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State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Solid Waste Management

James B. Hunt, Jr., Governor
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William L. Meyer, Director

DEHNR

June 16, 1995

Ms. Cynthia Gurley
NC CERCLA Project Officer
US EPA Region IV Waste Division, 6th Floor
345 Courtland Street, NE
Atlanta, GA 30365

RE: Site Inspection
Union Carbide Corporation Battery Disposal Site
5400 Hovis Road, Charlotte NC
NCD ~~# 986 166 379~~
980 844 336

Dear Ms. Gurley:

A Site Inspection was conducted at the Union Carbide Corporation Battery Disposal Site (NCD # 980 844 336) in Charlotte North Carolina on March 23, 1995. Source samples, surface water, and sediment samples were collected from the site and analyzed for volatiles, semi-volatiles, and inorganics. Sampling shows observed releases of zinc, manganese, and bis (2-ethylhexyl) phthalate. However, due to limited targets, the site is recommended for a "No Further Remedial Action Planned Status".

If you have any questions about this site please contact me at (919) 733-2801 Ext. 317.

Sincerely,

Keith Snavely

Keith Snavely, P.G.
Hydrogeologist
NC Superfund Section

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STATE OF NORTH CAROLINA

Department of Environment, Health, and Natural Resources
Division of Solid Waste Management
Superfund Section

SITE INSPECTION PRIORITIZATION

Union Carbide Corporation Battery Disposal Site
NCD 980 844 336
Charlotte, Mecklenburg County, North Carolina
Reference No. 03103

June 1995

Keith Snavely
Hydrogeologist
Division of Solid Waste Management
Superfund Section

SITE INSPECTION PRIORITIZATION

Union Carbide Corporation Battery Disposal Site
NCD 980 844 336
Charlotte, Mecklenburg County, North Carolina
Reference No. 03103

June 1995

Superfund Section
Division of Solid Waste Management
North Carolina Department of Environment, Health and Natural Resources

Prepared by:
Keith Snavely
Hydrogeologist

Reviewed by:
Grover Nicholson
Branch Head
Federal Contracts

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1.0 INTRODUCTION

Under the Authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendment Reauthorization Act of 1986 (SARA), the North Carolina Superfund Section conducted a Site Inspection Prioritization (SIP) of the Union Carbide Corporation Battery Disposal Site (NCD # 980 844 336) located at 5400 Hovis Road in Charlotte, North Carolina. The purpose of the SIP was to update information regarding potentially affected populations, sensitive environments, and surface water pathways not documented in the Site Investigation Report of February 1985. The scope of the SIP included a review of available file information, an on-site reconnaissance and sampling of the surface water pathway and source area, a 4-mile target distance survey of groundwater populations, and a thorough evaluation of the 15-mile surface water pathway.

2.0 SITE DESCRIPTION, OPERATIONAL HISTORY, AND WASTE CHARACTERIZATION

2.1 Location

The Union Carbide Battery disposal site is located at the southeastern end of the former Eveready Battery Plant located at 5400 Hovis Road, in Mecklenburg County, Charlotte, North Carolina (Reference 1, Figures 1 and 2, Photographs 1 and 2). The coordinates, taken at the water tower located at the west end of the property, are north latitude 35°16'13.5" and west longitude 80°53'43.5" (Reference 2, Figure 1).

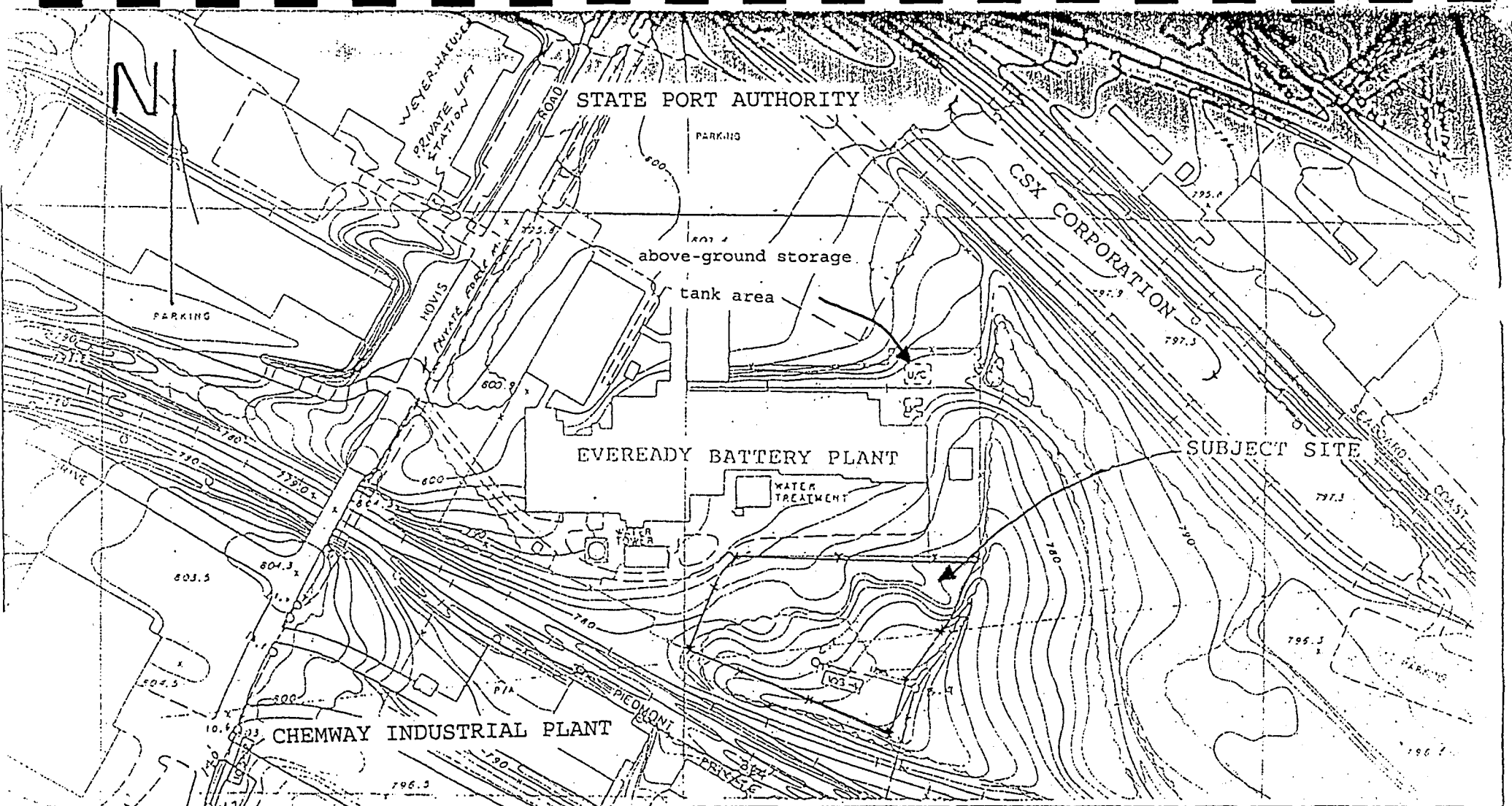
The two-year, twenty-four hour rainfall averages 3.5 inches (Reference 3). The normal annual total precipitation is 44 inches and the lake evaporation is 41 inches, resulting in a net precipitation of 3.0 inches (Reference 4).

2.2 Site Description

The Eveready Battery Plant property occupies approximately 23 acres and encompasses the plant, a plant water tower, storage area for above ground storage tanks, a 200,000 gallon open reservoir (water treatment area), and a 2.4 acre battery disposal area (Reference 5, Figure 2). A reconnaissance of the site conducted by the NC Superfund Section on March 23, 1995 noted the southern end of the plant is occupied by Custom Pallet Company and Crating, Inc., and Creative Dying, Incorporated (Reference 5, Photographs 1 and 3). The reconnaissance also noted the tanks from the above ground tank farm (10,000 gal. zinc chloride, 20,000 gal. magnesium perchlorate, 6,000 gal ammonium hydroxide, 7500 gal. toluene and 7,500 No.3 Diesel Fuel Oil) have been removed and only the concrete storage areas remain (Reference 6, Figure 2, Photographs 4 and 5).

FIGURE 1

TOPOGRAPHIC MAP AND SITE LOCATION MAP



SCALE

200 100 0 200 400

TOPO MAP 103
SOURCE OF BASE MAP: CITY OF CHARLOTTE
ENGINEERING DEPT, CHARLOTTE, NC

SITE TOPOGRAPHIC MAP		
SCALE: 1"= 200'	CONTOUR INTERVAL = 2'	DRAWN BY DWD
DATE: 1-30-92		REVISED
UNION CARBIDE CORPORATION BATTERY DISPOSAL SITE		
Source: Phase I Environmental Assessment, 1992 2.87 Acre Industrial Plant (Godley Property) by Coastal Environmental for NC State Port Auth.		DRAWING NUMBER FIGURE 2

8½ X 11 PRINTED ON NO. 1000H CLEARPRINT

Superfund personnel noted the 2.4 acre disposal area contains numerous piles of battery parts, stressed vegetation, and stained soils (Photograph 6). The site is fenced, however there is not a locked gate at the site entrance (Photographs 7, 8, and 9). Battery parts are located outside the fence and along the stream (Photographs 10 and 11). The stream contains numerous battery parts and maroon colored leachate in the soils along the bank of the stream (Photographs 12 and 13). A portion of the stream bank outside the fence area has subsided into the creek and an approximate thickness of 3 feet of battery disposal parts were exposed along the stream bed. (Reference 5, Photograph 14).

The plant property is bordered by Hovis Road and industrial facilities to the west, the State Port Authority to the north, undeveloped property to the east, and the Seaboard Coastal Railroad and Chemway Industrial plant to the south (Reference 5 and 6, Figure 2).

2.3 Operational History and Waste Characteristics

According to Union Carbide records between 1943 (when facility operations began) to 1959, non-combustible scrap wastes generated from round and flat cell LeClanche battery production were discarded on plant property. This scrap waste consist of materials made up of primarily manganese and zinc compounds, with lesser amounts of acetylene black, ammonium chloride, carbon paper and plastics. After March of 1959, all of the solid process waste generated at the plant was discarded in an off-site landfill. Following the plant closing in 1979, the plant facility was sold to the Godley Company, Inc. on November 13, 1980 (Reference 7).

In response to a request from the State Property Office, the Solid and Hazardous Waste Management Branch initiated a site investigation of the disposal area on February 13, 1985. During the site investigation, stream and soil samples were collected from the battery disposal area (Reference 8). The surface water from the stream adjacent to the disposal area contained 170 ppb of toluene and 50 ppb of tetrachloroethylene. Several soil samples were collected in the battery disposal area and analyzed for total and extractable metals (Reference 8). The laboratory analyses indicate manganese levels with total values of 380 mg/kg to 117,000 mg/kg and total zinc levels from 540 mg/kg to 108,000 mg/kg (Reference 8).

Surface water, sediment, and soil samples were collected during the SIP reconnaissance in March 1995, because background samples and laboratory data from the Site Investigation was incomplete. During the SIP two soil, two surface water, and two sediment samples were collected from the disposal area and adjacent stream (Reference 5, Figure 3). Each sample was analyzed for volatiles, semi-volatiles, and metals. The laboratory results are detailed in each environmental pathway (Reference 5, Appendix A). In addition to the soil sampling, the source area was assumed to be 2.4 acres based on survey data (Reference 6).

3.0 WASTE/SOURCE SAMPLING

3.1 Sample Locations

During the 1985 site investigation, three samples of battery parts and ten soil samples were collected from the battery disposal area and analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, manganese, and zinc (Reference 8).

During the March 23, 1995, sampling trip, one soil sample was collected in the source area at the eastern edge of the 2.4 acre battery disposal site approximately 25 feet inside the fence near the bank of the perennial stream (Reference 5, Figure 3, Photograph 7). This sample (UNC-SO-SS01- Lab Numbers 951178, 951179, and 003862) was collected in stained soil from ground surface to a depth of six inches. In addition, a background soil sample (UNC-BG-SS01 - Lab Numbers 951176, 951177, and 003861) was collected at the entrance to the plant near Hovis Road (Reference 5, Figure 3, Photograph 1). Each soil sample was analyzed for volatiles, semi-volatiles, and metals.

3.2 Analytical Results

The analytical results of the battery parts collected during the site investigation from 1985 indicate the source material contains extractable manganese and zinc values that range from 0.8 to 14.7 mg/l, and 1.8 to 1990 mg/l, respectively (Reference 8).

The analytical laboratory results of the soil sample within the battery disposal area during the 1995 site reconnaissance indicate an observed release of bis (2-ethylhexyl) phthalate, arsenic, cadmium, lead, manganese, mercury, silver, and zinc. Laboratory analyses, sample request forms, and chain-of-custody records are located in Appendix A (Reference 5).

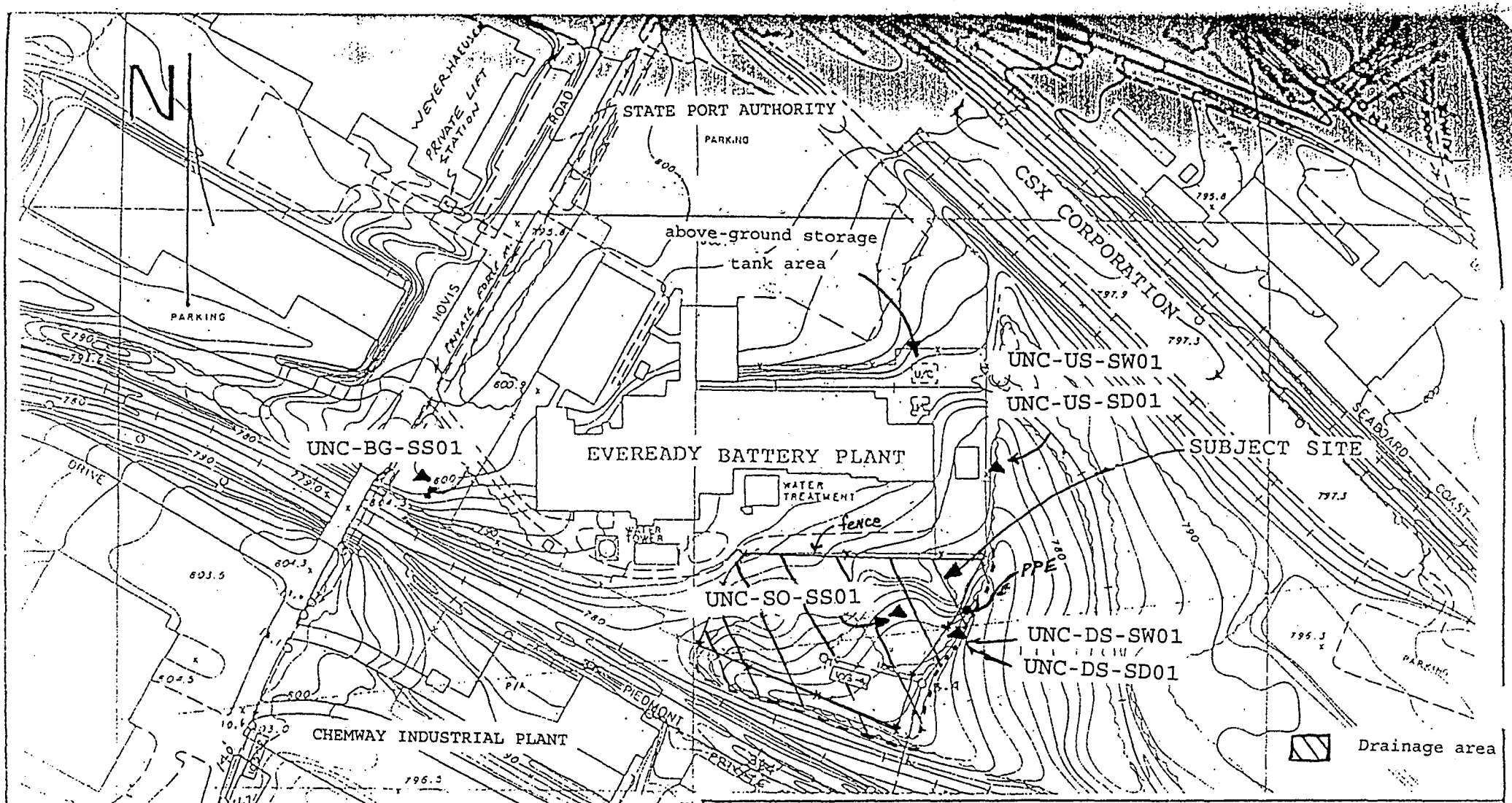
3.3 Waste/Source Conclusions

Soil samples and battery parts collected in the disposal site indicate elevated levels of metals, primarily zinc and manganese. In addition, some organics were noted in the soils of the battery disposal site.

4.0 GROUNDWATER PATHWAY

4.1 Hydrogeologic Setting

The site is located within the Charlotte geologic belt which consists of granitic intrusives and metamorphosed quartz diorite (References 9 and 10). The bedrock in the site area is overlain by weathered saprolite and sandy clays of the Cecil-Urban soil unit (References 9 and 11). The water table in the area averages 20 feet below ground surface (Reference 12). The hydraulic conductivity of the aquifer is estimated at 1.76 X 10-3 cm/sec (Reference 13).



SCALE

200 100 0 200 400

TOPO MAP 103
SOURCE OF BASE MAP: CITY OF CHARLOTTE
ENGINEERING DEPT, CHARLOTTE, NC

SITE SAMPLING MAP AND DRAINAGE AREA

SCALE: 1"= 200'	CONTOUR INTERVAL = 2'	DRAWN BY DWD
DATE: 1-30-92		REVISED

UNION CARBIDE CORPORATION BATTERY DISPOSAL SITE

Source: Phase I Environmental Assessment, 1992
2.87 Acre Industrial Plant (Godley Property)
by Coastal Environmental for NC State Port Auth.

DRAWING NUMBER
FIGURE 3

8½ X 11 PRINTED ON NO. 1000H CLEARPRINT

4.2 Groundwater Targets

The closest drinking water well was identified approximately 1.5 miles west of the source area (Reference 14, Figure 1). Additional drinking water supplies in the vicinity include private and community wells. Table 1 shows the populations served by community well systems (Reference 15).

Table 1. Populations Served by Community Groundwater Well Systems

Community Water Well	Population Served	Radii Distance from Site (miles)
Trexler Park	114	2.00 - 3.00
Oakdale S/D Well #1	440	2.00 - 3.00
Oakdale S/D Well #2	*******	3.00 - 4.00

S/D - Subdivision
******* - Oakdale S/D Wells 1 and 2 supply water to 440 persons.

In order to determine the total population that uses private wells for drinking water, the areas and populations served by surface water systems and community groundwater systems were identified. The municipal water systems were delineated on Figure 1 (in blue) and it is assumed that the remainder of the houses shown on the USGS topographic maps are served by private groundwater wells. These houses were counted and these numbers were multiplied by the persons-per-household for Mecklenburg County (Reference 14). This value from the 1990 US Census is 2.50 persons (Reference 16). Because the USGS topographic maps were approximately 15 years old, population data reported from the North Carolina State Center for Geographic Information and Analysis (CGIA) was used with the house count data to calculate the best accurate population count for various distance rings of the site (Reference 17). Table 2 shows the total population which received drinking water from groundwater wells within 4 miles of the site (Reference 14). This population from each distance ring includes community water well populations.

Table 2. Populations Served by Private Groundwater Wells

Distance Ring from Site (miles)	Population per Distance ring	Cumulative Population
0.0 - 0.25	0.0	0.0
0.25 - 0.50	0.0	0.0
0.50 - 1.00	0.0	0.0
1.00 - 2.00	1057	1057
2.00 - 3.00	454	1511
3.00 - 4.00	1408	2919

There are no wellhead protection areas in Mecklenburg County (Reference 18).

4.3 Sample Locations

There are no groundwater wells within 1.00 mile from the site (Reference 14). No groundwater samples were collected from the site (Reference 5).

4.4 Groundwater Conclusions

No groundwater samples were collected from the site, however groundwater in the battery disposal site is suspected to have been affected by on-site contaminants due to the leachate noted in the stream bank adjacent to the site (Reference 5).

5.0 SURFACE WATER PATHWAY

5.1 Hydrologic Setting

Runoff from the disposal site is directed to the adjacent stream located east of the site (Reference 5). This unnamed stream flows southeast from the probable point of entry of the site for 3 miles to the intersection with Stewart Creek (Reference 19, Figure 4). The estimated mean annual runoff at the site is 16 inches/year and the site does not lie in a flood plain (References 19 and 20). The drainage area of the site is approximated at 2.73 acres (Reference 21).

Stewart Creek flows south-southwest for 1.5 miles into Irwin Creek and Irwin Creek flows 3.5 miles into Sugar Creek. The surface water pathway extends 7 miles from the Sugar Creek intersection to the end of the 15-mile surface water pathway (Reference 19, Figure 4). The flow rate of the unnamed stream is less than 10 cubic feet per second and the flow rate of Sugar Creek within the surface water pathway is 77 cfs (Reference 19).

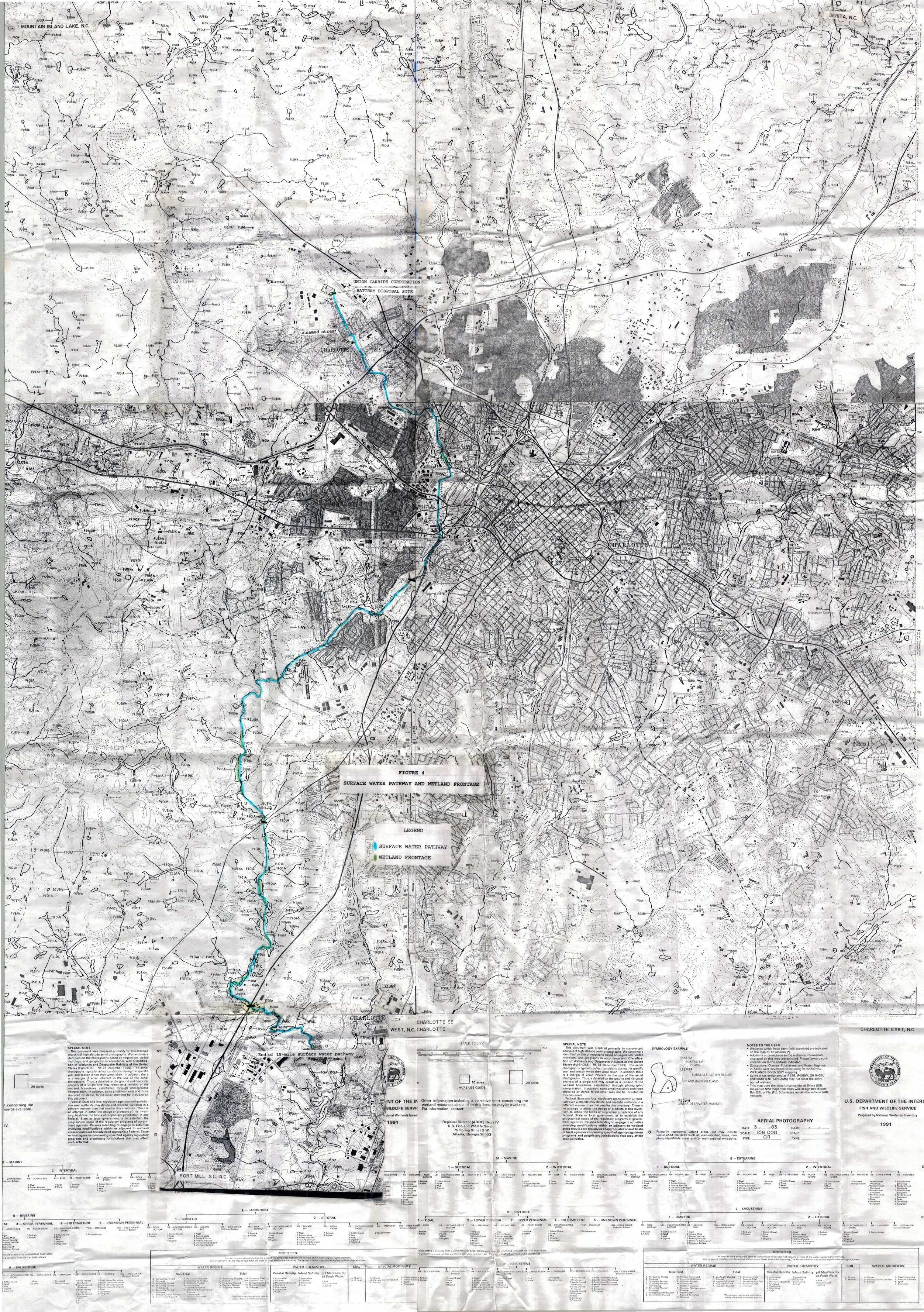


FIGURE 4

SURFACE WATER PATHWAY AND WETLAND FRONTAGE

5.2 Surface Water Targets

There are no drinking water intakes along the surface water pathway (Reference 22). Stewart Creek, Irwin Creek, and Sugar Creek are fisheries (Reference 23). The stream classification for the creeks of Stewart, Irwin, and Sugar are Class C. Class C streams are suitable for aquatic life propagation and survival, fishing, wildlife, and secondary recreation (Reference 24). Recreational areas are located along Irwin Creek at Revolution Park (Reference 25, Figure 1).

Two endangered animals were noted within the surface water pathway and within the 4-mile radius of the site. However, these animals, the Carolina Heelsplitter (**Lasmigona Decorata**) and the Carolina Elktoe (**Alasmidonta Robusta**) were considered extirpated and extinct from the site (References 26, 27, and 28). The total wetland frontage located along the surface water pathway is 2.6 miles of primarily palustrine forested wetland (Reference 29, Figure 4).

5.3 Sample Locations

Two surface water and two sediment samples were collected within the surface water pathway (Reference 5). The downgradient surface water (UNC-DS-SW01- Lab Numbers 951180, 951181, 003859) and sediment samples (UNC-DS-SDO1 - Lab Numbers 951182, 951183, 003863) were collected within the stream adjacent to the disposal area approximately 25 feet north of an outfall pipe located along the stream bank (Reference 5, Figure 3, Photograph 15). The upgradient surface water sample (UNC-US-SW01 - Lab numbers 951184, 951185 and 003860) and the upgradient sediment sample (UNC-US-SD01 - Lab Numbers 951186, 951187, and 003864) were collected approximately 200 feet north of the downgradient sample point (Reference 5, Figure 3, Photograph 16). Each surface water sample was analyzed for volatiles, semi-volatiles, and metals.

5.4 Analytical Results

The laboratory analyses of the surface water and sediment samples indicate an observed release of zinc in the surface water and an observed release of lead and manganese in the downstream sediment. The sample analysis request forms, and chain-of-custody records are located in Appendix A (Reference 5).

5.5 Surface Water Conclusions

Surface water and sediment samples were collected from the unnamed stream along the east side of the site. The downgradient surface water and sediment samples were collected in areas of stained soil and discolored surface water (Reference 5). The laboratory analyses of the surface water and sediment samples show no detection of volatile or semi-volatile contaminants. However, an observed release of zinc was detected in the downstream surface water sample. Elevated levels of lead and manganese were noted in the downstream sediment sample.

6.0 SOIL EXPOSURE AND AIR PATHWAYS

6.1 Physical Conditions

The battery disposal area is characterized by sparse vegetation, sandy clayey surficial soils in the east and southeast portions of the site, and stained soils both inside and outside the fenced boundary (References 5 and 11). Drainage from the site is directed east-southeast of the site and the erosion of the soils are moderate to severe (References 5 and 11).

6.2 Soil and Air Targets

The disposal site is located in an industrial area south of Brookshire Freeway (Highway 16) in Charlotte, North Carolina (Figure 1). There are no residences, workers, or daycare centers on the disposal site area (Reference 30). However, an estimated 20 or more workers are present at the plant (Reference 30). There are 278 residents within 0.25 mile radius of the site (Reference 17). According to the North Carolina State Center for Geographic Information and Analysis (Table 3), the following numbers of people live within the various distance rings of the site (Reference 17):

Table 3. Population Per Distance Ring

Distance from site location (miles)	Population Per Ring	Cumulative Population
0.0 - 0.25	278	278
0.25 - 0.50	827	1,105
0.50 - 1.00	4,544	5,649
1.00 - 2.00	13,284	18,933
2.00 - 3.00	24,504	43,437
3.00 - 4.00	26,988	70,425

6.3 Soil Sample Locations

Soil samples were collected in the source area and upgradient of the disposal site near the entrance at the western end of the plant. The soil sample from the source area (UNC-SO-SS01 - Lab Numbers 951178, 951179, and 003862) was collected at a depth of 6 inches below ground surface in a stained soil area at the southeastern edge of the site approximately 25 feet inside the fenced boundary (Reference 5, Figure 3, Photograph 17). The background soil sample (UNC-BK-

SS01 - Lab Numbers 951176, 951177, 003861) was collected at a depth of 6 inches below ground surface in a grassy area approximately 50 feet southwest of the entrance driveway to the plant (Reference 5, Figure 3, Photograph 1).

6.4 Soil Sample Results

Each soil sample was analyzed for volatiles, semi-volatiles, and metals. The soil sample in the source area contained an observed release of bis(2-ethylhexyl)phthalate at 18,467 ug/kg, arsenic at 78 mg/kg, cadmium at 16 mg/kg, lead at 600 mg/kg, manganese at 3100 mg/kg, mercury at 47 mg/kg, silver at 12 mg/kg, and zinc at 11,000 mg/kg. Appendix A contains laboratory results and chain-of-custody records.

6.4 Soil Exposure and Air Conclusions

No soil or air targets were identified on the disposal site, however there are workers at the plant building that park their automobiles adjacent to the fence boundary of the disposal site. There are no residences on the site property and no daycare centers adjacent to the site. No air releases were observed during the Site Inspection Prioritization (Reference 5).

7.0 SUMMARY AND CONCLUSIONS

The Union Carbide Battery Disposal Site is located on the southern most 2.4 acres of a former battery plant located at 5400 Hovis Road In Charlotte, North Carolina. Waste disposal records indicate that between 1943 and 1959 non-combustible scrap wastes generated from round and flat cell LeClanche battery production were discarded on plant property. After March of 1959, all of the solid process waste generated at the plant were discarded in an off-site landfill (Reference 7).

Surface water, sediment, and soil samples were collected from the battery disposal site. Each sample was analyzed for volatiles, semi-volatiles, and metals. The laboratory analyses indicates an observed release of bis(2-ethylhexyl)phthalate, arsenic, lead, manganese, mercury, silver, and zinc in a soil sample of the source area. In addition, an observed release of zinc was detected in the downstream surface water sample (Appendix A).

A reconnaissance of the site conducted in March of 1995, noted no residences, daycare centers, or schools adjacent to or within 200 feet of the disposal area. Workers at the plant building park their vehicles adjacent to the site on an asphalt parking area. The disposal area is enclosed with a chain-link fence, but the gate remains unlocked. Waste piles of battery parts, stained soil, stressed vegetation, and discolored surface water from a nearby stream were noted.

There are no drinking water wells on site or within 1.00 mile from the site. The adjacent stream is not a fishery and the closest fishery is located approximately 3 miles from the PPE. The closest wetlands along the surface water pathway are located 2 miles downstream.

Based upon the available data, it is recommended that the site be assigned a "No Further Remedial Action Planned Status".

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UNION CARBIDE CORPORATION BATTERY DISPOSAL SITE
NCD # 980 844 336

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31. US Environmental Protection Agency, Part II Federal Register, 40 CFR Part 300, Hazard Ranking System; Final Rule., December 14, 1990.

32. US Environmental Protection Agency, Superfund Chemical Data Matrix (SCDM), June 1994.

Photograph 1. Entrance to plant off Hovis Road. Note water tower in background.

Photograph 2. Battery disposal area viewing northwest at south end of plant.

K&M Company
Torrance, CA 90503
PV119

Photograph 3. The west end of the plant located along Hovis Road. The plant is presently being rented to several businesses.

Photograph 4. The outside storage area of above-ground storage tanks located at northeast corner of the plant.

Photograph 5. Outside above-ground storage tank area at northeast end of plant property.

Photograph 6. Pile of battery parts and stressed vegetation area located at southeast area of disposal site.

K&H Company
Torrance, CA 90503
PV119

Photograph 7. Fence enclosing the eastern edge of the site with battery parts adjacent to the fence.

Photograph 8. The northern most end of the battery disposal area enclosed by chain-link fence.

Photograph 9. Viewing the disposal area from the entrance. Wood and trash are located near the site entrance.

Photograph 10. The eastern edge of the site and adjacent stream located on right side of photograph.

K&M Company
Torrance, CA 90503
PV119

Photograph 11. Adjacent stream located east of site flowing south towards concrete drain.

Photograph 12. Circular and rectangular battery parts located in the stream bed.

Photograph 13. Maroon colored soils located on the bank of the stream adjacent to the battery disposal site.

Photograph 14. Stream bank that has subsided with large amounts of battery parts.

K&M Company
Torrance, CA 90503
PV119

Photograph 15. Downstream sampling location in stained soil and discolored surface water.

Photograph 16. Upstream sampling location situated in the northeastern end of the site.

Photograph 17. Source soil sample location approximately 25 feet inside fence.

K&H Company
Torrance, CA 90503
PV119

APPENDIX A

CHAIN-OF-CUSTODY RECORDS, SAMPLE ANALYSIS REQUEST FORMS, AND LABORATORY ANALYSES

NC-DEHNR
Division of Solid Waste Management
☐ Superfund Section
☐ Hazardous Waste Section
☐ Solid Waste Section

Organics Lab: ✓
Inorganics Lab: _____

CHAIN OF CUSTODY RECORD

Project Name: Union Carbide
Site ID # (NCD#) 980-844-336
Location: Charlotte, NC
Address:

Sampled by: Keith Snavely
Sampler ID
Telephone: (919) 733-2801
Date Sampled: 3-23-95
Time Sampled: 1200 - 1505

Sample Types: Soil ✓ Water ✓ Waste _____ Other sediment

Remarks:

Field Sample Numbers: 019523, 019524, 019525, 019526, 019527, 019528, 019529, 019530, 019531, 019532, 019533, 019534, 019535

Relinquished by: Richard Keith Snavely (Signature) Date: 3-24-95 Time: 1245

Received by: William C. Glenn Jr (Signature) Date: 3-24-95 Time: 12:50

Relinquished by: _____ (Signature) Date: _____ Time: _____

Received by: _____ (Signature) Date: _____ Time: _____

Relinquished by: _____ (Signature) Date: _____ Time: _____

Received by: _____ (Signature) Date: _____ Time: _____

Results Reported: John L. Neal (Signature) Date: 4-3-95 Time: _____

(COCR.FRM)

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

Lot #

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

RECEIVED APR 4 1995 SUPERFUND SECTION

Site Number NCD-980-844-336 Field Sample Number 019523

Name of Site Union Carbide Corp Site Location Hovis Road, Charlotte NC

Collected By RKS - GN ID# Date Collected 3-23-95 Time ~~[illegible]~~ 1200

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	OR	Concentrate	Comments
____ Ground water (1)		____ Solid (5)	
____ Surface water (2)		~~✓ Liquid (6)~~	Trip Blank
____ Soil (3)		____ Sludge (7)	
✓ Other (4)		____ Other (8)	

TCLP Compounds

Inorganic Compounds	Results(mg/l)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chromium	
____ Lead	
____ Mercury	
____ Selenium	
____ Silver	

Organic Chemistry

Parameter	Results(mg/l)
✓ P&T:GC/MS	
____ Acid:B/N Ext.	
____ MTBE	

Inorganic Chemistry

Parameter	Results(mg/l)(mg/kg)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chloride	
____ Chromium	
____ Copper	
____ Fluoride	
____ Iron	
____ Lead	
____ Manganese	
____ Mercury	
____ Nitrate	
____ Selenium	
____ Silver	
____ Sulfates	
____ Zinc	
____ pH	
____ Conductivity	
____ TDS	
____ TOC	

Organic Compounds

Organic Compounds	Results(mg/l)
____ benzene	
____ carbon tetrachloride	
____ chlordane	
____ chlorobenzene	
____ chloroform	
____ o-cresol	
____ m-cresol	
____ p-cresol	
____ cresol	
____ 1,4-dichlorobenzene	
____ 1,2-dichloroethane	
____ 1,1-dichloroethylene	
____ 2,4-dinitrotoluene	
____ heptachlor	
____ hexachlorobenzene	
____ hexachlorobutadiene	
____ hexachloroethane	
____ methyl ethyl ketone	
____ nitrobenzene	
____ pentachlorophenol	
____ pyridine	
____ tetrachloroethylene	
____ trichloroethylene	
____ 2,4,5-trichlorophenol	
____ 2,4,6-trichlorophenol	
____ vinyl chloride	
____ endrin	
____ lindane	
____ methoxychlor	
____ toxaphene	
____ 2,4-D	
____ 2,4,5-TP (Silvex)	

Radiochemistry

Parameter	Results (PCi/l)
____ Gross Alpha	
____ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Date Received 3-24 95 KGAB Reported by John L. Neal

Date Extracted ____ Date Reported 4-3-95

Date Analyzed 3-28-95 nw Lab Number 951175

CPD89E

#951175 - 951187

Purpose: Enforcement and compliance with the N.C. Solid and Hazardous Waste Management Rules.

Preparation: A sample analyses request form must be completed for each type of evaluation requested (e.g., inorganic, organic, microbiology, radiochemistry). For sampling conditions which require more than one (1) container (i.e., ground or surface water) a sample label must be affixed to one of the containers. The collector must then write the site and sample number on the duplicate container.

Do not submit an analysis request form without any parameters indicated.

Equivalent measurements: ppm = μg/ml = mg/l = μg/g = mg/kg
ppb = μg/l = μg/1000g = μg/kg

DEFINITIONS/INSTRUCTIONS

Site Number - A unique twelve-digit site/location identifier (i.e., the EPA identification number).

Field Sample Number - A unique six-digit sample identifier which is pre-printed on the sample label.

Name of Site - Name of facility, landfill, etc.

Site Location - City and county.

Collected By - Name and staff identification number of collector.

Date and Time Collected - Self-explanatory.

Environmental - A sample of a naturally occurring substance such as ground water, surface water, or soils which may be contaminated.

Concentrate - A sample of a waste, including but not limited to, sludges, resins, treatment effluents, or drummed wastes.

Comments - Lists details regarding sample or sample point (e.g., sample location, well number, phase separation, and/or odors.

Inorganic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

Organic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

TCLP Compounds - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided. TCLP can only be performed on solid or semi-solid samples. For totals of the inorganic parameters, check (✓) the corresponding parameter under **Inorganic Chemistry**.

Microbiology and Radiochemistry - Contact the Raleigh office prior to sampling either of these.

Distribution:
1. Send or deliver the original to the State Laboratory of Public Health.
2. The Lab then sends a copy (with results) to the Solid Waste Management Division.
3. The Solid Waste Management Division sends a copy to the field person or collector.

Disposition: This form may be destroyed in accordance with the Environmental Health, Solid and Hazardous Waste Section of the Records Disposition Schedule as published by the North Carolina Division of Archives and History

Additional forms may be ordered from: Solid Waste Management Division
Hazardous Waste Section
P.O. Box 27687
Raleigh, NC 27611

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number: NCD 980-844-336 Field Sample Number: 019524

Name of Site: Union Carbide Corp Site Location: Old Havis Road, Charlotte NC

Collected By: RKS - GN ID#: Date Collected: 3-23-95 Time: 1405

Agency: ___ Hazardous Waste ___ Solid Waste ✓ Superfund

Sample Type

Environmental	OR	Concentrate	Comments
___ Ground water (1)		✓ Solid (5)	Background soil
___ Surface water (2)		___ Liquid (6)	~~Sedim~~ Sample near
✓ Soil (3)		___ Sludge (7)	outfalls to plant site
___ Other (4)		___ Other (8)	

Organic Chemistry

Parameter	Results(mg/l)
✓ P&T:GC/MS	
___ Acid:B/N Ext.	
___ MTBE	

Radiochemistry

Parameter	Results (PCi/l)
___ Gross Alpha	
___ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Inorganic Chemistry

Parameter	Results(mg/l)(mg/kg)
___ Arsenic	
___ Barium	
___ Cadmium	
___ Chloride	
___ Chromium	
___ Copper	
___ Fluoride	
___ Iron	
___ Lead	
___ Manganese	
___ Mercury	
___ Nitrate	
___ Selenium	
___ Silver	
___ Sulfates	
___ Zinc	
___ pH	
___ Conductivity	
___ TDS	
___ TOC	

TCLP Compounds

Inorganic Compounds	Results(mg/l)
___ Arsenic	
___ Barium	
___ Cadmium	
___ Chromium	
___ Lead	
___ Mercury	
___ Selenium	
___ Silver	

Organic Compounds	Results(mg/l)
___ benzene	
___ carbon tetrachloride	
___ chlordane	
___ chlorobenzene	
___ chloroform	
___ o-cresol	
___ m-cresol	
___ p-cresol	
___ cresol	
___ 1,4-dichlorobenzene	
___ 1,2-dichloroethane	
___ 1,1-dichloroethylene	
___ 2,4-dinitrotoluene	
___ heptachlor	
___ hexachlorobenzene	
___ hexachlorobutadiene	
___ hexachloroethane	
___ methyl ethyl ketone	
___ nitrobenzene	
___ pentachlorophenol	
___ pyridine	
___ tetrachloroethylene	
___ trichloroethylene	
___ 2,4,5-trichlorophenol	
___ 2,4,6-trichlorophenol	
___ vinyl chloride	
___ endrin	
___ lindane	
___ methoxychlor	
___ toxaphene	
___ 2,4-D	
___ 2,4,5-TP (Silvex)	

Date Received: 3-26-95 W, AB Reported by:

Date Extracted: Date Reported:

Date Analyzed: 3-29-95 nw Lab Number: 951176

EPD89E

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD 980-844-336 Field Sample Number 019525

Name of Site Union Carbide Corp. Site Location Hovis Road, Charlotte NC

Collected By GN ID# ____ Date Collected 3-23-95 Time 1405

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	OR	Concentrate	Comments
____ Ground water (1)		✓ Solid (5)	Background soil
____ Surface water (2)		____ Liquid (6)	sample near entrance
✓ Soil (3)		____ Sludge (7)	to plant
____ Other (4)		____ Other (8)	

TCLP Compounds

Inorganic Compounds	Results(mg/l)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chromium	
____ Lead	
____ Mercury	
____ Selenium	
____ Silver	

Organic Compounds	Results(mg/l)
____ benzene	
____ carbon tetrachloride	
____ chlordane	
____ chlorobenzene	
____ chloroform	
____ o-cresol	
____ m-cresol	
____ p-cresol	
____ cresol	
____ 1,4-dichlorobenzene	
____ 1,2-dichloroethane	
____ 1,1-dichloroethylene	
____ 2,4-dinitrotoluene	
____ heptachlor	
____ hexachlorobenzene	
____ hexachlorobutadiene	
____ hexachloroethane	
____ methyl ethyl ketone	
____ nitrobenzene	
____ pentachlorophenol	
____ pyridine	
____ tetrachloroethylene	
____ trichloroethylene	
____ 2,4,5-trichlorophenol	
____ 2,4,6-trichlorophenol	
____ vinyl chloride	
____ endrin	
____ lindane	
____ methoxychlor	
____ toxaphene	
____ 2,4-D	
____ 2,4,5-TP (Silvex)	

Organic Chemistry

Parameter	Results(mg/l)
____ P&T:GC/MS	
✓ Acid:B/N Ext.	
____ MTBE	

Radiochemistry

Parameter	Results (PCi/l)
____ Gross Alpha	
____ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Inorganic Chemistry

Parameter	Results(mg/l)(mg/kg)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chloride	
____ Chromium	
____ Copper	
____ Fluoride	
____ Iron	
____ Lead	
____ Manganese	
____ Mercury	
____ Nitrate	
____ Selenium	
____ Silver	
____ Sulfates	
____ Zinc	
____ pH	
____ Conductivity	
____ TDS	
____ TOC	

Date Received 3-24-95 WG AB Reported by ____

Date Extracted 3-27-95 SA Date Reported ____

Date Analyzed 3-28-95 BD Lab Number 951177

SPD89E

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD 980-844-336 Field Sample Number 019526

Name of Site Union Carbide Corp Site Location Harris Road, Charlotte NC

Collected By RKS - GM ID# ____ Date Collected 3-23-95 Time 1420

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	OR	Concentrate	Comments
____ Ground water (1)		✓ ~~Solid (5)~~	Soil sample collected
____ Surface water (2)		____ Liquid (6)	in battery disposal
✓ Soil (3)		____ Sludge (7)	area
____ Other (4)		____ Other (8)	

TCLP Compounds

Inorganic Compounds	Results(mg/l)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chromium	
____ Lead	
____ Mercury	
____ Selenium	
____ Silver	

Organic Compounds	Results(mg/l)
____ benzene	
____ carbon tetrachloride	
____ chlordane	
____ chlorobenzene	
____ chloroform	
____ o-cresol	
____ m-cresol	
____ p-cresol	
____ cresol	
____ 1,4-dichlorobenzene	
____ 1,2-dichloroethane	
____ 1,1-dichloroethylene	
____ 2,4-dinitrotoluene	
____ heptachlor	
____ hexachlorobenzene	
____ hexachlorobutadiene	
____ hexachloroethane	
____ methyl ethyl ketone	
____ nitrobenzene	
____ pentachlorophenol	
____ pyridine	
____ tetrachloroethylene	
____ trichloroethylene	
____ 2,4,5-trichlorophenol	
____ 2,4,6-trichlorophenol	
____ vinyl chloride	
____ endrin	
____ lindane	
____ methoxychlor	
____ toxaphene	
____ 2,4-D	
____ 2,4,5-TP (Silvex)	

Organic Chemistry

Parameter	Results(mg/l)
✓ P&T:GC/MS	
____ Acid:B/N Ext.	
____ MTBE	

Inorganic Chemistry

Parameter	Results(mg/l)(mg/kg)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chloride	
____ Chromium	
____ Copper	
____ Fluoride	
____ Iron	
____ Lead	
____ Manganese	
____ Mercury	
____ Nitrate	
____ Selenium	
____ Silver	
____ Sulfates	
____ Zinc	
____ pH	
____ Conductivity	
____ TDS	
____ TOC	

Radiochemistry

Parameter	Results (PCi/l)
____ Gross Alpha	
____ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Date Received 3-24-95 WG, AD Reported by ____

Date Extracted ____ Date Reported ____

Date Analyzed 3-29-95 nw Lab Number 951178

PD89E

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD 980-844-336 Field Sample Number 019527

Name of Site Union Carbide Corp Site Location Hovis Road, Charlotte NC

Collected By RKS - GM ID# _____ Date Collected 3-23-95 Time 1420

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	OR	Concentrate	Comments
____ Ground water (1)		✓ ~~Solid (5)~~	Soil sample collected
____ Surface water (2)		____ Liquid (6)	in battery disposal
✓ Soil (3)		____ Sludge (7)	area
____ Other (4)		____ Other (8)	

TCLP Compounds

Inorganic Compounds	Results(mg/l)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chromium	
____ Lead	
____ Mercury	
____ Selenium	
____ Silver	

Organic Chemistry

Parameter	Results(mg/l)
____ P&T:GC/MS	
✓ Acid:B/N Ext.	
____ MTBE	

Inorganic Chemistry

Parameter	Results(mg/l)(mg/kg)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chloride	
____ Chromium	
____ Copper	
____ Fluoride	
____ Iron	
____ Lead	
____ Manganese	
____ Mercury	
____ Nitrate	
____ Selenium	
____ Silver	
____ Sulfates	
____ Zinc	
____ pH	
____ Conductivity	
____ TDS	
____ TOC	

Organic Compounds

Organic Compounds	Results(mg/l)
____ benzene	
____ carbon tetrachloride	
____ chlordane	
____ chlorobenzene	
____ chloroform	
____ o-cresol	
____ m-cresol	
____ p-cresol	
____ cresol	
____ 1,4-dichlorobenzene	
____ 1,2-dichloroethane	
____ 1,1-dichloroethylene	
____ 2,4-dinitrotoluene	
____ heptachlor	
____ hexachlorobenzene	
____ hexachlorobutadiene	
____ hexachloroethane	
____ methyl ethyl ketone	
____ nitrobenzene	
____ pentachlorophenol	
____ pyridine	
____ tetrachloroethylene	
____ trichloroethylene	
____ 2,4,5-trichlorophenol	
____ 2,4,6-trichlorophenol	
____ vinyl chloride	
____ endrin	
____ lindane	
____ methoxychlor	
____ toxaphene	
____ 2,4-D	
____ 2,4,5-TP (Silvex)	

Radiochemistry

Parameter	Results (PCi/l)
____ Gross Alpha	
____ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Date Received 3-24-95 WG, AB Reported by _____

Date Extracted 3-27-95 SA Date Reported _____

Date Analyzed 3-28-95 BD Lab Number 951179

GPD89E

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD 980-844-336 Field Sample Number 019528

Name of Site Union Carbide Corp Site Location Hovis Road, Charlotte NC

Collected By RKS- GN ID# _____ Date Collected 3-23-95 Time 14 45

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	OR	Concentrate	Comments
____ Ground water (1)		____ Solid (5)	Downstream ~~Soil~~
✓ Surface water (2)		~~✓ Liquid (6)~~	surface water sample
____ Soil (3)		____ Sludge (7)	collected upgradient of sewer
____ Other (4)		____ Other (8)	out flow - near stained soil

Organic Chemistry

Parameter	Results(mg/l)
✓ P&T:GC/MS	
____ Acid:B/N Ext.	
____ MTBE	

Radiochemistry

Parameter	Results (PCi/l)
____ Gross Alpha	
____ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Inorganic Chemistry

Parameter	Results(mg/l)(mg/kg)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chloride	
____ Chromium	
____ Copper	
____ Fluoride	
____ Iron	
____ Lead	
____ Manganese	
____ Mercury	
____ Nitrate	
____ Selenium	
____ Silver	
____ Sulfates	
____ Zinc	
____ pH	
____ Conductivity	
____ TDS	
____ TOC	

TCLP Compounds

Inorganic Compounds	Results(mg/l)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chromium	
____ Lead	
____ Mercury	
____ Selenium	
____ Silver	

Organic Compounds	Results(mg/l)
____ benzene	
____ carbon tetrachloride	
____ chlordane	
____ chlorobenzene	
____ chloroform	
____ o-cresol	
____ m-cresol	
____ p-cresol	
____ cresol	
____ 1,4-dichlorobenzene	
____ 1,2-dichloroethane	
____ 1,1-dichloroethylene	
____ 2,4-dinitrotoluene	
____ heptachlor	
____ hexachlorobenzene	
____ hexachlorobutadiene	
____ hexachloroethane	
____ methyl ethyl ketone	
____ nitrobenzene	
____ pentachlorophenol	
____ pyridine	
____ tetrachloroethylene	
____ trichloroethylene	
____ 2,4,5-trichlorophenol	
____ 2,4,6-trichlorophenol	
____ vinyl chloride	
____ endrin	
____ lindane	
____ methoxychlor	
____ toxaphene	
____ 2,4-D	
____ 2,4,5-TP (Silvex)	

Date Received 3-24-95 WG, AB Reported by _____

Date Extracted _____ Date Reported _____

Date Analyzed 3-28-95 nw Lab Number 951180

EPD89E

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD 980-844-336 Field Sample Number 019529

Name of Site Union Carbide Corp. Site Location Havis Road, Charlotte NC

Collected By RBS - GAC ID# ____ Date Collected 3-23-95 Time 1445

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	Concentrate	Comments
____ Ground water (1)	____ Solid (5)	Downstream surface water
✓ Surface water (2)	✓ Liquid (6)	sample collected upgradient
____ Soil (3)	____ Sludge (7)	of sewer outfall - near
____ Other (4)	____ Other (8)	stained soil

OR

TCLP Compounds

Inorganic Compounds	Results(mg/l)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chromium	
____ Lead	
____ Mercury	
____ Selenium	
____ Silver	

Organic Chemistry

Parameter	Results(mg/l)
____ P&T:GC/MS	
✓ Acid:B/N Ext.	
____ MTBE	

Radiochemistry

Parameter	Results (PCi/l)
____ Gross Alpha	
____ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Inorganic Chemistry

Parameter	Results(mg/l)(mg/kg)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chloride	
____ Chromium	
____ Copper	
____ Fluoride	
____ Iron	
____ Lead	
____ Manganese	
____ Mercury	
____ Nitrate	
____ Selenium	
____ Silver	
____ Sulfates	
____ Zinc	
____ pH	
____ Conductivity	
____ TDS	
____ TOC	

Organic Compounds	Results(mg/l)
____ benzene	
____ carbon tetrachloride	
____ chlordane	
____ chlorobenzene	
____ chloroform	
____ o-cresol	
____ m-cresol	
____ p-cresol	
____ cresol	
____ 1,4-dichlorobenzene	
____ 1,2-dichloroethane	
____ 1,1-dichloroethylene	
____ 2,4-dinitrotoluene	
____ heptachlor	
____ hexachlorobenzene	
____ hexachlorobutadiene	
____ hexachloroethane	
____ methyl ethyl ketone	
____ nitrobenzene	
____ pentachlorophenol	
____ pyridine	
____ tetrachloroethylene	
____ trichloroethylene	
____ 2,4,5-trichlorophenol	
____ 2,4,6-trichlorophenol	
____ vinyl chloride	
____ endrin	
____ lindane	
____ methoxychlor	
____ toxaphene	
____ 2,4-D	
____ 2,4,5-TP (Silvex)	

Date Received 3-24-95 AB, MG Reported by ____

Date Extracted 3-29-95 SA Date Reported ____

Date Analyzed 3-31-95 BD Lab Number 951181

PD89E

N.C. Department of Environment,
Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD 980-844-336 Field Sample Number 019530

Name of Site Union Carbide Corp. Site Location Huvis Road, Charlotte, NC

Collected By RKS - GN ID# _____ Date Collected 3-23-95 Time 1450

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	Concentrate	Comments
____ Ground water (1)	____ Solid (5)	Downstream sediment
____ Surface water (2)	____ Liquid (6)	sample - collected upgradient
____ Soil (3)	____ Sludge (7)	of outfall of sewer -
✓ Other (4) sediment	____ Other (8)	Near stained soil in stream bank

Organic Chemistry

Parameter	Results (mg/l)
✓ P&T:GC/MS	
Acid:B/N Ext.	
MTBE	

Radiochemistry

Parameter	Results (PCi/l)
Gross Alpha	
Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Inorganic Chemistry

Parameter	Results (mg/l) (mg/kg)
Arsenic	
Barium	
Cadmium	
Chloride	
Chromium	
Copper	
Fluoride	
Iron	
Lead	
Manganese	
Mercury	
Nitrate	
Selenium	
Silver	
Sulfates	
Zinc	
pH	
Conductivity	
TDS	
TOC	

TCLP Compounds

Inorganic Compounds	Results (mg/l)
Arsenic	
Barium	
Cadmium	
Chromium	
Lead	
Mercury	
Selenium	
Silver	

Organic Compounds	Results (mg/l)
benzene	
carbon tetrachloride	
chlordane	
chlorobenzene	
chloroform	
o-cresol	
m-cresol	
p-cresol	
cresol	
1,4-dichlorobenzene	
1,2-dichloroethane	
1,1-dichloroethylene	
2,4-dinitrotoluene	
heptachlor	
hexachlorobenzene	
hexachlorobutadiene	
hexachloroethane	
methyl ethyl ketone	
nitrobenzene	
pentachlorophenol	
pyridine	
tetrachloroethylene	
trichloroethylene	
2,4,5-trichlorophenol	
2,4,6-trichlorophenol	
vinyl chloride	
endrin	
lindane	
methoxychlor	
toxaphene	
2,4-D	
2,4,5-TP (Silvex)	

Date Received 3-24-95 AB NW Reported by _____

Date Extracted _____ Date Reported _____

Date Analyzed 3-29-95 NW Lab Number 951182

CPD89E

Purpose: Enforcement and compliance with the N.C. Solid and Hazardous Waste Management Rules.

