source Area Pumping/Onsite Treatment Discharge to POTW

Alternative 4A: Complete Groundwater Pumping/Onsite Treatment Discharge to Surface Water

Alternative 4B: Complete Groundwater Pumping/Onsite Treatment Discharge to POTW

Overall Protection of Human Health and the Environment

Each alternative was evaluated to determine whether it is likely to effectively mitigate and minimize the long-term risk of harm to public health and the environment currently presented at the Site. Alternative 1 does not eliminate any exposure pathways or reduce the level of risk. Alternative 2 eliminates some exposure pathways, with a reduction in the potential risk of groundwater ingestion and inhalation. The exposure pathways associated with continued contaminant migration in groundwater and through surface water discharge would not be eliminated. Alternatives 3 and 4

TABLE 10-1
REMEDIAL ALTERNATIVES

GROUNDWATER ALTERNATIVES

Alternative 1	No Action	$ 170,036
Alternative 2	Limited Action	$ 186,286
Alternative 3	Pumping of Primary Source Areas/Onsite Treatment	
	A. Discharge to SW	$10,027,145
	B. Discharge to POTW	$ 8,406,501
Alternative 4	Complete GW Pumping/ Onsite Treatment	
	A. Discharge to SW	$10,742,145
	B. Discharge to POTW	$ 9,821,522

SOIL ALTERNATIVES

Alternative 1	No Action	$ 170,036
Alternative 2	Limited Action	$ 351,325
Alternative 3	Excavation/Capping	$12,756,347
Alternative 4	Excavation/Onsite Treatment Soil Washing, Thermal Desorption, S/S, Onsite Disposal	$55,843,923
Alternative 5	Excavation/Onsite Treatment Thermal Desorption, S/S, Onsite Disposal	$33,853,428
Alternative 6	Excavation/Offsite Disposal	$75,930,895
Alternative 7	Excavation/Onsite Treatment S/S, Onsite Disposal	$30,648,522
Alternative 8	Excavation/Onsite Treatment S/S, Offsite Disposal	$43,324,117

eliminate exposure pathways and it is expected that any potential risk of ingestion or inhalation would also be greatly reduced as long as the system is in operation.

Compliance With ARARs

The no action and the limited action alternatives would not comply with ARARs. Alternative 3 would attain ARARs in the primary source areas, while Alternative 4 would attain ARARs across the entire Site. Table 10-2 identifies the federal regulations applicable to the alternatives and Table 10-3 identifies the North Carolina regulations pertaining to these alternatives.

Long-term Effectiveness and Permanence

In Alternatives 1 and 2, contaminant migration through groundwater and surface water discharge would continue. In Alternative 3, the pathway exposure is moderately reduced. It reduces contamination and reduces potential for further migration from the primary source areas. Contaminated groundwater outside of primary source areas will continue to migrate. For Alternative A, there would be a maximum reduction in pathway exposure risk, and would eliminate further migration.

Reduction of Toxicity, Mobility, and Volume

Alternatives 1 and 2 would not reduce the toxicity, mobility, or volume (T/M/V) of the contaminants. Alternative 3 would cause a moderate reduction of T/M/V, with Alternative 4 providing the maximum reduction of T/M/V.

Short-term Effectiveness

All of the alternatives can be implemented without significant risks to the community or on-site workers and without adverse environmental impacts.

Implementability

In Alternative 2, implementability would depend upon the requirements necessary to connect affected residents to the Cabarrus County water supply. Alternative 3A and 4A would require a NPDES permit, while Alternatives 3B and 4B would require approval by the local POTW.

Cost

Total present worth costs for the groundwater alternatives are presented in Table 10-1.

B. Soil Remediation

The following alternatives were developed for Site soils and were subjected to detailed analysis:

Alternative 1: No Action

TABLE 10-2

FEDERAL REGULATIONS AFFECTING IMPLEMENTATION OF THE ALTERNATIVES UNDER EVALUATION
BYPASS 601 SITE
CONCORD, NORTH CAROLINA

Applicable Criteria	Regulation	Application
National Interim Primary Drinking Water Standards	40 CFR 141	Maximum contaminant levels (MCLs) for heavy metals, anions, bacteria, pesticides, radionuclides, and organic chemicals of concern in drinking water. Under this regulation, the groundwater at the site is classified as Class IIA. EPA's cleanup policy is most stringent for Class IIA groundwater, and involves cleanup to background or drinking water levels. Several of these MCLs have been adopted as remediation levels for the site.
National Secondary Drinking Water Standards	40 CFR 143	Maximum contaminant levels (MCLs) for constituents affecting the aesthetic quality and use of drinking water.
Clean Water Act	40 CFR 131	Criteria for surface water quality based on toxicity to aquatic organisms and human health.
Clean Air Act	40 CFR 61	National emission standards for hazardous air pollutants. Applicable to air stripping of contaminants.

TABLE 10-3

NORTH CAROLINA REGULATIONS AFFECTING THE IMPLEMENTATION OF THE ALTERNATIVES UNDER EVALUATION
BYPASS 601 SITE
CONCORD, NORTH CAROLINA

Applicable Criteria	Regulation	Application
Water Quality Standards Applicable to the Groundwaters of the State	15A NCAC 2L.0200	Classifications and water quality standards for groundwater which is an existing or potential source of drinking water supply for humans. Applicable to Alternatives 1GW, 2GW, 3GW, and 4GW.
North Carolina Drinking Water Quality Standards	15 NCAC 18C.1510 through 18C.1518	Drinking water quality standards applicable to groundwater at the Bypass 601 Site. Applicable to Alternatives 1GW, 2GW, 3GW, and 4GW. Maximum contaminant levels (MCLs) for heavy metals, anions, bacteria, pesticides, radionuclides, and organic chemicals of concern in drinking water. These MCLs have been adopted as groundwater standards for the surficial aquifer at the site because the groundwater at the Bypass 601 Site is classified as Class GA.
Classification of Surface Waters	15A NCAC 2B.0100	Procedures for assignment of water quality standards for surface waters. Irish Buffalo Creek is a Class C surface water. Applicable to Alternatives 3GW-A and 4GW-A.
Surface Water Quality Standards	15A NCAC 2B.0200	Classifications and water quality standards applicable to surface waters of North Carolina. Applicable to Alternatives 3GW-A and 4GW-A.
Coastal Waste Treatment Disposal	15A NCAC 2B.0400	Treatment standards to ensure compliance with water quality standards promulgated by the North Carolina Environmental Management Commission for propagation of shellfish in coastal waters (i.e., Class C waters). Applicable for discharge to Irish Buffalo Creek. Applicable to Alternatives 3GW-A and 4GW-A.
Wastewater Discharge to Surface Waters	15A NCAC 2H.0100	Requirements and procedures for application and issuance of State NPDES permits. Applicable
Wastewater Discharge to Waters other than Surface Waters of the State	15A NCAC 2H.0200	Requirements and procedures for application and issuance of permits for discharge to sewer systems, disposal systems, treatment works, and sludge disposal systems. Applicable to Alternatives 3GW-A and 4GW-A.

Alternative 2: Limited Action

Alternative 3: Excavation and Onsite Disposal (Capping)

Alternative 4: Excavation and Onsite Treatment (Soil Washing, Thermal Desorption, S/S), Onsite Disposal

Alternative 5: Excavation and Onsite Treatment (Thermal Desorption, S/S), Onsite Disposal

Alternative 6: Excavation and Offsite Disposal

Alternative 7: Excavation and Onsite Treatment (S/S), Onsite Disposal

Alternative 8: Excavation and Onsite Treatment (S/S), Offsite Disposal

Overall Protection of Human Health and the Environment

Alternatives 1 and 2 do not eliminate any exposure pathways or reduce the level of risk. Alternative 3 virtually eliminates the potential risk of direct contact and leaching into the groundwater. It minimizes the risk of further contamination to drinking water wells and reduces the risk of groundwater ingestion and inhalation. Alternatives 4 through 8 eliminate the potential risk of direct contact and leaching into the groundwater.

Compliance With ARARs

Alternatives 6 and 8 would comply with EPA's offsite policy and Land Disposal Restrictions. Alternatives 4 through 8 would comply with all treatment ARARs, including TCLP.

Long-term Effectiveness and Permanence

Alternatives 1 and 2 would not be effective in removing or limiting the migration . of contaminants. Alternative 3 would be effective at least 20 years, with proper maintenance of the cap, but it is not considered a permanent remedy. Alternatives 4, 5, and 7 are considered permanent remedies that would be effective. Alternatives 6 and 8 are permanent remedies for the Bypass 601 Site, but not at the offsite disposal facility.

Reduction of Toxicity, Mobility, and Volume

Contaminant levels would remain unchanged for Alternatives 1 and 2. Alternative 3 would eliminate the mobility and effective toxicity of the contaminants, but would not reduce the volume. Alternative 4 would reduce the T/M/V of the contaminants. Alternatives 5 through 8 would reduce the toxicity and mobility of the contaminants, but volume of contaminated material would increase due to the addition of the solidifier.

Short-term Effectiveness

All of the Alternatives can be implemented without significant risks to onsite workers or the community. Aquatic biota would be disturbed during excavation and backfilling of stream sediments in Alternatives 3 through 8.

Implementability

Implementation of Alternatives 1, 2, 3, 6, 7, and 8 would pose no significant difficulties. Implementation of Alternatives 4 and 5 may depend on the availability of mobile thermal desorption equipment.

Cost

Total present worth costs for the soil remediation alternatives are presented in Table 10-1.

C. Modifying Criteria

State and community acceptance are modifying criteria that shall be considered in selecting the remedial action.

State Acceptance

The State of North Carolina concurs with the selected remedy.

Community Acceptance

A proposed plan fact sheet was released to the public on December 17, 1992. The proposed plan public meeting was held on January 7, 1993. The public comment period on the proposed plan was held from December 17, 1992 to February 18,1993. The letters, comments, and questions asked during the January 7th meeting and received during the comment period are summarized in the attached Responsiveness Summary.

XI. THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the NCR, the detailed analysis of alternatives and public and state comments, ERA has selected both a source control and groundwater remedy for this Site. At the completion of this remedy, the risk associated with this Site has been calculated to be within the accepted risk range determined to be protective of human health and the environment. The total present worth of the selected remedies, Alternative 4B for groundwater ($9,821,522) and Alternative 7 for soil ($30,648,522), is estimated at $40,470,044. See Tables 11-1 and 11-2 for the detailed cost estimates of the two chosen alternatives.

A. Source Control

Source Control remediation will address the contaminated soils and materials at the Site. The source control remedy requires that the contaminated soils in Source Areas 2, 3, 4, 5, 6, 8, and 9 be excavated and transported to the MSR facility. Contaminated soils on the MSR facility will also be excavated. The excavated material will be treated using a solidification/stabilization (S/S) technology. Stabilization is a chemical reaction between one or more waste components which would immobilize, insolubilize, or otherwise render the waste components less hazardous. The purpose of solidification is to transform hazardous contaminants into a physical form which is more suitable for storage and reduces the water permeability into the waste (acts as a barrier between the waste particles and the environment). Treatability testing must address the effectiveness in immobilizing metals, possible leaching, and the increased weight and volume of the S/S material. Emphasis will be placed on optimizing leachate resistance rather than structural integrity.

The excavated material will be transferred to an onsite cement batch plant, and mixed with Portland cement and/or other aggregates. The battery debris will be preprocessed by shredder (to less than 1 inch in diameter) and mixed with calcium oxide to neutralize any remaining sulfuric acid and lead.

Following excavation and removal of soils from Source Areas 2,3,6, 7, 8, and 9, clean fill will be placed in the excavated areas. The areas will then be graded and revegetated. The treated material will be placed onsite at the MSR facility, and portions of the flea market property (Source Area #4) and the landfill. The areas that contain the treated material will then be covered and vegetated.

As part of Site preparation, portions of the abandoned flea market at Source Area #4, and any standing buildings at the MSR facility would be demolished and disposed of offsite. During source area remedial activities, one trailer home at Source Area #3 will require temporary relocation.

A.l. Excavation Standards

Excavation shall continue until the remaining soil and material achieve the following maximum contaminant levels.

Contaminant	**Units**	**Remediation Level**		**Risk Level**
		Source Areas 2, 3, 6, 8, 9	**Source Areas 4, 5, & MSR**	
Antimony	mg/kg	24	820	HI= 1
Barium	mg/kg	153	153	HI = 0.05
Chromium	mg/kg	56	56	HI = 0.02
Lead	mg/kg	500	500	NA
Manganese	mg/kg	4,200	4,200	HI = 0.71
Vanadium	mg/kg	87	87	HI = 0.21
Carbon Tetrachloride	µg/kg	10	10	HI = 0.24
Lead (Sediment)	mg/kg	35	35	NA

Hazard Index (HI) - Relates to non-cancer risks
1E-06 Risk Level - Probability for carcinogenic effects
NA - Not applicable - Risk from lead is not calculated using HI or risk level.

A.2. Treatment Standards

The treated material must be subjected to toxicity characteristic leaching procedure (TCLP) (55 FR 11798, March 29, 1990) to determine if treatment is effective. The treated material will not be disposed of onsite until it passes the TCLP test. The treatability study that will be conducted before remediation begins will ensure that the mix of cement and aggregates is sufficient to effectively fix all the contaminants.

B. Groundwater Remediation

Groundwater remediation will address the contaminated groundwater at the Site. Groundwater remediation will include extraction of contaminated groundwater, treatment and final discharge to the Publicly Owned Treatment Works (POTW).

The treatment will consist of precipitation of metals and suspended solids, and air stripping to remove organics. The treatment system will be located on the MSR facility, with contaminated groundwater from the other source areas pumped to this central location.

The groundwater system will operate 24 hours per day. System controls will allow complete automatic operation with minimal operator attention. Long-term monitoring for cleanup verification purposes and to track contaminant plume migration will be required. The system is expected to operate 30 years; samples will be collected from 30 existing wells on a quarterly basis for the first 5 years, and on an annual basis for the following 25 years.

The groundwater treatment system will also require monitoring and maintenance. Monitoring of the treatment system will include periodic sampling of the influent and effluent from the treatment system and analysis in accordance with the POTW discharge permit requirements. Sludge produced from the precipitation process will be analyzed for total metals and by TCLP. If the sludge passes TCLP and the concentrations of metals are below soil remediation levels, the sludge will be deposited onsite. If the sludge does not pass the TCLP test and/or the concentrations of metals are above the soil remediation levels, the sludge will be disposed of in an approved hazardous waste landfill.

B.1. Extraction and Performance Standards

Groundwater will be extracted from the MSR facility, Source Areas 1,2,3,4, 5, 7, B, 9, and 10. Location of extraction wells and pumping rates will be determined during the remedial design.

Final discharge will be to the local POTW. Discharge standards will be driven by the POTW requirements and will be defined during the development of the Remedial Design.

Groundwater shall be treated until the following maximum concentration levels are attained throughout the contaminant plume:

Contaminant	Remediation Level	Risk Level
Barium	1,000 µg/l	HI = 0.56
Beryllium	4 µg/l	HI = 0.02
Cadmium	5 µg/l	HI = 0.27
Chromium	50 µg/l	HI = 0
Copper	1,000 µg/l	HI = 0.74
Manganese	9,000 µg/l	HI = 0.52
Nickel	100 µg/l	HI = 0.14
Lead	15 µg/l	NA
Vanadium	1256 µg/l	HI = 1
Benzene	1 µg/l	1.64E-06
Carbon Tetrachloride	1 µg/l	HI = 0.04
1,2-Dichloroethane	1 µg/l	5.1E-06
Sulfate	250,000 µg/l	HI = 0.12

Hazard Index (HI) - Relates to non-cancer risks
1E-06 Risk Level - Probability for carcinogenic effects
NA - Not applicable. Risk from lead is not calculated using HI or risk level.

The goal of this remedial action is to restore the groundwater to its beneficial use, as defined in Section 6.0. Based on information obtained during the RI, and the analysis of all remedial alternatives, ERA and the State of North Carolina believe that the selected remedy may be able to achieve this goal.

Groundwater contamination may be especially persistent in the immediate vicinity of the contaminants' source, where concentrations are relatively high. The ability to achieve remediation levels at all points throughout the area of attainment, or plume, cannot be determined until the extraction system has been implemented, modified, as necessary, and plume response monitored overtime.

If the selected remedy cannot meet the specified performance standards, at any or all of the monitoring points during implementation, the contingency measures and goals described in this section may replace the selected remedy and goals for these portions of the plume. Such contingency measures will, at a minimum, prevent further migration of the plume and include a combination of containment technologies and institutional controls. These measures are considered to be protective of human health and the environment, and are technically practicable under the corresponding circumstances.

The selected remedy will include groundwater extraction for an estimated period of 30 years, during which time the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include any or all of the following:

a) at individual wells where remediation levels have been attained, pumping may be discontinued;

b) alternating pumping at wells to eliminate stagnation points;

c) pulse pumping to allow aquifer equilibration and encourage adsorbed contaminants to partition into groundwater;

d) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

To ensure that cleanup continues to be maintained, the aquifer will be monitored at those wells where pumping has ceased on an occurrence of at least every 2 years following discontinuation of groundwater extraction.

If it is determined, on the basis of the preceding criteria and the system performance data, that certain portions of the aquifer cannot be restored to their beneficial use, all of the following measures involving long-term management may occur, for an indefinite period of time, as a modification of the existing system:

a) engineering controls such as physical barriers, or long-term gradient control provided by low level pumping, as contaminant measure;

b) chemical-specific ARARs may be waived for the cleanup of those portions of the aquifer based on the technical impracticability of achieving further contaminant reduction;

c) institutional controls may be provided/maintained to restrict access to those portions of the aquifer which remain above remediation levels;

d) continued monitoring of specified wells; and

e) periodic reevaluation of remedial technologies for groundwater restoration.

The decision to invoke any or all of these measures may be made during a periodic review of the remedial action, which will occur at 5 year intervals in accordance with CERCLA Section 121 (c).

The remedial actions shall comply with all ARARs (See Sections VII and X).

The presence of residual contamination in the solidified/stabilized material and the presence of contaminants in the groundwater will require deed recordation/restriction to document their presence and could limit future use of the property. The extent of the property restrictions and limitations will be determined during the remedial design.

TABLE 11-1
GROUNDWATER SELECTED REMEDY COST ESTIMATE

ITEM DESCRIPTION	UNITS	QUANTITY	UNIT PRICE DOLLARS	TOTAL COST DOLLARS
GROUNDWATER:				
ALTERNATIVE WATER SUPPLY	each	10	$1,000	$10,000
MOBILIZATION				
Transport Equipment & Staff	each	1	$40,000	$40,000
Temporary Facilities	each	1	$20,000	$20,000
GROUNDWATER EXTRACTION				
Site Preparation	acre	45	$3,000	$135,000
Well Installation	well	46	$2,500	$115,000
Submersible Pumps	each	46	$1,000	$46,000
Pipes, Valves, & Fittings	ft	20,300	$15	$304,500
WATER TREATMENT FACILITY				
Site Preparation	acre	0.5	$3,000	$1,500
Earthwork	cy	500	$15	$7,500
Treatment Facility	each	4800	$80	$384,000
Lighting & HVAC Systems	lump sum	1	$15,000	$15,000
WATER TREATMENT PROCESS UNITS				
Equilization Tank	each	1	$20,000	$20,000
Metals Removal Facilities	each	1	$250,000	$250,000
Air Stripping Unit	lump sum	1	$50,000	$50,000
Equipment Installation	lump sum	1	$100,000	$100,000
Transfer Pumps	each	2	$3,000	$6,000
Control Panel & Instrumentation	lump sum	1	$60,000	$60,000
Piping, Valves & Appurtenances	lump sum	1	$60,000	$60,000
Filter Press	each	2	$20,000	$40,000
TREATED WATER DISCHARGED TO POTW				
Pumps (Installed)	each	2	$2,500	$5,000
Pipe, Valves, & Fittings	ft	500	$25	$12,500
HEALTH AND SAFETY EQUIPMENT	lump sum	1	$30,000	$30,000
Subtotal -- Capital Cost				$1,712,000
Contractor Fee (10% of Capital Cost)				$171,200
Legal Fees, Licenses & Permits (5% of Capital Cost)				$85,600
Engineering & Administrative (15% of Capital Cost)				$256,800
Subtotal				$2,225,600
Contingency (25% of Subtotal)				$556,400
TOTAL CONSTRUCTION COST				$2,782,000
PRESENT WORTH O&M COST				$7,039,522
TOTAL PRESENT WORTH COST				$9,821,522

TABLE 11-2
SOIL SELECTED REMEDY COST ESTIMATE

ITEM DESCRIPTION	UNITS	QUANTITY	UNIT PRICE DOLLARS	TOTAL COST DOLLARS
SOIL:				
MOBILIZATION				
Transport Equipment & Staff	each	1	$30,000	$30,000
Temporary Facilities	each	1	$30,000	$30,000
EXCAVATION				
Site Preparation	acre	8	$3,000	$24,000
Demolition of MSR Facility and Flea Market	sy	3,587	$11	$39,457
Offsite Disposal of Demolition Debris to a RCRA HazWaste Facility	cy	4,519	$269	$1,215,611
Soil & Sediment Excavation/Dredging	cy	185,106	$20	$3,702,125
Backfill Uncontaminated Soil	cy	62,083	$10	$620,825
Dust Control & Place in MSR Facility for Treatment	cy	123,024	$10	$1,230,238
Backfill with Clean Fill	cy	9,000	$20	$180,000
Backfill with Treated Soil	cy	123,024	$10	$1,230,238
Grading & Compacting	acre	11.0	$7,000	$77,000
Seed & Mulch	acre	11.0	$2,000	$22,000
ONSITE TREATMENT				
Treatability Study	lump sum	1	$50,000	$50,000
Solidification/Stabilization	cy	123,024	$80	$9,841,900
EQUIPMENT & MATERIALS				
Health & Safety Equipment	each	1	$30,000	$30,000
AIR QUALITY MONITORING	week	156	$1,000	$156,000
Subtotal – Capital Cost				$18,479,393
Contractor Fee (10% of Capital Cost)				$1,847,939
Legal Fees, Licenses & Permits (5% of Capital Cost)				$923,970
Engineering & Administrative (15% of Capital Cost)				$2,771,909
Subtotal				$24,023,211
Contingency (25% of Subtotal)				$6,005,803
TOTAL CONSTRUCTION COST				$30,029,014
PRESENT WORTH O&M COST				$619,508
TOTAL PRESENT WORTH COST				$30,648,522

XII. AMENDMENT TO OPERABLE UNIT ONE RECORD OF DECISION

On August 27,1990, the ERA Region IV Administrator signed a Record of Decision (ROD) for Operable Unit (OU) One. OU #1 consists of the contaminated soils on the MSR facility only. This Amendment is being provided in accordance with CERCLA § 117(c) and the National Contingency Plan (NCR) 40 CFR § 300.435(c) (2)(ii). The amendment will become part of the administrative record file (NCR 40 CFR § 300.825(a)(2)) for OU One and OU Two, which is located at the Site repository. The repository is located at the Charles A. Cannon Memorial Library, 27 Union Street, Concord, North Carolina.

