EPA/ROD/R04-99/079
1999

EPA Superfund
Record of Decision:

BATTERY TECH (DURACELL-LEXINGTON)
EPA ID: NCD000648402
OU 01
LEXINGTON, NC
09/30/1999

DURACELL BATTERY TECH SITE

RECORD OF DECISION
OPERABLE UNIT ONE

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

SEPTEMBER 1999

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DECLARATION FOR THE RECORD OF DECISION

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Duracell Battery Tech Site
Operable Unit One (OU1)
EPA ID # -NCD 000 648 402
To Address Soil and Sediment Contamination, and Ecological Concerns
Lexington, Davidson County, North Carolina

Statement of Basis and Purpose

This decision document presents the selected remedy for Operable Unit One (OU1) to address contaminated soil and sediment, and ecological concerns at the Duracell Battery Tech Site (the Site) in Lexington, Davidson County, North Carolina. This remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Selection of the remedy in this decision document is supported by the information contained in the Administrative Record for OU1.

The State of North Carolina concurs with the selected remedy.

Assessment of the Site

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Description of the Selected Remedy

The major components of the selected remedy for OU1 are:

- In-Situ Stabilization/Solidification of Contaminated Soil in the Former Plant #2 Area, followed by Capping of the Former Plant #2 Area;
- In-Situ Chemical Oxidation of Contaminated Soil in the Former Solvent Disposal Area, followed by Capping of the Former Solvent Disposal Area;
- Selective Excavation and Off-Site Disposal of Contaminated Soil in the Building #4 Area and the Northern Site Area, and contaminated soils and sediments located outside the facility fence line;
- Capping of other areas located within the facility fence fine for ecological concerns; and
- Long-term monitoring of site-related contamination in soil, sediments, and ecological receptors;

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the extent practicable. This remedy also satisfies, to the extent practicable, the statutory preference for treatment as a principal element of the remedy. Because this remedy will result in hazardous substances remaining on-site above health-based levels for an indefinite period of time, a review will be conducted within five years after initiation of the remedial action and every five years thereafter until remediation goals are achieved, to ensure that the remedy continues to provide adequate protection to human health and the environment.

Data Certification Checklist

The information fisted below is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record for this Site.

- Chemicals of concern (COCs) and their respective ranges of concentrations
- Baseline risks represented by the COCs
- Cleanup levels established for COCs and the basis for the levels
- Estimated capital, operation and maintenance (O&M), and total present worth costs; and the number of years over which the remedy cost estimates are projected
- Decisive factors that led to selecting the remedy

30 SEP 99

Richard D. Green
Director
Waste Management Division

Date

DECISION SUMMARY

The Duracell Battery Tech facility encompasses approximately 26.5 acres in a fight industrial/commercial area of Lexington. The subject of this Record of Decision (ROD) is Operable Unit One (OU1); which is EPA's designation to address contaminated soil, sediment, and ecological concerns associated with past operations at the Site.

1.0 SITE NAME AND LOCATION

Duracell Battery Tech Site
EPA ID Number - NCD 000 648 402
Operable Unit One (OU1)
Lexington, Davidson County, North Carolina

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Duracell site is located at 305 New Highway 64 East in Lexington, Davidson County, North Carolina. The 26.5-acre Site is an active facility that began operating in the 1950's. Previous owners/operators of the Site, including P.R. Mallory and Duracell, manufactured mercuric oxide batteries, as well as dry cells for commercial and industrial use. Over the years, several plant operations have been added to the Site to expand production.

Over the years various types of batteries have been produced at the Site; the following substances were used in the battery production:

- mercuric oxide powder
- cadmium oxide powder
- silver oxide powder
- manganese dioxide oxide powder
- manganese dioxide
- graphite
- zinc
- elemental mercury
- potassium hydroxide
- lithium metal
- ethylene glycol dimethylether

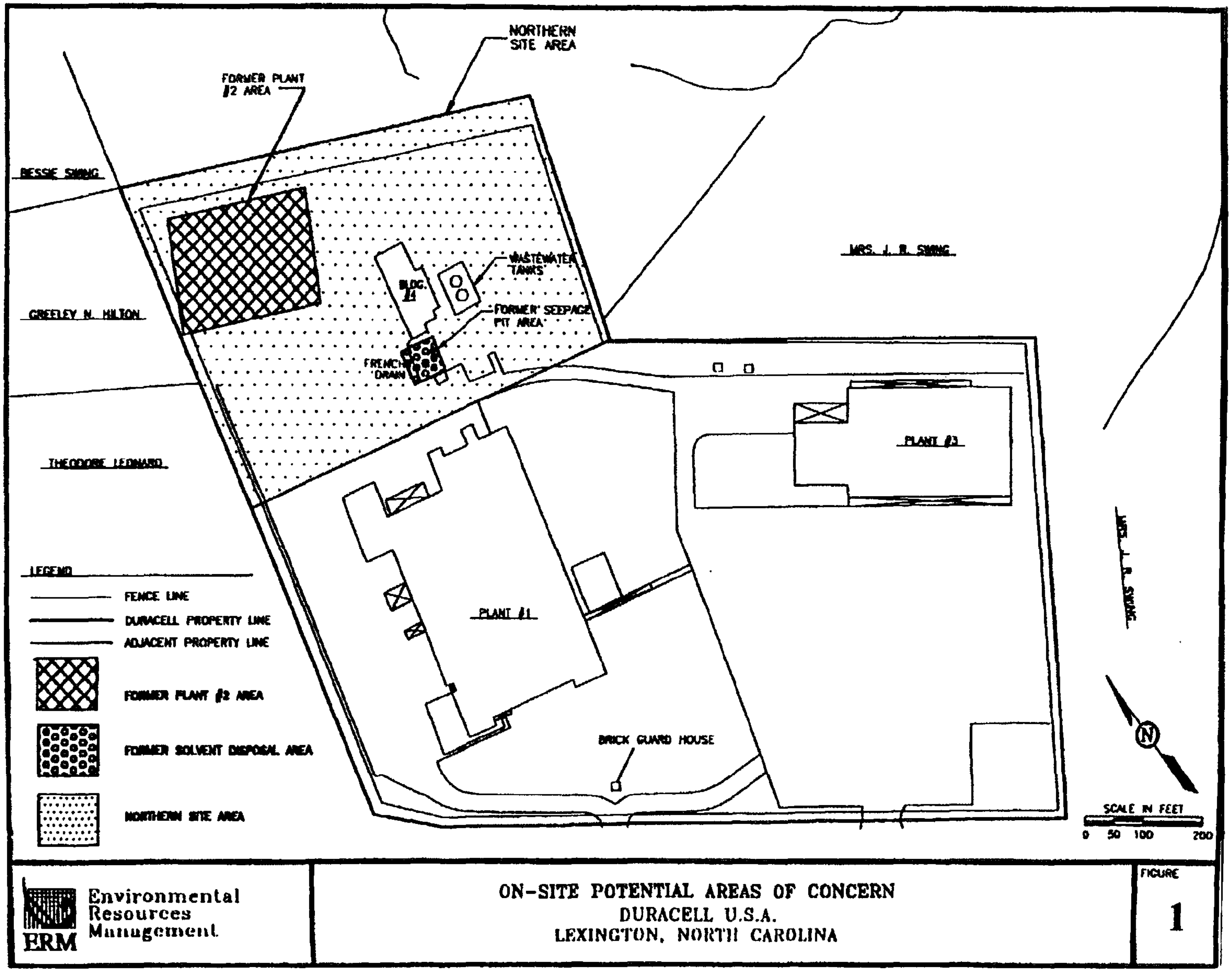
The Duracell facility currently consists of three main buildings; Plant #1, Plant #3, and Building #4. Plant #1 is the battery cell assembly operation where chemicals are mixed and placed into containers to make batteries. Plant #2 was the building where mercuric oxide was formulated from 1977 to 1986. Mercury reclamation operations also took place on the east side of Plant #2 from

1977 to 1986. A small wastewater treatment system consisting of two concrete-fined sumps was also in operation at Plant#2 prior to installation of the Memtek treatment system at Building #4. Plant #2 was demolished and removed from the Site in 1995. Plant #3 was purchased in 1976 and is utilized for testing, packaging, and shipping and receiving. Building #4 was built in 1981 to house the mercury reclamation furnace; this building is now used to store hazardous waste and house the wastewater Memtek pretreatment system Figure 1 shows the Site and the on-site areas of concern.

Site Operations over the years resulted in extensive mercury contamination in the soil and groundwater at the Site. One source of mercury contamination in the soil involved the past operations in the area of Plant#2. Another source of mercury contamination involved spillage while transporting the mercuric oxide from Plant #2 to Plant #1. Leaching of the mercury from the soil to the groundwater resulted in mercury groundwater contamination. Mercury is present in the on-site groundwater at levels significantly higher than both State and Federal drinking water standards.

Runoff from the Site over the years has also resulted in elevated levels of mercury in the sediment of the surface water pathways draining the Site, including the unnamed tributary of Fritz Branch, Leonards Creek, and Abbotts Creek southward to High Rock Lake. A 1981 fish tissue study conducted in Abbotts Creek and High Rock Lake revealed levels of mercury in excess of one part-per-million. Since these levels of mercury in fish are considered unsafe for human consumption, a fish advisory was placed on portions of Abbotts Creek and High Rock lake in June 1981. In 1992, the measured levels of mercury in the fish decreased below the one-per-million level, and the fish advisory was lifted. Since that time, mercury concentrations in fish have continued to decline and NCDENR has determined that Abbotts Creek is now fully supporting its designated uses.

Volatile organic compounds such as acetone, methylene chloride, trichloroethene, tetrachloroethene, 1, 1,1-trichloroethane, and 1,1,2-trichloroethane were used over the years as solvents to clean tools, dyes, presses, watch battery cells, etc. The solvents were routinely disposed of in an unlined pit located between Building #4 and Plant #1 from the early 1960s until the early 1970s. As a result, the soil in the area of the former disposal pit contains volatile organic compounds. On-site groundwater became contaminated as the volatile organic compounds migrated from the soil in the disposal pit downward into groundwater. Volatile organic compound contamination exists in the on-site groundwater at levels in excess of State and Federal drinking water standards.



ON-SITE POTENTIAL AREAS OF CONCERN
DURACELL U.S.A.
LEXINGTON, NORTH CAROLINA

The Site is not currently on the National Priorities List (NPL). However, an Administrative Order of Consent was signed between EPA and Duracell in 1995 to perform the RI/FS. Duracell agreed to conduct the RI/FS, and will incur all appropriate costs associated with the RI/FS as outlined in the Administrative Order. Although the Duracell Battery Tech Site is not on the NPL, the NPL-equivalent site is being addressed in a manner consistent with the National Contingency Plan (NCP).

3.0 COMMUNITY PARTICIPATION HIGHLIGHTS

Pursuant to CERCLA §1113(k)(2)(B)(i-v) and §117, the RI/FS Report and the Proposed Plan for OU1 were made available to the public in July 1999. These documents can be found in the Administrative Record file and the information repository maintained at the EPA Docket Room in Region 4 and at the Davidson County Public Library, 602 South Main Street, Lexington, North Carolina. In addition, the Proposed Plan fact sheet was mailed to individuals on the Site's mailing list on July 22, 1999.

The notice of the availability of these documents and notification of the Proposed Plan Public Meeting was announced in The Dispatch in July 1999. A 30-day public comment period was held from July 23, 1999 through August 23, 1999. In addition, a public meeting was held on July 29, 1999, at the Agricultural Center in Lexington. At this meeting, representatives from EPA answered questions about the Site and the remedial alternatives for the action under consideration. EPA's responses to comments received during the 30-day comment period, including those raised during the public meeting, are included in the Responsiveness Summary, which is part of this ROD. The Responsiveness Summary also incorporates a transcript of the Proposed Plan public meeting.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

Due to its complexity, the Site has been organized into two Operable Units. The objective of **Operable Unit One** is to address site-related soil and sediment contamination, and to implement a monitoring program for ecological receptors. **Operable Unit Two** will address site-related groundwater contamination. It is anticipated that the Operable Unit Two Remedial Investigation activities will be completed in Fall 1999. A separate Operable Unit Two RI Report, Baseline Risk Assessment, and Feasibility Study will be developed to evaluate the risk associated with the groundwater contamination, and to evaluate alternatives for addressing the groundwater contamination. The Operable Unit Two Remedy will be selected during calendar year 2000 to address the site-related groundwater contamination.

The primary objective of conducting the Operable Unit One Remedial Investigation was to determine the nature and extent of site-related soil and sediment contamination, and to conduct an ecological assessment to evaluate the potential impacts to ecological receptors. This information was used to support the development of the Operable Unit One Baseline Risk Assessment (BRA) and the Feasibility Study (FS).

5.0 SUMMARY OF SITE CHARACTERISTICS

The Duracell Battery Tech site encompasses approximately 26.5 acres in an area characterized as light industrial/commercial. The subject of this ROD is OU1, EPA's designation for addressing soil and sediment contamination, as well as ecological concerns. Therefore, Site characteristics for the soil, sediment, and ecological concerns will be discussed in this section. Groundwater concerns will be addressed with Operable Unit Two (OU2).

5.1 Topography and Surface Drainage

This section presents information Concerning the physical characteristics of the study area, including regional and site-specific surface features, surface water, geology, soils, hydrogeology, climate, land use, and ecology. This information was drawn from observations and data collected during the Phase 1, Phase 2, and Phase 3 field investigations for OU1, as well, as from previous studies, state and federal databases, and published sources.

The Site is located in central Davidson County, North Carolina. Davidson County is situated in the west-central part of North Carolina. Lexington is the Davidson County seat. The county is bounded on the north by Forsyth County, on the east by Guilford and Randolph Counties, on the south by Montgomery County, and on the west by Rowan and Davie Counties. Davidson County is separated from the last-named counties by the Yadkin River. The County encompasses an approximate 567-square mile area.

Davidson County is a plateau, dissected by numerous streams, which have cut deep, narrow valleys. The surface of the county is rolling to steeply rolling, and the lowlands along the streams constitute the only level areas. Some of the interstream areas are gently rolling or undulating. In the southern half of the county, the topography becomes semi-mountainous in the vicinity of Cid, Denton, Jackson Hill, Bain, Newsom, and High Rock. Among the more prominent of the semi-mountainous areas Flat Swamp, Three Hat, Rich, Wild Cat, Grist, and Bald Mountains. The higher elevations occur in the northern end of the county and the lower in the southwestern part, along the Yadkin River below High Rock Lake.

The Site is located in the Abbotts Creek drainage basin of eastern Lexington. The topography is rolling in the eastern portion near the Site. The ground surface at the Site exhibits a slope towards Fritz Branch, with elevations varying from 760 feet mean sea level (MSL) at the Site to 640 feet MSL at Fritz Branch. Davidson County falls within the Yadkin-Pee Dee River basin. Numerous small tributaries drain central North Carolina and discharge to the Yadkin River. The Abbotts Creek watershed encompasses approximately one-third of Davidson County and empties into the Yadkin River at High Rock Lake. The Yadkin River at High Rock lake, under the North Carolina Administration Code (NCAC) Section 15A.2B.0309, is classified as Class WS-IV waters. Class WS-IV waters are protected as water supplies, which are generally in moderately to highly, developed watersheds. In addition, these waters must be suitable for all Class C uses. Class C freshwaters are protected for secondary recreation, fishing and aquatic life propagation and survival.

Storm water runoff from the northern portion of the Site drains generally to the north/northeast into three unnamed tributaries. One tributary drains into Fritz Branch. Fritz Branch is a small perennial flow stream which flows from west to east and terminates in Leonards Creek approximately 2,000 feet upstream of Abbotts Creek. The second tributary, also drains to Leonards Creek about 500 feet upstream of Abbotts Creek and is an intermittent stream which can go dry during extended periods of low rainfall. The third northern tributary drains eastward from Plant #3 to Leonards Creek near the confluence with Abbotts Creek. Runoff from the southern portion of Site drains to the south/southwest to an unnamed tributary of Abbotts Creek. Abbotts Creek drains into High Rock Lake approximately 8.5 miles downstream from the Site. Both Leonards Creek and Abbotts Creek are classified as Class C waters.

The headwaters of Leonards Creek originate several miles due north of the Duracell facility. Approximately two miles north of the facility, Leonards Creek travels through City lake, a 30-acre lake. The land use in the Leonards Creek watershed is primarily rural including forested areas, pastureland and crop land. Fritz Branch, which enters from the west, drains a more urban area on the northeast side of Lexington. The substrate in Leonards Creek is very sandy and vegetation cover is primarily deciduous hardwoods, however, shrubs and herbaceous growth is abundant also. Numerous snags and dead fall are found near Abbotts Creek. Because of the beaver activity, numerous long pools are found in the channel. Upstream of the beaver activity the creek has small pools and riffles and exposed sand bars.

Abbotts Creek originates northeast of the Duracell facility in a watershed parallels to Leonards Creek. Rich Fork and Hamby Creek make confluence with Abbotts Creek approximately 1.5 miles northeast of the Site resulting in a third order stream. The Abbotts Creek drainage is highly forested and includes some areas of agriculture - primarily pastureland. Wetlands are also common in the watershed and as a result Abbotts Creek is dark in color with tannins during most of the year as the pH is generally below 6.0. The substrate in Abbotts Creek is very sandy upstream of Leonards Creek, then becomes more rocky downstream as gradient increases. From its confluence with Leonards Creek, Abbotts Creek flows about eight miles to the impounded waters of Abbotts Creek Arm of High Rock Lake. The impounded waters of High Rock Lake begin to affect Abbotts Creek about 2.5 to 3.0 miles downstream of Leonards Creek where it becomes slow and deep and can be navigated by boat. The City of Lexington discharges to Abbotts Creek downstream of Leonards Creek.

5.2 Geology and Soils

The soil survey of Davidson County, North Carolina (USDA, 1994) reports that the soil in the county is generally weathered felsic, intermediate, and mafic crystalline rocks or from fine-grained metamorphic rocks. The crystalline rocks are primarily in the northern and northwestern parts of the county. The fine-grained metamorphic rocks are in the southern and southeastern parts of the county. The felsic rocks are mostly granite, gneiss, or schist. Soils that are formed in material weathered from this type of rock are acidic. The mafic rocks are mostly gabbro. Soils that formed in material weathered from this type of rock are slightly acidic to mildly alkaline. Large areas of the county are underlain by intermediate rocks, such as diorite, or have a mixture of felsic and mafic rocks. The fine-grained metamorphic rocks are slate-like rocks that are dominantly argillite. Soils formed in material weathered from these rocks are acidic. Soil textures vary depending on the mineralogy or the parent material (e.g. the schists produce micaceous; silts while gneiss or intrusives produce silty or sandy clays).

The soils beneath the Site generally consists of weathered bedrock or saprolite, which is composed of predominantly silty clays to clayey silts. Based on prior investigative efforts, two distinct soil types were noted to be present in the shallow subsurface beneath the Site. The uppermost soil zone encountered at the Site is a medium consistency, multicolored (red, orange, yellow, brown, gray, and green) silty clay. The silty fraction in this zone ranged from approximately 30% near the base. Some medium- to fine-grained sand was present in this zone. This uppermost zone was found to extend from the ground surface to a depth of approximately five to ten feet below ground level (BGL).

Davidson County is in the center of the Piedmont physiographic province. Davidson County is on the boundary between two major geologic belts, the Charlotte Belt to the north and the Carolina Slate Belt to the south. The Charlotte Belt is characterized by both felsic and mafic igneous rocks. The felsic rocks are primarily granite, and the mafic rocks are primarily gabbro. The Carolina Slate Belt includes various types of volcanic and sedimentary rocks, such as mudstones, and mixtures, of volcanic debris. The felsic volcanic rocks are very resistant to weathering and underlie the more prominent topographic features. The sedimentary rocks consist of such rocks as mudstones and siltstones that have been physically and chemically altered by metamorphism to a more indurated slate. Much of the sedimentary rock is intermediate in hardness and is classified as argillite.

The fractured bedrock at the Site consists primarily of the felsic intrusive complex on the west of the facility and intermediate intrusive rocks on the east side of the facility. Alluvium is found to the north of the facility along the unnamed tributaries, and consists of dark brown, gray to white unconsolidated sand, silt, and clay, occasionally containing subrounded to well-rounded pebbles and cobbles.

5.3 Hydrogeology

Groundwater in the general vicinity of the Site exists within two zones. The first or uppermost, water-bearing zone is within the silty clay residual saprolite soils overlying felsic igneous bedrock. The second, or lower, water-bearing zone is within the underlying igneous bedrock where the occurrence such as fractures, joints, and foliations. Due to gradational changes from weathered saprolite to competent bedrock, ground water in the uppermost water-bearing zone is expected to show preferential movement along relic structures. Ground water in the saprolite is usually found under unconfined conditions or semi-confined conditions with ground water flow generally conforming to surface topography. Depth to bedrock has been found to range from about 12 feet to much as approximately 50 feet below land surface. Depth to ground water in this upper-bearing zone typically ranges from 10 to 25 feet below land surface depending on the location at the Site and the time of year. Due to the low permeability of the fine-grained materials comprising the uppermost water-bearing zone, ground water yields to wells tapping this zone are very small and typically not sufficient for water supply purposes.

Ground water in the lower water-bearing zone in bedrock is typically under semi-confined or confined conditions with flow direction being controlled by the presence and orientation of secondary openings. Depth to ground water in the bedrock zone varies considerably due to the random distribution of secondary openings. Overall ground water movement will be from areas of higher hydraulic bead (higher elevations) towards areas of lower hydraulic head (lower elevations or stream valleys). Ground water yields from the bedrock are typically higher than the upper zone above bedrock with yields high enough to sustain private water supplies. Private wells tapping the bedrock aquifer are present in the general vicinity of the Site; however, private supply wells were not found which tap the shallower saprolite zone.

6.0 NATURE AND EXTENT OF CONTAMINATION OVERVIEW

This section provides a summary of findings associated with the investigative activities conducted as part of this RI. The initial phase of the Remedial Investigation fieldwork was initiated in January 1996 and was completed in November 1996. Two additional phases of fieldwork were conducted from March 1997-January 1998, and from February-March 1998. The various environmental media sampled as part of the Operable Unit 1 RI included: 1) background soils, 2) soils within the facility fence line, 2) soils outside the facility fence line, 3) sump residuals, 4) surface water, 5) sediment, and 6) ecological receptors. The various environmental media samples were analyzed for a wide range of analytical parameters including:

i six site-specific inorganic compounds including cadmium, chromium, manganese, mercury, silver, and zinc;

i target analyte fist (TAL) inorganic compounds;

i target compound list (TCL) organic compounds which included volatile organic compounds, semi-volatile organic compounds, and pesticides/poly-chlorinated biphenyls (PCBs); and

i Chlorinated dioxins and furans (soils only).

A summary of the number of samples collected from the various environmental media as part of the Operable Unit 1 RI sampling activities and the number of associated duplicate samples for each media are presented in Table 1. To establish background concentrations of various inorganic and organic constituents, background samples of each sampling media were collected at locations distant from the Site so as to not be impacted by releases from the facility, yet near enough to the Site to be representative of local conditions

6.1 Soil Sample Results

Background soils were collected from 23 separate locations in the vicinity of the Site. At 17 of the locations, soil samples were collected from the surface only, whereas at six of the sampling locations samples were collected from the surface and at depth (7-8 feet below ground surface). The deeper soils were considered to be more representative of naturally occurring background conditions since they would not be subject to backfilling, leaching due to rainfall infiltration, runoff, or deposition of other naturally occurring and anthropogenic material from remote areas.

Certain inorganic constituents exhibit a fairly wide range of background concentrations. The wide range in the reported concentrations of many of these inorganics is due to the natural distribution of these compounds in the environment, which is related to the lithologies of the varied geologic source materials of the soils.

A total of 861 surface and subsurface soil samples were collected during the Remedial Investigation to determine the presence and extent of inorganic and organic constituents of concern in soils both inside and outside the facility fence line. More limited analyses of other compounds, including TAL inorganics, TCL VOCs, TCL SVOCs, and TCL pesticides/PCBs, were performed to assess the potential that other constituents might be present at concentrations of concern (see RI report for locations).