Preparation: A sample analyses request form must be completed for each type of evaluation requested (e.g., inorganic, organic, microbiology, radiochemistry). For sampling conditions which require more than one (1) container (i.e., ground or surface water) a sample label must be affixed to one of the containers. The collector must then write the site and sample number on the duplicate container.

Do not submit an analysis request form without any parameters indicated.

Equivalent measurements: ppm = μg/ml = mg/l = μg/g = mg/kg
ppb = μg/l = μg/1000g = μg/kg

DEFINITIONS/INSTRUCTIONS

Site Number - A unique twelve-digit site/location identifier (i.e., the EPA identification number).

Field Sample Number - A unique six-digit sample identifier which is pre-printed on the sample label.

Name of Site - Name of facility, landfill, etc.

Site Location - City and county.

Collected By - Name and staff identification number of collector.

Date and Time Collected - Self-explanatory.

Environmental - A sample of a naturally occurring substance such as ground water, surface water, or soils which may be contaminated.

Concentrate - A sample of a waste, including but not limited to, sludges, resins, treatment effluents, or drummed wastes.

Comments - Lists details regarding sample or sample point (e.g., sample location, well number, phase separation, and/or odors.

Inorganic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

Organic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

TCLP Compounds - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided. TCLP can only be performed on solid or semi-solid samples. For totals of the inorganic parameters, check (✓) the corresponding parameter under **Inorganic Chemistry**.

Microbiology and Radiochemistry - Contact the Raleigh office prior to sampling either of these.

Distribution:
1. Send or deliver the original to the State Laboratory of Public Health.
2. The Lab then sends a copy (with results) to the Solid Waste Management Division.
3. The Solid Waste Management Division sends a copy to the field person or collector.

Disposition: This form may be destroyed in accordance with the Environmental Health, Solid and Hazardous Waste Section of the Records Disposition Schedule as published by the North Carolina Division of Archives and History

Additional forms may be ordered from: Solid Waste Management Division
Hazardous Waste Section
P.O. Box 27687
Raleigh, NC 27611

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD 980-844-336 Field Sample Number 019531

Name of Site Union Carbide Corp. Site Location Harris Road, Charlotte NC

Collected By RISS-GN ID# ____ Date Collected 3-23-95 Time 1450

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	Concentrate	Comments
____ Ground water (1)	____ Solid (5)	Downstream sediment
____ Surface water (2)	____ Liquid (6)	sample - collected upgradient
____ Soil (3)	____ Sludge (7)	of outfall of sewer -
✓ Other (4) sediment	____ Other (8)	Mean stained soil into stream bank

TCLP Compounds

Inorganic Compounds	Results(mg/l)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chromium	
____ Lead	
____ Mercury	
____ Selenium	
____ Silver	

Organic Chemistry

Parameter	Results(mg/l)
____ P&T:GC/MS	
✓ Acid:B/N Ext.	
____ MTBE	

Inorganic Chemistry

Parameter	Results(mg/l)(mg/kg)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chloride	
____ Chromium	
____ Copper	
____ Fluoride	
____ Iron	
____ Lead	
____ Manganese	
____ Mercury	
____ Nitrate	
____ Selenium	
____ Silver	
____ Sulfates	
____ Zinc	
____ pH	
____ Conductivity	
____ TDS	
____ TOC	

Organic Compounds	Results(mg/l)
____ benzene	
____ carbon tetrachloride	
____ chlordane	
____ chlorobenzene	
____ chloroform	
____ o-cresol	
____ m-cresol	
____ p-cresol	
____ cresol	
____ 1,4-dichlorobenzene	
____ 1,2-dichloroethane	
____ 1,1-dichloroethylene	
____ 2,4-dinitrotoluene	
____ heptachlor	
____ hexachlorobenzene	
____ hexachlorobutadiene	
____ hexachloroethane	
____ methyl ethyl ketone	
____ nitrobenzene	
____ pentachlorophenol	
____ pyridine	
____ tetrachloroethylene	
____ trichloroethylene	
____ 2,4,5-trichlorophenol	
____ 2,4,6-trichlorophenol	
____ vinyl chloride	
____ endrin	
____ lindane	
____ methoxychlor	
____ toxaphene	
____ 2,4-D	
____ 2,4,5-TP (Silvex)	

Radiochemistry

Parameter	Results (PCi/l)
____ Gross Alpha	
____ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Date Received 3-28-95 MG AB Reported by ____

Date Extracted 3-27-95 SA Date Reported ____

Date Analyzed 3-28-95 BD Lab Number 951183

CPD89E

Purpose: Enforcement and compliance with the N.C. Solid and Hazardous Waste Management Rules.

Preparation: A sample analyses request form must be completed for each type of evaluation requested (e.g., inorganic, organic, microbiology, radiochemistry). For sampling conditions which require more than one (1) container (i.e., ground or surface water) a sample label must be affixed to one of the containers. The collector must then write the site and sample number on the duplicate container.

Do not submit an analysis request form without any parameters indicated.

Equivalent measurements: ppm = μg/ml = mg/l = μg/g = mg/kg
ppb = μg/l = μg/1000g = μg/kg

DEFINITIONS/INSTRUCTIONS

Site Number - A unique twelve-digit site/location identifier (i.e., the EPA identification number).

Field Sample Number - A unique six-digit sample identifier which is pre-printed on the sample label.

Name of Site - Name of facility, landfill, etc.

Site Location - City and county.

Collected By - Name and staff identification number of collector.

Date and Time Collected - Self-explanatory.

Environmental - A sample of a naturally occurring substance such as ground water, surface water, or soils which may be contaminated.

Concentrate - A sample of a waste, including but not limited to, sludges, resins, treatment effluents, or drummed wastes.

Comments - Lists details regarding sample or sample point (e.g., sample location, well number, phase separation, and/or odors.

Inorganic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

Organic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

TCLP Compounds - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided. TCLP can only be performed on solid or semi-solid samples. For totals of the inorganic parameters, check (✓) the corresponding parameter under **Inorganic Chemistry**.

Microbiology and Radiochemistry - Contact the Raleigh office prior to sampling either of these.

Distribution:
1. Send or deliver the original to the State Laboratory of Public Health.
2. The Lab then sends a copy (with results) to the Solid Waste Management Division.
3. The Solid Waste Management Division sends a copy to the field person or collector.

Disposition: This form may be destroyed in accordance with the Environmental Health, Solid and Hazardous Waste Section of the Records Disposition Schedule as published by the North Carolina Division of Archives and History

Additional forms may be ordered from: Solid Waste Management Division
Hazardous Waste Section
P.O. Box 27687
Raleigh, NC 27611

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD 980-844-336 Field Sample Number 019532

Name of Site Carbide Corp Site Location Harris Road, Charlotte NC

Collected By RKS-GM ID# ____ Date Collected 3-23-95 Time 1505

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	Concentrate	Comments
____ Ground water (1)	____ Solid (5)	upstream surface water
✓ Surface water (2)	✓ Liquid (6)	sample in pool near
____ Soil (3)	____ Sludge (7)	running stream above
____ Other (4)	____ Other (8)	disposal area

Organic Chemistry

Parameter	Results (mg/l)
✓ P&T:GC/MS	
____ Acid:B/N Ext.	
____ MTBE	

Radiochemistry

Parameter	Results (PCi/l)
____ Gross Alpha	
____ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Inorganic Chemistry

Parameter	Results (mg/l) (mg/kg)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chloride	
____ Chromium	
____ Copper	
____ Fluoride	
____ Iron	
____ Lead	
____ Manganese	
____ Mercury	
____ Nitrate	
____ Selenium	
____ Silver	
____ Sulfates	
____ Zinc	
____ pH	
____ Conductivity	
____ TDS	
____ TOC	

TCLP Compounds

Inorganic Compounds	Results (mg/l)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chromium	
____ Lead	
____ Mercury	
____ Selenium	
____ Silver	

Organic Compounds	Results (mg/l)
____ benzene	
____ carbon tetrachloride	
____ chlordane	
____ chlorobenzene	
____ chloroform	
____ o-cresol	
____ m-cresol	
____ p-cresol	
____ cresol	
____ 1,4-dichlorobenzene	
____ 1,2-dichloroethane	
____ 1,1-dichloroethylene	
____ 2,4-dinitrotoluene	
____ heptachlor	
____ hexachlorobenzene	
____ hexachlorobutadiene	
____ hexachloroethane	
____ methyl ethyl ketone	
____ nitrobenzene	
____ pentachlorophenol	
____ pyridine	
____ tetrachloroethylene	
____ trichloroethylene	
____ 2,4,5-trichlorophenol	
____ 2,4,6-trichlorophenol	
____ vinyl chloride	
____ endrin	
____ lindane	
____ methoxychlor	
____ toxaphene	
____ 2,4-D	
____ 2,4,5-TP (Silvex)	

Date Received 3-24-95 KG AB Reported by ____

Date Extracted ____ Date Reported ____

Date Analyzed 3-28-95 MW Lab Number 951184

C:PD89E

Purpose: Enforcement and compliance with the N.C. Solid and Hazardous Waste Management Rules.

Preparation: A sample analyses request form must be completed for each type of evaluation requested (e.g., inorganic, organic, microbiology, radiochemistry). For sampling conditions which require more than one (1) container (i.e., ground or surface water) a sample label must be affixed to one of the containers. The collector must then write the site and sample number on the duplicate container.

Do not submit an analysis request form without any parameters indicated.

Equivalent measurements: ppm = μg/ml = mg/l = μg/g = mg/kg
ppb = μg/l = μg/1000g = μg/kg

DEFINITIONS/INSTRUCTIONS

Site Number - A unique twelve-digit site/location identifier (i.e., the EPA identification number).

Field Sample Number - A unique six-digit sample identifier which is pre-printed on the sample label.

Name of Site - Name of facility, landfill, etc.

Site Location - City and county.

Collected By - Name and staff identification number of collector.

Date and Time Collected - Self-explanatory.

Environmental - A sample of a naturally occurring substance such as ground water, surface water, or soils which may be contaminated.

Concentrate - A sample of a waste, including but not limited to, sludges, resins, treatment effluents, or drummed wastes.

Comments - Lists details regarding sample or sample point (e.g., sample location, well number, phase separation, and/or odors.

Inorganic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

Organic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

TCLP Compounds - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided. TCLP can only be performed on solid or semi-solid samples. For totals of the inorganic parameters, check (✓) the corresponding parameter under **Inorganic Chemistry**.

Microbiology and Radiochemistry - Contact the Raleigh office prior to sampling either of these.

Distribution:
1. Send or deliver the original to the State Laboratory of Public Health.
2. The Lab then sends a copy (with results) to the Solid Waste Management Division.
3. The Solid Waste Management Division sends a copy to the field person or collector.

Disposition: This form may be destroyed in accordance with the Environmental Health, Solid and Hazardous Waste Section of the Records Disposition Schedule as published by the North Carolina Division of Archives and History

Additional forms may be ordered from: Solid Waste Management Division
Hazardous Waste Section
P.O. Box 27687
Raleigh, NC 27611

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD 980-844-336 Field Sample Number 019533

Name of Site Union Carbide Corp Site Location Harris Road, Charlotte NC

Collected By _____ ID# _____ Date Collected 3-23-95 Time 1505

Agency: ___ Hazardous Waste ___ Solid Waste ✓ Superfund

Sample Type

Environmental	OR	Concentrate	Comments
___ Ground water (1)		___ Solid (5)	upstream surface water
✓ Surface water (2)		✓ ~~Liquid (6)~~	sample in pool area /
___ Soil (3)		___ Sludge (7)	running stream above
___ Other (4)		___ Other (8)	disposal area

TCLP Compounds

Inorganic Compounds	Results(mg/l)
___ Arsenic	
___ Barium	
___ Cadmium	
___ Chromium	
___ Lead	
___ Mercury	
___ Selenium	
___ Silver	

Organic Chemistry

Parameter	Results(mg/l)
___ P&T:GC/MS	
✓ Acid:B/N Ext.	
___ MTBE	

Inorganic Chemistry

Parameter	Results(mg/l)(mg/kg)
___ Arsenic	
___ Barium	
___ Cadmium	
___ Chloride	
___ Chromium	
___ Copper	
___ Fluoride	
___ Iron	
___ Lead	
___ Manganese	
___ Mercury	
___ Nitrate	
___ Selenium	
___ Silver	
___ Sulfates	
___ Zinc	
___ pH	
___ Conductivity	
___ TDS	
___ TOC	

Radiochemistry

Parameter	Results (PCi/l)
___ Gross Alpha	
___ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Organic Compounds	Results(mg/l)
___ benzene	
___ carbon tetrachloride	
___ chlordane	
___ chlorobenzene	
___ chloroform	
___ o-cresol	
___ m-cresol	
___ p-cresol	
___ cresol	
___ 1,4-dichlorobenzene	
___ 1,2-dichloroethane	
___ 1,1-dichloroethylene	
___ 2,4-dinitrotoluene	
___ heptachlor	
___ hexachlorobenzene	
___ hexachlorobutadiene	
___ hexachloroethane	
___ methyl ethyl ketone	
___ nitrobenzene	
___ pentachlorophenol	
___ pyridine	
___ tetrachloroethylene	
___ trichloroethylene	
___ 2,4,5-trichlorophenol	
___ 2,4,6-trichlorophenol	
___ vinyl chloride	
___ endrin	
___ lindane	
___ methoxychlor	
___ toxaphene	
___ 2,4-D	
___ 2,4,5-TP (Silvex)	

Date Received 3-24-95 WG, AB Reported by _____

Date Extracted 3-29-95 SA Date Reported _____

Date Analyzed 3-31-95 BD Lab Number 951185

CPD89E

Purpose: Enforcement and compliance with the N.C. Solid and Hazardous Waste Management Rules.

Preparation: A sample analyses request form must be completed for each type of evaluation requested (e.g., inorganic, organic, microbiology, radiochemistry). For sampling conditions which require more than one (1) container (i.e., ground or surface water) a sample label must be affixed to one of the containers. The collector must then write the site and sample number on the duplicate container.

Do not submit an analysis request form without any parameters indicated.

Equivalent measurements: ppm = μg/ml = mg/l = μg/g = mg/kg
ppb = μg/l = μg/1000g = μg/kg

DEFINITIONS/INSTRUCTIONS

Site Number - A unique twelve-digit site/location identifier (i.e., the EPA identification number).

Field Sample Number - A unique six-digit sample identifier which is pre-printed on the sample label.

Name of Site - Name of facility, landfill, etc.

Site Location - City and county.

Collected By - Name and staff identification number of collector.

Date and Time Collected - Self-explanatory.

Environmental - A sample of a naturally occurring substance such as ground water, surface water, or soils which may be contaminated.

Concentrate - A sample of a waste, including but not limited to, sludges, resins, treatment effluents, or drummed wastes.

Comments - Lists details regarding sample or sample point (e.g., sample location, well number, phase separation, and/or odors.

Inorganic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

Organic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

TCLP Compounds - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided. TCLP can only be performed on solid or semi-solid samples. For totals of the inorganic parameters, check (✓) the corresponding parameter under **Inorganic Chemistry**.

Microbiology and Radiochemistry - Contact the Raleigh office prior to sampling either of these.

Distribution:
1. Send or deliver the original to the State Laboratory of Public Health.
2. The Lab then sends a copy (with results) to the Solid Waste Management Division.
3. The Solid Waste Management Division sends a copy to the field person or collector.

Disposition: This form may be destroyed in accordance with the Environmental Health, Solid and Hazardous Waste Section of the Records Disposition Schedule as published by the North Carolina Division of Archives and History

Additional forms may be ordered from: Solid Waste Management Division
Hazardous Waste Section
P.O. Box 27687
Raleigh, NC 27611

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD 980-844-336 Field Sample Number 019534

Name of Site Union Carbide Corp Site Location Hovis Road, Charlotte NC

Collected By RKS - GN ID# _____ Date Collected 3-23-95 Time 1505

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	Concentrate	Comments
____ Ground water (1)	____ Solid (5)	upstream ~~soil~~ sediment
____ Surface water (2)	____ Liquid (6)	sample in pool area /
____ Soil (3)	____ Sludge (7)	running stream above
✓ Other (4) sediment	____ Other (8)	disposal area

Organic Chemistry

Parameter	Results(mg/l)
✓ P&T:GC/MS	
____ Acid:B/N Ext.	
____ MTBE	

Radiochemistry

Parameter	Results (PCi/l)
____ Gross Alpha	
____ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Inorganic Chemistry

Parameter	Results(mg/l)(mg/kg)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chloride	
____ Chromium	
____ Copper	
____ Fluoride	
____ Iron	
____ Lead	
____ Manganese	
____ Mercury	
____ Nitrate	
____ Selenium	
____ Silver	
____ Sulfates	
____ Zinc	
____ pH	
____ Conductivity	
____ TDS	
____ TOC	

TCLP Compounds

Inorganic Compounds	Results(mg/l)
____ Arsenic	
____ Barium	
____ Cadmium	
____ Chromium	
____ Lead	
____ Mercury	
____ Selenium	
____ Silver	

Organic Compounds	Results(mg/l)
____ benzene	
____ carbon tetrachloride	
____ chlordane	
____ chlorobenzene	
____ chloroform	
____ o-cresol	
____ m-cresol	
____ p-cresol	
____ cresol	
____ 1,4-dichlorobenzene	
____ 1,2-dichloroethane	
____ 1,1-dichloroethylene	
____ 2,4-dinitrotoluene	
____ heptachlor	
____ hexachlorobenzene	
____ hexachlorobutadiene	
____ hexachloroethane	
____ methyl ethyl ketone	
____ nitrobenzene	
____ pentachlorophenol	
____ pyridine	
____ tetrachloroethylene	
____ trichloroethylene	
____ 2,4,5-trichlorophenol	
____ 2,4,6-trichlorophenol	
____ vinyl chloride	
____ endrin	
____ lindane	
____ methoxychlor	
____ toxaphene	
____ 2,4-D	
____ 2,4,5-TP (Silvex)	

Date Received 3-24-95 KG, AB Reported by _____

Date Extracted _____ Date Reported _____

Date Analyzed 3-29-95 MW Lab Number 951186

CPD89E

Purpose: Enforcement and compliance with the N.C. Solid and Hazardous Waste Management Rules.

Preparation: A sample analyses request form must be completed for each type of evaluation requested (e.g., inorganic, organic, microbiology, radiochemistry). For sampling conditions which require more than one (1) container (i.e., ground or surface water) a sample label must be affixed to one of the containers. The collector must then write the site and sample number on the duplicate container.

Do not submit an analysis request form without any parameters indicated.

Equivalent measurements: ppm = μg/ml = mg/l = μg/g = mg/kg
ppb = μg/l = μg/1000g = μg/kg

DEFINITIONS/INSTRUCTIONS

Site Number - A unique twelve-digit site/location identifier (i.e., the EPA identification number).

Field Sample Number - A unique six-digit sample identifier which is pre-printed on the sample label.

Name of Site - Name of facility, landfill, etc.

Site Location - City and county.

Collected By - Name and staff identification number of collector.

Date and Time Collected - Self-explanatory.

Environmental - A sample of a naturally occurring substance such as ground water, surface water, or soils which may be contaminated.

Concentrate - A sample of a waste, including but not limited to, sludges, resins, treatment effluents, or drummed wastes.

Comments - Lists details regarding sample or sample point (e.g., sample location, well number, phase separation, and/or odors.

Inorganic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

Organic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

TCLP Compounds - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided. TCLP can only be performed on solid or semi-solid samples. For totals of the inorganic parameters, check (✓) the corresponding parameter under **Inorganic Chemistry**.

Microbiology and Radiochemistry - Contact the Raleigh office prior to sampling either of these.

Distribution:
1. Send or deliver the original to the State Laboratory of Public Health.
2. The Lab then sends a copy (with results) to the Solid Waste Management Division.
3. The Solid Waste Management Division sends a copy to the field person or collector.

Disposition: This form may be destroyed in accordance with the Environmental Health, Solid and Hazardous Waste Section of the Records Disposition Schedule as published by the North Carolina Division of Archives and History

Additional forms may be ordered from: Solid Waste Management Division
Hazardous Waste Section
P.O. Box 27687
Raleigh, NC 27611

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD-980-844-336 Field Sample Number 019535

Name of Site Union Carbide Corp Site Location Hovis Road, Charlotte NC

Collected By RKS - GN ID# ____ Date Collected 3-23-95 Time 1505

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	Concentrate	Comments
___ Ground water (1)	___ Solid (5)	upstream sediment
___ Surface water (2)	___ Liquid (6)	sample in pool area
___ Soil (3)	___ Sludge (7)	running stream above
✓ Other (4) sediment	___ Other (8)	disposal area

Organic Chemistry

Parameter	Results(mg/l)
___ P&T:GC/MS	
✓ Acid:B/N Ext.	
___ MTBE	

Radiochemistry

Parameter	Results (PCi/l)
___ Gross Alpha	
___ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Inorganic Chemistry

Parameter	Results(mg/l)(mg/kg)
___ Arsenic	
___ Barium	
___ Cadmium	
___ Chloride	
___ Chromium	
___ Copper	
___ Fluoride	
___ Iron	
___ Lead	
___ Manganese	
___ Mercury	
___ Nitrate	
___ Selenium	
___ Silver	
___ Sulfates	
___ Zinc	
___ pH	
___ Conductivity	
___ TDS	
___ TOC	

TCLP Compounds

Inorganic Compounds	Results(mg/l)
___ Arsenic	
___ Barium	
___ Cadmium	
___ Chromium	
___ Lead	
___ Mercury	
___ Selenium	
___ Silver	

Organic Compounds	Results(mg/l)
___ benzene	
___ carbon tetrachloride	
___ chlordane	
___ chlorobenzene	
___ chloroform	
___ o-cresol	
___ m-cresol	
___ p-cresol	
___ cresol	
___ 1,4-dichlorobenzene	
___ 1,2-dichloroethane	
___ 1,1-dichloroethylene	
___ 2,4-dinitrotoluene	
___ heptachlor	
___ hexachlorobenzene	
___ hexachlorobutadiene	
___ hexachloroethane	
___ methyl ethyl ketone	
___ nitrobenzene	
___ pentachlorophenol	
___ pyridine	
___ tetrachloroethylene	
___ trichloroethylene	
___ 2,4,5-trichlorophenol	
___ 2,4,6-trichlorophenol	
___ vinyl chloride	
___ endrin	
___ lindane	
___ methoxychlor	
___ toxaphene	
___ 2,4-D	
___ 2,4,5-TP (Silvex)	

Date Received 3-24-95 MG, KB Reported by ____

Date Extracted 3-27-95 SA Date Reported ____

Date Analyzed 3-28-95 BD Lab Number 951187

C:PD89E

Purpose: Enforcement and compliance with the N.C. Solid and Hazardous Waste Management Rules.

Preparation: A sample analyses request form must be completed for each type of evaluation requested (e.g., inorganic, organic, microbiology, radiochemistry). For sampling conditions which require more than one (1) container (i.e., ground or surface water) a sample label must be affixed to one of the containers. The collector must then write the site and sample number on the duplicate container.

Do not submit an analysis request form without any parameters indicated.

Equivalent measurements: ppm = μg/ml = mg/l = μg/g = mg/kg
ppb = μg/l = μg/1000g = μg/kg

DEFINITIONS/INSTRUCTIONS

Site Number - A unique twelve-digit site/location identifier (i.e., the EPA identification number).

Field Sample Number - A unique six-digit sample identifier which is pre-printed on the sample label.

Name of Site - Name of facility, landfill, etc.

Site Location - City and county.

Collected By - Name and staff identification number of collector.

Date and Time Collected - Self-explanatory.

Environmental - A sample of a naturally occurring substance such as ground water, surface water, or soils which may be contaminated.

Concentrate - A sample of a waste, including but not limited to, sludges, resins, treatment effluents, or drummed wastes.

Comments - Lists details regarding sample or sample point (e.g., sample location, well number, phase separation, and/or odors.

Inorganic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

Organic Chemistry - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided.

TCLP Compounds - Check (✓) the desired parameters to be analyzed. If not listed, enter the element/compound in the space provided. TCLP can only be performed on solid or semi-solid samples. For totals of the inorganic parameters, check (✓) the corresponding parameter under **Inorganic Chemistry**.

Microbiology and Radiochemistry - Contact the Raleigh office prior to sampling either of these.

Distribution:
1. Send or deliver the original to the State Laboratory of Public Health.
2. The Lab then sends a copy (with results) to the Solid Waste Management Division.
3. The Solid Waste Management Division sends a copy to the field person or collector.

Disposition: This form may be destroyed in accordance with the Environmental Health, Solid and Hazardous Waste Section of the Records Disposition Schedule as published by the North Carolina Division of Archives and History

Additional forms may be ordered from: Solid Waste Management Division
Hazardous Waste Section
P.O. Box 27687
Raleigh, NC 27611

(1)

STATE LABORATORY OF PUBLIC HEALTH
PO BOX 28047 - 306 N. WILMINGTON ST., RALEIGH, NC 27611

ORGANIC CHEMICAL ANALYSIS

PURGEABLE COMPOUNDS	LAB NO	951175	951176	951178	951180	951182	951184
	FIELD NO	19523	19524	19526	19528	19530	19532
COMPOUND	TYPE	(4)	(3)	(3)	(2)	(4)	(2)
	UNITS	(µg/l) µg/kg	µg/l (µg/kg)	µg/l (µg/kg)	(µg/l) µg/kg	µg/l (µg/kg)	(µg/l) µg/kg
CHLOROMETHANE	20 ppb	u	u	u	u	u	u
VINYL CHLORIDE	10				1J		
BROMOMETHANE	20				u		
CHLOROETHANE	10						
TRICHLOROFLUOROMETHANE	10						
ACETONE	50		25 J,B		4 J,B	10 J,B	
1,1-DICHLOROETHENE	5		u		u	u	
IODOMETHANE	10						
METHYLENE CHLORIDE	5		79 J,B				
CARBON DISULFIDE			u				
TRANS-1,2-DICHLOROETHENE							
ACRYLONITRILE	20						
1,1-DICHLOROETHANE	5				trace		
2-BUTANONE	50				u		
CIS-1,2-DICHLOROETHENE	5				trace		
CHLOROFORM					u		
1,1,1-TRICHLOROETHANE							
CARBON TETRACHLORIDE	10						
BENZENE	5				3J	trace	
1,2-DICHLOROETHANE					trace	u	
TRICHLOROETHENE					u		
1,2-DICHLOROPROPANE							
BROMODICHLOROMETHANE	10						
	↑MDL↑						

B - BACKGROUND PRESENT IN LAB BLANKS.
J - Estimated value
K - Actual value is known to be less than value given.
L - Actual value is known to be greater than value given.
U - Material was analyzed for but not detected. The number is the Minimum Detection Limit.
NA - Not analyzed.
1/ - Tentative identification.
2/ - On NRDC List of Priority Pollutants.
H - COMPOUND RELIABLY DETECTABLE ONLY AT HIGH CONCENTRATIONS.
C - POSSIBLE LAB CONTAMINATION.

(2)

STATE LABORATORY OF PUBLIC HEALTH
PO BOX 28047 - 306 N. WILMINGTON ST., RALEIGH, NC 27611

ORGANIC CHEMICAL ANALYSIS

PURGEABLE COMPOUNDS	LAB NO	951175	951176	951178	951180	951182	951184
	FIELD NO	19523	19524	19526	19528	19530	19532
COMPOUND	TYPE	(4)	(3)	(3)	(2)	(4)	(2)
	UNITS	µg/l µg/kg	µg/l µg/kg	µg/l µg/kg	µg/l µg/kg	µg/l µg/kg	µg/l µg/kg
DIBROMOMETHANE	5ppb	u	u	u	u	u	u
4-METHYL-2-PENTANONE	50						
CIS-1,3-DICHLOROPROPENE	5						
TOLUENE	↓						
TRANS-1,3-DICHLOROPROPENE	↓						
1,1,2,2-TETRACHLOROETHANE	10						
1,1,2-TRICHLOROETHANE	5						
2-HEXANONE	50						
TETRACHLOROETHENE	5						
DIBROMOCHLOROMETHANE	10						
ETHYLENE DIBROMIDE	5						
CHLOROBENZENE	5						
1,1,1,2-TETRACHLOROETHANE	10				↓		
ETHYL BENZENE	5				trace		
XYLENES	10				trace		
STYRENE	5				u		
BROMOFORM	10						
H TRANS-1,4-DICHLORO-2-BUTENE	80						
1,2,3-TRICHLOROPROPANE	20						
1,4-DICHLOROBENZENE	10						
1,2-DICHLOROBENZENE	↓						
1,2-DIBROMO-3-CHLOROPROPANE	20						
H VINYL ACETATE	200	↓	↓	↓	↓	↓	↓
	↑MDL↑						

B - BACKGROUND PRESENT IN LAB BLANKS.
J - Estimated value
K - Actual value is known to be less than value given.
L - Actual value is known to be greater than value given.
U - Material was analyzed for but not detected. The number is the Minimum Detection Limit.
NA - Not analyzed.
1/ - Tentative identification.
2/ - On NRDC List of Priority Pollutants.
H - COMPOUND RELIABLY DETECTABLE ONLY AT HIGH CONCENTRATIONS.
C - POSSIBLE LAB CONTAMINATION.

DEHNR 3068-O (10/93)

PURGCOM.OR

(3)

STATE LABORATORY OF PUBLIC HEALTH
PO BOX 28047 - 306 N. WILMINGTON ST., RALEIGH, NC 27611

ORGANIC CHEMICAL ANALYSIS

PURGEABLE COMPOUNDS	LAB NO	951186					
	FIELD NO	19534					
COMPOUND	TYPE	(4)	( )	( )	( )	( )	( )
	UNITS	µg/l µg/kg	µg/l µg/kg	µg/l µg/kg	µg/l µg/kg	µg/l µg/kg	µg/l µg/kg
CHLOROMETHANE	20 ppb	u					
VINYL CHLORIDE	10						
BROMOMETHANE	20						
CHLOROETHANE	10						
TRICHLOROFLUOROMETHANE	10						
ACETONE	50						
1,1-DICHLOROETHENE	5						
IODOMETHANE	10						
METHYLENE CHLORIDE	5						
CARBON DISULFIDE	↓						
TRANS-1,2-DICHLOROETHENE	↓						
ACRYLONITRILE	20						
1,1-DICHLOROETHANE	5						
2-BUTANONE	50						
CIS-1,2-DICHLOROETHENE	5						
CHLOROFORM	↓						
1,1,1-TRICHLOROETHANE	↓						
CARBON TETRACHLORIDE	10						
BENZENE	5						
1,2-DICHLOROETHANE	↓						
TRICHLOROETHENE	↓						
1,2-DICHLOROPROPANE	↓						
BROMODICHLOROMETHANE	10	↓					
	↑ MDL ↑						

B - BACKGROUND PRESENT IN LAB BLANKS.
J - Estimated value
K - Actual value is known to be less than value given.
L - Actual value is known to be greater than value given.
U - Material was analyzed for but not detected. The number is the Minimum Detection Limit.
NA - Not analyzed.
1/ - Tentative identification.
2/ - On NRDC List of Priority Pollutants.
H - COMPOUND REWABLY DETECTABLE ONLY AT HIGH CONCENTRATIONS.
C - POSSIBLE LAB CONTAMINATION.

DEHNR 3065-O (10/93) PURGCOMLORC

STATE LABORATORY OF PUBLIC HEALTH
PO BOX 28047 - 306 N. WILMINGTON ST., RALEIGH, NC 27611

ORGANIC CHEMICAL ANALYSIS

PURGEABLE COMPOUNDS	LAB NO	951186					
	FIELD NO	19534					
COMPOUND	TYPE	(-4)	( )	( )	( )	( )	( )
	UNITS	µg/l µg/kg	µg/l µg/kg	µg/l µg/kg	µg/l µg/kg	µg/l µg/kg	µg/l µg/kg
DIBROMOMETHANE	5ppb	u					
4-METHYL-2-PENTANONE	50						
CIS-1,3-DICHLOROPROPENE	5						
TOLUENE	↓						
TRANS-1,3-DICHLOROPROPENE	↓						
1,1,2,2-TETRACHLOROETHANE	10						
1,1,2-TRICHLOROETHANE	5						
2-HEXANONE	50						
TETRACHLOROETHENE	5						
DIBROMOCHLOROMETHANE	10						
ETHYLENE DIBROMIDE	5						
CHLOROBENZENE	5						
1,1,1,2-TETRACHLOROETHANE	10						
ETHYL BENZENE	5						
XYLENES	10						
STYRENE	5						
BROMOFORM	10						
H TRANS-1,4-DICHLORO-2-BUTENE	80						
1,2,3-TRICHLOROPROPANE	20						
1,4-DICHLOROBENZENE	10						
1,2-DICHLOROBENZENE	↓						
1,2-DIBROMO-3-CHLOROPROPANE	20						
H VINYL ACETATE	200	↓					
	↑MDL↑						

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J - Estimated value
K - Actual value is known to be less than value given.
L - Actual value is known to be greater than value given.
U - Material was analyzed for but not detected. The number is the Minimum Detection Limit.
NA - Not analyzed.
1/ - Tentative identification.
2/ - On NRDC List of Priority Pollutants.
H - COMPOUND RELIABLY DETECTABLE ONLY AT HIGH CONCENTRATIONS.
C - POSSIBLE LAB CONTAMINATION.

STATE LABORATORY OF PUBLIC HEALTH

P.O. BOX 28047 - 306 N. WILMINGTON, ST., RALEIGH, N.C. 27611

ORGANIC CHEMICAL ANALYSIS

BASE/NEUTRAL AND ACID EXTRACTABLES	LAB NO	951177	951179	951181	951183	951185	951187
	FIELD #	19525	19527	19529	19531	19533	19535
COMPOUND	TYPE	(3)	(3)	(2)	(4)	(2)	(4)
	UNITS	~~µg/l~~ µg/kg	~~µg/l~~ µg/kg	µg/l ~~µg/kg~~	~~µg/l~~ µg/kg	µg/l ~~µg/kg~~	~~µg/l~~ µg/kg
[redacted]nitrosodimethylamine	10/330	u	u	u	u	u	u
[redacted]s(2-chloroethyl)ether	↓	↓	↓	↓	↓	↓	↓
2-chlorophenol	↓	↓	↓	↓	↓	↓	↓
[redacted]henol	↓	↓	↓	↓	↓	↓	↓
[redacted]3-dichlorobenzene	↓	↓	↓	↓	↓	↓	↓
[redacted],4-dichlorobenzene	↓	↓	↓	↓	↓	↓	↓
1,2-dichlorobenzene	↓	↓	↓	↓	↓	↓	↓
[redacted]s(2-chloroisopropyl)ether	↓	↓	↓	↓	↓	↓	↓
[redacted]xachloroethane	↓	↓	↓	↓	↓	↓	↓
N-nitroso-di-n-propylamine	↓	↓	↓	↓	↓	↓	↓
[redacted]trobenzene	↓	↓	↓	↓	↓	↓	↓
[redacted]ophorone	↓	↓	↓	↓	↓	↓	↓
2-nitrophenol	↓	↓	↓	↓	↓	↓	↓
2,4-dimethylphenol	↓	↓	↓	↓	↓	↓	↓
[redacted]s(2-chloroethoxy)methane	↓	↓	↓	↓	↓	↓	↓
2,4-dichlorophenol	↓	↓	↓	↓	↓	↓	↓
1,2,4-trichlorobenzene	↓	↓	↓	↓	↓	↓	↓
[redacted]phthalene	↓	↓	↓	↓	↓	↓	↓
[redacted]xachlorobutadiene	↓	↓	↓	↓	↓	↓	↓
4-chloro-m-cresol	↓	↓	↓	↓	↓	↓	↓
[redacted]xachlorocyclopentadiene	↓	↓	↓	↓	↓	↓	↓
[redacted]4,6-trichlorophenol	↓	↓	↓	↓	↓	↓	↓
2-chloronaphthalene	↓	↓	↓	↓	↓	↓	↓
[redacted]cenaphthylene	↓	↓	↓	↓	↓	↓	↓
[redacted]imethyl phthalate	↓	↓	↓	↓	↓	↓	↓
[redacted],6-dinitrotoluene	↓	↓	↓	↓	↓	↓	↓
acenaphthene	↓	↓	↓	↓	↓	↓	↓
[redacted],4-dinitrophenol	50/1650	↓	↓	↓	↓	↓	↓
[redacted],4-dinitrotoluene	10/330	↓	↓	↓	↓	↓	↓
4-nitrophenol	50/1650	↓	↓	↓	↓	↓	↓
[redacted]luorene	10/330	↓	↓	↓	↓	↓	↓
[redacted]-chlorophenylphenylether	↓	↓	↓	↓	↓	↓	↓
diethyl phthalate	↓	↓	↓	↓	↓	↓	↓
4,6-dinitro-o-cresol	50/1650	↓	↓	↓	↓	↓	↓
[redacted]iphenylamine	10/330	↓	↓	↓	↓	↓	↓
[redacted]zobenzene	↓	↓	↓	↓	↓	↓	↓
4-bromophenylphenylether	↓	↓	↓	↓	↓	↓	↓
[redacted]exachlorobenzene	↓	↓	↓	↓	↓	↓	↓
[redacted]entachlorophenol	50/1650	↓	↓	↓	↓	↓	↓
phenanthrene	10/330	↓	↓	↓	↓	↓	↓
[redacted]nthracene	↓	↓	↓	↓	↓	↓	↓
[redacted]ibutyl phthalate	↓	↓	↓	↓	↓	↓	↓
fluoranthene	↓	✓	✓	✓	✓	✓	✓

MDL
H_2O/SOIL

[redacted] - Estimated value.
K - Actual value is known to be less than value given.
L - Actual value is known to be greater than value given.
[redacted] - Material was analyzed for but not detected. The number is the Minimum Detection Limit. MDL
[redacted]A - Not analyzed.
[redacted]/ - Tentative identification.
2/ - On NRDC List of Priority Pollutants.

STATE LABORATORY OF PUBLIC HEALTH

P.O. BOX 28047 - 306 N. WILMINGTON, ST., RALEIGH, N.C. 27611

ORGANIC CHEMICAL ANALYSIS

BASE/NEUTRAL AND ACID EXTRACTABLES	LAB NO	951177	951179	951181	951183	951185	951187
	FIELD #	19525	19527	19529	19531	19533	19535
COMPOUND	TYPE	(3)	(3)	(2)	(4)	(2)	(4)
	UNITS	~~µg/l~~ µg/kg	~~µg/l~~ µg/kg	µg/l ~~µg/kg~~	~~µg/l~~ µg/kg	µg/l ~~µg/kg~~	~~µg/l~~ µg/kg
pyrene	10/330	U	U	U	U	U	U
benzidine	50/1650						
utyl benzyl phthalate	10/330						
enz(a)anthracene							
chrysene							
,3-dichlorobenzidine	50/1650						
is(2-ethylhexyl)phthalate	10/330		18,467	10K			
di-n-octyl phthalate	10/330		U	U			
benzo(b)fluoranthene	50/1650						
benzo(k)fluoranthene							
benzo(a)pyrene							
indeno(1,2,3-cd)pyrene							
dibenzo(a,h)anthracene							
benzo(g,h,i)perylene							
aniline	50/1650	U	U	U	U	U	U
benzoic acid							
benzyl alcohol							
4-chloroaniline							
dibenzofuran	10/330						
2-methylnaphthalene							
2-methylphenol							
4-methylphenol							
2-nitroaniline	50/1650						
3-nitroaniline							
4-nitroaniline							
2,4,5-trichlorophenol							

MDL

H_2O/501L

J - Estimated value.
K - Actual value is known to be less than value given.
L - Actual value is known to be greater than value given.
U - Material was analyzed for but not detected. The number is the Minimum Detection Limit. MDL
NA - Not analyzed.
1/ - Tentative identification.
2/ - On NRDC List of Priority Pollutants.