A. Rationale for Issuing the ROD Amendment

The remedy chosen for OU #1 consisted of excavation and consolidation of contaminated soil, covering the soil with 6 inches of clean fill, HDPE liner, 18 inches of drainage layer, and 6 inches of clean topsoil, and revegetation. This remedy was only considered an interim action to prevent human and environmental exposure to the contaminants, and to minimize the generation of contaminated leachate entering the groundwater. As stated in the August 1990 ROD, the remedy would not prohibit future remedial actions at the Site, but would provide a level of protection until such time that a treatment and/or disposal remedy could be implemented.

This ROD for OU #2 includes a permanent treatment remedy for the OU #1 soils at the MSR facility as well as the soils on the ten other identified source areas. Combining the soils for OU #1 and OU #2 for treatment is cost-effective and efficient.

The fundamental differences to the ROD for OU #1 are presented below.

Original Remedy	Modified Remedy
Capping of approximately 57,000 cy of contaminated soil. contamination	Solidification/Stabilization of approximately 20,800 cy soil.
Remediation level of 500 ppm for lead only.	Remediation levels for various metals. See Table 8-2.

B. Description of New Alternatives

The original selected remedy, onsite capping, and the amended remedy, S/S, along with other alternatives evaluated in the FS are described in Section 9 of this ROD.

C. Evaluation of Alternatives

The original selected remedy, onsite capping and the amended remedy S/S, along with other alternatives evaluated in the FS are profiled against the nine criteria in Section 10 of this ROD.

D. Statutory Determinations

Considering the new information that has been developed and the changes that have been made to the selected remedy for OU #1, the ERA and NCDEHNR believe that the remedy remains protective of human health and the environment, complies with federal and state requirements, and is cost effective. In addition, the amended remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for this Site.

XIII. STATUTORY DETERMINATIONS

Based upon available information, the selected remedy satisfies the remedy selection requirements under CERCLA, as amended by SARA, and the NCR. The remedy provides protection of public health and the environment, is cost-effective, utilizes permanent solutions to the maximum extent practicable, and satisfies the statutory preference for remedies involving treatment technologies.

Protection of Human Health and the Environment

The selected remedy will permanently treat the groundwater and soil and remove the potential risk associated with the contamination. Dermal, ingestion, and inhalation contact with Site contaminants would be eliminated.

Compliance with ARARs

The selected remedy will comply with all Federal and State ARARs. No waivers of State or Federal requirements are anticipated for this Site.

Cost Effectiveness

The selected groundwater and soil remediation technologies are more cost-effective than the other acceptable alternatives considered. The selected remedies provide greater benefit for the cost because they permanently treat the waste.

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

The selected remedy represents the maximum extent to which permanent solutions and treatment can be practicably utilized for this action. Of the alternatives that are protective of human health and the environment and comply with ARARs, EPA and the State have determined that the selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through treatment; short-term effectiveness, implementability, and cost; State and community acceptance, and the statutory preference for treatment as a principal element.

Preference for Treatment as a Principle Element

The preference for treatment is satisfied by the use of S/S on the soils and a series of treatment methodologies on the groundwater. The principal threats at the Site will be mitigated by use of these treatment technologies.

XIV. DOCUMENTATION OF SIGNIFICANT CHANGE

CERCLA Section 117(b) requires an explanation of any significant change from the preferred alternative presented in the Proposed Plan. In the Proposed Plan, Alternative 8 was chosen for soil remediation. This alternative consists of excavation and onsite treatment by solidification/ stabilization, with offsite disposal of the treated material at an industrial landfill.

However, comments received during the 60-day public comment period, December 17,1992 to February 18,1993, overwhelming favored Alternative 7. This alternative is the same as Alternative 8, however, the treated material would be disposed of onsite instead of taken offsite.

This remedy. Alternative 7, is approximately $13 million less than Alternative 8. However, the basis for choosing Alternative 8 were: 1) EPA had received complaints from residents surrounding the MSR facility that the mound of soil currently onsite was unsightly (Onsite disposal would create a mound ten times as big as currently onsite); and 2) With offsite disposal, deed and land-use restrictions would not be needed. The properties could be used more extensively or developed without environmental restriction.

Residents and area citizens however, preferred onsite disposal instead of trucking approximately 7800 loads of treated material to an area landfill. Therefore, this remedy is in accord with the concern expressed during the comment period by the affected community.

APPENDIX A

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

BYPASS 601 GROUNDWATER CONTAMINATION SITE CONCORD, NORTH CAROLINA

This Responsiveness Summary for the Bypass 601 Groundwater Contamination Site (hereinafter referred to as the "Bypass 601 Site" or the "site") is divided into the following sections:

SECTION I **OVERVIEW**

The overview summarizes the public's reaction to the remedial alternatives listed in the Proposed Remedial Action Plan (Proposed Plan). The Proposed Plan outlines the various methods of remediation at the Bypass 601 Site and discusses EPA's preferred alternative.

SECTION II **BACKGROUND ON COMMUNITY INVOLVEMENT**

The background section summarizes the major community concerns identified in the Community Relations Plan and public comment period on the Remedial Investigation/Feasibility Study (RI/FS) and Proposed Plan.

SECTION III **SUMMARY OF COMMENTS AND QUESTIONS RECEIVED DURING THE PUBLIC MEETING AND EPA'S RESPONSES**

This section summarizes and responds to major issues and concerns raised by individual citizens, citizen groups, local officials, and Potentially Responsible Parties (PRPs) during the public meeting. The comments/questions and EPA's responses are categorized by topic.

SECTION IV **SUMMARY OF COMMENTS AND QUESTIONS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA'S RESPONSES**

This section responds to all significant comments and concerns received in writing by EPA during the public comment period. The comments/questions and EPA's responses are categorized by topic.

I. OVERVIEW

The Proposed Plan for the Bypass 601 Site was issued in December 1992. EPA's public comment period for the site was originally scheduled to run from December 17, 1992 through January 19, 1993. This comment period was extended an additional 30 days in response to a request. EPA conducted a public meeting on January 7, 1993 to present the Proposed Plan to the public. At this meeting, the public was given an opportunity to ask questions and to comment on the remedial alternatives outlined in the Proposed Plan and EPA's preferred alternative. The comments and EPA's responses are summarized in Section III of this document. In general, the public supported EPA's preferred alternative to pump and treat all contaminated groundwater at the site. However, the public preferred the alternative to treat contaminated soil onsite with subsequent onsite disposal, rather than EPA's preferred alternative of onsite soil treatment and offsite disposal at an industrial landfill.

These sections follow:

- Background on Community Involvement
- Summary of Comments Received During the Public Meeting and EPA's Responses
- Summary of Comments Received During the Public Comment Period and EPA's Responses

II. BACKGROUND ON COMMUNITY INVOLVEMENT

The Bypass 601 Site is located on the western edge of Concord, North Carolina, which is roughly 21 miles northeast of Charlotte, North Carolina. The immediate area surrounding the site is fairly heavily developed with light industry, retail establishments, and residences.

Contamination problems at the Martin Scrap Recycling (MSR) facility came to the attention of the State of North Carolina in the early 1970s. During a routine inspection, heavy metals were detected in surface water onsite and the water was found to be highly acidic. In 1981, lead-related health problems became apparent among employees of the MSR facility. According to records, MSR employees who were exposed to lead in their workplace were taking lead home on their clothing, thus contaminating their homes and families. Heavy media coverage, beginning in March 1982, cited many health problems claimed to be a result of lead poisoning in children of MSR employees. In August and September 1981, inspections of the MSR facility were carried out by the State of North Carolina Division of Environmental Management (DEM) and the Division of Health Services (DHS).

EPA's involvement with the Bypass 601 Site began in June 1986 with the site's inclusion on the National Priorities List (NPL). Since that time, EPA has implemented a community relations program in the site area designed to inform the public of site activities and solicit input from the community regarding its site-related concerns and questions. These efforts have included disseminating printed public information materials and conducting public meetings and information sessions to coincide with technical milestones at the site.

EPA conducted community interviews with residents in October 1987 to identify community issues and concerns regarding the site. Up to that point, there had been no organized community involvement with the Bypass 601 Site. General, area-wide knowledge of and interest in the site had peaked in the 1970s with the discovery and media coverage of lead poisoning incidences among children of MSR employees. Interviews conducted with residents in the immediate vicinity of the site revealed that only those who perceived their health or property to be directly affected by the "old battery place" when it was operational were aware of potential groundwater problems. Others, who lived close to the site, but did not perceive themselves to be directly affected by the facility, assumed the lead poisoning incidences to be the extent of the problem posed by MSR. In general, with the exception of a few residents adjacent to the Bypass 601 Site, community interest in the site virtually dissipated when the MSR facility closed in 1986 and the interviews conducted in 1987 revealed that most area residents were not aware of continuing problems related to the site or of EPA's involvement and plans for cleanup.

Key issues raised by area residents during the 1987 interviews were:

- Prevalence of battery casings on the ground outside the boundary of the MSR facility
- Air quality as a result of past operations at the facility
- Dead vegetation due to contamination from the site
- Surface water quality in the Unnamed Stream and Irish Buffalo Creek
- Health issues as a result of lead poisoning
- Future use of site property after remediation and restoration

A public meeting was held in May 1990 to present the Proposed Plan and discuss soil remediation for Operable Unit (OU) 1, the MSR facility. A Record of Decision (ROD) was signed in August 1990 selecting excavation and capping of the soils at the MSR facility as an interim remedial action. A public meeting was held in October 1991 to discuss the investigation of other potential sources of contamination (OU 2) and groundwater contamination (OU 3) at the site. Based on the attendance at public meetings and the overall feedback EPA has received from the public, the level of community interest in the Bypass 601 Site is characterized as moderate. In general, residents have responded favorably to site remediation.

III. SUMMARY OF COMMENTS AND QUESTIONS RECEIVED DURING THE PUBLIC MEETING AND EPA'S RESPONSES

This section contains a summary of verbal questions and comments received from the community during the January 7, 1993 public meeting. Comments presented in this section are organized into the following categories:

A. Remedial Investigation
B. Risk Assessment
C. Remedial Alternatives Selection and Implementation
D. Cleanup Funding and Schedule
E. PRP and Financial Responsibilities
F. Other Concerns

A. Remedial Investigation

Comment: A concerned citizen asked if the soil on the other side of the stream from the MSR facility (Unnamed Stream) is contaminated.

EPA Response: The remedial investigation found that lead and organics are present in the soil over much of this area (identified as source area 8) at levels warranting remediation.

Comment: A concerned citizen asked how deep were the wells installed during the remedial investigation, on an average. More specifically, the resident inquired as to whether any of the wells were deep enough into bedrock to sample the drinking water aquifer, and if not, was the contamination only limited to the aquifer above this drinking water supply.

EPA Response: The wells installed varied in depth, depending on the topography at the locations. An objective of well installation was to sample groundwater at the water table interface and twenty feet into bedrock. The average depth of the shallow wells was thirty feet and the deep wells averaged sixty feet in depth. Contamination was found in the zone where water may be extracted for drinking water purposes.

Comment: The pastor of the Concord Wesleyan Church inquired about the condition of the church's well, which was sampled during the remedial investigation, and if anyone should be drinking from it. The church is next to the area designated as source area 10.

EPA Response: The results from all of the private wells sampled during the remedial investigation, including the church's well, were within EPA's guidelines for drinking water. Therefore, it should be safe to consume water from these wells.

Comment: A concerned citizen commented that there had been a fire on the MSR property about three years ago and a large amount of water was pumped out over the battery casings in order to put the fire out. The resident asked when the wells were installed and inquired as to the validity of the sample data as a result of this incident.

EPA Response: The remedial investigation occurred in 1991, so the data presented is what exists after the fire. The amount of water used to put out the fire does not have any affect on the degree of contamination found.

B. Risk Assessment

Comment: A concerned citizen asked why the fish sampled during the ecological investigation were not analyzed for organics, which are more readily assimilated by the fish and turtle populations.

The resident also inquired as to what type of fish were collected for sample analysis.

EPA Response: When the remedial investigation was initiated, organics had not been identified as contaminants of concern in surface water. Lead was the primary contaminant of interest. Therefore, the fish collected during the investigation were only analyzed for lead. The results of the remedial investigation indicated that lead and sulfate are the only concerns in surface water and sediment.

Specific fish were not collected. A mass capture was performed and the fish tissue was analyzed collectively.

Comment: A concerned citizen asked if there were any reported incidences of individuals living around the site becoming ill.

EPA Response: EPA has not received any reports of illness due to site contamination.

Comment: A concerned citizen inquired as to the affects of lead on a child's brain.

EPA Response: Exposure to lead is particularly dangerous for unborn children, because of their great sensitivity during development. Exposure to lead is also dangerous for young children, because they swallow more lead through normal mouthing activity, take more of the lead that they swallow into their bodies, and are more sensitive to its effects. Lead exposure may decrease intelligence quotient (IQ) scores and reduce the growth of young children. At high levels of exposure, lead can severely damage the brain and kidneys in children.

Comment: A concerned citizen asked if a risk analysis has been performed on the treated soil that will be transported offsite.

EPA Response: Once the soil is solidified, it will be considered nonhazardous and does not warrant a risk analysis. A TCLP test will be performed to assure that the material is not hazardous and does not pose a risk.

C. Remedial Alternatives Selection and Implementation

Comment: A concerned citizen asked if private drinking wells would be drained during the remediation of contaminated groundwater.

EPA Response: In order to remediate contaminated groundwater, extraction wells will be installed at designated locations, determined during the design phase. The volume of water extracted will not affect the private wells such that all water would be drained from them.

Comment: A concerned citizen asked if there is a possibility that the drinking water supply will be contaminated during remediation of contaminated groundwater.

EPA Response: All contamination, excluding sulfate, was found in the upper thirty feet (the water table aquifer). At this time, it is not expected that the contamination is going to move any further down into the bedrock (drinking water supply).

Comment: A concerned citizen asked for a conversion between the amount of dirt that has to be moved and truckloads.

EPA Response: 100,000 cubic yards (cy) has to be moved. A truck can carry about 20 cy. Therefore, about 5,000 truckloads of soil could be moved.

Comment: The same resident asked if the trucks will carry 20 yards of soil after it has been solidified. This would be a tremendous amount of weight.

EPA Response: Each truck should be capable of carrying 20 cy of material, whether it is solidified or not.

Comment: A concerned citizen asked why thermal desorption is used in Alternatives 4 and 5 as a pretreatment for PAH and VOC contamination (with solidification/ stabilization (S/S) for metals contamination) and why, in Alternatives 7 and 8, S/S is the only treatment technique used for all types of contaminated soil. Is it thought that S/S will effectively tie up organics contamination.

EPA Response: Different alternatives were evaluated during the feasibility study. In order for the soil alternative chosen (S/S only) to work, treatability studies will have to be performed to determine which aggregate will tie up both metals and organics. If the results of these studies show that S/S will not effectively work for PAH and VOC contaminated soil, then some other method of treatment will have to be added to deal with this contamination. In addition, there is only a small amount of soil contaminated with organics only and not metals. This is the only material that would have been treated by thermal desorption.

Comment: The same resident asked if the treated soil would be checked before it is disposed of to ensure that nothing is leaching off.

EPA Response: Once the soil is solidified, it has to pass a TCLP (Toxicity Characteristic Leachate Procedure) test before it can be disposed. This test determines if any contaminant will leach from the treated material.

Comment: A concerned citizen asked if the soil transported offsite would be considered a hazardous material.

EPA Response: If the soil is not treated, it would be considered hazardous. Since the contaminated soil at the Bypass 601 Site will be treated by S/S, it will be rendered nonhazardous after passing a TCLP test.

Comment: A concerned citizen asked if the treated material could be buried onsite to cut down on the height of the mound which would be created.

EPA Response: The contaminated soil that is removed would be backfilled with the treated material. However, there is could be as much as 200,000 cy of solidified material to dispose of, which would be a large amount of solid material to bury.

Comment: A concerned citizen asked if the solidified material would be in big or little chunks and to describe a monolithic block. Also, would there be a potential of fugitive dust generated during the treatment process and the transportation of the solidified material offsite.

EPA Response: The size of the chunks and the size and height of the monolithic block will be decided upon during the design phase, at which time the appropriate method of transportation will also be decided. Every effort will be made to minimize fugitive dust during implementation of this treatment technique, as well as during transportation of the treated material offsite. The trucks will be covered to prevent dust and spillage off the truck.

Comment: A concerned citizen asked if onsite disposal of the treated soil would be accomplished in the same way as landfills are designed (i.e., would a liner be used).

EPA Response: There would be no need for a liner in disposing of the treated soil, since it would not be a hazardous material. It would have a cover on it and grass would be planted over it for aesthetic purposes.

Comment: A concerned citizen asked how the contaminated groundwater is going to be extracted in order to be treated.

EPA Response: During the design phase, it will be decided upon as to where the best place would be to put in extraction wells. The water will be pumped out through these wells and sent to the treatment plant via piping. Installed wells will be targeted at the groundwater plume at whatever depth contamination exists at various locations.

Comment: A concerned citizen asked if, in order to be effective, would groundwater remediation take place after contaminated soil is removed.

EPA Response: Yes, in order to be fully effective, the soil would be excavated before groundwater is treated.

Comment: A concerned citizen asked how much BFI Landfill charges for disposal.

EPA Response: The estimate received from them during the feasibility study was, at the most, $35 per ton of material.

Comment: A concerned citizen asked what EPA's distinction is between onsite and offsite disposal and why was offsite disposal chosen.

EPA Response: With onsite disposal, there will be a mound over a designated 8 acres that would be 7 to 14 feet high. Offsite disposal was chosen because people around the site had expressed a dissatisfaction with the current mound onsite. In addition, with onsite disposal, these properties could not be used for anything. With offsite disposal, there is no need for institutional controls because there would not be any contamination left on the site. BFI Landfill was contacted for costing purposes to get an idea as to how much it would cost to send the treated material to an industrial landfill. At this time, it is not definite as to where the material will be taken.

Comment: A concerned citizen asked how high the cap would be if the excavation and capping alternative had been chosen.

EPA Response: Using just the MSR property and considering 100,000 cy of contaminated soil, the cap would be approximately 15 feet high above the current surface now.

Comment: A concerned citizen asked what other sites had been considered for offsite disposal.

EPA Response: EPA recommended an alternative for offsite disposal in a landfill permitted to accept the treated material. When the time comes to actually dispose of the soil, a bid will be put out to eligible landfills and the cheapest price will win the award.

D. Cleanup Funding and Schedule

Comment: A concerned citizen asked if it would be more cost-effective to solidify the contaminated soil and leave it where it is, rather than transport it offsite.

EPA Response: Yes, it would be cheaper to leave the treated material onsite. One of the alternatives for remediation looked at leaving the treated material onsite. The only drawback is that there would be 3 properties that would have a mound of dirt on them ranging anywhere between 7 and 14 feet high. Therefore, for aesthetic reasons, offsite disposal was chosen.

Comment: A concerned citizen commented that since the federal government ends up paying for most of the remediation, why not let the Army Corps of Engineers come in and clean up the site, thus cutting the cost by half. If it is under federal contract and the Corps comes in, then that cost would not exist, since they get paid a wage just like everyone else. In addition, it is citizen tax dollars that are paying for the cleanup in the end.

EPA Response: After the ROD is completed, EPA enters a moratorium period where they invite the PRPs to come in and negotiate with EPA to see if the they want to do the work under EPA oversight. There is an allotted amount of time in which the PRPs can come forward with a good-faith offer and if a consent decree can be negotiated that is suitable to both parties, then the PRPs will do the work or contract it out. If an agreement or consent decree is not reached, the next two options are that EPA can order the PRPs to do the work with an administrative order, or it can by done by EPA. The Corps of Engineers has acted as an EPA contractor in doing such work at various sites. However, the cost projections for cleanup are the same, no matter who does it. At this point in time, EPA fully expects the PRPs to pay for the cleanup.

Comment: Is the projected cost for the starting time of remediation (2 years from now) or today's prices.

EPA Response: Capital costs, which are up-front costs, are at today's prices. The rest is projected out over the amount of time it would take to do complete the alternative.

Comment: A concerned citizen asked what the time frame is at this point.

EPA Response: The comment period will end on February 18, 1993. Then EPA will write the ROD shortly thereafter. Within the next several months, EPA will be sending out special notice letters to the PRPs and a moratorium period will begin. Within 1-1/2 to 2 years, something will happen as far as remediation. Within this time frame, someone will be tasked to do a design and cleanup will begin.

E. PRP and Financial Responsibilities

Comment: A concerned citizen asked how EPA is going about identifying PRPs and what further efforts does EPA have in mind to complete the PRP list.

EPA Response: EPA has conducted an extensive investigation through the business of Oliver Martin and his son at the MSR facility. Receipts have been located which detail deliveries of batteries and lead to the facility. Those receipts have been followed up on with a round of general notice letters, which were sent to the PRPs. As a result of this general notice letter, which also included an information request, EPA was able to investigate more into what types of wastes were brought to the facility. Through this process, EPA will determine a list of those parties which are responsible for the cleanup. At that point, special notice letters will be issued, which alert the parties that they are a responsible party and that EPA wants to negotiate how the cleanup would be accomplished.

Comment: A concerned citizen asked what EPA's confidence level was in terms of the completeness of the current PRP list.

EPA Response: At this time, EPA has determined that approximately 1500 PRPs exist for the Bypass 601 Site. Approximately 250 have been located and the process of locating the remaining 1250 is still ongoing. Special notice letters will be sent to the remaining PRPs when and if they are located.

Comment: A concerned citizen asked EPA how complete the records of the MSR facility are and how far back they go.

EPA Response: EPA has records spanning the existence of the facility. There are business receipts from 1980 to 1986.

Comment: A concerned citizen asked if the county gave Mr. Martin a permit to open up the battery recycling facility, then why are the people who disposed of their batteries there being charged now.