For purposes of this RI report, the soil sampling activities inside the facility fence line have been segregated according to current or former uses of specific areas. These areas include: 1) southern Site Area; 2) Northern Site area; 3) Former Plant #2 Area; 4) Former Solvent Disposal Area; 5) Former Cleaning Operations Area; 6) Former underground storage tank (UST) Areas; and 7) Sump Areas. Refer again to Figure 1.

TABLE 1
NUMBER OF SAMPLES COLLECTED FROM VARIOUS MEDIA AND ASSOCIATED ANALYTICAL PARAMETERS

Duracell U.S.A.
Lexington, North Carolina

Media	Constituents	Number of Samples	Number of Duplicates	Number of Triplicates
Soils				
(Field)	SPLP Site-Specific Inorganics 1	35	1	3
	SPLP TCL Volatiles	10	1	1
	SPLP TCL SemiVolatiles	2	0	1
	TCLP Site-Specific Inorganics	35	4	3
	TCLP Volatiles	8	1	1
	TCLP SemiVolatiles	2		1
	Site-Specific Inorganics (ex. Hg)	738	71	3
	Hg	963	84	3
	TAL Inorganics	55		0
	TCL Volatiles	327	26	2
	TCL SemiVolatiles	90	4	1
	Pesticides and PCB’s	77	3	0
	Chlorinated Dioxine and Furans	7	0	0
(Background)	Site-Specific Inorganics	29	3	0
	TAL Inorganics	24	2	0
	TCL Volatiles	24	2	0
	TCL SemiVolatiles	24	2	0
	Pesticides and PCB’s	23	2	0
Sediments				
(Field)	Site-Specific Inorganics (ex. Hg)	114	9	0
	Hg	116	10	0
	TAL Inorganics	10	1	0
	TCL Volatiles	10	2	0
	TCL SemiVolatiles	17	3	0
	Pesticides and PCB’s	9	1	0
(Background)	TAL Inorganics and Site-Specific Inorganics	9	1	0
	TAL Inorganics	2	0	0
	TCL Volatiles	2	1	0
	TCL SemiVolatiles	2	1	0
	Pesticides and PCB’s	2	1	0
Surface Water				
(Field)	Site-Specific Inorganics (ex. Hg)	62	6	0
	Hg	64	7	0
	TAL Inorganics	9	2	0
	TCL Volatiles	11	3	0
	TCL SemiVolatiles	9	2	0
	Pesticides and PCB’s	9	2	0
	Dissolved Hg	3	1	0

TABLE 1
NUMBER OF SAMPLES COLLECTED FROM VARIOUS MEDIA AND ASSOCIATED ANALYTICAL PARAMETERS

Duracell U.S.A.
Lexington, North Carolina

Media	Constituents	Number of Samples	Number of Duplicates	Number of Triplicates
Surface Water (cont'd.)				
(Background)	Site-Specific Inorganics	6	0	0
	TAL Inorganic	4	0	0
	TCL Volatiles	4	0	0
	TCL SemiVolatiles	4	0	0
	Pesticides and PCB's	4	0	0
Stormwater				
	Site-Specific Inorganics	4	1	0
	TAL Inorganic	4	1	0
	TCL Volatiles	4	1	0
	TCL SemiVolatiles	4	1	0
	Pesticides and PCBs	4	1	0
Sump Liquids				
	Site-Specific Inorganics	1	0	0
	TAL Inorganic	1	0	0
	TCL Volatiles	1	0	0
	TCL SemiVolatiles	1	0	0
	Pesticides and PCBs	1	0	0
Sump Sediments				
	Site-Specific Inorganics	4	1	0
	TAL Inorganic	4	1	0
	TCL Volatiles	4	1	0
	TCL SemiVolatiles	4	1	0
	Pesticides and PCBs	4	1	0
Ecological				
(Biotic)				
Amphibian	Site-Specific Inorganics	14	0	0
Corbicula	Site-Specific Inorganics	24	1	0
Fish	Site-Specific Inorganics	178	9	0
Small Mammal	Site-Specific Inorganics	69	0	0
Phase I Earthworms	Site-Specific Inorganics	8	1	0
Terrestrial Plants	Site-Specific Inorganics	8	1	0
Phase II Earthworms	Site-Specific Inorganics	28	0	0
(Sediments)[2]				
Amphibian	Site-Specific Inorganics	13	1	0
Corbicula	Site-Specific Inorganics	15	0	0
(Soils)[2]				
Small Mammal	Site-Specific Inorganics	25	3	0
Phase I Earthworms	Site-Specific Inorganics	6	0	0

[1] Site-Specific Inorganics - include Cadmium, Chromium, Maganese, Mercury, Silver, and Zinc

[2] Ecological sediments/soil are also included in the previously listed soils and sediments.

The southern Site area includes the area of the Site extending southward from the approximate southern extent of the Former Solvent Disposal Area to the southern property boundary. Both Plant #1 and Plant #3 are located in this area. This area also includes the Former Cleaning Operations Area located immediately north of Plant #1, the sumps located on the west side of Plant #1, and the two former UST areas. However, since these four areas were believed to be potential sources of constituents of concern, they are discussed separately from the southern Site area.

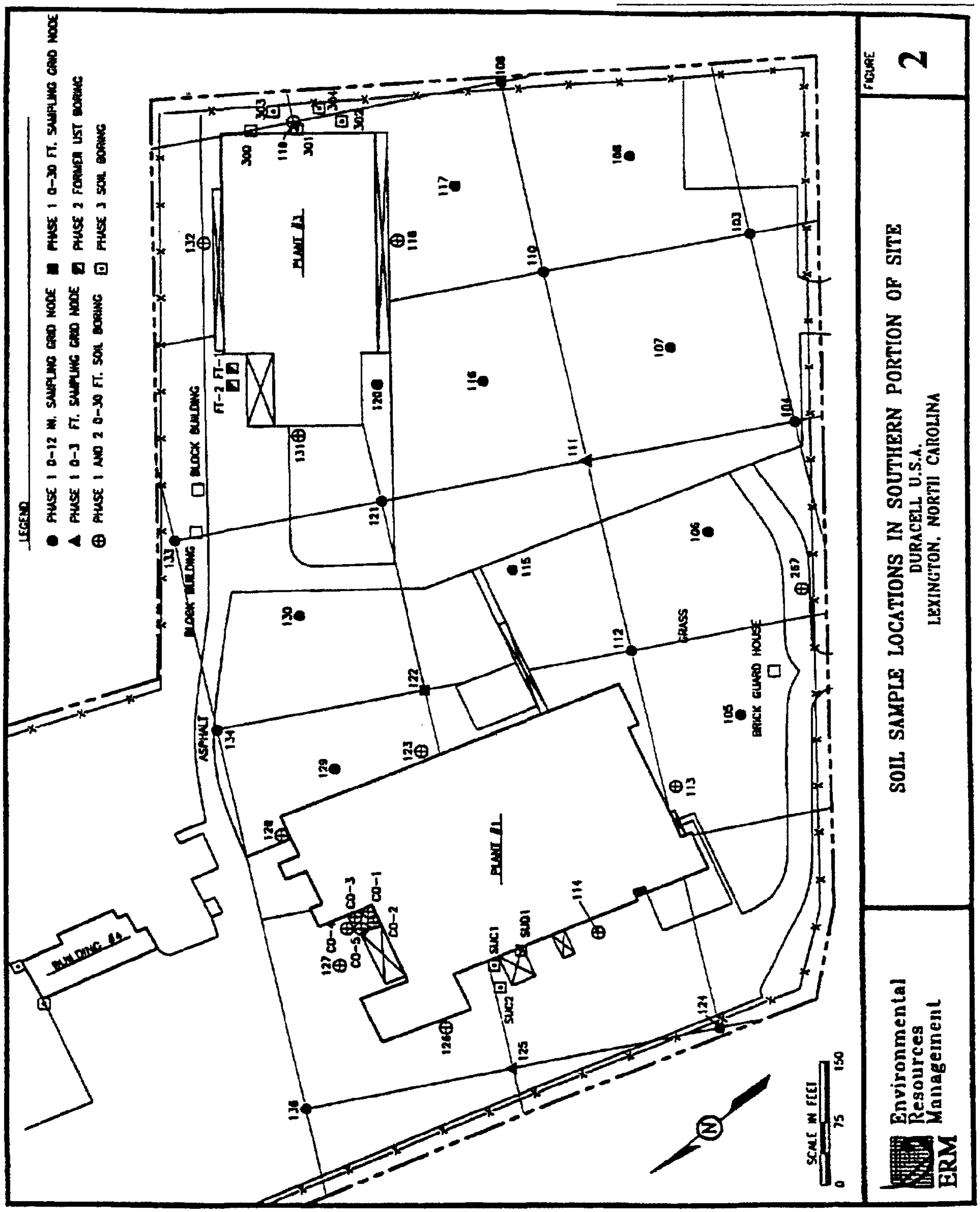
Soils samples from the southern Site area were analyzed for the full range of inorganic and organic constituents. A total of 112 soil samples were analyzed for the six site-specific inorganics. Ten soil samples also were analyzed for the remaining TAL inorganic constituents. Figure 2 shows the soil sample locations in the southern Site area. The concentration ranges and locations of the maximum detected concentrations, are presented in Table 2.

Table 2 - Summary of Inorganic Constituents In southern Site Area

Inorganic Constituents	**Concentration Range (ppm)**	**Location of Maximum Concentration**
Cadmium	BDL to 2.0	DUR-SB-130-1
Chromium	0.81 to 343	DUR-SB-132-6
Manganese	69 to 14,000	DUR-SB-131-1
Mercury	BDL to 6.8	DUR-SB-127-1
Silver	BDL	Not Applicable
Zinc	3.9 to 255	DUR-SB-127-21

The highest manganese value, 14,000 ppm, detected in surface soil sample DUR-SB-131-1, is located immediately west of Plant #3. This elevated level of manganese is most likely due to a very localized release of manganese powder, since 16 additional soil samples collected from this area as part of an investigation associated with a Plant #3 expansion had levels of manganese ranging from 236 to 1,810 ppm.

A total of 31 soil samples, from the southern Site area were analyzed for TCL VOCs. Halogenated VOCs were detected in only one soil sample (SB-127) located north of Plant #1. The reported concentrations were each less than 10 ppb. Acetone was detected in 21 of the 31 soil samples with a maximum concentration of 380 ppb.



SOIL SAMPLE LOCATIONS IN SOUTHERN PORTION OF SITE
DURACELL U.S.A.
LEXINGTON, NORTH CAROLINA

Twelve soil samples from the southern Site area were analyzed for TCL SVOCs. Both PAHs and phthalate esters were detected in these samples. The phthalate ester, di-n-butyl phthalate (DNBP), detected in four samples, was the only compound reported at a concentration greater than 1,000 ppb. Ten soil samples from the southern Site area were analyzed for TCL pesticides and PCBs. No pesticides or PCB were detected in any of the ten soil samples.

The northern Site Area includes all Site property north of Plant #1, excluding the Former Solvent Disposal Area and the Former Plant #2 Area. The northern Site area includes Building #4, the existing wastewater treatment system, a paved parking area, and grass-covered areas. Since the sumps associated with Building #4 were believed to be a local source of constituents of concern, these are discussed separately from the northern Site area.

Soil samples from the northern Site area were analyzed for the full range of inorganic and organic constituents. RI sampling was initially conducted during the Phase I RI in 1996. As part of the Phase II investigation, samples were collected during 1997 in order to better delineate mercury concentrations, primarily in the vicinity of former Plant #2. Additional soil samples also were collected to assess SVOC concentrations in the northeast quadrant of the area and VOC concentrations at selected locations. Limited sampling for site-specific constituents was performed in this area during the 1998 Phase III investigation.

A total of 185 soil samples for the northern Site area were analyzed for the six site-specific inorganics. An additional 88 samples were analyzed only for mercury. Twenty-five samples also were analyzed for the remaining TAL inorganic constituents. Figure 3 shows the soil sample locations in the Northern Site. The concentration ranges and locations of the maximum concentrations, are presented in Table 3.

Table 3 - Summary of Inorganic Constituents in northern Site Area

Inorganic Constituents	**Concentration Range (ppm)**	**Location Of Maximum Concentration**
Cadmium	BDL to 2.5	DUR-SB-247-1
Chromium	BDL to 134	DUR-SB-196-3
Manganese	32.6 to 3,810	DUR-SB-194-3
Mercury	BDL to 673	DUR-SB-247-1
Silver	BDL to 40	DUR-SB-214-6
Zinc	4.9 to 899	DUR-SB-214-6

A total of 35 soil samples from the northern Site area were analyzed for TCL VOCS. Halogenated VOCS were detected in 11 of the 35 soil samples at concentrations below 100 ppb.

Non-halogenated VOCS were detected in 16 of the soil samples. Acetone was reported in 13 of the 35 soil samples. Thirty-one soil samples from the northern Site area were analyzed for TCL SVOCs. PAHs were detected in ten soil samples that primarily were located in the eastern half of the northern property. The area in which these elevated PAH concentrations were detected historically has received runoff from areas from which PAHs would be released (i.e. stormwater runoff from asphalt paved areas and building roof areas).

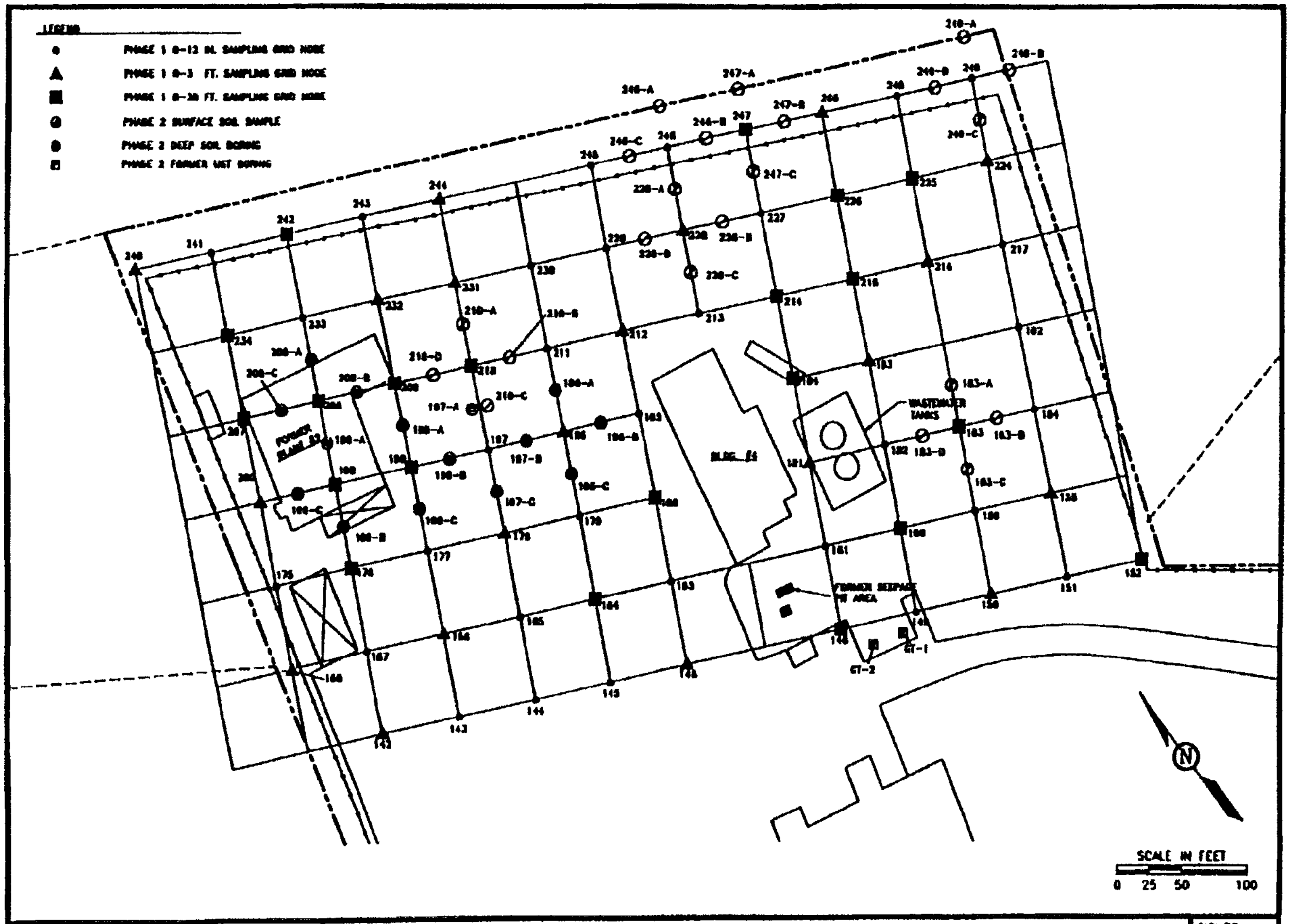
Phthalate esters also were detected in six soil samples. The phthalate ester, DNBP, was detected in four samples. This was the only phthalate ester reported at a concentration greater than 1,000 ppb. Two other phthalate esters were reported once each at lower concentrations.

Twenty-six soil samples were analyzed for TCL pesticides and PCBs. No PCBs were detected in any sample from the northern Site area. Endrin was the only pesticide detected with a concentration of 2 ppb in a single soil sample (DUR-SB-176-2Z).

Three soil samples from the northern Site area were analyzed for chlorinated dibenzo-p-dioxins (CDDs) and chlorinated dibenzofurans (CDFs). No tetra-, penta-, and hexachlorinated CDDs or CDFs were detected in any of the samples; however, low concentrations of hepta- and octachlorinated CDDs and CDFs were detected.

The former Plant #2 area is located in the northwest corner of the northern portion of the Duracell property. Plant #2 was formerly used to store, process, and reclaim mercury. Soils samples from this area were analyzed for the full range of inorganic and organic constituents. Soil sampling was initially conducted during the Phase I RI in 1996. As part of the Phase II investigation conducted in 1997, samples were collected in this area to better delineate mercury concentrations. Limited sampling for site-specific constituents was also performed during the 1998 Phase III investigation.

A total of 81 soil samples from the former Plant #2 area were analyzed for the six site-specific inorganics and 136 additional samples were analyzed only for mercury. Ten samples also were analyzed for the remaining TAL inorganic constituents. Figure 3 shows the soil sample locations in the former Plant #2 area. The concentration ranges and locations of the maximum concentrations, are presented in Table 4.



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SOIL SAMPLE LOCATIONS IN NORTHERN PORTION OF SITE
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FIGURE 3

Table 4 - Summary of Inorganic Constituents in former Plant #2 Area

Inorganic Constituents	Concentration Range (ppm)	Location Of Maximum Concentration
Cadmium	BDL to 2.7	DUR-SB-208-4
Chromium	BDL to 197	DUR-SB-210-11
Manganese	22.6 to 2,820	DUR-SB-233-1
Mercury	BDL to 2,070	DUR-SB-208C-1
Silver	BDL to 2.4	DUR-SB-208-1
Zinc	4.8 to 195	DUR-SB-200-2

Refer again to Figure 3 for the locations of the soil samples in the former Plant #2 area. The higher concentrations of mercury are distributed generally in two soil depth zones, a shallow zone and a deep zone. Relatively shallow soils at depths between 0 and 6 ft BGS had reported higher concentrations of mercury in two small areas. One area is in the immediate vicinity of soil boring locations SB-208 and SB-208C. The other area is near the southeast corner of the former Plant #2 area in the are of borings SB-197 and SB-197B.

Deeper soils in the vicinity of boring locations SB-198, SB-198A, and SB-209 had reported mercury concentrations that exceed 10 ppm. These soils ranged in depth from 19 to 31 feet. This area appears to be localized since the mercury concentrations reported in deep soils in adjoining borings (SB-197A, SB-198B, SB-188C, SB-199B, SB-199C, and SB-209) were less than 10 ppm. The only deeper soil reported to contain mercury at a concentration greater than 10 ppm was from SB-199 at 8 to 9 ft BGS. This location is surrounded on the south, west, and north by borings with mercury concentrations that were less than 10 ppm.

Fourteen soil samples from the former Plant #2 area were analyzed for TCL VOCs. Halogenated VOCs were not detected in any of the soil samples. Non-halogenated VOCs were detected in only three of the 14 soil samples at concentrations less than 20 ppb.

Eleven soil samples from the former Plant #2 area were analyzed for TCL SVOCs. PAHs were not detected in any soil samples from this area and phthalate esters were detected in three samples. The compound phenol was detected in one soil sample.

Ten soil samples from the former Plant #2 area were analyzed for TCL pesticides and PCBs. No pesticides were detected in any soil sample. A single PCB Aroclor was detected at 33 ppb in one sample.

The former solvent disposal area is located in the southern portion of the northern area of the Site, immediately south of Building #4. Spent solvents reportedly were disposed in this area. These solvents also may have contained other raw materials used in the production of batteries.

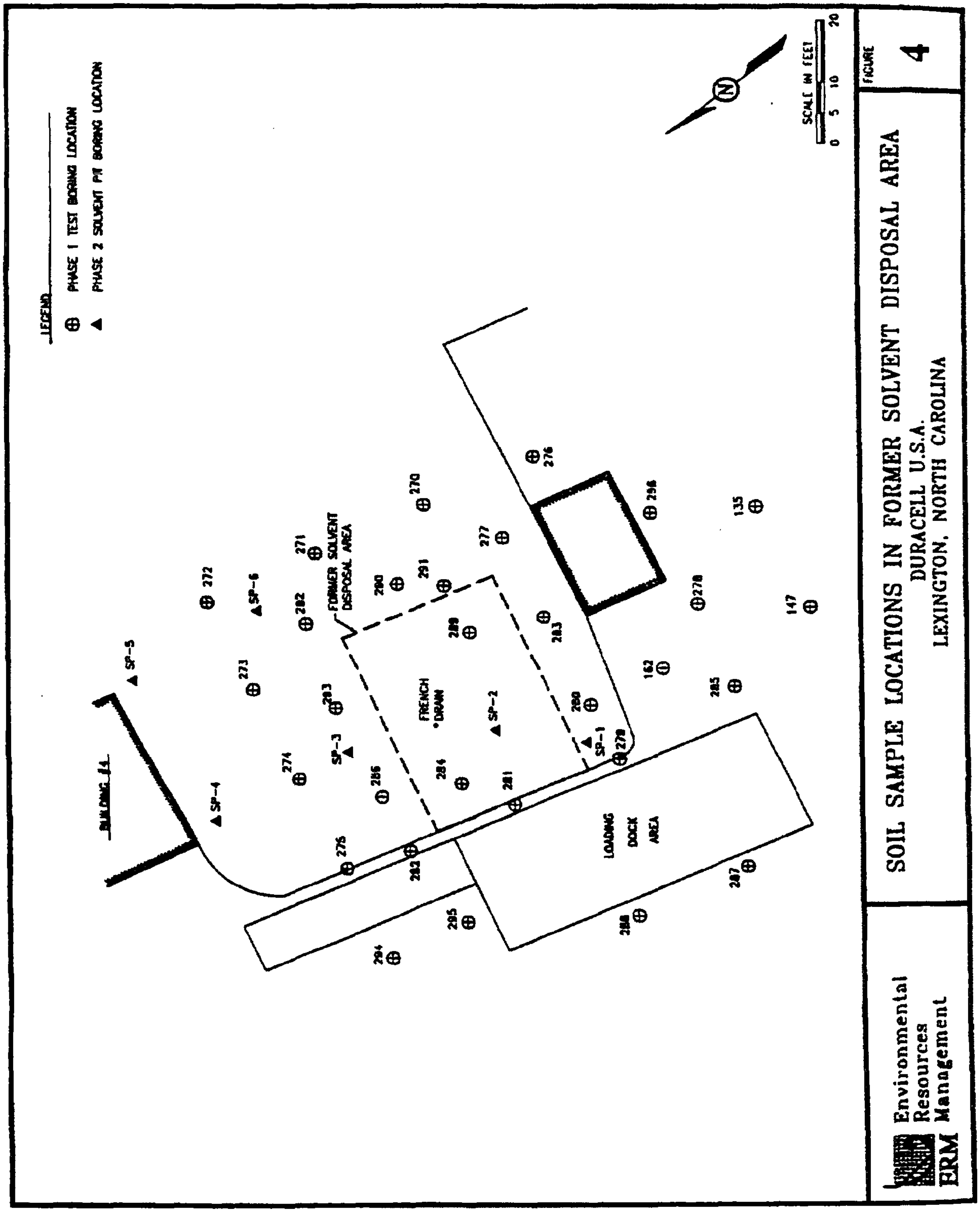
Soils samples from this area were analyzed for the full range of inorganic and organic constituents. Soil sampling initially was conducted during the Phase I RI in 1996. As part of the 1997 Phase II investigation, samples were collected in the area to better delineate PCB concentrations. Limited sampling for site-specific inorganics, TCL VOCs, and TCL SVOCs was performed during the 1998 Phase III investigation.