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

RECEIVED MAY 05 1995 SUPERFUND SECTION

Site Number NCD 980-944-336 Field Sample Number 617463

Name of Site Union Carbide Corp. Site Location Harris Road, Charlotte

Collected By RKS - GN ID# Date Collected 3-23-95 Time 1445

Agency: ___ Hazardous Waste ___ Solid Waste ✓ Superfund

Sample Type

Environmental	Concentrate	Comments
___ Ground water (1)	___ Solid (5)	Downstream surface
✓ Surface water (2)	✓ Liquid (6)	water sample collected
___ Soil (3)	___ Sludge (7)	upgradient of sewer
___ Other (4)	___ Other (8)	outfall - near stained rail

Organic Chemistry

Parameter	Results(mg/l)
___ P&T:GC/MS	
___ Acid:B/N Ext.	
___ MTBE	

Radiochemistry

Parameter	Results (PCi/l)
___ Gross Alpha	
___ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Inorganic Chemistry

Parameter	Results(mg/l) ([redacted])
✓ Arsenic	<0.01
✓ Barium	0.06
✓ Cadmium	<0.002
Chloride	
✓ Chromium	<0.01
Copper	
Fluoride	
Iron	
✓ Lead	<0.005
✓ Manganese	1.92
✓ Mercury	<0.0005
Nitrate	
✓ Selenium	<0.005
✓ Silver	<0.05
Sulfates	
✓ Zinc	5.16
pH	
Conductivity	
TDS	
TOC	

TCLP Compounds

Inorganic Compounds	Results(mg/l)
___ Arsenic	
___ Barium	
___ Cadmium	
___ Chromium	
___ Lead	
___ Mercury	
___ Selenium	
___ Silver	

Organic Compounds	Results(mg/l)
___ benzene	
___ carbon tetrachloride	
___ chlordane	
___ chlorobenzene	
___ chloroform	
___ o-cresol	
___ m-cresol	
___ p-cresol	
___ cresol	
___ 1,4-dichlorobenzene	
___ 1,2-dichloroethane	
___ 1,1-dichloroethylene	
___ 2,4-dinitrotoluene	
___ heptachlor	
___ hexachlorobenzene	
___ hexachlorobutadiene	
___ hexachloroethane	
___ methyl ethyl ketone	
___ nitrobenzene	
___ pentachlorophenol	
___ pyridine	
___ tetrachloroethylene	
___ trichloroethylene	
___ 2,4,5-trichlorophenol	
___ 2,4,6-trichlorophenol	
___ vinyl chloride	
___ endrin	
___ lindane	
___ methoxychlor	
___ toxaphene	
___ 2,4-D	
___ 2,4,5-TP (Silvex)	

Date Received ___ Reported by ___

Date Extracted ___ Date Reported 4 May 95

003859 MAR 24 95

Date Analyzed ___ Lab Number ___

[illegible]089E

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD 980-844-336 Field Sample Number 017465

Name of Site Union Carbide Corp Site Location Hovis Road, Charlotte NC

Collected By RKS-GM ID# ____ Date Collected 3-23-95 Time 1505

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	Concentrate	Comments
___ Ground water (1)	___ Solid (5)	upstream surface water
✓ Surface water (2)	✓ Liquid (6)	sample in pool area/
___ Soil (3)	___ Sludge (7)	running stream above
___ Other (4)	___ Other (8)	disposal area

Organic Chemistry

Parameter	Results(mg/l)
___ P&T:GC/MS	
___ Acid:B/N Ext.	
___ MTBE	

Radiochemistry

Parameter	Results (PCi/l)
___ Gross Alpha	
___ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Inorganic Chemistry

Parameter	Results(mg/l)
✓ Arsenic	<0.01
✓ Barium	0.04
✓ Cadmium	<0.002
___ Chloride	
✓ Chromium	<0.01
___ Copper	
___ Fluoride	
___ Iron	
✓ Lead	<0.005
✓ Manganese	1.49
✓ Mercury	<0.0005
___ Nitrate	
✓ Selenium	<0.005
✓ Silver	<0.05
___ Sulfates	
✓ Zinc	0.16
___ pH	
___ Conductivity	
___ TDS	
___ TOC	

TCLP Compounds

Inorganic Compounds	Results(mg/l)
___ Arsenic	
___ Barium	
___ Cadmium	
___ Chromium	
___ Lead	
___ Mercury	
___ Selenium	
___ Silver	

Organic Compounds	Results(mg/l)
___ benzene	
___ carbon tetrachloride	
___ chlordane	
___ chlorobenzene	
___ chloroform	
___ o-cresol	
___ m-cresol	
___ p-cresol	
___ cresol	
___ 1,4-dichlorobenzene	
___ 1,2-dichloroethane	
___ 1,1-dichloroethylene	
___ 2,4-dinitrotoluene	
___ heptachlor	
___ hexachlorobenzene	
___ hexachlorobutadiene	
___ hexachloroethane	
___ methyl ethyl ketone	
___ nitrobenzene	
___ pentachlorophenol	
___ pyridine	
___ tetrachloroethylene	
___ trichloroethylene	
___ 2,4,5-trichlorophenol	
___ 2,4,6-trichlorophenol	
___ vinyl chloride	
___ endrin	
___ lindane	
___ methoxychlor	
___ toxaphene	
___ 2,4-D	
___ 2,4,5-TP (Silvex)	

Date Received ____ Reported by ____

Date Extracted ____ Date Reported ____

003860 MAR 24 95

Date Analyzed ____ Lab Number ____

D89E

NC-DEHNR
Division of Solid Waste Management
☑ Superfund Section
☐ Hazardous Waste Section
☐ Solid Waste Section

Organics Lab: _____
Inorganics Lab: ✓

RECEIVED
JUN 08 1995
SUPERFUND SECTION

CHAIN OF CUSTODY RECORD

Project Name: Union Carbide Corp
Site ID # (NCD#) 980-844-336
Location: 5400 Hovis Road
Address: Charlotte NC

Sampled by: Keith Snowly
Sampler ID
Telephone: (919) 733-2801
Date Sampled: 3-23-95
Time Sampled: 1405 - 1505

Sample Types: Soil ✓ Water ✓ Waste _____ Other _____

Remarks:

Field Sample Numbers: 017461, 017462, 017463, 017464, 017465, 017466

Relinquished by: Richard Reed Drawely (Signature) Date: 3-24-95 Time: 1250

Received by: [signature] (Signature) Date: 24 Mar 95 Time: 12:50

Relinquished by: _____ (Signature) Date: _____ Time: _____

Received by: _____ (Signature) Date: _____ Time: _____

Relinquished by: _____ (Signature) Date: _____ Time: _____

Received by: _____ (Signature) Date: _____ Time: _____

Results Reported: [signature] (Signature) Date: 5 June 95 Time: _____

(COCR.FRM)

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD-980-844-336 Field Sample Number 017461

Name of Site Union Carbide Corp Site Location Hovis Road, Charlotte NC

Collected By RKS-GK ID# ____ Date Collected 3-23-95 Time 1415

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	Concentrate	Comments
____ Ground water (1)	✓ Solid (5)	Background soil
____ Surface water (2)	____ Liquid (6)	sample near outfrance
✓ Soil (3)	____ Sludge (7)	to plant
____ Other (4)	____ Other (8)	

TCLP Compounds

Inorganic Compounds	Results(mg/l)
✓ Arsenic	<0.01
✓ Barium	0.43
✓ Cadmium	<0.05
✓ Chromium	<0.05
✓ Lead	<0.10
✓ Mercury	<0.01
✓ Selenium	<0.005
✓ Silver	<0.05
✓ Manganese	0.09
✓ Zinc	0.46

Organic Chemistry

Parameter	Results(mg/l)
____ P&T:GC/MS	
____ Acid:B/N Ext.	
____ MTBE	

Inorganic Chemistry

Parameter	Results (mg/kg)
✓ Arsenic	<3.9
✓ Barium	53
✓ Cadmium	<9.8
____ Chloride	
✓ Chromium	16
____ Copper	
____ Fluoride	
____ Iron	
✓ Lead	90
✓ Manganese	<200
✓ Mercury	0.45
____ Nitrate	
✓ Selenium	<3.9
✓ Silver	<9.8
____ Sulfates	
✓ Zinc	51
____ pH	
____ Conductivity	
____ TDS	
____ TOC	

Organic Compounds

Organic Compounds	Results(mg/l)
____ benzene	
____ carbon tetrachloride	
____ chlordane	
____ chlorobenzene	
____ chloroform	
____ o-cresol	
____ m-cresol	
____ p-cresol	
____ cresol	
____ 1,4-dichlorobenzene	
____ 1,2-dichloroethane	
____ 1,1-dichloroethylene	
____ 2,4-dinitrotoluene	
____ heptachlor	
____ hexachlorobenzene	
____ hexachlorobutadiene	
____ hexachloroethane	
____ methyl ethyl ketone	
____ nitrobenzene	
____ pentachlorophenol	
____ pyridine	
____ tetrachloroethylene	
____ trichloroethylene	
____ 2,4,5-trichlorophenol	
____ 2,4,6-trichlorophenol	
____ vinyl chloride	
____ endrin	
____ lindane	
____ methoxychlor	
____ toxaphene	
____ 2,4-D	
____ 2,4,5-TP (Silvex)	

Radiochemistry

Parameter	Results (PCi/l)
____ Gross Alpha	
____ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Date Received ____ Reported by ____

Date Extracted ____ Date Reported ____

Date Analyzed ____ Lab Number ____

003861 MAR 24 95

0591

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD 980-844-336 Field Sample Number 017462

Name of Site Union Carbide Corp Site Location Hovis Road, Charlotte NC

Collected By RKS-GN ID# _____ Date Collected 3-23-95 Time 1420

Agency: ____ Hazardous Waste ____ Solid Waste ____ Superfund

Sample Type

Environmental	Concentrate	Comments
___ Ground water (1)	✓ Solid (5)	Soil sample collected
___ Surface water (2)	___ Liquid (6)	in battery disposal
✓ Soil (3)	___ Sludge (7)	area
___ Other (4)	___ Other (8)	

TCLP Compounds

Inorganic Compounds	Results(mg/l)
✓ Arsenic	<0.02
✓ Barium	0.25
✓ Cadmium	0.15
✓ Chromium	<0.05
✓ Lead	<0.10
✓ Mercury	<0.01
✓ Selenium	<0.005
✓ Silver	<0.05
✓ Manganese	1.39
✓ Zinc	99.62

Organic Chemistry

Parameter	Results(mg/l)
___ P&T:GC/MS	
___ Acid:B/N Ext.	
___ MTBE	

Inorganic Chemistry

Parameter	Results(mg/kg)
✓ Arsenic	78
✓ Barium	140
✓ Cadmium	16
___ Chloride	
✓ Chromium	16
___ Copper	
___ Fluoride	
___ Iron	
✓ Lead	600
✓ Manganese	3,100
✓ Mercury	47
___ Nitrate	
✓ Selenium	<3.9
✓ Silver	12
___ Sulfates	
✓ Zinc	11,000
___ pH	
___ Conductivity	
___ TDS	
___ TOC	

Organic Compounds	Results(mg/l)
benzene	
carbon tetrachloride	
chlordane	
chlorobenzene	
chloroform	
o-cresol	
m-cresol	
p-cresol	
cresol	
1,4-dichlorobenzene	
1,2-dichloroethane	
1,1-dichloroethylene	
2,4-dinitrotoluene	
heptachlor	
hexachlorobenzene	
hexachlorobutadiene	
hexachloroethane	
methyl ethyl ketone	
nitrobenzene	
pentachlorophenol	
pyridine	
tetrachloroethylene	
trichloroethylene	
2,4,5-trichlorophenol	
2,4,6-trichlorophenol	
vinyl chloride	
endrin	
lindane	
methoxychlor	
toxaphene	
2,4-D	
2,4,5-TP (Silvex)	

Radiochemistry

Parameter	Results (PCi/l)
___ Gross Alpha	
___ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Date Received _____ Reported by _____

Date Extracted _____ Date Reported _____

Date Analyzed _____ Lab Number _____

003862 MAR 24 95

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD 980-844-336 Field Sample Number 017464

Name of Site Union Carbide Corp. Site Location Hovis Road, Charlotte NC

Collected By RKS - GN ID# ____ Date Collected 3-23-95 Time 1450

Agency: ____ Hazardous Waste ____ Solid Waste ✓ Superfund

Sample Type

Environmental	Concentrate	Comments
____ Ground water (1)	____ Solid (5)	Downstream sediment
____ Surface water (2)	____ Liquid (6)	sample collected upgradient
____ Soil (3)	____ Sludge (7)	of outfall of sewer -
✓ Other (4) sediment	____ Other (8)	Near stained soil in stream bank

TCLP Compounds

Inorganic Compounds	Results (mg/l)
✓ Arsenic	<0.02
✓ Barium	0.71
✓ Cadmium	<0.05
✓ Chromium	<0.05
✓ Lead	<0.10
✓ Mercury	<0.01
✓ Selenium	<0.005
✓ Silver	<0.05
✓ Manganese	10.18
✓ Zinc	5.26

Organic Chemistry

Parameter	Results (mg/l)
____ P&T:GC/MS	
____ Acid:B/N Ext.	
____ MTBE	

Inorganic Chemistry

Parameter	Results (mg/kg)
✓ Arsenic	<3.9
✓ Barium	39
✓ Cadmium	<9.8
____ Chloride	
✓ Chromium	25
____ Copper	
____ Fluoride	
____ Iron	
✓ Lead	<20
✓ Manganese	1,100
✓ Mercury	≤ 0.13
____ Nitrate	
✓ Selenium	<3.9
✓ Silver	<9.8
____ Sulfates	
✓ Zinc	500
____ pH	
____ Conductivity	
____ TDS	
____ TOC	

Organic Compounds

Organic Compounds	Results (mg/l)
____ benzene	
____ carbon tetrachloride	
____ chlordane	
____ chlorobenzene	
____ chloroform	
____ o-cresol	
____ m-cresol	
____ p-cresol	
____ cresol	
____ 1,4-dichlorobenzene	
____ 1,2-dichloroethane	
____ 1,1-dichloroethylene	
____ 2,4-dinitrotoluene	
____ heptachlor	
____ hexachlorobenzene	
____ hexachlorobutadiene	
____ hexachloroethane	
____ methyl ethyl ketone	
____ nitrobenzene	
____ pentachlorophenol	
____ pyridine	
____ tetrachloroethylene	
____ trichloroethylene	
____ 2,4,5-trichlorophenol	
____ 2,4,6-trichlorophenol	
____ vinyl chloride	
____ endrin	
____ lindane	
____ methoxychlor	
____ toxaphene	
____ 2,4-D	
____ 2,4,5-TP (Silvex)	

Radiochemistry

Parameter	Results (PCi/l)
____ Gross Alpha	
____ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Date Received ____ Reported by ____

Date Extracted ____ Date Reported ____

003863 MAR 24 95

Date Analyzed ____ Lab Number ____

PD89E

N.C. Department of Environment, Health, & Natural Resources
Solid Waste Management Division

SAMPLE ANALYSIS REQUEST

State Laboratory of Public Health
P.O. Box 28047, 306 N. Wilmington Street
Raleigh, North Carolina 27611

Site Number NCD-980-844-336 Field Sample Number 017466

Name of Site Union Carbide Corp. Site Location Houis Road, Charlotte NC

Collected By RKS-GN ID# Date Collected 3-23-95 Time 1505

Agency: ___ Hazardous Waste ___ Solid Waste ✓ Superfund

Sample Type

Environmental	Concentrate	Comments
___ Ground water (1)	___ Solid (5)	upstream sediment
___ Surface water (2)	___ Liquid (6)	sample in pool/area
___ Soil (3)	___ Sludge (7)	running stream above
✓ Other (4) sediment	___ Other (8)	disposal area

TCLP Compounds

Inorganic Compounds	Results(mg/l)
✓ Arsenic	<0.02
✓ Barium	0.34
✓ Cadmium	<0.05
✓ Chromium	<0.05
✓ Lead	<0.10
✓ Mercury	<0.01
✓ Selenium	<0.005
✓ Silver	<0.05
✓ Manganese	0.47
✓ Zinc	7.36

Organic Chemistry

Parameter	Results(mg/l)
___ P&T:GC/MS	
___ Acid:B/N Ext.	
___ MTBE	

Inorganic Chemistry

Parameter	Results (mg/kg)
✓ Arsenic	14
✓ Barium	37
✓ Cadmium	<9.8
___ Chloride	
✓ Chromium	16
___ Copper	
___ Fluoride	
___ Iron	
✓ Lead	51
✓ Manganese	390
✓ Mercury	0.42
___ Nitrate	
✓ Selenium	<3.9
✓ Silver	<9.8
___ Sulfates	
✓ Zinc	820
___ pH	
___ Conductivity	
___ TDS	
___ TOC	

Organic Compounds

Organic Compounds	Results(mg/l)
___ benzene	
___ carbon tetrachloride	
___ chlordane	
___ chlorobenzene	
___ chloroform	
___ o-cresol	
___ m-cresol	
___ p-cresol	
___ cresol	
___ 1,4-dichlorobenzene	
___ 1,2-dichloroethane	
___ 1,1-dichloroethylene	
___ 2,4-dinitrotoluene	
___ heptachlor	
___ hexachlorobenzene	
___ hexachlorobutadiene	
___ hexachloroethane	
___ methyl ethyl ketone	
___ nitrobenzene	
___ pentachlorophenol	
___ pyridine	
___ tetrachloroethylene	
___ trichloroethylene	
___ 2,4,5-trichlorophenol	
___ 2,4,6-trichlorophenol	
___ vinyl chloride	
___ endrin	
___ lindane	
___ methoxychlor	
___ toxaphene	
___ 2,4-D	
___ 2,4,5-TP (Silvex)	

Radiochemistry

Parameter	Results (PCi/l)
___ Gross Alpha	
___ Gross Beta	

Microbiology

Parameter	Results (Col/100ml)

Date Received ___ Reported by ___

Date Extracted ___ Date Reported ___

003864 MAR 24 95

Date Analyzed ___ Lab Number ___

0891E

LATITUDE AND LONGITUDE CALCULATION WORKSHEET #2
LI USING ENGINEER'S SCALE (1/60)

Battery Disposal Site

SITE NAME: Union Carbide Corporation CERCLIS #: NCD 980 844 336

AKA: _____ SSID: _____

ADDRESS: 5400 Hovis Road

CITY: Charlotte STATE: NC ZIP CODE: 28208

SITE REFERENCE POINT: Battery disposal area located 250' Due S of SE Corner of Main Building and 450' SSE of Water Tank

USGS QUAD MAP NAME: Mountain Island Lake TOWNSHIP: — N/S RANGE: — E/W

SCALE: 1:24,000 MAP DATE: 1969 PI 1983 SECTION: — 1/4 — 1/4 — 1/4

MAP DATUM: 1927 1983 (CIRCLE ONE) MERIDIAN: —

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 80° 52' 30" LATITUDE: 35° 15' 0"

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 80° 52' 30" LATITUDE: 35° 15' 0"

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 223

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 73.68"

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 1' 13.68"

D) ADD TO STARTING LATITUDE: 35° 15' 0.0" + 1' 13.5 =

SITE LATITUDE: 35° 16' 13.5"

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 222

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 73.34"

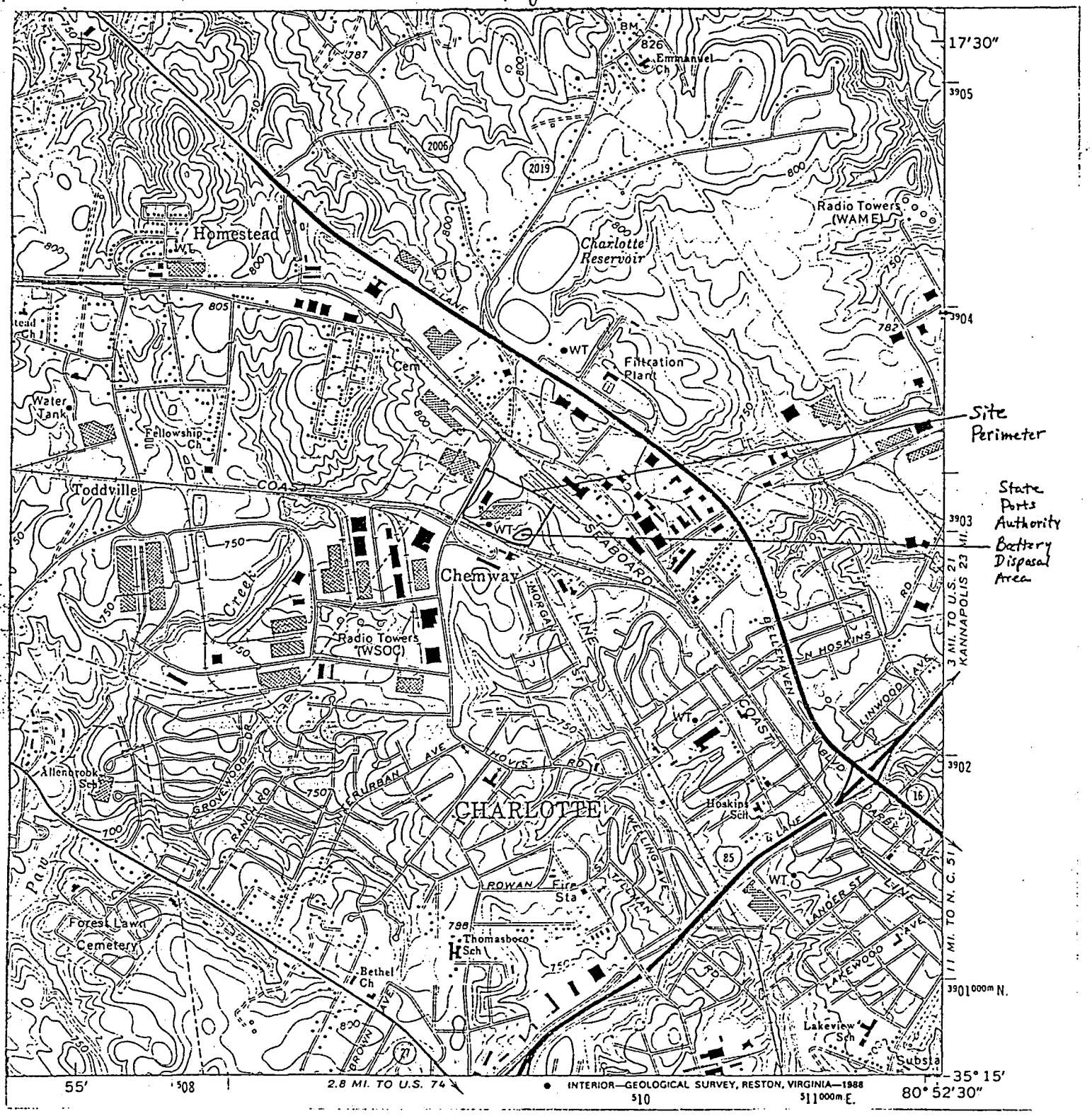
C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 1' 13.34"

D) ADD TO STARTING LONGITUDE: 80° 52' 30.0" + 1' 13.5 =

SITE LONGITUDE: 80° 53' 43.5"

INVESTIGATOR: Steve Williams DATE: 5/6/92

SITE NAME: State Ports Authority NUMBER: NCD 980 844 336



TOPOGRAPHIC MAP QUADRANGLE NAME: Mountain Island Lake SCALE: 1:24,000

COORDINATES OF LOWER RIGHT-HAND CORNER OF 2.5-MINUTE GRID:

LATITUDE: 80° 52' 30" LONGITUDE: 35° 15' 0"

DEPARTMENT OF COMMERCE
[illegible] H. Hodges, Secretary

WEATHER BUREAU
F. W. Reichelderfer, Chief

TECHNICAL PAPER NO. 40

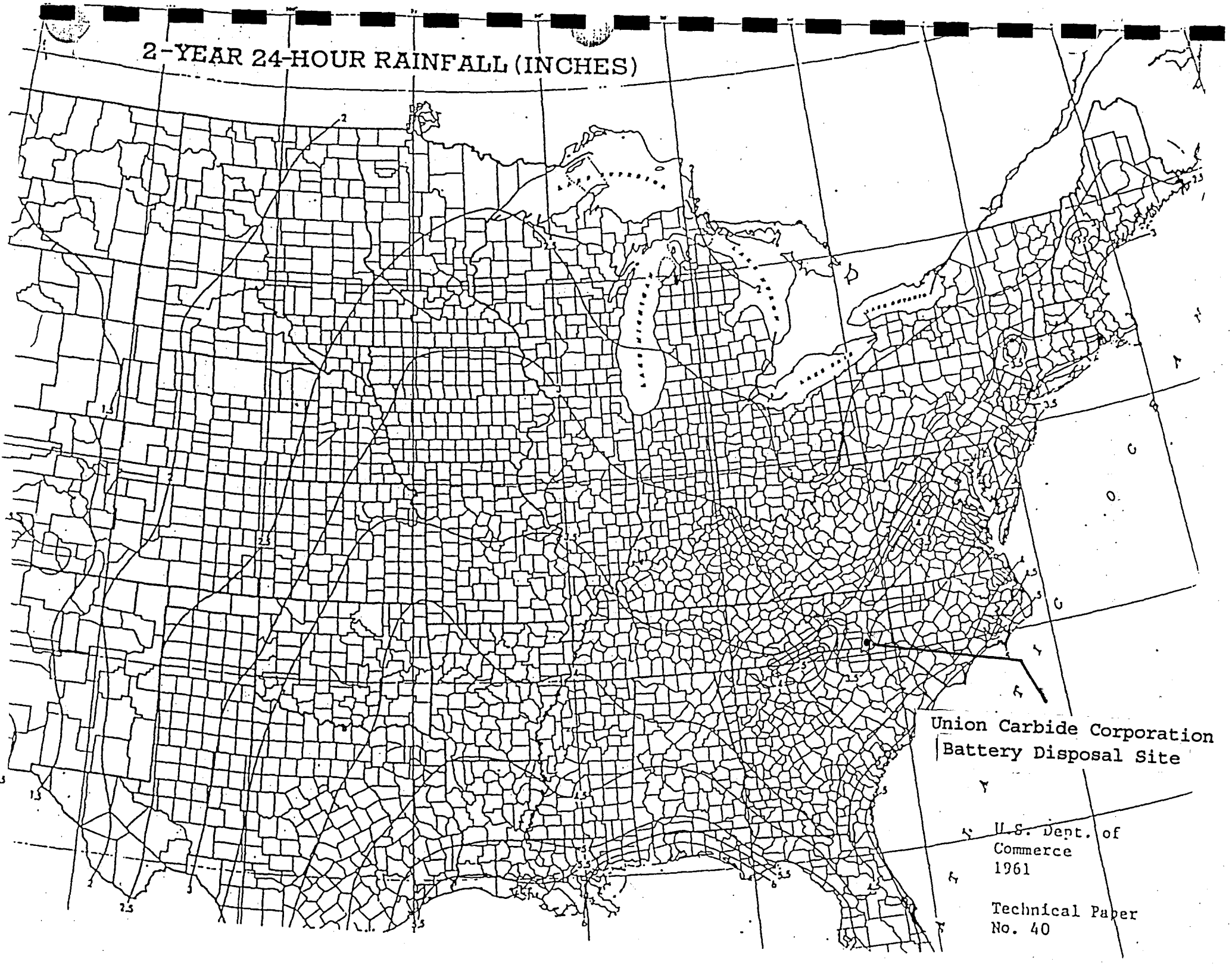
RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

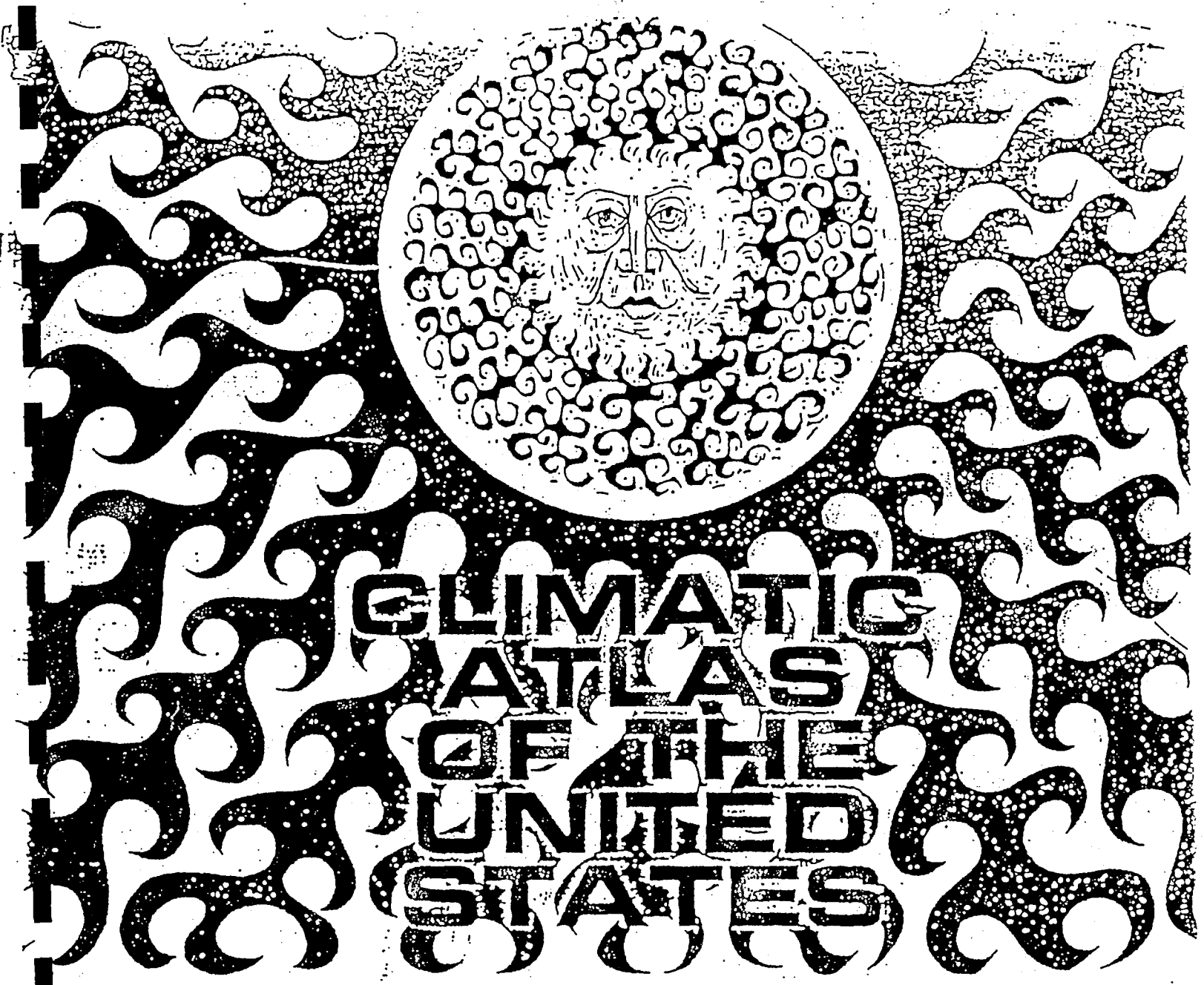
Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture

PROPERTY OF EPA
FIT IV

Reference 3

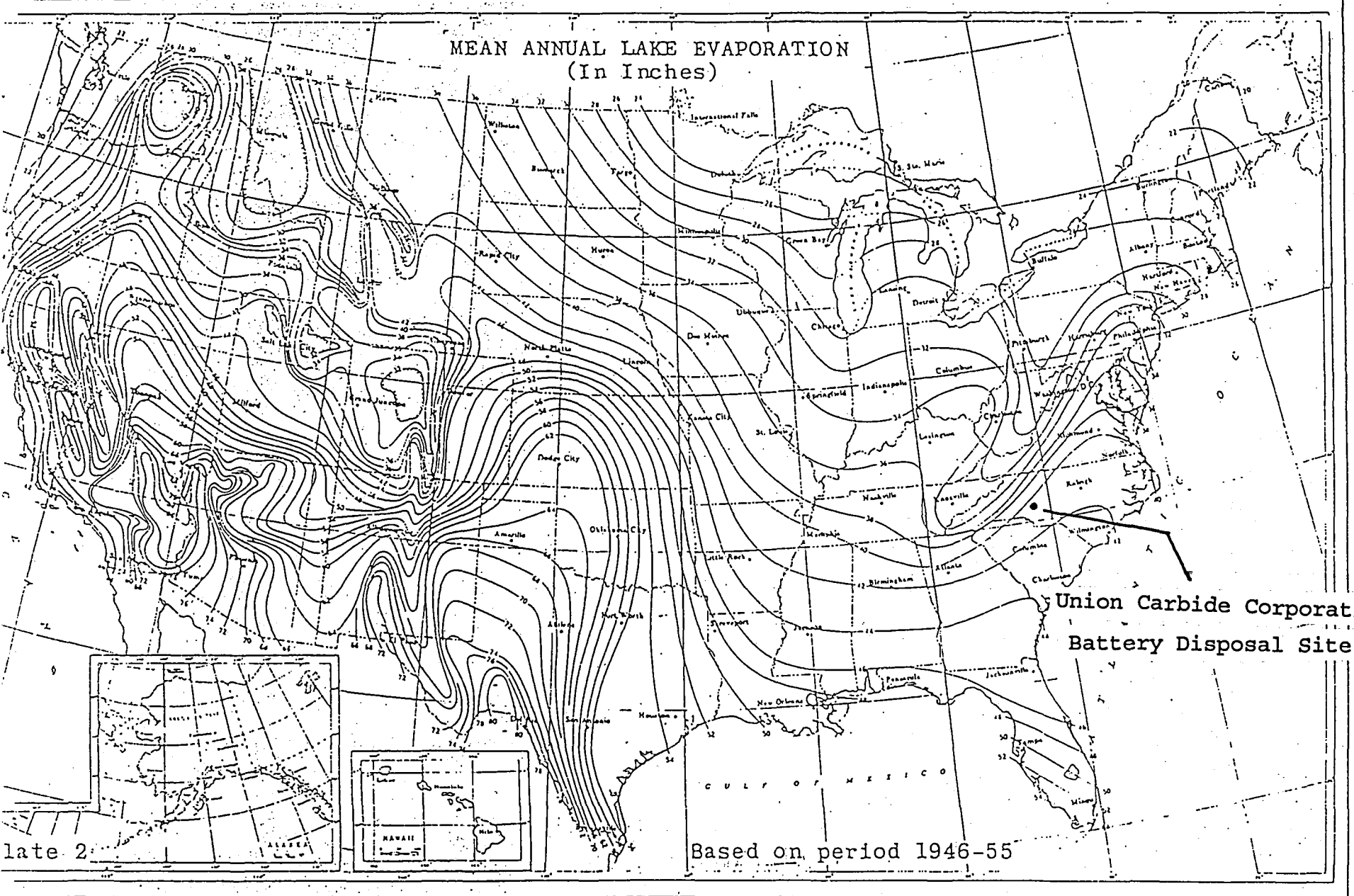

2-YEAR 24-HOUR RAINFALL (INCHES)
Union Carbide Corporation
Battery Disposal Site
U.S. Dept. of
Commerce
1961
Technical Paper
No. 40

Reference 4

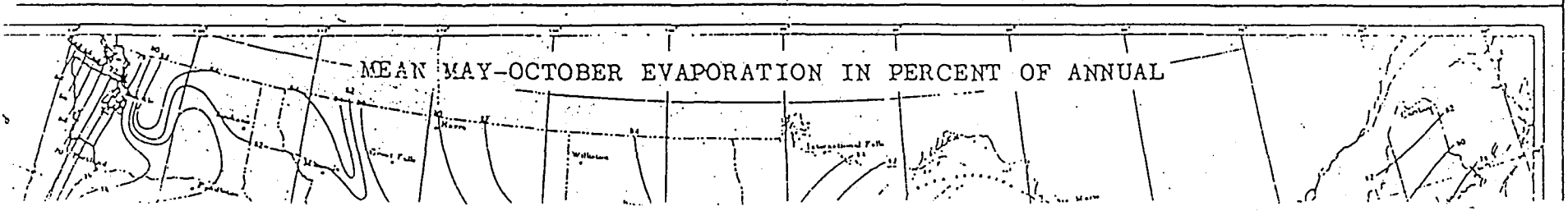


. Environmental Science Services Administration . Environmental Data Service

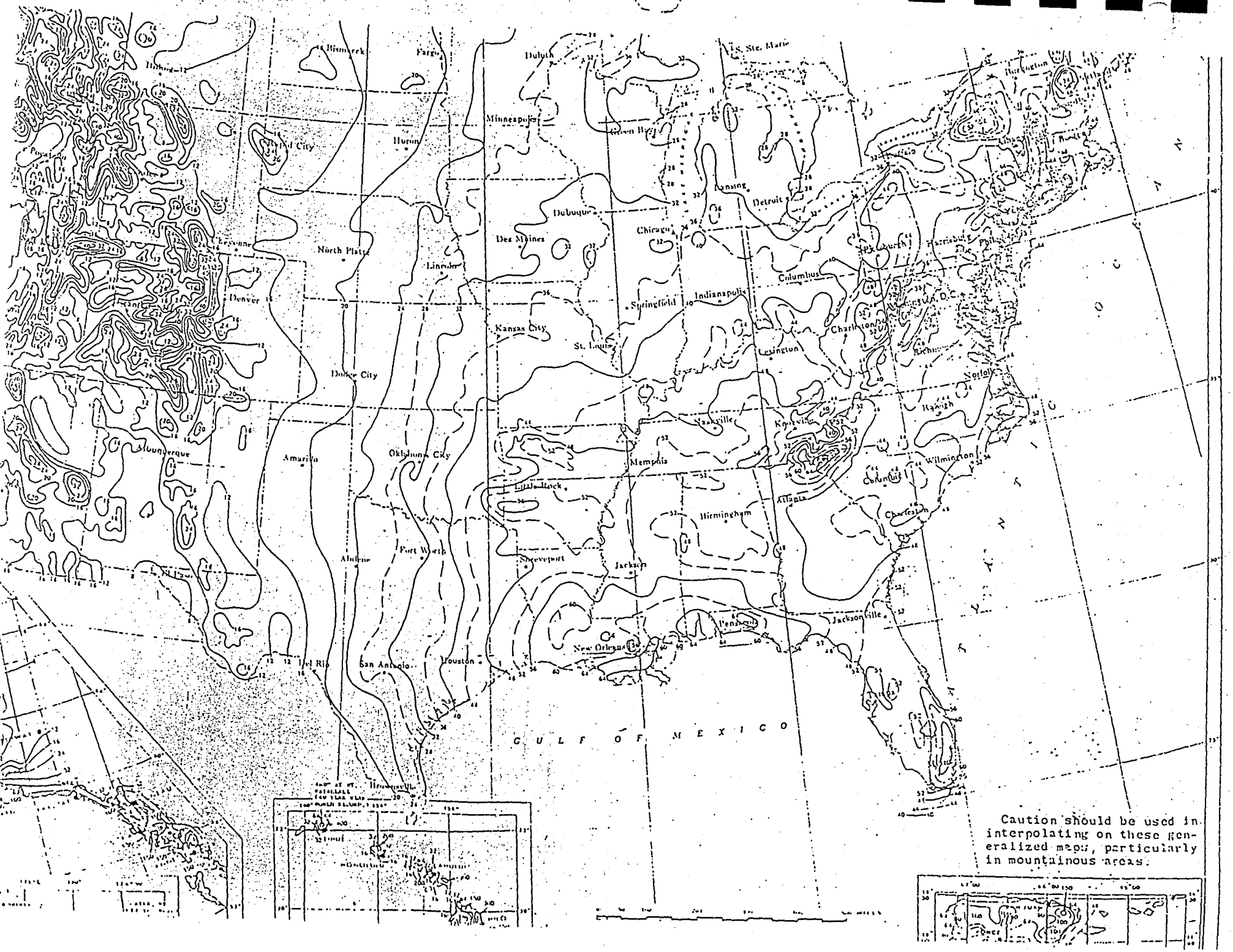
United States Department of Commerce, 1979, Climatic Atlas of the United States, National Climatic Center, Asheville, NC.


MEAN ANNUAL LAKE EVAPORATION
(In Inches)
Union Carbide Corporation
Battery Disposal Site
Based on period 1946-55
GULF OF MEXICO
ALASKA
HAWAII

late 2


MEAN MAY-OCTOBER EVAPORATION IN PERCENT OF ANNUAL

NORMAL ANNUAL TOTAL PRECIPITATION (INCHES)



Caution should be used in interpolating on these generalized maps, particularly in mountainous areas.

MEMO

DATE: April 26, 1995

TO: File

FROM: Keith Snavely RKS
Hydrogeologist
NC Superfund Section

RE: Site reconnaissance and sampling trip
Union Carbide Battery disposal site
5400 Hovis Road, Charlotte, North Carolina
NCD 980 844 336

Grover Nicholson and I arrived at the referenced site to conduct a site inspection at 11:30 am on March 23, 1995. We briefly met with Mr. Frankie Godley of Godley Auction, the owner of the property, to receive directions to the site. The battery disposal site is 2.4 acres and is located on the southeastern end of the former Eveready Battery Plant property owned by Union Carbide at 5400 Hovis Road in Charlotte, North Carolina.

The 2.4 acre disposal area contains numerous piles of battery parts, stressed vegetation, and stained soils. The site is fenced, however there is not a locked gate at the site entrance. Some of the battery parts appeared to be carried from the site by overland flow past the property boundary fence into a small stream that borders the site to the east. The stream contains numerous battery parts and maroon colored leachate is noted in the soils along the bank of the stream. A portion of the stream bank outside the fence area has subsided into the creek and a thickness of 3 to 4 feet of battery disposal parts were noted along the stream bed near the fence to the disposal area.

During the SI conducted in 1985, stream and soil samples were collected from the battery disposal area. The surface water from the stream adjacent to the disposal area contained 170 ppm of toluene and 50 ppb of tetrachloroethylene. Several soil samples were collected in the battery disposal area and analyzed for total and extractable metals. The laboratory analyses indicate manganese levels with total values of 380 mg/kg to 117,000 mg/kg, and total zinc levels from 540 mg/kg to 108,000 mg/kg. The extractables of zinc and manganese exceed the North Carolina 2L groundwater standards of 2.1 mg/l and 0.05 mg/l, respectively by 100 times. The locations of several stream and background samples were not

present in the SI and therefore, the stream and disposal area were resampled during the SIP.

Currently, the plant building is occupied and rented by Custom Pallet Company, and Crating, Inc. and Creative Dying, Incorporated. The estimation of the number of workers at the plant is unknown. The plant building is located approximately 100 feet north of the disposal area across an asphalt parking area.

The site is bordered by Hovis Road and industrial facilities to the west, the State Port Authority to the north, undeveloped property to the east, and the Seaboard Coastal Railroad and industrial plants to the south.

After a reconnaissance was conducted of the disposal area, Grover Nicholson and I prepared sample containers to collect soil, surface water, and sediment samples from the disposal area and adjacent stream. The GPS unit was used to measure latitude and longitude and was set to record each sample location. The soil, surface water, and sediment samples were collected and analyzed for volatiles, semi-volatiles, and metals.

Two soil samples were collected within 6 inches of groundsurface from the site. An upgradient sample was collected from soil in a grassy area adjacent to the plant entrance south of the entrance driveway outside of the fence. The target soil sample was collected in the eastern part of the disposal area about 25 feet from the fence near a pile of battery parts. The GPS files for the soil sample locations are R-032318A (Background) and R-032319A (target soil sample).

The downstream and upstream soil and sediment samples were collected from the stream located to the east of the site. The downstream sample was collected north of an outfall pipe that was located beneath the landfill area. The origin of this sewer drain is unknown. The downstream surface water and sediment sample were collected in an area of the stream that contained stained soil and discolored surface water. The upstream surface water and sediment sample was collected approximately 100 feet north of the downstream location. The GPS files for the site are R-032319C (downstream) and R-032319D (upstream).

The sample locations and several areas of the disposal site were photographed. Approximately 30 photos were collected during the SIP reconnaissance and sampling. All sample bottles including trip blanks were labeled packed in blue ice and ice in a cooler for transport to Raleigh. We decontaminated our boots, cleaned the van and left the site by 4:00 and arrived in Raleigh by 7:00 PM.

MEMO

DATE: April 26, 1995

TO: File

FROM: Keith Snavely RKS
Hydrogeologist
NC Superfund Section

RE: Source - Area Approximation
Union Carbide Battery Disposal Site
5400 Hovis Road, Charlotte, NC
NCD 980 844 336

A site reconnaissance of the disposal area has approximated the battery source area of contamination as 2.4 acres. A volume was not determined for the source area, although a thickness of 3 feet of fill was noted along the stream bank on the eastern side of the site. There is no information to the depth of the battery fill material in the center and western portions of the disposal area.

MEMO

DATE: April 27, 1995

TO: File

FROM: Keith Snavely RKS
Hydrogeologist
NC Superfund Section

RE: Overland distance to surface water from source
Union Carbide Battery Disposal Site
5400 Hovis Road, Charlotte, NC
NCD 980 844 336

The distance from the source area to the adjacent stream located east of the disposal area is 0.0 feet since battery parts were noted in the stream, and leachate from the battery landfill area is noted in the stream bank.

Reference 6

NORTH CAROLINA STATE PORTS AUTHORITY

POST OFFICE BOX 9002 / WILMINGTON, NORTH CAROLINA 28402 / (919) 763-1621

JAMES E. BROWN
Director, Planning

RECEIVED
FEB 11 1992
SUPERFUND SECTION

February 10, 1992

Ms. Lee Crosby
Environment, Health and
Natural Resources
Solid Waste Management
Superfund Section
401 Oberlin Road
Raleigh, North Carolina 27605-1350

Dear Ms. Crosby:

Permission was granted by Mr. William E. Burnett, President, Coastal Environmental Services Company to forward you a copy of the Phase 1 Environmental Assessment, 2.87 Acre Industrial Site (Godley Property) Proposed Addition to the NCSPA Charlotte Intermodal Terminal, 5400 Hovis Road, Charlotte, Mecklenburg County, North Carolina. The assessment was prepared at the request of the North Carolina State Ports Authority.

Because of your familiarity with the Godley property, and to afford the State Ports Authority a higher degree of confidence in its proposed purchase of subject property, please review the assessment and let me know your comments, recommendations, etc. If you feel the property should be subject to a field audit by your staff, because of its proximity to the adjacent contaminated area, please let me know.

Surveys and appraisals for the purpose of potential negotiations to purchase the property, which is subject of the assessment, are presently on hold until we have comments from you.

Upon completion of your review, please return the Phase I Environmental Assessment to this office. Thank you for your assistance in this matter and I look forward to hearing from you.

Sincerely,

Bonnie R. Albritton

Bonnie R. Albritton
Property Administrator

Enclosure

PHASE 1 ENVIRONMENTAL ASSESSMENT
2.87 ACRE INDUSTRIAL SITE (GODLEY PROPERTY)
PROPOSED ADDITION TO THE
NCSPA CHARLOTTE INTERMODAL TERMINAL
5400 HOVIS ROAD, CHARLOTTE, MECKLENBURG COUNTY, NC

PREPARED FOR:

NC STATE PORTS AUTHORITY
WILMINGTON, NC

JANUARY, 1992

COASTAL ENVIRONMENTAL SERVICES CO.

ENVIRONMENTAL CONSULTING
SOUTHEAST OFFICE: 7151 MARKET STREET WILMINGTON, NC 28405 (919) 686-9617
SOUTHWEST OFFICE: 43 NIGUEL POINT DRIVE LAGUNA NIGUEL, CA 92677 (714) 249-1603

with Investigations Pending Category" listing maintained by the Superfund Branch. Seventy three (73) of these sites are remote from the subject property and have had no impact whatsoever on the audit site. The subject site as a part of the overall Godley Tract is listed as the State Port Authority site (US EPA I.D. No. NCD980844336 and NC Superfund I.D. No. SIS600000496) on this list.

This agency also maintains the current list of hazardous waste sites on the North Carolina National Priority List (NCNPL). Sites on this list are slated for cleanup under the EPA-administered national Superfund program. The current NCNPL has a total of 22 sites listed for North Carolina. There is one (1) Superfund site in Mecklenburg County. It is identified as the Martin Marietta-Sodyeco Division site located in Charlotte (US EPA I.D. No. NCD001810365). However, this site is relatively remote (more than one mile) from the audit property and has had no impact whatsoever on the subject property.

The Wastelan Preremedial Report 20 (also known as the CERCLIS-ERRIS sites list) which lists the sites of spills of hazardous wastes in North Carolina and the status of their cleanup is also maintained by the Superfund Branch. There are a total of eighty two (82) incidents of record for Mecklenburg County on this list. All but twelve (12) of these incidents are listed for the City of Charlotte. Of the seventy (70) incidents listed for Charlotte, one (1) is attributed to the subject property under a listing for the State Port Authority. This listing carries the same EPA I.D. Number as the listing on the SPL Site Investigations Pending list and the address of 5400 Hovis Road which is the street address of the Godley Tract. The date of discovery of the incident is listed as January 1, 1985. The date for the completion of a preliminary assessment of the situation is listed as March 27, 1985. With the exception of this one listing for the subject property, all of the other sites are very remote from the audit property and are not likely to pose any future threat to the environmental integrity of the subject property.

Included in Attachment D of this report is a copy of a letter dated 25 March, 1985 from the Superfund Branch (formerly the NC Solid and Hazardous Waste Management Branch) which relates to the results of the State Agency's limited investigation of the battery disposal area on the Godley Tract at 5400 Hovis Road. The reader is referred to Attachment D for details. In summary, analyses of surface water samples from the stream which separates the subject property from the adjacent site showed elevated levels of the volatile organic compounds of toluene (170 ppm) and tetrachloroethylene (50ppm). Elevated levels of manganese (6.8ppm) and zinc (64ppm) were also found. However, it is unclear from the letter whether these latter values were for soil

or surface water. The letter concludes with the recommendation that the NC State Port Authority not purchase the property due to the fact that the owner of same would be considered a responsible party for the costs of the removal of the waste and remedial action.

The Superfund Branch also maintains an inventory of facilities which have or are in the process of applying for a Resource Conservation and Recovery Act (RCRA) permit to treat, store, or to dispose of hazardous waste. Permitted or interim status facilities are found on the "Hazardous Waste TSD Facilities" listing maintained by the agency. This listing includes five (5) Charlotte area facilities. All of the sites listed are remote from the subject property. Therefore, the hazardous wastes treated, stored or disposed of at these facilities with RCRA permits have had or will have no impacts on the subject property.

A check with the offices of the NC Division of Environmental Management (NCDEM) in Raleigh revealed that there are no environmental permits of any nature on file for the audit site. This includes NPDES, non-discharge, CAMA, Dredge and Fill, Air Quality or Air Toxics Permits. Also, there are no known documented (permitted) landfill sites within a mile radius of the audit property according to NCDEM records.

In addition to the above noted contacts with regulatory agency personnel, a copy of the Incident Management Report published by the Groundwater Section of NCDEM, Raleigh, NC and dated January 3, 1989 and a recent updated supplement thereto dated January 29, 1991 were checked by the undersigned for incidents of record which could possibly involve or affect the audit site. This report lists one hundred twenty eight (128) documented incidents of groundwater contamination in Mecklenburg County. A careful review of the addresses of the documented incidents on this list revealed that all of the incidents of record are remote from the audit property and so have had no impact whatsoever on the subject site.