EPA Response: Under the Superfund statute, there are three types of parties which are liable for cleanup costs. There are owners and operators of facilities. There are generators, or those who generate the waste that is sent to the facilities. And finally, there are those who transport the waste to the facilities, or those who choose which facilities they are going to bring the waste to. Under the scenario for this site, those who sent batteries to the site would be the generators of the waste and under the statute, as written, the liability falls upon them. The statute works retroactively (applies to the past).

Comment: A concerned citizen asked that once the ROD has been signed, if there would ever be a chance of it being changed once PRP negotiations had commenced.

EPA Response: The ROD does not change based on the location of PRPs and negotiations with them. The only way the ROD can change would be if there were some unforeseen circumstances which changed EPA's opinion of what should be done at the site. It is not affected by the negotiations with the PRPs. A remedy is decided upon by EPA, and the PRPs are given the opportunity to perform the work.

Comment: A concerned citizen asked if EPA had compiled an inventory of the total volume of batteries thought to have been sent to the MSR facility, based on the records collected from the facility, and when this inventory list might be available.

EPA Response: EPA is in the process of compiling a list now. The information requests are helping to form an inventory. However, since EPA is continuing to receive responses, it is unknown when a completed list might be available.

F. Other Concerns

Comment: A concerned citizen asked when the stockpile at the MSR facility is going to be moved.

EPA Response: The stockpile will be removed when all the contaminated soil is remediated, which will take place approximately 1-1/2 to 2 years from now.

Comment: A concerned citizen, living in the area designated as source area 3, asked if the creek bed would be straightened out after contaminated soil is removed, so that it will not be a swampland down there anymore. If it is straightened out, it will lower the amount of contamination running through that area.

EPA Response: The area requiring soil removal will be backfilled and restored to the level it is now. The course that the creek follows will not be altered or changed. The water in those streams is coming from the groundwater, which is contaminated. Groundwater flows to and enters the streams. As a result, sediment, surface water, and soil is contaminated. Contaminated groundwater will continue to enter those streams even if it is straightened out.

Comment: A concerned citizen asked if the land used for onsite disposal of the treated soil would be unusable.

EPA Response: If offsite disposal is implemented, the land would be usable at some point after remediation. With onsite disposal, there would be deed restrictions as far as what could be done on top of that material. There would be limitations as far as the weight that could be put on it.

Comment: A concerned citizen asked if EPA had talked to the man that owns the landfill next to the MSR facility and could the material go there instead of another landfill.

In addition, how can someone be blamed for what they threw out twenty years ago.

EPA Response: The landfill is permitted to receive demolition debris only. The untreated soil could not be disposed of there. Most Superfund sites are there because twenty years ago people disposed of things in the acceptable way of that time. In most industries you were working around, if you had a waste product, you dug a hole and put the waste in there. As time went on, EPA learned that digging a hole and dropping the waste in it was a problem that was causing great contamination. No one is to blame directly, but Congress said it needed to be cleaned up. People were being hurt by this and when they looked around for someone to pay for it, they came up with a funding scheme of responsible parties, basically landowners and generators, and that was the genesis of the letters that went out.

Comment: A concerned citizen asked why the stockpile of contaminated soil, excavated during the emergency removal, was placed at the MSR facility.

EPA Response: The emergency removal action was done because there was an immediate threat to the people who lived in areas where there were battery chips. It was EPA's job to do something about the threat, not just leave it there. The soil was stockpiled at the MSR facility to be dealt with during the remediation of all contaminated soil because access to the MSR facility is limited by a locked fence.

IV. SUMMARY OF COMMENTS AND QUESTIONS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA'S RESPONSES

This section contains a summary of written comments received during the 60-day public comment period. Comments presented in this section are organized into the following categories:

A. Comments from the MSR PRP Steering Committee
B. Comments from ERM, Inc. on behalf of the PRP Steering Committee
C. Comments from other interested parties

A. Comments from the MSR PRP Steering Committee

Comment: The use of an offsite remedy is inconsistent with EPA remedies which have been selected at other lead-contaminated sites. In almost every other site remediation involving lead-contaminated soils, EPA has selected the most cost-effective, onsite disposal remedy.

EPA Response: Each Superfund site consists of individual site conditions that play a key role in determining the alternative chosen for remediation. Just because other sites have used onsite disposal as part of the alternative does not mean it is appropriate to use at the Bypass 601 Site.

Comment: Public comments and North Carolina state policy support the selection of an onsite remedy. Community and state acceptance are two of the nine formal criteria used by EPA in selecting a cleanup remedy under CERCLA and it is particularly important to give proper deference to these factors in determining the appropriate cleanup at the Bypass 601 Site.

EPA Response: EPA agrees. The Agency is choosing an alternative that includes onsite treatment and disposal.

Comment: EPA's proposed application of soil cleanup standards is erroneous and inconsistent with the use of cleanup standards at other sites. EPA should use a soil remediation standard for lead of 1,000 ppm or higher for all or at least significant portions of the Bypass 601 Site.

In addition, EPA has improperly used drinking water performance standards in establishing proposed cleanup levels at the site. EPA is proposing that "the fixed material must be subjected to TCLP to determine if treatment is effective. TCLP results must not exceed North Carolina Drinking Water Standards (15A NCAC 02L)."

EPA Response: The soil remediation standard for lead can range from 500 to 1,000 ppm. Since much of the affected areas are considered residential at this site, the standard of 500 ppm was chosen as the remediation level. Each site has different conditions which require various standards to be applied. Superfund sites using 1,000 ppm as a cleanup standard may have been in a more industrial area than this site.

EPA agrees. The TCLP results must meet those standards that are listed in the Toxicity Characteristic (TC) rule (55 FR 11798, March 29, 1990), not the NC Drinking Water Standards.

Comment: EPA's sampling procedures have likely overstated the threat to groundwater at the site. Findings are based only on unfiltered sampling data and thus do not accurately reflect groundwater quality conditions. Instead, dissolved metals data should determine whether a groundwater problem actually exists at the site.

EPA Response: Monitoring wells are installed to collect representative samples of the groundwater. The wells must be well constructed, properly maintained, properly purged, and properly sampled to obtain a nonturbid sample. The argument has been made that filtering of samples is needed to remove any suspended material that may be present in the sample. The argument has also been made that filtering samples avoids false indications of a contaminant problem. However, EPA Region IV Standard Operating Procedures (SOP) requires nonfiltered samples. The rationale for this decision is that filtering removes material which may be mobile in the aquifer and thus, the resultant sample is not representative of the aquifer. When filtration of a sample occurs, the potential exists for the removal of colloidal particles onto which contaminants have bound. In a representative groundwater sample, the colloidal particles (which are mobilizing contamination) are part of the dissolved phase and a well installed in such an aquifer will produce water at the tap that will contain these colloidal particles (with contaminants).

Filtration of samples may also produce false negatives. A false negative may be induced because the clay particles will line the filter, possibly producing an ionic barrier in which the inorganic constituents will adhere. In other instances, filtration of samples may introduce airborne contaminants to the sample along with the filter itself introducing a non-naturally occurring contaminant. The bottom line is that EPA Region IV does not believe that filtration of groundwater samples provides a representative sample of site groundwater chemistry. With proper well construction, well development, purging and sampling techniques, a nonturbid sample can be collected.

Comment: The current administrative record for the Bypass 601 Site lacks key decision making documents as well as critical data relating to site conditions and is therefore incomplete.

EPA Response: All documents pertaining to the investigations at the site and evaluation of alternatives are part of the administrative record. EPA acknowledges that additional data are required to complete the design and implementation of the alternatives chosen. This need for additional data to design treatment systems is common to many Superfund sites where a ROD has been signed. The lack of data needed to complete the design is irrelevant to EPA's selection of the remedial alternatives. EPA chose the alternatives because they will best satisfy the requirements of CERCLA/SARA and the NCP as compared to the other alternatives which were presented in the FS report.

Comment: EPA failed to provide enough time for the submission of public comments on the Proposed Plan and, as a result, due process was somehow violated. Specifically, the MSR PRP Steering Committee requested to have the public comment period extended.

EPA Response: EPA complied with all relevant public comment provisions in the National Contingency Plan (NCP) when it published the Proposed Plan on December 17, 1992. Concurrent with this publication, EPA also started a thirty (30) day public comment period and held a public meeting to discuss the Proposed Plan on January 7, 1993. The original comment period, which was scheduled to end on January 19, 1993, was extended on one occasion to allow an additional thirty (30) days to comment. With the extension, the comment period ended on February 18, 1993. As a result, adequate time was provided for the submission of comments on the Proposed Plan.

Comment: EPA failed to grant the Committee authorization to gain access to perform sampling at the site and, as a result, due process was somehow violated.

EPA Response: EPA has attempted, in good faith, to instruct the Committee on the correct procedures which must be followed in order to insure that sampling data beneficial to both parties is obtained. It is EPA's policy to require a sampling-specific Project Operations Plan as a prerequisite to any site sampling in order to maintain both safety and quality. Additionally, under the NCP, EPA cannot designate the Committee as its representative for purposes of site access because the Committee has not agreed to conduct response activities pursuant to an administrative order or consent decree. See 40 C.F.R. § 300.400(d)(3). Because the Committee has failed to adequately comply with any of the procedural requirements, EPA has been unable to grant its request to perform sampling at the site.

Comment: The Committee did not have an appropriate opportunity to comment on actions taken at the site before the Committee received notice of its potential liability.

EPA Response: EPA made a reasonable effort to identify and notify PRPs as early as possible in the remedial process. EPA was provided information linking members of the Committee and other contributors to the site subsequent to the signing of a ROD for OU 1 at the site, as well as subsequent to a removal performed at the site. All PRPs known to EPA were given notice and the opportunity to finance or conduct these response activities. Additionally, the public and the PRPs were notified of these activities through local publication, and were also given the opportunity to participate through public comment periods regarding response activities at the site.

Comment: The site should be redefined because PRP group members are not potentially liable for contamination at all of the outlying source areas. According to recently-obtained information, both Oliver and William Martin were not involved with several of the outlying source areas at the site. Thus, the current definition of the site is overly inclusive and should be redefined to reflect the true extent of involvement at the site by the Martins.

EPA Response: The definition of the site was not determined based on PRP liability, but was based on proximity of the source areas, similar contaminants, and similar debris. PRP liability is addressed as a part of the enforcement process.

B. Comments from ERM, Inc. on behalf of the PRP Steering Committee

Comments and questions on the RI/FS have been assembled by order of the sections in the RI/FS.

EXECUTIVE SUMMARY

Comment: (Page ES-9) The use of the Contract Required Detection Limit (CRQL) as the remediation level for carbon tetrachloride in soils is questionable. This is a level likely to change with time as analytical procedures improve. Also, the reliability of such a measure is questionable.

EPA Response: In the case of carbon tetrachloride, the risk-based number was lower than the CRQL. Therefore, EPA selected the CRQL as the remediation level. The CRQL is the lowest detection attainable by a given laboratory for any given chemical. Once the remediation level is set in the ROD, the level will not become a "moving target" and change or lower when more sophisticated methodology is discovered. Therefore, the CRQL of 10 µg/kg for carbon tetrachloride will remain as the remediation level.

Comment: (Page ES-10) The use of the Treatment Technique Action Level (TTAL) as a remediation level for lead in groundwater is questionable. The treatment technique action level is not defined. However, assuming it is the minimum attainable treatment level, this value can also change with time, similar to analytical detection levels.

EPA Response: The TTAL is the only cleanup level available for lead at this time and is defined in 40 CFR Part 141. The cleanup level will not change for this site. See the response above.

Comment: (Page ES-17) The characterization of the capping remedy fails to evaluate the primary objective of a capping technology, which is to protect the subsurface material from environmental exposure. This failure inaccurately prejudges the selection of a capping remedy. Remedial Alternative 3S states that capping would not reduce leaching of contaminants in the groundwater. It is ERM's assertion that a properly designed cap would substantially reduce leaching of contaminants to groundwater.

EPA Response: It is true that capping reduces leaching of contaminants into groundwater, since infiltration and migration of contaminants in the unsaturated zone is stopped. However, in some areas of the site, contamination exists below the water table. In other words, groundwater is running through battery casings. In this case, leaching would continue, even if the area was capped. In addition, capping is not a permanent remedy.

1.0 INTRODUCTION

Comment: The comments on Section 1.0 focus primarily on the findings of the investigations conducted prior to the work done by CDM at the site and characterization data gaps or inconsistencies associated with the investigations. The area of battery casing debris at the various source areas is not defined. Lead and chromium in background soils were not considered. There are no boring logs in the public record for all samples collected. There is no information on the construction of the temporary wells or the method of sampling these wells. The surface water analyses should have included dissolved as well as total metals concentrations.

EPA Response: The RI conducted in 1990 was the subject of a previous public comment period.

2.0 SITE FEATURES INVESTIGATION

Comment: (Page 2-1) The "other probable areas of contamination at the site are not defined in the RI/FS. All suspected areas should have been investigated during the RI so that a unified remedy for the site could be developed.

EPA Response: All known or suspected areas of contamination were investigated during the RI. However, as stated in the RI Report, because of the nature of the past disposal practices, it is probable that other, as yet undiscovered, source areas of contamination exist at the site. If other potential areas are identified, they will be investigated appropriately.

Comment: (Page 2-2) The EPA emergency response action was conducted on sites remote from the MSR site, and resulted in the stockpiling of soils at the MSR property. The presence of the stockpile in an area of the site where EPA proposes to conduct future remediation activities will require movement of the stockpile, which represents double handling of this material.

EPA Response: The soils removed during EPA's emergency response action were stockpiled in the area where the treatment system was anticipated to be set up so that minimal future transport would be required during this action.

Comment: (Page 2-14) The "dip direction of the underlying rock units" is not defined in the report. The RI/FS does not include a description of the lithologic feature for which the dip is measured. Therefore, the data on the geologic feature (foliation) is not completely explained. This type of measurement may be particularly important in the engineering design of the groundwater extraction system, because the foliation feature and the geologic dip can aid in understanding preferred groundwater flow pathways.

EPA Response: As stated in the RI Report, the underlying rock units dip to the northeast at approximately 0.044 feet per foot. The underlying rock is also described in the RI Report as a massive (but fractured) white to grayish green to gray granite with zones of white quartz veins. EPA believes this information, along with the other geologic and hydrogeologic information collected for the site and presented in the RI Report, was enough to perform the feasibility study and for remedy selection.

Comment: (Page 2-14) The characterization of the hydrogeologic setting is general and incomplete. Therefore, the selection of a remedy is prejudged due to lack of a thorough understanding of site-specific geological conditions which may influence the remedy selection process. Although geologic data were collected at 84 boreholes at 62 locations, the geologic cross sections are very schematic depicting essentially only fill zones, one unit for the entire soil/saprolite zone (except at streams, where sediment deposits are depicted), and the bedrock zone. The geologic descriptions in the text indicate that the nature of the soil/saprolite zone is variable and can consist of interlayered silty clays, clayey sands, and sands. However, no detailed descriptions of the thickness, extent or depth of occurrence of these various unconsolidated units are provided. A more detailed characterization of the occurrence of clayey units and sandy units within the soil/saprolite zone is needed to evaluate their effect on groundwater flow and contaminant migration (see page 2-22).

No discussion of the nature of the "transition zone" is provided. In the Piedmont, the transition zone is the weathered rock above competent bedrock which often has a relatively higher hydraulic conductivity and serves as a preferred migration route for groundwater. No evaluation of this zone is presented in the RI Report, and no monitoring wells were installed to allow discrete sampling of this critical zone.

EPA Response: EPA disagrees. The geologic and hydrogeologic characterization of the site was specific and complete enough to perform the feasibility study and select a remedy without prejudice. The geologic cross sections present those units which are discernable on a site-wide basis. Although the soil/saprolite is variable in nature and consists of interlayered silty clays, clayey sands, and sands, these features are not individually extensive or discernable enough to be classified as units. In addition, although these features may affect groundwater flow and contaminant migration on a very local scale, their effect is not significant on a site-wide scale, and thus more detailed characterization is not needed for the feasibility study and remedy selection.

Three rock cores were collected from the site to evaluate the transition zone. Two of these cores did not indicate a transition zone while one showed a 10-foot transition zone. Therefore, EPA does not believe the transition zone at this site (if any) is significant enough on a site-wide basis to present a preferred migration route for groundwater contaminants.

Comment: (Page 2-20) The statement that the granite is "generally massive" seems inconsistent with an average fracture frequency of 1 per 10 feet. The rock core evaluations do not adequately describe the correlation of fracture frequency with depth or with topographical location. The information provided on fracture frequency does not indicate the areal distribution of fracture frequency. This information can be used in extraction system design if the extraction of groundwater is intended to include groundwater within the bedrock.

EPA Response: The three rock cores collected from the site showed the granite to be a solid, massive section of rock between fractures. Given that the cores were collected from the upper 20 feet of rock and the average fracture is 1 per 10 feet, EPA feels that this description is consistent with the data collected. The rock core data evaluations give a minimum, maximum, and average fracture frequency for the three cores collected and this evaluation is considered by EPA to be adequate for the purposes of the feasibility study and remedy selection.

Comment: (Page 2-20) In the Piedmont aquifers, groundwater flow and contaminant migration are influenced by fractures in the bedrock and remnant fractures and other structures in the saprolite. Characterization of fracture patterns by lineament analysis is a basic element of hydrogeologic assessments in the Piedmont and is needed for proper design of groundwater monitoring and groundwater recovery networks. No regional or local lineament analyses were conducted to characterize fracture patterns at the site. The lack of this information as a means of determining local groundwater preferred flow paths may have incorrectly influenced the remedy selection process for the proposed groundwater extraction.

EPA Response: EPA acknowledges that groundwater flow and contaminant migration are influenced by fractures in the bedrock, and remnant fractures and other structures in the saprolite. However, EPA believes that for the depth of contamination observed at the site, fracturing is extensive enough that groundwater flow and contaminant transport follow the principles of an equivalent porous medium with minimal preferential flow paths, on a site-wide basis. The hydraulic, hydrogeologic, and contaminant distribution characteristics observed at the site support this conclusion. Therefore, EPA does not believe a lineament analysis is warranted for this site.

Comment: (Page 2-22) There is a wide range in the horizontal hydraulic conductivity values for the soil overburden and bedrock zones (Tables 2-2 and 2-3). There is no analysis of or explanation for the observed variability. The report offers no correlation of hydraulic conductivity and soil type, fracture frequency, topographic location, etc. to allow an evaluation of what is controlling hydraulic conductivity. These hydrogeologic properties are key parameters needed in the design of a groundwater extraction system.

EPA Response: EPA acknowledges that there is a wide range in the horizontal hydraulic conductivity values measured (through slug testing) for both the soil overburden and bedrock zones at this site. EPA, however, does not believe that an analysis or explanation of this variability is warranted since such variations are common at most sites due to local heterogeneities inherent in most aquifer systems. EPA, believes that a reasonable estimate of the average hydraulic conductivity of each hydrogeologic unit can be obtained by averaging the results of several slug tests, and that the average values obtained are sufficient for performing a feasibility study and remedy selection.

Comment: (Page 2-22) In the discussion of the laboratory tests for vertical hydraulic conductivity of the five soil samples tested is "... approximately 3,000 times less than the average horizontal hydraulic conductivity determined by in-situ tests, thus indicating unrealistic anisotropic conditions...". It is concluded that "... the laboratory test results for vertical hydraulic conductivity, while indicative of the property of the soil at the points where the samples were collected, are not believed to be representative of actual field conditions from a site-wide perspective..." This conclusion seems to dismiss the significance of the laboratory test results. As mentioned in previous comments, there is no detailed characterization of the variability of the overburden soil zone. The range' of vertical hydraulic conductivity test results points out the heterogeneous nature of the overburden soils and the significance of determining the effects of the different soil units within the overburden on contaminant migration and attenuation. The understanding of these hydrogeologic properties is especially important to be included in alternatives evaluation prior to selection of a remedy for the site. Otherwise a proposed remedy may include improper, incorrect or ineffective features or technologies.

EPA Response: The significance of the lab test results was not dismissed. They indicate that on a very local scale, soil properties may vary by several orders of magnitude. EPA acknowledges and understands that the aquifer system is heterogeneous and that these heterogeneities may affect contaminant migration on a local scale. However, it is infeasible and impracticable to evaluate each individual heterogeneity in an aquifer system to select a remedy. EPA believes that evaluation of the aquifer system at this site on a site-wide basis was sufficient enough for performing a feasibility study and selecting a remedy.

Comment: (Page 2-18) The range of the vertical hydraulic conductivities presented in Table 2-4 emphasizes the point made in the previous comment. The lowest vertical hydraulic conductivity shown on the table is 0.000016 feet/day for a silty clay sample collected at the 10-13 foot depth interval at the MW-19-DP borehole. The data is not interpreted to indicate whether the silty clay is laterally extensive. Also, there is no discussion of the impact of the silty clay unit on vertical contaminant migration. The clay units in the Piedmont overburden soils may not serve as confining units which separate aquifers, but their occurrence is still significant in terms of contaminant migration and attenuation. The understanding and proper use of complete hydrologic characterization information, especially hydraulic conductivities, is vital to the remedy selection process, particularly for in-place remedies.

EPA Response: The geologic logs obtained for this site were examined to determine if there was any correlation between the silty clay samples, as well as other types of soil. Few correlations were identified. It was thus concluded that the soil overburden at this site is predominantly a mixture of various soil types; however, none are laterally extensive enough to be considered a unit. As stated above, EPA acknowledges and understands that the aquifer is heterogeneous and that these heterogeneities may affect contaminant migration on a local scale. However, EPA believes the information obtained and the evaluations performed on the aquifer system were sufficient enough to perform the feasibility study and select a remedy for the site.

Comment: (Page 2-29) The potentiometric map is constructed using water level elevation data from both the shallow (overburden soil) monitor wells and the deep (bedrock) monitor wells. It is more useful to prepare separate water level elevation maps for the overburden soil zone and bedrock zone. The flow patterns and hydraulic gradients within each zone can differ.

EPA Response: EPA believes that the water level differences measured between the shallow and deep zones are insignificant, and thus one average water level contour map is sufficient for characterizing the flow patterns and gradients at the site.

Comment: (Page 2-19) No information is provided on the vertical hydraulic gradients at the numerous shallow/deep well pairs. Vertical hydraulic gradients allow evaluation of the local groundwater recharge and discharge areas, surface water/groundwater relationships, and potential for vertical migration of contaminants.

EPA Response: As stated above, EPA believes that the water level differences measured between the shallow and deep zones are insignificant. An evaluation of the groundwater recharge and discharge areas, surface water/groundwater relationships, and potential for vertical migration of contaminants was therefore performed through groundwater modeling of the site.