A total of 197 soil samples were collected in the former solvent disposal area and analyzed for the six site-specific inorganic constituents. Five samples also were analyzed for the remaining TAL inorganic constituents. Figure 4 shows the soil sample locations in the former solvent disposal area. The concentration ranges for the six site-specific inorganic constituents, and the locations of the maximum concentrations, are presented in Table 5.

Table 5 - Summary of Inorganic Constituents in Former Solvent Pit Area

Inorganic Constituents	**Concentration Range (ppm)**	**Location Of Maximum Concentration**
Cadmium	BDL to 3.0	DUR-SB-284-11
Chromium	BDL to 229	DUR-SB-285-21
Manganese	43.3 to 3,430	DUR-SB-272-11
Mercury	BDL to 5,050	DUR-SB-277-1
Silver	BDL to 33.2	DUR-SB-277-1
Zinc	11.1 to 650	DUR-SB-277-1

The highest mercury concentration, 5,050 ppm, was detected in surface soil sample DUR-SB-277 (0-1 ft) located on the east side of the former solvent disposal area. The higher manganese concentrations, including a detection of 3,430 ppm in sample DUR-SB-272 (11 feet bls), were detected primarily in the eastern portion of the former solvent disposal area.



SOIL SAMPLE LOCATIONS IN FORMER SOLVENT DISPOSAL AREA
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FIGURE 4

A total of 199 soil samples from the former solvent disposal area were analyzed for TCL VOCs. The concentration ranges and the locations of the maximum concentrations for inorganic constituents in the former solvent pit area are presented in Table 6. The locations of soil samples collected and analyzed for VOCs in the solvent disposal area are shown on Figure 4.

Table 6 - Summary of Organic Compounds in Former Solvent Pit Area

VOC	**Concentration Range (ppb)**	**Location Of Max. Conc.**
Tetrachloroethene	BDL to 41,000	DUR-SB-278-11
Trichloroethene	BDL to 15,000	DUR-SB-293-16
1,1,1-Trichloroethane	BDL to 91,000	DUR-SB-278-11
1,1,2-Trichloroethene	BDL to 510	DUR-SB-278-21
1,2-Dichloroethene	BDL to 5,600	DUR-SB-293-16
1,1-Dichloroethene	BDL to 2,400	DUR-SB-273-11
1,2-Dichloroethane	BDL to 1,100	DUR-SB-289-11
1,1-Dichloroethane	BDL to 2,900	DUR-SB-293-11
Methylene Chloride	BDL to 2,100	DUR-SB-274-21
Carbon tetrachloride	BDL to 15,000	DUR-SB-278-11
Acetone	BDL to 11,000	DUR-SB-270-1
Toluene	BDL to 27,000	DUR-SB-278-21

The higher concentrations of halogenated VOCs are present in a north-south band extending across the former solvent disposal area. The highest concentration of total halogenated VOCS was detected in SB- 278 at 10 to 11 ft BGS (147,000 ppb). The next higher concentration of total halogenated VOCs was detected in SB-293 at 10-11 ft BGS (51,000 ppb). In addition, samples from SB-273 (20-21 ft) and SB-274 (20-21 ft) had total halogenated VOC concentrations of 23,200 ppb and 20,400 ppb, respectively. The only other soil boring in which the concentration of total halogenated VOCs exceeded 10,000 ppb was SB-291 at 15 to 16 ft BGS.

Boring SB-278 is bounded by borings SB-162 and SB-285 to the west, SB-147 and SB-135 to the south, and SB-295 to the east. Of the 30 soil samples analyzed in these five borings, three samples had total halogenated VOC concentrations ranging from 1,000 ppb to 4,000 ppb. In addition, borings SB-279, SB-280, and SB-283 are located approximately 40 feet north of SB-278. Of the eighteen soil samples analyzed from these borings, two soil samples had total halogenated VOC concentrations ranging from 1,000 ppb to 2,000 ppb.

A total of 86 soil samples were collected in the former solvent disposal area between ground surface and 6 ft BGS. Twenty-five of those samples had halogenated VOCs concentrations greater than 100 ppb and only one (SB-278-1) exceeded 1,000 ppb. These data indicate that the majority of the halogenated VOCs in the former solvent disposal area are present at a depth greater than six feet.

Six different non-halogenated VOCs were detected above 100 ppb in soils from the former solvent disposal area. Carbon disulfide was detected in a single sample in a soil boring. Carbon disulfide was not reported to have been used at the facility. Xylene also was detected in a single sample. The remaining four non-halogenated VOCs were detected above 100 ppb in 77 samples. In 56 of these samples, acetone was the only non-halogenated VOC detected above 100 ppb. The distribution of the non-halogenated VOCs other than acetone (i.e., toluene, 2-butanone (MEK), 4-methyl-2-pentanone (MIBK)) was similar to the distribution of the halogenated VOCs. Of these three VOCs, only toluene was reported above 1,000 ppb in four soil borings. All other soil borings had concentrations less than 300 ppb.

The distribution of acetone did not appear to follow any distinct pattern. Unlike the other VOCs, acetone frequently was reported at elevated concentrations in samples collected at depths between ground surface and 6 ft BGS. Eight of the 11 acetone concentrations above 1,000 ppb were between ground surface and 6 ft BGS.

Four soil samples from the former solvent disposal area were analyzed for TCL SVOCs. SVOCs were detected in three of these samples. A single PAH (2-methyl naphthalene) was detected in one soil sample at less than 1,000 ppb. Phthalate esters were detected in three soil samples. The phthalate ester, DNBP, was detected in the two samples.

A total of four soil samples were initially collected in March 1996 from the former solvent disposal area and analyzed for TCL pesticides and PCBs. An additional 27 soil samples were collected from six supplemental borings in the former solvent disposal area in April 1997 for analyses of pesticides and PCBs. Pesticides were detected in only three soil samples from the former solvent disposal area. The pesticide methoxychlor was detected in SB-SP5-3 at 41 ppb, All other pesticide concentrations were less than 6 ppb. PCBs were detected in 12 soil samples. These data indicate that PCBs are present in very localized areas of the former solvent disposal area with only two of 29 soil samples having total PCB concentrations greater than 1ppm.

The **former cleaning operations area** is located on the north side of Plant #1, immediately east of monitoring well DW-1. Five soil borings were drilled in the area of the former cleaning operations area in order to determine the magnitude and extent of residual volatile organic compounds and site-specific inorganic constituents in the underlying soils.

In order to characterize the soil in the vicinity of this reported cleaning operation area, 19 discrete soil samples were collected from five stations and subsequently analyzed for the six site-specific inorganic constituents. The concentration ranges and the locations of the maximum concentrations for the six site-specific inorganic constituents are identified in Table 7. The VOC 1,1,2-trichloroethane was the only VOC identified in two soil samples collected from this area at stations CO1 (DUR-SB-CO1-21 at 2 ppb) and CO4 (DUR-SB-CO4-21 at 2 ppb).

Table 7 - Summary of Inorganic Constituents in Former Cleaning Operations Area

Inorganic Constituents	**Concentration Range (ppm)**	**Location of Maximum Concentration**
Cadmium	BDL to 6.2	DUR-SB-CO4-1
Chromium	BDL to 39	DUR-SB-CO2-1
Manganese	85.5 to 1240	DUR-SB-CO2-1
Mercury	BDL to 19	DUR-SB-CO3-1
Silver	BDL to 5.4	DUR-SB-CO4-1
Zinc	20.3 to 369	DUR-SB-CO5-1

The **former underground storage areas (USTs)** were used in the past for storing fuel. One of these areas was a former location of a 550-gal gasoline UST located above 100 feet south of Building #4. The other area was a former location of a 20,000-gal fuel oil tank located at the northwest corner of Plant #3. These former UST areas are areas of concern due to the presence of fuel-related organic compounds in the soil and ground water. For this reason, two soil borings were drilled at each of two former UST areas. A total of 13 soil samples were collected in two of these areas to evaluate the magnitude and extent of potential constituents of concern associated with these former USTs.

The concentrations of lead observed in the soil samples ranged from a minimum of 2.9 ppm at boring GT 1 from a depth of 15 to 16-ft to a maximum of 10.9 ppm at boring GE1 (GT1) at the 7-ft depth interval. Only two VOCs, methylene chloride and acetone, were detected in the soil samples collected in the two former UST areas. Methylene chloride was detected in only one soil sample (DUR-SB-GT2-16) at a concentration of 17 ppb. Acetone was detected in four of the soil samples collected from the fortner UST locations. The maximum acetone concentration was 33,000 ppb from boring G1E from the 7-ft depth interval at the former gasoline UST area. Five soil samples from the former fuel oil UST area were analyzed for SVOCs. Semi-volatile organic compounds were not detected in any of these five soil samples.

Four wastewater **sump areas,** located at Building #4 and Plant #1, were previously used at the facility for storing wastewater generated during the battery manufacturing process. Based on a process sewer assessment conducted during the RI/FS by Metcalf and Eddy, these four wastewater sumps were found to have potentially released wastewater to the subsurface.

The Plant #1 sumps have been included as part of the Southern Site area for data evaluation purposes whereas the Building #4 sumps were included as part of the Northern Site area. A total of five borings were drilled and 28 discrete soil samples were collected in these areas to evaluate the magnitude and extent of contamination of site-specific parameters in the vicinity of these sumps.

A total of 28 discrete soil samples were collected from five stations (SUA, SUB, SUC1, SUC2, and SUD1), and subsequently analyzed for the six site-specific inorganic constituents. Table 8 shows the concentration ranges and locations of the maximum concentrations for the six site-specific inorganic constituents.

Table 8 - Summary of Inorganic Constituents in Sump Areas

Inorganic Constituents	**Concentration Range (ppm)**	**Location of Maximum Concentration**
Cadmium	BDL to 10.8	DUR-SB-SUB-1
Chromium	BDL to 192	DUR-SB-SUA-16
Manganese	275 to4,380	DUR-SB-SUC1-6
Mercury	BDL to 1, 100	DUR-SB-SUA-3
Silver	BDL to 8.0	DUR-SB-SUA-3
Zinc	5.2 to 2,8 10	DUR-SB-SUC1-3

Four of the five highest mercury concentrations and the two highest cadmium concentrations were detected in samples collected from the borings drilled at sumps SUA and SUB, both located at Building #4. The two highest manganese concentrations were detected at the two sumps at Plant #1 (SUC and SUD).

A total of seven halogenated VOCs and three non-halogenated VOCs were detected in the soil samples collected from the four sump areas. The concentration ranges of the predominant VOCs and the location of the maximum concentration are shown in Table 9.

The maximum concentrations for these VOCs, as noted above, were found at soil sampling stations SUB and SUC1. Lower concentrations of these compounds also were found in the soil samples collected from stations SUA and SUD1.

Table 9 - Summary of Organic Compounds in Sump Areas

VOCs	Concentration Range (ppb)	Locations of Maximum Concentration
Acetone	BDL to 1,300	DUR-SB SUB-6
1,1,1-Trichloroethane	BDL to 1,600	DUR-SB-SUB-3
Trichloroethene	BDL to 1,700	DUB-SB-SUC1-1
Xylene	BDL to 5,500	SUR-SB-SUB-3

In addition to the four VOCs listed in the above table, six other VOcs were detected at low frequencies and concentration (BDL to 78 ppb). The majority of VOC detections were in soil samples collected from the two sumps at Building #4 (SUA and SUB).

PAHs were detected at Station SUA at Building #4 at concentrations ranging from 50 to 120 ppb, and at Station SUC2 at Plant #1 at concentrations ranging from 2,000 to 20,000 ppb. Two of the most common phthalate esters, diethyl phthalate and bis (2-ethyl hexyl) phthalate, also were detected in the soil samples collected from stations SUA, SUB, and SUD1.

A total of 201 surface soil samples were collected outside the facility fence line from properties surrounding the Duracell property. In addition, 26 surface soil and 6 subsurface soil samples were collected from 23 background areas some distance away from the Site to establish soil conditions in nearby areas not affected by the Site.

Off-site soil sampling was conducted to determine the presence and extent of site-related inorganic constituents and organic compounds in soils located outside the facility fence line. More limited analyses of other compounds, including TAL inorganics, TCL VOCs, TCL SVOCs, and TCL pesticides/PCBs, were performed to assess the potential that other constituents night be present.

For purposes of the RI report, the off-site soil sampling activities were segregated into discrete areas according to proximity to the northern portion of the Site. These areas include: 1) 0 to 400 feet from the northern Site boundary, 2) 400 to 800 feet from the northern Site boundary; 3) 800 feet to ½ mile from the northern Site boundary; and 4) greater than ½ mile from the northern Site boundary.

A total of 67 soil samples were coflected from 0 to 400 feet from the northern Site area and analyzed for the full range of inorganic and organic constituents described above. Soil sampling initially was conducted in this area during the Phase I RI in 1996, with limited follow-up sampling being conducted as part of Phase II sampling in 1997. Samples were not collected from this area as part of the Phase III RI program. Soils samples were collected from this area as part of both the soil sampling programs and the ecological investigations.

All samples were analyzed for the six site-specific inorganic constituents, and seven additional samples were analyzed for mercury only. Five samples also were analyzed for the remaining TAL inorganic compounds. The concentration ranges and locations of the maximum concentrations of the site-specific inorganics are identified in Table 10.

Table 10 - Summary of Inorganic Constituents in Off-Site Soils Located from 0-400 Feet From Northern Site Area

Inorganic Constituents	**Concentration Range (ppm)**	**Location of Maximum Concentration**
Cadmium	BDL	Not Applicable
Chromium	4.9 to 93.8	DUR-SB-169-1
Manganese	190 to 3,220	DUR-SB-154-1
Mercury	BDL to 31.4	DUR-SB-D3-9
Silver	BDL to 2.1	DUR-SB-D3-9
Zinc	21.7 to 1,570	DUR-SB-156-1

In the case of the manganese, some contribution from Site runoff or airborne emissions is a possibility. This is most likely in small areas immediately north of the northern Site property boundary.

A total of 16 soil samples were analyzed for TAL VOCs. Acetone was reported above the detection limit in two of the 13 samples. No other VOCs were reported above detection limits in these soil samples. Six soil samples were analyzed for TAL SVOCs within 0 to 400 feet from the northern Site area.. The phthalate ester, DNBP, was detected in three samples at a maximum concentration of 2,300 ppb. No other SVOCs were detected. Four soil samples were analyzed for TCL pesticides and PCBs. No pesticides or PCB were detected in any soil sample from this area. Therefore, pesticides and PCBs are not considered to be a concern in this area.

Four soil samples from off-site locations were analyzed for CDDs and CDFs. No tetra-, penta-, and hexachlorinated CDDs, or any CDFs were detected in any off-site soil samples; however, low concentrations of hepta- and octachlorinated CDDs were identified.

A total of 76 soil samples were collected from the area located 400 to 800 feet from the Northern Site area, and analyzed for the six site-specific inorganic constituents. Soil sampling initially was conducted in this area during the Phase I RI in 1996, with limited follow-up sampling being conducted as part of Phase II sampling in 1997. Soil samples were collected from this area as part of both the soil sampling programs and the ecological investigations.

Seventy-two soil samples were analyzed for the six site-specific inorganic constituents and an additional four samples were analyzed for mercury only. No samples were analyzed for the remaining TAL inorganic constituents. The concentration ranges and locations of the maximum concentrations of the site-specific inorganic constituents are identified in Table 11.

Table 11 - Summary of Inorganic Constituents From 400 to 800 Feet Within the Northern Site Area

Inorganic Constituents	Concentration Range (ppm)	Location of Maximum Concentration
Cadmium	BDL to 2.7	DUR-OS-57-1
Chromium	3.1 to 219	DUR-OS-76-1
Manganese	197 to 4,280	DUR-OS-89-1
Mercury	0.12 to 29.6	DUR-OS-251-1
Silver	BDL to 4.6	DUR-OS-263-1
Zinc	17.1 to 1,080	DUR-OS-56-1

A total of 42 soils samples were collected from the off-site area located 800 Feet to ½ Mile Area from Northern Site area as part of both the Phase II RI soil sampling program and the ecological investigations. Thirty-eight soil samples were analyzed for the six site-specific inorganics and a single sample (DUR-SB-102-2Z) was analyzed for TAL inorganics. The concentration ranges and locations of the maximum concentrations of the site-specific inorganic constituents are identified in Table 12. A single soil sample (DUR-SB-102-2Z) was analyzed for TCL VOCs and SVOCs. The only VOC detected was acetone at 290 ppb. No SVOCs were detected in this sample.

A total of 16 soil samples were collected from this off-site area and analyzed for the six site-specific inorganics as part of the Phase II RI soil sampling program. Soil samples from this off-site area were analyzed only for the six site-specific inorganic constituents. The concentration ranges and locations of the maximum concentrations of the site-specific inorganic constituents are identified in Table 13.

Table 12 - Summary of Inorganic Constituents Located from 800 Feet to ½ Mile From Northern Site Area

Inorganic Constituents	**Concentration Range (ppm)**	**Location of Maximum Concentration**
Cadmium	BDL to 1.0	DUR-OS-41-1
Chromium	4.5 to 91.7	DUR-OS-13-1
Manganese	281 to 2,240	DUR-OS-13-1
Mercury	BDL to 13.1	DUR-OS-16-1
Silver	BDL to 0.48	DUR-OS-50-1
Zinc	17.4 to 184	DUR-OS-41-1

Table 13 - Summary of Inorganic Constituents in Off-Site Som 800 Feet to ½ Mile From Northern Site Area

Inorganic Constituents	**Concentration Range (ppm)**	**Location of Maximum Concentration**
Cadmium	BDL to 0.83	DUR-OS-44-1
Chromium	6.1 to 81.9	DUR-OS-53-1
Manganese	225 to 1,250	DUR-SB-OS-53
Mercury	BDL to 0.76	DUR-OS-44-1
Silver	BDL to 0.35	DUR-OS-34-1
Zinc	24.0 to 204	DUR-OS-40-1

6.2 Surface Water and Sediment Sample Results

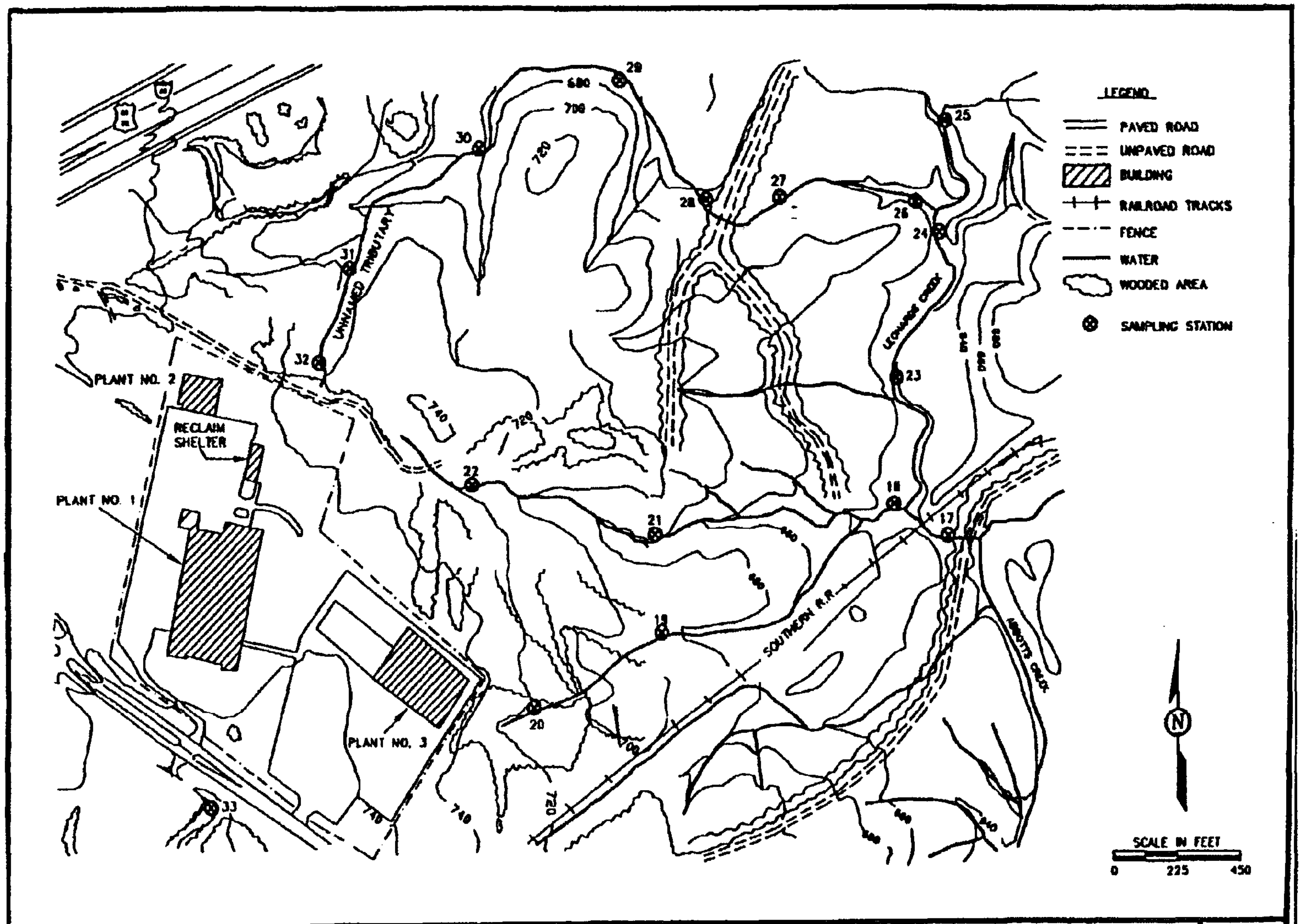
A total of 71 surface water samples were collected from 33 different locations including the unnamed tributaries located to the north, south, and east of the Site, Leonards Creek, Abbotts Creek, and High Rock Lake. The surface water sampling was conducted to determine whether contaminants of concern are present in the surface water of the unnamed tributary northeast of former Plant #2, the unnamed tributary east of Plant #3, the unnamed tributary north of Plant #3, the unnamed tributaries south of Plant #1, Fritz Branch, Leonards Creek, Abbotts Creek, and the Abbotts Creek Arm of High Rock Lake. The surface water samples were analyzed for the six site-specific inorganic constituents, as well as the full range of TAL inorganic and TCL organic compounds. The surface water data also were used to evaluate local ground water discharge to the upper reaches of the unnamed tributaries draining the Site. See Figures 5 and 6 for the surface water and sediment sample locations. In addition, six surface water samples were collected from three background locations to establish surface water conditions in areas not affected by the Site.

To establish background concentrations of various TAL inorganic and TCL organic constituents, a total of six samples were collected from three background stations (SW-10, SW-16, and SW-25) at locations distant from the Site so as to not be impacted by releases from the facility, yet near enough to the Site to be representative of local conditions. Variations in detected concentrations of the inorganic constituents are attributable to the natural distribution of these constituents in the environment. Arsenic, beryllium, selenium, and thallium were not detected in any of the background surface water samples. VOCs, SVOCs, pesticides, and PCBs were not detected in any of the background surface water samples. Samples for inorganic compounds in surface water were collected from 33 stations during the Phase I and Phase II sampling events, totaling 71 samples. Nine samples were analyzed for TAL inorganic constituents. The concentration ranges and locations of the maximum concentrations of the site-specific inorganic constituents are identified below in Table 14.