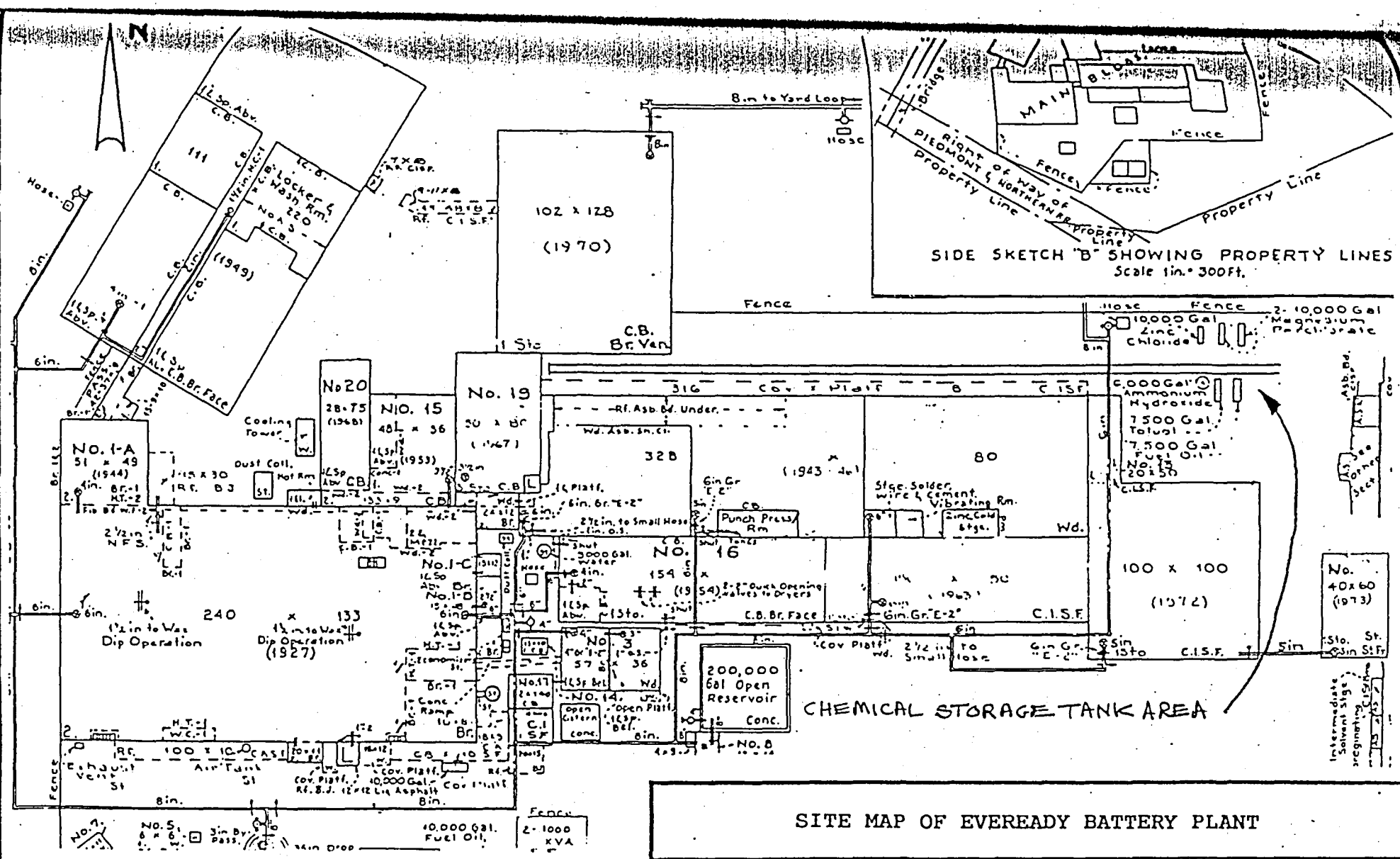
In summary, the above noted information indicates that the existing public record on the subject property shows that the subject site has not been a previously documented location for the known deposition or spills of toxic or hazardous materials. However, the subject property is adjacent to a site which has been documented as the location for the deposition of hazardous waste. The old battery parts disposal area on the adjacent site is included in the public record as a hazardous waste disposal site. Further discussion of the impacts and implications of this on the subject property are found in the Summary, Conclusions and Recommendations Section of this report.

Battery Plant site formerly owned by the Union Carbide Corporation clearly has the potential for adverse effects on adjacent properties including that which is under consideration in this investigation.

The sources of the contamination on the Battery Plant property appear to be associated with a practice of discarding battery parts on the site and using same as fill in a 2.4 acre segment of the site. Tests performed in 1985 by the State Superfund Branch (See Attachment D) and others completed as a part of this investigation reveal that the surface water in the creek and the sediment in the creekbed itself appears to be contaminated with hazardous chemical compounds which likely have their origin in the fill and/or from spills or releases of hazardous materials at the battery plant. Figure 7 shows a site map of the former battery plant. A tank farm which was formerly located at the northeast corner of this site and proximate to the creek had aboveground storage tanks containing zinc chloride (10,000 gallons), magnesium perchlorate (20,000 gallons), ammonium hydroxide (6,000 gallons), toluene (7,500 gallons) and No. 3 Diesel Fuel Oil (7,500 gallons). The 1985 tests showed the presence of toluene, zinc and manganese in the surface water in the creek.

Therefore, in view of the fact that the creek appears to have been adversely impacted by the contamination on the Battery Plant property and in view of the fact that the subject site has apparently not been so impacted (based on visual observations and limited testing of soil from boring HB-1), it is our professional opinion that the subject 2.87 acre site could be acquired by the NCSPA for use as a container hardstand area without incurring any environmental liability. This could be accomplished by resurveying the western property boundary to create a buffer zone between the subject site and the creek. A firm "scientific" determination of an effective width of this zone would require more detailed environmental testing. However, in the absence of such data, a buffer zone of 15 to 25 feet off of the centerline of the creek would appear to afford what may be considered to be a comfortable level of protection. This opinion is predicated in part on the fact that groundwater movement under the Battery Plant site is likely towards the creek (based on surface contours and visual observation of groundwater leakage from the western bank of the creek). Likewise, based on surface topography (See Figure 3: Site Topographic Map), groundwater movement under the subject site is most likely to be to the west and southwest towards the creek. From a hydrogeological standpoint, the creek which currently separates the two properties appears to act as a line sink and exit conduit for pollutants which have their origin on the Battery Plant property.

To afford a higher degree of confidence in this procedure for site



SITE MAP OF EVEREADY BATTERY PLANT

SCALE: NO SCALE	APPROVED BY:	DRAWN BY WEB
DATE: 1-31-92		REVISED

PHASE 1 ENVIRONMENTAL ASSESSMENT
NCSPA CHARLOTTE INTERMODAL TERMINAL ADDITION

COASTAL ENVIRONMENTAL SERVICES CO.
ENVIRONMENTAL CONSULTING WILMINGTON, NORTH CAROLINA

DRAWING NUMBER
FIGURE 7

8½ X 11 PRINTED ON NO. 1000H CLEARPRINT

North Carolina
Department of Administration

James G. Martin, Governor

Grace J. Rohrer, Secretary

January 29, 1985

MEMORANDUM TO: William L. Meyer
Health Services
Department of Human Resources

FROM: Charles L. Holliday
Deputy Director
State Property Office

RE: Testing of 2.40 acres
5400 Hovis Road
Charlotte, Mecklenburg County File 60-B

The State Property Office, at the request of State Ports Authority, has initiated negotiations to acquire approximately 23 acres of land in Charlotte to establish an inland container terminal. It has been brought to our attention that 2.40 acres of the total area is referred to as an "Old Battery Scrap Disposal Area".

This is a request for your office to proceed with an investigation of the 2.40 acre tract to determine if hazardous waste materials, or whatever, is present. Enclosed is a copy of the deed, a location map, and written permission from the property owner to perform tests on his property.

If hazardous waste are present, please advise what expense would be involved to remove it.

HAP/ewv

Enclosure

116 West Jones Street • Raleigh, North Carolina 27611 • Telephone 919-733-7232

An Equal Opportunity / Affirmative Action Employer

THIS DEED made the 5th day of November 1980, by UNION CARBIDE CORPORATION (formerly known as UNION CARBIDE AND CARBON CORPORATION), a corporation organized and existing under and by virtue of the laws of the State of New York, party of the first part, to GODLEY AUCTION COMPANY, INC., having an address at Rozzells Ferry Road, Charlotte, North Carolina 28216, party of the second part.

PRESENTED FOR REGISTRATION NOV 18 4 49 PM '80 CHARLES E. CROWDER REGISTER OF DEEDS MECKLENBURG CO N.C.

W I T N E S S E T H :

That, the said party of the first part, in consideration of Ten Dollars ($10.00) to it paid by the said party of the second part, the receipt of which is hereby acknowledged, has bargained and sold and by these presents does bargain, sell and convey unto the said party of the second part and its successors and assigns, the following described property located in Mecklenburg County, State of North Carolina:

Property situate, lying and being in Paw Creek Township, Mecklenburg County, State of North Carolina and more particularly described as follows:

> BEGINNING at the intersection of the center line of Belt Road, so-called, with a line 150 feet from the southwesterly right of way line of Seaboard Airline Railway and 250 feet from the center line of the right of way of said Railway measured at a right angle therefrom; thence south 45° 17' east at 150 feet from and parallel to said southwesterly right of way line a distance of 1,365 feet to a concrete monument; thence south 66° 00' west a distance of 795.95 feet to an iron stake; thence north 85° 05' west a distance of 332 feet to the center line of the right of way of Piedmont and Northern Railroad; thence north 60° 23' west along said center line a distance of 550 feet to a stake in the center line of said Belt Road; thence north 29° 55' east along said center line of Belt Road a distance of 1,136.16 feet, more or less, to the point or place of beginning, containing 23.61 acres, being the property conveyed to the party of the first part by National Carbon Company, Inc. by deed dated December 31, 1949 and recorded in the Register of Deeds Office of Mecklenburg County on the 26th day of January, 1950.

Together with all other real property and rights in real property, whether legal or equitable, owned by the party of the first part on the date of the ensealing of these presents relating to the

property described herein.

Subject to (a) zoning regulations and ordinances and building restrictions and regulations, if any, (b) real estate taxes for the year 1980 and thereafter, (c) notices, violations of statutes, ordinances, orders or requirements of state, county or municipal governments or departments having jurisdiction issued to or received by Seller or posted on said premises between the date hereof and the date of delivery of the deed, (d) any state of facts which an accurate survey would show, (e) existing leases and tenants in possession, if any, and (f) any and all covenants, liens, encumbrances, reservations, restrictions, easements and rights of way, whether or not recorded, (g) rights of North Carolina State Highway Commission and the public over that part of the premises lying within the right of way of the Belt Road, (h) the right of way of the Piedmont and Northern Railway Company over a strip of land along the southwesterly side thereof and subject to the rights of the North Carolina State Highway Commission over that portion of said tract lying within the right of way of the Belt Road along the westerly side of said tract.

Together with all and singular the tenements, hereditaments and appurtenances thereunto belonging and anywise appertaining.

TO HAVE AND TO HOLD the aforesaid tracts or parcels of land and all privileges and appurtenances thereunto belonging to the said party of the second part and its successors and assigns forever subject to the following limitations, restrictions, conditions and covenants which shall apply to the Property and to its use by the second party, its successors and assigns in perpetuity:

"The Grantee covenants that that part of the premises identified as "Old Battery Scrap Disposal Area"

(hereinafter called the "Area"), as described in Exhibit "A" attached hereto and made a part hereof, shall not be used except for a parking lot; that Grantee, it successors and assigns will not construct any buildings thereon or any part thereof; that pipes, drains or other improvements of any nature or kind shall not be installed or placed below the surface thereof; and that Grantee, its successors and assigns will take all precautions and actions to effectively prevent the escape of any of the contents located therein into the adjacent soil or waters.

Grantee, its successors and assigns shall indemnify, defend and hold Grantor harmless from any and all claims arising out of its use of the said Area or from the conduct of its business or from any activity, work or things which may be permitted or suffered by Grantee or its successors or assigns or from any violation of this covenant whether such breach is caused or occasioned by Grantee, its successors or assigns or their agents, contractors, employees or invitees.

This covenant shall run with the land and bind all future owners thereof."

And the said party of the first part, for itself, its successors and assigns, covenants with the said party of the second part, its successors and assigns only that it has done nothing to encumber the Property while seized of same except as aforesaid.

IN TESTIMONY WHEREOF, the said party of the first part has caused these presents to be signed by its duly authorized officer and its corporate seal to be affixed and attested the day and year first above written.

ATTEST:

Assistant Secretary

UNION CARBIDE CORPORATION

By

Its Treasurer

STATE OF NORTH CAROLINA
NOV 18 '80
P.D. 16709
Real Estate Excise Tax
500.00

STATE OF NEW YORK)
:.ss:
COUNTY OF NEW YORK)

This 18th day of November, A.D. 1980, personally came before me, a Notary Public for the County and State aforesaid S. E. Nightingale, who being by me duly sworn says that he is the Treasurer of UNION CARBIDE CORPORATION, and that the seal affixed to the foregoing instrument in writing is the corporate seal of said corporation and that said writing was signed and sealed by him in behalf of said corporation by its authority duly given, and the said S. E. Nightingale acknowledged the said writing to be the act and deed of said corporation.

Grace M. Mahelsky
Notary Public
GRACE M. MAHELSKY
Notary Public, State of New York
No. 4674483
Qualified in Westchester County
Certified in New York County
Term Expires March 30, 1982

STATE OF NORTH CAROLINA)
COUNTY OF MECKLENBURG)

The foregoing certificate of a Notary Public for the State of New York

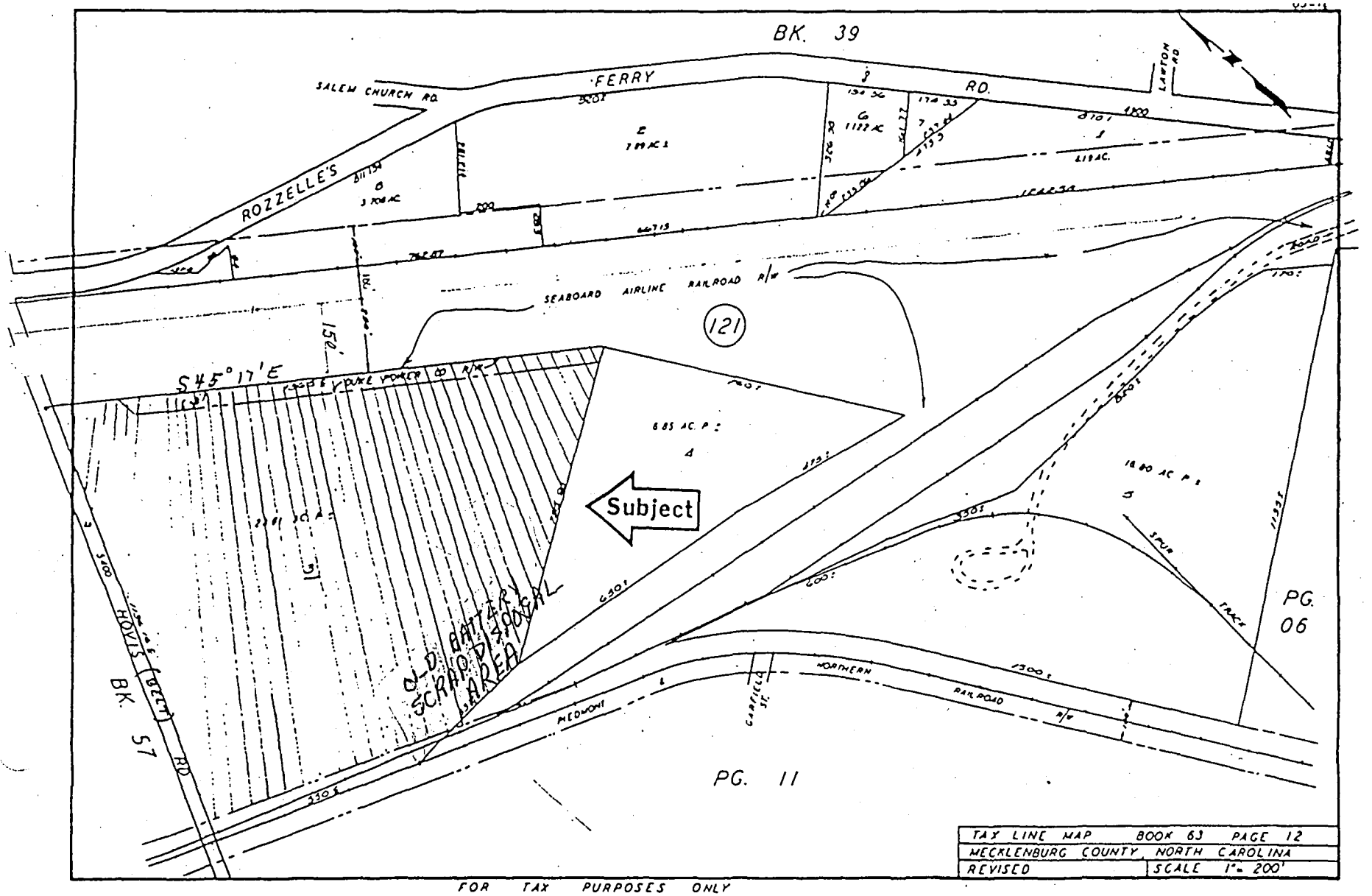
BOOK PAGE
4369 0790

State of North Carolina, County of Mecklenburg
The foregoing certificate(s) of Grace M. Mahelsky
a Notary(~~ies~~) Public ~~xx~~ for the ~~xxxxxxxx~~ State of New York
is ~~xxx~~ certified to be correct. This 18 day of November, 19 80
Charles E. Crowder, Registor of Deeds, By: Mary C. Rice
DEPUTY

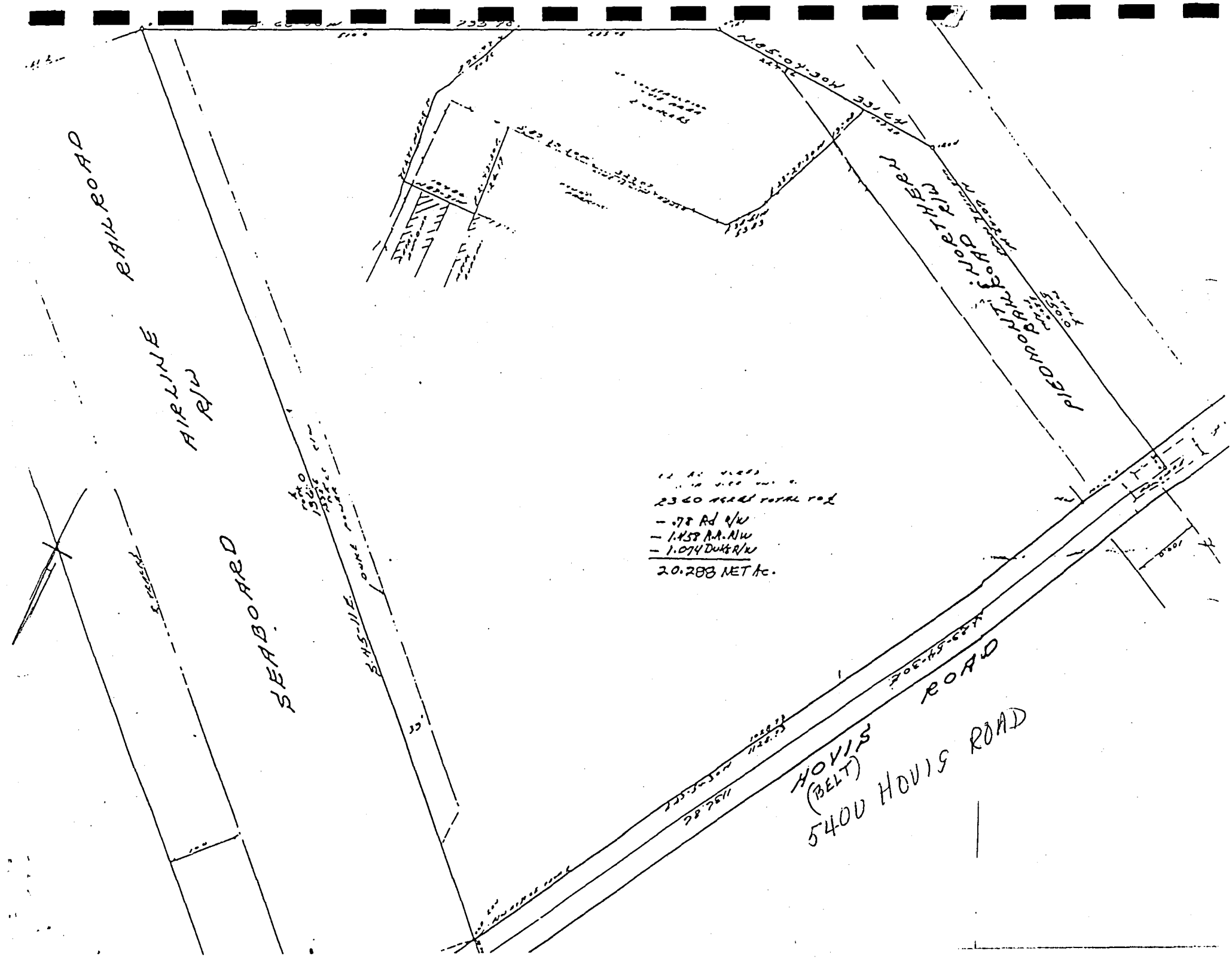
See Exhibit A-Page 0791

EXHIBIT A TO DEED DATED NOVEMBER 5, 1980
FROM UNION CARBIDE CORPORATION TO GODLEY AUCTION COMPANY; INC,

BEGINNING at an old iron S. 66-00 W. 795.48 feet from an existing concrete monument which marks the southeasterly corner of the property conveyed to Union Carbide and Carbon Corporation (now UNION CARBIDE CORPORATION) by Deed dated December 31, 1949, and recorded January 26, 1950, in Book 1420 at page 431 of the Mecklenburg County Public Registry, thence from said Beginning point, as thus established, N. 85-04-30 W. 224.36 feet to a point in the right-of-way of Piedmont & Northern Railroad; thence N. 23-27-30 E. 192.08 feet to a point; thence N. 38-51 E. 53.83 feet to a point; thence along a line of an existing fence N. 89-39-30 E. 329.07 feet to a point; thence N. 2-43-30 W. 126.17 feet to a point; thence S. 89-31 E. 104.86 feet to a point; thence S. 3-28 E. 124.72 feet to a point; thence S. 26-26 W. 138.08 feet to a point; thence S. 66-00 W. 285.48 feet to an old iron, the point and place of BEGINNING, containing 2.40 acres, all as described on that certain boundary survey of the property of Godley Auction Co., Inc. dated November 6, 1980, as revised November 11, 1980, as prepared by Charles E. Moon, NCRLS, L-1489.



FOR TAX PURPOSES ONLY


RAILROAD
AIRLINE R/W
SEABOARD
HOVIS (BELT) ROAD
5400 HOVIS ROAD
2360 acres total tract
- .78 Rd R/W
- 1.458 A.A. N/W
- 1.074 Dwg R/W
20.288 NET Ac.

North Carolina
Department of Administration

James G. Martin, Governor

Grace J. Rohrer, Secretary

JAN 1985
STATE PROPERTY OFFICE

January 22, 1985

Mr. Frankie H. Godley
Godley Auction Company
4918 Rozzell's Ferry Road
Charlotte, NC 28216

Re: Property of Godley Auction Company
Inland Container Terminal Site File 60-B

Dear Mr. Godley:

Pursuant to your conversation with Alton Phillips of this office, this is to confirm our request for permission to enter your property on Hovis Road in Charlotte for the purpose of making tests on that 2.40 acre section referred to in the deed as "Old Battery Scrap Disposal Area".

If you have no objection to the State of North Carolina making tests on the 2.40 acre section, please indicate by signing this letter in the lower left where indicated, and return it in the enclosed envelope. A copy of this letter is enclosed for your file.

Sincerely,

Charles L. Holliday, Deputy Director
State Property Office

HAP/ewv

Enclosure

Godley Auction Company

By: _____
Frank H. Godley, Vice President

116 West Jones Street • Raleigh, North Carolina 27611 • Telephone 919-733-7232

An Equal Opportunity / Affirmative Action Employer

Reference 7

1405

UNION CARBIDE CORPORATION 39 OLD RIDGEBURY ROAD, DANBURY, CT 06817-0001
LAW DEPARTMENT

August 19, 1988

RECEIVED
JAN 10 1989
SUPERFUND BRANCH
SOLID WASTE MANAGEMENT SECTION

Mr. William L. Meyer
Chief, Solid Waste Management Section
North Carolina Department of Human Resources
Division of Health Services
P.O. Box 2091
Raleigh, NC 27602-2091

Re: 5400 Hovis Road, Charlotte, NC 28203

Dear Mr. Meyer:

In response to your letter to Union Carbide Corporation dated May 6, 1988 with respect to the above location, we have reviewed our records in order to ascertain relevant information. Data is quite limited due to the fact Union Carbide sold the facility to Godley Auction Company, Inc. on November 13, 1980. Prior to that time, the facility had been one of our battery products plants.

We wish to note that we are unaware of the identity of the present owner of the site and we have no knowledge of activities at or uses of the site since the sale by Union Carbide nearly eight years ago. Our limited records indicate that between 1943 (when facility operations began) and 1959, non-combustible scrap wastes generated from round and flat cell LeClanche battery production were discarded on plant property. During this period, scrap cells, partial cells and other solid material containing metals were generated at the plant, consisting primarily of manganese and zinc compounds, with a lesser amount of acetylene black, ammonium chloride, carbon, paper, plastics and water containing trace quantities of such constituents. In addition to these materials, trace concentrations of aluminum, calcium, chloride, chromium, iron and mercury may also have been present in some of the waste materials produced. After March of 1959, all of the solid process waste generated at the plant were discarded in an off-site landfill.

Again, please note that more information may be available from the present owner.

If I can be of any further help, please call me at 203-794-6225.

Very truly yours,

Gerald E. Klein

Gerald E. Klein
Environmental Counsel

GEK/jem
6754r

Reference 8

SITE INVESTIGATION REPORT

FOR

STATE PORT AUTHORITY

5400 Hovis Road

Charlotte, North Carolina

EPA ID No: NC D980844336

By

Len Bramble, Engineer
NC Department of Human Resources
NC Division of Health Services
Solid and Hazardous Waste Management Branch
RCRA 3012

Executive Summary

This site in North Charlotte is presently being used by the State Ports Authority and other small businesses but was used from the time of World War II until 1979 as a battery manufacturing facility. The site was inspected on 13 February 1985 in response to a request from the State Property Office.

The site consists of approximately eleven acres with several large buildings and extensive asphalt parking areas surrounded by grassed areas. The grassed area on the southern boundary has been used as a battery disposal area. A small stream along the southern edge drains the area and flows into Stewart Creek. Land use within a mile of the site is primarily industrial and commercial. The area is served by the Charlotte water supply. No groundwater use is known to exist in the vicinity.

Analyses of samples of soil from the battery disposal area and of surface water from the bordering stream showed high levels of toluene and tetrachloroethylene in the water and high extractable levels of zinc and manganese in the soils.

LOCATION:

State Port Authority
5400 Hovis Road
Charlotte, North Carolina 28208

Latitude: 35 16 30
Longitude: 080 53 30

See Appendix A for local and state maps.

SITE LAYOUT:

This facility consists largely of brick industrial buildings and asphalt parking lots. This site is located on a broad, gently sloping hillside. See Appendix B for site maps.

OWNERSHIP HISTORY:

This site is presently owned by: Godley Auction Company
4918 Rozzell's Ferry Road
Charlotte, NC 28208
(704) 399-9756

Industrial operations began at this site during World War II when the facility was a government plant manufacturing batteries for walkie-talkies, radios, etc.

After World War II, Union Carbide Corporation purchased the site and continued the manufacture of batteries until closure in June of 1979.

SUMMARY TRIP REPORT:

A Site Investigation was conducted at this facility on February 13, 1985. Contact was made with the following prior to the inspection:

Elwood Thomas, Director
State Port Authority Inland Port Terminal
Charlotte, NC
(704) 398-2076

Godley Auction Company
4918 Rozzell's Ferry Road
Charlotte, NC 28208
(704) 399-9756

The Site Inspection, being undertaken by the RCRA 3012 group of the North Carolina Division of Health Services, consisted of taking seventeen samples. The sampling area included the battery disposal area on the southern corner of the site. See Appendix C sampling information.

RCRA 3012 personnel conducting this Site Inspection were as follows:

Len Bramble, Environmental Engineer
Lee Crosby, Chemist

TOPOGRAPHY:

This site is located in the Piedmont of North Carolina among gently rolling hills divided by many small streams and creeks. Slopes in this area tend to be highest along the flood plain borders.

SURFACE WATERS:

Surface water runoff from this site drains in a southern direction to tributaries of Stewart Creek. Stewart Creek becomes Irwin Creek which is tributary to Sugar Creek.

GEOLOGY AND SOILS

The general soil type for this area are the Mecklenburg-Iredell soil types. These are slowly permeable, slightly acidic and neutral, very plastic soils.

Underlying rock are generally igneous and metamorphic from the Paleozoic Era. These are classified as diorite-gabbro and described as massive to weakly foliated, gray to dark-greenish gray rocks, composed mostly of plagioclase, hornblende, and pyroxene.

GROUNDWATER:

No monitoring wells exist on this site.

No private wells in the vicinity are known to exist.

CLIMATE AND METEOROLOGY:

Average Annual Rainfall	45 inches
Average Annual Evaporation	41 inches
Prevailing Wind Speed and Direction	SW 9 MPH

LAND USE:

Land use within a one-mile radius of this facility includes primarily industrial and commercial.

POPULATION:

This facility is located approximately 9 miles from Downtown Charlotte. The 1980 census reported a population of 350,715 persons for Charlotte.

WATER SUPPLY:

The primary source of consumptive water in this vicinity is city water from Charlotte. No private wells are suspected in this area at this time.

WASTE QUANTITIES:

An unknown quantity of hazardous materials related to battery manufacturing have been disposed of on this site.

An unknown quantity of hazardous materials related to battery manufacturing have been disposed of on this site.

WASTE DISPOSAL METHODS AND LOCATIONS:

Between World War II and June 1979, an unknown quantity of hazardous materials related to battery manufacturing have been disposed of on the southeast corner of this site. The disposal area is estimated as approximately 3 to 4 acres.

See Appendix B and C for appropriate maps.

WASTE TYPES AND CONCENTRATIONS:

Analysis of the surface water from a stream along the perimeter of the battery disposal site shows 170 ppm toluene and 50 ppm tetrachloroethylene. No purgeables including toluene and tetrachloroethylene were detected in the soil. Laboratory analyses also indicates that low concentrations of polychlorinated biphenyls (PCBs) may be present in the soil.

Inorganic analyses of the soil and stream water samples show extractable levels of manganese as high as 16 mg/l and of zinc as high as 1990 mg/l.

Reference 9

NORTH CAROLINA
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
GEORGE R. ROSS, DIRECTOR

DIVISION OF MINERAL RESOURCES
JASPER L. STUCKEY, STATE GEOLOGIST

BULLETIN NUMBER 63

GEOLOGY AND GROUND WATER IN THE Charlotte Area, North Carolina

BY

H. E. LEGRAND AND M. J. MUNDORFF
GEOLOGISTS, U. S. GEOLOGICAL SURVEY

PREPARED COOPERATIVELY BY THE GEOLOGICAL SURVEY,
UNITED STATES DEPARTMENT OF THE INTERIOR

1952

MECKLENBURG COUNTY

(Area 542 square miles; population in 1950, 197,052)

Geography and physiography.—Mecklenburg County, in the southeast part of the Charlotte area, is the most densely populated county in the area. Charlotte, the only city, is the county seat; it is the largest city in the State and had a population of 133,219 according to the 1950 U. S. census. The county is the center of the textile industry of the State, many of the mills lying in the close environs of Charlotte.

That part of the Piedmont Province that includes Mecklenburg County consists of a series of moderately level interstream areas which are appreciably hilly near the larger streams. No hills stand out prominently above the general level of the upland. The highest land in the county is near Davidson, in the extreme northern part of the county, where the altitude is slightly more than 850 feet above sea level, and the lowest land is on the Catawba River at the South Carolina line, where the altitude is about 520 feet.

The western part of Mecklenburg County is drained by the Catawba River, whereas the eastern part is drained by small streams tributary to Rocky River, which itself is in the drainage basin of the Pee Dee River. The major divide formed by these drainage systems extends from Davidson in the north through Derita to the vicinity of Matthews. The Catawba River flows southward along the western border of the county, whereas the Rocky River flows along the northeast part. These rivers are only 10 miles apart in the northern part of the county, and as a consequence the interstream area is narrow and much dissected. On the other hand, Catawba and Rocky Rivers in the southern part of the county are more widely spaced which results in longer tributaries of lower gradients extending to the major divide. Thus, the topography in the southern part is rather gentle.

Geology.—The most striking feature of the geology of Mecklenburg County is the near absence of schistose rocks (fig. 17). With the exception of a thin belt of slaty rocks in the extreme east, the rocks of the county are, for the most part, massive and are generally lacking in regional structural trends.

Rocks of the Carolina slate belt occur in the southeastern part of the county where they extend southward from Cabarrus County. Although several types of rock occur within the belt only two are shown on the accompanying geologic map; they are the greenstone and undifferentiated rocks, including slates and associated volcanic rocks. The slates are generally composed of dense, fine-grained siliceous material. At least a part of the slate is well bedded and resembles the slate at Monroe,[28] which is a distinctive part of the Carolina slate belt. The slates, as a rule, are well jointed and possess a gentler dip than other rocks in the Charlotte area.

With the exception of the rocks of the Carolina slate belt in the east, the rocks of Mecklenburg County belong to the diorite-granite complex or are believed to be associated with it. Gabbro-diorite is widely exposed along N. C. Route 49 south of Shopton in the southwest part of the county. It is a massive medium- to coarse-grained dark colored igneous rock composed mostly of pyroxene or hornblende and plagioclase feldspars. It is exposed in a few road cuts and as isolated boulders above the generally flat land surface. It is locally referred to as "blackjack" and is the source of the Mecklenburg soil type.[29] The extent of the gabbro-diorite to the south in South Carolina is not known, but it is bounded in Mecklenburg County by rocks of the diorite-granite complex.

The diorite-granite complex proper covers a large area around Charlotte. Bodies of diorite are locally separate from bodies of granite, but as a whole the two rocks are too closely intermixed to map separately. Outcrops are not common enough to ascertain the predominance of one type over the other except in a general way. However, the granite component is everywhere conspicuous and appears to make up the greater part of the complex. It appears to be subordinate to the diorite in a band bordering the gabbro-diorite in the south and along the Cabarrus County line in the northeast.

Rocks in the northern part of the county do not fall easily into the classification of rocks designed for the Charlotte area. They are granitic but contain considerable hornblende and biotite in places. They

[28]Stuckey, J. L., Personal communication.

[29]Report on Mecklenburg County Soils, Agriculture, and Industry: North Carolina Dept. Agriculture County Soil Report No. 1, vol. 38, no. 4, p. 32, 1917.

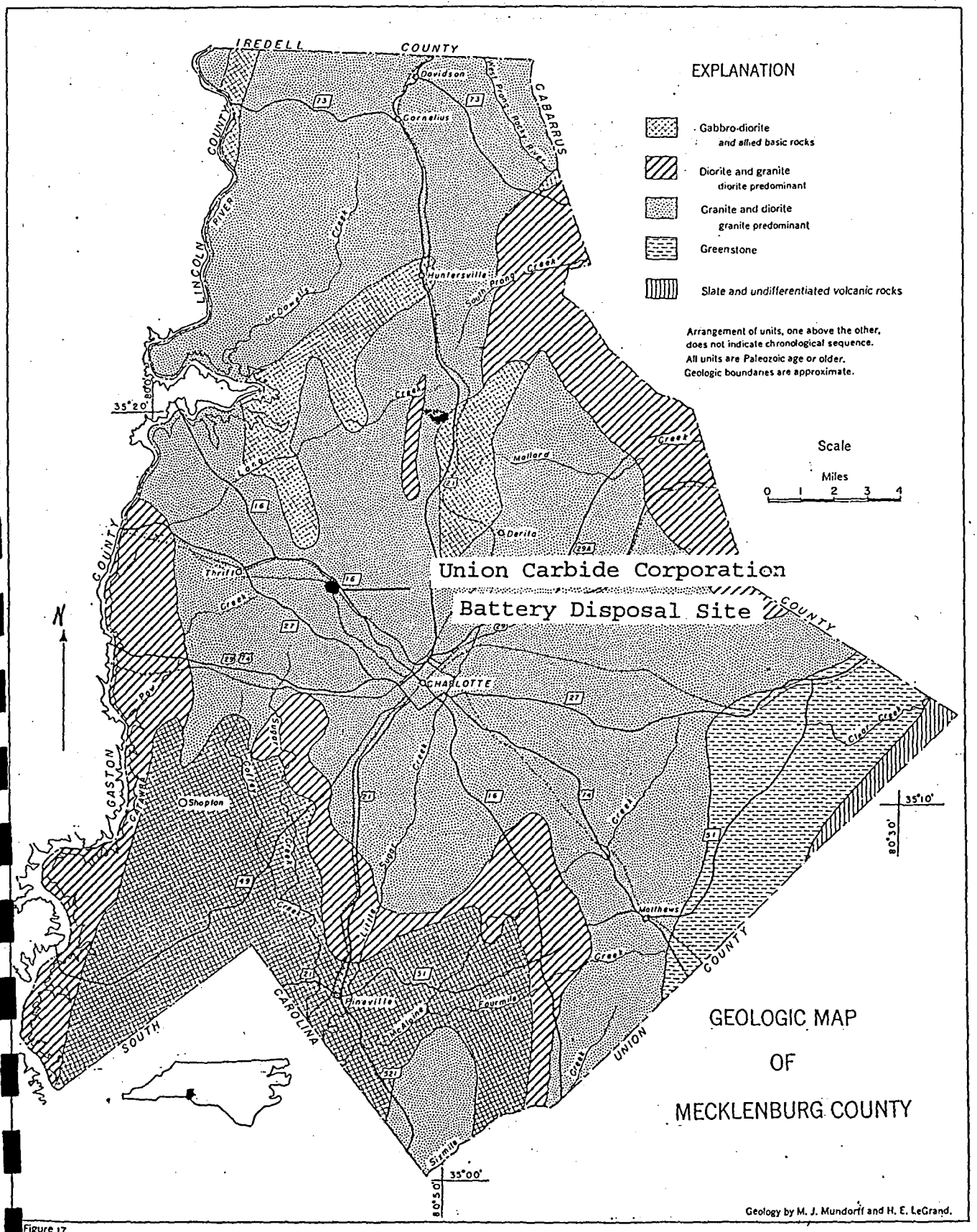


Figure 17

FIGURE 17.—GEOLOGIC MAP OF MECKLENBURG COUNTY.

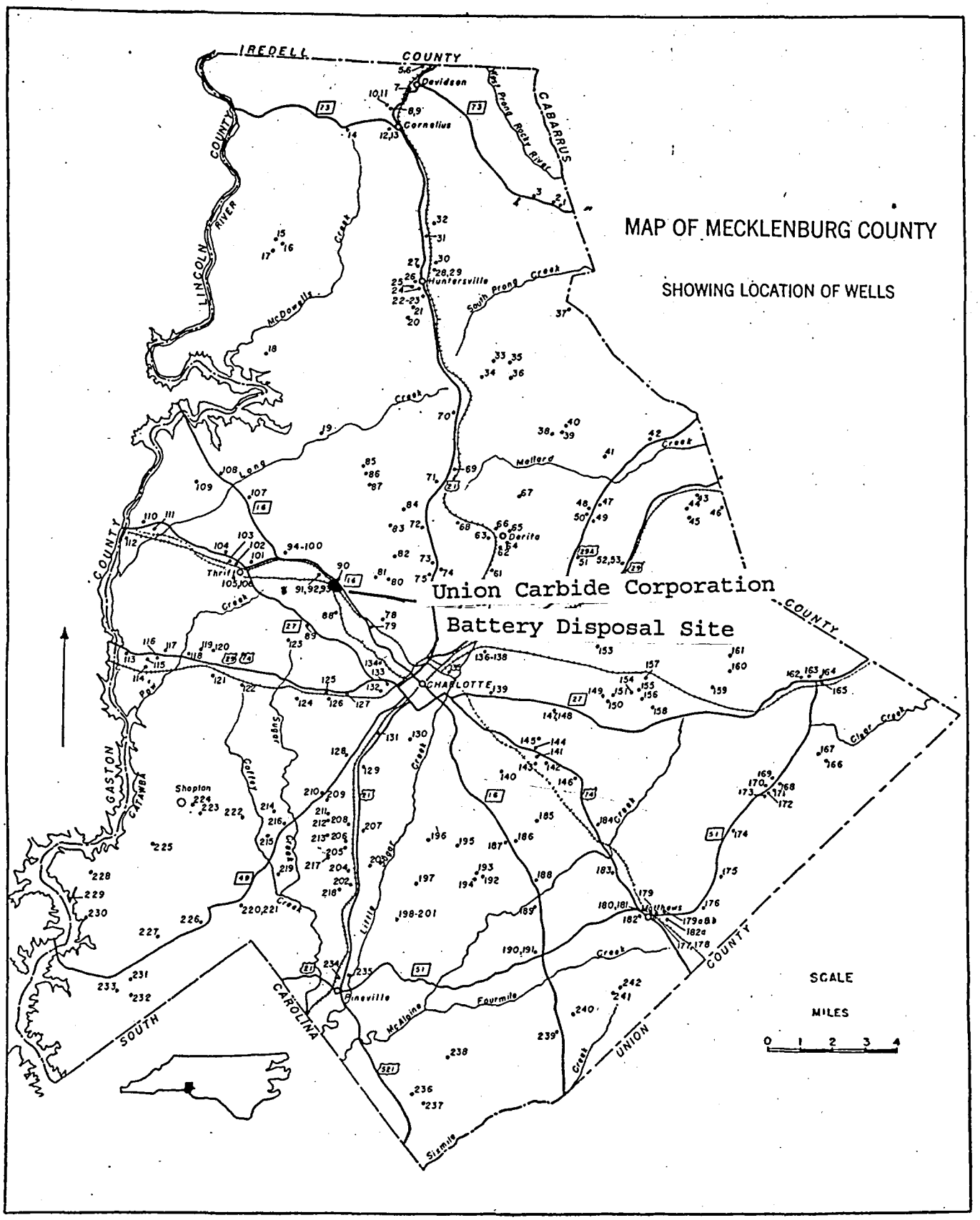


FIGURE 18.—MAP OF MECKLENBURG COUNTY SHOWING LOCATION OF WELLS.

are shown on the geologic map of Mecklenburg County as predominantly granite although they contain a greater quantity of black minerals than other granites in the Charlotte area. These rocks appear to have the same composition as those of the diorite-granite complex if a complete mixing of diorite and granite had occurred. Thus this approximate equivalence and the juxtaposition of these rocks suggest that they may be genetically related and that the hornblende-biotite granite in the northern part of the county may represent a nearly complete mixing of the diorite and granite components.

The soil derived from the hornblende-biotite granite has a deeper color than soils from other granites of the Charlotte area and contains many yellow flakes of vermiculite.

The rock weathers deeply, owing to the sharp relief in its area of outcrop, thus allowing a thick zone of weathering above the general water table.

Ground water.—Nearly all domestic water supplies and three municipal water supplies are obtained from wells (fig. 18).

Dug wells are extensively used for domestic supplies in rural districts. Normally they are from about 15 to 50 feet deep and 2½ to 4 feet in diameter. As these wells cannot easily penetrate hard rock, they generally yield adequate water as long as the water table does not fall below the surface of the hard rock, or more specifically as long as the water table does not fall below the bottom of the well. Where the bedrock lies at or near the surface, as in much of the area underlain by diorite and gabbro in the southwestern part of the county, wells may not be dug deep enough to prevent them from going dry during long periods of dry weather.

Records of more than 245 drilled wells are given in the tables of well data for Mecklenburg County. Many of these, especially in the rural areas, were core-drilled with chilled shot and are 2 or 3 inches in diameter. Their cheapness makes them suitable for domestic use, but inasmuch as 7 or 8 gallons a minute is the maximum rate at which water can be removed from a 2-inch well by a deep-well pump they are not generally used where large supplies of water are desired. Most industrial and public-supply wells are drilled with a percussion drill and are from 4 to 8 inches in diameter. The large-diameter wells might encounter fractures and cracks than missed by small-diameter wells. Also, more water can be pumped from a large-diameter well. Also, pumps with greater capacities can be installed in the larger wells.

The rocks penetrated by wells in Mecklenburg County are chiefly granite and diorite. The gabbroid rocks, occurring mostly in the southwestern part of the county, are included, for the purposes of ground-water description, with the diorite. A few wells in the eastern part of the county are drilled in slate but complete data on these wells are lacking. As the diorite and granite are rather closely intermingled, some wells doubtless penetrate both rocks. Table 13 presents characteristics of the wells as related to rock types and topographic locations.

TABLE 13.—SUMMARY OF DATA ON WELLS IN MECKLENBURG COUNTY

ACCORDING TO ROCK TYPE

Type of Rock	Number of wells	Average depth (feet)	Yield (gallons a minute)			Percent of wells yielding 1 gallon a minute or less.
			Range	Average	Per foot of well	
Diorite	41	117	1—75	17.9	0.153	2
Granite	54	124	2—65	11.5	.092	0
All wells	95	132	1—75	14.3	.109	1

[1] Drilled wells 2 inches or more in diameter.

SUMMARY OF DATA ON WELLS IN MECKLENBURG COUNTY
(Drilled wells 3 inches or more in diameter)

ACCORDING TO ROCK TYPE

Type of Rock	Number of wells	Average depth (feet)	Yield (gallons a minute)			Percent of wells yielding 1 gallon a minute or less.
			Range	Average	Per foot of well	
Diorite	30	155	3—75	22.6	.147	0
Granite	36	136	3—100	14.8	.109	0
All wells	66	144	3—100	18.4	.128	0

ACCORDING TO TOPOGRAPHIC LOCATION

Topographic location	Number of wells	Average depth (feet)	Yield (gallons a minute)			Percent of wells yielding 1 gallon a minute or less.
			Range	Average	Per foot of well	
Hill	41	125	1-65	8.5	0.068	2
Flat	13	119	2—40	13.1	.110	0
Slope	19	144	2—75	15.9	.110	0
Draw	21	144	5—75	24.9	.173	0
Valley	1	97	----------	8	.082	0

According to table 13 wells in diorite have greater yield and average yield per foot of well than wells in granite. The average yield of all diameters for which information is available in diorite is 17.9 gallons a minute as compared with an average of 11.5 gallons a minute for wells in granite. If only 3-inch and larger wells are considered, those in diorite yield 22.6 gallons a minute and those in granite 14.8 gallons a minute.

Although granite occurs extensively throughout the county, the data on wells do not indicate that it yields more water at one place than another, if topography is disregarded. The same condition holds true for the diorite. According to topographic location, wells on hills yield less water than wells on any other topographic site, yielding only .068 gallons a minute per foot of well. This is slightly more than one-third of the yield of wells in the most favorable locations, draws, that yield .173 gallon a minute per foot of well. Thus wells in draws have an average depth of 144 feet and an average yield of 24.9 gallons a minute. The average yield might be appreciably higher if only 3-inch and larger wells were considered.

As no particular part of the county can be designated as unusually poor and no part as exceptionally good, it appears advisable to give considerable attention to local conditions in locating a well. West of the slate belt, diorite, the best aquifer, occurs sporadically in almost every square mile. Thus in many cases it is possible to locate a well in the dark-colored diorite or gabbro without sacrificing convenience of location. As topography is an important consideration, the location of wells in lowlands or especially in draws should be attempted if relatively large yields are desired.

The quality of ground water in Mecklenburg County is good almost everywhere. (See table of analysis.) Analyses of water from wells penetrating granite in Mecklenburg County vary considerably in the concentration of dissolved mineral solids. This is doubtless due to the penetration of one or more small bodies of dioritic material in the granite. By virtue of their relatively insoluble mineral constituents the granites should contain water lower in mineral matter. Analyses of water from wells 27, 133, and 180 suggest that, although the predominant rock is granite, a large part of the mineral matter in solution comes from dioritic or mafic bodies penetrated by the wells.

Well 235, at Pineville, drilled in a large area of dark-colored gabbroid rocks, yields water containing 395 parts per million dissolved solids. Although this water is considered more or less typical of that in gabbro-diorite, it is doubtful if any of the ground waters in the county greatly exceed this in mineral matter; most of the ground waters should contain much less.

Temperatures range from 59° to 63° F and average 61° F.

Municipal supplies.—Huntersville, population 763 (1940 census), obtains its supply from deep wells. Four deep wells have been drilled for the municipal supply and yields of 5, 9, 22, and 35 gallons a minute are reported for individual wells. The well yielding 5 gallons a minute originally yielded 20, and the well yielding 9 gallons a minute originally yielded 40. The decline in yields in these two wells may be due to interference of wells. In 1945 the average daily use was 30,000 gallons. The water is not treated. The chemical quality of the water, as shown by the analysis of well 27, is good.

Matthews, population 486 (1940 census), obtains its water from a deep well drilled in greenstone, which yields 20 gallons a minute. The water is not treated.