Comment: (Page 2-23) The report states that groundwater flow in bedrock aquifers "is controlled by the geometry, orientation, and interconnections within the bedrock fractures" yet no effort was made to characterize the fracture system at the site.

The statement that area-wide groundwater flow in the fractured bedrock zone will generally adhere to the principles of groundwater flow in porous media is unfounded and incorrect.

The report acknowledges that the hydraulic calculations used to estimate potential contaminant migration are simplistic. ERM believes that the simplistic approach is subject to overly conservative assumptions and is used because of the uncertainties in the hydrogeologic data. Therefore the proposed remedy is likely to be overly conservative.

EPA Response: EPA did characterize the fracture system at this site, and as stated above, EPA believes that on a site-wide basis, for the depth of contamination observed at the site, fracturing is extensive enough that groundwater flow and contaminant transport follow the principles of an equivalent porous medium. Groundwater flow in the bedrock zone on a local scale is controlled by the geometry, orientation, and interconnections within the bedrock fractures.

EPA disagrees. The hydraulic, hydrogeologic, and contaminant distribution characteristics observed at the site support the conclusion that on a site-wide basis, for the depth of contamination observed at the site, fracturing is extensive enough that groundwater flow and contaminant transport follow the principles of an equivalent porous medium.

The simplistic calculations presented in this section of the RI Report were made to determine the potential range of contaminant migration. These calculations were not used in the risk assessment nor the feasibility study to evaluate potential remedies. A much more sophisticated, three-dimensional, finite element groundwater flow and contaminant transport model was developed and used for this purpose. This model incorporated all the data collected from the site.

3.0 SOIL INVESTIGATION

Comment: There is some question as to how well the site laboratory data compare to the CLP data. Results presented in Appendix F seem to indicate that the results of CLP versus onsite lab results were not comparable; however, Section 3-3 Summary states "For the most part, the data from the onsite laboratory and the CLP laboratory compared well."

Further it is stated on page 3-4 "Because the data between the two laboratories compared well, the results from both labs were used in determining the extent of soil contamination as well as in the risk assessment.

EPA Response: Since one of the goals of the RI was to determine the extent of contamination, an onsite laboratory was utilized to screen for lead. Twenty percent of the samples collected were split and sent to a CLP laboratory. The onsite laboratory provided Data Quality Objective (DQO) Level 3 data while the CLP laboratory provided a higher level of quality (DQO Level 4). Level IV data undergoes data validation, where qualifiers are applied when appropriate. Therefore, an estimated (J) concentration from the CLP lab may be higher than the onsite lab, since it is not completely accurate that it is present at that high of a concentration. EPA feels that the data compared well enough to estimate areas of contamination and was appropriate for conducting the feasibility study and remedy selection.

Comment: (Page 3-34) The statement is made that, for the purposes of the RI/FS "it is conservatively assumed that significantly elevated sulfate concentrations extend over the same area as significantly elevated metals concentrations." This assumption is not a substantiated or statistically evaluated fact, and therefore may represent inaccuracies in the development of affected soil quantities. This also means that the proposed remedy could have been inappropriately selected, given the amount of incorrect or incomplete data.

EPA Response: Since there were not complete CLP data results for each sample location, as was the case with sulfate, the area of concern was assumed to extend over that of elevated metals concentrations. It is a known fact that lead and sulfate (or sulfuric acid) was the net result of the battery recycling operations. Therefore, EPA feels that being conservative in assuming that the overlapping areas of lead and sulfate concentrations was appropriate in developing affected soil quantities and evaluating the results.

Comment: (Page 3-102) The statement is made in defining the extent of contamination in source area 8 that, for the purposes of the RI/FS "it is conservatively assumed that significantly elevated sulfate concentrations extend over the entire source area down to a 3-foot depth." This assumption is not a substantiated or statistically evaluated fact, and therefore may represent inaccuracy in the development of affected soil quantities. This also means that the proposed remedy could have been inappropriately selected, given the amount of incorrect or incomplete data.

EPA Response: See response to above comment.

4.0 SURFACE WATER/SEDIMENT INVESTIGATION

Comment: (Page 4-3) There appear to be instrument malfunctions during testing and the resulting measurements may be inaccurate.

EPA Response: EPA recognizes the fact that there could have been some malfunctions in collecting field parameter data. However, it is felt that this does not affect the contaminant results and conclusions made.

Comment: (Page 4-15) Comparing sediment analyses to background surface soil concentrations is inappropriate, since they represent two different media.

EPA Response: The point of sending split samples to a CLP laboratory for full TCL/TAL and sulfate analyses, was to analyze the most significant samples for characterizing and defining the extent of soil contamination at DQO Level 4. Therefore, a background sediment sample was not sent for full scan. Instead, sediment data was compared to background surface soil as an alternative. Lead was compared to background sediment samples analyzed by the onsite laboratory.

Comment: (Page 4-19) The statement is made in defining the extent of contamination in Unnamed Stream 1 that for the purposes of the RI/FS "it is conservatively assumed that significantly elevated sulfate concentrations significantly elevated above background extend over the same area as significantly elevated surface water sulfate concentrations in this stream." This assumption is not a substantiated or statistically evaluated fact, and therefore may represent inaccuracies in the development of affected sediment quantities. This also means that the proposed remedy could have been inappropriately selected, given the amount of incorrect or incomplete data.

EPA Response: Since there were not complete data for all sediment locations, a conservative estimate was made based on surface water data. Surface water contamination is due to groundwater feeding the surface water and contaminated sediments. Therefore, it is believed that the estimation of overlapping sulfate surface water and sediment areas was appropriate in conducting the feasibility study.

5.0 GROUNDWATER INVESTIGATION

Comment: (Page 5-1) At several monitoring well locations (e.g., MW-05-SH/DP), fill material with battery casings was encountered in the near surface soils (0-10 feet). These potentially contaminated fill soils were not cased off in the shallow monitoring well boreholes. The augers were advanced through these fill soils to the total depth of the shallow monitor well boreholes. If no other precautions were taken, there can be no assurance that contaminated soils were not carried down by the auger flights from the fill zone to the saturated zone. Similarly, although surface casings were set to the top of bedrock to prevent cross contamination of the bedrock aquifer from the overburden soil aquifer, the drilling of the surface casing borehole may have also resulted in carry down of contaminants from the near surface soils to the top of bedrock. It appears that these drilling techniques could result in inaccurate data, due to the presence of contaminants at depths where they would not otherwise occur, were it not for the drilling activity.

EPA Response: EPA followed standard operating procedures in the construction of the monitor wells. EPA believes the chance of contaminants being carried down from the surficial soil zones to the lower soil zones was minimized through the techniques used, since the auger flights lifted the soils to the surface as the boreholes were drilled.

Comment: (Page 5-11) The report does not indicate that any dissolved metals analyses were conducted on the groundwater samples. If this is the case, then the contribution of suspended particulate metals to the total metals concentrations is undetermined, and the groundwater analyses may not be representative of actual groundwater quality for metals.

EPA Response: EPA followed standard operating procedures for the collection and analysis of groundwater samples. See the previous response on the use of unfiltered samples.

Comment: (Page 5-11) There appears to be no basis for using 1.5 times above background concentrations to indicate areas of affected groundwater.

EPA Response: Engineering judgement was used in selecting 1.5 times the background concentrations to indicate areas of affected groundwater. This selection was made for presentation/display of the analytical data only. This number was not used for any purpose in the risk assessment nor the feasibility study.

Comment: (Page 5-21) This presentation of analytical results is of little use. Concentrations of individual dissolved metal compounds would be more meaningful. ERM evaluated the total lead concentrations of the groundwater samples. Total lead concentrations exceeded the remedial action level of 15 µg/1 in only twelve monitor wells, excluding estimated (J) values which were reported below the quantitation limit. Figure 5-2 indicates that there are 15 monitoring wells with "significantly elevated metals concentrations". This simplistic evaluation presented in Figure 5-2 is overly conservative and may exaggerate the extent of affected groundwater.

EPA Response: EPA disagrees. This figure indicates the areas where groundwater is estimated to have been affected by metals, whether the metal is lead or any of the other metal contaminants of concern. This figure may be simplistic and conservative but EPA does not believe it is overly conservative. This figure is based on the analytical data collected for groundwater, the source area data, and the hydrogeologic data collected indicating groundwater flow and contaminant transport potential.

Comment: (Page 5-26) Another reason for the decrease in metals concentrations may be the potential for cross contamination during drilling of the monitor wells which may have resulted in initial false positive results which are now declining.

The results of two sampling events indicate that there is a reduction in groundwater sample metals content which is not properly explained, with the possibility that natural attenuation could also be occurring at the site. The conclusion made by CDM in Section 5.4.1 is that further groundwater sampling and evaluation is necessary to confirm the viability of natural attenuation as an alternative remedy. However, no additional sampling has apparently been performed.

EPA Response: EPA acknowledges that there is always a chance of cross contamination when drilling wells. However, as stated above, this chance was minimized through the techniques used, since the auger flights lifted the soils to the surface as the boreholes were drilled.

The most plausible reasons for the general decrease in metals concentrations are given in the RI Report. It would take several years of sampling to determine whether the metals contaminants are naturally attenuating at the site. In the interest of time, because there are a variety of reasons which could explain the general decrease of metals concentrations between the two sampling events other than natural attenuation, and because there are other contaminants which do not appear to be naturally attenuating, EPA is proceeding with a pump and treat remedy.

6.0 ECOLOGICAL INVESTIGATION

Comment: (Page 6-1) "nine fish whole body tissue samples from Irish Buffalo Creek"...

Nine fish samples from three locations and three trophic levels equals one for each sample or one piece of data to interpret. Therefore, the fish data are relatively meaningless. Also, fish do not bioaccumulate lead as well as algae or invertebrates - obviously fish data are more important to human health, but other species would be better indicators of ecological impact.

EPA Response: EPA cannot determine the significance of the opening statements in this comment. Although it is true that other organisms might bioaccumulate lead better than fish, for the purposes of this RI with important ties correlating to human health, EPA felt it necessary to collect fish tissue samples.

Comment: (Page 6-1) "The samples were taken from riffles using a standard D-frame dip net." The D-frame dip net is not a good tool for a qualitative analysis. It does serve well for quantitative analysis. If a dip net were used, all types of habitat should have been sampled (i.e., logs, overhangs, riffles, pools, etc.). Table 6-2 indicates the habitats are different at each location; therefore, this sampling technique is not adequate to evaluate diversity.

EPA Response: The kick net (D-frame dip net) is a standard EPA recommended collection method for qualitative sampling (Klenn, Donald J., et. al, Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters, EPA/600/4-90/030, November, 1990). EPA standard protocol was followed to ensure adequate representation of the samples collected from the varying substrates. Four of the six stations (1, 3, 4, and 6) have very similar habitats. Stations 5 and 2 had the most suitable macroinvertebrate habitat, yet station 2 had the second lowest species diversity. Station 1 (control) had a less than ideal substrate for macroinvertebrates, yet it was still able to support the highest species diversity of all the stations.

Comment: (Page 6-2) The number of taxa may be a better indication of community health, with the highest observed at station 3 and station 1 (control) the second lowest. Other indicators may also be used such as EPT

(Ephemeroptera to Plecoptera to Tricoptera ratio) or density (number of organisms per unit area). Density can only be analyzed with a different type of sampling device.

EPA Response: A high number of pollution tolerant organisms (as seen in stations 2, 3, and 5) is a good indicator that a stream has been impacted. It is true that station 3 had a high number of taxa, but a high number of taxa of pollution tolerant species is an indicator of an unhealthy environment as opposed to a healthy one, as is suggested.

Comment: (Page 6-4) "Adverse impact from the site is suggested." This statement is premature with so little invertebrate data, and with the potential of other sources of contamination from what appears to be an urban/light industrial area. This is also supported by the observation of the dark precipitate at the referenced site of the unnamed stream. A second unnamed stream seen on Figure 6-1 was not sampled. There are not enough good data to determine impact, specifically for a single contaminant such as lead.

EPA Response: EPA disagrees. Sufficient samples were collected during the RI and the evaluation of the impact to aquatic biota was adequate for the purposes of the FS and remedy selection.

Comment: (Page 6-6) "A dark brown precipitate of unknown origin."

Typically, a dark brown precipitate in surface streams indicates sewage fungus.

EPA Response: Comment noted. There were county sewer lines which ran along the southern side of the unnamed tributary.

8.0 BASELINE RISK ASSESSMENT SUMMARY

Comment: Children do not ingest 200 mg soil per day for 350 days per year of their entire childhood. While such a large exposure may occur, it would be infrequent Careful measurements of metals in children's feces by Calabrese and others suggests that the daily ingestion of soil equivalents is closer to 50 mg per day. This is particularly true for commercial or industrial properties where there is little likelihood of exposure to children.

EPA Response: The exposure assumptions used for ingestion of soil by children are consistent with those in EPA's Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors", OSWER Directive 9285.6-03.

Comment: (Page 8-17) In the exposure dose calculation the assumption was made that natural attenuation in soil and groundwater were not to be considered. This appears to be inconsistent with the information presented in Section 5.0, where natural attenuation is considered to be a potential explanation for diminishing metals content in groundwater samples.

EPA Response: This is a baseline risk assessment and an estimate of future contaminant concentrations which may diminish over time due to attenuation or other factors was not done.

Comment: (Page 8-18) Volatilization factors, including Henry's Law Constant, do not have any bearing on inhalation of fugitive dusts. Organics adsorbed to soil carbon are the major source for exposure to organic contaminants in dust. In this section, the RI/FS confuses solubilized organic chemical atoms in air with those which are potentially transported into the lungs via particulates.

EPA Response: It is agreed that volatilization factors have no bearing on inhalation of fugitive dust. The purpose of discussing volatilization factors was to justify their exclusion from the discussion of PAHs, which by some measures may be considered volatile.

Comment: (Page 8-21) Concerning potential groundwater ingestion, although three residential wells exhibited moderate levels of contamination Appendix A provides a list of well usage, there is no indication to what degree these wells are currently used or capable of being used as drinking water sources. In addition, it would appear that potential childhood ingestion rates of 2 L/day, while adult workers are estimated to drink 1 L/day, may overestimate risks to children.

EPA Response: Because of the lack of well construction details, risk due to consumption of water from in-use residential wells was not calculated. Risk due to ingestion of groundwater was calculated as a hypothetical future use scenario using data from monitoring wells. The ingestion rate for children is a conservative estimate; no EPA-established level currently exists for children.

Comment: (Table 8-4) It would appear that the RI/FS has errors in its assignment of relevant carcinogenic slope factors (CSFs) for many contaminants of concern at the MSR site. Specifically, CSFs have been arbitrarily increased by a factor of 20-fold for dermal absorption versus ingestion. Such statistical manipulation is both unfounded and enormously misleading. This application suggests that carcinogens are 20 times more potent by dermal absorption than by oral ingestion, when there is absolutely no basis in the toxicologic literature or in U.S. EPA guidance to support such an assertion.

EPA Response: Carcinogenic Slope Factors (CSFs) were adjusted from administered to absorbed doses according to the method described in Appendix A of EPA's Risk Assessment Guidance for Superfund (RAGS), December 1989. As a conservative assumption, a 5% oral absorption efficiency was used, resulting in a 20-fold increase for the absorbed slope factor over the administered slope factor.

Comment: Assignment of equivalent CSFs for Aroclors 1254 and 1260 is no longer valid. An exhaustive reinvestigation of U.S. National Toxicology Program data for PCBs in 1991 by the Institute for Evaluating Health Risks has shown that only Aroclor 1260 is carcinogenic and that the corrected CSF for Aroclor 1260 should be 2.9 rather than 7.7 $(mg/kg/day)^{-1}$.

EPA Response: EPA's IRIS database makes no distinction between PCB congeners; all are assigned an oral CSF of 7.7 mg/kg/day.

Comment: Use of the CSF for benzo(a) pyrene for all carcinogenic polycyclic aromatic hydrocarbons (CPAHs) is inappropriate. Most CPAHs are considerably less potent than benzo(a) pyrene. U.S. EPA Region IV has recommended the use of relative potency factors for other CPAHs (memorandum dated 11 February 1992). It should be noted that in Table 8-4 footnote 4 is cited for CDM's utilization of 7.3 (mg/kg/day)$^{-1}$ as a default for oral CSFs for all of the above-noted CPAHs by ingestion. However, Table 8-4 contains no reference for footnote 4. Thus, there is no basis for the assumption of an oral CSF of 7.3. In table 8-5 (see below), footnote 4 refers to U.S. EPA Region IV.

EPA Response: It is agreed that all carcinogenic PAHs are not equally potent. However, it is inappropriate to adjust the CSF for benzo(a) pyrene for each of the carcinogenic PAHs. Instead, the toxicity equivalent factors referenced in EPA Region IV's memorandum of February 11, 1992 were used to convert each carcinogenic PAH concentration to an equivalent concentration of benzo(a) pyrene. It is acknowledged that the reference for footnote 4 was omitted in Table 8-4. The correct reference is EPA Region IV.

Comment: Although listed as an oral carcinogen by U.S. EPA, from a critical examination of the toxicologic literature, it is doubtful that beryllium provides any carcinogenic risk by this exposure route. Other carcinogenic metals (cadmium, nickel and hexavalent chromium) pose risk by inhalation, but not ingestion. The supporting data for beryllium are all more than 15 years old and of dubious quality.

EPA Response: Beryllium is listed in category B2, probable human carcinogen via the oral route of exposure in the IRIS database used for the risk assessment.

Comment: (Table 8-5) The same route-specific error is perpetuated for noncarcinogenic effects by dermal absorption as is committed for carcinogenic effects. Specifically, toxicants are not 20-fold more toxic by dermal absorption than by ingestion, in contrast to the assumptions made in assessing RfDs by dermal contact in the RI/FS risk assessment.

EPA Response: See EPA Response to comment on Table 8-4.

Comment: Risks from lead are assessed utilizing version 0.50 of U.S. EPA's uptake-biokinetic (UBK) model. This UBK model targets 10 µg/dl blood lead as the threshold which should not be exceeded without threat of inhibition of precognitive development in children under age 5. The source of this determination stems from Needleman's epidemiologic studies, which have been widely criticized by other epidemiologists. In the opinion of ERM's senior toxicologist, 25 µg/dl should be used as the targeted blood lead concentration in utilizing U.S. EPA's UBK model, and this target will allow for 2.5 times as much lead in environmental media as contrasted with the RI/FS risk assessment.

EPA Response: The June 7, 1991 Federal Register, pp. 26467-26469 is EPA's justification for the use of a blood lead level of 10 µg/dl as a benchmark in evaluating lead exposures. In the cited reference, several scientific studies are quoted which note health effects at blood lead concentrations less than 25 µg/dl, the level cited by ERM's senior toxicologist.

Comment: The inhalation RfD of trivalent chromium of 5.7E-07 mg/kg/day has been withdrawn from both IRIS and HEAST. There is no evidence for adverse health effects from inhalation of nanogram quantities of Cr(III), let alone picogram quantities. Reinstatement of a new inhalation RfD is pending. If patterned after the oral RfD, this new inhalation RfD for trivalent chromium will be 5 to 6 orders of magnitude higher.

EPA Response: The comment is acknowledged. The correct reference for the inhalation RfD for Cr(III) is HE AST, 1991. Despite the use of this toxicity value, exposure to Cr(III) via inhalation was not shown to contribute to non-cancer risk. In fact, as seen in Tables 8-6 and 8-9, none of the Hazard Indices (HIs) for inhalation exceeded 0.0.

Comment: The 10,000 uncertainty factor for naphthalene was not based upon decreased weight gain, as stated in Table 8-5, but upon adverse ocular effects. This 100-fold increase in the uncertainty factor for naphthalene has artificially reduced the RfD by 100 fold, even though the database for this bicyclic aromatic hydrocarbon is the same. Because of the misapplication of critical toxicologic indices and assumptions concerning exposure pathways by CDM, major calculations of baseline risks at the MSR site are in error. Examples of these errors and the magnitude of risk overestimation are detailed below.

EPA Response: According to HE AST, 1992, the critical effect upon which the RfD was based was decreased weight. The correct uncertainty factor is 1,000 and not 10,000 as stated in Table 8-5.

Comment: Maximal baseline risks are portrayed as stemming from ingestion and dermal contact with source area 9. Dermal contact carcinogenic risks for child residents, adult residents, and child visitors are portrayed as 8.9E-05, 1.8E-04 and 5.7E-05, respectively. However, these apparent risks which are all near 1/10,000 or more are artifacts of the assumption that CSFs are 20-fold more by dermal absorption than by ingestion. Real risks to these three potential receptor populations are 4.5E-06, 9.0E-06 and 2.9E-06, respectively, which are all well within U.S. EPA's acceptable range of baseline risks (1E-4 to 1E-6). Hence, since source area 9 represents the worst of the exposure scenarios at the MSR site, it follows that all other dermal contact risks also fall within U.S. EPA acceptable risk envelope.

EPA Response: See EPA response to comment on Table 8-4.

Comment: Concerning ingestion, PCBs and CPAHs dominate carcinogenic risk in this RI/FS. As indicated above, CDM has misconstrued and overestimated risks from these contaminants by ingestion. Rather than an ingestion lifetime carcinogenic risk to child residents of 2.2E-05 at source area 9, for example, the realistic carcinogenic risks at this source area are less than 2.0E-06, utilizing contemporary carcinogenic indices. The risk assessment has overestimated carcinogenic risk by an order of magnitude or more from Aroclor 1254, benzo(a) anthracene, chrysene, benzo(b) fluoranthene, benzo(k) fluoranthene and indeno(l, 2,3-c, d) pyrene and, hence, erred in calculating potential risks by ingestion. Again, as for dermal absorption above, the worst-case carcinogenic risks by ingestion are specifically explored in this critique, with the conclusions equally applicable to all other areas of lesser ingestion risks.

EPA Response: Risks associated with exposure to carcinogenic PAHs and PCBs were calculated appropriately as explained above.

Comment: Through use of a target blood lead level threshold of 25 µg/dl as based upon a critical review of the epidemiology concerning inhibition of precognitive development in preschool children, source areas 2, 8, and 9 do not pose an unacceptable risk under the current use scenario from lead contamination. Use of the UBK model shows no anticipated blood lead levels above 17 µg/dl from any of these source areas. As indicated by CDM's assessment, other source areas are also below blood lead action thresholds.

EPA Response: Use of a target blood lead threshold of 25 µg/dl is inappropriate as explained in the EPA response to the comment on Table 8-5.

Comment: Maximal concentrations of lead in site surficial soils are around 500-1,000 mg/kg. These levels fall well within U.S. EPA's interim guidelines of 500 mg/kg for residential areas and 1,000 mg/kg for industrial sites. (These guidelines were in place before U.S. EPA's adoption of the UBK model.)