Table 14 - Summary of Inorganic Constituents in Surface Water Samples

Inorganic Constituents	**Concentration Range (ppb)**	**Location of Maximum Concentration**
Cadmium	BDL to 5.5	DUR-SW-32
Chromium	BDL to 21.5	DUR-SW-32
Manganese	10.8 to 14,500	DUR-SW-32
Mercury	BDL to 56.9	DUR-SW-32
Silver	BDL	Not Applicable
Zinc	BDE to 794	DUR-SW-32

The maximum concentrations for each of these inorganic constituents were found in the surface water sample collected on July 16, 1996 at Station 32, located on the unnamed tributary northeast of former Plant #2.



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SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS FOR TRIBUTARIES DRAINING SITE

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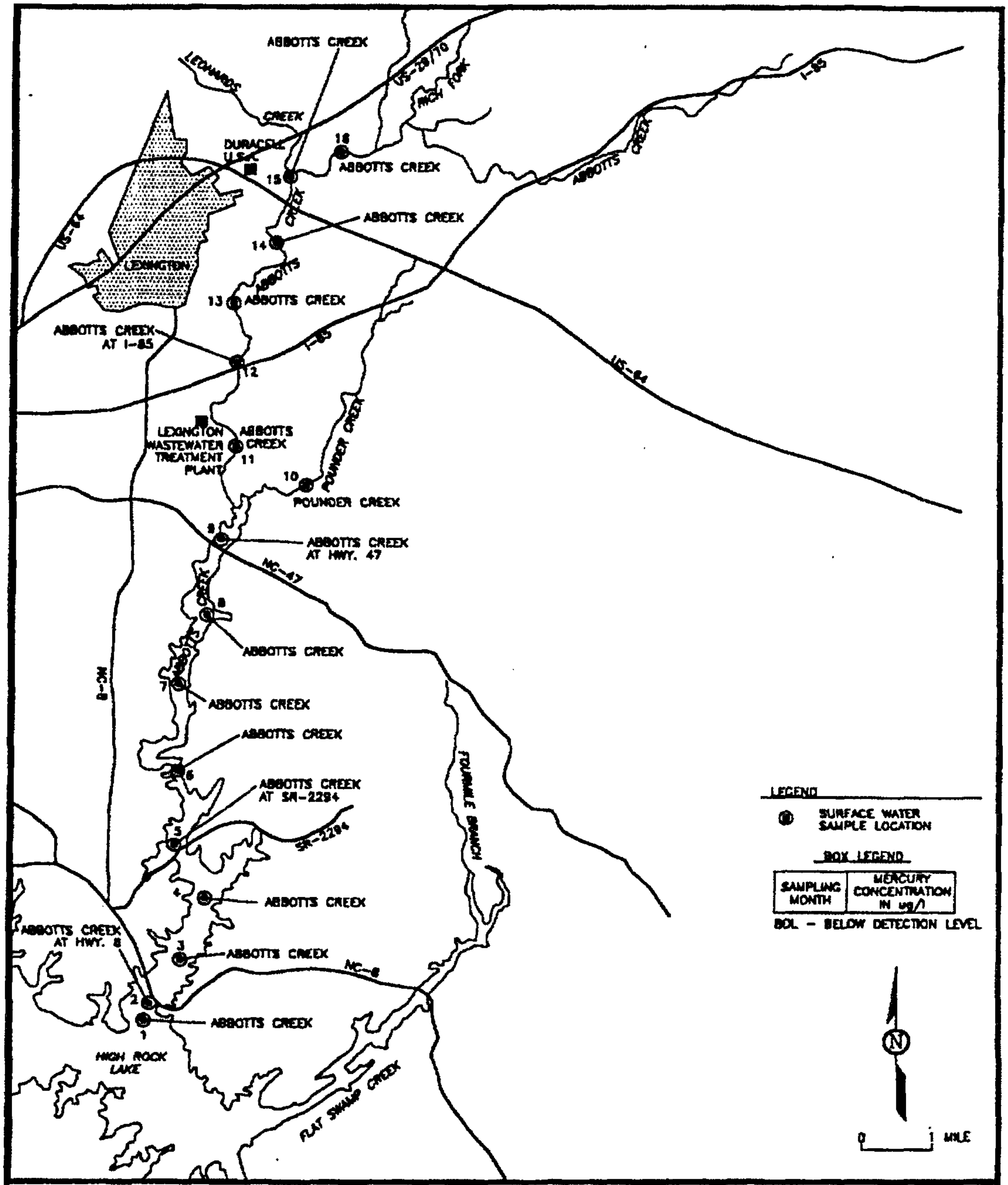
FIGURE
5



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OFF-SITE SURFACE WATER
AND SEDIMENT SAMPLING LOCATIONS

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FIGURE
6

Higher mercury concentrations were reported in the surface water samples collected during July 1996 from stations SW-31 (10.6 ppb) and SW-32 (56.9 ppb), both located in the unnamed tributary northeast of former Plant #2. These samples also revealed elevated total suspended solids (TSS) concentrations greater than 9,000 ppm.

Mercury also was detected in the surface water samples collected from station SW-33 (5.8 ppb) and from stations SW-22 (0.68 ppb), SW-24 (0.35 ppb), and SW-27 (1.7 ppb) during the April 1996 sampling event.

A total of 11 surface water samples were collected from nine stations during the Phase I and Phase II sampling events and analyzed for organic compounds. A total of four samples also were collected from two background stations (SW-16 and SW-25). The analytical results for volatile organic compounds at the background stations were below detection limits.

A total of 11 VOCs were detected in samples collected from non-background stations. The maximum concentrations for these organic compounds were found at surface water sampling stations SW-33 and SW-34 located immediately south and southwest of the Site, respectively. Station SW-33 is located at the head of the unnamed tributary south of Plant #1. Station SW-34 is located at the head of the unnamed tributary southwest of Plant #1. Lower concentrations of VOCs were reported at other stations including SW-2, SW-9, SW-17, and SW-36.

Chlorinated VOCs were detected at only two surface water stations (SW-33 and SW-36). These VOCs are potentially related to the Site via the shallow ground water system. The presence of vinyl chloride in a surface water sample collected from Station SW-33 located south of the Site may be a result of the degradation of halogenated VOCs used at the facility, including PCE and TCE, to vinyl chloride. Acetone was detected in surface water samples from five stations (SW-2, SW-9, SW-17, SW-33, and SW-34) at concentrations of 67 ppb and less. The exact source of the acetone is unknown. Toluene, ethyl benzene, and total xylene also were detected at concentrations ranginf from 2 to 9 ppb at a single surface water station, SW-2, located on the Abbotts Creek Arm of High Rock Lake. These compounds are typical to gasoline and their presence is most likely due to releases from boat motors in High Rock Lake or cars from the nearby highway bridge.

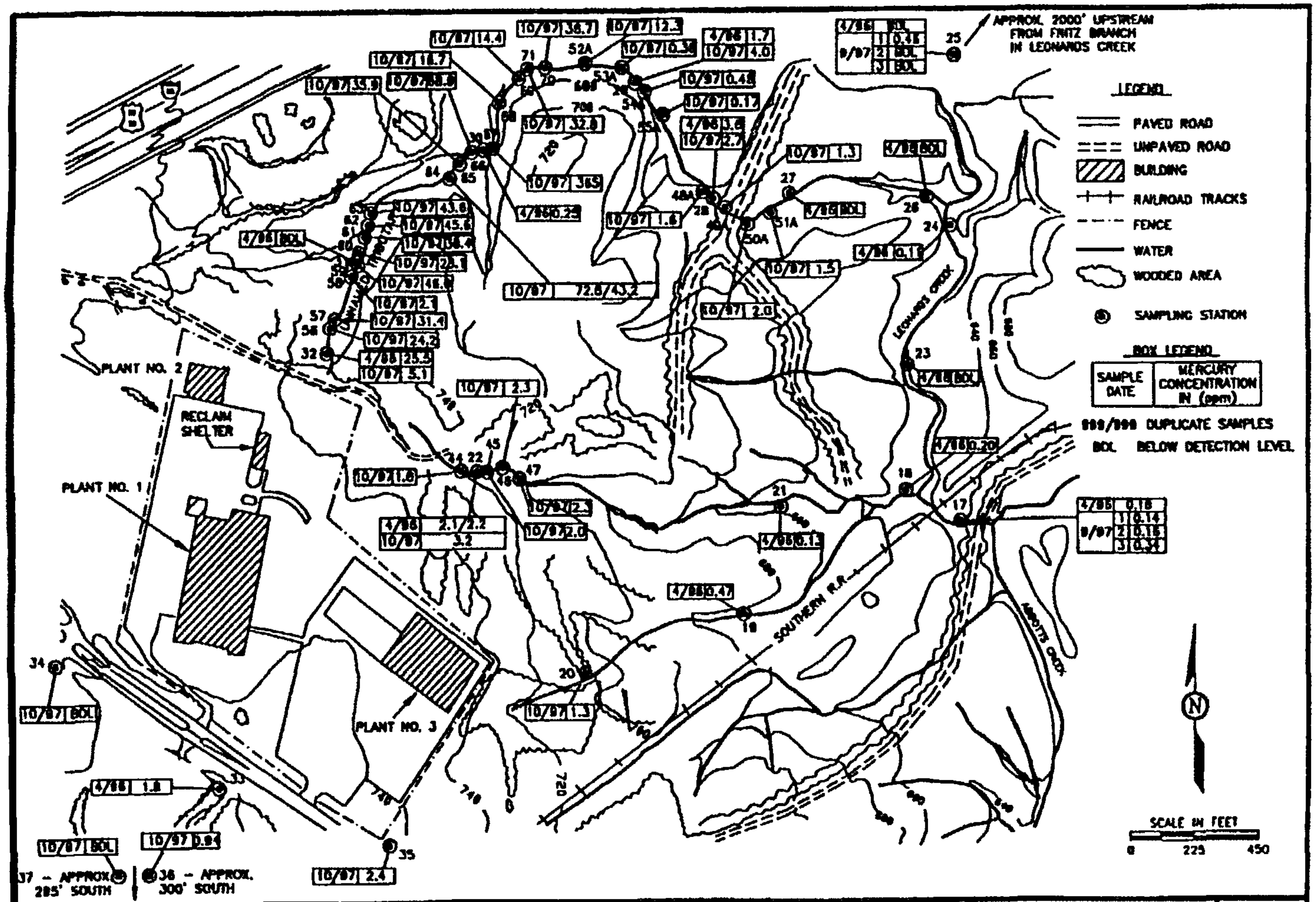
A total of eleven surface water samples were collected from five stations during the Phase I and Phase II sampling events and analyzed for semi-volatile organic compounds. A total of four samples also were collected from two background stations (SW-16 and SW-25). Analytical results for semi-volatile organic compounds at the background stations were below detection limits.

The only SVOC detected at three of the five non-background stations was bis (2-ethyl hexyl) phthalate (DEHP) at concentrations ranging from non-detect to 57 ppb. The highest concentration was detected at Station SW-37 located on the southern unnamed tributary to Abbotts Creek, upstream of the confluence with the unnamed tributary south of Plant #1. Low concentrations of DEHP also were found in the surface water samples collected from Stations SW-2, located on the Abbotts Creek Ann of High Rock Lake, and SW-33, located on the unnamed tributary south of Plant #1. The exact source of the DEHP is not known.

A total of nine samples were collected from five stations during the Phase I and Phase II sampling events and analyzed for pesticides and PCBs. A total of four samples also were collected from two background stations (SW-16 and SW-25). Analytical results for pesticides and PCBs at the background stations were below detection limits. Neither pesticides nor PCBs were detected in any of the surface water samples. Therefore, pesticides and PCBs are not considered to be an issue in the surface water in the vicinity of the Site.

A total of 117 sediment samples were collected from 70 stations during the Phase I and Phase II sampling events and analyzed for inorganic constituents. Figures 7 and 8 show the mercury concentrations at each sediment sample location collected along the tributaries draining the Site, as well as Abbotts Creek and into High Rock Lake. These locations included the unnamed tributary northeast of former Plant #2, the unnamed tributary east of Plant #3, the unnamed tributary north of Plant #3, the unnamed tributaries south of Plant #1, Fritz Branch, Leonards Creek, Abbotts Creek, and the Abbotts Creek Arm of High Rock Lake. This includes 21 sediment samples collected as part of the ecological sampling program for amphibians and *Corbicula*. A total of nine samples were collected from three background stations (SW-10, SW-16, and SW-25). Eleven sediment samples were analyzed for TAL inorganic constituents. The concentration ranges and the locations of the maximum concentrations of the site-specific inorganic constituents are identified below in Table 15.

The highest mercury concentration was detected in a sediment sample collected from station SD-67 (365 ppm), located in the unnamed tributary northeast of former Plant #2. The source of the mercury in the sediments is most likely runoff from the areas of concern located inside the facility fence line (i.e., former Plant #2 area, northern site area, and Building #4 sump area). Lower concentrations of mercury were detected in the sediments sampled from other stations along this unnamed tributary, as well as from Stations SD-33 (1.8 ppm) and SD-22 (2.2 ppm). Station SD-33 was located at the head of the small unnamed tributary located south of Plant #1. Station SD-22 was in the unnamed tributary located north of Plant #3. Station SD-14, located in Abbotts Creek, had an initial Phase I mercury concentration of 11.8 ppm. Station SD-14 is downstream of the Site, the Old Lexington Landfill, and the Old Wastewater Treatment Plant. Mercury was not detected above 0.22 ppm in 11 subsequent sediment samples collected at Station SD-14, as well as downstream and upstream of Station SD-14.



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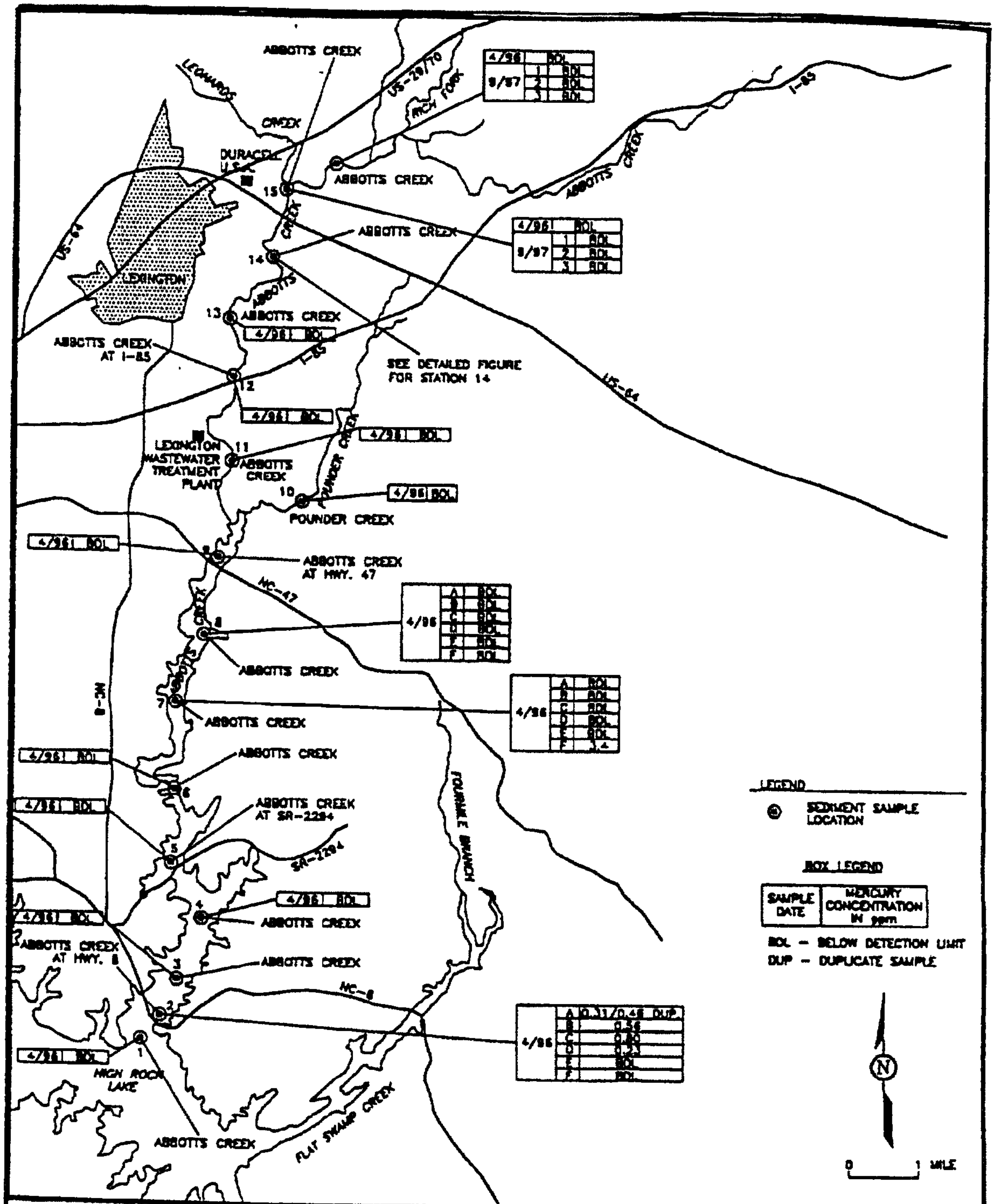
MERCURY CONCENTRATIONS (ppm) AT SEDIMENT SAMPLING LOCATIONS FOR TRIBUTARIES DRAINING SITE
DURACELL U.S.A.
LEXINGTON, NORTH CAROLINA

FIGURE
7



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MERCURY CONCENTRATIONS (ppm) AT ABBOTTS CREEK AND POUNDER CREEK SEDIMENT SAMPLING LOCATIONS
DURACELL U.S.A.
LEXINGTON, NORTH CAROLINA

FIGURE
8

Table 15 - Summary of Inorganic Constituents in Sediment Samples

Inorganic Constituents	Concentration Range (ppm)	Location of Maximum Concentration
Cadmium	BDL to 7.9	DUR-SD-17-3
Chromium	6.1 to 152	DUR-SD-19
Manganese	114 to 9,440	DUR-SD-47
Mercury	BDL to 365	DUR-SD-67
Silver	BDL to 5.0	DUR-SD-6
Zinc	11.5 to 140	DUR-SD-67

A total of 10 sediment samples were collected from ten stations during the Phase I and Phase II sampling events and analyzed for VOCs. Two samples also were collected from two background stations (SW-16 and SW-25). A total of nine VOCs were detected in the sediment samples. The higher concentrations for these organic compounds were found at sediment sampling stations SD-2, SD-33, and SD-36. Station SD-2 is located along the Abbotts Creek Ann of High Rock Lake (impounded), while Stations SD-33 and SD-36 are located along the unnamed tributary south of Plant #1. Lower concentrations of VOCs were detected in the sediments collected from stations SD-9, SD-17, and SD-26.

Chlorinated VOCs were detected in only two sediment samples which were collected from Stations SD-33 and SD-36. The presence of chlorinated VOCs at these locations is most likely attributable to the discharge of shallow ground water containing VOCs to this surface stream.

A geomembrane was placed into the upper reached of the unnamed tributary following the 1994 sediment removal activities conducted by Duracell. In order to investigate the presence of residual inorganic constituents beneath the geomembrane, sediment samples were collected from beneath the geomembrane. Seven samples were collected and analyzed for the site-specific inorganic constituents. These locations were selected based on historical data which indicated concentrations of mercury in the sediment at these locations. The concentration ranges and locations of the maximum concentrations of the site-specific inorganic constituents are identified below in Table 16.

Table 16 - Summary of Inorganic Constituents beneath Geomembrane

Inorganic Constituents	Concentration Range (ppm)	Location of Maximum Concentrations
Cadmium	BDL to 0.59	DUR-SS-03
Chromium	5.8 to 12.4	DUR-SS-01
Manganese	505 to 968	DUR-SS-01
Mercury	0.74 to 45.3	DUR-SS-03
Silver	BDL to 0.69	DUR-SS-03
Zinc	54.8 to 92.9	DUR-SS-04

These data indicate that residual concentrations of mercury are present at certain locations beneath the geomembrane in the unnamed tributary. The material is not directly accessible for exposure or transport in the environment.

6.3 Summary of the Ecological Assessment

A Phase I screening-level ecological assessment and a Phase II ecological assessment were conducted to evaluate the potential ecological impacts related to the Site. Numerous samples were collected and analyzed as part of this effort. The key objectives of these ecological assessments included:

- determining if habitats of any federally listed Threatened or Endangered (T & E) species have been adversely impacted by site-related contamination;

- determining if bioaccumulation of site-related contaminants has occurred in benthic macro-invertebrates, such as the freshwater mussels called Corbicula, living in streams near the site;

- determining if bioaccumulation of site-related contaminants has occurred in fish living in Abbott Creek and High Rock Lake. A total of 187 fish samples were collected and analyzed for this effort; and

- determining if uptake and bioaccumulation of site-related contaminants has occurred in terrestrial organisms living near the site, including shrews, mice, and earthworms, as well as higher order predators in the food chain.

The study area consisted primarily of two ecozones: 1) terrestrial off-site ecozone and 2) aquatic/riparian ecozone. The Tier I screening-level ecological risk assessment identified certain organisms (representatives of different feeding groups in the terrestrial and aquatic ecozones in the vicinity of the Site) which could potentially be impacted due to the presence of site-related constituents, particularly mercury. Based on the results of the Phase I screening-level ecological assessment, the decision was made to conduct a Phase II ecological risk assessment.

The Phase II ecological sampling was intended primarily to fill data needs in the ecological database that has been used for the screening level and ecological risk analyses. The Phase II sampling included a study of the target off-site ecozones to estimate habitat suitability and abundance. Specifically, observations were made of target species (and others in the same niches/feeding guilds), tracks, scats, cover types, nest sites, nesting habitat, and other observations, following the data collection and input data procedures of the United States Fish & Wildlife Service (USFWS) and the Habitat Evaluation Procedure (HEP) model. The HEP protocols were selected in order to follow a well-understood and repeatable methodology at this stage, realizing that the data needs of any Tier II analyses would not be fully defined at the time of the Phase II field work.

6.4 Fate and Transport of COCs

The constituents present in the soil (gas, aqueous, or sorbed onto the solid phase) are subjected to physical, biological, and chemical reactions which directly influence the persistence and migration of the constituents. The site-related constituents of potential concern (COPCs) include the following inorganic constituents (mercury, manganese, zinc, silver, cadmium, chromiurn, and lithium), and volatile organic compounds (tetrachloroetbene, carbon tetrachloride, methylene chloride, trichloroethene, 1,1-dichloroethene, trans-1,2-dichloroetbene, 1,1-dicbloroethane, 1,2dichloroethane, 1,1,1-trichloroethane, 1,1,2-trichloroethane, acetone, chloroform), toluene, xylene, PCBs, and polynuclear aromatic hydrocarbons (PAHs).

Based on the areas of concern identified above, pathways of migration include air, surface water runoff, surface water, and ground water. The air pathway includes transport of surface soil particles that might contain inorganic and organic constituents of concern to on-site and off-site areas. In addition, VOC vapor emissions from the surface soils in the vicinity of the former solvent disposal area would be transported via the air pathway.

The surface water runoff pathway includes the transport of constituents of concern entrained in soil, and, to a lesser extent, the transport of dissolved constituents of concern in the water phase. This pathway of migration leads predominantly to a series of unnamed tributary streams draining to the north/northeast of the Site and to a minor extent to the south. The surface water pathway continues the transport of suspended sediment and dissolved constituents of concern downstream from these unnamed tributaries to Leonards Creek, Abbotts Creek, and High Rock Lake.

Uptake of various constituents of concern by aquatic and terrestrial plants and organisms also can occur. This uptake and subsequent bioaccumulation occurs through the local ecosystem based on the dominant species comprising the food web in the area. Bioaccumulation of certain constituents of concern such as mercury can occur which can have an impact on various plants and organism.

Mercury is typically present in the soils in the metallic state as a hydroxide and chloride. Based on the relatively low concentrations of mercury that leached from the soils as part of the SPLP tests, the concentration of mercuric chloride, a high solubility species of mercury, is considered to be low. Mercury present in the soils is expected to methylate at a very slow rate, if at all.

Mercury present in sediments is primarily derived from mercury bound to soil that is transferred via runoff; therefore, the species initially present will be similar to the species present in the parent soil. Because the soils at the facility are mineral soils, low organic carbon levels may be restricting transformation to methyl mercury. If this transformation is occurring, methyl mercury is rapidly being removed from the aquatic system. Based on the low concentrations of mercury observed in the aquatic biota, methylation is apparently not occurring at a significant rate, or total mercury concentrations are sufficiently low that significant bioaccurnulation does not occur.