RECORDS OF WELLS IN MECKLENBURG COUNTY

Well no.	Location	Owner	Driller	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water level (feet below surface)	Yield (g.p.m.)	Total hardness (field tests) (p.p.m.)	Remarks
1	4¾ miles NE. of Huntersville	H. G. Bradford	Sherril	Cr-Dr	160	2					Granite. Adequate yield, slightly hard water. Flat.
2	do	R. G. Summers	Earl Torrence	Cr-Dr	83	2	60		7		Granite. Water slightly hard. Hill.
3	4 miles NE of Huntersville	John G. Caldwell J. H. Stillwell		Cr-Dr	70	2			2-3		Granite. Moderately soft water. Hill.
4	do	R. C. Bradford		Cr-Dr	85	3			6+		Granite; 61° F. Hard water. Hill.
5	Davidson	Davidson Cotton Mills Inc.		Cr-Dr	80±	2		22	4	65	62½° F. Well at machine shop. Draw.
6	do	do		Cr-Dr	60-80				14		7 wells in group. Aggregate yield 14 g.p.m. to suction pump. When drilled 6 of the 7 wells flowed. Draw.
7	do	Davidson Ice & Fuel Co.	Jim Robbins	Cr-Dr	100	4	35		11	80	Rock at 30 feet. Slope.
8	Cornelius	Cornelius Mills, Inc.		Cr-Dr	115	3	90±		15	60	Rock reported at 90 feet. Schist. Flat.
9	do	do		Cr-Dr	127	2			8		Schist. Flat.
10	do	do	W. A. Kirkley	Cr-Dr	106	4			70		Schist. Water level 60 feet below surface when pumped at 20 g.p.m. Flat.
11	do	do	do	Cr-Dr	55	4			50		Schist. Flat.
12	do	Gem Yarn Mills		Cr-Dr	90±	2			5		Schist. Draw.
13	do	do		Cr-Dr	160	2			3¾		Do.
14	1¾ miles W. of Cornelius	Mrs. Mary C. Hager		Cr-Dr	45	2			3	40	Schist. Hill.
15	4½ miles W. of Huntersville	Mrs. J. C. Blythe		Dug	30	24	30	23.24			Schistose diorite. Hill.
16	do	Joe L. Blythe		Cr-Dr	175	3	100		5+	40	Do.
17	do	J. L. Norket		Cr-Dr	125	2			6	35	Schistose diorite. Slope.
18	5 miles SW. of Huntersville	W. O. Hollingsworth		Cr-Dr						60	Schistose diorite.
19	do	Long Creek High School	Hickory Drilling Co.	Dr	101	6			65	25	Granite. 62½° F. Hill.
20	2 miles S. of Huntersville	Prison Camp		Cr-Dr	225	3			2½	100	Granite. 60½° F. Rock at 20 feet. Hill.
21	1¾ miles S. of Huntersville	do		Cr-Dr	97	3			7½	65	Granite. 59¾° F. Valley.
22	1¼ miles S. of Huntersville	County Sanatorium		Dr	120+	8		16	15	35	62° F.
23	do	do		Dr	140+	8			11	50	63° F. Draw.
24	Huntersville	Town well 1		Dr	70	5		40	9	55	62° F. Originally 110 ft. deep, 8 in. in diameter. Yielded 40 g.p.m. Filled with sand and was redrilled. Draw.
25	Huntersville	Town well 2	Abernathy	Dr	210	8	100	30	22	65	62½° F. Draw.
26	do	Town well 3	Ralph Robbins	Dr	97	5	97		5	50	Granite. Originally yielded 20 g.p.m. Draw.

RECORDS OF WELLS IN MECKLENBURG COUNTY—*Continued*

Well no.	Location	Owner	Driller	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water level (feet below surface)	Yield (g.p.m.)	Total hardness (field tests) (p.p.m.)	Remarks
27	Huntersville	Town well 4	R. E. Faw	Dr	190	8	100±	20	35	64	Analysis. Granite. Draw.
28	do	Anchor Mills Co.		Cr-Dr	38-81	2	38 to 81	5 to 30	27½	105	62° F. Combined yield of 10 wells. 27½ g.p.m. Draw.
29	do	do	Robbins	Dr	185	5			10-12		Hard water reported. Draw.
30	do	do		Cr-Dr	300 or 400	3			12	70	63° F. Hill.
31	1¼ miles N. of Huntersville	G. R. Fleenor	Sherril	Cr-Dr	72	2			10	35	Flat.
32	1½ miles N. of Huntersville	Ralph Johnson		Cr-Dr	140	2	100		3		Flat.
33	2½ miles SE. of Huntersville	D. B. Jordan J. R. Westbrook, tenant		Dug	62	40	62	58			Granite. Hill.
34	3 miles SE. of Huntersville	Plantation Pipeline Co.		Dr	260	8				15	Granite. Draw.
35	2¾ miles SE. of Huntersville	F. M. Fite	Robbins	Cr-Dr	116½	3	20	45	3	70	61° F. Granite. Hill.
36	3½ miles SE of Huntersville	B. C. Zeigler		Cr-Dr	50+	2				55	Diorite. Water contains iron. Hill.
37	4½ miles E. of Huntersville	M. B. Wallace		Cr-Dr	69	2	45±	15	5	580	Diorite. Laboratory test. "Black jack" soil. Draw.
38	3½ miles NE. of Derita	B. W. Alexander		Cr-Dr	118	2	18		2	110	Diorite. Slope.
39	do	James I. Crenshaw	Va. Mach. Co.	Dr	85	6			12	95	Diorite. Water contains iron. Hill.
40	4 miles NE. of Derita	O. B. Cochran	do	Dr	38	6			4-5	50	Granite. Water contains iron. Hill.
41	do	Clarence Pender	Will Fortner	Cr-Dr	96	2				65	Diorite. 61¾° F. Adequate yield. Hill.
42	5½ miles NE of Derita	Henry Doster		Cr-Dr		2				237	Diorite. (Laboratory test). Adequate yield. Draw.
43	3½ miles NE. of Newell	Frank Cochran	Bowers	Cr-Dr	132	3			8	85	Diorite. Slope.
44	2½ miles NE. of Newell	L. W. Austin		Dug	32½	30		31.58			Diorite. Hill.
45	2¼ miles NE. of Newell	J. R. Austin		Cr-Dr	137	2			7½		Diorite. Slope.
46	3½ miles NE. of Newell	James Caldwell	Bostin	Cr-Dr	79	4	58	20	20		Diorite. Slightly hard water. Hill.
47	2 miles N. of Newell	County Home	Hinson	Dr	162	10			60	140	Diorite. 64° F. Use, about 35,000 to 40,000 gallons a day. Draw.
48	do	Victor Penninger	Bowers	Cr-Dr	92	2	86	23	5	45	Pump in basement, 8 feet below surface. Granite. Slope.
49	2 miles N. of Newell	N. M. Christenbury	J. Torrence	Cr-Dr	133	2	35±		5	75	Granite. Hill.
50	do	J. W. Dierstein		Cr-Dr	80	2		14.5	2½	50	Granite. 61¾° F. Slope.
51	1½ miles NW. of Newell	S. P. Moyer		Cr-Dr	90	2			½	65	Diorite. Hill.
52	Newell	High School		Cr-Dr	335	3			8	30	Granite. 62½° F. Slope.
53	do	do		Cr-Dr	80	3			8		Granite. Slope.
54	¾ mile S. of Newell	Mrs. Annie Babb	W. A. Kirkley	Cr-Dr	96½	3	35	16	8	30	Granite. Hill.
55	5 miles E. of Charlotte	Galloway Estate		Cr-Dr	113	2			7		Do.
56	5¼ miles NE. of Charlotte	F. S. Neal Estate		Cr-Dr	196	2½		22	5-10	45	Flat.
57	4¾ miles NE. of Charlotte	Mecklenburg Furniture Shop	E. Mullis	Cr-Dr	134	3	94		9	60	Flat.
58	4½ miles NE. of Charlotte	W. S. Abernathy	Montgomery	Cr-Dr	165	2			12	35	Draw.
59	1¾ miles SW. of Derita	J. E. Heafner	do	Cr-Dr	130	2	130	9	7	50	Draw.
60	1½ miles SW. of Derita	E. T. Robinson	Everett Mullis	Cr-Dr	116	3	100		7	55	Granite. Flat.
61	1 mile SW. of Derita	B. J. Hunter	Allen (?)	Cr-Dr	380	2			3	60	61¾° F. Rock at 80 feet. Hill.
62	Derita	Louis G. Ratcliffe, Inc.	Bill Brathn	Cr-Dr	92 to 135	2	92-135		11 to 35 each	55	Group of 4 wells used at greenhouses. Draw.
63	do	Bob Farington		Cr-Dr	65	3		21	12		Draw.
64	¾ mile E. of Derita	H. L. Young		Dug	38	36	36	31.5		15	60° F. Adequate supply. Hill.
65	Derita	School		Dr	90	6			20		Hill.
66	do	B. J. Hunter	Ed. Hunter	Cr-Dr	92	2	61	21	12	30	Supplies 27 houses. Hill.
67	1½ miles NE. of Derita	C. A. Scegar		Cr-Dr	99	2				20	Draw.
68	1 mile NW. of Derita	J. H. Stevens		Dug	40	36	40	23.5			
69	2½ miles NW. of Derita	P. J. Penninger		Dug	21	36	21	13	1½	55	Granite. Flat.
70	4 miles NW. of Derita	J. E. Penninger	Homer Sherril	Cr-Dr	125½	2	80	12	5	30	Granite. 62° F. Supplies 3 buildings. Flat.
71	2½ miles NW. of Derita	Clyde Hunter	Martin	Cr-Dr	146	3		20-25	7		Soft water. Flat.
72	4½ miles N. of Charlotte	C. E. Collins	Robbins	Cr-Dr	113	2	40	21	3	65	Gneiss. Flat.

RECORDS OF WELLS IN MECKLENBURG COUNTY—*Continued*

Well no.	Location	Owner	Driller	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth casing (feet)	Water level (feet below surface)	Yield (g.p.m.)	Total hardness (field tests) (p.p.m.)	Remarks
73	3¾ miles N. of Charlotte	G. V. Burris	W. A. Ivester	Cr-Dr	48	2			15		Moderately soft water. Draw.
74	do	C. T. Stallings	Robbins	Cr-Dr	71½	2	31		6		Slightly hard water. Draw.
75	3¼ miles N. of Charlotte	Mrs. Eva Mae Ellis		Cr-Dr	96	2			2½		Gneiss. Hard water. Hill.
76	2½ miles NE. of Charlotte	Interstate Granite Corporation	W. A. Kirkley	Cr-Dr	165	4			35		Granite. Slope.
77	do	do	do	Cr-Dr	200	4			35		Granite. Draw.
78	2½ miles NW. of Charlotte	G. V. Keller	Hinson	Dr	190	6	190	26	10-15	65	Diorite. Hill.
79	do	Planters Fertilizers & Phosph. Co.		Dug	31	30		25	5		
80	3 miles N. of Charlotte	I. T. Hutchison		Cr-Dr	110	2		22	5	25	Hill.
81	3½ miles NW. of Charlotte	T. P. Caldwell	Montgomery	Cr-Dr	158	2	83	30	3½		Diabase dike. 63° F. Soft water. Well was dynamited to increase yield. Hill.
82	4 miles N. of Charlotte	E. C. Glenn		Cr-Dr	150	2			5±	25	Hill.
83	4¾ miles N. of Charlotte	J. W. Buchanan		Cr-Dr	85	2			7½	50	Hill.
84	5½ miles N. of Charlotte	F. W. Dotzer		Cr-Dr	82	2	78		7	35	Diorite. Hill.
85	7 miles N. of Charlotte	P. V. Humphrey	Geo. Stephenson	Cr-Dr	100	2	99		5	35	
86	do	R. W. Parker	do	Cr-Dr	140	2	85	25	6		No water until well was dynamited.
87	do	H. T. Reavis	do	Cr-Dr	130	2	100	25	5		Do. Slope.
88	3½ miles NW. of Charlotte	Chadwick-Hoskins Co.	Sydnor	Dr	549	10			100	80	63° F. Well at plant 2 supplies both plants and school. Draw.
89	4 miles NW. of Charlotte	Mecklenburg Nurseries		Cr-Dr	135	2	90		4-5	60	Dug well, nearly went dry in 1941-1942. Hill.
90	do	Godley Bros.		Cr-Dr	80	3			6		Soft water. Hill.
91	4¼ miles NW. of Charlotte	National Carbon Co.	W. A. Kirkley	Cr-Dr	150	4	100		18	35	63° F. Company well 1. Draw
92	do	do	do	Cr-Dr	135	4	102		8		62° F. Company well 2. Draw
93	do	do	do	Cr-Dr	108	4	84		7		Company well 3. Slope.
94	1¼ miles NE. of Paw Creek	Leaksville Woolen Mill Co.	Sydnor	Dr	350	10			36	55	62½° F. Company well 4. Draw.
95	do	do		Dr	300	10			60	75	59° F. Company well 5. Temperature taken after pumping 35 minutes—7/17/45. Draw.
96	do	do	do	Dr	1,166½	10			68	170	63° F. Company well 6. Pumping level 173 feet below surface in 1942. Draw.
97	1¼ miles NE. of Paw Creek	Leaksville Woolen Mills Co.	Sydnor	Dr	1,074	10			67¼	72	61½° F. Company well 7. Temperature after pumping 20 minutes. Draw.
98	do	do	do	Dr	250	8			30		Company well 1. Not in use. Draw.
99	do	do		Dr	250	10-8			50		Company well 2. Never used Water too hard.
100	do	do		Dr	250	10			25		Company well 3. Not used. Originally yielded 100 g.p.m.
101	Paw Creek	High School	Carolina Drill. Co.	Dr	140	6			30		Slope.
102	do	Standard Oil Plant	J. S. Hinson	Dr	306	6			55	40	Draw.
103	do	Shell Oil Plant	Heater Well Co.	Dr	148	6	80½	21	36	40	61½° F. Draw.
104	do	American Oil Co. Plant		Cr-Dr	85	3				80	62° F. Draw.
105	do	Kendall Mills Thrift Plant		Dr	600	10-8	60	32	55	150	63° F. Slope.
106	do	do		Cr-Dr	33 to 65	2½	33 to 65	½ to 2	14	60	59½° F. Group of 6 wells. Valley.
107	2 miles N. of Paw Creek	McClure Lumber Co.		Cr-Dr	115	3	76		4		Granite. Hill.
108	3 miles NW. of Paw Creek	M. L. Dunn	Robbins	Cr-Dr	54	2			3	50	Granite. Flat.
109	3¼ miles NW. of Paw Creek	James Costevens		Dug	30	12	30	23.0			Adequate water supply. Soft water. Flat.
110	3¼ miles NW. of Paw Creek	R. C. Beatty	Geo. Stevenson	Cr-Dr	90	3			10	80	61½° F. Granite "sand". Draw.
111	do	C. O. Hager		Dug	80	36		65			Supplies 12 houses. Soft water. Hill.
112	4 miles NW. of Paw Creek	Southern Dyestuff Corp.	Sydnor	Dr	221	6	60		38	450	61¾° F. Laboratory test.

RECORD OF WELLS IN MECKLENBURG COUNTY—*Continued*

Well no.	Location	Owner	Driller	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth casing (feet)	Water level (feet below surface)	Yield (g.p.m.)	Total hardness (field tests) (p.p.m.)	Remarks
113	8¾ miles W. of Charlotte	K. M. Beaty		Dug	39½	18	39½	34.7			
114	8¼ miles W. of Charlotte	Paul Thompson	Helms	Cr-Dr	115	2			4-5		Granite. Soft water. Flat.
115	do	C. E. Berryhill		Cr-Dr	126	2			5-6	40	Granite. Slope.
116	8 miles W. of Charlotte	Cathey Brothers		Dr	80	6			18	40	Granite.? Supplies house and dairy. Hill.
117	7½ miles W. of Charlotte	Otis Keeter	W. A Kirkley	Cr-Dr	136	3			25	45	Recreational Park. Hill.
118	7¼ miles W. of Charlotte	(Willamette Park) R. A. Suttle	Ralph Robbins	Dr	95	6	30	10 to 12	17		Recreational park. Draw.
119	6¾ miles W. of Charlotte	E. E. Williams		Cr-Dr	120					95	Hill.
120	6 miles W. of Charlotte	E. L. Black	Everett Mullis	Cr-Dr	77	2	25		5		Granite. Hill.
121	6¼ miles W. of Charlotte	Berryhill High School	Abernathy	Dr	110	6			12	25	Always has furnished adequate supply. Flat.
122	5 miles W. of Charlotte	Douglas Airport		Dr	300	6					Not used. Slope.
123	4¼ miles W. of Charlotte	J. L. Todd		Cr-Dr	181	2					Slope.
124	4 miles W. of Charlotte	Plato-Price High School		Dr	90	6			20		Slope.
125	2¾ miles W. of Charlotte	American Cyanimide Co.	Robbins	Dr	149	6			28	42	Diorite.
126	3 miles W. of Charlotte	Carolina Golf Course		Dr	70	6		1.8			Draw.
127	2½ miles W. of Charlotte	Southern Engineering Co.	Robbins	Dr	42½	5 5/8	40	4	25	55	Used for cooling. Draw.
128	3½ miles SW. of Charlotte	W. W. Davis		Dug	21	36	21	15.9			Adequate supply; soft water. Slope.
129	do	Diamond Point Grocery	W. A. Kirkley	Cr-Dr	80	3			30	40	
130	Charlotte	Scholtz Greenhouses	do	Cr-Dr	225	4	60	20	22	60	64° F. Slope.
131	do	Shoenith Candy Co.		Dug	110	72			10	40	62° F. Well is abandoned mine shaft. Slope.
132	do	Charlotte Pipe and Foundry Co.	J. S. Hinson	Dr	196	6		20	10-15	105	62½° F. Slope.
133	do	Air Reduction Sales Co.	Sydnor	Dr	200	6	85		50	113	62° F. Analysis in table. Water used for cooling. Draw.
134	do	National Welding Supply Co.	W. A. Kirkley	Cr-Dr	150	3			18	55	61° F. Granite. Used for cooling. Draw.
135	do	Highland Park Mfg. Co., Plant 1		Cr-Dr	30 to 80	2			15		Group of 13 wells yield 15 g.p.m. Draw.
136	do	Highland Park Mfg. Co.	Ralph Robbins	Dr	75	6			14		Slope.
137	do	do	do	Dr	87	6			9		Slope.
138	do	do	do	Cr-Dr	30 to 60	2			40		Three groups of six wells each; combined yield 40 g.p.m. Draw.
139	2½ miles E. of Charlotte	Z. E. Hargett		Dr	150	6		26	25	60	61°½ F. Granite. Slope.
140	4¼ miles SE. of Charlotte	A. C. Roundton	W. A. Kirkley	Cr-Dr	76	4		18	20		Granite. Slope.
141	4¾ miles SE. of Charlotte	Pure Oil Co.	Ralph Robbins	Dr	62	6			30	35	63° F. Draw.
142	do	Sharon Memorial Park		Dr	150	6					Slope.
143	do	W. W. Covington	E. Mullis	Cr-Dr	83	2			6	40	Granite. Slope.
144	4½ miles SE. of Charlotte	F. C. Thompson	W. A. Kirkley	Cr-Dr	95	2	85	15	9	50	Slope.
145	4½ miles SE. of Charlotte	Hudson Hosiery Co.	W. A. Kirkley	Cr-Dr	95	4	85	18	15	30	62¾° F. Granite. Draw.
146	5½ miles SE. of Charlotte	I. G. Wallace	Clayton Cooke	Cr-Dr	60	2	55	7	4-5	50	
147	4¼ miles E. of Charlotte	Joe W. Yandle		Dug	30	24	30	19.3			Well not used. Flat.
148	do	do		Cr-Dr	180	2			7-8	45	Draw.
149	5¼ miles E. of Charlotte	Sam Wallace		Cr-Dr	200	2			1½		Hill.
150	do	W. T. Harris		Cr-Dr	85	2			5½		Draw.
151	do	D. B. Wilson	Glosson	Cr-Dr	85	2	68	8	8		Soft water. Draw.
152	6 miles E. of Charlotte	H. G. Russell	do	Cr-Dr	60	2			4½	30	Granite. Slope.
153	do	C. E. Morris		Cr-Dr	190	4		19	12	35	Hill.
154	6 miles E. of Charlotte	S. M. Craig	Donaldson	Cr-Dr	95	2	90	20	4-5		Soft water. Slope.
155	6½ miles E. of Charlotte	Harvey Morris	Ralph Robbins	Dr	184½	5 5/8	128	23	20	35	
156	do	J. A. Smith	Sam Allen	Cr-Dr	195	3	100	23.6	8		Hill.
157	7 miles E. of Charlotte	Hickory Grove School	W. A. Mullis	Cr-Dr	135	2			5		Flat.
158	do	United Arco Service		Cr-Dr	149	3		18	30		Granite. Draw.

RECORDS OF WELLS IN MECKLENBURG COUNTY—*Continued*

Well no.	Location	Owner	Driller	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth casing (feet)	Water level (feet below surface)	Yield (g.p.m.)	Total hardness (field tests) (p.p.m.)	Remarks
159	3½ miles NW. of Mint Hill	Clear Creek Negro School		Dr	91	6			60		Draw.
160	3¾ miles NW. of Mint Hill	Mrs. Montie Lucas		Cr-Dr	235	2			3		Soft water. Hill.
161	4 miles NW. of Mint Hill	Mason Wallace	Mullis	Cr-Dr	170	2			2-3		Granite. Soft water. Hill.
162	3¼ miles NE. of Mint Hill	Clear Creek High School	A. E. Beaver	Cr-Dr	110	3			12-15		Hill.
163	3½ miles NE. of Mint Hill	Allen and Brooks Ginning Co.		Cr-Dr	178	4			12		Slate. Not in use. Slope.
164	3¾ miles NE. of Mint Hill	do		Cr-Dr	134	2			5	50	Flat.
165	do	C. G. Allen		Cr-Dr	100	2			4		Slate. Soft water. Flat.
166	1¼ mile E. of Mint Hill	T. S. Houston	Glosson	Cr-Dr	100½	2			7		Hill.
167	do	R. C. Beaver		Dug	43	30		39.07			Hill.
168	Mint Hill	Kingcraft Hosiery Mill	Everett Mullis	Cr-Dr	110	2			8		
169	do	C. J. McEwen	Duncan	Cr-Dr	180	2			7		Slope.
170	do	R. J. McEwen & Son	W. C. Mullis	Cr-Dr	80	2			7	35	Draw.
171	do	C. J. McEwen		Dug	33	30	33				Hill.
172	do	W. F. Haigler	E. Mullis	Cr-Dr	155	2	100	12	5		Soft water. Slope.
173	do	Mrs. J. W. McEwen	Beaver	Cr-Dr	210	3			5-6		Dynamited well to increase yield. Slope.
174	2¼ miles SW. of Mint Hill	E. M. Gray	Mullis	Cr-Dr	105	2			5		Slope.
175	2½ miles NE. of Matthews	L. H. Yandle	E. Mullis	Cr-Dr	92	2			5	55	Hill.
176	1¾ miles E. of Matthews	D. B. Query	Sam Allen	Cr-Dr	100	2	70	25	6	50	Slope.
177	Matthews	E. M. Renfron	W. Donaldson	Cr-Dr	125	2			2½		Soft water. Slope.
178	do	L. H. Yandle	Abernathy	Cr-Dr	74	3	50	18	10-12		Do.
179	do	do	Will Mullis	Cr-Dr	75	3	40		20	35	Well at barn.
179a	do	do	Walter Abernathy	Dr	187	6		1½R	55		Used for domestic uses and swimming pool. Greenstone. Draw.
179b	do	C. L. Neal	Ben Aycock	Dr	87	4			45		Greenstone. Used for domestic uses and swimming pool. Draw.
180	do	B. D. Funderburk	W. Abernathy	Dr	200	3		18	18	61	Analysis in table. Supplies six businesses and four families. Granite. Draw.
181	do	do	do	Dr	125	3			7		Well at stable. Granite. Draw.
182	do	Matthews School	do	Dr	160	3			7	55	Well dymanited to increase yield.
182a	do	Town	Ben Aycock	Dr	275	6	110		20		Greenstone. Distribution not yet installed. Slope.
183	1¾ miles NW. of Matthews	Carlyle Thompson	Sam Allen	Dr	50	2			5		Granite. Hill.
184	3 miles NW. of Matthews	J. B. Fowler		Dr	95	3			7	60	Hill.
185	5½ miles SE. of Charlotte	J. J. Akers	Ralph Robbins	Dr	165	5 5/8	110		35	55	Diorite. Slope.
186	do	John L. Hunter	W. A. Kirkley	Dr	96	3		36.78		45	Diorite. Flat.
187	do	T. W. Pritchard	Ralph Robbins	Dr	147	5 5/8			15		Granite. Slope.
188	7 miles SE. of Charlotte	F. W. Alexander		Cr-Dr	165	2			5	95	Slope.
189	4 miles W. of Matthews	Providence School		Cr-Dr	100	3			5		
190	3¾ miles W. of Matthews	Eli B. Springs	Ben Aycock	Dr	190	6	30	17 to 20	60	150	Draw.
191	do	do	W. A. Kirkley	Cr-Dr	150	3			15		Greenstone. Flat.
192	6 miles S. of Charlotte	C. R. Collins	Montgomery	Cr-Dr	180	3			5	60	Diorite. Hill.
193	6 miles S. of Charlotte	C. R. Collins	Ralph Robbins	Dr	60	55	20	18.00	5		Slope.
194	do	do	Ben Aycock	Dr	100	6		3	18		Gabbro. Draw.
195	5¼ miles S. of Charlotte	Sharon School		Dr	65	6			15		Flat.
196	5 miles S. of Charlotte	Springside Dairy	Robbins	Cr-Dr	137	3	32		6		Soft water. Slope.
197	4¼ miles NE. of Pineville	Harkey Bros. Nursery, Inc.		Dug	25	30	25	15.02		45	Greenstone.? Flat.
198	3 miles NE. of Pineville	Dr. A. M. Whisnant		Cr-Dr	139	2			4		Diorite. Abandoned; not sufficient water. Hill.
199	do	do		Cr-Dr	209	3			8-10		Diorite. Abandoned; pumped sand. Hill.
200	do	do	Ralph Robbins	Dr	102	5 5/8		45	20	45	Diorite. Draw.
201	do	do	W. A. Kirkley	Cr-Dr	262	4-3			12		Diorite. Slope.
202	3½ miles N. of Pineville	Mrs. Eunice E. Smith		Dug	65	48	65	47.0			Soft water. Hill.
203	4¼ miles N. of Pineville	Dr. T. N. Reed		Cr-Dr	200	3			5	85	Granite. Hill.
204	4 miles N. of Pineville	H. B. Smith	W. A. Kirkley	Cr-Dr	140					35	Hill.

RECORD OF WELLS IN MECKLENBURG COUNTY—*Continued*

Well no.	Location	Owner	Driller	Type of well	Depth of well (feet)	Diameter of well (inches)	Dept casing (feet)	Water level (feet below surface)	Yield (g.p.m.)	Total hardness (field tests) (p.p.m.)	Remarks
205	5¼ miles SW. of Charlotte	Ebenezer Presbyterian Church	W. A. Kirkley	Cr-Dr	156	3	60±		6	35	62° F. Slope.
206	do	H. R. Mauney		Cr-Dr	125	2					Moderately soft water. Slope.
207	4¾ miles SW. of Charlotte	C. N. Baker	W. A. Kirkley	Cr-Dr	93	4			8	35	Tested at 10 g.p.m. Hill.
208	4½ miles SW. of Charlotte	J. H. Huntley		Dug	26	36		20	2-3	30	Hill.
209	4¾ miles SW. of Charlotte	Mrs. L. J. Eller	W. A. Kirkley	Cr-Dr	145	4		14	18	30	Slope.
210	do	F. D. Hemphill	Hurley Helms	Cr-Dr	90	2			5	25	Slope.
211	5¼ miles SW. of Charlotte	E. L. Jenkins	W. A. Kirkley	Cr-Dr	92	3			10	45	Draw.
212	do	A. Y. Deal		Cr-Dr	88	2			5		Diorite. Flat.
213	5¾ miles SW. of Charlotte	Edwin Bruton	E. Mullis	Cr-Dr	108	2			7-8	45	Diorite. Draw.
214	6 miles SW. of Charlotte	R. S. Smith	W. A. Kirkley	Cr-Dr	108	4			3	50	Diorite. Hill.
215	6½ miles SW. of Charlotte	H. B. Hunter	Montgomery	Cr-Dr	204	3	60		8	60	62° F. Diorite. Hill.
216	5¾ miles SW. of Charlotte	J. N. Herron	W. A. Kirkley	Cr-Dr	127½	3	50		6-8	50	Hill.
217	6½ miles SW. of Charlotte	J. T. Greenwood		Dug	48	36		42.71			Diorite. Hill.
218	3¼ miles N. of Pineville	W.B.T. Radio Station	Montgomery	Cr-Dr	225	3			7-8		Slope.
219	4 miles NW. of Pineville	Arrowood	Abernathy	Dr	286	6	20		16	261	62¼° F. Laboratory test. Draw.
220	3¾ miles NW. of Pineville	U. S. Rubber Co. Shell Loading Plant	W. A. Kirkley	Cr-Dr	196	3		12	40		Gabbro. Well capped; not used. Flat.
221	do	do	do	Cr-Dr	145	3		12	30		Gabbro. Flat.
222	7 miles SW. of Charlotte	Miss Amanda Coffey	Tom Allen	Cr-Dr	112	2	80		5	60	61° F.
223	7¾ miles SW. of Charlotte	R. A. Grier		Cr-Dr						25	
224	do	Mrs. F. K. Byrum		Cr-Dr	100	2			6		Diorite. Flat.
225	9¼ miles SW. of Charlotte	Samuel Knox		Dug	20	24		14.51			Gabbro. Hill.
226	4½ miles NW. of Pineville	N. M. Boyd		Dug	21	30		10.55		125	Gabbro.
227	5¾ miles NW. of Pineville			Dug	17.5			11.79		185	Gabbro. Has always furnished adequate supply.
228	8 miles NW. of Pineville	O. B. Knox	Charles Montgomery	Cr-Dr	110	2			3	20	Diorite. Hill.
229	8½ miles NW. of Pineville	Island Point Club	do	Cr-Dr	100	2			2	105	Do.
230	8 miles NW. of Pineville	R. S. Smith	Ralph Robbins	Dr	181	5 5/8	83		25		Do.
231	6 miles W. of Pineville	J. R. Smith		Bored	52	12	52	43.08			Granite.
232	5¾ miles W. of Pineville	W. C. Stroup	Montgomery	Cr-Dr	128	3	80	20	15	25	62½° F. Granite. Hill.
233	6 miles W. of Pineville	H. M. Blackwelder	do	Cr-Dr	175	2			3-4	20	Granite. Hill.
234	Pineville	J. E. M. Davenport		Dr	132	6		12	75		Schistose diorite Slope.
235	do	Town		Dr	134	8		12	75	234	62½° F. Schistose diorite. Analysis. Draw.
236	4 miles SE. of Pineville	James K. Hall		Dr	90	2			5		Granite. Hill.
237	4¼ miles SE. of Pineville	R. G. Bryant	Robbins & Wilson	Cr-Dr	132	2	90	42	5	35	Do.
238	3¾ miles SE. of Pineville	Mrs. E. E. Niven		Dug	38	36	38	31.95			Adequate yield. Draw.
239	4½ miles SW. of Matthews	J. J. Grier		Bored	32	12	32	23.74		20	Hill.
240	3¾ miles SW. of Matthews	J. M. Knox		Dug	39	36		29.80		25	Well more than 50 years old; has never gone dry. Flat.
241	2½ miles SW. of Matthews	W. N. McKee	Abernathy	Cr-Dr	235	3-2	135		5	45	Granite. Hill.
242	2½ miles SW. of Matthews	Presley Smith	C. C. Montgomery	Cr-Dr	85	2	75		8-10		Granite.

CHARLOTTE AND MILTON BELTS

METAMORPHIC ROCKS

- CZph — FINE-GRAINED BIOTITE GNEISS — Massive to strongly foliated; minor layers of amphibolite and muscovite schist
- CZg — FELSIC MICA GNEISS — Interlayered with biotite and hornblende gneiss and schist
- CZbg — BIOTITE GNEISS AND SCHIST — Inequigranular and megacrystic; abundant potassic feldspar and garnet; interlayered and gradational with calc-silicate rock, sillimanite-mica schist, mica schist, and amphibolite. Contains small masses of granitic rock
- CZv — METAVOLCANIC ROCK — Interbedded felsic to mafic tuffs and flowrock
- CZlv — MAFIC METAVOLCANIC ROCK — Metamorphosed basaltic to andesitic tuffs and flows, grayish green to black. Locally includes hypabyssal intrusives and minor felsic metavolcanic rock
- CZlv — FELSIC METAVOLCANIC ROCK — Metamorphosed dacitic to rhyolitic flows and tuffs, light gray to greenish gray; minor mafic and intermediate metavolcanic rock
- CZq — QUARTZITE — Massive to well foliated; contains andalusite, kyanite, or sillimanite, chloritoid, and pyrite
- CZph — PHYLLITE AND SCHIST — Minor biotite, pyrite, and sillimanite; includes minor quartzite

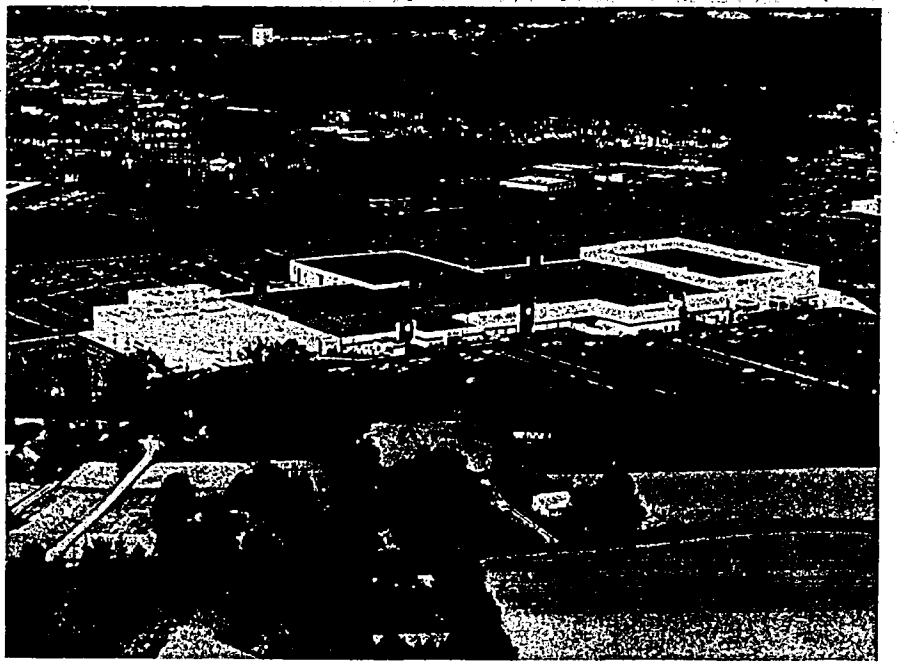
INTRUSIVE ROCKS

- Jd — DIABASE — Dikes, gray to black
- PIPg — GRANITIC ROCK (Pennsylvanian to Permian, 265-325 my; 11,9) — Megacrystic to equigranular. Churchland Plutonic Suite (Western group) - Churchland, Landis, and Mooresville intrusives
- DSg — GRANITE OF SALISBURY PLUTONIC SUITE (Devonian to Silurian, 385-415 my; 5) — Pink, massive to weakly foliated. Gold Hill, Kannapolis, Salisbury, Southmont, and Yadkin intrusives
- DSs — SYENITE OF CONCORD PLUTONIC SUITE (Silurian, 404 my; 9) — Includes the Concord ring dike
- DOgb — GABBRO OF CONCORD PLUTONIC SUITE (Devonian to Ordovician, 399-479 my; 24) — Barber, Concord, Farmington, Mecklenburg, and Weddington intrusives
- DOg — GRANITIC ROCK — Locally pinkish gray, massive to weakly foliated; contains hornblende
- SHELTON GRANITE GNEISS (Silurian, 429 my; 21) — Poorly foliated, lineated granitic to quartz monzonitic gneiss
- CZq — METAMORPHOSED QUARTZ DIORITE — Foliated to massive
- PzZg — METAMORPHOSED GABBRO AND DIORITE — Foliated to massive
- PzZm — METAMORPHOSED MAFIC ROCK — Metagabbro, metadiorite, and mafic plutonic-volcanic complexes
- META-ULTRAMAFIC ROCK — Metamorphosed dunite and peridotite; serpentinite, soapstone, and other altered ultramafic rock. Only larger bodies shown
- CZg — METAMORPHOSED GRANITIC ROCK — Megacrystic, well foliate locally contains hornblende

Reference 10

Soil survey of

Mecklenburg County, North Carolina



United States Department of Agriculture
Soil Conservation Service
in cooperation with
Mecklenburg County Board of Commissioners and
North Carolina Agricultural Experiment Station

Reference 11

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1972-77. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1977. This survey was made cooperatively by the Soil Conservation Service, the Mecklenburg County Board of Commissioners, and the North Carolina Agricultural Experiment Station. It is part of the technical assistance furnished to the Mecklenburg Soil and Water Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Shopping mall in Mecklenburg County and adjacent farmland. Cecil sandy clay loam is the dominant soil in the foreground.

1. Cecil

Gently sloping to strongly sloping, well drained soils that have a predominantly clayey subsoil; formed in residuum from acid igneous and metamorphic rock

This unit occurs throughout most of the county on broad smooth ridges and side slopes on the uplands. It makes up about 41 percent of the county. It is about 65 percent Cecil soils and 35 percent soils of minor extent.

Cecil soils have a yellowish red sandy clay loam surface layer and a red clay and clay loam subsoil.

Minor in this unit are areas of the steeper Pacolet soils, areas of Helena soils in depressions and around the heads of drainageways, and small scattered areas of Mecklenburg and Enon soils where the parent rock is less acid.

This unit is used mainly as cropland or pasture. Erosion is the main limitation in farming.

The Cecil soils in this unit have moderate potential for most row crops, moderate potential for woodland, and high potential for most urban uses.

2. Cecil-Urban land

Nearly level to strongly sloping urban areas on well drained soils that have a predominantly clayey subsoil; formed in residuum from acid igneous and metamorphic rock

This unit, the business and commercial district of downtown Charlotte and the commercial, industrial, and residential areas around the edges of the city, makes up about 18 percent of the county. It is about 52 percent the Cecil-Urban land complex, 20 percent Urban land, and 28 percent soils of minor extent.

The Cecil-Urban land complex part of this unit is 50 to 70 percent Cecil soils and 15 to 35 percent Urban land. It is mainly around the edges of the city. Cecil soils have a yellowish red sandy clay loam surface layer and a red clay and clay loam subsoil. Urban land is covered mostly by houses, paved streets and sidewalks, apartment buildings, small shopping centers, schools, churches, paved parking lots, and recreational areas.

The Urban land part of this unit consists of areas where more than 85 percent of the surface is covered by asphalt, concrete, buildings, or other impervious cover. It is mainly in the central business district of Charlotte and along major traffic arteries around the city.

Minor in this unit are scattered areas of Mecklenburg and Enon soils. These soils are underlain by thin strata of acidic and basic rocks and are thus less acid than Cecil soils. Also in this unit are reshaped areas, as a result of site preparation during construction, and cut and fill areas. In the cut areas most or all of the natural soil has been removed. In the fill areas the original surface is covered with more than 20 inches of fill material.

This unit is used almost entirely for urban purposes.

3. Iredell-Mecklenburg

Nearly level to strongly sloping, moderately well drained and well drained soils that have a predominantly clayey subsoil; formed in residuum from diorite, gabbro, and other rock high in ferromagnesian minerals

The largest areas of this unit are in the southwestern and south-central parts of the county. Other areas are in the northeastern and northwestern parts. The landscape is one of broad flats and gentle side slopes. The flats are broken by many large knolls of slightly higher elevation.

This unit makes up about 11 percent of the county. It is about 40 percent Iredell soils, 35 percent Mecklenburg soils, and 25 percent soils of minor extent.

Iredell soils are moderately well drained. They are on the broad flats and gentle side slopes. The surface layer is olive brown fine sandy loam, and the subsoil is light olive brown clay and clay loam.

Mecklenburg soils are well drained. They occupy the broad ridges, the gently sloping to strongly sloping side slopes, and the large knolls on the flat landscape. The surface layer is dark reddish brown fine sandy loam, and the subsoil is yellowish red clay.

The minor soils in this unit are mostly Wilkes and Davidson in the southern part of the county and Enon, Wilkes and Helena in the northern part.

This unit is used mainly as cropland and pasture. The wetter areas are mostly forest. Erosion and wetness are the main limitations in farming.

The major soils in this unit have moderately high potential for most crops, moderate potential for woodland, and low potential for most urban uses.

4. Wilkes-Enon

Gently sloping to steep, well drained soils that have a predominantly clayey subsoil; formed in residuum from diorite, hornblende schist, and other basic rock, or from mixed acidic and basic rock

This map unit occurs as scattered areas throughout the county on broad and narrow ridges and strongly sloping to steep side slopes. It makes up 13 percent of the county. It is about 40 percent Wilkes soils, 30 percent Enon soils, and 30 percent soils of minor extent.

Wilkes soils are on narrow ridges and moderately steep to steep side slopes adjacent to drainageways. The surface layer is dark grayish brown loam, and the subsoil is strong brown clay and clay loam.

Enon soils are on broad ridges and gently sloping to strongly sloping side slopes. The surface layer is brown sandy loam. The subsoil is yellowish brown sandy clay loam, clay, and clay loam.

few areas of soils that are less acid than the Cecil soil, and a few intermingled areas of Appling, Mecklenburg, and Vance soils. The included areas, each less than 5 acres, make up to 35 percent of this map unit.

The organic matter content is low in the surface layer of this Cecil soil. Permeability is moderate, the available water capacity is medium, the shrink-swell potential is moderate, and surface runoff is medium. The subsoil is strongly acid or very strongly acid. Depth to bedrock is more than 60 inches. The water table is below 6 feet.

Most of the acreage is used as cropland. Some areas are used for hay and pasture. The rest is forested.

This soil has moderate potential for corn, soybeans, small grain, pasture, hay (fig. 2), and horticultural crops. Keeping this soil in good tilth is difficult because the surface layer is thin. The surface layer commonly forms a crust as it dries after a hard rain and becomes cloddy if worked when wet, both of which affect germination and cause poor or uneven crop growth. Minimum tillage, the return of crop residue to the soil, and the use of cover crops, including grasses and legumes, improve tilth, reduce runoff, and help to control erosion.

The potential is moderate for broadleaf and needleleaf trees. The dominant trees are loblolly pine, shortleaf pine, and Virginia pine. The main understory species are dogwood, sourwood, redbud, and black cherry. The clayey subsoil is the main limitation in woodland use and management.

This soil has high potential for most urban uses. The moderate permeability is a limitation for septic tank absorption fields. This limitation can generally be overcome by modifying the field or by increasing the size of the absorption area, or both. The potential is dominantly moderate for recreation because of the clayey subsoil.

The capability subclass is IIIe. The woodland group is 4c.

CeD2—Cecil sandy clay loam, 8 to 15 percent slopes, eroded. This well drained soil is on side slopes on the uplands. Mapped areas are oblong and range from 6 to 100 acres.

Typically, the surface layer is yellowish red sandy clay loam about 6 inches thick. The subsoil is 47 inches thick. The upper part is red clay, and the lower part is red clay loam. The underlying material to a depth of 65 inches is red and yellow loam.

Included with this soil in mapping are a few uneroded areas where the surface layer is thicker and browner than is typical and a few areas of similar soils that have a clayey subsoil less than 24 inches thick. Also included are many areas of rills and shallow gullies, a few areas of soils that are less acid than the Cecil soils, and a few intermingled areas of Appling, Mecklenburg, and Vance soils. The included areas, each less than 5 acres, make up 10 to 35 percent of this map unit.

The organic matter content is low in the surface layer of this Cecil soil. Permeability is moderate, the available water capacity is medium, the shrink-swell potential is moderate, and surface runoff is medium. The subsoil is strongly acid or very strongly acid. Depth to bedrock is more than 60 inches. The water table is below 6 feet.

Most of the acreage is used for hay or pasture. Some areas are used as cropland. The rest is forested.

This soil has moderate potential for corn, soybeans, small grain, pasture, hay, and horticultural crops. Because the surface layer is thin, this soil is difficult to keep in good tilth. Additional erosion is a severe hazard where cultivated crops are grown. Minimum tillage, the return of crop residue to the soil, and the use of cover crops, including grasses and legumes, improve tilth, reduce runoff, and help to control erosion.

The potential is moderate for broadleaf and needleleaf trees. The dominant trees are loblolly pine, shortleaf pine, and Virginia pine. The main understory species are dogwood, sourwood, redbud, and black cherry. The clayey subsoil is the main limitation in woodland use and management.

This soil has only moderate potential for most urban uses because of the slope and the moderate permeability. The slope limitation can be reduced or modified by special planning, design, or maintenance. The moderate permeability is a limitation for septic tank absorption fields. This limitation can generally be overcome by modifying the field or by increasing the size of the absorption area, or both. Erosion is a hazard if the ground cover is removed. The potential is dominantly moderate for recreation because of the slope and the clayey subsoil.

The capability subclass is VIe. The woodland group is 4c.

CuB—Cecil-Urban land complex, 2 to 8 percent slopes. This map unit consists of areas of Cecil soils and areas of Urban land primarily in the suburban areas of Charlotte. These areas are too small and too intricately mixed to be mapped separately. The undisturbed Cecil soil makes up 50 to 70 percent of each area, and Urban land makes up 15 to 35 percent. The rest of this unit consists of areas where most of the natural soil has been altered or covered as the result of grading and digging.

The undisturbed Cecil soil is well drained. Typically, the surface layer is yellowish red sandy clay loam about 6 inches thick. The subsoil is 47 inches thick. The upper part is red clay, and the lower part is red clay loam. The underlying material to a depth of 65 inches is red and yellow loam.

The organic matter content is low in the surface layer of this Cecil soil. Permeability is moderate, the available water capacity is medium, the shrink-swell potential is moderate, and surface runoff is medium. The subsoil is strongly acid or very strongly acid. Depth to bedrock is more than 60 inches. The water table is below 6 feet.

The Urban land part of this unit is covered with houses, paved streets, parking lots, driveways, small shopping centers, industrial buildings, schools, churches, and apartment complexes (fig. 3).

In some altered, or disturbed, areas the Cecil soil is covered with more than 20 inches of fill material. In others, more than two-thirds of the natural soil has been removed by cutting and grading.

Included in mapping are small areas of Appling, Enon, and Mecklenburg soils.

In disturbed areas erosion is a hazard because of the slope and the runoff. Surface runoff from rooftops and paved surfaces increases the hazard of flooding in lowlying areas downstream. The clayey subsoil is a limitation in landscaping. The moderate permeability is a limitation for septic tank absorption fields. This limitation generally can be overcome by modifying the field or by increasing the size of the absorption area, or both.

Onsite investigation is generally needed before planning the use and management of this unit.

This unit is not assigned to a capability subclass or to a woodland group.

CuD—Cecil-Urban land complex, 8 to 15 percent slopes. This map unit consists of areas of Cecil soils and areas of Urban land primarily in the suburban areas of Charlotte. These areas are too small and too intricately mixed to be mapped separately. The undisturbed Cecil soil makes up 50 to 70 percent of each area, and Urban land makes up 15 to 35 percent. The rest of this unit consists of areas where most of the natural soil has been altered or covered as the result of grading and digging.

The undisturbed Cecil soil is well drained. Typically, the surface layer is yellowish red sandy clay loam about 6 inches thick. The subsoil is 47 inches thick. The upper part is red clay, and the lower part is red clay loam. The underlying material to a depth of 65 inches is red and yellow loam.

The organic matter content is low in the surface layer of this Cecil soil. Permeability is moderate, the available water capacity is medium, the shrink-swell potential is moderate, and surface runoff is medium. The subsoil is strongly acid or very strongly acid. Depth to bedrock is more than 60 inches. The water table is below 6 feet.

The Urban land part of this unit is covered mostly with houses, paved streets, parking lots, driveways, small shopping centers, industrial buildings, churches, and apartment complexes.

In some altered, or disturbed, areas the Cecil soil is covered with more than 20 inches of fill material. In others, more than two-thirds of the natural soil has been removed by cutting and grading.

Included in mapping are small areas of Appling, Enon, and Mecklenburg soils.

If cover is not well established, soils on these areas have an erosion hazard. Grading is necessary for urban development. Surface runoff from rooftops and pave surfaces causes an increased hazard of flooding in low lying areas downstream. The clayey subsoil is a limitatio to landscaping. The moderate permeability is a limitatio for septic tank absorption fields. This limitation generall can be overcome by modifying the field or by increasin the size of the absorption area, or both.

Onsite investigation is generally needed before plan ning use and management of this unit.

This unit is not assigned to a capability subclass or t a woodland group.

DaB—Davidson sandy clay loam, 2 to 8 percen slopes. This well drained soil is on broad ridges on th uplands. Mapped areas are commonly irregular an range from 4 to several hundred acres.

Typically, the surface layer is dark reddish brow sandy clay loam about 7 inches thick. The subsoil to depth of 103 inches is dark red clay loam in the uppe part and dark red clay in the lower part.

Included with this soil in mapping are a few areas o soils that have a loam surface layer, a few areas of soil that are less acid than is typical, a few areas where th lower part of the subsoil is lighter red, and a few sma eroded areas where the surface layer is clay loam. Als included are a few small areas of Cecil and Mecklenbur soils. The included areas make up 25 to 40 percent o this map unit.