EPA Response: It is not true that maximum concentrations of lead in site surficial soils are around 500-1,000 mg/kg. As seen in Table 8-1 and detailed in Section 3.0, maximum lead concentrations, as measured by the onsite laboratory, ranged up to 118,000 mg/kg.

9.0 REMEDIAL INVESTIGATION SUMMARY AND CONCLUSIONS

Comment: (Page 9-2) The RI concludes that the carcinogenic risk and health index for soils are above action levels. However, a reanalysis of the risk assessment using current exposure and toxicologic data shows the carcinogenic risk to be in the 10E-6 range, and surface soils are within EPA's proposed action level for this site of 500 mg/kg.

EPA Response: Exposure assumptions used in the risk assessment were based on EPA guidance or conservative assumptions. With the exception of Cr(III), which had its reference dose withdrawn by EPA, toxicity values were applied appropriately. Exposure to Cr(III) was not a major factor in the calculation of risk. All other risk calculations were correct. Lead concentrations exceed 500 mg/kg at several locations.

Comment: The suggested impact on aquatic communities is misleading since too few samples were collected to draw these conclusions.

EPA Response: For the purposes of this RI, an adequate number of samples were collected and the conclusions drawn are fully justifiable.

10.0 DEVELOPMENT OF REMEDIAL ACTION OBJECTIVES

Comment: (Page 10-1) OSHA requirements pertaining to safety for deep excavation were omitted as an ARAR for those alternatives involving excavation.

EPA Response: OSHA was cited in Table 10-1 and is expanded to include all related activities where worker health and safety would be involved.

Comment: (Page 10-5) RCRA and RCRA groundwater protection standards are listed as chemical-specific ARARs. MCLs as specified in drinking water regulations may be more appropriate as an ARAR for drinking water.

EPA Response: All the chemical-specific ARARs listed in Table 10-1 are considered when evaluating remedial alternatives.

Comment: (Page 10-10, Table 10-5) The cleanup levels for soil should focus on surface soils (with dermal contact being the basis for cleanup) and subsurface soils (with protection of groundwater being the basis for cleanup) instead of applying a direct contact exposure scenario to all media.

EPA Response: In order to be protective of human health and the environment, EPA was conservative and applied a direct contact exposure scenario to all media. However, most of the remediation levels were based on protection of groundwater.

Comment: (Page 10-11) The lead remedial level of 500 mg/kg is referenced as having a basis in OSWER Directive 9355.4-02. This guidance is clear that 500-1,000 mg/kg is the residential cleanup standard, not an industrial cleanup standard. This is in direct conflict with the CDM assumptions set forth on page 10-15, where the text states that the remediation levels were selected based on present and future land use at the site, assuming source areas 4, 5, and the MSR facility land uses are to be commercial/industrial and the remaining source areas to be residential. Given the CDM assumption of commercial or industrial land use the remedial cleanup level of 1,000+ ppm lead should be used for the MSR property and the adjacent property.

EPA Response: EPA disagrees. The soil remediation standard for lead can range from 500 to 1,000 ppm. Since much of the affected areas are considered residential at this site, the standard of 500 ppm was chosen as the remediation level. EPA was conservative, so as to be protective of human health and the environment.

Comment: (Page 10-12) ERM expects that the battery casings could be relatively easily screened from the soil, washed if needed to remove residual lead, and landfilled as nonhazardous material. Segregation and separate treatment of such material could result in a significant volume reduction over that currently estimated. Moreover, there would be no need for shredding the battery casings or stabilizing them.

There is no distinction made between soils and battery casings with respect to treatability, teachability, or waste management. In Appendix C, there are no partitioning data for lead and battery casings. ERM expects that lead on these materials would be readily removable with high-pressure washing, to the extent that the resulting materials would be nonhazardous. It is inappropriate to group the soils and casings together with respect to teachability.

The partitioning information for lead indicates that the lead is strongly sorbed to the soil, which could greatly reduce its teachability, even without stabilization. Until leaching studies are done, one should not assume a priori that the lead is leachable to the extent that it classifies all the soils as hazardous.

EPA Response: EPA was conservative and assumed S/S would be the most effective way to treat the battery casing debris.

To be conservative, EPA has assumed that the battery casings will have the same characteristics as soil in terms of leachability. Pressure washing will not be an appropriate method of dealing with the casings, because this method of "cleaning" battery casings has not been proven to be effective in removing lead.

EPA disagrees. Conservative leaching analyses were performed, and EPA believes that analyses performed were appropriate for the purposes of conducting the FS and selecting a remedy for cleanup. In addition,

TCLP tests were performed by EPA's Emergency Removal personnel before the 1992 removal was performed. The tests results indicated lead above the TCLP limit of 5 mg/1. For more information about the TCLP tests, see the Removal Administrative Record located in the Cannon Memorial Library and EPA Region IV offices.

Comment: (Page 10-13) There are two Tables 10-5 with different cleanup standards for soils on each in the public record. One precedes p. 10-13 and is unpaginated, except that it is provided with a public record page number. Which is correct?

TCLP leach data are needed for all areas before excavation takes place to determine whether, in fact, the lead is leachable, and therefore hazardous by the characteristic of TCLP.

The TCLP limit is 5 mg/L for lead. In addition, the 0.015 mg/1 leachate level for lead set in the FS appears not to be an ARAR, based on a review of NC regulations for characteristically hazardous waste and our knowledge of the federal standard, which is 5 mg/1 for lead.

EPA Response: The latter version is the correct table.

See the previous responses on TCLP requirements.

Comment: (Page 10-5) The table should consider 1,000+ mg/kg for lead in soils at industrial sites.

The basis for the NOAA risk-based value is not given.

The cleanup level for carbon tetrachloride in soils should be based on its partitioning to groundwater or dermal contact, not a CRQL.

The metals levels based on background concentrations in soils should be revised to look at dermal contact or partitioning to groundwater.

EPA Response: As discussed previously, the soil remediation standard for lead can range from 500 to 1,000 ppm. Since much of the affected areas are considered residential at this site, the standard of 500 ppm was chosen as the remediation level. EPA was conservative, so as to be protective of human health and the environment.

As stated in the RI/FS report, the NOAA risk-based value is used for lead because there is no other basis for establishing cleanup levels for sediments.

As discussed previously, in the case of carbon tetrachloride, the risk-based number was lower than the CRQL. Therefore, EPA selected the CRQL as the remediation level. The CRQL is the lowest detection attainable by the laboratory for any given chemical.

EPA did look at dermal contact and partitioning to groundwater for all metals. However, the background concentration was selected as the remediation level if it was above the risk-based or protection of groundwater goal.

Comment: (Page 10-15) The CRQL should not pertain as a cleanup level unless the risk-based criterion that is calculated is less than that measurable. In the case of carbon tetrachloride, a risk-based cleanup level is calculable both for dermal contact and protection of groundwater.

EPA Response: See the previous response on CRQL.

Comment: (Page 10-15) If commercial/industrial usage was assumed (as is proper) for the MSR facility and source areas 4 and 5, the lead cleanup level for industrial use should be higher than that for residential. For industrial/ commercial uses, a lead cleanup level of 1,000+ mg/kg should be selected, in lieu of the 500 mg/kg standard. Moreover, source area 6 is commercial, not residential, and so should also have a cleanup level of 1,000+ mg/kg.

EPA Response: See the previous response on lead cleanup levels.

Comment: (Page 10-16) The development of affected soil quantities is based on the discussion in Section 10.4, and assumptions regarding the extent of contamination for the several chemicals of concern. This analysis is expected to overstate the calculation of volumes of lead affected soil, by inclusion of areas not affected by lead. The assumptions made in calculations are also expected to understate the total volume of lead affected soils due to the lack of definitive soil sample results for lead content at depth in several affected areas. The end result is that the uncertainty of excavation is greatly increased.

EPA Response: EPA recognizes the fact that soil volumes presented in the RI/FS report are estimates only. However, EPA believes that sufficient samples were collected and reasonably conservative assumptions were made in calculating the volumes. It would not be cost effective or feasible to sample every inch of the site in order to calculate soil volumes down to cubic yard. Areas of contamination were drawn with the following in mind: if contamination existed at one sample point but clean at the next point, then it was assumed contamination existed up to half the distance to the clean location. EPA was conservative in estimating the soil volumes so as to be protective of human health and the environment, and to present a " worst-case" scenario of what could actually exist in this area. EPA believes the approach taken for estimating the soil volumes was appropriate for the purposes of conducting the FS and selecting a remedy. Actual volumes will be determined when the remedial action is complete.

Comment: (Page 10-18) The extent of source removal action for area 1 appears much larger than the area that exceeds cleanup levels based on Figure 3-11. While battery casings may have been found along the trench that was excavated, their presence does not justify their excavation if they do not exceed action levels. A significant volume of soils was excavated from this area and stockpiled on the MSR site, increasing the cost of the remedy unnecessarily.

EPA Response: This comment is incorrect. Figure 3-11 refers to source area 3. Figure 3-3 depicts source area 1 sampling. Figure 3-3 only shows the area of concentrations above 1.5 times background and not above remediation levels. In addition, only limited sampling was conducted in this area because of the unstable conditions involved in mounting a drill rig. The removal action involved sampling during the course of excavation. If results indicated soil levels in excess of 500 mg/kg, excavation continued. For more information, see the Removal Administrative Record.

Comment: (Page 10-19) In source area 2, the area around SS-150-2 that is scheduled for remediation in the FS needs to be resampled before it is assumed to require remediation. One surface sample was taken in this area, and while the lead level was significant, all the closest surrounding borings are clean. Remediation should never be conducted on the basis of a single sample result.

The depth of metals contamination assumed at SS-150-2 and SS-114 was 2 ft.; however, the analytical sampling was conducted between 0 and 1 ft only. Therefore, the 2-ft depth of contamination is actually unknown and may be over-or underestimated.

The remediation for soils around SS-114 will involve significant clearing of trees, which will incur additional expense as well as affect the aesthetics of the homeowner's lot. In addition, clean soil was backfilled in the apparent majority of area 2 after the removal action. If this soil overlies the areas that still need remediation in area 2, its removal and subsequent replacement will increase the cost of the remedy unnecessarily.

EPA Response: EPA disagrees. As discussed previously, EPA believes sufficient sampling was conducted to perform the FS and select a remedy. Remediation is necessary in source area 2 since a sample has indicated concentrations above remediation levels.

EPA disagrees. As discussed previously, EPA believes sufficient sampling was conducted during the RI to reasonably estimate the areas and volumes of contamination, and that the approach used for estimating the volumes was appropriate for the purposes of conducting the FS and selecting a remedy for cleanup.

EPA believes that since results have indicated concentrations above remediation levels, that this area requires remediation. In addition, EPA believes that the appearance of this area would not be significantly affected by excavation since it is presently a gully full of underbrush.

Comment: (Page 10-20) In source area 3 the area outlined for remediation around SS-150 is not contaminated in excess of cleanup levels, with lead under 500 mg/kg. Therefore, the area estimated for remediation is excessive.

The remediation for soils around SS-150 will involve significant clearing of trees, which will incur additional expense as well as affect the aesthetics of the homeowner's lot.

The area proposed for remediation between SS-212 and SS-4 has not been defined as to depth. An assumption of 1 ft. depth could be an underestimate, which would affect the cost of the remedy.

The remediation area around BH-56 and BH-58 is apparently based on the cleanup of vanadium at a depth of 10-12 ft. Since it was not found at the surface, it is inappropriate to draw the limits of remediation to the adjoining surface boring SS-1. Similarly, the radius of the remedial area around BH-15 is apparently based on clean adjoining surface samples; however, the apparent contamination found in BH-15 is found only at a depth of 10 to 12 ft. The extremely high (44,000 mg/kg) lead found at this depth in BH-14 is inconsistent with all the other lead values found for borings in this area, which were below 150 mg/kg. Before remediation is considered for this area, additional samples should be taken.

EPA Response: This comment is incorrect. The samples collected in this area indicated concentrations above the remediation levels. Therefore, EPA believes the estimated area is reasonable.

Since it was determined that soil exists at concentrations above remediation levels, this area requires remediation. In addition, EPA believes that aesthetics will not be significantly affected since this area is on top of a hill with only a scattering of trees.

EPA believes that sufficient sampling was conducted to perform the FS and select a remedy for cleanup.

EPA disagrees. Sufficient sampling was conducted during the RI to accurately and conservatively estimate the areas of contamination. Results were appropriate for the purposes of conducting the FS and selecting a remedy for cleanup.

Comment: (Page 10-21) For source area 4 the surface soils in this area, based on p. 3-51, are not contaminated with lead (no other metals were analyzed for). Therefore, the 0-2 ft. interval should not be considered for remediation.

The basis for the areal extent of the various affected areas is not obvious. This could significantly overestimate the volume requiring remediation, since the area around each boring is quite large. However, the volume of soil requiring removal to reach these depths is extremely large and would include these soils.

Various boreholes are listed with the depth of contamination as compared to ERM's interpretation of the depth. The depth-dependent volume for the borings appear under- or overestimated. This has a direct effect on the cost of the proposed remedy.

EPA Response: This comment is incorrect. There were soil samples collected at the surface and analyzed for TAL metals and the results indicated contamination above remediation levels.

EPA disagrees. As discussed previously, EPA believes sufficient sampling was conducted during the RI to reasonably estimate the areas and volumes of contamination, and that the approach used for estimating the volumes was appropriate for the purposes of conducting the FS and selecting a remedy for cleanup.

EPA disagrees. As discussed previously, EPA believes sufficient sampling was conducted during the RI to reasonably estimate the areas and volumes of contamination, and that the approach used for estimating the volumes was appropriate for the purposes of conducting the FS and selecting a remedy for cleanup.

Comment: (Page 10-22) For source area 5, the areal extent of remediation shown on this figure includes SS-16, BH-14, SS-42, and SS-20. SS-16 results, when averaged, were under 500 mg/kg of lead. None of these samples showed contamination above acceptable levels. Therefore, these delineations would artificially extend the area requiring remediation. The area around BH-13 is extended considerably to the south, although there are no subsurface samples anywhere in this area except BH-13. The entire area outlined by surface contamination, as modified to omit the above borings, could well extend to a depth of up to 10 or 15 ft., based on the three deep borings within this area. This could effect an approximate five-fold increase in soil volumes in this area, which would greatly increase the cost of the remedy proposed.

EPA Response: EPA disagrees. As discussed previously, EPA believes sufficient sampling was conducted during the RI to reasonably estimate the areas and volumes of contamination, and that the approach used for estimating the volumes was appropriate for the purposes of conducting the FS and selecting a remedy for cleanup.

Comment: (Page 10-23) In source area 6, the area around SS-119 is affected by vanadium, but the average level of two sample replicates is within the cleanup level. Therefore, this area should be deleted from consideration for remediation.

Beryllium at 0.98 mg/kg (compared to a 0.91 mg/kg cleanup level) at a depth of 10 to 12 ft. should not be a justification for excavating to this depth.

Any operations in this source area along the stream will need to take great care not to affect the stream with respect to sediment load, either by earthmoving activities or removal of vegetation from the bank, encouraging erosion.

EPA Response: It is EPA policy not to average sample data. To be conservative, the higher data result is used for estimating areas of contamination.

Beryllium has been eliminated from the contaminant cleanup list because the risk associated with direct contact with this compound is within EPA's acceptable risk range. In addition, the concentrations found would not cause groundwater degradation above MCLs.

Comment acknowledged.

Comment: (Page 10-24) In source area 8, the area shown as containing contamination to a depth of 4 ft. should actually be 4+ ft., since no borings were taken deeper. Similarly, all the remaining samples with the exception of SS-33 to SS-35 and SS-29 to SS-30 are known to be contaminated to at least 1 ft. deep, and no samples were taken any deeper. Therefore, the extent of contamination requiring remediation in source area 8 could be over 50 percent higher than currently estimated.

Excavation in this area could be difficult, since it is mostly wooded and extremely close to a stream bank. Clearing the bank of vegetation or decreasing stream shading in this area could be detrimental to the stream from the standpoint of sediment load and increased water temperatures.

EPA Response: EPA disagrees. As discussed previously, EPA believes sufficient sampling was conducted during the RI to reasonably estimate the areas and volumes of contamination, and that the approach used for estimating the volumes was appropriate for the purposes of conducting the FS and selecting a remedy for cleanup.

Comment acknowledged.

Comment: (Page 10-26) In source area 10, the area excavated during the removal action is considerably greater than that shown to contain metals levels in excess of allowable levels. This results in increased volumes of soil deposited on the MSR site that will have to be dealt with during remediation, thus unnecessarily increasing the cost of the remedy.

EPA Response: As discussed previously, the figures presented in Section 3 depict areas which are 1.5 times above background and not above remediation levels. Limited sampling was performed since the area was heavily wooded and steep-sloped. The removal action involved more extensive sampling during the course of excavation. If results indicated soil levels in excess of 500 mg/kg, excavation continued.

Comment: (Page 10-28) The data presented in Appendix F.1.3 and the text on p. 10-32 suggest that a smaller area of contamination is present in sediments (between samples 3 and 13 and near sample 17), rather than the two elongated areas shown on Figure 10-11. There is no apparent basis for this Figure 10-11.

EPA Response: EPA disagrees. As discussed previously, EPA assumed that contamination exists at halfway between a "dirty" sample and a "clean" samples, and that this approach is appropriate for reasonably estimating the areas and volumes of contamination, and that the approach used for estimating the volumes was appropriate for the purposes of conducting the FS and selecting a remedy for cleanup.

Comment: (Page 10-29, Table 10-7) The PAHs in the soils in the stockpile were contributed at levels above the cleanup level only from area 9. Area 9 contributed only 48.4 tons of soil to the stockpile, out of a total of approximately 9,470 tons. Given that the benzo(a) pyrene at 1,300 µg/kg in one sample in area 9 was mixed with the soils represented by the other eight area 9 samples not exceeding cleanup levels for PAHs, PAHs would be reduced to significantly below the cleanup standard of 780 µg/kg in area 9 soils alone, not to mention after mixing with soils from areas 1, 2, and 10. Consequently, PAHs will not be a contaminant of concern in the stockpile soils.

The VOCs in the soils from area 2 were found only in one sample above cleanup levels, and this area was excavated during the removal action to a depth of 2 ft. Soil was only sampled to a 1 ft. depth in this area. The excavated soils are stockpiled at the MSR site, and no other VOC-containing soils were co-mingled with them in the stockpile. Consequently, VOCs are no longer a problem in area 2, and Table 10-7 should reflect this. What is the basis for the 112 cy that are to be excavated containing metals and VOCs, if the area in question has already been excavated?

Debris in area 4 should not be considered with soil/sediment, since it would be dealt with differently. In addition, there are no soils in area 4 that contain only PAHs; rather, these soils exceed metals limits as well. What is the source of the 1,199 cy listed under this category - is this volume already accounted for in the remaining volume listed under this category?

EPA Response: EPA believes that mixing soil, so as to dilute concentrations, is not an appropriate means of remediation. However, PAHs have been eliminated from the cleanup contaminant list for similar reasons as beryllium was eliminated. See previous response.

The sample showing VOC contamination was collected after the removal action was completed. Even if only one sample indicated VOC contamination, EPA believes' this is sufficient indication that remediation is warranted.

As shown in Table 10-7, debris is listed separately in and will be dealt with apart from the soils. There are different contaminant groupings within all the source areas. The 1,199 cy of soil is contaminated with metals and PAHS, while there is 1,678 cy that is contaminated with PAHs only.

Comment: (Page 10-31) In area 4, metals were not observed above remediation levels from 0 to 60 ft. Rather, metals were observed from deeper than 12 to less than 55 ft. Since the soils to a depth of 12 ft. (minimum) and 32 ft (maximum) are not contaminated above 500 mg/kg, the volumes of soil calculated for area 4 need to be reexamined. While the 0 to 2 ft. interval and the 55 to 60 ft. interval would be removed, thus reducing the overall volume to be remediated in this area, it is possible that the entire area between borings BH-8, BH-43, BH-3, and BH-39 is underlain by a 20-ft thick layer of metals-contaminated material. This would increase the volume of soils to be remediated.

EPA Response: EPA disagrees. As discussed previously, EPA believes sufficient sampling was conducted during the RI to reasonably estimate the areas and volumes of contamination, and that the approach used for estimating the volumes was appropriate for the purposes of conducting the FS and selecting a remedy for cleanup.

Comment: (Page 10-32) What is the reason that metals and VOCs are assumed to extend vertically 30 ft. in the upper surficial aquifer, but sulfates are assumed to extend 60 feet vertically? The volume of contaminated groundwater should have been calculated based on the largest areal extent of the total plume, not based on the sum of volumes for each contaminant's plume, as the plumes overlap.

EPA Response: As stated in the RI/FS report, metals and VOCs were not found at concentrations above remediation levels at depths greater than 30 feet while sulfate was.

The comment is correct. The total volume of contaminated water was recalculated to be 54,949,749 gallons. However, EPA believes that this does not affect the analysis of alternatives in the FS or the selected remedy.

Comment: (Page 10-33, Figure 10-12) The metals levels that exceed ARARs are believed to have been analyzed as total metals. From a drinking water perspective, only soluble metals are of concern, as homeowners would either filter or not use a turbid water source. In either case, suspended metals will not be present in a typical well water supply. The highly variable levels (over orders of magnitude) for conventional metals (calcium, magnesium, iron, and manganese) suggest that some wells were adequately purged but that some others had significant residual suspended or colloidal solids levels. Before the areas shown on Figure 10-12 are assumed to be in excess of drinking water standards and in need of remediation, dissolved metals data must be taken to determine whether a problem actually exists.

EPA Response: See the previous response to the filtered versus unfiltered groundwater sample issue.

Comment: (Page 10-34, Figure 10-13) Is source area 5 really a source of sulfates, or are they originating at the MSR facility and simply flowing beneath area 5 with the groundwater? Is source area 2 really a source of sulfates, or are they originating at area 9, which is downgradient? Is source area 7 really a source of metals, when there were no metals exceeding cleanup levels in this area? Is the MSR facility really the source of volatiles, when there were no volatiles detected above cleanup levels in the soils in this area? Area 4 appears to be a source of volatiles in the groundwater, based on the groundwater flow patterns and the plume shape, but there were no volatiles found in this area in the soils.