The various VOCs detected at the Site can be classified as halogenated VOCs (HVOCs) and non-halogenated VOCs (NVOCs). The halogenated volatile organic compounds (HVOCs) identified in the soil and ground water at the Site have moderate solubilities, high volatilities, low to moderate partition coefficients, high mobilities, and densities greater than water. As a result, they can be readily leached from soil into ground water. Once in the subsurface, these HVOCs typically undergo progressive dehalogenation and degradation.

The Site had concentrations detected above background for various inorganic constituents including cadmium, chromium, manganese, mercury, silver, and zinc, as well as halogenated and non-halogenated VOCs, PAHs, phthalate esters, and PCBs.

The soils at the Site do not have a high organic carbon concentration and, therefore, these VOCs will move relatively rapidly through the soil along with infiltrated water. This mobility is evident in the former solvent disposal area.

Inorganic constituents are elements and, therefore, will not biodegrade. Inorganic mercury compounds can undergo a microbiologically-induced transformation to methyl mercury, an organo-inorganic compound. Methylation of mercury can cause increased bioaccumulation of mercury in aquatic life. Inorganic and organic constituents present in surface and subsurface soils can migrate through soils. The inorganic constituents of concern have high K_d values and will readily sorb onto soil particles. This phenomenon was confirmed by the SPLP testing performed as part of the RI. Although the inorganic constituents tend to preferentially sorb to soil particles, some migration in the water phase does occur. The presence of inorganic constituents in the ground water demonstrates this transport mechanism. With the exception of metallic mercury, the various inorganic constituents and related inorganic species all have low vapor pressures and, therefore, movement as a vapor will not be a significant migration pathway through soils.

Transport through soils of the various constituents of concern associated with the Site is limited to on-site ground water. Surface runoff of soil material is limited to small surface areas immediately north and northeast of the Site, and to the three small unnamed tributaries to the north/northeast and the one small unnamed tributary to the south.

Site constituents of concern can enter surface water from other media. Inorganic constituents can be transported in surface water either as dissolved inorganic constituents, precipitated inorganic constituents, or inorganic constituents associated with suspended matter. Dissolved inorganic constituents also can be transported with surface water flow. The concentration of the inorganic constituents of concern in surface water, except in areas immediately adjacent to the Site, are low. The low levels of VOCs identified in surface water adjacent to the Site are most likely the result of ground water discharge to the heads of the small unnamed tributaries. Based on this limited extent, VOCs entering the surface water are rapidly removed, most likely via volatilization to the atmosphere.

Inorganic constituents can be transported to sediments via soils entrained in stormwater runoff, deposition of dust, or transfer of dissolved or precipitated inorganic constituents in surface water to sediments. Inorganic constituents can be transported with sediments either as bed-flow or suspended sediments. The sediments would be deposited onto the bottom of the surface water body when water velocity is reduced to a rate at which bed-flow ceases or suspended matter settles out. Once sediments settle to the bottom, they can be remobilized as bed-flow or suspended matter if a sufficient water velocity is reached, or they can be covered by additional sediment and the constituents buried.

Based on the low concentrations of mercury and VOCs in the near surface soils at the Site, transport via volatilization and the air pathway is not considered significant. In addition, the vegetative cover and compact soils at the Site would limit transport via entrainment in wind-blown dust.

6.5 Development of Soil Remediation Levels

Soil remedial goals for the protection of ground water were derived based on physical and chemical transport mechanisms at the Site. Although it is possible that the risk assessment for Operable Unit Two (ground water) will result in site-specific ground water quality criteria for the Site, for the purposes of this analysis, the ground water cleanup goals for the site-specific constituents of concern were based on default ground water quality criteria. These criteria were taken from the North Carolina Ground Water Quality Standards (NCGWQS) or the EPA Maximum Contaminant Levels (MCLs).

The soil remedial goals for protection of ground water are not considered to be the maximum allowable concentrations that can be present in soil in a given area of concern in order to be protective of ground water quality. Rather these remedial goals represent an average concentration of a particular constituent of concern in a given area of concern with a specific soil volume. The total mass of a constituent of concern available for migration to ground water is controlled by the total surface area and depth of soil through which infiltration occurs, in addition to the average constituent concentration. Therefore, these soil remedial goals for protection of ground water are to be used as a guide to reducing the overall risk at each area of concern associated with migration to ground water.

Hydraulic and solute transport models were constructed to represent Site conditions and to determine a dilution/attenuation factor from the source areas to the northern Site boundary. Soil remedial goals were derived from the model results using a soil:water partitioning equation.

The modeling effort was necessary to establish soil concentrations that would be protective of ground water in the future as a result of leaching of COCs from the soils at the Site. The methods evaluated for predicting or determining the mobility of COCs in the soil at the Site include: 1) simple soil/water partition equations using literature data; 2) simple soil/water partition equations using site-specific environmental data; 3) complex unsaturated and saturated zone chemicalequilibrium models; and 4) site-specific leach tests, such as the Synthetic Precipitation Leaching Procedure (SPLP).

A direct method of testing the mobility of the COCs using on-site soils was considered to be a more representative and appropriate approach to assessing the site-specific mobility of COCs. The SPLP, as described in SW-846 Method 1312, was used in making this site-specific assessment. The 1996 EPA Soil Screening Guidance: User’s Guide recognizes the utility of a leach test in assessing the mobility of COCs in soil and specifically cites the SPLP as the leaching test appropriate for a contaminated soil scenario.

The calibrated transport models were used to determine soil remedial goals (SRGs) for the protection of ground water. The SRGs were determined by incorporating the soil-water partition coefficients, dispersion and dilution during transport, and for the organic compounds, the degradation rate. This analysis involved a two step process. First, an aquifer mass loading was determined using WinTrant®. Second, that mass loading was converted to a soil concentration based on the area of the source and the rate of infiltration through the source area. Analytical results for VOCs in soil were reviewed to evaluate the need for determining site-specific SRGs for the VOCs in the former solvent disposal area. The VOC data initially were compared to the EPA soil screening levels (SSLs) for migration to ground water, employing a dilution attenuation factor of 20 (20DAF) and a fraction organic carbon content (f_{oc}) of 0.2%. Based on this comparison, 11 VOCs were detected at concentrations that exceeded the EPA SSL for migration to ground water at 20DAF. Based on the soil data collected as part of this RI, the following four source areas were identified for modeling purposes. The dimensions and configurations of these areas are based on the soil data collected as part of this RI, and are shown on Figure 9.

Soil remedial goals were calculated for manganese and mercury for each of the four cases, and for those VOCs that exceeded preliminary rernediation goats at the former solvent disposal area. The primary VOCs of concern in soil which need to be addressed in the former solvent disposal area, along with the soil remediation level for each, are as follows: tetrachloroethene (0.28 ppm), carbon tetrachloride (0.15 ppm), methylene chloride (0.29 ppm.), trichloroethene (0.48 ppm), 1,1-dichloroethene (0.90 ppm.), 1,1-dichloroethane (55.4 ppm.), 1,2-dichloroethane (0.02 ppm.), 1,1,2-trichloroethane (0.49 ppm), trans-1,2-dichloroethene (7.6 ppm), 1,1,1-trichloroethane (40.5 ppm),chlorofonn (.02 ppm), acetone (32.6 ppm), toluene (186 ppm), xylene (148 ppm.), and PCBs (144 ppm). The remediation levels for the remaining VOCS of concern in soil can be found in the Feasibility Study.

Equilibrium partitioning, or soil/water distribution coefficients (K_d) for site-specific inorganic constituents and the predominant VOCs were derived from reported total constituent concentrations in soil and the corresponding constituent concentrations in the extracts from the soil SPLP test method. The distribution coefficients derived from the SPLP test results reflect the concentration distributions of COCs in the soil and water phases that would occur as a result of infiltrating rainfall through the unsaturated (vadose) zone.

6.6 Current and Potential Future Site and Resources Uses

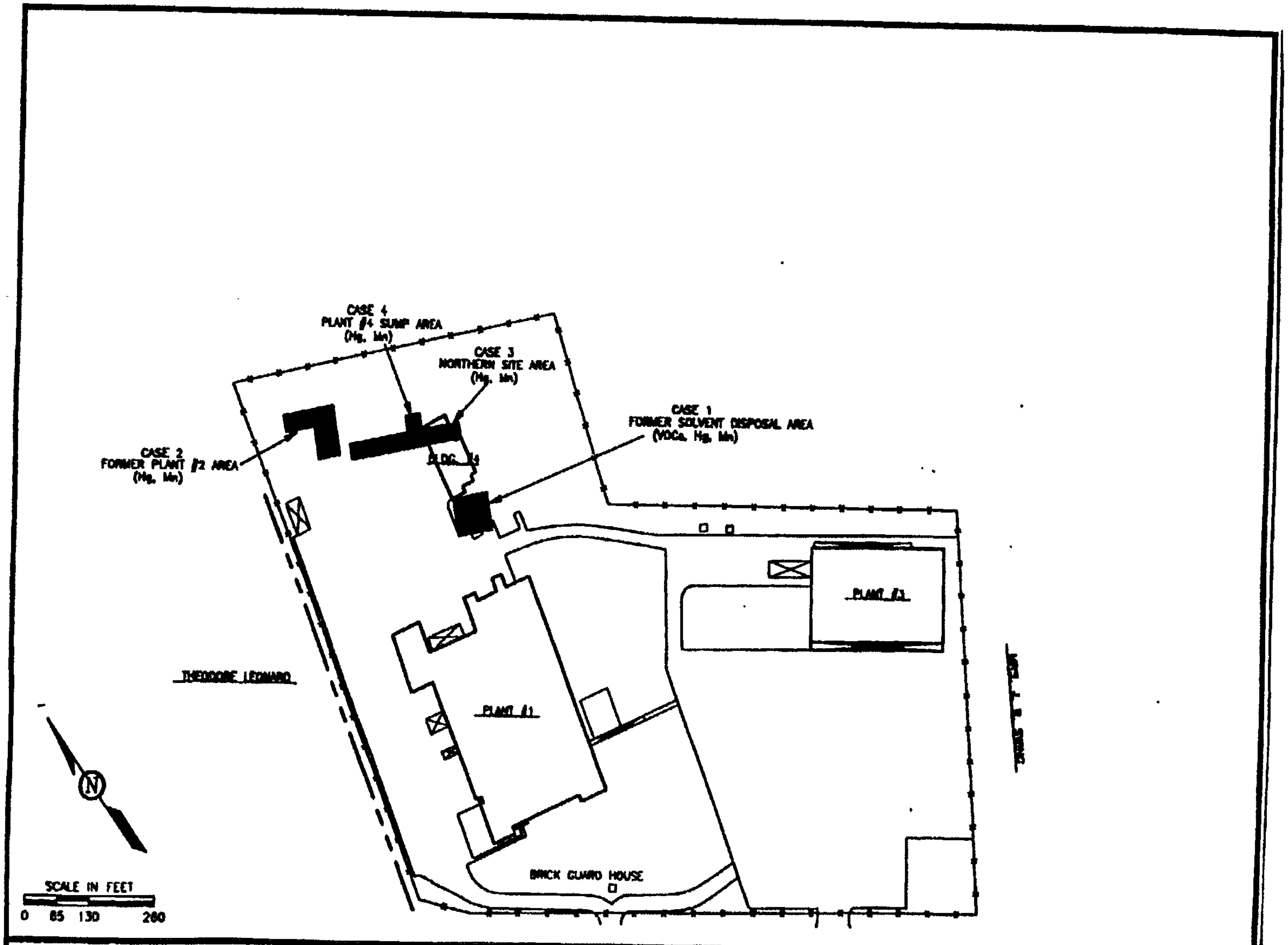
The current and reasonably anticipated future land uses for the facility and the land around the facility is summarized as follows:

- The facility, including the northern Site area, former plant #2 area, former solvent disposal area, sump areas, and southern Site area, is presently operating as a battery manufacturing plant;

- The land surrounding the facility is presently used for a variety of purposes, including commercial, fight industrial, and residential;

- The facility will continue to be a battery manufacturing plant into the future. Land use restrictions will be placed on the facility property as part of this remedy to ensure the protection of human health and the environment into the future.

- The reasonably anticipated future land use for the land around the facility will continue to be commercial, fight industrial, and residential purposes. The potential beneficial ground water and surface water uses for future use assumptions (e.g., potential drinking water, recreational) are based on knowledge of current uses. The current and future ground water use assumption are a key factor in determining the importance of establishing soil remediation levels at the Site. Ground water contamination will be addressed during Operable Unit Two.



Environmental Resources Management
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MODELED SOURCE AREAS FOR SOIL REMEDIATION
GOAL CALCULATIONS FOR PROTECTION OF GROUND WATER
DURACELL U.S.A.
LEXINGTON, NORTH CAROLINA

FIGURE
9

7.0 SUMMARY OF SITE RISKS

As part of the RI/FS, EPA conducted a baseline risk assessment (BRA) to determine the current and future effects of contaminants on human health and the environment if no action were taken to address the contaminated soil and sediment at the Site. The BRA focused on potential health effects for both children and adults that could result from current or future direct contact with contaminated soil or sediment (e.g., children ingesting soil or sediment while playing in the area). Based on discussions with the Site owners, the facility is currently zoned for industrial use, and will remain an industrial facility for the foreseeable future. The facility owners have agreed to apply land use restrictions to their property as part of this remedy to prohibit residential use of the facility in the future. The BRA also focused on potential effects to ecological receptors that could result from the direct contact with or bioaccumulation of contaminated soil, surface water, or sediment (e.g., predatory birds feeding on mice or shrews with elevated levels of mercury, raccoons eating fresh water mussels, etc.).

7.1 Summary of Human Health Risk Assessment

Exposure scenarios for both current and future land use were evaluated based on an estimate of Reasonable Maximum Exposure. Under the current land use scenario, current human receptors near the Site potentially include child or adult residents living near the Site who may incidentally ingest or come into contact with soil and sediment with elevated levels of mercury. A current human receptor on-site would be a construction worker coming into contact with on-site soils contaminated with mercury.

Under the future land use scenario, future human receptors living around the Site potentially include child or adult residents who incidentally ingest or come into contact with soil and sediment with elevated levels of mercury. The reasonable future land use scenario for the Duracell facility will remain industrial, and future land use restrictions will be implemented as part of this remedy to prohibit the facility from being used for residential purposes. Therefore, the potential for future child or adult residents living on the facility and incidentally ingesting or coming into contact with elevated levels of mercury is eliminated. However, a future human receptor on-site would be a future construction worker coming into contact with elevated levels of mercury in the soil.

The baseline risk assessment focused on the health effects for adult and child residents that could result from potential exposures both inside and outside the facility fence line, as well as to construction workers on the facility. The chemicals of concern (COCs) for an exposure scenario are the chemicals of potential concern (COPCs) that significantly contribute to an exposure pathway for an identified receptor. The Risk Assessment also adds the risk from all COCs in order to assess the cumulative risk for each exposure scenario. A COC must have an individual cumulative carcinogenic risk which exceeds 1X10^{-4} (or one-in-ten-thousand), or a hazard index (HI) for noncarcinogenic risk (e.g., nervous disorders) of 1.0. A 1X10^{-4} cumulative carcinogenic risk level or an HI of 1.0 for noncarcinogenic risk are typically used as "remediation triggers".

No unacceptable carcinogenic risk was identified during the RI from exposures to the COCs. However, there are several exposure scenarios evaluated in the Risk Assessment with HI values greater than 1.0. The HI value greater than 1.0 is primarily due to incidental ingestion of, and dermal contact with, mercury in soil. The exposure scenarios with HI values greater than 1.0 included future construction workers in the Northern Site area (total HI = 3.0), future on-site adult residents in the Northern Site area (total HI = 2.0), future on-site child residents (1-6 years of age) in the Northern Site area (total HI = 15), and future child residents (1-6 years of age) in the Southern Site area (total HI = 4.0).

7.1.1 Identification Of Chemicals Of Concern

Based on the history of operations and materials used at the Site, and an evaluation of the analytical data collected during the Remedial Investigation, the primary chemicals of potential of concern at the Site in soil include mercury, manganese, PCBs, toluene, xylene, and volatile organic compounds including tetrachloroethene, trichloroethene, carbon tetrachloride, methylene chloride, 1,2-dichloroethane, acetone, 1,1,1-trichloroethane, trans-1,2-dichloroethene, 1,1-dichloroethane, 1,1,2-trichloroethane, 1,1-dichloroethene, and chloroform.

Elevated levels of mercury in soil can be toxic if human beings are exposed through inhalation, ingestion or dermal contact exposure. Elevated levels of mercury in soil can also cause adverse impacts to ecological receptors. Mercury can bioaccumulate in living tissue, potentially causing adverse effects to higher order organisms in the food chain. Elevated levels of mercury in soil is also a source of groundwater contamination. The elevated levels of manganese and volatile organic compounds in the soil do not pose a direct contact exposure risk, but are a source of groundwater contamination at the Site. Although the above constituents were considered to be the primary constituents of concern associated with the Site, the Remedial Investigation detected other chemical constituents through sampling and analyses.

7.1.2 Exposure Assessment

A conceptual site model incorporates information on the potential chemical sources, affected media, release mechanisms, potential exposure pathways, and known human and/or ecological receptors to identify complete exposure pathways. The conceptual model for the Site is presented on Figure 10. A pathway is considered complete if: (1) there is a source or chemical release from a source; (2) there is an exposure point where human or ecological contact can occur; and (3) there is a route of exposure (oral, dermal, or inhalation) through which the chemical may be taken into the body.

The mercury, manganese, and volatile organic compound contamination in the soil resulted from past operations at the Site. Soil contamination over the years has resulted in continued releases to ground water. Groundwater has been impacted by mercury, manganese, and volatile organic compounds through the leaching action of infiltrating rain water. Surface water and sediment in nearby surface water pathways have been impacted by mercury due to runoff of soil contamination from the Site. The potential exists for adverse impacts to terrestrial and aquatic ecological receptors due to the uptake or the bioaccumulation of mercury.

Based on these models, the media available for human contact are:

(1). Soil within the facility fence line as well as outside the fence line. The receptors evaluated in the BRA included future site residents, current and future residents around the Site, current on-site visitor, and current and future construction workers at the facility;

(2). Surface water and sediment in the unnamed tributaries are accessible to juvenile and adult residents living near the facility. It is assumed that these receptors may be exposed while swimming, wading, or fishing in the stream; and

(3). Fish in Abbotts Creek and High Rock Lake caught by human beings and consumed.

The potentially significant human exposure routes are:

(1). through the inhalation, direct contact, and/or incidental ingestion of contaminated soil;

(2). through the inhalation of, incidental ingestion of, and/or dermal contact with surface water and sediment in the unnamed tributary. Direct contact with sediment in the unnamed tributary may occur since the sediment is not covered by surface water for much of the year.

3). through the consumption of fish in Abbotts Creek and High Rock Lake due to levels of mercury in fish fillets.

The media available for ecological uptake and/or bioaccumulation are:

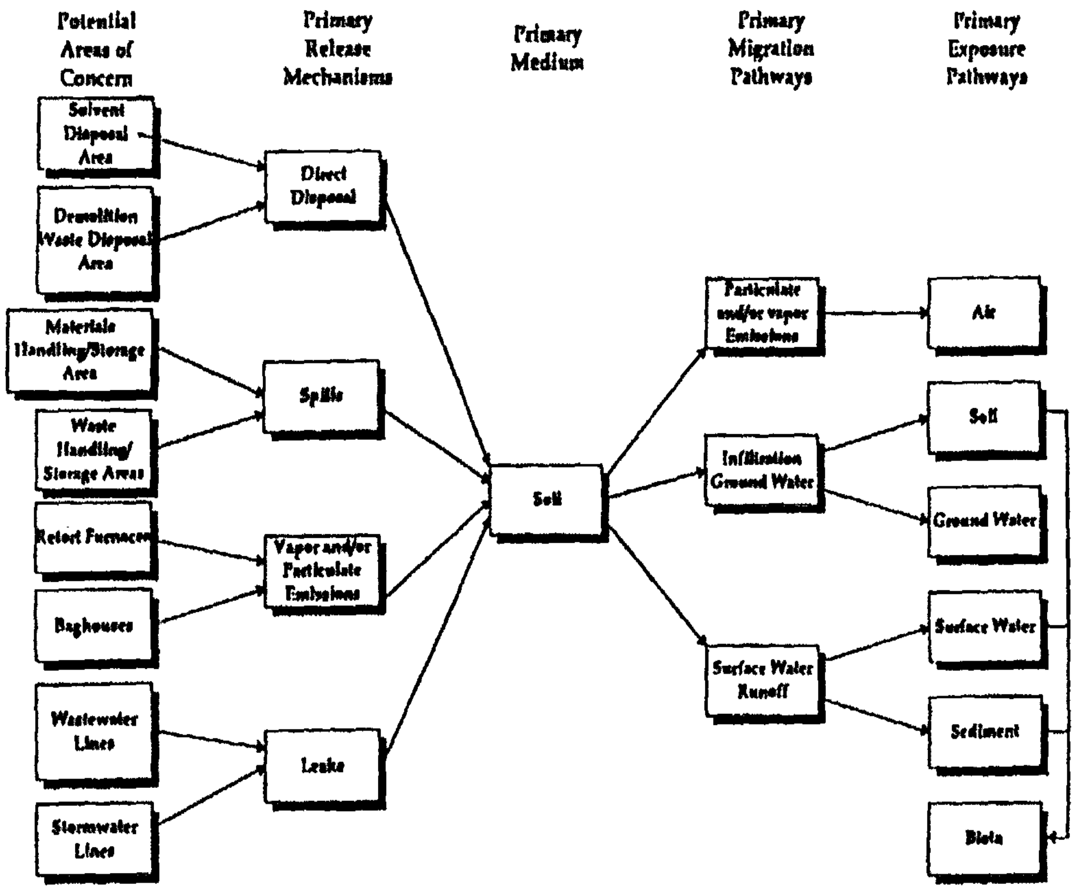
(1) soil located within the facility fence line as well as outside the fence fine. Earthworms were evaluated for the bioaccumulation of mercury, and through the use of food chain models, the bioaccumulation potential to high-order organisms

(2) surface water and sediment in the unnamed tributary of Fritz Branch. Fresh water fish and mussels were evaluated for bioaccumulation of mercury, and through the use of food chain models, the bioaccumulation potential to higher-order organisms in the food chain including carnivorous and omnivorous mammals, was estimated.

The potentially significant exposure routes to ecological receptors are:

(1) through direct with and/or ingestion of contaminated soil, as well as the ingestion of lower-order organisms in the food chain; and

FIGURE 10
CONCEPTUAL SITE MODEL
DURACELL U.S.A
LEXINGTON, NORTH CAOLINA



	Human		Biota	
EXPOSURE ROUTE	On Site	Off Site	Terrestrial	Aquatic
Ingestion				
Inhalation	●	●	●	
Dermal Contact				
Ingestion	●	●	●	
Inhalation	●[1]	●[1]	●[1]	
Dermal Contact	●	●	●	
Ingestion		●		
Inhalation		●		
Dermal Contact		●		
Ingestion		●	●	●
Inhalation		●[1]	●[1]	
Dermal Contact		●	●	●
Ingestion		●	●	●
Inhalation				
Dermal Contact		●	●	●
Ingestion		●	●	●
Inhalation				
Dermal Contact				

[1] VOCs ONLY

(2) through direct contact with and/or ingestion of contaminated surface water and sediment, as well as the ingestion of lower-order organisms in the food chain.

7.1.3 Toxicity Assessment

Toxicity assessment is a two-step process whereby the potential hazards associated with route-specific exposure to a given chemical are (1) identified by reviewing relevant human and animal studies; and (2) quantified through analysis of dose-response relationships.