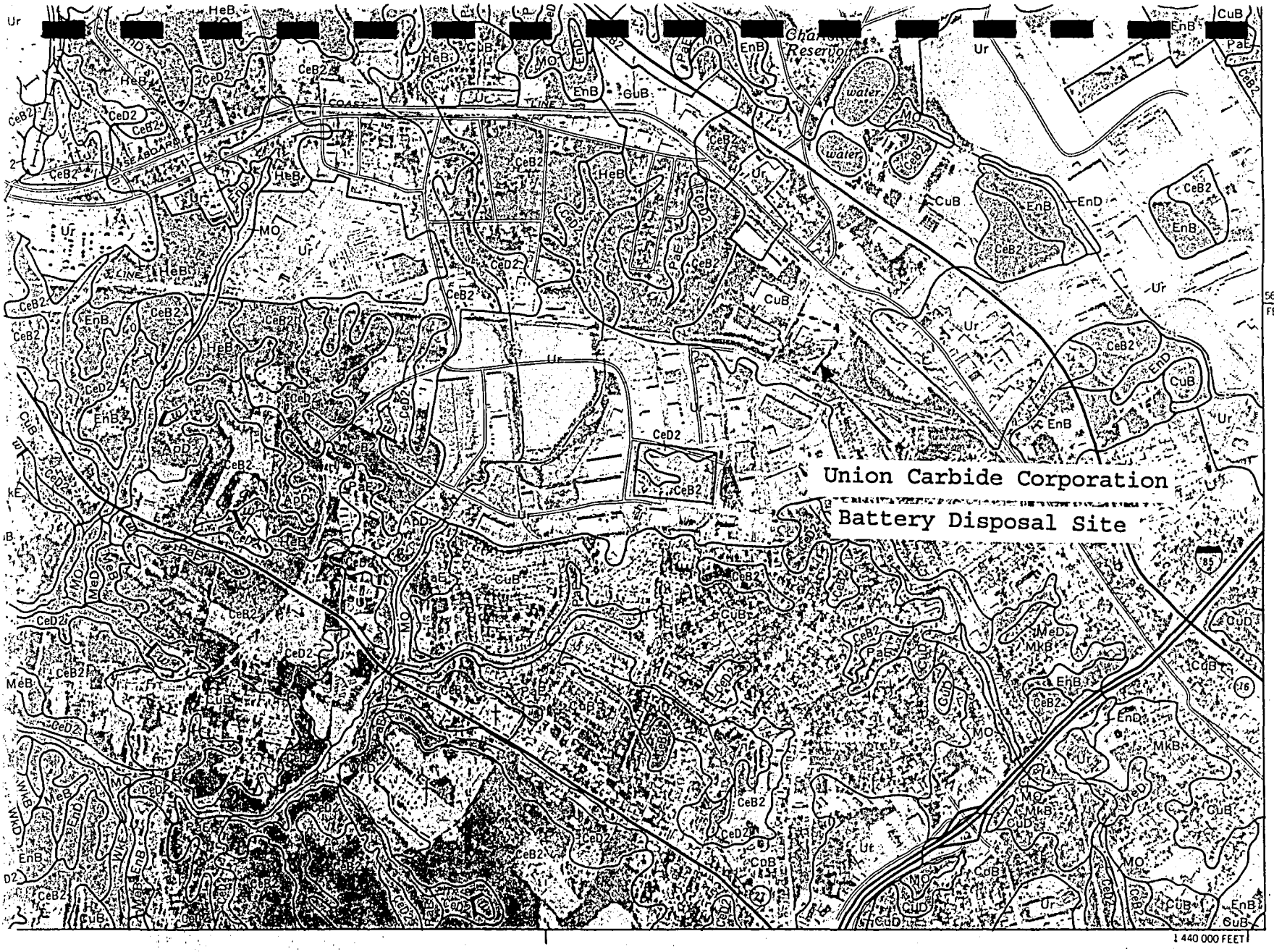
The organic matter content is low in the surface laye of this Davidson soil. Permeability is moderate, the avail able water capacity is high, the shrink-swell potential i low, and surface runoff is medium. The subsoil range from very strongly acid to medium acid. Depth to bed rock is more than 60 inches. The water table is below 6 feet.

Most of the acreage is used as woodland. The rest i cropland and pasture. Some areas along the Catawb River are used for recreation.

This soil has high potential for corn, soybeans, sma grain, hay, pasture, and horticultural crops. Crop poten tial can be reduced through erosion. As the original sur face layer is lost, the underlying sticky, clayey subso becomes part of the plow layer. This process lowers th overall tilth of the surface layer. Minimum tillage, th return of crop residue, and the use of cover crops, in cluding grasses and legumes, reduce runoff and help t control erosion.

This soil has moderately high potential for broadlea and needleleaf trees. The dominant trees are loblol pine, shortleaf pine, yellow-poplar, hickory, white oak red oak, sweetgum, and ash. The main understory spe cies are dogwood, sourwood, redbud, black cherry, an holly. The clayey subsoil is the main limitation in wood land use and management.

This soil has high potential for most urban uses. Be cause of the moderate permeability, this soil is limited fc septic tank absorption fields. This limitation can be ove

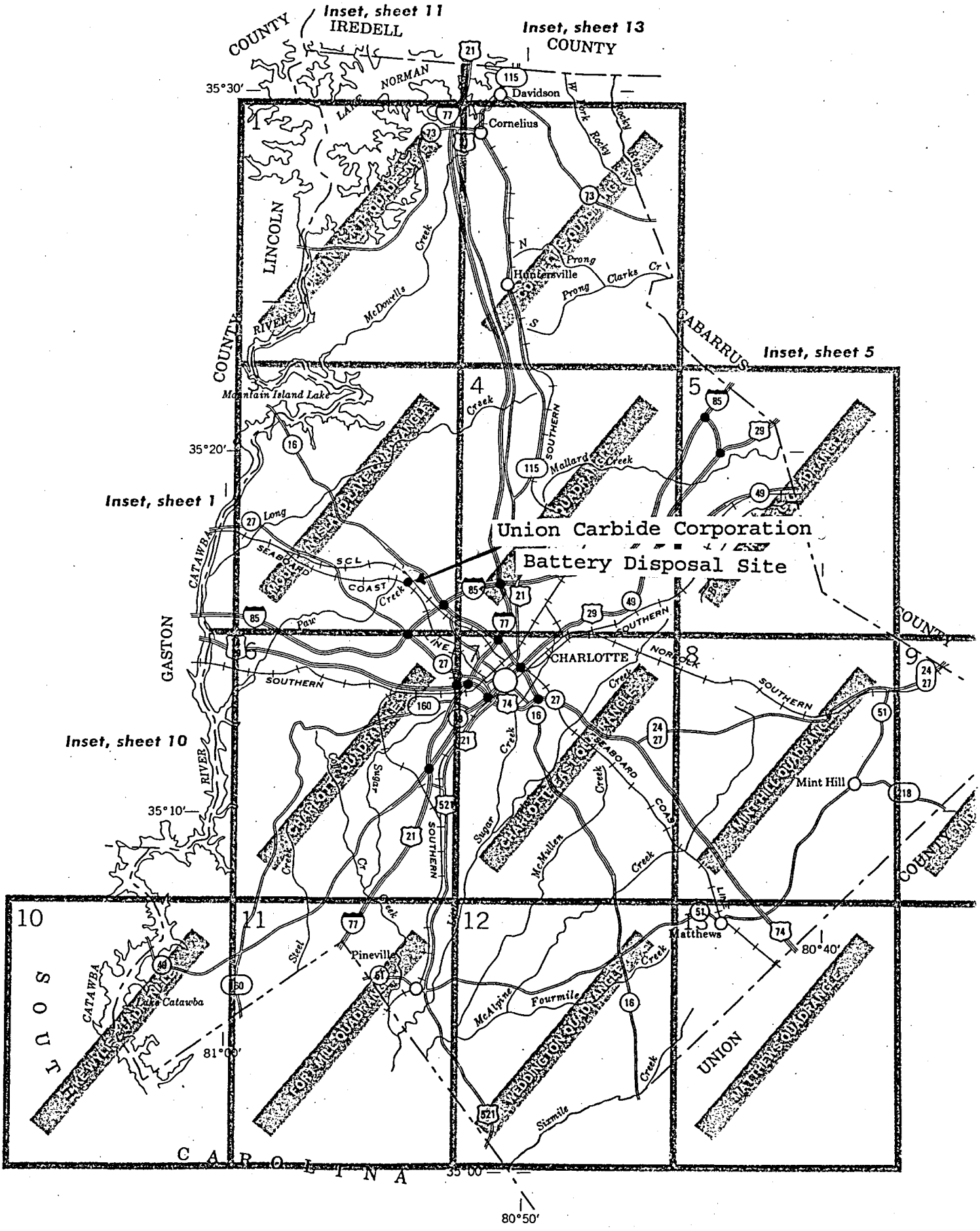


1 2 Miles

5000 10000 Feet

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1976 photography obtained from U.S. Department of Interior, Geological Survey.

RTH CAROLINA NO. 3


Inset, sheet 11
IREDELL
COUNTY
Inset, sheet 13
COUNTY
Davidson
Cornelius
Huntersville
LINCOLN
COUNTY
CABARRUS
Inset, sheet 5
Mountain Island Lake
Inset, sheet 1
Union Carbide Corporation
Battery Disposal Site
CATAWBA
GASTON
COUNTY
CHARLOTTE
Inset, sheet 10
Mint Hill
Pineville
Matthews
Lake Catawba
UNION
COUNTY
CAROLINA
35°30′
35°20′
35°10′
35°00′
81°00′
80°50′
80°40′

MEMO

DATE: April 28, 1995

TO: File

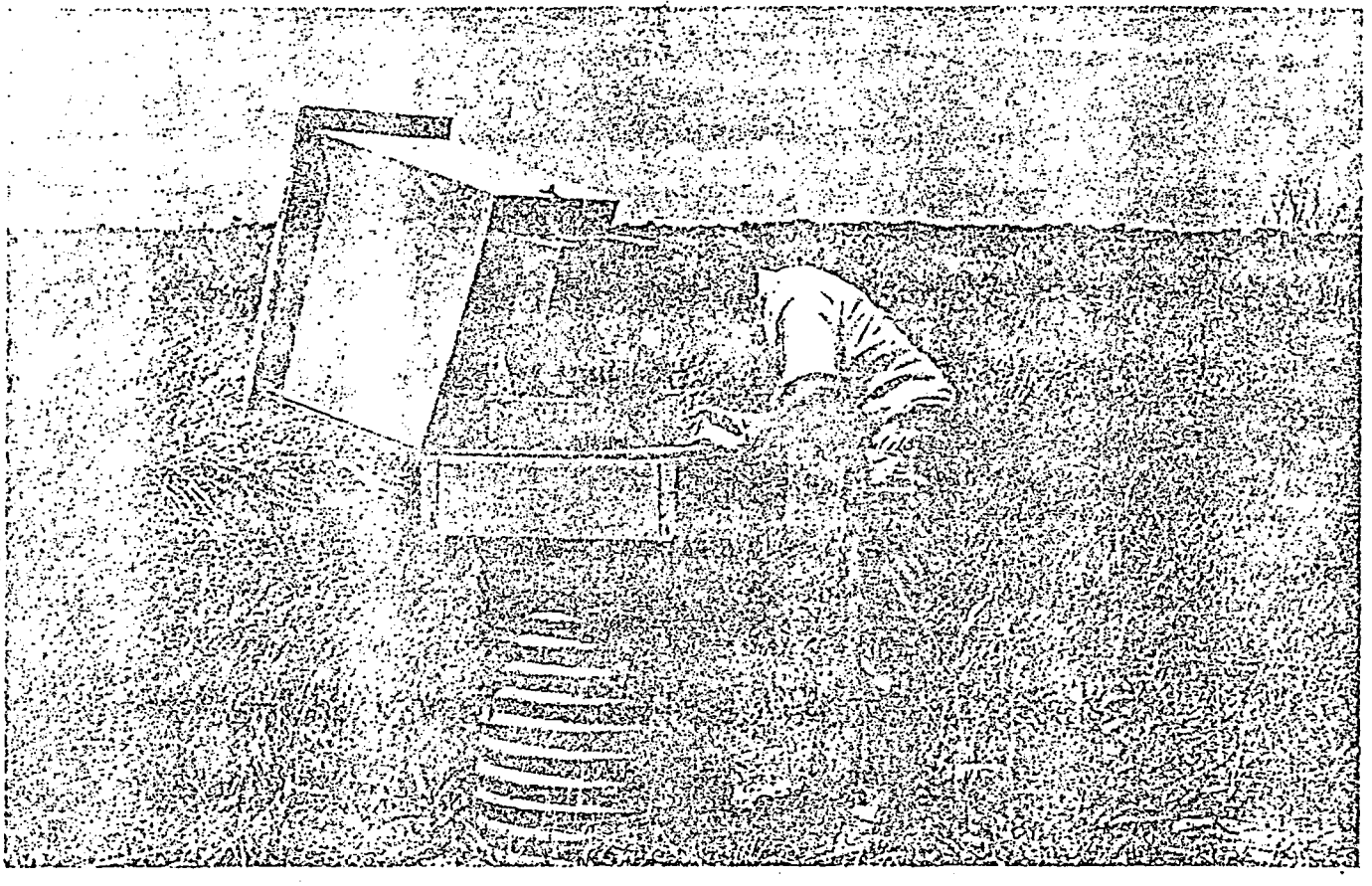
FROM: Keith Snavely RKS
Hydrogeologist
NC Superfund Section

RE: Depth to Groundwater
Union Carbide Battery Disposal Site
5400 Hovis Road, Charlotte, NC
NCD 980 844 336

The depth of groundwater near the site was approximated from well records from four industrial groundwater wells and one domestic well out of Geology and Ground Water in the Charlotte Area, North Carolina, Legrand and Mundorff, 1952. The well depths range from 150 to 200 feet below groundsurface except for one dug well with a depth of 31 feet below groundsurface. The depth of groundwater from these wells range from 20 to 26 feet below groundsurface. The depth of groundwater chosen for the battery disposal site is estimated at 20 feet below groundsurface. The five wells that were reviewed are: the G.V. Keller well with a depth of 190 feet and water level of 26 feet below ground surface; the Planter's Fertilizers & Phosph. Co. with a well depth of 31 and water level of 25 feet below groundsurface; the Charlotte Pipe and Foundary Co. with a well depth of 196 feet and water level of 20 feet below groundsurface; and Air Reduction Sales Co. and National Welding Supply Co. with well depths respectively at 200 and 150 feet below groundsurface. These last two wells do not contain water level data.

Reference 13
DeLOSA

Basic Elements of Ground-Water Hydrology with Reference to Conditions in North Carolina



U.S. GEOLOGICAL SURVEY
WATER RESOURCES INVESTIGATIONS
OPEN-FILE REPORT 80-44

Prepared in cooperation with the
North Carolina Department of Natural
Resources and Community Development

Bob

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Basic Elements of Ground-Water Hydrology With Reference to Conditions in North Carolina

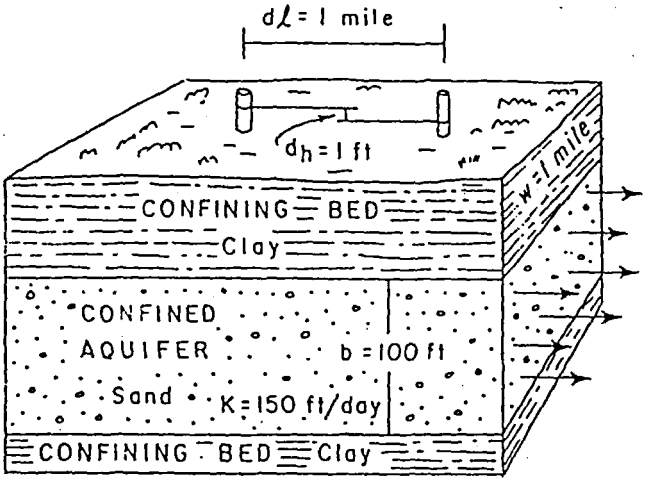
By Ralph C. Heath

U.S. Geological Survey
Water-Resources Investigations
Open-File Report 80-44

Prepared in cooperation with the
North Carolina Department of Natural
Resources and Community Development

Raleigh, North Carolina
1980

Transmissivity



The capacity of an aquifer to transmit water is referred to as its transmissivity. The *transmissivity* (T) of an aquifer is equal to the hydraulic conductivity of the material comprising the aquifer multiplied by the thickness of the aquifer. Thus

$$T = Kb \qquad (1)$$

where T is transmissivity,
K is hydraulic conductivity, and
b is aquifer thickness.

As was the case with hydraulic conductivity, transmissivity is also defined in terms of a unit hydraulic gradient.

If we combine equation 1 with Darcy's law (see HYDRAULIC CONDUCTIVITY), the result is an equation that can be used to calculate the quantity of water moving through a width, w, of an aquifer. Thus,

$$Q = KA\frac{dh}{dl} = K(bw)\frac{dh}{dl} = (Kb)w\frac{dh}{dl}$$

$$Q = Tw\frac{dh}{dl} \qquad (2)$$

Equation 2 is also used to calculate transmissivity, where the quantity of water (Q) discharging from a known width of aquifer can be determined as, for example, with streamflow measurements. Rearranging terms, we obtain

$$T = \frac{Q\,dl}{w\,dh} \qquad (3)$$

The units of transmissivity, as can be demonstrated with the preceding equation, are

$$T = \frac{(ft^3\ day^{-1})\ (ft)}{(ft)\ \ (ft)} = \frac{ft^2}{day}$$

Because transmissivity depends both on K and b, its value is different in different aquifers and from place to place in the same aquifer.

Average Values of Hydraulic Conductivity, Thickness, and Transmissivity for Selected Aquifers in North Carolina

Aquifer	Hydraulic Conductivity (ft./day)	Thickness (ft.)	Transmissivity (ft²./day)
Post-Yorktown deposits	50	20	1000
Yorktown Formation	50	40	2000
Castle Hayne Limestone	300	100	30000
Cretaceous deposits	20	200	4000
Saprolite	5	50	250
Granite and gneiss	5	200	1000

Transmissivity replaces the term "coefficient of transmissibility" because, by convention, an aquifer is transmissive and the water in it is transmissible.

PROBLEM - Determine the quantity of water (Q) moving through the segment of the confined aquifer shown in the preceding drawing in both ft.³/day and gal./day.

(1) Calculation of transmissivity

$$T = Kb = \frac{150\ ft}{day} \times \frac{100\ ft}{1} = \frac{15{,}000\ ft^2}{day}$$

(2) Solution in ft.³/day

$$Q = Tw\frac{dh}{dl} = \frac{15{,}000\ ft^2}{day} \times \frac{5280\ ft}{1} \times \frac{1\ ft}{5280\ ft} = \frac{15{,}000\ ft^3}{day}$$

(3) Conversion of ft³./day to gal./day

$$\frac{15{,}000\ ft^3}{day} \times \frac{7.5\ gal}{ft^3} = 112{,}500\ gal/day$$

MEMO

DATE: May 1, 1995

TO: File

FROM: Keith Snavely RKS
Hydrogeologist
NC Superfund Section

RE: Hydraulic Conductivity
Union Carbide Battery Disposal Site
5400 Hovis Road, Charlotte, NC
NCD 980 844 336

The hydraulic conductivity of the granitic aquifer in the Charlotte area was approximated from average hydraulic conductivity values in North Carolina out of Basic Elements of Ground-Water Hydrology with Reference to Conditions in North Carolina- Heath, Ralph., 1980, U.S. Geological Survey, Water Resources Investigations, Open-File Report 80-44. The hydraulic conductivity is 5 ft/day. The conversion to cm/sec is shown below:

5 ft/day X 12 in/1 ft X 2.54 cm/in X 1 day/24 hr X 1 hr/60 min

X 1 min/60 sec. = 1.76 X 10-3 cm/sec

MEMO

DATE: May 25, 1995

TO: File

FROM: Keith Snavely KKS
Hydrogeologist
NC Superfund Section

RE: Groundwater Population Information
Union Carbide Corporation Battery Disposal Site
5400 Hovis Road, Charlotte NC
NCD # 980 844 336

On May 24, 1995, I received public water supply information on community wells within 4-miles of the referenced site. Once this information was plotted on the USGS quad maps of Mountain Island Lake, Derita, Charlotte East, and Charlotte West, Charlotte municipal water was delineated in the site area, and residents using groundwater were determined. Houses that were not supplied municipal or community well water were assumed as private well users. There are some residents within the city limits of Charlotte that still use groundwater but have access to municipal water from the Charlotte-Mecklenburg Utility Department (CMUD). The number of these residents are minumal and counted in the groundwater count only in areas where there is known clusters of groundwater users.

The groundwater population was determined by counting houses within each distance ring of 0.0 - 0.25, 0.25 - 0.50, 0.50 - 1.00, 1.00 - 2.00, 2.00 - 3.00, 3.00 - 4.00 miles from the site. To determine the population from each house count, the house counts were multiplied by the person-per-household value for Mecklenburg County of 2.5 persons. Each USGS map uses is a 1"=2000' scale and the total groundwater population includes the community water well information plotted in each distance ring. The total population per distance ring is listed below:

Table 1. Total groundwater population within 4-mile

Distance Ring miles	Population	Cumulative Population
0.0 - 0.25	0	0
0.25 - 0.50	0	0
0.50 - 1.00	0	0
1.00 - 2.00	495	495
2.00 - 3.00	568	1063
3.00 - 4.00	1079	2142

The community groundwater wells per distance ring included in the groundwater totals of Table 1 are listed below.

Table 2. Community Water Wells

Distance Ring	System Name	Population
1.00 - 2.00	Oakdale S/D	440
2.00 - 3.00	Trexler Park	114
3.00 - 4.00	---	---

PMMGRID STATE N.C. PUBLIC WATER SUPPLY SYSTEM 05/23/95

Reference 15

ACTIVE SYSTEMS

GRID LATITUDE: 351248 / 351947, LONGITUDE: 0804930 / 0805805

PWS ID	SYSTEM NAME	TYPE	POPULATION	RES.PERSON WORK PHONE	SOURCE NAME	SOURCE TYPE	SOURCE AVAIL.	LATITUDE	LONGITUDE
160103	JUNIPER DRIVE WATER SYSTEM	C	94	7045960655	WELL #1 & #2	G	P	351630	805300
	JUNIPER DRIVE WATER SYSTEM	C	94	7045960655	WELL #1 & #2	G	P	351630	805300
160160	MINERAL SPRINGS MHP	C	108		WELL	G	P	351419	805028
160171	OAKDALE S/D	C	440	7045257990	WELL #2	G	P	351818	805342
	OAKDALE S/D	C	440	7045257990	WELL #1	G	P	351800	805336
160173	PARKWOOD MHP	C	157	9106650817	WELL #2	G	P	351618	805436
	PARKWOOD MHP	C	157	9106650817	WELL #1	G	P	351618	805436
160190	TREXLER PARK	C	114	7045257990	WELL	G	P	351700	805200
160226	FARMINGTON	C	109	7045257990	WELL	G	P	351510	805510
160227	PROVIDENCE WEST S/D	C	309	7045257990	WELL #2	G	P	351700	805500
	PROVIDENCE WEST S/D	C	309	7045257990	WELL #1	G	P	351700	805500
160471	THE LITTLE SUPER MARKET	N	80	7043990739	WELL	G	P	351407	805635
160472	RIVER VIEW INN	N	1000	7043993385	WELL	G	P	351402	805630
160484	ROADWAY EXPRESS	P	95	7045966370	WELL	G	P	351838	805028
160496	BRADLEY MOTEL	N	75	7043923206	WELL	G	P	351404	805627
160497	LITTLE GENERAL STORE	N	25	7043924570	WELL	G	P	351405	805620
160501	RBE INC	N	99	7043913100	WELL	G	P	351250	805730
	RBE INC	N	99	7043913100	WELL	G	P	351256	805730
160517	SHUFFLETON GRILL	N	75	7043931755	WELL	G	P	351945	805715
160527	PINE ISLAND GOLF CLUB	N	100	7043941422	WELL	G	P	351807	805752
160528	COULWOOD HILLS SWIM CLUB	N	350	7043825074	WELL	G	P	351755	805653
160537	WALDROPS GRILL	N	50	7045969968	WELL	G	P	351742	805022
160575	SUNSET HILLS GOLF PRO SHOP	N	900	2043990980	WELL	G	P	351830	805315
160605	BERRYHILL ELEM SCHOOL	P	700	7043436040	WELL	G	P	351332	805731
160608	OAK GROVE BAPTIST CHURCH	N	70	7043945075	WELL	G	P	351701	805747
160619	COPAL GRILL	N	250	7043922241	WELL	G	P	351335	805625
160622	MEMORIAL FOUR SQUARE CHURCH	N	75	7043949997	WELL SUPPLY	G	P	351700	805647
160623	BERRYHILL BAPTIST CHURCH	N	100	7043991870	WELL	G	P	351329	805740
160627	OAKDALE SWIM CLUB	N	25	7043999586	WELL	G	P	351817	805335
160673	MCCALL BROS	P	30	7043991506	WELL	G	P	351733	805453
	MCCALL BROS	P	30	7043991506	WELL	G	P	351738	805458
160675	WILSON MEMORIAL BAPTIST CHURCH	N	70	7043920714	WELL	G	P	351745	805215
160680	OAKDALE BAPTIST CHURCH	N	120	7043947295	WELL	G	P	351730	805407
160681	ROCK OF AGES BAPTIST CH	N	50	7045969489	WELL	G	P	351645	805000
160702	SHIRLEYS CHILD CARE	P	50	7045965206	WELL	G	P	351745	805100
160707	KINGDOM HALL OF JEHOVH'S WITNE	N	90	7043929931	WELL	G	P	351715	805637
160710	SOUTH 21	N	25	7043991678	WELL	G	P	351713	805427
160717	THRIFT ROAD CHRISTIAN CHURCH	N	160	7043926650	WELL	G	P	351515	805515
160763	NORTHWEST AUTO AUCTION	N	37	7043940326	WELL	G	P	351730	805445
160782	MIDSTATE AUTO AUCTION OF CHARL	N	32	7043940326	WELL	G	P	351730	805445
160790	FOX DRIVE-IN THEATER	N	600	7045960115	WELL	G	P	351930	804940
160791	RUDY'S	N	25	7045960090	WELL	G	P	351835	805447

U.S. Department of Commerce
Economics and Statistics Administration
BUREAU OF THE CENSUS

1990 CPH-1-35

Reference 16

CENSUS '90

1990 Census of Population and Housing

Summary Population and Housing Characteristics

North Carolina

Table 5. Household, Family, and Group Quarters Characteristics: 1990—Con.

[For definitions of terms and meanings of symbols, see text]

State County County Subdivision Place	Persons in households	All households	Family households: Total	Family households: Married-couple family	Family households: Female householder, no husband present	Nonfamily households: Total	Nonfamily households: Householder living alone: Total	Nonfamily households: Householder living alone: 65 years and over: Total	Nonfamily households: Householder living alone: 65 years and over: Female	Persons per— Household	Persons per— Family	Persons in group quarters: Total	Persons in group quarters: Institutionalized persons	Persons in group quarters: Other persons in group quarters
Martin County	24 813	9 317	6 900	5 087	1 518	2 417	2 213	1 100	906	2.66	3.17	265	257	8
Beargrass township	1 748	627	481	399	62	146	135	61	54	2.79	3.26	–	–	–
Beargrass town	77	35	24	19	4	11	11	6	6	2.20	2.75	–	–	–
Cross Roads township	1 131	445	334	252	59	111	98	43	36	2.54	2.95	–	–	–
Everetts town	143	63	45	33	9	18	16	14	14	2.27	2.69	–	–	–
Goose Nest township	1 686	573	432	308	105	141	126	63	46	2.94	3.47	–	–	–
Oak City town	389	147	105	86	15	42	38	19	14	2.65	3.22	–	–	–
Griffins township	1 021	385	306	248	40	79	75	38	33	2.65	3.01	–	–	–
Hamilton township	2 018	690	544	382	130	146	130	56	43	2.92	3.36	20	20	–
Hamilton town	524	195	149	111	28	46	41	20	15	2.69	3.13	20	20	–
Hassell town	95	39	25	17	7	14	12	4	3	2.44	3.08	–	–	–
Jamesville township	2 465	965	700	542	127	265	250	132	120	2.55	3.10	11	7	4
Jamesville town	608	262	163	103	57	99	93	48	44	2.32	3.07	4	–	4
Poplar Point township	503	176	133	111	15	43	36	20	14	2.86	3.36	–	–	–
Robersonville township	4 432	1 583	1 182	812	319	401	367	202	153	2.80	3.33	–	–	–
Parmele town	321	117	81	43	30	36	32	19	14	2.74	3.44	–	–	–
Robersonville town	1 940	769	537	366	153	232	220	136	111	2.52	3.13	–	–	–
Williams township	1 055	395	318	264	45	77	72	35	25	2.67	3.03	–	–	–
Williamston township	8 754	3 478	2 470	1 769	616	1 008	924	450	382	2.52	3.05	234	230	4
Williamston town	5 353	2 178	1 474	942	482	704	652	344	290	2.46	3.06	150	146	4
Mecklenburg County	499 886	200 219	134 361	103 211	25 013	65 858	52 037	12 990	10 610	2.50	3.05	11 547	3 578	7 969
Township 1, Charlotte	383 674	156 729	101 116	73 965	22 077	55 613	44 161	10 974	8 981	2.45	3.05	5 897	2 626	3 271
Charlotte city (pt.)	383 674	156 729	101 116	73 965	22 077	55 613	44 161	10 974	8 981	2.45	3.05	5 897	2 626	3 271
Township 2, Berryhill	3 824	1 473	1 099	898	145	374	301	93	73	2.60	3.00	–	–	–
Township 3, Steel Creek	6 586	2 603	1 988	1 822	103	615	458	87	68	2.53	2.89	–	–	–
Charlotte city (pt.)	292	115	65	42	9	50	29	3	2	2.54	2.94	–	–	–
Township 4, Sharon	7	2	2	1	1	–	–	–	–	3.50	3.50	–	–	–
Charlotte city (pt.)	7	2	2	1	1	–	–	–	–	3.50	3.50	–	–	–
Township 5, Providence	14 526	4 828	4 223	3 996	165	605	518	245	210	3.01	3.26	186	186	–
Charlotte city (pt.)	1 644	531	478	455	16	53	45	6	3	3.10	3.30	–	–	–
Matthews town (pt.)	3 821	1 397	1 127	1 067	46	270	251	179	160	2.74	3.12	50	50	–
Weddington town (pt.)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Township 6, Clear Creek	16 036	5 643	4 755	4 258	375	888	743	222	194	2.84	3.13	121	121	–
Mint Hill town (pt.)	9 827	3 407	2 930	2 644	218	477	401	145	129	2.88	3.14	–	–	–
Township 7, Crab Orchard	12 415	4 632	3 175	2 782	278	1 457	794	122	101	2.68	3.04	3 436	–	3 436
Township 8, Mallard Creek	8 803	3 394	2 552	2 257	217	842	684	137	101	2.59	3.02	9	–	9
Charlotte city (pt.)	1 236	515	354	280	56	161	147	35	24	2.40	2.94	–	–	–
Township 9, Deweese	5 309	2 053	1 496	1 190	254	557	489	199	162	2.59	3.08	1 495	265	1 230
Cornelius town (pt.)	2 051	767	576	445	107	191	173	72	60	2.67	3.17	–	–	–
Davidson town (pt.)	2 200	908	611	468	122	297	263	108	89	2.42	2.99	1 495	265	1 230
Township 10, Lemley	6 118	2 494	1 834	1 650	127	660	516	90	56	2.45	2.86	3	–	3
Cornelius town (pt.)	530	215	144	104	31	71	56	5	1	2.47	3.04	–	–	–
Davidson town (pt.)	351	207	80	70	3	127	94	4	1	1.70	2.30	–	–	–
Township 11, Long Creek	10 690	3 888	3 062	2 528	393	826	669	205	155	2.75	3.11	332	332	–
Charlotte city (pt.)	3 174	1 096	876	658	174	220	183	41	33	2.90	3.26	–	–	–
Township 12, Paw Creek	6 315	2 445	1 936	1 684	173	509	430	154	120	2.58	2.92	2	2	–
Charlotte city (pt.)	3	1	1	–	1	–	–	–	–	3.00	2.00	–	–	–
Township 13, Morning Star	15 986	5 772	4 608	4 112	363	1 164	917	166	137	2.77	3.13	9	–	9
Matthews town (pt.)	9 776	3 415	2 778	2 477	216	637	508	102	84	2.86	3.21	4	–	4
Mint Hill town (pt.)	1 740	580	514	482	24	66	48	23	19	3.00	3.20	–	–	–
Township 14, Pineville	4 588	2 306	1 073	893	130	1 233	899	120	107	1.99	2.73	53	46	7
Charlotte city (pt.)	7	2	2	2	–	–	–	–	–	3.50	3.50	–	–	–
Pineville town	2 917	1 392	715	582	93	677	505	98	88	2.10	2.82	53	46	7
Township 15, Huntersville	5 009	1 957	1 442	1 175	212	515	458	176	145	2.56	3.03	4	–	4
Huntersville town	3 014	1 257	860	666	158	397	360	127	108	2.40	2.95	–	–	–
Mitchell County	14 288	5 779	4 420	3 777	479	1 359	1 265	669	539	2.47	2.88	145	130	15
Bakersville township	1 570	621	476	403	50	145	130	70	58	2.53	2.93	14	14	–
Bakersville town	326	148	99	71	17	49	44	21	15	2.20	2.71	6	6	–
Bandana township	308	128	95	86	7	33	31	25	23	2.41	2.87	–	–	–
Bradshaw township	528	217	168	153	6	49	47	26	23	2.43	2.84	–	–	–
Cane Creek township	671	264	199	162	23	65	59	33	23	2.54	2.97	–	–	–
Fork Mountain-Little Rock Creek township	753	301	240	214	17	61	59	35	27	2.50	2.83	5	5	–
Glenn township	327	138	97	86	10	41	37	18	15	2.37	2.90	114	107	7
Grassy Creek township	7 130	2 913	2 194	1 829	295	719	678	339	270	2.45	2.88	–	–	–
Spruce Pine town	2 010	858	610	474	118	248	234	134	109	2.34	2.84	–	–	–
Harrell township	1 095	419	353	306	33	66	64	32	21	2.61	2.89	–	–	–
Poplar township	300	115	95	79	10	20	19	11	8	2.61	2.92	–	–	–
Red Hill township	336	151	106	100	4	45	43	30	23	2.23	2.72	–	–	–
Snow Creek township	1 270	512	397	359	24	115	98	50	48	2.48	2.82	12	4	8
Montgomery County	22 279	8 290	6 274	4 823	1 119	2 016	1 838	876	690	2.69	3.14	1 067	997	70
Biscoe township	4 474	1 662	1 235	914	247	427	382	178	138	2.69	3.14	64	61	3
Biscoe town (pt.)	1 478	513	389	281	88	124	103	52	38	2.88	3.34	6	6	–
Candor town	745	299	207	159	40	92	88	33	32	2.49	3.05	3	–	3
Cheek Creek township	758	281	226	195	22	55	55	25	20	2.70	3.10	–	–	–
Eldorado township	620	269	192	169	15	77	69	27	13	2.30	2.77	48	–	48
Little River township	879	289	245	216	20	44	39	17	15	3.04	3.33	–	–	–
Mount Gilead township	3 753	1 300	972	654	263	328	302	159	134	2.89	3.44	57	57	–
Mount Gilead town	1 279	480	348	236	99	132	124	74	64	2.66	3.25	57	57	–
Ophir township	504	178	147	126	16	31	30	17	12	2.83	3.19	–	–	–
Peedee township	846	345	270	232	26	75	69	23	14	2.45	2.82	–	–	–
Rocky Springs township	1 480	485	381	274	85	104	96	45	29	3.05	3.52	72	72	–
Star township	2 539	990	752	604	108	238	222	108	90	2.56	3.00	90	80	10
Biscoe town (pt.)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Star town	708	291	202	146	38	89	85	41	39	2.43	3.00	67	57	10
Troy township	5 349	2 088	1 525	1 147	294	563	513	257	211	2.56	3.05	736	727	9
Troy town	2 668	1 095	734	507	179	361	328	177	149	2.44	3.02	736	727	9
Uwharrie township	1 077	403	329	292	23	74	61	20	14	2.67	2.95	–	–	–
Moore County	58 010	23 827	17 483	14 312	2 473	6 344	5 662	2 744	2 201	2.43	2.87	1 003	970	33
Township 1, Carthage	4 700	1 792	1 334	1 053	216	458	424	207	156	2.62	3.11	164	164	–
Carthage town	912	377	252	194	46	125	113	62	46	2.42	3.03	64	64	–
Township 2, Bensalem	2 898	1 087	829	651	121	258	231	96	71	2.67	3.10	140	140	–
Township 3, Sheffields	5 127	1 960	1 489	1 205	201	471	429	223	179	2.62	3.03	13	13	–
Robbins city (pt.)	859	351	249	169	58	102	91	53	47	2.45	2.88	13	13	–
Township 4, Ritters	2 388	919	700	591	82	219	201	107	88	2.60	3.04	6	6	–
Robbins city (pt.)	98	44	28	23	4	16	14	8	8	2.23	2.86	–	–	–
Township 5, Deep River	408	160	117	94	17	43	38	20	18	2.55	3.04	–	–	–
Township 6, Greenwood	2 326	898	658	522	100	240	215	106	85	2.59	3.07	28	28	–
Cameron town	215	79	57	37	18	22	20	11	9	2.72	3.23	–	–	–

Site Name: State Ports Authority
Site Number: NCD 980 844 336

Site Location: Charlotte, N.C.
Mecklenburg County
Latitude: 35 16 13.5
Longitude: 80 53 43.5

Date: July 06, 1992

Calculation Results

Distance from Site Location	Population Per Ring	Population Cumulative	Number of Households Per Ring	Number of Households Cumulative
0 to 1/4 mile	278	278	88	88
>1/4 to 1/2 mile	827	1,105	277	365
>1/2 to 1 mile	4,544	5,649	1,754	2,119
>1 to 2 miles	13,284	18,933	5,419	7,538
>2 to 3 miles	24,504	43,437	9,472	17,010
>3 to 4 miles	26,988	70,425	10,553	27,563

Note: The populations and number of households within specified target distance rings were calculated for the NC Superfund Section by the NC State Center for Geographic Information and Analysis using the 1990 US Census data. These values were calculated by summing the population and the number of households data for each census block located within each target ring. For census blocks lying only partially within the ring, the per cent area of the block within the ring was multiplied by the population and household densities of the block.

MEMO

DATE: April 27, 1995

TO: File

FROM: Keith Snavely RKS
Hydrogeologist
NC Superfund Section

RE: Wellhead Protection Areas - Mecklenburg County
Union Carbide Battery Disposal Site
5400 Hovis Road, Charlotte, NC
NCD 980 844 336

Mr. Randy Prillaman of the Wellhead Protection Program within the Groundwater Section of NC Department of Environmental Health and Natural Resources (NCDEHNR) was contacted on April 26, 1995 to obtain any information on wellhead protection areas in Mecklenburg County. According to the wellhead protection program there are no wellhead protection areas in Mecklenburg County.

MEMO

DATE: April 21, 1995

TO: File

FROM: Keith Snavely
Hydrogeologist RKS
NC Superfund Section

RE: Flow Calculations along the 15-mile surface water pathway
Union Carbide Battery - 5400 Hovis Road
NCD 900 844 336
Charlotte, NC - Mecklenburg County

Flow calculations were determined within the site's 15-mile surface water pathway (SWP) from 4 gauging stations. The 15-mile surface water pathway extends south of the PPE from the battery disposal area along Stewart Creek to the end of the 15-mile SWP in Sugar Creek, Fort Mill quadrangle. Five wetland inventory maps were reviewed for the 15-mile surface water pathway. These are Mountain Island Lake, Charlotte West, Charlotte East, Derita, and Fort Mill, SC-NC. A topographic map measuring wheel was used to determine the length of the 15-mile surface water pathway with a scale of 1"= 2000'.

The references used to determine flow along the Deep River are the US Geological Survey Open-File Report 83-211 - Drainage Areas of Selected Sites on Streams in North Carolina; and Water Resources Investigations Report 88-4094 - Map of Mean Annual Runoff for the Northeastern, Southeastern, and Mid-Atlantic United States, Water Years 1951-80. The mean annual runoff of the site area and the drainage area from each stream segment are placed into a formula used to determine the flow of the stream (s) at various locations along the surface water pathway.

The formula is:

runoff X drainage area/13.58 = flow

The runoff in the site area is 16 inches/year.

The flow calculations at each gauging station are as follows:

1) Stewart Creek at I-85 at Charlotte:

16 in/yr X 3.34 sq. miles/13.58 = 3.93 cubic feet/sec (cfs)

2) Irwin Creek at Barringer Drive at Charlotte:

16 in/yr X 26.0 sq. miles/13.58 = 30.63 cfs

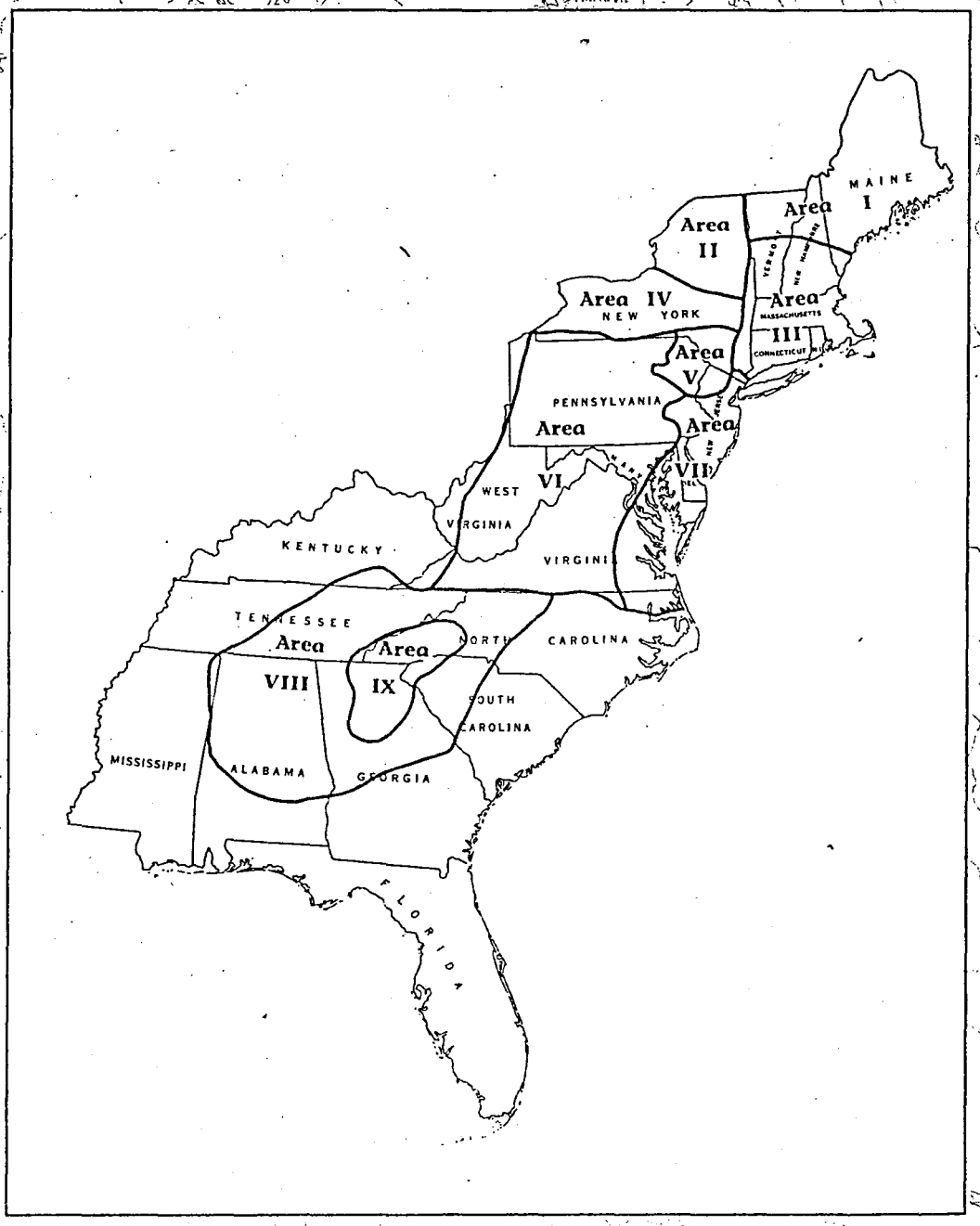
3) Sugar Creek at NC 49 Near Charlotte:

16 in/yr X 41.2 sq. miles/13.58 = 48.54 cfs

4) Sugar Creek at US 21 at Pineville:

16 in/yr X 65.3 sq. miles/13.58 = 76.93 cfs

MAP OF MEAN ANNUAL RUNOFF FOR THE NORTHEASTERN, SOUTHEASTERN, AND MID-ATLANTIC UNITED STATES, WATER YEARS 1951-80



Prepared in cooperation with the
U.S. Environmental Protection Agency

MAP OF MEAN ANNUAL RUNOFF FOR THE NORTHEASTERN, SOUTHEASTERN, AND MID-ATLANTIC UNITED STATES, WATER YEARS 1951–80

By
William R. Krug, Warren A. Gebert, David J. Graczyk, U.S. Geological Survey;
Donald L. Stevens, Jr., Eastern Oregon State College;
Barry P. Rochelle, Northrop Services, Inc.;
and M. Robbins Church, U.S. Environmental Protection Agency

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 88–4094

Prepared in cooperation with the
U.S. ENVIRONMENTAL PROTECTION AGENCY

Madison, Wisconsin
1990

sions that the methods that used the area-weighted average of the drainage area or the centroid of the drainage area produced somewhat better correlations—that is, the interecept was closer to zero, the standard errors were small, and the correlation coefficients were larger. These methods have slightly greater power to predict actual runoff

Additional statistical investigation found no significant differences in reliability of the runoff estimates among the areas. No significant differences existed in the errors for stations with drainage areas of differing size.

USE OF MEAN ANNUAL RUNOFF MAP

Mean annual runoff for a site can be estimated from the runoff map by several methods. The simplest method of estimating the runoff is to locate the site on the runoff map and to identify the runoff contour nearest the site. This method, however, is less accurate than other methods. The most accurate method is to draw the drainage basin on the runoff map, and use the runoff contours to divide the basin into bands of differing runoff. The area of each of the bands within the drainage basin is then determined. The areas of the separate bands are then used to compute a weighted average runoff for the basin. For example, if 50 percent of the basin is in an area of 18 in/yr (inches per year) of runoff, 30 percent in an area of 20 in/yr of runoff and 20 percent in an area of 22 in/yr of runoff the mean annual runoff would be calculated as follows:

$$0.5 \times 18 + 0.3 \times 20 + 0.2 \times 22 = 19.4$$

Runoff estimated from the map is in inches per year, averaged over the entire drainage basin. Multiply this value by the drainage area, in square miles, and divide by 13.58 to convert to mean annual discharge, in cubic feet per second. In the above example, assume the drainage area of the site is 100 mi^2. The mean annual discharge, in cubic feet per second, would be:

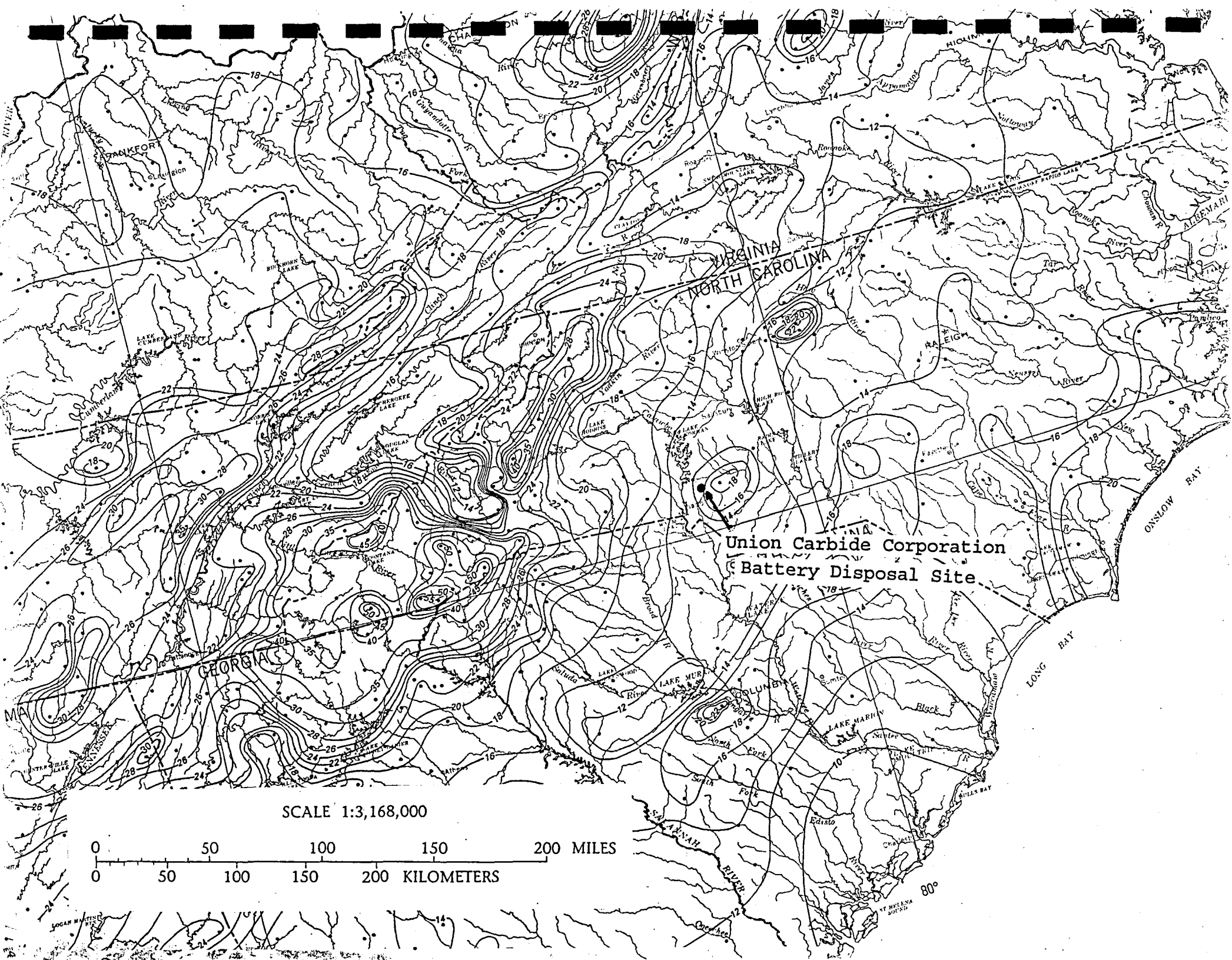
$$19.4 \times 100/13.58 = 143$$

The runoff map was prepared to allow estimation of mean annual runoff at sites where no streamflow data are available. The map represents mean annual runoff for areas with natural land cover. Caution should be used in applying the map to estimate runoff for areas that are not natural land areas. The runoff map should not be used for areas, such as large urban areas, where the land cover has been altered in ways that would change the amount of runoff. The runoff map is not applicable for lakes or bays, for coastal wetlands affected by tides, for streams controlled by reservoirs large enough to influence the total annual streamflow, or for streams with substantial diversions.