EPA Response: Sample results indicate that sulfates may indeed be originating at the MSR facility. Sample results also indicate that sulfates are originating at source area 2. The origin of groundwater contamination at source area 7 is unknown at this time. Sample results indicate VOC contamination exists at the MSR facility and that the facility is the source of this contamination, even though VOCs were not found in the soils. Sample results also indicate that source area 4 is a source of VOC groundwater contamination, even though VOCs were not found in the soils.

Comment: (Page 10-35, Figure 10-14) For the MSR facility, the three plumes overlap to the extent of about 90 percent. The area 2 plumes overlap completely. Therefore, the volume of water calculated based on depth and area double-counts volume and is an overestimate.

EPA Response: This comment is correct. As discussed previously, the total volume of contaminated water was recalculated. However, this difference is not believed to have any impact on the analysis of alternatives and selection of a remedy.

Comment: (Page 10-36, Table 10-8) The plume volumes will likely decrease over time as the sources are controlled. Therefore, selection of the groundwater treatment system that is to be installed should be deferred until the effects of source control can be determined. This is especially important, since the various small plumes are widely scattered and will be very expensive to connect to a centralized treatment system.

The analytical method used for sulfate was not evident from the work plan; however, certain of the methods employed precipitation step in acidic solution. In such a case, insoluble sulfates present as suspended solids in the groundwater sample could artificially increase sulfate levels. Suspended solids were not analyzed in the testing.

EPA Response: When the FS was conducted, EPA looked at each operable unit separately when evaluating and selecting cleanup alternatives. Therefore, source control was not considered as part of the groundwater alternatives analysis. However, EPA believes that source control will be implemented prior to groundwater remediation and the effects will be evaluated during the remedial action phase when monitor wells are resampled.

Sulfate was analyzed for by EPA-approved CLP methods. The samples were analyzed through Special Analytical Services (SAS). As discussed previously, it is EPA policy not to filter samples.

Comment: (Page 10-36) An effective porosity was assumed for the top 20 ft. of the surficial aquifer and for the deeper bedrock aquifer. However, no assumptions or basis for assumptions are given for porosity in the lower portion of the surficial aquifer?

EPA Response: EPA assumed an effective porosity of 0.2 for the top 20 feet of the surficial aquifer and 0.05 for the remaining extent of this aquifer and the bedrock aquifer. These are typical values for the geologic materials encountered at the site.

11.0 IDENTIFICATION, SCREENING, AND EVALUATION OF TECHNOLOGIES AND PROCESS OPTIONS

Comment: (Page 11-2) It is noted that treatment is generally preferred unless site-or contaminant-specific characteristics make it infeasible in an engineering or implementation sense, or too costly. For areas 4 and 5 and the MSR facility, the remedial option involving treatment that was selected is too costly, and for area 4, the remedial option selected is infeasible due to the steep slopes and depths to which the waste is buried.

EPA Response: EPA does not feel that the remedial options for source areas 4, 5, and the MSR facility are too costly when evaluating the fact that remediation is being carried out to protect human health and the environment. Adequate shoring will be performed when excavating source area 4.

Comment: (Page 11-8) The NL Industry site used an industrial level for lead contaminated soil of 1,000 mg/kg and a residential cleanup of 500 mg/kg. These levels show that flexibility in cleanup levels should be considered.

EPA Response: As discussed previously, the soil remediation standard for lead can range from 500 to 1,000 ppm. Since much of the affected areas are considered residential at this site, the standard of 500 ppm was chosen as the remediation level. EPA was conservative, so as to be protective of human health and the environment. As a note, the ILCO site used a cleanup level of 300 ppm for soil, which shows that the remediation level could have been lower than the 500 ppm chosen for the Bypass Site.

Comment: (Page 11-12) The text regarding selection of remedies is very misleading. The RODs listed on pages 11-4 through 11-11 present the most common remedy as S/S. This remedy was chosen in four sites, and it was chosen as the contingent remedy in additional sites for a total of five S/S remedies. Soil washing was the second most common remedy, including three sites. Incineration was not a primary remedy.

EPA Response: The text gives a summary of the treatment processes chosen at the listed sites to treat the various types of waste, and therefore, is not misleading.

Comment: (Page 11-12) In comparison with the ROD remedy cost range provided on this page, the remedy proposed for implementation at the Bypass 601 Site has a CDM present worth estimate of $53 million. ERM believes this cost to be significantly underestimated as noted elsewhere in these comments. This cost also exceeds the uppermost end of the cost range of all the ROD remedies listed by $8 million; therefore, the remedy warrants further investigation from a value engineering perspective to determine how its cost-effectiveness can be increased.

EPA disagrees. Conservative assumptions were appropriately made in conducting the FS, estimating costs, and selecting a remedy for cleanup.

Comment: (Page 11-15) While Table 11-2 states that Subtitle D (Industrial Waste Landfills) are not likely to be applicable, since it is unlikely that such a landfill would accept CERCLA wastes, the remedy proposed for implementation assumes use of such a landfill. Moreover, the RI/FS has not established that the wastes are hazardous under RCRA (via TCLP testing), and consequently this option should not have been eliminated.

EPA Response: EPA conservatively assumes that materials contaminated above remediation levels are hazardous and would not be permitted to be disposed of at an industrial landfill. The remedy chosen involves treating the waste onsite prior to offsite disposal. After treatment, the soil will be considered nonhazardous, after passing TCLP testing, and can be disposed of at an industrial landfill. See the previous response to TCLP testing.

Comment: (Page 11-20) Institutional controls are stated to "satisfy all criteria," at minimal cost. This option is considered technically feasible and protective of human health and the environment, but administratively relatively infeasible. The administrative infeasibility should be reexamined, as deed restrictions and groundwater use restrictions have been successfully implemented in other areas of the country. Institutional controls are particularly applicable for areas 2 and 9, where only residual contamination remains, and where groundwater levels of metals are not significantly elevated.

EPA Response: The text appears to have been misleading. The FS states "the administrative implementability of this process option is low" which is meant to indicate that there would be minimal implementation constraints.

Comment: (Page 11-21) The reliability of clay caps has been proven in many situations, including landfill construction and site remediation, and capping of contaminated soils. While it is true that clay caps generally are not as effective as multimedia caps for preventing contaminant migration, they can also be significantly less costly. Eliminating soil and/or clay capping from further consideration does not take into account the cost/benefit ratio of this particular remedy, or the fact that it can adequately protect human health and the environment.

EPA Response: EPA believes multimedia caps are the most reliable and effective types of caps. The secondary screening is based on effectiveness and implementability. Cost is used to screen out process options only if one is considered significantly higher than the other, but both relative effectiveness and implementability are not significantly different.

Comment: (Page 11-21) In addition to multimedia caps and clay and soil caps, asphalt caps should have been considered, especially for area 6, which is directly behind a tire store. The asphalt cap described and screened out in Table 11-2 appears to be an MC-30 type, which will not have long-term reliability, instead of an engineered asphaltic pavement. An engineered asphaltic pavement will have a permeability of 10E-06 cm/sec, which should be sufficient for capping purposes.

EPA Response: The area of contamination at source area 6 covers a steep bank leading down to Irish Buffalo Creek. Therefore, EPA believes that asphalt would not be effective here.

Comment: (Page 11-21) This page states that "capping is particularly applicable when the waste covers an extensive subsurface area and excavation and removal are impractical." This is precisely the case in areas 4, 5, and the MSR facility. Therefore, this option should not have been eliminated in the final selection of remedy.

EPA Response: Battery wastes at source areas 4 and the MSR facility are below the water table. Therefore, EPA believes that in order to effectively reduce groundwater contamination, the wastes and subsurface soil contamination needs to be removed and not capped in place.

Comment: (Page 11-22) This page states that "excavation and removal... may be cost prohibitive at great depths." This is the situation in area 4. It also states that "factors to be considered include worker health and safety, feasibility of onsite containment... and costs of disposal once the waste has been excavated." In areas 4, 5, and the MSR facility, there is limited working area due to the small site area, onsite containment is feasible, the costs for offsite disposal will be quite significant, and the need for shoring or other protection of worker health and safety during deep excavation must be considered. In addition, the volume of backfill required will be very large. All of these issues should have been factored into the evaluation of the selected remedy.

EPA Response: As discussed previously, battery wastes at source area 4 are below the water table. In order to be protective of human health and the environment, excavation must take place.

Comment: (Page 11-23) Removal of deep contaminated soil below the water table, is not a defensible action, unless waste material or free product are present, which is not the case. This is because the actual medium bearing the contamination cannot be determined with certainty (i.e., whether contaminated soils are leaching to groundwater or whether contaminated groundwater is contaminating soils). In addition, backfill of clean soils into an area through which contaminated groundwater may still flow only serves to recontaminate the clean fill.

EPA Response: This comment is incorrect. As discussed previously, battery casings are present below the water table and require removal. EPA believes that the clean fill will not be contaminated above remediation levels as a result of contaminated groundwater. Instead, the clean fill will aid in the remediation of groundwater, since contaminants will sorb to the fill material, thus reducing the concentrations in groundwater.

Comment: (Page 11-24) Offsite treatment should have been retained as an option, if offsite disposal following onsite treatment remains the recommended remedy. This is because a staging area will be required in the proposed remedy to treat (via stabilization) the soils onsite, and space at the site is very limited. In addition, it is less costly to haul the unstabilized material, since there is a significantly lower volume before treatment, to its destination.

EPA Response: It is EPA policy to actually treat the waste onsite, if possible, rather that transport it offsite as hazardous material.

Comment: (Page 11-27) Thermal desorption is not needed for the soils in question, since the majority of soils are not contaminated above acceptable levels with PAHs. In addition, the degree of leachability of the PAHs is not known, since no leach tests have been conducted. The cleanup levels for these compounds could change once the leach results are available, as the levels are based on the assumption of leaching to a potable source of groundwater.

EPA Response: See the previous response on PAH remediation.

Comment: (Page 11-28) The teachability of the stabilized soils should be considered in the context of the unstabilized soils (both for metals and PAHs). Since no teachability tests have been conducted on the soils, it is not known whether some of the contaminants in the soils are not already bound sufficiently such that they do not leach at unacceptable levels. This needs to be determined first before treatment is assumed to be necessary.

It is noted that contaminated soil and debris (and possible sediments) would be treated in an onsite batch plant and replaced in the excavated area at the MSR facility. Where will be the staging area for all the waste removed from the MSR facility portion designated for eventual storage of the treated waste? Alternatively, where will the treated waste be stored until all the necessary waste material is removed from the MSR site such that replacement of treated soils can begin?

A near doubling of volume of the stabilized soils is noted on p. 11-28. This further reinforces the need for offsite treatment if offsite disposal is contemplated, to reduce transportation costs.

EPA Response: Leaching analyses were performed as part of the RI/FS to determine remediation levels for the protection of groundwater. These analyses are presented in Appendix L. EPA believes that the analyses conducted and the results are sufficient for the purposes of conducting the FS and choosing a remedy for cleanup.

These decisions will be decided during the remedial design phase.

Onsite disposal is being selected for this site.

Comment: (Page 11-29) The discussion of offsite landfilling assumes that land ban restrictions will apply. In the absence of leach test results, it cannot be assumed that all materials that require remediation will be hazardous. The discussion of onsite disposal assumes that the wastes are RCRA-hazardous and that therefore RCRA requirements pertain to the construction of the landfill. This cannot be assumed, until teach testing has been completed.

EPA Response: See the previous response on TCLP testing.

Comment: (Page 11-30) Land disposal requirements do not apply to onsite remedies where placement has not occurred. The definition of what area is onsite should include areas 2 through 9, to allow for maximum flexibility in carrying out the remedy, and to allow for consolidation of waste materials without triggering placement.

The TCLP extract levels should conform to federal standards (i.e., 100 times the MCL), not to the groundwater standards themselves. This is because this is how a characteristically hazardous waste is defined by rule.

EPA Response: EPA conservatively assumed that land ban restrictions may apply.

See the previous response on TCLP requirements.

Comment: (Page 11-32) The FS does not adequately discuss the expected performance of a groundwater collection system. There is no discussion of how or how well a groundwater collection system would work given the particular hydraulic characteristics of the site.

EPA Response: EPA believes that the FS adequately evaluates the technologies and alternatives and that the hydraulic measurements collected were sufficient in performing the FS and selecting a remedy. EPA believes that a groundwater collection system is feasible and appropriate for the remediation of contaminated groundwater at the site. The actual collection system will be designed and expected performance evaluated during the remedial design and remedial action phases.

Comment: (Page 11-33) There were evidently no dissolved metals data taken for groundwater. Because chemical precipitation is proposed as part of the remedy for groundwater, the relative proportion of suspended and dissolved metals needs to be determined. In the event that the majority of metals are suspended (due to residual well water turbidity), chemical precipitation, and if fact, groundwater remediation may not be needed for a large portion of the area contemplated for groundwater recovery.

EPA Response: Based on the data collected during the RI, EPA believes chemical precipitation will be required. In addition, EPA believes that the data collected during the RI gives sufficient indication of groundwater contamination and, therefore, remediation is warranted.

Comment: (Page 11-34 and 11-36) The discussion of air stripping as a remediation technique does not adequately address its applicability to this site. There is no discussion of the particular volatile compounds involved at the site and whether or not they are strippable or treatable using air stripping. In addition, although the FS suggests that air emissions would be controlled if necessary, this may not be feasible for certain contaminants. In addition, there may be specific requirements in North Carolina which have not been addressed, including air attainment status, and limits on Clean Air Act Amendments Hazardous Air Pollutant emissions. Other EPA regions have been very concerned about creating additional air emissions sources in the process of remediating sites.

EPA Response: EPA disagrees. The text states that air stripping will be adequate in remediating VOCs at the site. As indicated in Table 10-8, the volatiles to be air stripped are benzene, carbon tetrachloride, and 1,2-dichloroethane (listed as contaminants found in groundwater at the MSR facility).

EPA believes that technologies are available for controlling air emissions at the site and these will be implemented, if needed. Actual design parameters and permits will be evaluated during the design phase.

Comment: (Page 11-36) Off-gas concentrations should be estimated in the FS and the need for off-gas controls evaluated during the FS to provide a realistic cost estimate for the groundwater treatment system. The organics that are strippable are not particularly well adsorbed on vapor-phase carbon. Consequently, fume incineration could be needed. If this technology is required, it may shift the selection of treatment measures to another option, based on the relative cost-effectiveness of the two options.

EPA Response: Off-gas controls are included as part of the unit price of the treatment system. EPA believes that fume incineration will not be necessary, and that the FS was sufficient in evaluating all technologies and alternatives. Actual design parameters will be determined during the design phase.

Comment: (Page 11-37) Separate pretreatment for air stripper fouling should not be needed, in view of the need for metals removal via chemical precipitation or alternate means.

EPA Response: EPA believes that separate pretreatment for air stripper fouling would be needed to remove iron and TSS. It should be noted that the text here is only giving a description of air stripping and what is involved in the implementation of this type of treatment. Since the actual treatment system chosen for this site includes metals precipitation, this will probably be sufficient in removing metals that may foul the air stripper.

Comment: (Page 11-40) Activated carbon adsorption should not have been retained for consideration, because the effluent limits for volatiles can be met by air stripping alone.

EPA Response: Carbon adsorption is only being retained conservatively as a polisher to air stripping. If, during the design phase, it is found that this is not necessary, it will be removed from the treatment train.

Comment: (Page 11-41) Ion exchange for groundwater treatment is generally inappropriate, because even ion-selective resins have high regeneration costs and a high potential for fouling. Sulfate may not require treatment, if the results of testing to date include a significant proportion of insoluble sulfate.

EPA Response: As discussed previously, data indicates sulfate concentrations exist above remediation levels, thus warranting remediation. EPA believes that ion exchange would effectively treat contaminated groundwater for sulfates.

Comment: (Page 11-41) The discussion on UV/oxidation is very brief and does not adequately address why this remedial alternative is eliminated. UV oxidation is an effective technology which has been used for treating groundwater contaminated with the organics present at the site and it should likely be retained as a technology at this point.

EPA Response: EPA disagrees. The text states that ozone generating equipment is very expensive and requires specialized operations. EPA believes that the organics present at the site can be more readily air stripped. Therefore, UV/oxidation was eliminated from further consideration.

Comment: (Page 11-41) UV/peroxidation should have also been considered, not just UV/ozonation.

EPA Response: EPA believes that UV peroxidation is not a common technology with proven effectiveness. Therefore, only UV/ozonation was discussed. However, UV/peroxidation would have been eliminated for the same general reasons as UV/ozonation.

Comment: (Page 11-44) The discussion on discharge to the POTW is confusing and contradictory. The text states that discharge to a POTW of treated water would be retained for further consideration, but then goes on to state that option is eliminated from further consideration because it is less attractive than discharging to the onsite surface water body. This issue should be clarified. Additional information on the distance to an appropriate sewer tie in point is needed for this option to be evaluated as feasible. Additionally an explicit statement that the specific POTW has capacity and can accept this discharge is required.

EPA Response: This was a typographical error. POTW is not eliminated from further consideration. The feasibility of transporting treated groundwater to the POTW was sufficiently evaluated during the FS. Conversations with the POTW have indicated that the discharge could be accepted through sewers or by trucking. The actual means of transportation will be determined during the design phase.

Comment: (Table 11-4) The analytical method required for the volatiles for the limitation of "below detection limit" (BDL) needs to be determined.

EPA Response: Table 11-4 and the "BDL" citation refer to discharge to the POTW. The POTW will set the discharge limits when an agreement is reached with them for discharge. This will be determined during the RD.

Comment: (Page 11-45) The alternatives that were selected for evaluation in Section 11.5 from the various remedial measures retained in Section 11.4 are selected without justification. The alternatives represent the most extreme case for either strict containment, extensive treatment, or offsite disposal. Combinations of capping, treatment, and disposal were not evaluated, as they should have been, to tailor the remedy to the contamination at the various site areas.

EPA Response: EPA believes that the process options were combined to form alternatives that meet remediation levels most effectively and protect human health and the environment the greatest. The combinations of capping, treatment, and disposal did not meet these objectives.

Comment: (Page 11-46) Multimedia capping should have low capital and low operations and maintenance cost, relative to any of the treatment alternatives for soil, not moderate to high cost. Removal via excavation will have high cost, not moderate cost.

Excavation is not readily implementable at all the various site areas, due to the need to remove soils in forest areas, the depth to which waste extends, and the fact that a portion of the area yet to be excavated was regraded or filled with clean fill during the removal action.

The assertion that stabilization has moderate to low operations and maintenance costs, versus high operations and maintenance costs for soil washing and thermal desorption is erroneous. As will be seen later in this document, the FS significantly underestimates the cost for stabilization. In actuality, none of these alternatives will have long-term operations and maintenance except during their implementation onsite.

Table 11-5 discusses the effectiveness, implementability, and cost of several soil process options. The implementability elements for containment and removal are somewhat misleading. For containment, the table states that time is required for implementation: this is also true for removal. The table also states that excavation is readily implementable. There should be an indication that excavation of 98,000 cy of soil will take considerable time to implement.

EPA Response: EPA disagrees. EPA believes that multimedia capping has a moderate to high cost as compared to the other alternatives, and excavation will have a moderate cost as compared to the other alternatives.

EPA disagrees. With the appropriate equipment, which is readily available, excavation should be easy to implement.

EPA disagrees. EPA believes that soil washing and thermal desorption have a higher cost than S/S.

EPA disagrees. As stated above, excavation is readily implementable with the appropriate equipment.

Comment: (Page 11-48) Groundwater extraction wells would have moderate, not low, capital cost, since so many are proposed for the remedy, as it is presently configured.

Chemical precipitation systems have moderate, not low, capital cost. Conversely, air strippers have low, not moderate, capital cost. Carbon systems have moderate, not high capital cost.

EPA Response: EPA disagrees. EPA believes that groundwater extraction wells will have a low capital cost compared to other alternatives, such as slurry walls.

EPA disagrees. EPA believes that chemical precipitation systems have low capital costs. EPA also believes that air strippers have moderate capital costs and that carbon systems have high capital costs.

Comment: (Page 11-49) Reverse osmosis and ion exchange are not readily implementable, as both need extensive pretreatment to prevent resin/ membrane fouling. Both of these technologies would require more extensive pretreatment than air stripping.

Discharge to a POTW should have a lower capital and O&M cost than discharge to surface, because the pretreatment requirements will be less stringent for POTW discharge.

EPA Response: EPA disagrees. Even though pretreatment is involved, EPA believes that these technologies are readily implementable given the appropriate equipment. EPA disagrees. Although pretreatment requirements will be less stringent, transportation needs makes this option more costly than discharge to surface water.

Comment: (Page 11-50) The statement that "capping may not meet the remedial action objectives for the site" is erroneous, since it will both reduce the mobility of contaminants, prevent direct contact with wastes, and prevent degradation of groundwater. All of the remedial objectives listed on p. 10-12 can be met with a properly designed cap.

Soil washing is assumed to meet remedial action objectives, although the existing partitioning data indicate that the lead is strongly sorbed to the soils. Moreover, no leach testing or treatability has been done to determine whether, in fact, soil washing would be successful at meeting the soil cleanup levels.

The use of soil washing and S/S is redundant in Alternative 4S, as either technology could address the concern of lead leaching.

EPA Response: EPA disagrees. Remedial action objectives are the remediation levels established for the site. As discussed previously, battery casings are evident below the water table, thus causing groundwater contamination. In order to meet the objectives for the site, removal is necessary. Capping would not be effective.

EPA believes that S/S is the most appropriate treatment technology for contaminated soils at the site, based on the FS results. If, during the remedial design phase, it is determined that S/S is not effective, then other means of treatment will be evaluated.

Soil washing is not meant to be redundant, but instead is used as a volume reduction step before S/S. This would decrease the volume of material that would need to be solidified.

Comment: (Page 11-53) It is inappropriate to pump contaminated groundwater from all areas that contained battery casings, when some of these areas have been excavated extensively already. In these latter areas, there may be no need for groundwater pumping; rather, monitoring should be conducted to assess natural attenuation of the plume over time.

The limited action alternative, including point-of-use treatment for any affected residential wells should be employed during the attenuation period, in lieu of needing significant pipe runs to link isolated groundwater plume collection systems together.

In view of the low discharge limit for lead for surface discharge, hydroxide precipitation may not be sufficient to achieve this level. Iron coprecipitation may be a more efficient technology. Until it is determined whether the metals in the groundwater are in soluble or suspended form, the type of metals treatment and the extent of groundwater recovery cannot be specified.

EPA Response: EPA believes that complete pump and treat is the most appropriate and effective way of remediating contaminated groundwater at all source areas.

As stated above, EPA believes that complete pump and treat is the most appropriate and effective way of treating groundwater at all source areas. Limited action does not meet remedial action objectives for the site.