Toxicity values are used in the baseline evaluation to determine both carcinogenic and non-carcinogenic risks associated with each chemical of concern and route of exposure. Toxicity values that are used in this assessment include:

- reference dose values (RfDs) for non-carcinogenic effects

- cancer slope factors (CSFs) for carcinogenic effects

RfDs have been developed to indicate the potential for adverse health effects from exposure to chemicals exhibiting non-carcinogenic (systemic) effects. RfDs are ideally based on studies where either animal or human populations were exposed to a given compound by a given route of exposure for the major portion of the life span (referred to as a chronic study). The RfD is derived by determining dose-specific effect levels from all the available quantitative studies, and applying uncertainty factors to the most appropriate effect level to determine an RfD for humans. The RfD represents a threshold for toxicity. RfDs are derived such that human lifetime exposure to a given chemical via a given route at a dose at or below the RfD should not result in adverse health effects, even for the most sensitive members of the population.

CSFs are route-specific values derived only for compounds that have been shown to cause an increased incidence of tumors in either human or animal studies. The CSF is an upperbound estimate of the probability of a response per unit intake of a chemical over a lifetime and is determined by low-dose extrapolation from human or animal studies. When an animal study is used, the final CSF has been adjusted to account for extrapolation of animal data to humans. If the studies used to derive the CSF were conducted for less than the life span of the test organism, the final CSF has been adjusted to reflect risk associated with lifetime exposure.

The RfDs and CSFs used in this assessment were primarily obtained from USEPA’s IRIS database. If no values for a given compound and route of exposure were listed in IRIS, then USEPA’s HEAST was consulted.

7.1.4 Risk Characterization

The final step of the baseline risk assessment is the risk characterization. Human intakes for each exposure pathway are integrated with reference toxicity values to characterize risk. Carcinogenic and non-carcinogenic effects are estimated separately.

In order to characterize the overall potential for non-carcinogenic effects associated with exposure to multiple chemicals, the Hazard Index (HI) approach is used. This approach assumes that simultaneous sub-threshold chronic exposures to multiple chemicals that affect the same target organ are additive, and could result in an adverse health effect. The HI is calculated as follows:

$$\text{Hazard Index} = ADD_1/RfD_1 + ADD_2/RfD_2 + \ldots ADD_i/RfD_i$$

where: ADD_i = Average Daily Dose (ADD) for the i^{th} toxicant
RfD_i = Reference Dose for the i^{th} toxicant

The term ADD_i/RfD_i is referred to as the Hazard Quotient (HQ).

Calculation of an 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 potential concern exceeds its RfD. However, given a sufficient number of chemicals under consideration, it is also possible to generate an HI greater than one even if none of the individual chemical intakes exceeds its respective RfD.

Carcinogenic risk is expressed as a probability of developing cancer as a result of lifetime exposure. For a given chemical and route of exposure, excess lifetime cancer risk is calculated as follows:

Risk = Lifetime Average Daily Dose (LADD) x Carcinogenic Slope Factor (CSF). These risks are probabilities that are generally expressed in scientific notation (i.e., 1×10^{-6} or 1E-6). An incremental lifetime cancer risk of 1×10^{-6} indicates that, as a plausible upper-bound, an individual has a one-in-one-million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at the site. For exposures to multiple carcinogens, it is assumed that the risk associated with multiple exposures is equivalent to the sum of their individual risks. Table 17 shows a risk summary for the chemicals of concern. The cumulative, non-carcinogenic hazard indices for the site-related COCs, along with the exposure point concentrations that trigger the need for remedial action.

7.2 Summary of Ecological Risk Assessment

Previous investigations conducted at the Site between 1980 and 1995 revealed mercury contamination in the soil around the facility, in sediment along segments of the surface water pathways around the Site, as well as in fish tissue collected from Abbotts Creek and High Rock Lake. As a result, a screening ecological assessment was conducted in 1996 as part of the RI to

TABLE 17 - RISK SUMMARY FOR CHEMICALS OF CONCERN

Current Off-Site Receptor Adult Resident Exposure Pathway-Incidental Ingestion of Surface Sod + Ingestion of Fish				
Media	Chemical of Concern	Exposure Point Concentration (ppm)	Associated Risk	
			Carcinogenic Risk	Noncarcinogenic Risk
Soil	Aluminum	50,500	NA	0.09
	Chromium	219	NA	0.02
	Iron	62,000	NA	0.4
	Manganese	4,280	NA	0.02
	Mercury	53.3	NA	0.07
	Vanadium	220	NA	0.06
Fish	mercury	0.509	NA	0.3

Total Noncarcinogenic Risk = 1.0

TABLE 17 (CONT.) - RISK SUMMARY FOR CHEMICALS OF CONCERN

Current Off-Site Receptor
Child Resident (age 3-6)
Exposure Pathway - Incidental Ingestion of Surface Soil + Ingestion of Fish

Media	Chemical of Concern	Exposure Point Concentration (pprn)	Associated Risk	
			Carcinogenic Risk	Noncarcinogenic Risk
Soil	Aluminum	50,500	NA	0.72
	Chromium	219	NA	0.14
	Iron	62,000	NA	3.0
	Manganese	4,280	NA	0.2
	Mercury	53.3	NA	0.51
	Vanadium	220	NA	0.45
Fish	Mercury	0.509	NA	03

Total Noncarcinogenic Risk 5.0

TABLE 17 (CONT.) - RISK SUMMARY FOR CHEMICALS OF CONCERN

Future Receptor
On-Site Adult Resident
Exposure Pathway - Incidental Ingestion + Dermal Contact with Surface Soil in Northern Site Area

Media	Chemical of Concern	Exposure Point Concentration (ppm)	Associated Risk	
			Carcinogenic Risk	Noncarcinogenic Risk
Soil	Aluminum	48,600	NA	0.1
	Arsenic	8	NA	0.02
	Cadmium	10.8	NA	0.002
	Chromium	121	NA	0.01
	Iron	71,800	NA	0.3
	Manganese	2,820	NA	0.05
	Mercury	5,050	NA	1.0
	Vanadium	172	NA	0.03

Total Noncarcinogenic Risk 2.0

TABLE 17 (CONT.) - RISK SUMMARY FOR CHEMICALS OF CONCERN

Future Receptor
On-Site Child Resident (age 1-6)
Exposure Pathway - Incidental Ingestion + Dermal Contact with Surface Soil in Nortbern Site Area

Media	Chemical of Concern	Exposure Point Concentration (ppm)	Associated Risk	
			Carcinogenic Risk	Noncarcinogenic Risk
Soil	Aluminum	48.600	NA	0.69
	Arsenic	8	NA	0.194
	Cadmium	10.8	NA	0.024
	Chromium	121	NA	0.13
	Iron	71,800	NA	3
	Manganese	2,820	NA	0.2
	Mercury	5,050	NA	10
	Vanadium	172	NA	0.4

Total Noncarcinogenic Risk 15.0

TABLE 17(CONT.) - RISK SUMMARY FOR CHEMICALS OF CONCERN

Future Receptor
On-Site Child Resident (age 1-6)
Exposure Pathway = Incidental Ingestion of Surface Soil in Southern Site Area

Media	Chemical of Concern	Exposure Point Concentration (ppm)	Associated Risk	
			Carcinogenic Risk	Noncarcinogenic Risk
Soil	Aluminum	37,000	NA	0.53
	Chromium	83.4	NA	0.18
	iron	52,600	NA	2.5
	Manganese	14,000	NA	0.26
	Mercury	226	NA	0.34

Total Noncarcinogenic Risk = 4.0

TABLE 17 (CONT.) - RISK SUMMARY FOR CHEMICALS OF CONCERN

Future Receptor
On-Site Construction Worker
Exposure Pathway - Incidental Ingestion and Dermal Contact with Surface and Subsurface Soil in Northern Site Area

Media	Chemical of Concern	Exposure point Concentration (ppm) (Surface/Subsurface)	Associated Risk	
			Carcinogenic Risk	Noncarcinogenic Risk
Soil	Aluminum	48,600/51,800	NA	0.1
	Arsenic	8/3.3	NA	0.02
	Cadmium	10.8/10.3	NA	0.002
	Chromium	121/267	NA	0.01
	Iron	71,800/62,800	NA	0.3
	Manganese	2,820/3,810	NA	0.05
	mercury	5,050/1,910	NA	1.0
	Vanadium	172/268	NA	0.03

Total Noncarcinogenic Risk = 2.0

evaluate the potential for significant ecological impacts. The screening ecological assessment indicated the potential for adverse impacts to ecological receptors on and around the facility; therefore, a qualitative ecological assessment was performed at the Site during the RI. No unique or sensitive habitats were identified at or near the facility.

The qualitative ecological assessment also indicated the potential for adverse impacts to ecological receptors on and around the facility.

The ecological assessment evaluated the uptake potential of mercury in fish, earthworms, and freshwater mussels, and through the use of food chain models, predicted the bioaccumulation potential to higher-order organisms in the food chain including worm-eating birds, worm-eating mammals, carnivorous birds, aquatic birds and mammals, and omnivorous mammals. Based on the food chain models, mercury soil contamination inside and outside the facility fence line, as well as mercury sediment contamination in the unnamed tributary to Fritz Branch, pose an unacceptable risk to the ecological receptors inside and outside the facility fence line.

7.3 Current and Potential Future Site and Resources Uses

The complete exposure routes pertinent to the contaminated soil and sediment on or around the Duracell facility for both current and future land use include:

- incidental ingestion of, and dermal contact with, mercury and iron in soil in the northern and southern site areas, by either a current/future industrial worker or construction worker;
- incidental ingestion of, and dermal contact with, mercury in surface soil, by a current site visitor in the northern and southern site areas; incidental ingestion of mercury in fish by a current/future recreational fisher;
- incidental ingestion of mercury in fish by a current off-site adult and child residents, and ingestion of aluminum, iron, manganese, mercury, and vanadium in off-site surface soil;
- incidental ingestion of mercury and iron in surface and subsurface soil by a future construction worker in the northern site area;
- incidental ingestion of iron, mercury, and aluminum in surface soil, by the future construction worker in the southern site area;
- incidental ingestion of, and dermal contact with iron and mercury in surface soil, by a future adult resident, in the northern site area;
- incidental ingestion of iron and aluminum in surface soil, by an on-site adult resident, in the southern site area;
- incidental ingestion of, and dermal contact with mercury and iron in surface soil, by an on-site child resident, in the northern site area; and

- incidental ingestion of iron, manganese, aluminum, and mercury in surface soil, by an on-site child resident, in the southern site area.

It should be noted that aluminum iron, and vanadium are not considered to be related to the Duracell facility.

8.0 REMEDIAL ACTION OBJECTIVES

The analytical results from the RI/FS indicate the following areas of concern which need to be addressed during the Operable Unit One Remedial Action at the Duracell Battery Tech Site.

- On-site surface and subsurface soils in the Northern Site area, the former Plant #2 area, the former solvent pit area, and the Building #4 sump areas, which contain elevated levels of mercury, manganese, and volatile organic compounds. The elevated levels of mercury, manganese, and volatile organic compounds in the soil are of concern as a potential source of groundwater contamination. In order to address the concerns described above, the levels of mercury, manganese, and volatile organic compounds need to be reduced to the remediation levels in order to limit their potential as a future source of groundwater contamination.
- The elevated levels of mercury identified in the Northern Site area soil would also pose a potential risk to future construction workers working in this area if left in-place. The levels of mercury need to be addressed in order to be protective of future construction workers should they work in this area.
- Several small areas located outside the Duracell facility fence line contain elevated levels of mercury. These areas need to be addressed to eliminate the potential for direct contact exposures with human beings.
- Analytical results from biota samples indicate potential risk due to earthworms exposed to elevated levels of mercury in soil both inside and outside the facility fence line. Levels of mercury in the surface soil in certain areas posed unacceptable risk to worm-eating birds, worm-eating mammals, and high-order organisms in the food chain. The levels of mercury in the surface soil need to be addressed to be protective of these ecological receptors.
- Analytical results from biota samples collected in nearby streams indicate potential risk to macro-invertebrates such as Corbicula, as well as to high-order organisms in the food chain. In order to address this concern, the levels of mercury in nearby stream sediments need to be reduced to minimize exposure to mercury, and minimize the bioaccumulation of mercury in the food chain. The potential still exists that surface water runoff from the Site may transport elevated levels of mercury into nearby streams. Therefore, engineering controls such as capping or constructing a retention basin need to be implemented to minimize future runoff of contaminated soil into nearby streams.

Remedial action objectives were developed based on the results of the Baseline Risk Assessment (BRA), and the examination of Potential Federal and State Applicable or Relevant and

Appropriate Requirements (ARARs). ARARs are categorized as action-specific, location-specific, and chemical-specific. Chemical-specific ARARs for contaminated soil and sediment include prohibitions on the disposal of certain hazardous wastes based on its chemical composition. Location-specific ARARs address site-specific conditions such as critical habitat upon which endangered species or threatened species depend, the presence of a wetland, or historically significant features. Action-specific requirements are controls or restrictions for particular activities related to the implementation of a remedial alternative.

Remediation levels were established to reduce the levels of mercury, manganese, and volatile organic compounds in soil both inside and outside the facility fence line, as well as sediment in the unnamed tributary of Fritz Branch, in order to be protective of human health and the environment. The objectives of the OU1 Remedial Action were established in order to be protective of facility workers (construction and non-construction), as well as to current residents living around the facility and future hypothetical residents living on the facility.

Remediation levels were also established to reduce the potential for future contamination of groundwater. Mercury was found to have different migration potentials from soil to groundwater across the facility. As a result, the mercury remediation levels established for protection of groundwater range from 42 parts per million (ppm) in the former Plant #2 area to 165 parts per million in the former solvent disposal area. The remedial level for manganese established for soil inside the facility fence line for protection of groundwater is 3,080 parts per million. The remediation levels for the primary volatile organic compounds for soil inside the facility fence line for protection of groundwater are as follows: tetrachloroethene (0.28 ppm), carbon tetrachloride (0.15 ppm), methylene chloride (0.29 ppm), trichloroethene (0.48 ppm.), 1,1-dichloroethene (0.90 ppm), 1,1-dichloroethane (55.4 ppm), trans- 1,2-dichloroethene (7.6 ppm.), 1,2-dichloroethane (0.02 ppm.), 1,1,2-trichloroethene, (0.49 ppm), 1,1,1-trichloroethane (40.5 ppm), chloroform (0.02 ppm), acetone (32.6 ppm), toluene (186 ppm), xylenes (148 ppm), and PCBs (144 ppm). The remediation levels for the remaining VOCs in the soil can be found in the Feasibility Study.

Remediation levels were established for mercury in surface soil and sediments in order to minimize any potential adverse impacts to ecological receptors both inside and outside the facility fence line. Long-term monitoring of the ecological receptors will also be required as part of the OU1 remedy to verify that adverse impacts to ecological receptors do not exist. If the monitoring indicates that adverse impacts to ecological receptors are occurring, a change or modification to that portion of the remedy may be warranted at that time.

The mercury remediation level of 10 parts per million (ppm) in the surface soil will be applied to certain areas outside the facility fence line in order to minimize any adverse impacts to ecological receptors, yet minimize destruction of existing habitat in those areas (i.e., avoid clear-cutting of hardwood forests). In other areas located just to the north of the facility fence line where soil removals have previously taken place and further destruction of habitat is not an issue, a mercury remediation level of 5 parts per million (ppm) will be applied to provide protection of ecological receptors. Applying the 5 and 10 ppm remediation levels for soils inside and outside the facility fence line are not considered to be fully protective based on the biota data results from the OU1

Remedial Investigation, but is considered to be a well-balanced response action for several reasons. First, removing mercury in the soil to 3.5 ppm will greatly reduce the volume of mercury contamination in the soil without destroying wildlife habitat in the area. Secondly, the long-term monitoring will be implemented to evaluate any potential adverse impacts to ecological receptors in the area. Likewise, applying a mercury remediation level of 10 parts per million for surface soils inside the facility fence line is not considered to be fully protective of ecological receptors. However, the active manufacturing facility is not considered to be prime feeding habitat, and the areas of concern inside the fence line are limited.

A mercury remediation level of 3.5 parts per million was also established for sediment around the facility. The 3.5 ppm sediment remediation level is slightly higher than the EPA Region IV Waste Management Division Sediment Screening Values for mercury in sediment, which range from 0.15 ppm for "low expected effects", to 1.3 ppm for "moderate expected effects." Nevertheless, the 3.5 ppm sediment remediation level is considered to be a well-balanced response action for several reasons. First, the volume of mercury contamination will be greatly reduced in the unnamed tributary, but minimizing the destruction of existing aquatic habitat. Secondly, long-term monitoring will be implemented to evaluate the potential for adverse impacts to ecological receptors. If the monitoring indicates that adverse impacts are occurring, a change or modification to that portion of the remedy may be warranted at that time.

9.0 DESCRIPTION OF REMEDIAL ALTERNATIVES

The following section provides a summary of the alternatives developed in the Feasibility Study (FS) report to address the soil and sediment contamination, and ecological concerns, associated with the Site. Alternatives 2, 6, and 7 were eliminated in the Feasibility Study for consideration as potential remedial alternatives for the Operable Unit One Remedial Action. For this reason, the following alternatives are numbered as atternatives l,3,4, and 5.

9.1 Alternative 1

CERCLA requires that the no action alternative be evaluated at every site to establish a baseline for comparison. Under this alternative, no further action would be taken at the Site to remove or control the Site contamination identified during the Remedial Investigation. The cost of the no action Alternative 1 is $0. A review of the no action remedy would be conducted every five years in accordance with the requirements of CERCLA. The costs of the five year reviews are considered a separate expense from the remedy.

9.2 Alternative 3

Alternative 3 would involve selective capping, selective soil vapor extraction, excavation/off-site disposal of off-site soils (protection of human health only), limited action for ecological concerns. The total present worth costs for Alternative 3 are estimated to be $3,640,000.

This alternative includes capping of certain on-site areas with elevated levels of mercury and manganese to address human health concerns, reduce the infiltration potential and mobility of the contaminants in the soil, and cover those areas inside the facility fence line to address ecological concerns. The type of cap evaluated in the Feasibility Study would involve using a low permeability clay layer, or synthetic finer, covered with an asphalt surface. Institutional controls such as land use restrictions would be implemented to provide further protection of human health. The soils within the facility fence line with elevated levels of volatile organic compounds would be treated with Soil Vapor Extraction to meet the soil remediation goals for protection of groundwater.

A treatability study would be required to ensure the soil vapor extraction technology would reduce the levels of organic soil contamination to meet the remediation levels established for soil. If the treatability study indicates the technology does not meet the remediation levels, an alternate treatment technology would need to be selected. In order to protect human health, soils in several small areas off-site with elevated mercury would be excavated and transported off-site to the appropriate Subtitle C or D disposal facility(ies) for further treatment and/or disposal.

There would be no treatment of off-site soils and sediments for protection of the ecological endpoint receptors. However, access restrictions, environmental enhancements, storm water controls, and monitoring would be implemented as part of the remedy.

9.3 Alternative 4

Alternative 4 would involve in-situ stabilization/solidification and capping of on-site soils, in-situ bioremediation of on-site soils, excavation and off-site disposal of off-site soils and sediment. The total present worth costs for Alternative 4 are estimated to be $5,370,000.

The insitu-stabilization/solidification treatment technology would be used to reduce the mobility of the inorganic contaminants in the soils inside the facility fence by chemical and physical means. A treatability study would be required to ensure the technology achieves the soil remediation levels established for protection of groundwater and human health. If the treatability study results indicate the technology does not meet the soil remediation levels, an alternate remedy for treating soils inside the fence line would be determined during the remedial design phase.

The In-situ Bioremediation treatment technology would be used to degrade or metabolize the volatile organic compounds in the soils inside the facility fence line. Soils and sediments outside the fence line which need to be addressed for protection of human health and ecological concerns would be excavated and transported off-site to an appropriate Subtitle C or D facility for treatment and/or disposal. Land use restrictions, environmental enhancements, storm water controls, and monitoring would be implemented as part of the remedy.

9.4 Alternative 5

Alternative 5 would involve selective excavation and off-site disposal of on-site soils, selective in-situ stabilization/solidification of on-site soils, selective capping of on-site soils, in-situ chemical oxidation of on-site soils, and selective excavation and off-site disposal of off-site soils and sediments. The total present worth costs for Alternative 5 are estimated to be $5,270,000.

Selective soils within the fence line with elevated inorganic constituents would be excavated and transported off-site to a disposal facility for treatment and/or disposal. Selective soils within the facility fence line with elevated inorganic constituents would be treated with In-situ Stabilization/Solidification to reduce the mobility of the inorganic constituents by chemical and physical means. A treatability study would be required to ensure that Stabilization/ Solidification would reduce the levels of inorganic constituents to meet the established remediation levels. If the treatability study indicates that the technology does not reduce the levels of inorganic contamination to meet the established remediation levels, an alternate treatment technology would be selected at that time. Selective capping of soils within the fence line would also be used to reduce the mobility of the inorganic constituents in the soil to meet the remedial action objectives for protection of human health, and address those areas with ecological concerns.

The In-situ Chemical Oxidation technology would be used to address soils within the fence line with elevated levels of volatile organic compounds. A treatability study would be required to ensure that Chemical Oxidation can reduce the levels of organic compounds in the soil to meet the established remediation levels. Access restrictions, environmental enhancements, storm water controls, and monitoring would also be employed as part of the remedy.

10.0 CRITERIA FOR EVALUATING REMEDIAL ALTERNATIVES

EPA's selection of the preferred alternative for the Operable Unit One Remedial Action at the Duracell Battery Tech Site, as described in this Record of Decision, is the result of a comprehensive evaluation and screening process. The Feasibility Study for Operable Unit One was conducted to identify and analyze the alternatives considered for addressing the contamination. The Feasibility Study for Operable Unit One describes, in detail, the alternative considered, as well as the process and criteria EPA used to narrow the list to potential remedial alternatives to address the Site contamination.

EPA always uses the following nine criteria to evaluate the alternatives identified in the Feasibility Study. While overall protection of human health and the environment is the primary objective of the remedial action, the remedial alternative selected for the Site must achieve the best balance among the evaluation criteria considering the scope and relative degree of the contamination at the Site.

1.) <u>Overall protection of human health and the environmen</u>t- EPA assesses the degree to which each alternative eliminates, reduces, or controls the threats to public health and the environment through treatment, engineering methods or institutional controls.

2.) <u>Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)</u>-

The alternatives area evaluated for compliance with all State and Federal environmental public health laws and requirements that apply or are relevant and appropriate to Site conditions.

3.) Long-term Effectiveness - The alternatives are evaluated based on their ability to maintain reliable protection of public health and the environment over time once the remediation levels have been met.

4.) Reduction of Contaminant Toxicity, Mobility, and Volume - EPA evaluates each alternative based on how it reduces (1) the harmful nature of the contaminants; (2) their ability to move through the environment; (3) the volume or amount of contamination a the Site.

5.) Short-term Effectiveness - The length of time needed to implement each alternative is considered, and EPA assesses the risks that may be posed to workers and nearby residents during construction and implementation.

6.) Implementability - EPA considers the technical feasibility (e.g., how difficult the alternative is to construct and operate) and administrative ease (e.g., the amount of coordination with other government agencies that is needed) of a remedy, including the availability of necessary materials and services.

7.) Cost - The benefits of implementing a particular remedial alternative are weighed against the cost of implementation. Cost includes the capital (up-front) cost of implementing an alternative over the long-term, and the net present worth cost of both capital and operation and maintenance costs.

8.) State Acceptance - EPA requests State comments on the documents produced during the RI/FS, including the Remedial Investigation, Baseline Risk Assessment, Feasibility Study, and Proposed Plan, and must take into consideration the State's comments on EPA's preferred alternative.

9.) Community Acceptance - To ensure theat the public has an adequate opportunity to provide input, EPA holds a public comments period and considers and responds to an comments received from the community prior to the final selection of a remedy.

11.0 COMPARISON OF THE ALTERNATIVES

The following summary profiles the performance of each alternative in terms of the nine evaluation criteria noting how it compares to the other alternatives under consideration. Table 18 shows a comparative analysis of the alternatives.

Alternative1 would not be protective of human health and the environment because no active remedial action would not address the contamination. As a result, the unacceptable risks outlined in the "Summary of Site Risks" section described above would not be reduced. Soil contamination within the fence line would be left in-place as a source of groundwater contamination, and a potential health threat to facility workers. Soil and sediment contamination outside the fence line would be left in-place and potentially cause adverse impact to ecological receptors. By comparison, Alternatives 3, 4, and 5 would provide a combination of remedial technologies, access restrictions, environmental enhancements, storm water controls, and long-term monitoring. These alternatives would therefore reduce soil contamination within the fence line to be protective of groundwater and facility workers.