Local features could cause the runoff at a particular site to differ substantially from the runoff indicated by the runoff map. The geology of the drainage basin might cause substantial amounts of water to enter or leave the basin as ground water. This could substantially increase or decrease the runoff. For example, a stream with a small drainage area that includes a large spring probably would have higher average streamflow than indicated by the runoff map.

Table 5.—Descriptive statistics of errors in estimated runoff at 93 test stations

Method	Mean absolute value	Mean	Standard error of mean	Standard deviation
		Error, in inches		
Area-weighted	2.0	–0.35	0.30	2.9
Centroid	2.2	–.71	.33	3.1
GIS	2.7	–1.74	.37	3.6
Nearest-inch	2.8	–1.77	.38	3.7
Nearest contour	2.8	–1.79	.39	3.8
		Percent error		
Area-weighted	9.0	–0.54	1.3	12.9
Centroid	9.8	–.71	1.4	13.5
GIS	12.0	–6.42	1.6	15.9
Nearest-inch	12.1	–6.20	1.6	15.6
Nearest-contour	12.2	–6.26	1.6	15.8


Union Carbide Corporation
Battery Disposal Site
VIRGINIA
NORTH CAROLINA
GEORGIA
RALEIGH
COLUMBIA
LAKE MURRAY
LAKE MARION
ONSLOW BAY
LONG BAY
SCALE 1:3,168,000
0 50 100 150 200 MILES
0 50 100 150 200 KILOMETERS
80°

U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 83-211

DRAINAGE AREAS OF SELECTED SITES ON STREAMS IN NORTH CAROLINA

Prepared in cooperation with the

North Carolina Department of Natural

Resources and Community Development

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DRAINAGE AREAS OF SELECTED SITES ON STREAMS IN NORTH CAROLINA

By Robert L. Meikle

Open-File Report 83-211

Prepared in cooperation with the
NORTH CAROLINA DEPARTMENT OF NATURAL
RESOURCES AND COMMUNITY DEVELOPMENT

Raleigh, North Carolina
1983

SOUTH FORK CATAWBA RIVER - CONTINUED

STATION NUMBER	STATION NAME	DRAINAGE AREA (SQ MI)	SITE TYPE	LAT	LONG	QUAD NAME	COUNTY CODE
0214400000	LONG C NR BESSEMER CITY	31.8	01	351823	811405	GASTONIA NORTH	071
0214401000	LONG C AT NC 275 NR GASTONIA	34.2	02	351808	811320	GASTONIA NORTH	071
0214416000	LONG C NR W GASTONIA	35.1	20	351759	811255	GASTONIA NORTH	071
0214432000	LONG C TRIB AT MTH NR DALLAS	1.26	20	351754	811253	GASTONIA NORTH	071
0214448000	KAGLOR B AT MTH NR GASTONIA	3.12	20	351747	811133	GASTONIA NORTH	071
0214450000	LONG C NR GASTONIA	41.9	01	351737	811108	GASTONIA NORTH	071
0214454600	LONG C AT DALLAS	43.3	11	351730	811055	GASTONIA NORTH	071
0214457600	LONG C TRIB AT MTH NR GASTONIA	1.06	20	351720	811033	GASTONIA NORTH	071
0214460600	JULE ALLEN B AT MTH NR GASTONIA	1.14	20	351751	810955	GASTONIA NORTH	071
0214463600	LONG C NR DALLAS	48.3	11	351755	810935	GASTONIA NORTH	071
0214464600	BURTON B AT MTH AT RANLO	1.88	20	351825	810807	GASTONIA NORTH	071
0214465900	L LONG C AT SR 1601 NR DALLAS	2.11	20	352000	811310	GASTONIA NORTH	071
0214467100	L LONG C NR DALLAS	4.30	11	351924	811137	GASTONIA NORTH	071
0214467600	L LONG C AT SR 1800 NR DALLAS	5.33	11	351932	811059	GASTONIA NORTH	071
0214468000	LITTLE LONG C AT NC 275 NR DALLAS	6.83	02	351915	810953	GASTONIA NORTH	071
0214476050	L LONG C AT MTH NR SPENCER MOUNTAIN	8.66	20	351830	810716	MOUNT HOLLY	071
0214476100	LONG C AT SPENCER MOUNTAIN	61.0	11	351830	810705	MOUNT HOLLY	071
0214476300	S F CATAWBA R AT DAM AT SPENCER MOUNTAIN	622.	20	351830	810640	MOUNT HOLLY	071
0214484100	HOUSER C NR LOWELL	2.01	11	351658	810610	MOUNT HOLLY	071
0214500000	S F CATAWBA R AT LOWELL	628.	01	351710	810600	MOUNT HOLLY	071
0214511200	S F CATAWBA R AT MCADENVILLE	632.	11	351535	810428	MOUNT HOLLY	071
0214511300	S F CATAWBA R TRIB AT MTH AT W CRAMERTON	1.10	20	351520	810420	MOUNT HOLLY	071
0214511320	S F CATAWBA R TRIB AT MTH AT CRAMERTON	1.50	20	351520	810415	MOUNT HOLLY	071
0214522452	S F CATAWBA R AT SRR AT CRAMERTON	637.	20	351407	810357	BELMONT	071
0214526455	DUHARTS C AT US 29 NR GASTONIA	2.62	20	351535	810746	GASTONIA NORTH	071
0214526550	DUHARTS C AT SR 2329 NR LOWELL	5.68	11	351507	810635	MOUNT HOLLY	071
0214527902	DUHARTS C AT WI AT CRAMERTON	10.1	20	351358	810430	BELMONT	071
0214536400	S F CATAWBA R AT SR 2513 NR BELMONT	650.	20	351312	810353	BELMONT	071
0214544200	S F CATAWBA R NR ELMORES X RDS	653.	20	351000	810218	BELMONT	071

UPPER CATAWBA RIVER

STATION NUMBER	STATION NAME	DRAINAGE AREA (SQ MI)	SITE TYPE	LAT	LONG	QUAD NAME	COUNTY CODE
0214549995	CATAWBA C AT US 321 AT GASTONIA	1.32	11	351457	811124	GASTONIA SOUTH	071
0214550600	CATAWBA C AT BOOGERTOWN	4.10	20	351420	811014	GASTONIA SOUTH	071
0214550803	CATAWBA C AT SR 2457 AT GASTONIA	8.05	20	351411	810910	GASTONIA SOUTH	071
0214550900	CATAWBA C NR GASTONIA	9.70	11	351348	810802	GASTONIA SOUTH	071
0214551065	CATAWBA C TRIB AT MTH NR BOOGERTOWN	2.09	20	351250	810713	BELMONT	071
0214551100	CATAWBA C TRIB AT MTH NR ELMORES X RDS	1.96	20	351238	810645	BELMONT	071
0214551200	CATAWBA C NR BOOGERTOWN	17.4	11	351231	810628	BELMONT	071
0214551400	CATAWBA C TRIB AT MTH NR CRAMERTON	2.48	20	351203	810620	BELMONT	071
0214551800	CATAWBA C NR CRAMERTON	23.4	20	351141	810453	BELMONT	071
0214551900	CATAWBA C AB MTH NR CRAMERTON	24.6	20	351050	810422	BELMONT	071
0214551950	CATAWBA C .1 MI AB MTH NR CRAMERTON	25.7	20	351044	810416	BELMONT	071
0214552200	CATAWBA C TRIB AT MTH NR BELMONT	1.60	20	351008	810415	BELMONT	071
0214553501	CROWDERS C HEADWATERS NR KINGS MOUNTAIN	2.00	20	351357	811831	KINGS MOUNTAIN	071
0214553525	SQUIRREL B AT MTH NR MOUNTAIN VIEW	1.00	20	351356	811819	KINGS MOUNTAIN	071
0214553600	MCGILL C AT NC 161 AT KINGS MTN	0.13	11	351444	811852	KINGS MOUNTAIN	045
0214553800	MCGILL C NR MOUNTAIN VIEW	1.16	11	351440	811908	KINGS MOUNTAIN	071
0214554000	MCGILL C AT MTH AT MOUNTAIN VIEW	1.35	20	351428	811743	KINGS MOUNTAIN	071
0214554300	CROWDERS C AT MOUNTAIN VIEW	6.58	11	351432	811715	KINGS MOUNTAIN	071
0214555100	ABERNATHY C TRIB AT MOUNTAIN VIEW	1.66	11	351521	811727	BESSEMER CITY	071
0214555600	ABERNATHY C TRIB AT BESSEMER CITY	.97	11	351603	811658	BESSEMER CITY	071
0214556200	ABERNATHY C AT MOUNTAIN VIEW	6.90	02	351520	811610	BESSEMER CITY	071
0214557300	DATES C NR BESSEMER CITY	1.18	11	351604	811505	BESSEMER CITY	071
0214557500	DATES C AT MTH NR GASTONIA	3.07	20	351518	811441	GASTONIA NORTH	071
0214558100	CROWDERS C NR MOUNTAIN VIEW	23.5	11	351402	811359	GASTONIA SOUTH	071
0214558210	CROWDERS C TRIB AT MTH NR S GASTONIA	2.86	20	351330	811347	GASTONIA SOUTH	071
0214558300	BLACKWOOD C NR GASTONIA	3.51	11	351335	811253	GASTONIA SOUTH	071
0214558450	BLACKWOOD C AT MTH AT S GASTONIA	4.84	20	351248	811327	GASTONIA SOUTH	071
0214558475	CROWDERS C TRIB AT MTH AT S GASTONIA	1.55	20	351245	811330	GASTONIA SOUTH	071
0214558500	CROWDERS C AT SR 1103 NR GASTONIA	35.6	11	351138	811322	GASTONIA SOUTH	071
0214558550	MCGILL B AT MTH AT CROWDERS	3.12	20	351105	811320	GASTONIA SOUTH	071
0214558600	CROWDERS C AT SR 1108 AT CROWDERS	40.7	20	351035	811258	GASTONIA SOUTH	071
0214558725	S CROWDERS C HEADWATERS NR MOUNTAIN VIEW	3.05	20	351129	811531	KINGS MOUNTAIN	071
0214558750	S CROWDER C TRIB HEADWATERS NR MOUNTAIN VIEW	1.98	20	351027	811658	KINGS MOUNTAIN	071
0214558760	S CROWDERS C TRIB AT MTH NR MOUNTAIN VIEW	3.60	20	351031	811608	KINGS MOUNTAIN	071
0214558780	S CROWDERS C AT SR 1103 NR MOUNTAIN VIEW	10.0	20	351015	811529	KINGS MOUNTAIN	071
0214559280	S F CROWDERS C TRIB AT MTH NR CROWDERS	12.5	20	350957	811452	GASTONIA SOUTH	071
0214559300	S F CROWDERS C NR CROWDERS	25.2	02	350951	811355	GASTONIA SOUTH	071
0214559900	S F CROWDERS C NR BOOGERTOWN	27.6	02	350943	811305	GASTONIA SOUTH	071
0214559905	S F CROWDERS C AT MTH NR CROWDERS	28.9	20	351011	811153	GASTONIA SOUTH	071
0214561000	CROWDERS C NR GASTONIA	70.4	02	351009	811144	GASTONIA SOUTH	071
0214561300	CROWDER C TRIB NO 2 AT SR 2412 NR GASTONIA	2.71	11	351215	811150	GASTONIA SOUTH	071
0214561700	CROWDERS C TRIB NR GASTONIA	6.61	11	351021	811137	GASTONIA SOUTH	071
0214563300	CROWDERS C AT STATE LINE NR GASTONIA	79.2	11	350931	811049	GASTONIA SOUTH	071
0214563350	CROWDERS C TRIB AT MTH NR CROWDERS	3.24	20	350927	811017	GASTONIA SOUTH	071

LOWER CATAWBA RIVER

STATION NUMBER	STATION NAME	DRAINAGE AREA (SQ MI)	SITE TYPE	LAT	LONG	QUAD NAME	COUNTY CODE
0214620550	IRWIN C AT SR 2523 AT DERITA	2.00	20	351721	804913	DERITA	119
0214621100	IRWIN C AT US 21 AT CHARLOTTE	5.97	20	351543	805015	DERITA	119
0214622180	KENNEDY B AB LAKE JO AT I 77 AT CHARLOTTE	2.03	20	351624	805054	DERITA	119
0214624300	IRWIN C AT NC 16 AT CHARLOTTE	11.8	20	351408	805118	CHARLOTTE EAST	119
0214626140	STEWART C AT I 85 AT CHARLOTTE	3.34	20	351607	805157	DERITA	119
0214626150	STEWART C TRIB AT CHARLOTTE	1.52	20	351554	805210	DERITA	119
0214628000	STEWART C AT CHARLOTTE	9.54	01	351412	805159	CHARLOTTE EAST	119
0214628535	STEWART C AT MTH AT CHARLOTTE	11.5	20	351329	805210	CHARLOTTE EAST	119
0214629195	IRWIN C AT BARRINGER DR AT CHARLOTTE	26.0	20	351227	805300	CHARLOTTE WEST	119
0214629220	IRWIN C TRIB AT MTH AT CHARLOTTE	1.21	20	351201	805352	CHARLOTTE WEST	119

STATION NUMBER	STATION NAME	DRAINAGE AREA (SQ MI)	SITE TYPE	LAT	LONG	QUAD NAME	COUNTY CODE
0214630000	IRWIN C NR CHARLOTTE	30.7	01	351150	805418	CHARLOTTE WEST	119
0214630800	TAGGART C NR CHARLOTTE	3.98	02	351256	805524	CHARLOTTE WEST	119
0214631500	TAGGART C AT NEW DIXIE RD NR CHARLOTTE	5.38	03	351221	805524	CHARLOTTE WEST	119
0214632100	TAGGART C AT MTH NR SHOPTON	6.63	20	351136	805455	CHARLOTTE WEST	119
0214632815	SUGAR C AT NC 49 NR CHARLOTTE	41.2	20	350952	805447	CHARLOTTE WEST	119
0214633000	SUGAR C NR CHARLOTTE	44.0	01	350821	805441	CHARLOTTE WEST	119
0214633405	COFFEY C AT NC 160 AT DIXIE	2.46	20	351220	805655	CHARLOTTE WEST	119
0214633806	COFFEY C 0.1 MILE AB WHIPPOORWILL LAKE NR SHOPTON	4.77	20	351105	805624	CHARLOTTE WEST	119
0214634750	COFFEY C AT SR 1155 NR CHARLOTTE	6.82	20	350947	805551	CHARLOTTE WEST	119
0214634800	COFFEY C NR CHARLOTTE	9.14	02	350843	805538	CHARLOTTE WEST	119
0214634900	COFFEY C AT MTH NR SHOPTON	10.5	20	350755	805515	CHARLOTTE WEST	119
0214635210	SUGAR C AT I 85 NR CHARLOTTE	54.9	20	350737	805459	CHARLOTTE WEST	119
0214635400	SUGAR C AT SR 1126 AT CHARLOTTE	58.1	20	350716	805410	FORT MILL (S.C	119
0214636400	KINGS B AT ARROWOOD RD NR CHARLOTTE	2.72	02	350812	805311	CHARLOTTE WEST	119
0214636930	KINGS B AT MTH AT STERLING	4.30	20	350635	805347	FORT MILL (S.C	119
0214638100	SUGAR C AT US 21 AT PINEVILLE	65.3	20	350526	805358	FORT MILL (S.C.)	119
0214638200	MCCULLOUGH B AT MTH NR PINEVILLE	2.21	20	350510	805405	FORT MILL (S.C.)	119
0214638215	SUGAR C AT STATE LINE AT PINEVILLE	69.4	20	350437	805424	FORT MILL (S.C.)	119
0214640200	L SUGAR C AT US 29 AT CHARLOTTE	1.96	20	351530	804731	DERITA	119
0214640475	L SUGAR C TRIB AT US 29 AT CHARLOTTE	2.37	20	351508	804836	DERITA	119
0214640525	L SUGAR C AT SRR BRIDGE AT CHARLOTTE	6.23	20	351444	804852	CHARLOTTE EAST	119
0214640695	L SUGAR C AT US 74 AT CHARLOTTE	10.2	20	351250	805011	CHARLOTTE EAST	119
0214640955	L SUGAR C AT E BLVD AT CHARLOTTE	12.3	20	351147	805020	CHARLOTTE EAST	119
0214641780	DAIRY B AT MTH AT CHARLOTTE	1.20	20	351130	805036	CHARLOTTE EAST	119
0214642000	L SUGAR C AT HILLSIDE AVE AT CHARLOTTE	15.0	01	351039	805048	CHARLOTTE EAST	119
0214642880	BRIER C TRIB 800 FEET AB MTH AT SHAMROCK DRIVE AT	0.74	20	351403	804609	CHARLOTTE EAST	119
0214643000	BRIER C AT CHARLOTTE	5.92	02	351405	804619	CHARLOTTE EAST	119
0214643500	BRIER C TRIB 6 AT SUDBURY ROAD AT CHARLOTTE	0.61	01	351327	804601	CHARLOTTE EAST	119
0214643600	BRIER C TRIB 7 AT SHAMROCK DRIVE AT CHARLOTTE	0.34	01	351407	804726	CHARLOTTE EAST	119
0214643750	BRIER C AT CENTRAL AVE AT CHARLOTTE	10.0	20	351306	804744	CHARLOTTE EAST	119
0214643855	EDWARDS B AT MTH AT CHARLOTTE	2.62	20	351226	804816	CHARLOTTE EAST	119
0214644000	BRIER C AT EAST SEVENTH STREET AT CHARLOTTE	14.7	03	351216	804835	CHARLOTTE EAST	119
0214645000	BRIER C AT SHARON ROAD AT CHARLOTTE	18.6	01	351047	804946	CHARLOTTE EAST	119
0214646604	BRIER C AT MTH AT CHARLOTTE	21.7	20	350925	805106	CHARLOTTE EAST	119
0214647000	L HOPE C AT SENECA PLACE AT CHARLOTTE	2.63	01	350953	805112	CHARLOTTE EAST	119
0214648516	L HOPE C AT MTH AT CHARLOTTE	3.18	20	350922	805111	CHARLOTTE EAST	119
0214650000	L SUGAR C NR CHARLOTTE	40.8	01	350913	805118	CHARLOTTE EAST	119
0214650500	L SUGAR C TRIB 7 AT BURNLEY ROAD AT CHARLOTTE	0.35	01	350919	805210	CHARLOTTE EAST	119
0214650530	L SUGAR C TRIB 7 AT MTH AT CHARLOTTE	0.70	20	350905	805127	CHARLOTTE EAST	119
0214650700	L SUGAR C AT ARCHDALE DR AT CHARLOTTE	42.6	01	350852	805129	CHARLOTTE EAST	119
0214651000	L SUGAR C TRIB 6 AT BROOKCREST DRIVE AT CHARLOTTE	0.72	01	350826	805201	CHARLOTTE EAST	119
0214652001	L SUGAR C AT SHARON ROAD WEST AT CHARLOTTE	46.2	20	350705	805206	WEDDINGTON	119
0214653000	L SUGAR C AT PINEVILLE	49.2	03	350506	805258	FORT MILL (S.C.)	119
0214653800	L SUGAR C NR PINEVILLE	49.5	03	350440	805310	FORT MILL (S.C.)	119
0214653895	L SUGAR C AT STATE LINE NR PINEVILLE	50.8	20	350402	805353	FORT MILL (S.C.)	119
0214655200	MCALPINE C AT LAWYERS RD NR WILGROVE	5.02	11	351133	804219	MINT HILL	119
0214655255	MCALPINE C AT SR 3143 NR IDLEWILD	7.52	20	351033	804312	MINT HILL	119
0214656150	CAMPBELL C HEADWATERS AT NC 24-27 NR ALEXANDERS ST	2.83	20	351211	804428	MINT HILL	119
0214656300	CAMPBELL C AT SR 3156 NR ALEXANDERS STORE	7.51	20	350950	804417	MINT HILL	119
0214657875	IRVINS C TRIB AT SR 1328 NR MINT HILL	1.62	20	351045	804037	MINT HILL	119
0214657900	IRVINS C AT SR 3135 NR MINT HILL	5.27	20	350958	804123	MINT HILL	119
0214658050	IRVINS C NR MATTHEWS	9.80	20	350858	804336	MINT HILL	119
0214658085	IRVINS C TRIB AT US 74 NR HOOD	1.61	20	350745	804235	MINT HILL	119
0214659200	MCALPINE C NR MATTHEWS	33.8	20	350853	804444	MINT HILL	119
0214659450	MCALPINE C TRIB AT MTH NR CHARLOTTE	1.37	20	350846	804525	CHARLOTTE EAST	119
0214659725	MCALPINE C TRIB AT MTH AT SED NR CHARLOTTE	0.78	20	350843	804532	CHARLOTTE EAST	119
0214660000	MCALPINE C AT SARDIS ROAD NR CHARLOTTE	39.6	01	350814	804605	CHARLOTTE EAST	119
0214661200	MCALPINE C AT OLDE PROVIDENCE RD NR CHARLOTTE	41.8	20	350730	804721	WEDDINGTON	119
0214661225	MCALPINE C TRIB AT SHARON VEIW ROAD NR CHARLOTTE	2.11	20	350736	804733	CHARLOTTE EAST	119
0214661251	MCALPINE C TRIB AT MTH AT OLDE PROVIDENCE	1.71	20	350712	804731	WEDDINGTON	119
0214662251	MCALPINE C TRIB AT MTH NR OLDE PROVIDENCE	1.80	20	350600	804906	WEDDINGTON	119
0214665500	MCALPINE C AT NC 51 NR CHARLOTTE	52.6	03	350508	805005	WEDDINGTON	119
0214666750	FOURMILE C AT SR 3448 AT MATTHEWS	3.95	20	350608	804349	MATTHEWS	119
0214666760	FOURMILE C BL TRIB AT OLDE PROVIDENCE	7.39	20	350556	804510	WEDDINGTON	119
0214666780	FOURMILE C TRIB AT MTH NR OLDE PROVIDENCE	1.48	20	350539	804538	WEDDINGTON	119
0214666800	FOURMILE C AT HWY 16 NR MATTHEWS	11.1	03	350517	804630	WEDDINGTON	119
0214666901	ROCKY B AT MTH NR PROVIDENCE	2.24	20	350444	804738	WEDDINGTON	119
0214667000	FOURMILE C NR PINEVILLE	17.8	02	350437	804922	WEDDINGTON	119
0214667010	FOURMILE C AT MTH NR PINEVILLE	18.9	20	350428	805026	WEDDINGTON	119
0214667030	MCALPINE C TRIB AT MTH NR PINEVILLE	3.28	20	350404	805114	WEDDINGTON	119
0214667045	MCALPINE C TRIB 2 AT MTH NR PINEVILLE	1.04	20	350337	805148	WEDDINGTON	119
0214667995	MCMULLEN C HEADWATERS AT CHARLOTTE	1.17	20	351034	804628	CHARLOTTE EAST	119
0214668945	MCMULLEN C TRIB AT MTH AT CHARLOTTE	1.38	20	351012	804714	CHARLOTTE EAST	119
0214669895	MCMULLEN C AT NC 16 AT CHARLOTTE	4.38	11	350935	804759	CHARLOTTE EAST	119
0214670000	MCMULLEN C AT SHARON VEIW ROAD NR CHARLOTTE	6.95	01	350827	804913	CHARLOTTE EAST	119
0214671625	MCMULLEN C TRIB NR GRIFFITH	0.62	20	350637	805020	WEDDINGTON	119
0214671650	MCMULLEN C TRIB 2 NR GRIFFITH	0.77	20	350627	805040	WEDDINGTON	119
0214672500	MCMULLEN C NR GRIFFITH	13.0	01	350522	805115	WEDDINGTON	119
0214674885	MCMULLEN C AT MTH NR PINEVILLE	15.2	20	350359	805210	WEDDINGTON	119
0214676000	MCALPINE C NR PINEVILLE	93.6	02	350343	805239	FORT MILL (S.C.)	119
0214676115	MCALPINE C AT STATE LINE NR PINEVILLE	95.4	20	350312	805306	FORT MILL (S.C.)	119
0214677950	STEELE C HEADWATERS NR SHOPTON	1.10	20	350859	805741	CHARLOTTE WEST	119
0214678000	STEELE C NR SHOPTON	4.89	02	350718	805712	FORT MILL (S.C.)	119
0214678225	WALKER B TRIB AT MTH NR SHOPTON	1.68	20	350600	805850	FORT MILL (S.C.)	119
0214678235	WALKER B TRIB #2 AT MTH NR SHOPTON	1.44	20	350545	805740	FORT MILL (S.C.)	119

LOWER CATAWBA RIVER - CONTINUED

STATION NUMBER	STATION NAME	DRAINAGE AREA (SQ MI)	SITE TYPE	LAT	LONG	QUAD NAME	COUNTY CODE
0214678335	WALKER B AT MTH NR SHOPTON	6.92	20	350540	805730	FORT MILL (S.C.)	119
0214678355	STEELE C AT STATE LINE NR PINEVILLE	14.5	20	350534	805730	FORT MILL (S.C.)	119
0214685380	SIXMILE C AT TILLEY MORRIS RD NR PROVIDENCE	1.78	20	350333	804507	WEDDINGTON	119
0214685400	SIXMILE C NR MATTHEWS	5.52	02	350210	804605	WEDDINGTON	119
0214685466	SIXMILE C TRIB AT MTH NR WEDDINGTON	0.94	20	350147	804730	WEDDINGTON	179
0214685532	FLAT B HEADWATERS NR PROVIDENCE	2.13	20	350258	804754	WEDDINGTON	119
0214685598	FLAT B AT MTH NR WEDDINGTON	3.90	20	350139	804819	WEDDINGTON	119
0214685664	MCBRIDE B AT MTH NR WEDDINGTON	1.23	20	350115	804843	WEDDINGTON	179
0214685730	MARVIN B AT MTH NR PINEVILLE	1.45	20	350045	804928	WEDDINGTON	179
0214685800	SIXMILE C NR PINEVILLE	20.3	02	350040	804940	WEDDINGTON	119
0214685820	TARKILL B HEADWATER NR WEDDINGTON	1.48	20	345914	804702	CATAWBA NE (S.C.)	179
0214685830	COWHORN B AT MTH NR WEDDING	1.76	20	345748	804759	CATAWBA NE (S.C.)	179
0214686845	E F TWELVEMILE C AT NC 84 AT WESLEY CHAPEL	5.65	20	350020	803943	MATTHEWS	179
0214686850	E F TWELVEMILE C AT SR 1162 NR MONROE	8.05	20	345945	803958	WAXHAW	179
0214686855	MOLLY B AT MTH NR UNION	2.46	20	345909	804041	WAXHAW	179
0214687825	MINE C AT SR 1008 NR WESLEY CHAPEL	2.79	20	350207	804109	MATTHEWS	179
0214687950	PRICE MILL C AT SR 1346 NR WESLEY CHAPEL	7.86	20	350052	804055	MATTHEWS	179
0214688095	PRICE MILL C AT SR 1336 NR UNION	10.5	20	345907	804059	WAXHAW	179
0214688200	E F TWELVEMILE C AT SR 1328 NR UNION	23.5	20	345811	804157	WAXHAW	179
0214688450	L TWELVEMILE C HEADWATERS AT MINERAL SPRINGS	3.97	20	345639	803930	WAXHAW	179
0214688475	L TWELVEMILE C TRIB AT MTH NR MINERAL SPRINGS	1.68	20	345659	803937	WAXHAW	179
0214688545	UNDERWOOD C AT SR 1315 NR HOUSTON	1.58	20	345809	803848	WAXHAW	179
0214688610	UNDERWOOD C AT MTH NR MINERAL SPRINGS	3.44	20	345755	804029	WAXHAW	179
0214688800	L TWELVEMILE C AT SR 1328 NR UNION	11.9	20	345803	804157	WAXHAW	179
0214688980	BATES B AT SCLRR BRIDGE AT MINERAL SPRINGS	1.78	20	345609	804039	WAXHAW	179
0214688985	BATES B BL TRIB AT MINERAL SPRINGS	2.95	20	345656	804111	WAXHAW	179
0214688995	BATES B AT MTH NR UNION	5.76	20	345740	804218	WAXHAW	179
0214689000	E F TWELVEMILE C NR WAXHAW	41.8	03	345746	804240	WAXHAW	179
0214689095	E F TWELVEMILE C TRIB AT MTH NR UNION	1.13	20	345750	804246	WAXHAW	179
0214689210	MACHINE B AT MTH NR UNION	1.27	20	345736	804405	WAXHAW	179
0214689400	BLYTHE C AT NC 75 AT WAXHAW	0.84	20	345528	804329	WAXHAW	179
0214689405	BLYTHE C AT SCLRR BRIDGE AT WAXHAW	3.73	20	345534	804331	WAXHAW	179
0214689415	BLYTHE C AT MTH NR WAXHAW	6.75	20	345653	804459	WAXHAW	179
0214689544	W F TWELVEMILE C AT SR 1358 NR INDIAN TRAIL	4.03	20	350230	804228	MATTHEWS	179
0214689550	TWELVEMILE C AT SR 1346 NR WESLEY CHAPEL	8.87	20	350113	804221	MATTHEWS	179
0214689570	CULVERT B AT SR 1341 NR WESLEY CHAPEL	1.64	20	350021	804348	MATTHEWS	179
0214689600	W F TWELVEMILE C NR MARVIN	14.5	02	345903	804410	WAXHAW	179
0214689650	W MUNOYS RUN AT DAM NR UNION	3.62	20	345923	804430	WAXHAW	179
0214689675	W F TWELVEMILE C HEADWATER NR WAXHAW	1.90	20	345809	804509	CATAWBA NE (S.C.)	179
0214689700	W F TWELVEMILE C AT SR1321 NR WAXHAW	22.4	02	345726	804508	CATAWBA NE (S.C.)	179
0214690000	TWELVEMILE C NR WAXHAW	76.5	01	345708	804521	CATAWBA NE (S.C.)	179
0214690450	TWELVEMILE C TRIB NR WAXHAW	2.12	20	345653	804606	CATAWBA NE (S.C.)	179
0214690555	TWELVEMILE C AT SR1301 NR WAXHAW	80.4	20	345641	804620	CATAWBA NE (S.C.)	179
0214692455	RONE B TRIB AT MTH NR WAXHAW	1.69	20	345437	804647	CATAWBA NE (S.C.)	179
0214692600	RONE B NR WAXHAW	1.90	20	345450	804550	CATAWBA NE (S.C.)	179
0214712180	WAXHAW C AT NC 200 NR ROUGHEDGE	2.79	20	345233	803914	WAXHAW	179
0214712185	GLEN B AT MTH NR ROUGHEDGE	1.96	20	345246	803956	WAXHAW	179
0214712195	WAXHAW C TRIB AT MTH NR ROUGHEDGE	3.70	20	345253	804117	WAXHAW	179
0214712210	WAXHAW C AT SR 1126 AT JACKSON	12.1	20	345243	804151	WAXHAW	179
0214712215	WAXHAW C TRIB AT MTH NR WAXHAW	1.34	20	345245	804215	WAXHAW	179
0214712275	WAXHAW C TRIB AT MTH NR JACKSON	0.94	20	345213	804306	UNITY (S.C.)	179
0214712305	MISSOURI B AT MTH NR JACKSON	1.26	20	345219	804439	UNITY (S.C.)	179
0214712310	WAXHAW C AT 1113 NR JACKSON	19.1	20	345125	804446	UNITY (S.C.)	179
0214712320	WAXHAW C TRIB AT MTH AB WALKUP RD NR JACKSON	6.13	20	345117	804530	VAN WYCK (S.C.)	179
0214712335	WAXHAW C AT SR 1104 NR JACKSON	29.2	20	345104	804625	VAN WYCK (S.C.)	179
0214712665	WAXHAW C AT STATE LINE NR JACKSON	35.2	20	345005	804745	VAN WYCK (S.C.)	179
0214719315	CANE C AT SR 1128 NR JACKSON	5.17	20	345106	803908	UNITY (S.C.)	179
0214719325	CANE C TRIB AT SR 1137 NR JACKSON	3.52	20	345003	803928	UNITY (S.C.)	179
0214719400	CANE C NR JACKSON	11.7	20	345017	804016	UNITY (S.C.)	179
0214719600	CANE C NR WAXHAW	14.6	20	345000	804158	UNITY (S.C.)	179
0214719650	ROOGER B AT SR 1117 NR JACKSON	2.45	20	345021	804202	UNITY (S.C.)	179
0214719675	CANE C AT NC-SC LINE NR JACKSON	20.2	20	344909	804253	UNITY (S.C.)	179
0214719680	SIMPSON B AT NC-SC LINE NR JACKSON	0.76	20	344909	804306	UNITY (S.C.)	179
0214719695	CANE C TRIB 1 AT NC-SC LINE NR JACKSON	1.46	20	344910	804401	UNITY (S.C.)	179

UPPER BROAD RIVER

0214832116	BROAD R HEADWATERS NR FAIRVIEW	2.86	20	353401	821717	BLACK MOUNTAIN	021
0214832122	TOM C AT MTH NR FAIRVIEW	.99	20	353356	821618	BLACK MOUNTAIN	021
0214832129	CROOKED C AT MTH NR FAIRVIEW	1.32	20	353351	821618	BLACK MOUNTAIN	021
0214832145	BROAD R AT NC 9 NR FAIRVIEW	6.02	20	353324	821610	BLACK MOUNTAIN	021
0214832159	BROAD R AT SR 2789 NR FAIRVIEW	9.81	20	353154	821533	BLACK MOUNTAIN	021
0214832175	BROAD R AT SR 2797 NR FAIRVIEW	13.9	20	353104	821515	BLACK MOUNTAIN	021
0214832180	ROCK C AT MTH NR FAIRVIEW	3.55	20	353034	821525	BLACK MOUNTAIN	021
0214832189	SAND B AT MTH NR FAIRVIEW	2.78	20	353050	821616	BLACK MOUNTAIN	021
0214832205	RUSH B AT MTH NR FAIRVIEW	1.40	20	353040	821650	BLACK MOUNTAIN	021
0214832405	FLAT C HEADWATERS NR FAIRVIEW	2.65	20	353303	821845	BLACK MOUNTAIN	021
0214832605	FLAT C NR FAIRVIEW	4.02	20	353145	821842	BLACK MOUNTAIN	021
0214832775	FLAT C AT MTH NR BAT CAVE	10.4	20	352943	821626	BAT CAVE	021
0214832806	FLAT C TRIB .1 MI AB MTH NR FAIRVIEW	2.55	20	353149	821852	BLACK MOUNTAIN	021
0214833200	BROAD R NR BAT CAVE	34.4	11	352942	821625	BAT CAVE	021
0214834000	GRASSY C AT NC 9 NR BAT CAVE	2.31	20	352149	821653	BAT CAVE	089
0214835200	BROAD R AT US 74 AT BAT CAVE	41.5	11	352711	821727	BAT CAVE	089
0214836803	HICKORY C AT US 74 AT GERTON	2.00	20	352846	822053	BAT CAVE	089
0214836900	HICKORY C NR GERTON	4.73	20	352756	821917	BAT CAVE	089
0214837000	TOMS F AT MTH NR BAT CAVE	1.77	20	352825	821818	BAT CAVE	089
0214837500	MIDDLE F AT US 74 NR BAT CAVE	3.55	20	352740	821824	BAT CAVE	089

Reference 20

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

C-34

FLOOD INSURANCE RATE MAP

CITY OF
CHARLOTTE, NORTH CAROLINA
MECKLENBURG COUNTY

PANELS: 3, 6, 7, 8, 9, 12, 13, 14, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 31

MAP INDEX

PANELS NOT PRINTED: 1, 2, 4, 5, 10, 11, 15, 16, 17, 30

COMMUNITY-PANEL NUMBERS
370159 0001 - 0031

MAP REVISED:
FEBRUARY 26, 1982

federal emergency management agency
federal insurance administration

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100–YEAR FLOOD

ZONE A No base flood elevations determined.

ZONE AE Base flood elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE A99 To be protected from 100–year flood by Federal flood protection system under construction; no base elevations determined.

ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X Areas of 500–year flood; areas of 100–year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100–year flood.

OTHER AREAS

ZONE X Areas determined to be outside 500–year flood plain.

ZONE D Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zone.

567 — Base Flood Elevation Line; Elevation in Feet*

A — A Cross Section Line

(EL 19) Base Flood Elevation in Feet Where Uniform Within Zone*

RM5 × Elevation Reference Mark

M3.0 • Mile Mark

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all planimetric features outside Special Flood Hazard Area or all areas subject to flooding, particularly from local drainage sources of small size.

Areas of Special Flood Hazard (100-year flood) include zones, A, AE, A1–A30, AH, AO, A99, V, VE and V1–V30.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Refer to Floodway Data Table where floodway width is shown at 1/20 inch.

Coastal base flood elevations apply only landward of the shoreline.

This map incorporates approximate boundaries of coastal barriers established under the Coastal Barrier Resources Act (PL 97-348).

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For adjoining panels, see separately printed Map Index.

MAP REPOSITORY

Mecklenburg County Engineering Department, Charlotte, North Carolina (Maps available for reference only, not for distribution.)

INITIAL IDENTIFICATION:

OCTOBER 22, 1976

FLOOD HAZARD BOUNDARY MAP REVISION:

FLOOD INSURANCE RATE MAP EFFECTIVE:

JUNE 1, 1981

FLOOD INSURANCE RATE MAP REVISIONS:

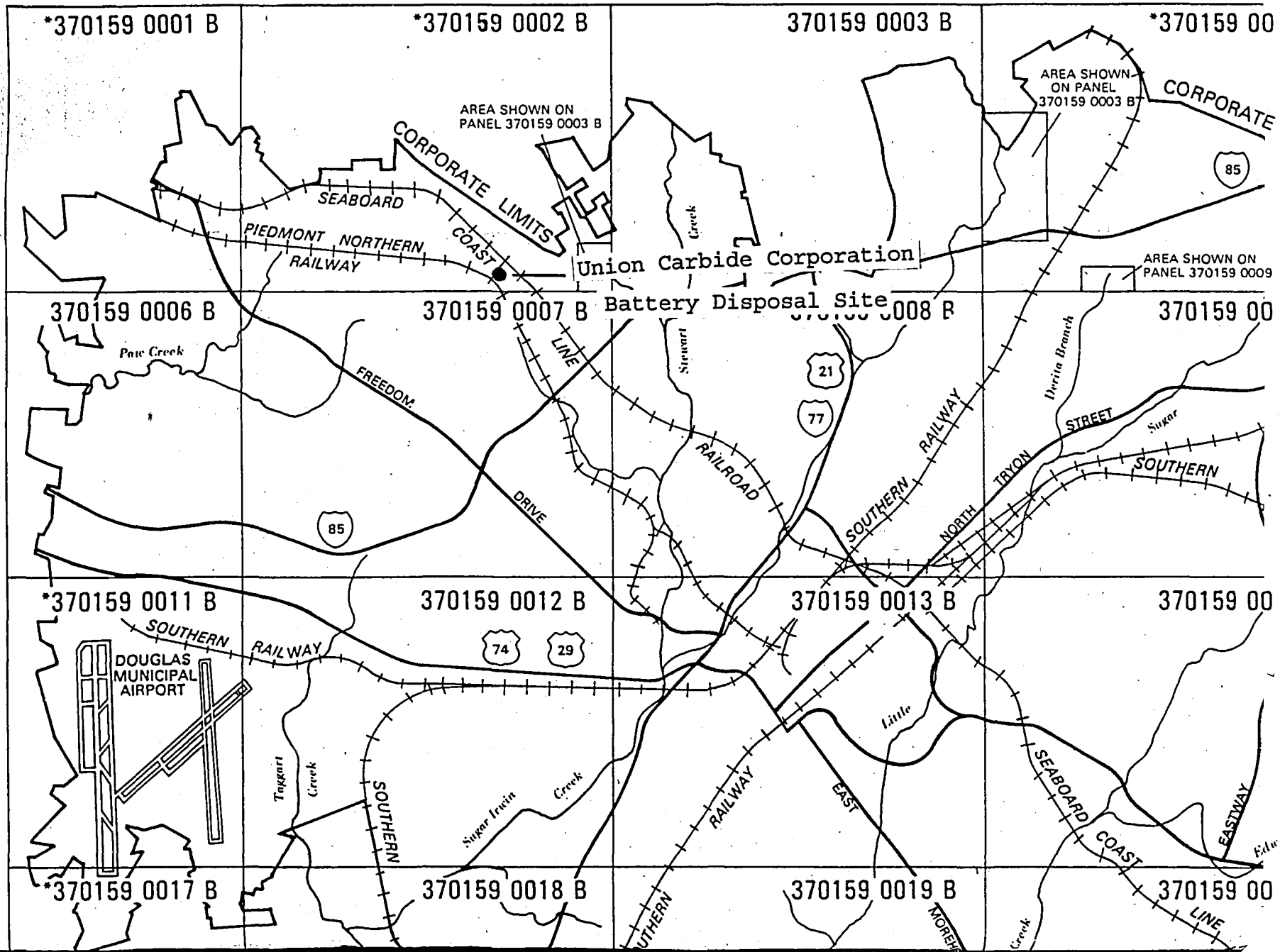
Map revised February 3, 1993
to change special flood hazard areas, base flood elevations, zone designations, and corporate limits and to add cross sections and floodways.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

N

APPROXIMATE SCALE IN FEET

1000 0 1000



* NOT PRINTED (NO SPECIAL FLOOD HAZARD AREA)

MEMO

DATE: April 27, 1995

TO: File

FROM: Keith Snavely
Hydrogeologist
NC Superfund Section

RE: Drainage Area RKS
Union Carbide Battery Disposal Site
5400 Hovis Road, Charlotte, NC
NCD 980 844 336

The drainage area of the site includes the source area of 2.4 acres, the area of the stream that borders the eastern edge of the site, and the drainage area south of the disposal area between the disposal area and Seaboard Coast Line Railroad. The acreage for each section of the drainage area is as follows:

The Disposal Area = 2.4 acres

Creek Area = 0.08 acres

Drainage area south of disposal area = approximately 0.25 acres

total acreage = 2.73 acres

MEMO

DATE: May 17, 1995

TO: File

FROM: Keith Snavely RKS
Hydrogeologist
NC Superfund Section

RE: Water Supply Information - Charlotte, NC
Union Carbide Corporation Battery Disposal Site
Charlotte, NC
NCD 980 844 336

I spoke to Mr. Barry Beamer of the Charlotte-Mecklenburg Utility Department (CMUD) to discuss city water mains and city water supply hookups from Charlotte in the referenced site area. According to Mr. Beamer, Charlotte, North Carolina receives its water supply from Mountain Island Lake. This water is pumped to the City of Charlotte via the Catawba River pump station. In addition, i asked him if there were any water intakes on Stewart, Irwin, and Sugar Creeks. He said there were no intakes along this surface water pathway, and these streams have been designated for industrial discharge.

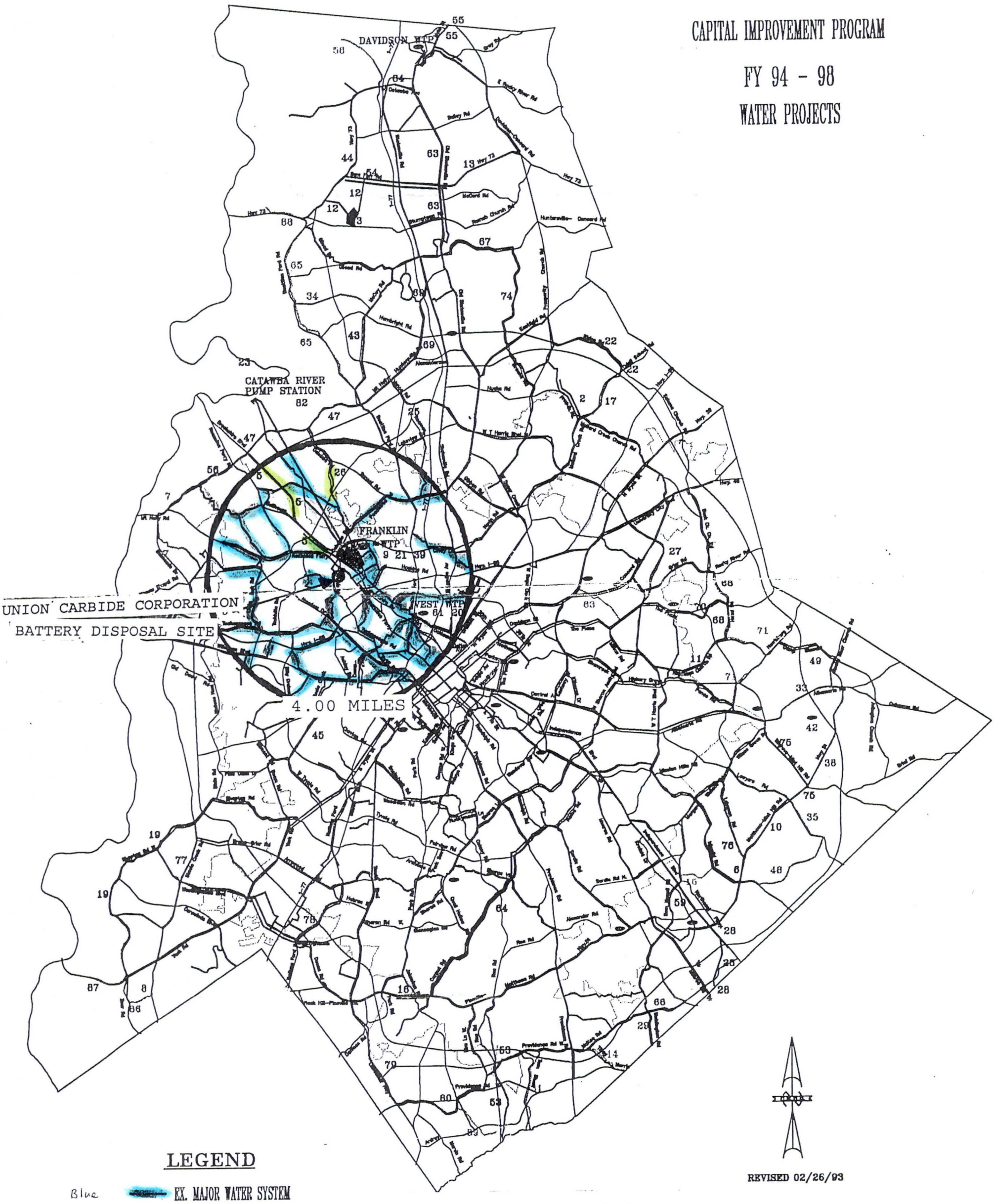
I mentioned that on file we have the Capital Improvement Program FY 94-98 water projects map. According to Mr. Beamer, major water main systems are identified on the Capital Improvement Program Fy 94-98 map, but water hookups for several smaller roads are not identified on this map. CMUD has several 1"=100' scale maps identifying roads connected to city water mains at its Charlotte Office at 5100 Brookshire Blvd.

CHARLOTTE-MECKLENBURG UTILITY DEPARTMENT

CAPITAL IMPROVEMENT PROGRAM

FY 94 - 98

WATER PROJECTS



REVISED 02/26/93

LEGEND

Blue — EX. MAJOR WATER SYSTEM
— PREVIOUSLY FUNDED
— FIRST YEAR FUNDED
Green — FUNDS IDENTIFIED
— UNFINANCED
— 10 YEAR NEEDS

All blue lined roads have existing Main lines. All other categories are not in existence as of December 1993. These funded listings are planned extensions for future construction. The accompanying pages list project # (Prj No.) and dates of funding. Some streets show an existing blue main with a projected green parallell extension. This t is to upgrade and replace the weakening blue main.--See Prj. 2.in NE part of County. Numbers on Map refer to project #.

S. French, NC Surveyed

GRAPHIC SCALE IN FEET

0 15000 30000

SCALE 1" = 15000'

December 1993

MEMO

DATE: April 28, 1995

TO: File

FROM: Keith Snavely RKS
Hydrogeologist
NC Superfund Section

RE: Fishing Information along surface water pathway
Union Carbide Battery Disposal Site
5400 Hovis Road, Charlotte, NC
NCD 980 844 336

On March 8, 1995, Mr. Wayne Chapman, the fish biologist in the study site, was contacted and noted fish are present in Stewart, Irwin, and Sugar Creeks. The tributary that drains the site flows through several industrial areas and is not large enough to support fishing. According to Mr. Chapman, there is fishing for catfish and sunfish in Irwin Creek and Sugar Creeks. According to Mr. Chapman, there has also been documented fish kills in Stewart Creek north of the surface water pathway of the site. The amount of fish removed from Irwin and Sugar Creeks are unknown.