The type of metals precipitations will be determined during the remedial design phase.

12.0 DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES

Comment: (Page 12-5) The statement that "contaminant leaching to groundwater and surface water from contaminated soil and sediment would continue" should be qualified by the fact that there are no leaching data on the site soils or the battery casings.

EPA Response: EPA disagrees. Leaching analyses were performed as part of the RI/FS, as presented in Appendix L. The analyses indicate that leaching to ground water and surface water from contaminated soil and sediment is a potential problem at this site.

Comment: (Page 12-7) In considering soil remedies, the various source areas should not be examined as a whole, since different remedial measures apply to differing degrees at the individual source areas. For example, areas 2 and 9 are appropriate for monitoring only, to see if the relatively low levels of contamination in groundwater in these areas dissipate over time now that the majority of the source is removed. Areas 3 and 8 likely should be excavated, although more data regarding the depth of contamination is required for both these areas. Areas 4, 5, and the MSR facility could be capped in place, incorporating the soils excavated from other areas. Area 6 is in a commercial area and could be capped with a traffic-bearing cover to prevent further infiltration.

The volume of 98,419 cy for excavation includes soils in areas 4, 5, and the MSR site. It is not sensible to excavate these areas, when a cap could be placed over these soils in place. Capping is the standard remedy for former landfills such as area 5. In particular, it is unnecessary to excavate the MSR site soils that will underlie the cap, since no under drains or liners beneath the soils are contemplated anyway, and the soils will remain onsite.

EPA Response: The source of contamination (battery recycling operations) has contributed to the contamination found at the source areas and, therefore, the site is being considered as a whole. The FS was conducted appropriately as each operable unit (soil and groundwater) was treated as a separate unit in terms of remediation. Therefore, all soils are treated as one unit and remediated in that manner.

As discussed previously, battery casings exist below the water table. Therefore, in order to be protective of human health and the environment, removal is necessary. Capping will not effectively stop contaminant leaching into groundwater.

Comment: (Page 12-10,12-19, 12-25, 12-30) Based on the area covered by the cap (Figure 12-1), there is no need to demolish the flea market buildings on area 4.

Also, the wipe samples conducted on the flea market buildings indicated, based on the absence of any discussion of the results in the RI or specific decontamination provisions in the FS, that the buildings tested were not contaminated above acceptable levels. Consequently, it appears overly conservative to assume that all the buildings to be demolished are contaminated.

EPA Response: EPA disagrees. There is a need to demolish portions of the flea market buildings if battery casings extend under the buildings, as anticipated. It is unknown whether the levels found are acceptable, as there are no guidelines for evaluating wipe sample data. Therefore, as discussed in the report, in order to give a conservative cost estimate only, the buildings have been considered hazardous.

Comment: (Page 12-10) It is important to stress that the remedial action objectives in the area would be met by a capping alternative.

EPA Response: As discussed previously, remediation levels set for remediation would not be met by capping, since battery casings exist below the water table, thus increasing contaminant concentrations in groundwater.

Comment: (Page 12-11) Capping will not cause increased erosion if the cap is installed properly such that runoff is controlled. Capping onsite, if properly performed, can provide as ultimate and permanent a remedy as any cap in an offsite RCRA disposal facility.

EPA Response: EPA agrees that capping will not cause increased erosion if the cap is installed properly such that runoff is controlled. The text merely indicates that capping will increase erosion if the cap is installed without any runoff control.

Comment: (Page 12-12) The toxicity of soil in areas that have been excavated would be negligible, just as the volume and mobility would be minimal. This is because the waste is no longer present in the areas.

The groundwater treatment system costs and selected technologies do not appear to take into account the treatment of equipment wash water, which would contain high suspended solids levels.

The noise, fugitive dust, and truck traffic arising from large-scale excavation, and backfill of excavated areas will continue over a three-year period. This constitutes a significant impact on surrounding residents.

EPA Response: EPA agrees. M/T/V will be negligible for areas where contaminated soil is excavated and removed. However, M/T/V will not be reduced in the areas where the cap is constructed.

EPA disagrees. These costs were evaluated and it was determined that they should not be significant compared to the overall cost.

EPA agrees. However, precautions will be taken to alleviate these impacts to the greatest extent possible.

Comment: (Page 12-13) The proposed location of the decontamination pad is in a wooded location, away from site roads, and near a stream. A better location requiring less site work and thus being cheaper to implement would be near where the trucks will enter and exit the site.

EPA Response: Comment acknowledged. The final location of the pad would be a component that is decided upon during the setup of the treatment plant (design phase).

Comment: (Page 12-14) The truck routes shown on Figure 12-4 do not include those to be used for bringing clean fill into the excavated areas.

EPA Response: EPA agrees. The purpose of Figure 12-4 is show the major routes that will be traveled during excavation of contaminated soil. However, EPA believes that backfill would be transported along the same routes.

Comment: (Page 12-18) If the majority of the MSR site is to be used for disposal of treated material, where will there be sufficient area to excavate the MSR soils affected and hold them prior to redisposal, until all soils that are planned to be excavated from the MSR facility have been removed?

EPA Response: This will be evaluated during the design phase.

Comment: (Page 12-18, 12-24) It is unnecessary to shred the battery casing debris, since the larger debris could be better washed down to clean it without shredding it. It is not known at present whether the debris even contains lead above allowable leachate levels. The debris constitutes a significant volume of material. To stabilize this material in shredded form could occupy up to 37,000 cy of disposal capacity, which is excessive in view of the potentially limited benefits derived. The calcium oxide would likely not need to be added to the debris if it were washed, as the acid associated with the lead could facilitate the lead's ready separation from the debris.

EPA Response: As discussed previously, EPA believes that S/S is the most appropriate way of dealing with the battery casing debris. If, during the remedial design phase, it is determined that S/S is not effective, then an alternate means of treatment would be employed.

Comment: (Page 12-21) A higher volume of truck traffic than in Alternative 3S is caused by this alternative, because stabilization reagents in large quantities will be needed to carry out the alternative.

EPA Response: EPA agrees. However, EPA believes both alternatives will have a high volume of traffic compared to other potential alternatives.

Comment: (Page 12-24) What is the basis for the 78,230 cy that will be stabilized? Does this assume a significant volume reduction in the debris due to shredding? Only a small volume of soils contains PAHs exclusively and would need only thermal desorption. If stabilization is employed for wastes that have been thermally stripped, it appears that the thermal stripping step is unnecessary. This is because the volatile compounds are present in negligible amounts and the PAHs are strongly adsorbed onto soil, such that stabilization should be successful in rendering them nonleachable.

EPA Response: The 78,230 cy does not include the battery casings that are to be screened out and dealt with separately and the organic-contaminated soil (no metals contamination) that would only require treatment via thermal desorption. This volume consists only of metal-contaminated soil requiring treatment by S/S.

EPA agrees. That is why S/S has been chosen for the treatment process for all contaminated soil.

Comment: (Page 12-26) A higher volume of truck traffic than Alternative 4S is caused by this alternative, because stabilization reagents in large quantities will be needed to carry out the alternative.

EPA Response: EPA agrees. However, EPA believes both alternatives will have a high volume of truck traffic compared to other potential alternatives.

Comment: (Page 12-28) Alternative 5S should require a shorter time than Alternative 4S to implement, since Alternative 4S involves additional treatment.

EPA Response: EPA disagrees. The times should not be significantly different even though additional treatment steps are involved.

Comment: (Page 12-29) Alternative 6S states that stabilization would be required before offsite disposal, but no other treatment is specified. If no other treatment is needed for offsite disposal at a commercial TSD, why is soil washing or thermal stripping considered for the onsite disposal remedies.

EPA Response: It is EPA policy to evaluate more innovative technologies, such as soil washing, when treating waste. Under Land Ban, the facility receiving the waste would have to treat it before it could be disposed. The facility contacted for costing purposes uses S/S as the treatment process.

Comment: (Page 12-29) The cost and volume of backfill that would be required to offset the volume of materials hauled offsite in Alternative 6S is 123,000 cy. This is a large volume of material, and the truck traffic engaged in hauling it would be burdensome to local residents. Approximately 15,000 trucks would be needed to remove and import materials for this remedial alternative.

EPA Response: EPA believes that this will not be overly burdensome.

Comment: (Page 12-32) More than two years would be required to carry out this remedial alternative, considering the number of trucks involved.

EPA Response: EPA disagrees. One year should be appropriate for carrying out this alternative.

Comment: (Page 12-33) Rail hauling of the soils should have been examined, in view of the excessive transportation costs associated with Alternative 6S.

EPA Response: Rail hauling was examined and it was determined that there are no railways within a reasonable distance to have made this option practicable.

Comment: (Page 12-34 through 12-69) It is noted that the groundwater alternatives assume that the sources of contamination are not eliminated. This is fallacious and leads to unnecessary complication of the alternatives evaluation. This is because the logical sequence of remedial operations is to first remove or halt the mobility of sources and then determine whether the groundwater will clean itself up in reasonably short period of time or whether active pump-and-treat activities are needed to halt the spread of a plume downgradient. In fact, CDM draws the conclusion that because of decreasing concentrations, natural attenuation should be evaluated as a remedial option. The results of assuming that the sources are still present include the questionable statement that it is highly unlikely no action will meet the remedial action objectives or ARARs established for the site. The no action alternative may be appropriate for groundwater in areas that have had soils removed. This is because the source no longer exists. The risk assessment is based on no action conditions and so does not represent present site risk after the removal actions occurred.

EPA Response: In order to evaluate soil and groundwater alternatives separately and choose one from each, it was assumed that source control would not be implemented. Each operable unit is considered separately and treated separately. It is unknown whether source control will eliminate the need for groundwater remediation. Therefore, to be sure of protecting human health and the environment, complete pump and treat has been determined to be the most appropriate way of treating contaminated groundwater.

Comment: (Page 12-35) The remaining criteria evaluated under no action also are improperly evaluated, when the source of contamination is assumed to remain in each area, with its mobility unrestricted. The evaluation of remedial measures for groundwater should look individually at each area of intended remediation to determine what alternatives are most appropriate.

EPA Response: See comment response above. EPA believes that it would not be cost-effective to look at each area separately for treatment. It is more practicable to have one treatment plant for remediation.

Comment: (Page 12-36) How is "onsite" defined with respect to eligible properties for hookup to public water. No figures are shown for the number or location of affected homes, and the data taken on private wells suggest that only a few homes need public water, not the 10 assumed.

EPA Response: "Onsite" applies to residents within the plume of contamination. It is unknown how many homes would require hookup. Therefore, ten was a conservative estimate used for costing purposes.

Comment: (Page 12-37, 12-53) How is the groundwater monitoring program under the groundwater alternatives different from that described for soils on p. 12-4. The cost of monitoring appears to have been partially double counted between soils and groundwater.

Wells in areas 2, 9, 10, and 1 may not be needed, since virtually all the source has been removed from these areas. The well to the west of area 10 is also not justified, when Figure 10-12 shows no wells in this area, and therefore no data, that would indicate a contamination problem exists here. Areas 1, 2, 9, and 10 certainly should not need groundwater extraction, when area 1 does not, which shows comparable lead levels in groundwater.

Without dissolved metals data, it is premature to determine what areas need to undergo groundwater recovery for metals removal. The number of wells in areas 4, 5, and the MSR facility is excessive.

EPA Response: It is the same type of monitoring for both programs. As discussed previously, since they are separate operable units, they were looked at separately, and both included monitoring for tracking of contamination.

For the purposes of this FS and remedy selection. EPA conservatively estimated the extent of groundwater contamination above remediation levels, and conceptually designed a groundwater extraction system for cost estimating. In addition, the actual number and location of extraction wells will be determined during the remedial design phase.

Comment: (Page 12-39) The proposed groundwater extraction well locations for Alternatives 3GW-A&B are inefficiently spaced to capture the plume, as there are no wells at the downgradient edge of the plume in area 3, and there are far more wells than needed for containment of groundwater contamination in areas 4, 5, and the MSR facility.

EPA Response: EPA disagrees. As discussed above, the groundwater extraction systems for the different alternatives were conceptually designed for the purposes of conducting the FS and selecting a remedy. EPA believes that pump and treat is the most appropriate way to treat contaminated groundwater. The actual extraction system will be designed during the remedial design phase and will be based on groundwater sampling conducted at that time.

Comment: (Page 12-40) The assumed rates of groundwater recovery are excessively optimistic, given known Piedmont groundwater yields.

EPA Response: EPA disagrees. Based on the groundwater modeling results, EPA believes the rates are reasonable and appropriate for the purposes of this FS and remedy selection.

Comment: (Page 12-41,12-48) The labor costs assumed for Alternatives 3A and 3B in Appendix M conflict with the unrealistic assumption of minimal operator attention.

EPA Response: EPA disagrees. After the treatment system is running sufficiently, operator attention should be minimal.

Comment: (Page 12-38 through 12-69) The assumption that all treatment equipment would be leased is entirely without basis, since the rental costs would exceed the purchase price several times over during a 30-year life.

The assumption that the sludge produced by the groundwater treatment process would require hazardous disposal is overly conservative, since the overall lead levels are not that high in the groundwater.

The potential in Alternatives 3GW-A& B for further groundwater contamination, contaminated groundwater intake, and contaminant mobility, toxicity, and volume could be significantly reduced, not moderately reduced, by these alternatives, with fewer wells more advantageously placed, as discussed for p. 12-39 above.

EPA Response: It is EPA policy to rent equipment for remediation, instead of purchasing it. It is unknown if the treatment system will have to operate for the full 30 years, as the actual time for remediation may be less.

EPA disagrees. Although the assumption is conservative, EPA believes it is realistic and appropriate.

As discussed previously, the final design of the extraction system will be determined during the remedial design phase based on groundwater sampling conducted at that time.

Comment: (Pages 12-38 through 12-69) The description for each alternative states that air emissions controls will be necessary for the air stripper. However, no line item for air emission control equipment is included in the cost estimates and the cost used for air stripping does not appear to be sufficient to cover the air emission control system costs.

The discussion of engineering considerations for each alternative indicates that sludge quantity and quality are not yet defined, and ion exchange regenerant requirements for Alternatives 3GW-A&B are not yet determined. However, costs for these items are included in the O&M potion of the cost estimates in Appendix M. What are the bases for these costs.

EPA Response: EPA disagrees. The cost estimates provided are given in terms of unit price. Air emission controls are factored into this system unit price.

The costs for sludge quantity and ion exchange regenerant requirements are based on historical data for sites of this nature.

Comment: Comments were offered on the groundwater recovery system proposed as inefficient for Alternative 4GW-A&B. This is because the wells are so spaced that dead zones of no cleanup will occur between the wells. Also, Figure 12-6 is not consistent with the groundwater data and/or soil sampling data available in the RI for a number of areas in particular: areas 1, 2, 3, 8, 9, and 10.

EPA Response: As discussed previously, the final extraction system will be determined during the remedial design phase based on groundwater samples collected at that time. Also, as discussed previously, EPA disagrees. Figure 12-6 indicates the areas where groundwater is estimated to have been affected by metals, whether the metal is lead or any of the other metal contaminants of concern, and is based on sample analytical results, the source area data, and the hydrogeologic data collected indicating groundwater flow and contaminant transport potential.

13.0 COMPARISON AND SUMMARY OF ALTERNATIVES

Comment: (Page 13-2) Fencing should not be required for any of the source areas for Alternatives 4S, 5S, or 6S, since there will not be an untreated waste remaining at the site. In Alternative 3S, no fencing would be needed for any of the satellite source areas outside the main area to be capped. Groundwater use restrictions do not apply to the soil alternatives, as they are included in the groundwater remedial alternatives. Groundwater use restrictions might not be needed for all areas, depending on whether removal of the source resulted in rapid attenuation of the plume.

Until dissolved metals data are collected, it is not known whether the groundwater exceeds applicable levels to the extent assumed in the FS or not.

Fencing should not be required around any plume area, because there is no chance for incidental contact with the groundwater unless wells are installed. Groundwater use restrictions account for this possibility.

EPA Response: Fencing under Alternatives 4S, 5S, and 6S at all source areas apply while excavating contaminated soil. Until testing is performed on the soil in each source area to confirm that all contamination has been removed, fencing will restrict access into the areas. Groundwater use restrictions do apply to the soil alternatives since the operable units are being dealt with separately. Groundwater use restrictions will apply as long as the groundwater is contaminated above remediation levels.

See the previous response on filtered versus unfiltered samples.

Fencing would be installed around areas where wells and piping are being installed for pumping contaminated groundwater. This would prohibit the tampering of equipment.

Comment: (Page 13-3) Needs to be revised to conform to the comments on Section 12.

EPA Response: See comment responses on Section 12.

Comment: (Page 13-6) The Coastal Waste Treatment Disposal regulations should not apply to discharge to Irish Buffalo Creek. The Wastewater Discharge to Waters other than Surface Waters of the State should apply to Alternatives 3GW-B and 4GW-B, not 3GW-A and 4GW-A.

EPA Response: EPA disagrees. The Coastal Waste Treatment Disposal includes Class C waters, which Irish Buffalo Creek is listed as.

EPA agrees with the comment in that the Wastewater Discharge to Waters other than Surface Waters of the State should apply to Alternatives 3GW-B and 4GW-B, not 3GW-A and 4GW-A. There was a typographical error in this table.

Comment: (Page 13-8) Alternative 3S does significantly reduce leaching of contaminants into groundwater and eliminate their mobility, contrary to what Table 13-5 states. This is because a cap's function is to prevent infiltration and migration of contaminants to groundwater.

If a cap is properly constructed, the impermeable portion of the cap should not weather or crack during its lifetime. For offsite disposal, the liner should not weather, because it is not exposed to the atmosphere after waste is deposited.

EPA Response: As discussed previously, capping would reduce leaching in unsaturated soils because it prevents infiltration of rainwater. However, battery casings exist below the water table and, therefore, contamination leaching off the casings into the groundwater would continue.

There is no guarantee that a cap or liner will not encounter problems during their lifetime. EPA believes that this is a possible event that must be accounted for in the evaluation of the alternatives.

Comment: (Page 13-8) Table 13-5 is inconsistent with Table 13-2, since capping will virtually eliminate potential risk of contaminant leaching into groundwater, by reducing mobility.

EPA Response: As discussed previously, capping will not completely eliminate the potential risk of contaminant leaching into groundwater, since battery casings exist below the water table.

Comment: (Page 13-9) Alternative 3GW could be readily modified with fewer, but more effectively placed wells, to achieve a similar degree of long-term effectiveness, and reduction in mobility, toxicity, or volume, as Alternative 4GW.

EPA Response: As discussed previously, the final extraction system will be designed during the remedial design phase.

Comment: (Page 13-10) The design and construction of an impermeable cap is not a constraint to implementation— such construction is done routinely on sites across the country. For Alternative 4S or 5S, TCLP criteria would not need to be met for onsite disposal unless the agency decided that the waste was being placed outside the boundaries of the waste unit, which could encompass all the source areas.

Alternative 6S would still need adequate shoring, as large-scale excavation is planned.

Alternatives 4S, 5S, and 6S do not have the same short-term effectiveness as Alternative 2S-- there is progressively greater potential for dust generation and traffic disruption with each of these three alternatives.

EPA Response: "Constraints to Implement" is not meant to mean that the factors noted would hinder the incorporation of the alternative, but rather are shown as factors to consider when carrying out the alternative. There would be an amount of time required to design and construct the cap, however minor one might think it would be.

TCLP is required in order to dispose of the treated material onsite.

EPA agrees. Excavation under Alternative 6S will require adequate shoring.

There is a typographical error in the table. Short-term effectiveness under Alternatives 4S, 5S, and 6S are the same as Alternative 3S.

Comment: (Page 13-12) Alternatives 3GW-B and 4GW-B do not have the same constraints to implementation as Alternative 3GW-A. This is because the former alternatives do not need an NPDES permit, but rather POTW discharge approval. In addition, Alternatives 3GW-B and 4GW-B have fewer obstacles to implementation, because they do not include ion exchange, which is a problematic technology for groundwater treatment.

EPA Response: EPA agrees that Alternatives 3GW-B and 4GW-B do not have the same constraints to implementation as Alternative 3GW-A since an NPDES permit is not required. However, there would still be obstacles to implementation, since there would be transportation of treated groundwater to the POTW and coordination with them in establishing the discharge criteria.

Comment: (Page 13-15) Table 13-18 needs to be revised to correct items identified in Section 12 and the preceding tables in Section 13. EPA Response:

EPA Response: See comment responses on Section 12.

APPENDIX J GROUNDWATER MODELING

Comment: (Page J-15) The range of hydraulic conductivities is based on slug test results and literature values. Slug tests provide order of magnitude conductivity values only. The actual conductivities at the site will be influenced by occurrence of fracture zones and remnant fracture features. What was the distribution of hydraulic conductivity values in the model grid? Were higher hydraulic conductivity values used at stream valleys, where more highly fractured zones typically occur in the Piedmont.

EPA Response: As stated previously, EPA characterized the fracture system at the site, and concluded that on a site-wide basis, for the depth of contamination observed at the site, fracturing is extensive enough that groundwater flow and contaminant transport follow the principles of an equivalent porous medium with minimal preferential flow paths. The slug test results were used to help guide development of the model. Actual hydraulic conductivities used in the model are based on calibration of the model. EPA believes the model was calibrated adequately for use in the feasibility study and for selecting a remedy. The hydraulic conductivity distribution is given in Table J-2.

Comment: (Page J-44) Well yields of 4 to 6 gpm are optimistic. Sustainable pumping rates of less than 1 to 2 gpm are more typical for shallow recovery wells in the Piedmont.

EPA Response: EPA acknowledges that well yields of 4 to 6 gallons is only an estimate. However, this estimate is based on the model results which incorporates all the data collected from the site. EPA believes that this estimate is sufficient enough for performing a feasibility study and for selecting a remedy. It is likely that during the remedial design phase, one or more aquifer performance tests will be conducted at the site to obtain a better estimate of well yields.

Comment: (Page J-44) The recovery well system design proposed by CDM is excessive and flawed, and must be fully reconsidered. A more realistic groundwater remediation goal for this geologic setting is plume containment rather than plume recovery. Fewer recovery wells could serve this goal. The grid network design of recovery wells proposed in the RI report would result in "dead zones" between the individual capture zones where no groundwater flow and no contaminant recovery would occur. A network of recovery wells concentrated at the leading edge of the plume would be more efficient. Interception trenches may be a valuable option, particularly at the smaller satellite source areas which border streams.