Alternative 3 would not be protective of ecological receptors since it would not address the mercury contamination in the soil and sediment contamination inside and outside the fence line. Alternatives 4 and 5 would be protective of ecological receptors since the soil and sediment contamination inside and outside the fence line would be addressed.

A complete summary of the State and Federal ARARs is shown in Table 19. The No Action Alternative 1 does not comply with the ARARs. By comparison, Alternatives 3, 4, and 5 comply with the ARARs.

Alternative 1 - the No Action Alternative - would not provide long-term effectiveness because the contamination would remain at the Site; therefore, the risks associated with the contamination would remain in place indefinitely. By comparison, Alternatives 3, 4, and 5 would provide long-term. effectiveness because the inorganic soil contamination at the Site would either be excavated and removed from the Site, or treated with Stabilization/Solidification or Capping. The organic contamination in the soil would be treated with Soil Vapor Extraction, In-Situ Bioremediation, or Chemical Oxidation. The contaminated soils and sediments would be addressed for ecological concerns by capping the areas of concern inside the fence line. Soils and sediments outside the fence line would be excavated and transported off-site for treatment and/or disposal.

The No Action Alternative 1 would not provide a reduction in the toxicity, mobility, or volume of any contaminants at the Site. By comparison, Alternatives 3, 4, and 5 would provide reductions in the mobility of the inorganic contaminants through stabilization/solidification of the contaminants, the toxicity and volume of the organic contaminants through chemical oxidation. The mobility of the contaminants would be further reduced by capping the areas.

Alternatives 3 and 4 would reduce the toxicity and volume of the volatile organic compound soil contamination through the use of Soil Vapor Extraction or In-Situ Bioremediation. Alternative 5 would also reduce the toxicity of volatile organic compound contamination in the soil through the use of the Chemical Oxidation technology. However, Alternatives 3, 4, and 5 would not reduce the toxicity of the inorganic soil contamination.

Alternatives 4 and 5 would potentially increase the volume of the inorganic contamination through treatment with stabilization/solidification. Alternative 5 would partially reduce the volume of the inorganic contamination inside and outside the facility fence line through excavation and off-site disposal.

Alternative 1 would not have short-term effectiveness because no action would be taken to reduce the risks from the contamination. By comparison, worker and public exposure would be limited in Alternatives 3, 4, and 5 through the implementation of institutional and engineered controls. However, greater potential worker and public exposure would increase over the short-term during

Table **18** *Comparative Analysis of Alternatives*
Duracell U.S.A., Lexington, North Carolina

Criteria	Alternative 1 No Action	Alternative 3 Cap (On-site Soil -Inorganics), Selective SVE (On-site Soil –Organics), Excavate and Dispose (Off-site Soils —Human Health RAOs), Limited Action (Off-site Soils and Sediments — Ecological RAOs)	Alternative 4 In-situ S/S (On-site Soil - Inorganics), In-situ Bio-remediation (On-site Soil — Organics), Excavate and Dispose (Off-site Soil and Sediments)	Alternative 5 Selective Excavation and Off-site Landfill, Selective In-situ S/S, and Selective Capping (On-Site Soils-Inorganics), In-situ Chemical Oxidation (On-site Soil- Organics), Selective Removal (Off-Site Soils, and Sediments)
Threshold Criteria				
Overall Protection of Human Health and the Environment	Not protective	Protective	Protective	Protective
Compliance with ARARs	Does not meet ARARs	Meets all ARARs	Meets all ARARs	Meets all ARARs
Balancing Criteria				
Long- Term Effectiveness and Permanence	Not effective	Effective in isolating COCs from public and environmental receptors. Long-term reliability would be high with continued maintenance. Long-term environmental impacts would be minimal.	Effective in isolating COCs from public and environmental receptors. Greater long-term reliability for on-site media than Alternative 3 due to stabilization of COCs followed by capping. Maintenance requirement would be reduced. Long-term environmental impacts	Effective in isolating COCs from public and environmental receptors. Less residual risk than in Alternatives 3 and 4 due to selective removal from the Site. Long-term environmental impacts could be substantial since off-site habitats (including wetlands) within the prescribed area could be destroyed or degraded for 10 to 50 years.

Table **18** *Comparative Analysis of Alternatives*
Duracell U.S.A., Lexington, North Carolina

could be substantial since off-site habitats (including wetlands) within the prescribed area could be destroyed or degraded for 10 to 50 years.

Criteria	Alternative 1 No Action	Alternative 3 Cap (On-site Soil - Inorganics), Selective SVE (On-site Soil – Organics), Excavate and Dispose (Off-site Soils —Human Health RAOs), Limited Action (Off-site Soils and Sediments —Ecological RAOs)	Alternative 4 In-situ Stabilization/Solidification With Cap (On-site Soil - Inorganics), In-situ Bio-remediation (On-site Soil — Organics), Excavate and Dispose (Off-site Soil and Sediments)	Alternative 5 Selective Excavation and Off-site Landfill, Selective In-situ S/S, and Selective Capping (On-Site Soils-Inorganics), In-situ Chemical Oxidation (On-site Soil- Organics), Selective Removal (Off-Site Soils, and Sediments)
Reduction of Toxicity, Mobility, and Volume Through Treatment	No treatment. No reduction	Capping on-site media will effectively reduce mobility. Toxicity and volume will only be reduced through treatment of organics (not inorganics).	S/S would effectively reduce mobility, but would not reduce toxicity. The volume could be expected to increase by 15 to 30 percent. Toxicity and volume would only be reduced through treatment of organics (not inorganics).	Capping or S/S would effectively reduce mobility, but would not reduce toxicity. Toxicity would only be reduced through treatment of organics (not inorganics). Selective excavation would provide no reduction of COC mobility or toxicity through treatment. The removed volume would be relocated without treatment unless determined to be necessary.
Short -Term Effectiveness	Not effective	Effective. Worker and public exposure to COCs would be limited through the implementation of institutional	Effective. Implementation would result in limited exposure to workers. Short-term off-site	Effective. While protective of workers and the public, implementation would result in greater risk to both. RA would

Table 18 Comparative Analysis of Alternatives
Duracell U.S.A., Lexington, North Carolina

		and engineered controls. Since the COCs remain in place, no handling of the COCs is involved in this alternative. Short-term environmental impacts are minor. Most off-site habitats would be protected. Duration of RA would be approximately six months for capping and five years for SVE. Duration of limited action would be approximately ten years as dictated by five-year reviews.	environmental impacts could be extensive since off-site habitats (including wetlands) within the prescribed area could be destroyed or degraded for 10 to 50 years. Duration of RA would be approximately six months for S/S, one year for off-site excavation and 10 to 15 years for bio-remediation.	involve substantial waste handling and transportation. Access controls, and sit-specific Health and Safety Plan would keep this RA protective. Short-term environmental impacts could be extensive since off-site habitats (including wetlands) within the prescribed area could be destroyed or degraded for 10 to 50 years. Duration of RA would be approximately six months for on-site excavation, one year for off-site excavation, and six months for chemical oxidation.
Criteria	**Alternative 1** **No Action**	**Alternative 3** **Cap (On-site Soil-Inorganics), Selective SVE, (On-site Soil— Organics), Excavate and Dispose (Off-site soils— Human Health RAOs), Limited Action (Off-site Soils and Sediments— Ecological RAOs).**	**Alternative 4** **In-site Stabilization/Solidification With Cap (On-site-Soil - Inorganics), In-situ Bio-remediation (On-site Soil— Organics), Excavate and Dispose (Off-site Soil and Sediments)**	**Alternative 5** **Selective Excavation and Off-site Landfill, Selective In-situ S/S, and Selective Capping (On-Site Soils-Inorganics), In-situ Chemical Oxidation (On-site Soil- Organics), Selective Removal (Off-Site Soils, and Sediments)**
Implementability	N/A	Feasible. All activities would be conducted using conventional and readily available construction methods, equipment, and services.	Feasible. The S/S technologies are well demonstrated. Typical applications require conventional material handling equipment that would be readily available. Most of the reagents and	Feasible. All activities would be conducted using conventional and readily available construction methods. Equipment, and services. Administrative feasibilty would be moderately difficult because of logistics of large waste volume.

Table 18 Comparative Analysis of Alternatives
Duracell U.S.A., Lexington, North Carolina

			additives used would be widely available and relatively inexpensive. Administrative feasibility would be moderately difficult because of logistics of large waste volume.	
Present Worth Cost	No Cost	$3,640,000	$5,370,000	$5,270,000

Table 19 *State Chemical Specific ARARs* *Duracell U.S.A., Lexington, North Carolina*

Standard, Requirements, or Limitation	Citation	Description	Alternatives for which ARARs are Applicable or Relevant and Appropriate	Comments
NORTH CAROLINA HAZARDOUS WASTE MANAGEMENT	Title 15A NCAC Subchapter 13A Section 13A.0006			
Identification and Listing of Hazardous Waste		Provide numerical criteria to determine those solid wastes that are subject to regulations as hazardous wastes.	3,4,5	Potentially applicable to remedial actions involving solid waste removal in the identification of wastes and application of other action-specific ARARs.
	Section 13A.0112			
Treatment Standards		Provides numerical treatment standards for hazardous wastes or hazardous waste extracts before land disposal is allowed.	3,4,5	Potentially applicable to remedial actions involving disposal of hazardous waste.
Groundwater Classification and Standards	Title 15A NCAC Subchapter 2L.			
Maximum Contaminant Levels in Ground Water	Sections 2L.0100,. 0201 and .0202	Establishes numerical standards for ground waste quality based on best usage.	3,4,5	Soils remaining on-site must be protective of ground water or surface water as a potable water supply.
CLASSIFICATIONS AND WATER QUALITY STANDARDS APPLICABLE TO SURFACE WATERS OF NORTH CAROLINA	Title 15A NCAC Subchapter 2B			
Classification and Water Quality Standards applicable to Surface Water and Wetlands in North Carolina.	Section 2B.0100 and .0200	Establishes a series of numerical standards for surface water and wetland quality.	3,4,5	Potentially applicable to remediation of and impacts to surface waters and wetlands.

Table 19 *State Chemical Specific ARARs (cont'd)*
Duracell U.S.A., Lexingotn, North Carolina

Standard, Requirement, or Limitation	**Citation**	**Description**	**Alternatives for which ARARs are Applicable or Relevant and Appropriate**	**Comments**
NORTH CAROLINA AMBIENT AIR QUALITY CONTROL ACT	Title 15A NCAC Subchapter 2D and 2H			
Ambient Air Quality Standards	Subchapter 2D Section .0400	Establishes ambient air quality standards for sulfur dioxide, total suspended particulates, PM10, carbon monoxide, ozone, nitrogen dioxide, etc.	3,4,5	Potentially applicable if air emission releases are involved in soil or sediment treatment/remediation.
Emissions Control Standards	Subchapter 2D Section .0500	Establishes emission standards for seven contaminants - benzene, mercury, arsenic, asbestos, beryllium, vinyl chloride, and radionuclides.	3,4,5	Not applicable to remediaion activities at Site because regulated activities are not performed at the Site; however, is relevant and appropriate to SVE.
Control of Toxic Air Pollutants	Subchapter 2D Section .1100	Establishes air toxic threshold concentrations.	3,4,5	Potentially applicable if air emission releases are involved in soil or sediment treatment/remediation. Must meet substantive requirements.

Table 19 *Federal Chemical Specific ARARs (cont'd)*
Duracell U.S.A., Lexingotn, North Carolina

Standard, Requirement, or Limitation	**Citation**	**Description**	**Alternatives for which ARARs are Applicable or Relevant and Appropriate**	**Comments**
RESOURCE CONSERVATION AND RECOVERY ACT	42 USC 6901			
Identification and Listing of Hazardous Waste	40 CFR 261 Subpart C	Provides numerical criteria to determine those solid wastes that are subject to and regulated as hazardous wastes.	3,4,5	Potentially applicable to remedial actions involving solid waste removal in the identification of wastes and application of other action-specific ARARs.
Treatment Standards	40 CFR 268 Subpart D	Provides numerical treatment standards for hazardous wastes or hazardous waste extracts before land disposal is allowed.	3,4,5	Potentially applicable to remedial actions involving disposal of hazardous waste.
SAFE DRINKING WATER	42 USC 300			
National Primary Drinking Water Standards	40 CFR 141	Establishes health-based enforceable standards for public water systems (maximum contaminant levels (MCLs))	1,3,4,5	Soils remaining on-site must be protective of ground water or surface water as a potable water supply.
National Secondary Drinking Water Standards	40 CFR 143	Establishes aesthetic-based, non-enforceable guidelines for public systems (secondary maximum contaminant levels (SMCLs))	1,3,4,5	Soils remaining on-site must be protective of ground water or surface water as a potable water supply.

Table 19 *Federal Chemical Specific ARARs (cont'd)* *Duracell U.S.A., Lexington, North Carolina*

Standard, Requirement, or Limitation	**Citation**	**Description**	**Alternatives for which ARARs are Applicable or Relevant and Appropriate**	**Comments**
Maximum contaminant Level Goals	40 CFR 141	Establishes non-enforceable drinking water quality goals (MCLGs) set at levels that cause no known or anticipated adverse health effects with an adequate margin of safety without consideration of available treatment technology or cost.	1,3,4,5	Soils remaining on-site must be protective of ground water or surface water as a potable water supply.
CLEAN WATER ACT	33 USC 1251-1376			
Ambient Water Quality Criteria (AWQC)	40 CFR 131	Establishes criteria for water quality goals set at levels of no known or anticipated adverse health effects.	3,4,5	The AWQC for organic and inorganic constituents are relevant and appropriate for remedial actions involving streams and tributaries
Point Sources	40 CFR Part 400	Establishes pretreatment concentrations.	3,4,5	Potential for any POTW discharge of surface water and decontamination water.
CLEAN AIR ACT	42 USC 1857-18571			
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.	3,4,5	Potentially applicable to any remedial action that releases regulated pollutants to the air.

Table 19 *Federal Chemical Specific ARARs (cont'd)* *Duracell U.S.A., Lexington, North Carolina*

Standard, Requirement, or Limitation	Citation	Description	Alternatives for which ARARs are Applicable or Relevant and Appropriate	Comments
National Emission Standards for Hazardous Air Pollutants	40 CFR Part 61	Establishes emission standards for seven contaminants - benzene, mercury, arsenic, asbestos, beryllium, vinyl chloride, and radionuclides	3,4,5	Not applicable to remediation activities at Site because regulated activities are not performed at the Site; however, is relevant and appropriate to activities, including SVE.
FOOD AND DRUG ADMINISTRATION	FDA 1984 (CPG 7108.07)			
Maximum level of methyl mercury in seafood products (edible portion)		Establishes 1.0 gpm as the maximum concentration in seafood.	1,3,4,5	Based on most recent surveys the mercury body burned is fish does not exceed the 1.0 ppm limit.

implementation of Alternative 5 due to the substantial volume of contaminated soil inside the facility fence fine, as well as sediment outside the facility fence line requiring excavation and offsite transportation.

The ecological habitats on and around the Site would not incur short-term damage if Alternative 3 were selected since there would be no excavation of soils or sediments outside the facility fence line. The ecological habitats outside the facility fence fine would incur short-term damage if Alternative 4 or 5 were selected since both alternatives involve the excavation of soils and sediments located both inside and outside the facility fence fine. The Implementability criterion does not apply to Alternative 1. Alternatives 3, 4, and 5 are all feasible, and would be conducted using conventional and readily available construction methods and services. Administratively, Alternatives 4 and 5 would be moderately difficult to implement due to the large volumes of waste.

Since Alternative #1 does not use any type of active or limited remediation, there are no costs associated with this alternative. The present worth costs for Alternative 3, 4, and 5 are $3,640,000, $5,370,000, and $5,270,000, respectively.

EPA and the North Carolina Department of Environment and Natural Resources (NCDENR) have participated in the decision-making process throughout the RI/FS process for OU1. NCDENR has participated in the development of the RI/FS through comment on each of the various reports developed by EPA, and the Draft ROD and through frequent contact between the EPA and the NCDENR Site project manager. EPA and NCDENR are in agreement on the selected remedy. Please refer to the Responsiveness Summary which contains a letter of concurrence from NCDENR.

EPA solicited input from the community on the Proposed Plan for this action. Although public comments indicated no opposition to the preferred alternatives, some local residents expressed some minor concerns during the Proposed Plan public meeting. Please see the Responsiveness Summary which contains a transcript of the public meeting.

12.0 THE SELECTED REMEDY

After conducting a detailed analysis of all the feasible remedial alternatives based on the criteria described in the previous sections, EPA selected Alternative 5 as a comprehensive, multicomponent remedy to address soil and sediment contamination, including:

- selective excavation and off-site disposal of soils contaminated with inorganic constituents (i.e., mercury and manganese) located inside and outside of the facility fence line;

- selective in-situ stabilization/solidification of soils contaminated with inorganic constituents (i.e., mercury and manganese) in the former Plant #2 area;

- in-situ chemical oxidation of soils contaminated with VOCs (i.e., tetrachloroethene, trichloroethene, carbon tetrachloride, methylene chloride, 1,1- dichloroethene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1,2-trichloroethane, 1,1,1-trichloroethane, trans-1,2-

dichloroethane, chloroform, acetone), as well as toluene, xylenes, and PCBs in the fornier solvent disposal area;

- capping of several areas inside the facility fence line (including the former Plant #2 area and the former solvent disposal area);
- excavation and off-site disposal of mercury-contaminated sediments located in the upper 2000 feet of the unnamed tributary; and
- land use restrictions, environmental enhancements, storm water controls, and long-term monitoring.

The remedial action objectives of Alternative 5 are to:

1) reduce levels of inorganic contamination in the soil both inside and outside of the facility fence line, thereby minimizing the potential risks to current residents living around the facility, and to future hypothetical residents living on the facility;

2) reduce the levels of inorganic contamination in the soil inside the facility fence line, thereby minimizing the potential risks to future construction and non-construction workers at the facility;

3) reduce the levels of organic and inorganic contamination in the soil inside the facility fence line, thereby minimizing the potential for future ground water contamination;

4) capping of several areas of concern inside the facility fence line, thereby eliminating any potential risks to humans due to direct contact exposures, minimizing the potential for future leaching of contaminants from soil into ground water, and minimizing the potential for future adverse impacts to ecological receptors;

5) reduce the levels of inorganic contamination in the soil and sediment outside the facility fence line, thereby minimizing the potential for future adverse impacts to ecological receptors;

6) establishing institutional controls such as future land use restrictions for the areas of concern at the facility, thereby eliminating the potential risks associated with the facility being used for residential purposes (more detail will be provided in the Remedial Design);

7) establishing environmental enhancements such as sediment traps to minimize the potential for future runoff of soil contamination into nearby surface water pathways; and

8) long-term monitoring (including but not limited to monitoring required for the 5-year reviews) of the areas of concern, as well as ecological receptors, to ensure the long-term effectiveness of the selected remedy.

Soil remediation levels were established to reduce the levels of mercury, manganese, and VOCs in soil both inside and outside the facility fence line, as well as sediment in the nearby unnamed tributary of Fritz Branch. The objectives of the OU1 Remedial Action include protecting current and future workers on the facility (construction and non-construction), as well as current residents living around the facility and future hypothetical residents living on the facility. Mercury was found to have different migration potential from soil to ground water across the facility. As a result, the mercury remediation levels established for protection of ground water range from 42 part per million (ppm) in the former Plant #2 area to 165 ppm in the former Solvent Disposal area. The remediation level for manganese inside the facility fence line for protection of ground water is 3,080 ppm The remediation levels for the primary volatile organic compounds in the former solvent disposal area for the protection of ground water are as follows: tetrachloroetene (0.28 ppm), carbon tetrachloride (0.15 ppm), methylene chloride (0.29 ppm), trichloroethene (0.48 ppm), 1,1-dichloroethene (0.90 ppm), 1,1- dichloroethane (55.4 ppm), 1,2-dichloroethane (0.02 ppm), 1,1,2-trichloroethane (0.49 ppm), 1,1,1-trichloroethane (40.5 ppm), trans-1,2-dichloroethene (7.6 ppm), chloroform (0.02 ppm), acetone (32.6 ppm), toluene (186 ppm), xylenes (148 ppm), and PCBs (144 ppm). The remediation levels for any remaining VOCs can be found in the Feasibility Study.

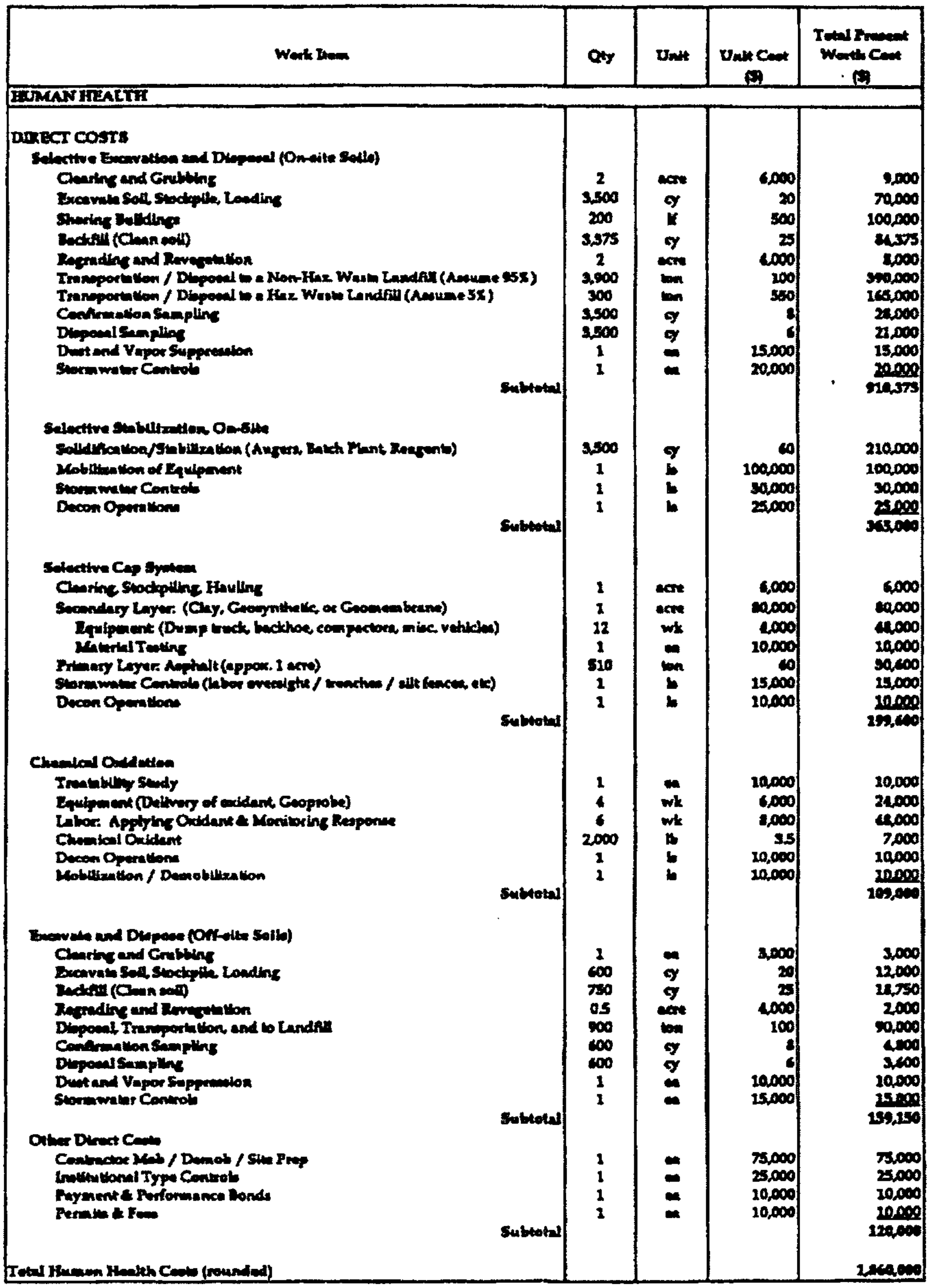
A remediation level of 10 parts per million (ppm) was established for mercury in surface soil for certain areas inside and outside the facility fence fine in order to minimize any adverse impacts to ecological receptors, yet minimize destruction of existing habitat in those areas (i.e., avoid clear cutting of hardwood forests). In other areas located just to the north of the facility fence line where soil removals have previously taken place and further destruction of habitat is not an issue, a mercury remediation level of 5 ppm will be applied to minimize any adverse impacts to ecological receptors. Applying the 5 and 10 ppm soil remediation levels is considered to be a well-balanced response action for several reasons. First, selectively removing mercury in the soil from 5 to 10 ppm will greatly reduce the volume of mercury contamination in the soil without destroying the wildlife habitat in the area. Secondly, the long-term monitoring required as part of this remedy will be implemented to evaluate any potential adverse impacts to ecological receptors in the area. If the long-term monitoring indicates that adverse impacts are occurring after the soil has been removed, additional response action(s) may be warranted at that time in order to minimize any adverse impacts to ecological receptors.