STATE OF
NORTH CAROLINA
DEPARTMENT OF
ENVIRONMENT, HEALTH,
AND NATURAL RESOURCES

Classifications and Water Quality Standards Assigned to The Waters of the Catawba River Basin

Division of Environmental Management
Raleigh, North Carolina

Reprint from North Carolina Administrative Code: 15A NCAC 2B .0308
Current through: February 1, 1993

SECTION .0300 - ASSIGNMENT OF STREAM CLASSIFICATIONS

.0301 CLASSIFICATIONS: GENERAL

(a) Schedule of Classifications. The classifications assigned to the waters of the State of North Carolina are set forth in the schedules of classifications and water quality standards assigned to the waters of the river basins of North Carolina, 15A NCAC 2B .0302 to .0317. These classifications are based upon the existing or contemplated best usage of the various streams and segments of streams in the basin, as determined through studies and evaluations and the holding of public hearings for consideration of the classifications proposed.

(b) Stream Names. The names of the streams listed in the schedules of assigned classifications were taken as far as possible from United States Geological Survey topographic maps. Where topographic maps were unavailable, U.S. Corps of Engineers maps, U.S. Department of Agriculture soil maps, and North Carolina highway maps were used for the selection of stream names.

(c) Classifications. The classifications assigned to the waters of North Carolina are denoted by the letters WS-I, WS-II, WS-III, WS-IV, WS-V, B, C, SA, SB, and SC in the column headed "class." A brief explanation of the "best usage" for which the waters in each class must be protected is given as follows:

Fresh Waters

Class WS-I:	waters protected as water supplies which are in natural and undeveloped watersheds; point source discharges of treated wastewater are permitted pursuant to Rules .0104 and .0211 of this Subchapter; local programs to control nonpoint source and stormwater discharge of pollution are required; suitable for all Class C uses;
Class WS-II:	waters protected as water supplies which are generally in predominantly undeveloped watersheds; point source discharges of treated wastewater are permitted pursuant to Rules .0104 and .0211 of this Subchapter; local programs to control nonpoint source and stormwater discharge of pollution are required; suitable for all Class C uses;
Class WS-III:	waters protected as water supplies which are generally in low to moderately developed watersheds; point source discharges of treated wastewater are permitted pursuant to Rules .0104 and .0211 of this Subchapter; local programs to control nonpoint source and stormwater discharge of pollution are required; suitable for all Class C uses;
Class WS-IV:	waters protected as water supplies which are generally in moderately to highly developed watersheds; point source discharges of treated wastewater are permitted pursuant to Rules .0104 and .0211 of this Subchapter; local programs to control nonpoint source and stormwater discharge of pollution are required; suitable for all Class C uses;
Class WS-V:	waters protected as water supplies which are generally upstream and draining to Class WS-IV waters; no categorical restrictions on watershed development or treated wastewater discharges are required, however, the Commission or its designee may apply appropriate management requirements as deemed necessary for the protection of downstream receiving waters (15A NCAC 2B .0203); suitable for all Class C uses;
Class B:	primary recreation and any other usage specified by the "C" classification;
Class C:	aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture.

Tidal Salt Waters

Class SA:	shellfishing for market purposes and any other usage specified by the "SB" and "SC" classification;
Class SB:	primary recreation and any other usage specified by the "SC" classification;
Class SC:	aquatic life propagation and survival, fishing, wildlife, and secondary recreation.

Supplemental Classifications

Trout Waters:	Suitable for natural trout propagation and maintenance of stocked trout;
Swamp Waters:	Waters which have low velocities and other natural characteristics which are different from adjacent streams;
NSW:	Nutrient Sensitive Waters which require limitations on nutrient inputs;
HQW:	High Quality Waters which are waters that are rated as excellent based on biological and physical/chemical characteristics through division monitoring or special studies, native and special native trout waters (and their tributaries) designated by the Wildlife Resources Commission, primary nursery areas (PNA) designated by the Marine Fisheries Commission and other functional nursery areas designated by the Wildlife Resources Commission, critical habitat areas designated by the Wildlife Resources Commission or the Department of Agriculture, all water supply watersheds which are either classified as WS-I or WS-II or those for which a formal petition for reclassification as WS-I or WS-II has been received from the appropriate local government and accepted by the Division of Environmental Management and all Class SA waters.
ORW:	Outstanding Resource Waters which are unique and special waters of exceptional state or national recreational or ecological significance which require special protection to maintain existing uses.

(d) Water Quality Standards. The water quality standards applicable to each classification assigned are those established in 15A NCAC 2B .0200, Classifications and Water Quality Standards Applicable to the Surface Waters of North Carolina, as adopted by the North Carolina Environmental Management Commission.

(e) Index Number.

(1) Reading the Index Number. The index number appearing in the column so designated is an identification number assigned to each stream or segment of a stream, indicating the specific tributary progression between the main stem stream and the tributary stream.

(2) Cross-Referencing the Index Number. The inclusion of the index number in the schedule is to provide an adequate cross reference between the classification schedules and an alphabetic list of streams.

(f) Classification Date. The classification date indicates the date on which enforcement of the provisions of Section 143-215.1 of the General Statutes of North Carolina became effective with reference to the classification assigned to the various streams in North Carolina.

(g) Reference. Copies of the schedules of classifications adopted and assigned to the waters of the various river basins may be obtained at no charge by writing to:

Director
Division of Environmental Management
Department of Environment, Health, and Natural Resources
Post Office Box 29535
Raleigh, North Carolina 27626-0535

(h) Places where the schedules may be inspected:

Division of State Library
Archives -- State Library Building
109 E. Jones Street
Raleigh, North Carolina.

(i) Unnamed Streams.

(1) Any stream which is not named in the schedule of stream classifications carries the same classification as that assigned to the stream segment to which it is tributary except:

(A) unnamed streams specifically described in the schedule of classifications; or

(B) unnamed freshwaters tributary to tidal saltwaters will be classified "C"; or

(C) after November 1, 1986, any newly created areas of tidal saltwater which are connected to Class SA waters by approved dredging projects will be classified "SC" unless case-by-case reclassification proceedings are conducted.

(2) The following river basins have different policies for unnamed streams entering other states or for specific areas of the basin:

Hiwassee River Basin (Rule .0302); Little Tennessee River Basin and Savannah River Drainage Area (Rule .0303); French Broad River Basin (Rule .0304); Watauga River Basin (Rule .0305); Broad River Basin (Rule .0306); New River Basin (Rule .0307); Catawba River Basin (Rule .0308); Yadkin-Pee Dee River Basin (Rule .0309); Lumber River Basin (Rule .0310); Roanoke River Basin (Rule .0313); Tar-Pamlico River Basin (Rule .0316); Pasquotank River Basin (Rule .0317).

History Note: Statutory Authority G.S. 143-214.1; 143-215.1; 143-215.3(a)(1);
Eff. February 1, 1976;
Amended Eff. August 3, 1992; August 1, 1990; October 1, 1989; November 1, 1986.

.0308 CATAWBA RIVER BASIN

(a) Places where the schedules may be inspected:

(1) Clerk of Court:
Alexander County
Avery County
Burke County
Caldwell County
Catawba County
Gaston County
Iredell County
Lincoln County
McDowell County
Mecklenburg County
Union County
Watauga County

(2) North Carolina Department of Environment, Health, and Natural Resources:

(A) Mooresville Regional Office
919 North Main Street
Mooresville, North Carolina

(B) Asheville Regional Office
Interchange Building
59 Woodfin Place
Asheville, North Carolina

(b) Unnamed Streams. Such streams entering South Carolina are classified "C".

.0308 CATAWBA RIVER BASIN

Name of Stream	Description	Class	Classification Date	Classification Index No.
	River			
Porter Branch	From source to Lake Wylie, Catawba River	C	9/1/74	11-133
Studman Branch	From source to Lake Wylie, Catawba River	C	9/1/74	11-134
Crowders Creek	From source to North Carolina-South Carolina State Line	C	9/1/74	11-135
Squirrel Branch	From source to Crowders Creek	C	9/1/74	11-135-1
McGill Creek	From source to Crowders Creek	C	9/1/74	11-135-2
Unnamed Tributary at Camp James (Camp James Lake)	From source to Dam at Camp James Lake	B	3/1/62	11-135-3-(1)
Unnamed Tributary at Camp James	From Dam at Camp James Lake to Crowders Creek	C	9/1/74	11-135-3-(2)
Abernethy Creek	From source to Crowders Creek	C	9/1/74	11-135-4
First Creek	From source to Abernethy Creek	C	9/1/74	11-135-4-1
Bessemer Branch	From source to Crowders Creek	C	9/1/74	11-135-5
Oats Creek	From source to Abernethy Creek	C	9/1/74	11-135-5-1
Oakland Lake	Entire lake and connecting stream to Crowders Creek	C	9/1/74	11-135-6
Blackwood Creek	From source to Crowders Creek	C	9/1/74	11-135-7
Ferguson Branch	From source to Crowders Creek	C	9/1/74	11-135-8
McGill Branch	From source to Crowders Creek	C	9/1/74	11-135-9
South Fork Crowders Creek	North Carolina Portion	C	3/1/62	11-135-10
South Crowders Creek	From source to South Fork Crowders Creek	C	3/1/62	11-135-10-1
Unnamed Tributary at Sparrow Springs Lake (Sparrow Springs Lake)	From source to Dam at Sparrow Springs Lake	B	3/1/62	11-135-10-1-1-(1)
Unnamed Tributary at Sparrow Springs Lake	From Dam at Sparrow Springs Lake to South Fork Crowders Creek	C	3/1/62	11-135-10-1-1-(2)
Rocky Branch	From source to North Carolina-South Carolina State Line	C	9/1/74	11-135-11
Torrence Branch	From source to North Carolina-South Carolina State Line	B	3/1/77	11-136
Sugar Creek	From source to North Carolina-South Carolina State Line	C	9/1/74	11-137
Irwin Creek	From source to Sugar Creek	C	9/1/74	11-137-1
Dillons Twins Lakes and Lake Jo	Entire lakes and connecting streams to Irwin Creek	C	9/1/74	11-137-1-1
Stewart Creek	From source to Irwin Creek	C	9/1/74	11-137-1-2
Taggart Creek (Taggard Creek)	From source to Sugar Creek	C	9/1/74	11-137-2
Glenwood Lake	Entire lake and connecting stream to Sugar Creek	C	9/1/74	11-137-3
Coffey Creek	From source to Sugar Creek	C	9/1/74	11-137-4
Whippoorwhill Lake	Entire lake and connecting stream to Coffey Creek	C	9/1/74	11-137-4-1

MEMO

DATE: April 28, 1995

TO: File

FROM: Keith Snavely RKS
Hydrogeologist
NC Superfund Section

RE: Water Recreation areas
Union Carbide Battery Disposal Site
5400 Hovis Road, Charlotte, NC
NCD 980 844 336

On March 8, 1995, Mr. Wayne Chapman, the fish biologist in the site area, was contacted and noted children play in Irwin Creek at Revolution Park near Clanton Road in Charlotte. This park is located along the surface water pathway approximately 5 miles south of the PPE of the site.

MEMO

DATE: April 26, 1995

TO: File

FROM: Keith Snavely RKS
Hydrogeologist
NC Superfund Section

RE: Sensitive Environments
Union Carbide Battery Disposal site
5400 Hovis Road, Charlotte, NC
NCD 980 844 336

On April 25, 1995, I visited the North Carolina National Heritage Foundation of the Parks and Recreation Division of NCDEHNR to review USGS maps of my site area for critical and sensitive environments. Two endangered and possibly extinct marine and estuarine animals were noted within the surface water pathway and within the 4-mile radius of the referenced site as noted on the Charlotte West USGS quadrangle. One was located along the surface water pathway of the site and the other within the 4-mile radius. The animal (mollusks) located along the surface water pathway was sited approximately 8 miles south of the site and is named the Carolina Heelsplitter or **Lasmigona Decorata.** The mollusks located within the 4-mile radius of the site at 3.5 miles west of the site and is the Carolina Elktoe or **Alasmidonta Robusta.**

In addition, I phoned the National Heritage Program at (919) 733-7701) and spoke to Mary Russo and Steve Hall about the dates when these animals were sited, since one is considered endangered and the other extinct. According to Nation Heritage Records, the sitings of the Carolina Heelsplitter along Sugar Creek were documented in the 1870's and 1987. However, due to the increased industry along Stewart, Irwin, and Sugar Creeks these mollusks are considered extirpated. The siting of the Carolina Elktoe was the only location in the State of North Carolina and this mollusks is considered extinct.

Reference 27

U.S. Fish & Wildlife Service
Asheville Field Office
100 Otis Street, Room 224
Asheville, NC 28801

The Final Report on a Status Survey of the Carolina Heelsplitter, *Lasmigona decorata* and the Carolina Elktoe, *Alasmidonta robusta*

Prepared by
Eugene P. Keferl
Department of Natural Sciences and Mathematics
Brunswick College
Brunswick, Georgia 31523

and

Rowland M. Shelley
North Carolina State Museum of Natural Science
Raleigh, North Carolina 27611

u 88 KEF 01 NC US

Prepared For
U. S. Department of the Interior
Fish and Wildlife Service
and
North Carolina State Museum
of Natural Science

9 July 1988

only 20% of the Catawba and 36% of those in the Pee Dee had naiades. The percentage of streams and rivers with Corbicula was not significantly different in the Saluda River (50%), Catawba River (49%) and the Pee Dee River (46%) system, but the diversity of the molluscan fauna varied significantly. The Pee Dee River system had 29 species while the Saluda drainage had only 10 species. These results should be considered significant only in the context of this survey. The objective of this survey was to locate two specific species of naiades. None of the sites were thoroughly examined over several seasons in order to locate the more seasonal species of gastropods. Also, no great effort was made to locate small gastropods or sphaeriids.

Lasmigona decorata (Lea, 1852), The Carolina Heelsplitter

The Carolina heelsplitter was originally described as Unio decoratus by Lea in 1852 from the "Abbeville District, South Carolina," (See Figure 9). This species was synonymized with Lasmigona subviridis (Conrad, 1835) by Johnson (1970:343-345). Clarke (1985:57-60) recognized Lasmigona decorata as a distinct species on the basis of its much larger size, its diversity of habitats, and its geographical location. Clarke (1985:57) synonymized Unio charlottensis Lea, 1863 from "Near Charlotte, Mecklenberg [sic] County, N. Carolina" (See Figure 12) and Unio insolidus Lea, 1872 from "Abbeville Dist., S.C. and Irwin's

Creek, N.C." (See Figure 11) with Lasmigona decorata (Lea, 1852). A taxonomic history, with a more detailed discussion of why it was separated from L. subviridis, is provided in Clark (1985:57-60).

Description

Lasmigona decorata is known only from shell characteristics. No soft anatomy or glochidia are known for the species. The shell of the largest known L. decorata attains a length of 114.8 mm, a height of 68.0 mm, and a width of about 39 mm (Clarke, 1985:58). This is nearly twice the size of a large L. subviridis. The thickness of the shell is also greater in L. decorata. The shell is an ovate trapezoid and unsculptured. The anterior margin is rounded, the ventral margin is straight to slightly convex; the posterior margin slightly biangulate below, exhibiting a rounded blunt end; then an oblique straight slope to the dorsal margin; the dorsal margin is straight or sinuate and slopes down toward the beaks and anterior end. The beaks are depressed and project a little above the hinge line. The posterior slope is rounded to subangulate. The yellowish, greenish, brownish periostracum is darker and thicker than pale yellowish or brownish color of L. subviridis. Lasmigona decorata also has greenish or blackish rays. The hinge teeth are well developed and heavy. The beak sculpture is double looped. According to Clarke (1985:58) L. decorata does not differ

significantly from L. subviridis in shell morphology except for its size.

Distribution

Lasmigona decorata has been known only from the Abbeville District in South Carolina (See Figure 7) and the area around Mecklenburg County in North Carolina. One specimen of L. decorata is recorded from Corsier's Branch, supposedly a tributary of the Pee Dee River. The Abbeville District, a terminology no longer employed, may be generally considered as being bordered on the south by the Savannah River and on the north by the Saluda River (see Figure 7). The Saluda River drains into the Congaree-Wateree-Santee River system. Mecklenburg County (Charlotte Area) is drained by the Catawba and Pee Dee Rivers which is also part of the Wateree-Santee River system. The Catawba River (Irwin Creek drainage) in Mecklenburg County, North Carolina, and the Saluda River in the Abbeville District of South Carolina are on opposite sides of the large Congaree-Wateree-Santee River System. It is therefore more likely that the type locality of L. decorata is in the Saluda River drainage of the "Abbeville District" then in the Savannah River drainage. Johnson (1970:344) refers to the type locality as being in the latter. Nothing resembling L. decorata has been recorded from the Savannah River system, and consequently the search for Lasmigona decorata was concentrated in the Saluda

River drainage near the old Abbeville District South Carolina (see Figure 7), and the Catawba and Pee Dee River drainages in and around Mecklenburg County, North Carolina.

According to Clarke (1985:59-60) the distribution of this species is confined to the upper drainages of the Wateree-Santee River system. Since no living populations were known, one of the principle objectives of this study was to determine if any existed, and whether L. decorata is currently threatened or endangered.

Life History and Habitat

Nothing is known about the life history of L. decorata. Very little is known about its habitat except that specimens were collected from creeks, streams, a river and ponds. According to Clarke (1985:60) a pond would be an unusual habitat for L. subviridis.

Geographical Records

The following list of localities was obtained from the unionid collections at the Academy of Natural Sciences at Philadelphia (ANSP) and the United States National Museum (USNM).

Pee Dee River Drainage

1. Crosier's Branch, Cabarrus County, North Carolina, Wheatley Collection (This is a part of the Pee Dee River system)
   a) ANSP 127186 - 1 specimen

Catawba River Drainage

1. Irwins Creek, Mecklenburg County, North Carolina, Wheat Collection (This creek flows through Charlotte and empti into Sugar Creek)
   a) USNM 83974 - Holotype of Unio insolidus Lea, 1872 - 1 specimen

   b) ANSP 126703 (This lot was mislabeled. It is actually catalogued as ANSP 126704.) - Paratypes of Unio insolidus Lea, 1872 - 7 specimens

   c) ANSP 126702 (This lot was mislabeled. It is actually catalogued as ANSP 126703) - 2 specimens

2. Paw Creek, Mecklenburg County North Carolina, Wheatley collection
   a) ANSP 126703 (This lot was mislabeled. It is actually catalogued as ANSP 126702) - 1 specimen

3. Sugar Creek, Mecklenburg County, North Carolina, Wheatley Collection (Sugar Creek flows through York County, South Carolina before joining the Catawba River. The shell is specifically labeled "Sugar Creek, N. Car.") - 1 specimen

4. Catawba River, North Carolina, Wheatley Collection (county not known).
   a) ANSP 126711 - 3 specimens

5. Mecklenburg County, North Carolina, Wheatley Collection (Body of water unknown).
   a) USNM 85402 - 2 specimens

6. Near Charlotte, Mecklenburg County, North Carolina, Wheatley Collection (Body of water unknown).

   a) USNM 85402 - Holotype of Unio charlottensis Lea, 1863 - 1 specimen, figured by Clarke (1985: 58) from Emmons (See Figure 12).
   b) USNM 85402 - 1 specimen (probably not a paratype since Lea Obs. XI, 13 specifically states that one specimen was sent by Dr. Emmons)
   c) ANSP 126714 - 6 specimens

7. Bissels Pond, Mecklenburg County, near Charlotte, North Carolina, Wheatley Collection (Pond not located yet)
   a) USNM 85402 - 1 specimen (See Figure 10)
   b) ANSP 126713 - 12 specimens

8. Elias Pond, Mecklenburg County, Charlotte, North Carolina, Wheatley Collection (Pond not located yet).
   a) ANSP 126709 - 1 specimen

9. Flanigan's Pond, Mecklenburg County, Charlotte, North Carolina, Wheatley Collection (Pond not located yet)
   a) ANSP 126712 - 3 specimens
   b) ANSP 126784 - 2 specimens

10. Pfeiffer's Pond, Mecklenburg County, Charlotte, North Carolina, Wheatley Collection (Pond not located yet).
   a) ANSP 126707 - 9 paired specimens and 9 single valves One specimen is figured by Clarke (1985: 58).

Unknown Drainage

1. Beaver Creek, North Carolina, Wheatley Collection (This site has not been located. There are two Beaverdam Creeks draining into the Catawba River, one in Gaston County, North Carolina and York County, South Carolina, and the other one is in Chester County, South Carolina. There is a Beaver Creek draining into the Catawba River in Kershaw County, South Carolina.)
   a) ANSP 126710 - 7 specimens

2. Locality Unknown
   a) ANSP 126791 - 3 specimens

Saluda River Drainage

1. Abbeville District, South Carolina, Barratt collection
   a) USNM 83972 - Holotype of Unio decoratus Lea, 1852 - 1 specimen
   b) USNM 83972 - Paratype of Unio decoratus Lea, 1852 - 1 specimen
   c) USNM 83973 - 3 specimens
   d) USNM 122339 - 1 specimen

Recent Collections

Lasmigona decorata was not located in the Saluda River system and probably no longer exists there since the main river has many dams and the most of the larger tributaries have been greatly

Life History and Habitat

Almost nothing is known about the life history of *L. decorata*. A few living specimens have been obtained. At least one living specimen has been obtained for each of the following dates; 29 June 1987, 26 August 1987 and 24 October 1987.

Lasmigona decorata was found in two small streams and a small river. It was found along a bank in a ponded portion of a small stream with a slow current and in a run along a steep bank with a moderate current. All specimens were found in less than three feet of water during summer and during low waters in the fall. All habitats were near banks shaded by overhanging trees. The substrates included soft mud, sand, muddy-sand, or sandy-gravel.

In the past, the locations for *Lasmigona decorata* were small streams (Irwins Creek, Paw Creek, Beaver Creek), a large stream (Sugar Creek), a large river (Catawba River) and "ponds" (Bissels Pond, Elias Pond, Flanigans Pond and Pfeiffers Pond). The habitat which really does not fit well are the "ponds". After having systematically examined the Catawba River system it is believed that the "ponds" were mill ponds. Many reminants of small dams and walls made of native rock were discovered. There were many mills in the river system, especially on the small streams. Each mill pond was probably named after the mill or family running the mill. These were also places where collectors could have easy access to the waters.

Recent Investigations

The only known location for A. robusta was Long Creek, Mecklenburg County, North Carolina. Eight sites on Long Creek and its tributaries were examined on nine visits. Even during mid-summer when the water was very low there were many pools that could support naiades, but only a small piece of one valve was found. Corbicula fluminea and Elimia were common at several locations.

We do not think Alasmidonta robusta still lives in Long Creek. After having examined most of the tributaries of the Catawba and Pee Dee Rivers in the area surrounding the type locality, we believe Alasmidonta robusta to be extinct. Naiades are uncommon in the Catawba River System in North Carolina above Union County. With the exception of one site on the Linville River, A. varicosa is rare throughout the Catawba and Pee Dee River systems. It is very unlikely that A. robusta an even rarer species, would turn up anywhere in these river systems.

CONCLUSIONS

1. Status of Lasmigona decorata, The Carolina Heelsplitter

Lasmigona decorata was collected at five sites in three streams in two river systems. Living specimens were taken at four of these five sites. Lasmigona decorata was found living in Waxhaw Creek of the Catawba River system, Goose Creek and Lynches River of the Pee Dee River system.

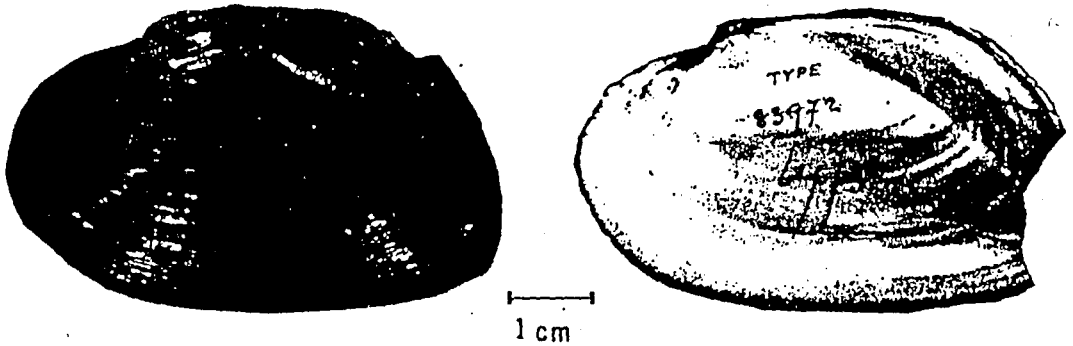


Figure 9. Unio decoratus Lea, 1852, holotype from Abbeville District South Carolina (USNM 83972).

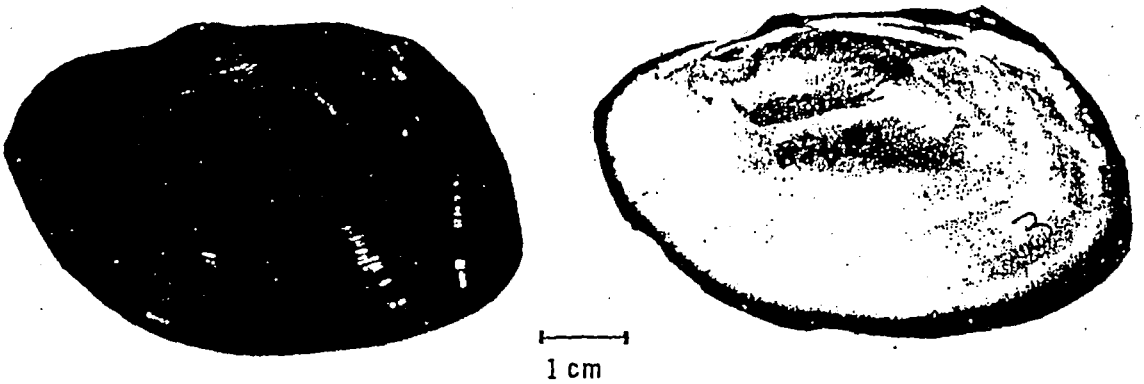


Figure 10. Lasmigona decorata (Lea, 1852) from Bissels Pond, Mecklenburg County, near Charlotte, North Carolina (USNM 85402).

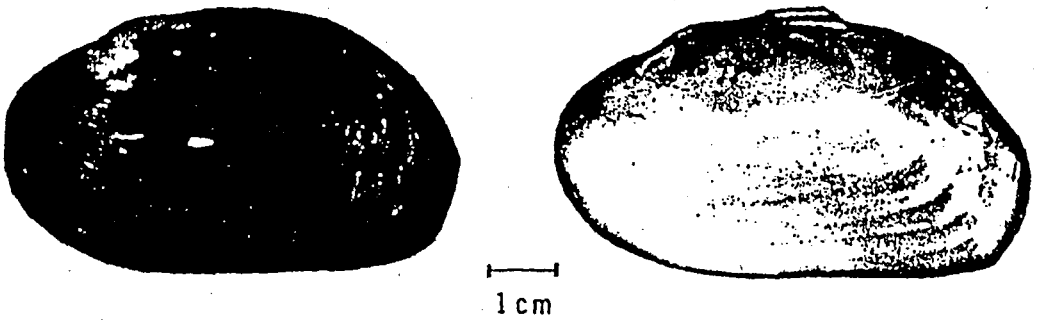


Figure 11. Lasmigona decorata (Lea, 1852) from Abbeville District, South Carolina (USNM 83973). Specimen was labeled Unio insolidus Lea, 1872.

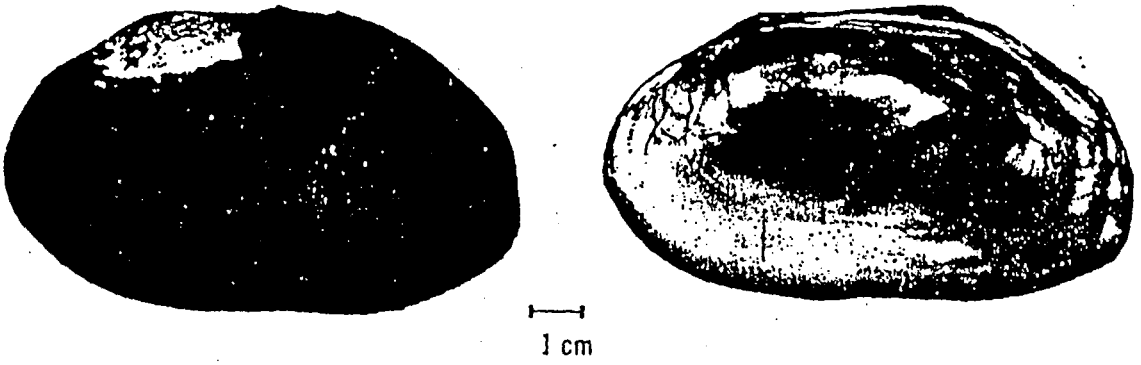


Figure 12. Unio charlottensis Lea, 1863, holotype from Mecklenburg County, near Charlotte, North Caroli

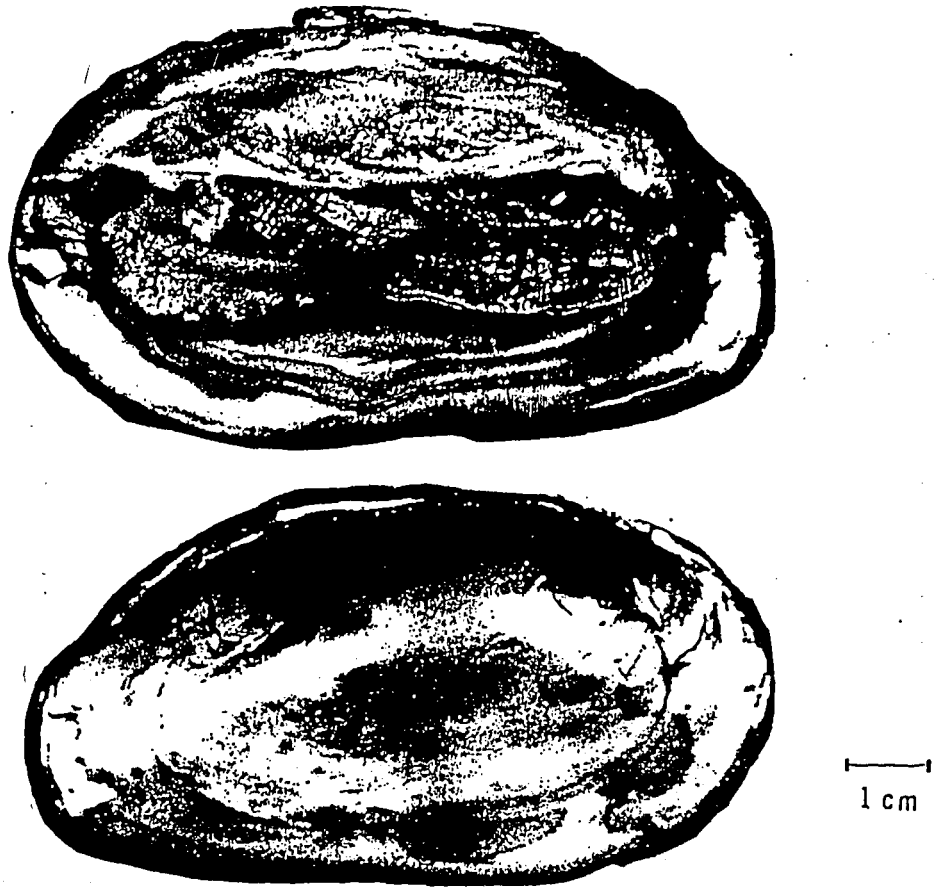


Figure 13. Lasmigona decorata from Waxhaw Creek, Union County, North Carolina; inside of left valve and soft anatomy in right valve.

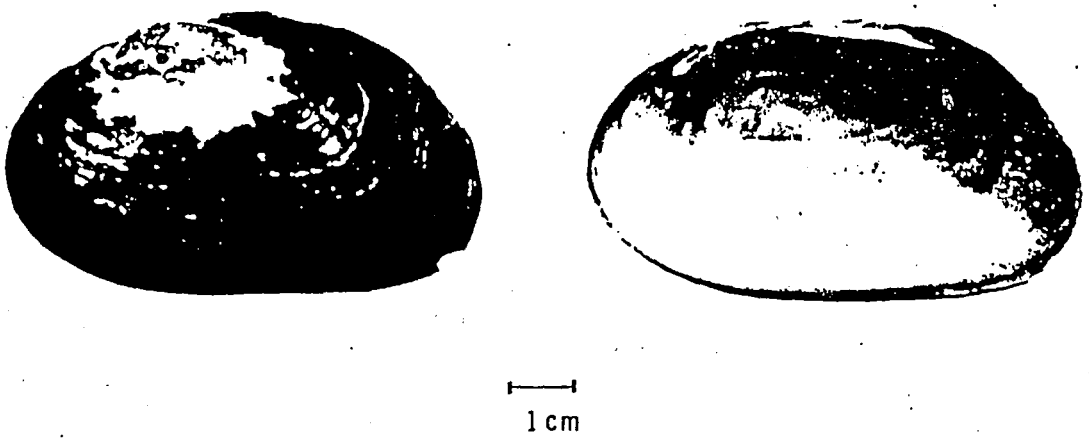


Figure 14. Lasmigona decorata from Lynches River Chesterfield/Lancaster Counties, South Carolina; outside of left valve and inside of right valve.

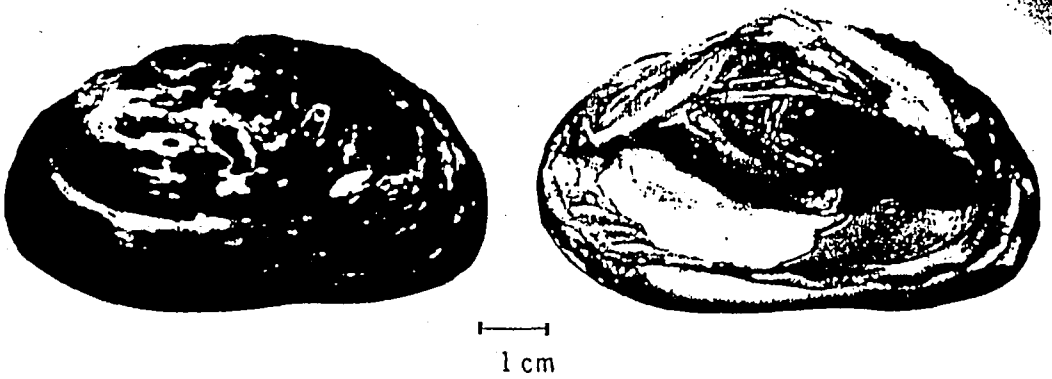


Figure 15. Lasmigona decorata from Lynches River, Chesterfield/Kershaw Counties, South Carolina; outside of left valve and soft anatomy in the right valve.

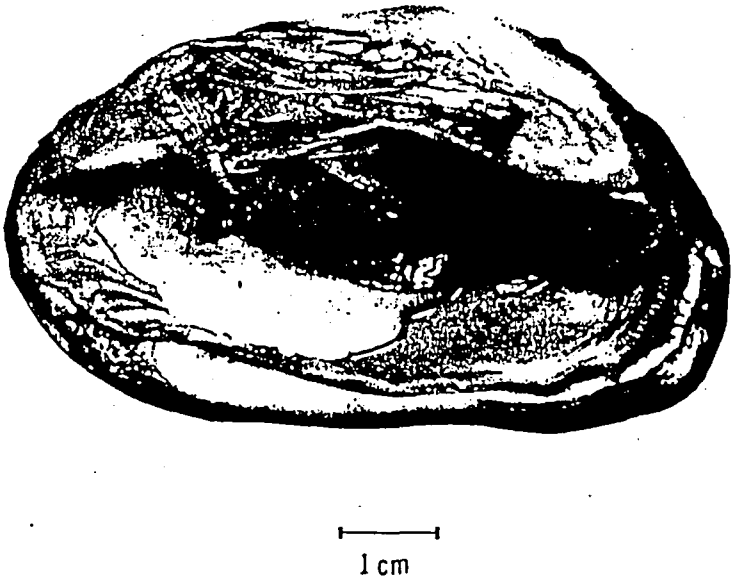


Figure 16. Enlarged view of the soft anatomy of Lasmigona decorata from the Lynches River.

Table 2. Some Morphometric Measurements of the *Lasmigona decorata* collected.

Collection Number	Bridge	Stream	L(mm)	H(mm)	W(mm)	B-A(mm)	H/L	W/L	B-A/L
EPK:1987:32	Co.Rd 1117	Waxhaw Ck	100.0	55.0	36.0	27.5	.55	.36	.28
EPK:1987:33	Co.Rd 1137	Waxhaw Ck	101.5	35.0	35.0	31.0	.53	.35	.31
EPK:1987:367	Co.Rd 1117	Waxhaw Ck	118.0	63.5	ca40.0	31.0	.54	.34	.26
EPK:1987:345	Co.Rd 1547	Goose Ck	60.0	35.0	19.5	18.0	.58	.33	.30
EPK:1987:345	Co.Rd 1547	Goose Ck	70.0	39.5	23.0	20.0	.56	.33	.29
EPK:1987:429	SC.Rt 265	Lynches River	68.5	39.0	22.3	20.0	.57	.33	.29
EPK:1987:447	SC.Rt 903	Lynches River	77.0	42.5	29.0	23.0	.55	.38	.30
EPK:1987:448	SC.Rt 265	Lynches River	49.5	27.5	15.5	14.0	.56	.31	.28
EPK:1987:448	SC.Rt 265	Lynches River	55.3	31.1	19.0	15.0	.56	.34	.27

Table 3. Range and Means of Shell Morphometric Measurements for the *Lasmigona decorata* collected.

	Range	Mean
Length (L)	49.5 - 118mm	77.8mm
Height (H)	27.5 - 63.5mm	43.0mm
Width (W)	19.0 - 40.0mm	26.6mm
Beak-Anterior End (B-A)	14.0 - 31.0mm	22.2mm
H/L	.53 - .58	.556
W/L	.31 - .38	.34
B-A/L	.26 - .31	.286

Element Occurrence Record
LASMIGONA DECORATA
08/13/91

Identifiers:

Elcode EO# State:
EOCODE: IMBIV22040*003*NC IDENT: Y FONUM:
SCOMNAME: CAROLINA HEELSPLITTER
ELEMENT RANKS: GRANK: G1 NRANK: SRANK: S1

Locators:
NATION: US SITECODE:
COUNTY-CODE: NCMECK

SITENAME:
SURVEYSITE:

PRECISION: G

QUADNAME:	QUAD CODE:	MARG NUM:	DOT NUM:	TEN TEN:
CHARLOTTE WEST	3508028	1		

LAT: 351135N S:
LONG: 0805441W N:
E:
W:

DIRECTIONS: IRWIN CREEK.

WATERSHED: 03050103

Status:
SURVEYDATE: 1987 LASTOBS: 1870'S FIRSTOBS:
EORANK: X EORANKDATE: 91-08-13
EORANKCOM: KEFERL SEARCHED IRWIN CREEK DURING THE STATUS SURVEY FOR L. DECORATA AND FOUND NO EVIDENCE THAT THEY STILL SURVIVE IN THIS STREAM.
EODATA: THIS WAS THE LOCATION OF A SYNTYPE OF L. DECORATA. 9 SPECIMENS ARE DEPOSITED IN THE ACADEMY OF NATURAL SCIENCES AT PHILADELPHIA.

Description:
GENDESC: SMALL PIEDMONT STREAM WHOSE HEADWATERS ARE LOCATED IN THE WESTERN PART OF CHARLOTTE.

ELEV: SIZE:

Protection:
MACODE: MANAME: CONTAINED:

MORELAND: MOREPROT: MOREMGMT: TNCINVOLVE:

MGMTCOM:

PROTCOM:

Ownership:
OWNER:
OWNERCOM: OWNERINFO:

General Comments:
COMMENTS:

Optional Fields:
GEOMORPH: PUC
GEOL:
SPECSTAT:
SURVEY: R
SOIL:
ELEMENTSPP:

Documentation and Maintenance:
DATASENS: BOUNDARIES: PHOTOS:
BESTSOURCE: KEFERL, E.P. AND SHELLEY, R.M. 1988. THE FINAL REPORT ON A STATUS SURVEY OF THE CAROLINA HEELSPLITTER, LASMIGONA DECORATA, AND THE CAROLINA ELKTOE, ALASMIDONTA ROBUSTA. REPORT TO THE US FISH AND WILDLIFE SERVICE AND NC ST. MUS. NAT. SCI.

TRANSCRIBR: 91-08-13 SPH SOURCECODE: U88KEF01NCUS
MAPPER: 91-08-13 SPH
DATARESP: NCNHP
UPDATE: 91-08-13 SPH

Element Occurrence Record
LASMIGONA DECORATA
08/13/91

Identifiers:

Elcode EO# State:

EOCODE: IMBIV22040*004*NC IDENT: Y FONUM:

SCOMNAME: CAROLINA HEELSPLITTER

ELEMENT RANKS: GRANK: G1 NRANK: SRANK: S1

Locators:

NATION: US SITECODE:

COUNTY-CODE: NCMECK

SITENAME:

SURVEYSITE:

PRECISION: G

QUADNAME:	QUAD CODE:	MARG NUM:	DOT NUM:	TEN TEN:
CHARLOTTE WEST	3508028	2		
FORT MILL	3508018	1		

LAT: 350812N S:
LONG: 0805455W N:
E:
W:

DIRECTIONS: SUGAR CREEK.

WATERSHED: 03050103

Status:

SURVEYDATE: 1987 LASTOBS: FIRSTOBS:

EORANK: X EORANKDATE: 91-08-13

EORANKCOM: KEFERL SEARCHED LONG CREEK DURING THE STATUS SURVEY FOR L. DECORATA AND FOUND NO EVIDENCE THAT THEY STILL SURVIVE IN THIS STREAM.

EODATA: 1 SPECIMEN FROM THIS CREEK IS DEPOSITED IN THE ACADEMY OF NATURAL SCIENCES AT PHILADELPHIA.

Description:

GENDESC: MEDIUM-SIZED PIEDMONT STREAM WHOSE HEADWATERS ARE LOCATED IN THE WESTERN PART OF CHARLOTTE.

ELEV: SIZE:

Protection:

MACODE: MANAME: CONTAINED:

MORELAND: MOREPROT: MOREMGMT: TNCINVOLVE:

MGMTCOM:

PROTCOM:

Ownership:

OWNER: OWNERINFO:

OWNERCOM:

General Comments:
COMMENTS:

Optional Fields:
GEOMORPH: PUC
GEOL:
SPECSTAT:
SURVEY: R
SOIL:
ELEMENTSPP:

Documentation and Maintenance:
DATASENS: BOUNDARIES: PHOTOS:
BESTSOURCE: KEFERL, E.P. AND SHELLEY, R.M. 1988. THE FINAL REPORT ON A STATUS SURVEY OF THE CAROLINA HEELSPLITTER, LASMIGONA DECORATA, AND THE CAROLINA ELKTOE, ALASMIDONTA ROBUSTA. REPORT TO THE US FISH AND WILDLIFE SERVICE AND NC ST. MUS. NAT. SCI.

TRANSCRIBR: 91-08-13 SPH SOURCECODE: U88KEF01NCUS
MAPPER: 91-08-13 SPH
DATARESP: NCNHP
UPDATE: 91-08-13 SPH

MEMO

DATE: February 12, 1994

TO: File

FROM: Jeanette Stanley, Environmental Chemist,
NC Superfund Section

RE: Old Mount Holly Road PCE Site
Charlotte, Mecklenburg County, NC
NCD 986 172 518

and

Consolidated Warehouse, Inc.
NCD 130 708 126
Charlotte, Mecklenburg County, NC

On October 13, 1993, I visited the Natural Heritage Office on the 7th floor of the Archdale Building in Raleigh, NC. There I reviewed the USGS quadrangle maps for sitings of endangered species and locations of priority areas and Natural communities. I reviewed the following quadrangle maps: Mountain Island Lake, Charlotte West, Mount Holly, Belmont and Lake Wylie.

I noted three sitings of animals that were within the air and surface water target distance limit of the site.

Along Long Creek, approximately 1/4 mile downstream of where the unnamed tributary enters Long Creek, there has been a siting of Alasmidonta robusta, also know as the Carolina Elktoe. This species is endemic to North Carolina and believed to be extinct. This species is also in the 2 - 3 miles distance ring via the air pathway.

Along Paw Creek, approximately 1.4 miles downstream from the upgradient lagoon, the Lawigona decorata, or Carolina Heelsplitter, has been spotted. This species is a NC endangered, federally proposed endangered, NC critically imperilled, and globally critically imperilled species. This siting is within the 1 - 2 mile distance ring from the site. This species has also been spotted approximately 2 miles further down Paw Creek. This siting is within the 2 - 3 mile target distance for the air pathway.

On November 3, 1993, I spoke with Dr. Eugene Keferl, Brunswick College, Brunswick, GA (912) 264-7233, regarding a study he conducted on endangered fresh water mollusks in 1987. We discussed the Carolina Elktoe that was on the Natural Heritage Map in the Long Creek surface water pathway. He said that this area and an area in the Pee Dee River System were the only places this mollusk was ever spotted, but the siting was in the 1800s. His study in 1987 found no endangered mollusks in Long Creek.

We discussed the Carolina Heelsplitter that was indicated to be present in Paw Creek. He said that his 1987 search showed Paw Creek to be devoid of any mollusks. He recommended that I contact Dr. Edward Menhanick (704) 547-4046 at UNC Charlotte. He may have some recent information on species in these creeks.

MEMO

DATE: April 25, 1995

TO: File

FROM: Keith Snavely RKS
Hydrogeologist
NC Superfund Section

RE: Wetland Frontage along 15-mile Surface Water Pathway
Union Carbide Battery Disposal Area,
5400 Hovis Road, Charlotte, North Carolina
NCD 980 844 336

The wetland frontage was determined along the site's 15-mile surface water pathway (SWP) by tracing the wetland frontage along Stewart Creek to Sugar Creek with a topographic map measurer using a scale of 1"= 2000'. Five national wetland inventory maps were reviewed to determine the wetland frontage along the surface water pathway. These are the wetland inventory maps of Mountain Island Lake, Derita, Charlotte East, Charlotte West, and Fort Mill, SC-NC. Three types of wetlands were identified from these sites. These are forested wetland, scrub-shrub wetland, and emergent wetland.

The total wetland frontage located along the site's 15-mile surface water pathway is approximately 2.6 miles. The frontage was evaluated along the SWP within four flow segments. The first flow segment extends from the site at Stewart Creek to Irwin Creek at Barringer Road. The wetland frontage within this segment is 0.25 miles. The second flow segment extends from Barringer Road to Sugar Creek at the Highway 49 overpass. The wetland frontage within this flow segment is 0.75 miles. The third flow segment extends from the Highway 49 overpass at Sugar Creek to the Highway 21 overpass. The frontage along this segment is 1.50 miles. The last segment extends from the Highway 21 overpass to the end of the 15-mile surface water pathway. This segment contains 0.1 miles of wetland frontage.

MEMO

DATE: April 28, 1995

TO: File

FROM: Keith Snavely RKS
Hydrogeologist
NC Superfund Section

RE: Surficial Contamination with 200 feet of residence, school, daycare or workplace
Union Carbide Battery Disposal site
5400 Hovis Road, Charlotte, NC
NCD 980 844 336

The battery disposal area is located within 200 feet of a workplace. However, the workplace or plant is separated from the site by an asphalt parking lot, and the disposal area is enclosed by a fence. There are no residence, schools, or daycares within 200 feet of the surficial contamination. The disposal area is accessible with no use.

MEMO

DATE: April 27, 1995

TO: File

FROM: Keith Snavely RKS
Hydrogeologist
NC Superfund Section

RE: On-site workers
Union Carbide Battery Disposal Site
5400 Hovis Road, Charlotte, NC
NCD 980 844 336

Two businesses occupy the plant area near the disposal site. These are Custom Pallet Company and Crating, Inc. and Creative Dying, Incorporated. The actual number of workers present at the site are unknown and estimated at over 20 persons.

March 1995
EPA HRS training

Reference 31

federal register

Friday
December 14, 1990

Part II

Environmental Protection Agency

40 CFR Part 300
Hazard Ranking System; Final Rule

Reference 32

SUPERFUND CHEMICAL DATA MATRIX

APPENDIX B TABLES

June 1994

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

- 4 1994

Ms. Pat DeRosa
North Carolina Department of Environment,
Health and Natural Resources
P.O.Box 27687
Raleigh, North Carolina 27611-7687

Subject: Superfund Chemical Data Matrix (SCDM)

Dear Ms. DeRosa:

Attached is the revised Superfund Chemical Data Matrix (SCDM) These tables, which replace the March 1993 version of SCDM, are to be used when evaluating sites with the Hazard Ranking System (HRS) . Changes from the previous version have been marked with an asterisk in the tables. Also enclosed is a separate list of the values which have been changed.

There is one change of specific importance. In the June 1994 SCDM, a benchmark has been included for lead in drinking water. Since the former MCL of 50 ug/l was rescinded in November 1992, the action level of 15 ug/l, which is the standard used by the drinking water program to monitor water quality at the tap, was included.

Please contact me at 404/347-5069, ext. 6160 or Trish Gowland at 703/603-9017 if you have any questions.

Sincerely

Deborah A. Vaughn-Wright

Deborah A. Vaughn-Wright
Region 4 NPL Coordinator

Enclosure

Printed on Recycled Paper