EPA Response: The well system layouts presented in the FS Report are meant to be conceptual designs developed for evaluation of the groundwater extraction alternatives in the feasibility study and for remedy selection. They are not intended to be final designs. The final design of the groundwater extraction system will be performed during the remedial design phase, after additional design data are collected from the site. EPA's policy for groundwater remediation emphasizes recovery of contaminants, when feasible, over containment of contaminants. EPA believes that recovery of contaminants is feasible at this site and has therefore conceptually designed a groundwater recovery system instead of a containment system for use in the feasibility study. If during remedial action, it is determined that groundwater remediation goals cannot be met through the groundwater recovery system, EPA may reevaluate the groundwater system.

Comment: (Page J-54) ERM believes that the model indicates there is no substantial decrease in estimated total cleanup time (Table J-11) between a 46-well recovery system and a 29-well recovery system. This illustrates that increasing the density of recovery wells provides no appreciable advantage for remediation and is not cost efficient. The focus should be on plume containment. EPA needs to design a recovery well network which takes advantage of the natural flow patterns and accounts for the hydrogeologic features (i.e., fracture zones) which control groundwater flow at the site.

EPA Response: See above comment response.

APPENDIX L DERIVATION OF RISK-BASED CLEANUP GOALS

Comment: Many of the metals have been assigned cleanup levels equal to "average background" levels because the "average background" concentrations exceeded the values calculated for protection of groundwater. The derivation of the soil cleanup levels for protection of groundwater for metals is based on some K_d values which reference ASTM D-4319. ASTM D-4319 is not listed in the 1991 book of ASTM standards, and the testing method described in the RI/FS is very unclear. It appears that the test used soil from shallow wells and unfiltered water from deeper wells in some type of sequential batch test. In all cases, the initial water concentration was several orders of magnitude greater than the final water concentration, indicating that metals were actually adsorbing from the liquid phase onto the soil. This provides very little confidence in the results of these tests, and therefore in the derived K_d values.

EPA Response: K_d values for lead, chromium, and nickel were estimated by performing tests on soil samples collected in the field. The test method used was ASTM D-4319 (Standard Test Method for Distribution Ratios by the Short-Term Batch Method). A description of this test method should be included in the your ASTM standards manual for soil and rock. However, a copy of the method can be obtained from EPA. K_d values are very important in determining soil remediation levels for the protection of groundwater. These tests were performed to provide estimates of the K_d values based on actual field conditions, instead of resorting to literature values. Because the K_d values fall within the reported range of values for soils of similar nature, EPA believes the results are reasonable and valid for determining the soil remediation levels for the protection of groundwater.

Comment: For organics, a fraction of organic carbon in soil of 0.053% was used. Although this value was referenced to some field tests, it seems extraordinarily low. The K_d values for soils were derived from K_{ow} values using a regression equation which relates K_{oc} to K_{ow}. The regression equation is unnecessary, since there is an abundance of literature regarding K_{oc} for the compounds in question. Although, the derived values of K_{oc} appear relatively realistic, the low value of f_{oc} yields unrealistically low K_d values.

EPA Response: There are many different methods for estimating K_d values. EPA chose to estimate the K_d values for the organic contaminants using a scientifically accepted regression equation which bases its calculation on the fraction of organic carbon in the soil and the K_{ow} for the organic contaminant of concern. The fraction of organic carbon in the soil was determined based on laboratory analysis of three soil samples. The value obtained falls within reported ranges for soils of similar nature. Therefore, EPA believes the laboratory analytical results for the fraction of organic carbon in the soil are reasonable and valid. Since K_{ow} is chemical specific and not site-related, the K_{ow} values used were obtained from scientific literature. EPA believes this method for estimating the K_d values for organic contaminants of concern at the site is reasonable and valid.

Comment: With K_d values as low as suggested by the RI/FS, the organics in question would have completely leached from the system long ago. At the very least, the source strength reduction over time (i.e., average concentration over the period of exposure) should be factored into the evaluation, since the organics were evaluated as carcinogens.

For both metals and organics, the conceptual model of leaching and migration in groundwater should be seriously reconsidered. This is particularly important since the calculated dilution factor for the upper aquifer is very low. If the model used is determined to be appropriate, then the hydraulic conductivity and gradient numbers should be checked. A mixing zone of four feet is assumed, which is very unrealistic unless the upper aquifer has only four feet of saturated thickness. Justification must be provided for this assumption. The background concentrations are provided without adequate support and result in unjustified remediation values.

EPA Response: The processes involved in the leaching of contaminants from soils to groundwater are very complicated, particularly at sites which have very heterogeneous soils like the Bypass 601 Site. Because of the complexities involved, the leaching of contaminants from soil to groundwater is very difficult, if not impossible to model at this site. Therefore, EPA selected and used a leaching model which is conservative in nature, and for those parameters in the model which are uncertain or unknown, EPA used conservative estimates, so as to be sure of protecting human health and the environment. For those parameters in the model which field data were available (such as background concentrations), EPA used the actual field data. EPA believes this method for determining soil remediation levels for the protection of groundwater is reasonable and valid.

Comment: No information is presented on how the background concentrations were derived. It is implied that a linear average was used. At the least, a statistical analysis should be used to determine the upper bound background concentration at a confidence of 95%. The available data should be evaluated to determine if the distribution is normal or log-normal, and the appropriate methods used. This type of analysis is generally used and is very easy to perform. If there are only one or two data points, then the possibility of using local literature values should be considered. A fall-back should be to use the maximum background concentration, definitely not the average.

EPA Response: Only a small number of background samples were collected and analyzed at the site. EPA does not believe that performing a statistical analysis to determine the upper bound background concentration at a confidence of 95% is appropriate for such a small data set. Instead, EPA decided to be conservative and use the linear averages of the measured background concentrations in the leaching model, so as to be sure of protecting human health and the environment.

Comment: The direct contact values and exposure assumptions are overly conservative and misleading. The exposure assumptions use a child scenario over a 6-year period. Normally, one uses an adult scenario over a 30-year period for residential exposures. If a deviation from the standard default exposure assumptions document published by EPA is warranted, then CDM should have used a lifetime averaged scenario including the infant, adolescent, and adult life stages.

EPA Response: Direct contact values and exposure assumptions are based on EPA guidance (OSWER Directive 9285.6-03). Remediation levels for residential land use were based on a child exposure scenario because they are more protective of public health than an adult exposure scenario.

Comment: No explanation is given for the particulate emissions factor, and it is likely this is not a realistic exposure pathway. In many cases, the exposure and toxicity, values, particularly the carcinogenic potency factors and reference doses (oral, inhalation, and dermal contact) presented do not seem to make sense. There is no basis for using separate potency factors and/or reference does specifically for the dermal absorption pathway.

EPA Response: The paniculate emissions factor is explained on page K-65. Separate potency factors and reference doses are required for dermal absorption as explained in Appendix A to RAGS.

Comment: The numbers in the spreadsheets which make up tables L-1 through L-6 have several math errors. For example, all of the inputs to the equation in Table L-1 for benzo(b/k) fluoranthene are numerically identical to those given for benzo(a) pyrene, yet the calculated cleanup levels for those two compounds differ by an order of magnitude. No explanation is given in the text. Another example is the use of an absorption factor (ABS) for manganese of 0.01 in Table L-l and 0.001 in Table L-2. ABS should be 0.001 for manganese in all cases. The groundwater cleanup levels presented are thus improperly derived.

EPA Response: The carcinogenic PAHs were adjusted to reflect the varying toxicities of PAHs with respect to benzo(a) pyrene. An explanation in the text would have been appropriate. It is acknowledged that the wrong absorption factor was used for manganese in Table L-l. However, its impact is nil as Table L-l calculated remediation levels based on cancer effects. Manganese is not a carcinogen. EPA disagrees that the cleanup levels are improperly derived. The adsorption factor is not used in calculating the groundwater remediation levels.

Comment: For the residential use scenario, it is generally accepted that the dose via inhalation and dermal contact is equal to the dose from ingestion (i.e., total dose = 2 x ingestion dose). The RI/FS uses a volatilization factor of 0.5 $1/m^3$ for which no reference or justification is given. This results in an inhalation dose approximately 7.5 times the ingested dose. It is also questionable whether a risk-based groundwater concentration should override a state or federal MCL when the risk-based number is lower. Secondary MCLs should NOT be used, since they are aesthetic criteria.

EPA Response: The volatilization factor of 0.5 $1/m^3$ is referenced on page K-71 to EPA's Human Health Evaluation Manual, Part B: Development of Risk Based Remediation Goals. It is agreed that risk-based groundwater remediation levels should not override a state or federal MCL. This is the approach that was used as explained in Section 10 of the FS report. Vanadium, which has no state or federal MCL, is the only substance which had its groundwater remediation level based on risk.

APPENDIX M COST ESTIMATES

The following are the major comments on the cost estimates:

The cost of piping the water from the various source areas to the treatment system appears to omit costs for street/highway crossings, stream crossings, obtaining easements, and coordination with other buried utilities.

The list of major system components for each alternative is incomplete.

Costs for TCLP testing and stabilization (if sludge does not pass) are not included in the cost analysis.

No basis is given for the alternate water supply costs.

Relative costs are qualitative in nature, since there is no quantitative design basis for groundwater pump and treat other than flow.

Various components of the costs estimates are either too high or low (more realistic ones are provided).

EPA Response: EPA believes that the cost estimates are reasonable for the purposes of conducting the FS and selecting a remedy for cleanup. The cost estimates provided in this FS serve the purpose of estimating only. Treatment systems were not broken down into each and every instrument and piece of equipment that would be used, but instead, unit prices were given. Various vendors and past data were used to provide the main system components of each alternative and the price associated with them. The purpose of evaluating cost in the FS is to compare the alternatives to one another on a large-scale basis. The remedial design/remedial action phase warrants an in-depth look at the system components and pricing. Only after treatability studies have been performed and the remedial design has begun, can the cost of the treatment facilities and associated processes be analyzed in detail.

APPENDIX P BREAKDOWN OF SOIL/SEDIMENT VOLUMES EXCEEDING REMEDIATION LEVELS

Comment: The testing program performed as part of the RI/FS is deficient in several important aspects. For example, the initial testing program which was performed did not include TCLP tests on the subsurface soils. By not including these tests in the original RI it is impossible to know whether the in-situ materials are characteristically hazardous, thus necessitating the need for treatment prior to offsite disposal. The TCLP will also indicate the degree to which the materials in question will tend to leach.

In addition, the original RI did not include permeability testing of the overburden soils above the saprolite layer nor did it include gradational characteristics or plasticity index for the upper existing fill soils in the three major excavation areas (4, MSR, and 5). Geotechnical testing of the saprolite indicates a permeability of 10E-07 to 10E-09 cm/sec. The upper soils are generally existing fill soils associated with previous dumping operations. These materials include both waste material such as battery casings and wire, and soil cover material. This soil cover material that consists of locally available material which is mainly micaceous silts and silty sands. These materials have consolidated due to their own weight during the course of time that the landfilled materials have been in place. It is this consolidation which has likely reduced the permeability of portions of the upper fill materials to less than 10E-05 cm/sec. Infiltrating water from the surface likely tends to follow discontinuous flow paths created by the battery casings within the fill.

It appears that the previous feasibility study reports follow the assumption that the in-place materials leach significant amounts of lead and that water recharge flow from the surface is continuous and widespread. The agency contractor does not provide a clear picture in its evaluation in that the assumptions followed in the FS mislead the process (i.e., by assuming that the material is hazardous and leaching to the groundwater, in-place containment is not considered). The simple additional testing that should have been performed is relatively inexpensive (under $20,000), and sample collection could have been done during the original field investigation. By not performing the above-referenced analysis, CDM engineers were not able to evaluate the possibility of in-place containment for some of the "source" areas.

Cost estimates for the chosen remedy are grossly underestimated. Significant increases in the cost are anticipated due to inaccurate volume calculations, the need for dewatering of any excavations, stability considerations (i.e., either flatter side slopes or deep sheeting and shoring) and offsite transportation and disposal costs.

Based on the estimated volumes provided on Table P-l of the FS, the total estimated quantity of material to be removed and disposed of is 98,419 cy. However, by calculating the quantity of material in between the contaminated layers we found that approximately 108,000 cy of material will need to be removed as part of the overall remedial action. The total to be removed is thus in excess of 200,000 cy. During the remedial action, it will be impossible to completely segregate all the materials in the intervals as suggested on Table P-l; therefore, the quantity of material to be sent for treatment and disposal will increase due to inadvertent cross contamination and further increases cost.

The existing cost estimates do not include dewatering of the excavation, although it is mentioned as a possibility in the FS. These costs could be significant given the magnitude of the area to be excavated. The water which is removed will require tankage and testing prior to disposal. Water disposal costs could be considerable, since during a construction project, dewatering of the excavation is a non-stop process during the time when work below the groundwater table is proceeding. In addition, dewatering will be required during the construction process from surface precipitation which will last up to 3.5 years.

Like the dewatering issue, sheeting and shoring requirements are stated in the FS as are the possible need for flatter excavation slopes, but the cost estimate does not consider this issue. Typical deep sheeting cost vary between about $10/sf to $40/sf depending on the depth of excavation. Given the depth of excavations anticipated for the Bypass 601 Site, a unit cost nearer to the higher value is likely. Furthermore, these deeper excavations cannot be excavated by conventional means, given the limited work space requirements. Therefore, the cost estimates need to be modified to include non-conventional excavation techniques.

The most misleading cost figure in all cost estimates was the unit cost for offsite transportation and disposal. Based on vendor contacts, the cost will be double that originally projected.

EPA Response: EPA is confused over the above comments made on Appendix P. Most of the questions seem to stress the cost estimates made in Appendix M and it may be more advisable to put these comments there. Appendix P merely gives a complete breakdown of soil volumes and contaminant types by source area so that one could get an idea of where and at what depth the contamination lies in each source area. Costing issues and responses are discussed above under Appendix M.

ADDENDUM TO FS

Comment: The area affected by replacement of the stabilized waste as presented for the "new" remedies differs dramatically from that in Alternatives 4S or 5S, where onsite stabilization and onsite disposal are both proposed. There is no explanation as to why onsite disposal or the addendum would require so much additional space.

EPA Response: EPA evaluated the height of the onsite disposal areas under Alternatives 4S and 5S. Since a huge mound would exist, the additional alternatives looked at a larger area to see what the difference in height would make and how it would affect the area aesthetically.

Comment: Stabilization of the soils onsite before offsite hauling (Alternative 8S) is not practical, because the volume to be hauled, the resulting truck traffic, and the resulting hauling cost could as much as double over that of offsite stabilization at the point of disposal (Alternative 6S).

EPA Response: Onsite treatment is preferred over offsite disposal.

Comment: Has EPA's contractor verified that the BFI Landfill in Charlotte, NC would be willing and permitted to accept 200,000 cy of material? If a different facility located at a greater distance from the site is used, the associated transportation costs would easily double. Also, land ban considerations will affect disposal of the treated soil, if the soils are hazardous prior to treatment.

EPA Response: BFI was only contacted for cost estimates. At this time, a landfill has not been selected for offsite disposal of the treated material. During the design phase, a bid would be put out to eligible landfills and the lowest bid will win the contract. Land ban would be followed for disposal.

Comment: ERM has submitted alternate alternatives for soil and groundwater.

EPA Response: Additional alternatives were reviewed by the Agency. For specific information, see above responses.

C. COMMENTS FROM OTHER INTERESTED PARTIES

Comment: Contaminated soil should be treated and disposed of onsite (Alternative 7). It will stand as a monument to despoilers of the environment. These sites should serve as a reminder of the terrible loss and damage they do, not trucked to some unknown location and spoil another area.

EPA Response: It is not the goal of EPA to choose alternatives that "teach a lesson to polluters of the environment." The soil alternative for the Bypass 601 Site was chosen because it serves as the most protective to human and health and the environment.

Comment: The Cabarrus County Board of Commissioners adopted a resolution urging EPA to undertake a project to eliminate the hazards posed by the Bypass 601 Site and to begin the cleanup as soon as possible.

EPA Response: EPA recognizes Cabarrus County's support in wanting the Bypass 601 Site to be cleaned up completely and effectively.

Comment: With regard to the groundwater alternatives, Alternative 4 (complete pump and treat) was fully supported, since this would insure long term protection of human health and the environment Additionally, there was full support for discharge of the treated groundwater to surface water, upon meeting NPDES discharge criteria.

With regard to the soil alternatives, there is support for Alternatives 5 and 7. Both alternatives involve onsite treatment and onsite disposal. Offsite disposal of this material would be very expensive for no net gain. It is true that aesthetically the site would probably be improved by offsite disposal. However, improving aesthetics is not what the Superfund trust money is to be used for. Additionally, offsite disposal poses a measurable risk of vehicular accidents.

EPA Response: EPA recognizes and appreciates the support shown in implementing the chosen groundwater alternative. Discharge to the POTW has been chosen because it would not warrant pretreatment for sulfate, thus the treatment system would not include ion exchange for sulfate removal.

EPA agrees. Onsite treatment and disposal is now the preferred remedy.

Comment: The 53 million dollar cleanup deal sounds utterly stupid. With a landfill next door, the area has already been wasted. If lead does not travel, then why not "wrap it up" where it is now. In a few years the groundwater should be purged of contaminants. Superfund money should be spent on more urgent cases.

EPA Response: See the previous response.

Comment: The following comments were received regarding soil washing:

If alternative 4 was chosen, a significant savings on the costs allocated to groundwater treatment would be realized. Ex-situ soil washing requires the use of a well point system to dewater the excavation site. Additionally, a water treatment plant is required to treat the process water used in the soil washing. Typical soil washing prices include water treatment as part of the package. One cannot consider the soil washing separately from the water treatment as one supports the other. The use of soil washing would reduce the need for thermal desorption. Soil washing plants are most sensitive to clay contents in the soils -not contaminants. The process of bulk soil washing will concentrate both PAHs and lead in the fines regardless of whether one or both of the contaminants are present. This will reduce the need to test and segregate materials during excavation. It will also reduce the amount of soil which will require thermal treatment The use of soil washing will allow the treated soils to be cleaned at the site and reused immediately as fill material.

Soil washing methods that are economical are readily available, which allow for extraction of lead from the soil while it is washed and recycled. Input values of 40,000 to 60,000 ppm have been reduced to less that 100 ppm using this method. One option which should be explored is using soil washing to concentrate the lead in the fines and then sell the sludge to a lead processing facility for recycling.

In discussions, it was disclosed that the cost per ton rate for soil washing used to calculate Alternative 4 was perhaps twice as high as actual bids on such work have been in the past The use of soil washing and treatment of the fines represents a permanent solution to the contamination. There won't be a mountain of lead contamination remaining after treatment. The land would be an excellent building site after soil washing because of greater load capacity on treated soil. The land would have marketable value to help offset the cost of cleaning. The time period of 3.5 years for Alternative 4 is too long. A soil washing plant operates at 100,000 tons per year. Even if you allowed time for other activities a time frame of 18 to 24 months would be more reasonable. This reduction of time represents a significant savings in administrative costs for the project.

EPA Response: EPA appreciates this information shared on the technique of soil washing. However, soil washing is still considered an innovative technology, whose implementability on a commercial scale is still not yet fully proven. In addition, this technology was estimated to be more expensive to implement compared to S/S. Treatability studies still need to be performed to determine if S/S will meet the requirements of organics and metals remediation in soil. If the results indicate that there could be a problem, then other types of treatment processes will need to be looked at, which could include soil washing. The costs and timeframe for the alternatives evaluated in the FS are only estimates. The design phase will more accurately pinpoint these factors.

APPENDIX B

STATE CONCURRENCE

5 9 0295

State of North Carolina
Department of Environment, Health, and Natural Resources
512 North Salisbury Street • Raleigh, North Carolina 27604

James B. Hunt, Jr., Governor
Division of Solid Waste Management
Telephone (919) 733-4996
Jonathan B. Howes, Secretary

March 12, 1993

Ms. Giezelle Bennett
Remedial Project Manager
US EPA Region IV
345 Courtland Street, NE
Atlanta, GA 30365

RE: State Concurrence with the Record of Decision
Bypass 601, Groundwater Contamination
NCD 044 440 303
Concord, Cabarrus County, NC

Dear Ms. Bennett:

The State of North Carolina has reviewed the Record of Decision for the Bypass 601 Site and concurs with the selected remedy, subject to the following conditions.

1. State concurrence on this Record of Decision and the selected remedy for the site is based solely on the information contained in the attached Record of Decision. Should the State receive new or additional information which significantly affects the conclusions or remedy selection contained in the Record of Decision, it may modify or withdraw this concurrence with written notice to EPA Region IV.

2. State concurrence on this Record of Decision in no way binds the State to concur in future decisions or commits the State to participate, financially or otherwise, in the clean up of the site. The State reserves the right to review, comment, and make independent assessment of all future work relating to this site.

P.O. Box 27687, Raleigh, North Carolina 27611-7687 Telephone 919-733-4984 Fax # 919-733-0513

3. The Presence of residual contamination in the Solidified/Stabilized waste will require deed recordation/restriction to document their presence and could limit future use of the property as specified in G.S. 130A-310.8.

The State of North Carolina appreciates the opportunity to comment on the Draft Record of Decision for the subject site, and we look forward to working with EPA on the final remedy.

Sincerely,

Jack Butler

Jack Butler, PE
Environmental Engineering Supervisor
Superfund Section

cc: Randy McElveen, NC Superfund Section

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET. N.E.
ATLANTA. GEORGIA 30365

MAR 24 1993

4WD-NSRB

Mr. Jack Butler, PE
Environmental Engineering Supervisor
Superfund Section
NCDEHNR
401 Oberlin Rd, Suite 150
Raleigh, NC 27605

RE: State Concurrence on the Bypass 601
Record of Decision

Dear Mr. Butler:

EPA Region IV appreciates the State's conditional concurrence on the Record of Decision (ROD) for the Bypass 601 Groundwater Contamination Site located in Concord, North Carolina. For the record, EPA would like to respond to the conditions formulated by the North Carolina Department of Environment, Health, and Natural Resources (NC DEHNR) - Superfund Section in the March 12, 1993 letter. Your letter, along with this response, will be included in Appendix B of the ROD. These letters should stand as official documentation that EPA and NCDEHNR have agreed on the preferred alternatives at this time.

Of the three conditions expressed (concurrence based on current information; concurrence exclusive of future work and land restrictions to be applied based on State law); only the third condition requires a response from the agency. In response, the State may in the future put in place, pursuant to State law (G.S. 130A-310.8), a deed recordation/restriction to document the presence of residual contamination which may limit the future use of the property.

Please give me a call at 404/347-7791 if you have any questions.

Sincerely,

Giezelle S. Bennett
Remedial Project Manager