A mercury remediation level of 3.5 parts per million (ppm) was established for sediment around the facility. The 3.5 ppm remediation level is slightly higher than the EPA Region IV Waste Management Division Sediment Screening Values for mercury in sediment, which range from 0.15 ppm for “low expected effects”, to 1.3 ppm for “moderate expected effects”. Nevertheless, the 3.5 ppm sediment remediation level is considered to be a well-balanced response action for several reasons. First, the volume of mercury contamination will be greatly reduced in the upper 2000 feet of the unnamed tributary of Fritz Branch where mercury in sediments was found to exceed 3.5 ppm, the destruction of existing aquatic habitat will be minimized. If the long-term monitoring required as part of this remedy indicates that adverse impacts are occurring after the sediment has been removed, additional response action(s) may be warranted at that time in order to minimize any adverse impacts to ecological receptors.

Treatability studies will be required to ensure the in-situ solidification/stabilization and the chemical oxidation remedies will reduce the levels of inorganic and organic constituents in the soil, respectively, to meet the remediation levels provided in this Record of Decision. Treatment standards will be established during the remedial design prior to the initiation of each treatability study. Upon completion of each treatability study, if the treatment standards are met, in-situ solidification/stabilization and chemical oxidation win be applied full-scale. If the treatment standards are not attained during the treatability studies, an alternate remedy will be selected at that time to address the organic and/or inorganic soil contamination.

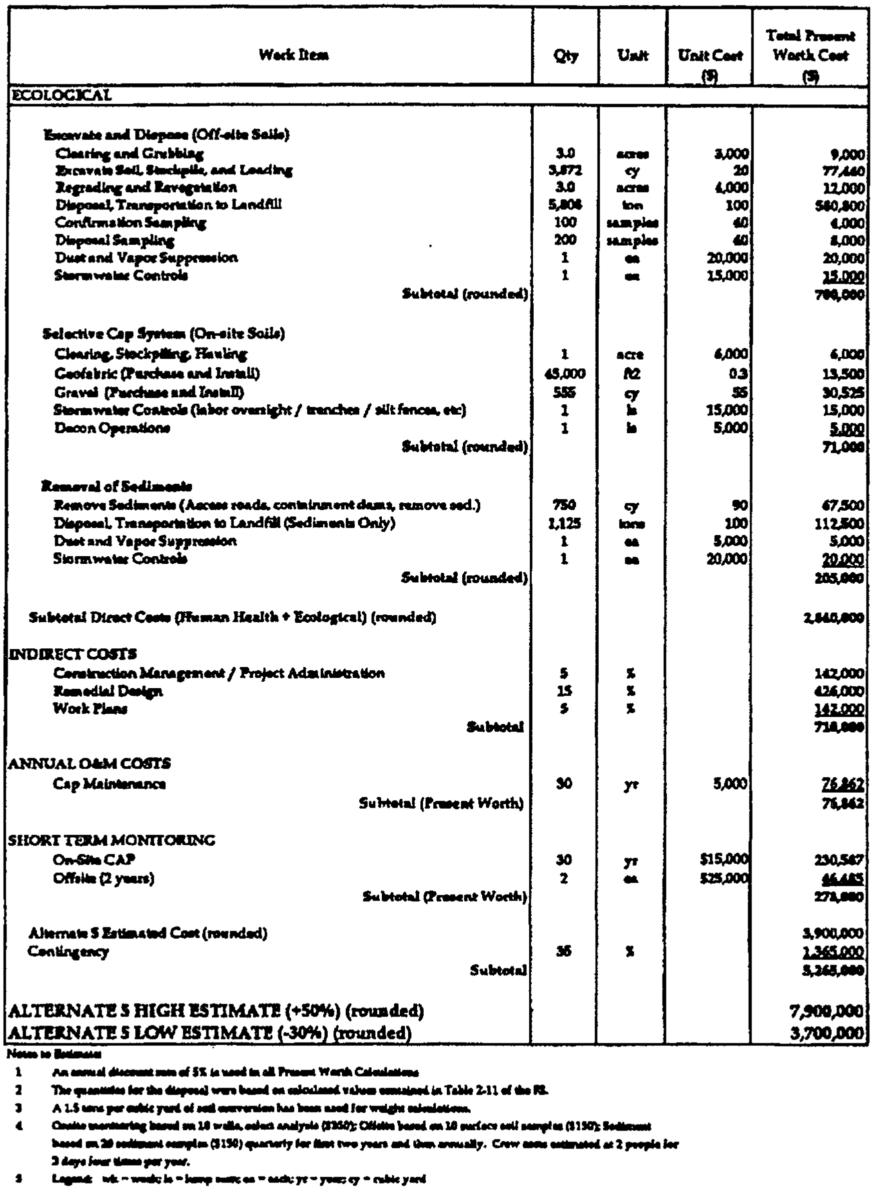
The total present worth costs for Alternative 5 are estimated to be approximately $5,270,000, based on capital costs (including contingency costs) of $1,775,000, annual operation and maintenance costs and monitoring costs of $20,000 per year for 30 years for the facility property, monitoring costs of $25,000 per year for 2 years for property outside the facility fence line, and a discount rate of 5%. Table 20 shows the estimated costs for Alternative 5.

Table 20 - Estimated Costs for Alternative 5



Work Item	Qty	Unit	Unit Cost ($)	Total Present Worth Cost ($)
HUMAN HEALTH				
DIRECT COSTS				
Selective Excavation and Disposal (On-site Soils)				
Clearing and Grubbing	2	acre	6,000	9,000
Excavate Soil, Stockpile, Loading	3,500	cy	20	70,000
Sheeting Buildings	200	lf	500	100,000
Backfill (Clean soil)	3,375	cy	25	84,375
Regrading and Revegetation	2	acre	4,000	8,000
Transportation / Disposal to a Non-Haz. Waste Landfill (Assume 95%)	3,900	ton	100	390,000
Transportation / Disposal to a Haz. Waste Landfill (Assume 5%)	300	ton	550	165,000
Confirmation Sampling	3,500	cy	8	28,000
Disposal Sampling	3,500	cy	6	21,000
Dust and Vapor Suppression	1	ea	15,000	15,000
Stormwater Controls	1	ea	20,000	20,000
Subtotal				910,375
Selective Stabilization, On-Site				
Solidification/Stabilization (Augers, Batch Plant, Reagents)	3,500	cy	60	210,000
Mobilization of Equipment	1	ls	100,000	100,000
Stormwater Controls	1	ls	30,000	30,000
Decon Operations	1	ls	25,000	25,000
Subtotal				365,000
Selective Cap System				
Clearing, Stockpiling, Hauling	1	acre	6,000	6,000
Secondary Layer: (Clay, Geosynthetic, or Geomembrane)	1	acre	80,000	80,000
Equipment: (Dump truck, backhoe, compactors, misc. vehicles)	12	wk	4,000	48,000
Material Testing	1	ea	10,000	10,000
Primary Layer: Asphalt (appox. 1 acre)	510	ton	60	30,600
Stormwater Controls (labor oversight / trenches / silt fences, etc)	1	ls	15,000	15,000
Decon Operations	1	ls	10,000	10,000
Subtotal				199,600
Chemical Oxidation				
Treatability Study	1	ea	10,000	10,000
Equipment (Delivery of oxidant, Geoprobe)	4	wk	6,000	24,000
Labor: Applying Oxidant & Monitoring Response	6	wk	8,000	48,000
Chemical Oxidant	2,000	lb	3.5	7,000
Decon Operations	1	ls	10,000	10,000
Mobilization / Demobilization	1	ls	10,000	10,000
Subtotal				109,000
Excavate and Dispose (Off-site Soils)				
Clearing and Grubbing	1	ea	3,000	3,000
Excavate Soil, Stockpile, Loading	600	cy	20	12,000
Backfill (Clean soil)	750	cy	25	18,750
Regrading and Revegetation	0.5	acre	4,000	2,000
Disposal, Transportation, and to Landfill	900	ton	100	90,000
Confirmation Sampling	600	cy	8	4,800
Disposal Sampling	600	cy	6	3,600
Dust and Vapor Suppression	1	ea	10,000	10,000
Stormwater Controls	1	ea	15,000	15,000
Subtotal				159,150
Other Direct Costs				
Contractor Mob / Demob / Site Prep	1	ea	75,000	75,000
Institutional Type Controls	1	ea	25,000	25,000
Payment & Performance Bonds	1	ea	10,000	10,000
Permits & Fees	1	ea	10,000	10,000
Subtotal				120,000
Total Human Health Costs (rounded)				1,860,000

Table 20 (Cont.) - Estimated Costs for Alternative 5



Work Item	Qty	Unit	Unit Cost ($)	Total Present Worth Cost ($)
ECOLOGICAL				
Excavate and Dispose (Off-site Soils)				
Clearing and Grubbing	3.0	acres	3,000	9,000
Excavate Soil, Stockpile, and Loading	3,872	cy	20	77,440
Regrading and Revegetation	3.0	acres	4,000	12,000
Disposal, Transportation to Landfill	5,808	ton	100	580,800
Confirmation Sampling	100	samples	40	4,000
Disposal Sampling	200	samples	40	8,000
Dust and Vapor Suppression	1	ea	20,000	20,000
Stormwater Controls	1	ea	15,000	15,000
Subtotal (rounded)				780,000
Selective Cap System (On-site Soils)				
Clearing, Stockpiling, Hauling	1	acre	6,000	6,000
Geofabric (Purchase and Install)	45,000	ft2	0.3	13,500
Gravel (Purchase and Install)	555	cy	55	30,525
Stormwater Controls (labor oversight / trenches / silt fences, etc)	1	ls	15,000	15,000
Decon Operations	1	ls	5,000	5,000
Subtotal (rounded)				71,000
Removal of Sediments				
Remove Sediments (Access roads, containment dams, remove sed.)	750	cy	90	67,500
Disposal, Transportation to Landfill (Sediments Only)	1,125	tons	100	112,500
Dust and Vapor Suppression	1	ea	5,000	5,000
Stormwater Controls	1	ea	20,000	20,000
Subtotal (rounded)				205,000
Subtotal Direct Costs (Human Health + Ecological) (rounded)				2,840,000
INDIRECT COSTS				
Construction Management / Project Administration	5	%		142,000
Remedial Design	15	%		426,000
Work Plans	5	%		142,000
Subtotal				710,000
ANNUAL O&M COSTS				
Cap Maintenance	30	yr	5,000	76,862
Subtotal (Present Worth)				76,862
SHORT TERM MONITORING				
On-Site CAP	30	yr	$15,000	230,567
Offsite (2 years)	2	ea	$25,000	46,485
Subtotal (Present Worth)				277,000
Alternate 5 Estimated Cost (rounded)				3,900,000
Contingency	35	%		1,365,000
Subtotal				5,265,000
ALTERNATE 5 HIGH ESTIMATE (+50%) (rounded)				7,900,000
ALTERNATE 5 LOW ESTIMATE (-30%) (rounded)				3,700,000

Notes to Estimate:

1 An annual discount rate of 5% is used in all Present Worth Calculations

2 The quantities for the disposal were based on calculated values contained in Table 2-11 of the RI.

3 A 1.5 tons per cubic yard of soil conversion has been used for weight calculations.

4 Onsite monitoring based on 10 wells, select analysis ($260); Offsite based on 10 surface soil samples ($150); Sediment based on 20 sediment samples ($150) quarterly for first two years and then annually. Crew costs estimated at 2 people for 3 days four times per year.

5 Legend: wk = week; ls = lump sum; ea = each; yr = year; cy = cubic yard

Table 21 summarizes the rernediation levels for the organic and inorganic contaminants in soil and sediment.

Table 21 - Summary of Remediation Levels for Soil and Sediment

Chemical of Concern	**Remediation Level (ppm) - (Media) - Location**	**Basis for Remediation Level**	**Risk at Remediation Level**
mercury	42 - (soil) - Former Plant #2 area	protection of ground water, risk assessment	HI < 1.0
	165 - (soils) -Former Solvent Disposal area + Building #4 Sump area	protection of ground water, risk assessment	HI< 1.0
	69 - (soil) - Northern Site area	protection of ground water, risk assessment	HI < 1.0
	5 - (soil) - applied in areas where habitat destruction is not an issue	ecological risk assessment	NA
	10 - (soil) - applied in areas where habitat destruction is an issue	ecological risk assessment	NA
	3.5 - (sediment) - in upper 2000 feet of unnamed tributary of Fritz Branch	ecological risk assessment	NA
manganese	3080	protection of ground water	NA
PCBs	144	protection of ground water	NA
carbon tetrachloride	0.15	protection of ground water	NA
tetrachloroethene	0.28	Protection of ground water	NA

Table 21 (Cont.) - Summary of Remediation Levels for Soil and Sediment			
Chemical of Concern	**Remediation Level (ppm) - (Media) - Location**	**Basis for Remediation Level**	**Risk at Remediation Level**
tricbloroethene	0.48	protection of ground water	NA
methylene chloride	0.29	protection of ground water	NA
1,2-dichloroethane	0.02	protection of ground water	NA
1,1,1-trichloroethane	40.5	protection of ground water	NA
trans-1,2-dichloroethene	7.6	protection of ground water	NA
1,1-dichloroethane	55.4	protection of ground water	NA
1,1,2-trichloro-ethane	0.49	protection of ground water	NA
1,1-dichloroethene	0.9	protection of ground water	NA
chloroform	0.02	protection of ground water	NA
xylenes	148	protection of ground water	NA
acetone	32.6	protection of ground water	NA
toluene	186	protection of ground water	NA

Based on the remediation levels above, the estimated size of the areas of concern, and the volumes of contaminated soil and sediment that need to be addressed during Operable Unit One are shown in Table 22.

Table 22 - Description of Source Areas to be Remediated

Name of Source Area	**Size of Source Area (ft^2)**	**Volume of Soil to be Remediated (yd^3) + (contaminant(s) of concern)**
Former Plant #2 Area	5,850	3,690 (mercury)
Former Solvent Disposal Area	4,900	1,720 (mercury, manganese, and VOCs)
Northern Site Area	6,750	1,570 (mercury, manganese)
Building #4 Sump Area	900	1,410 (mercury)
Sediment in the Unnamed Tributary	2,000 linear feet*	700-900 (mercury)

Alternative 5 should reduce the risk within a reasonable time frame and provide for long-term reliability of the remedy. Alternative 5 also allows the property to be used for the reasonably anticipated future land use. Therefore, based on current information, Alternative 5 appears to provide the best balance with respect to the nine criteria that EPA uses to evaluate alternatives. EPA believes the selected alternative will satisfy the statutory requirements of Section 121(b) of CERCLA, 42 USC 9621(b).

A remedy review would be performed every 5 years until clean up goals are achieved to determine the effectiveness of the remedy to protect human health and the environment. As a result of these 5-year reviews, if needed, additional site remediation or modifications to the remedy would be performed.

13.0 STATUTORY DETERMINATIONS

Under CERCLA Section 121, EPA must select remedies that are protective to human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently reduce the volume, toxicity, or mobility of hazardous waste as their principal element. The following sections discuss how this remedy meets these statutory requirements.

EPA's selected remedy for Operable Unit One at the Duracell Battery Tech Site protects human health and the environment through:

- reducing the potential of non-cancer risks to current residents living around the facility, future hypothetical residents living on the facility, and future construction and non-construction workers on the facility (non-carcinogenic risk levels reduced below a hazard index value of 1.0);

- reducing the potential for future ground water contamination resulting from the leaching of contaminants from soil to ground water; and

- reducing the potential of potential adverse impacts to ecological receptors both on and around the facility.

The selected remedy shall be in full compliance with all applicable or relevant and appropriate requirements (ARARs). The estimated present worth cost for the Selected Remedy is $5,270,000. EPA's selected remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (40 CFR 300.430(f)(l)(ii)(D). This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence represent a reasonable value for the money to be spent.

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

The selected OU1 remedy addresses principal threats posed through the use of in-situ solidification/stabilization to treat soil in the former Plant #2 area contaminated with mercury and manganese, and in-situ chemical oxidation to treat soil in the former solvent disposal area contaminated with VOCs. By utilizing treatment as a significant portion of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied.

Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure for a long period of time, a review win be conducted within five years after initiation of remedial action, and every five years thereafter until remediation goals are achieved, to ensure that the remedy continues to provide adequate protection to human health and the environment.

APPENDIX A - RESPONSIVENESS SUMMARY

EPA received a total of two letters from the general public during the thirty-day comment period. As the Remedial Project Manager for the Duracell Battery Tech site, I am providing the following responses to the comments provided in those two letters.

Comment #1 - Mr. David Kinney sent a letter to EPA-Region IV dated August 23, 1999, in which he expressed concerns about eating vegetables from his garden. He also asked if his property is contaminated?

EPA Response - No samples have been collected and analyzed from your property during the Remedial Investigation. For this reason, I can not tell you whether the soil on your property is contaminated as a result of historical releases from the Duracell facility, or any other facility located upstream in the Lexington area. For the same reason, I can not determine if the vegetables from your garden are safe to eat. However, based on the sample results from the Remedial Investigation, there is no reason to believe that your property has been impacted by the Duracell facility.

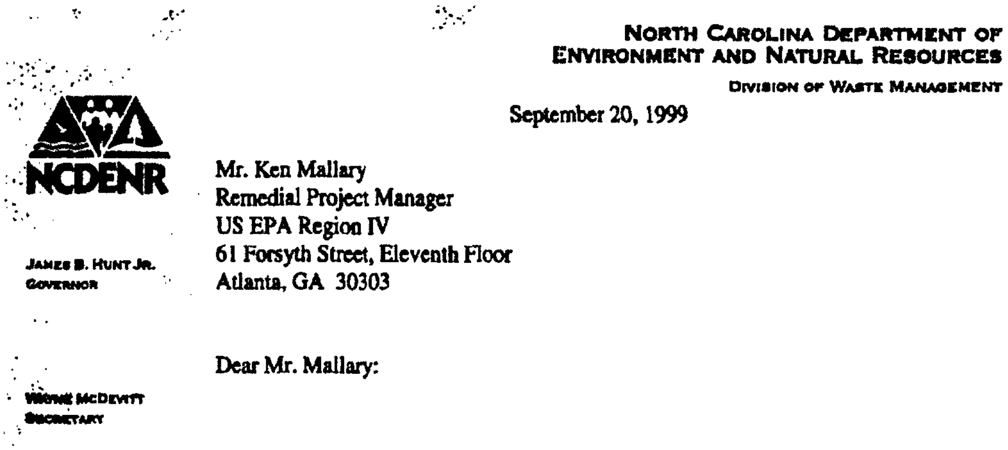
Comment #2 - The letter sent to EPA-Region IV from Yadkin, Inc., dated August 20 1999 in which Mr. Gene Ellis stated his concerns regarding the 3.5 parts per million remediation level for sediment. Mr. Ellis would like to know whether a lower sediment remediation level was considered, as well as what remedial objective for mercury in sediments would be “fully protective” of ecological receptors and what the associated costs are for this objective.

EPA Response - Before deciding on the sediment remediation level, EPA and the North Carolina Department of Environment and Natural Resources (NCDENR) evaluated the feasibility of applying a lower sediment remediation level, including how much sediment removal would be required, the potential impacts of the removal on the ecosystem, and the costs associated with the removal. The evaluation indicated that selecting a sediment remediation level lower than 3.5 ppm would require removing a much larger volume of sediment from the unnamed tributary of Fritz Branch to High Rock Lake, including the isolated occurrences of mercury mentioned in your letter. Implementing a massive sediment removal could potentially re-suspend isolated occurrences of mercury, and potentially destroy existing aquatic habitat over large areas.

EPA-Region IV does not consider the 3.5 ppm. sediment remediation level to be “fully protective” because it is slightly higher than the EPA Region IV Waste Management Division Sediment Screening Values for mercury in sediment, which range from 0.15 ppm for “low expected effects” to 1.3 ppm for moderate expected effects”. However, EPA and the NCDENR believe the 3.5 ppm sediment remediation level is a well-balanced response action for several reasons. The Remedial Investigation indicates the majority of the mercury is located in the upper 2000 feet of the unnamed tributary of Fritz Branch. Implementing the 3.5 ppm remediation level will greatly reduce the amount of mercury in the unnamed tributary, while minimizing the destruction of existing aquatic habitat and the amount of re-suspended sediment. The long-term monitoring program required as part of this remedy will be implemented to evaluate the potential for adverse impacts to ecological receptors.

The Record of Decision includes controls such as silt curtains as part of the sediment removal action in order to minimize the potential for re-suspension of sediments. While EPA can not provide assurances regarding potential future flooding events, long-term monitoring of soil and sediment quality, as well as ecological receptors, will be required to ensure the effectiveness of the remedy.

APPENDIX B - STATE CONCURRENCE LETTER



NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WASTE MANAGEMENT

NCDENR

JAMES B. HUNT JR.
GOVERNOR

WAYNE MCDEVITT
SECRETARY

September 20, 1999

Mr. Ken Mallary
Remedial Project Manager
US EPA Region IV
61 Forsyth Street, Eleventh Floor
Atlanta, GA 30303

Dear Mr. Mallary:

The State of North Carolina has reviewed the Draft Record of Decision (ROD) for the soil remedy at the Duracell-Lexington Site, OU#l, dated August 1999 and concurs with the selected remedy, subject to the following conditions.

1. Human Health Risks from remediation of Operable Unit #1 (Soil) at the Duracell Lexington Site will be accomplished to protect potential future residents off-site and for an industrial worker on-site. Therefore, the on-site soil remedy will require deed covenants/restrictions to preclude potential human exposure to site contaminants of concern (COCs) during future construction/development at the Duracell-Lexington Facility.

2. The State, in agreement with the EPA, has many concerns about the use of In-situ solidification/stabilization (S/S) of mercury in the deeper more highly contaminated areas of the former Plant #2 area of the Site. The use of in-situ S/S in the former Plant #2 area hinges on further research into its applicability for use with mercury contamination in soft and an acceptable and successful Treatability Study and Pilot Test.

3. State concurrence with this Record of Decision (ROD) and the selected remedy for the site is based solely on the information contained in the subject ROD dated August 1999. Should the State receive new or additional information which significantly affects the conclusions or remedy selection contained in the ROD, it may modify or withdraw this concurrence with written notice to EPA Region IV.

4. State concurrence on this Record of Decision (ROD) 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,

overview, comment, and make independent assessment of all future work related to this site.

5. If. after remediation is complete, the total residual risk level exceeds 10^{-6}, the State may require deed recordation/restriction to document the presence of residual contamination and possibly limit future use of the property as specified in NCGS 130A-310.8.

6. If the groundwater concentrations in the Pump and Treat remedy do not show improvements consistent with an effective source removal /control it will be documented that the source removal/control in this area was ineffective. This will eliminate the possibility of any future impracticability waiver since the NCAC 2L Groundwater Standards require effective source removal or control in order to implement a technical impracticability waiver for any contaminant source.

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 the EPA on the final remedy. If you have any questions or comments, please give me a call at, (919) 733-2801, extension 291.

Sincerely,

Grover Nicholson
Remediation Branch Head
Superfund Section

cc: Phil Vorsatz, NC Remedial Section Chief
Jack Butler, Chief NC Superfund Section
Randy McElveen, NC Superfund Section