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

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DEHNR

June 16, 1995

Ms. Cindy Gurley
NC CERCLA Project Officer
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345 Courtland Street, NE
Atlanta, Georgia 30365

Subject: Site Inspection Prioritization
Toddville Operations Center Site
Charlotte, Mecklenburg County, NC
NCD 981 478 480

The enclosed report contains the findings of the Site Inspection Prioritization of the Toddville Operations Center site. The report is based on information obtained by the North Carolina Superfund Section through sampling during the January 24, 1995 Site Inspection Prioritization and review of previous studies conducted in the area.

The Toddville Operations Center site has been investigated under CERCLA due to a citizen's complaint of possible PCB contamination at the site as a result of many years of transformer and capacitor repair and storage. The site has been in operation under Duke Power since approximately 1956 and had no known prior industrial use. Previous studies have identified surficial soil and groundwater contamination with PCB's at the site. The site is 115 acres in size and is securely fenced. A large portion of the site is used for open storage but the site also contains several storage buildings including a large (several acre) warehouse. The site is located in a suburban residential and light industrial area at 610 Toddville Road, Mecklenburg County, North Carolina. The site drains to a small unnamed tributary to Paw Creek which flows through linear wetlands before merging with Paw Creek. Paw Creek later merges with Lake Wylie and the Catawba River. Wetlands border several miles of the surface water pathway within fifteen miles downstream of the site.

The portions of the site used for transformer and capacitor storage are covered in fine sandy gravel. Other areas of the site are covered in either grass or pavement. At the time of the Site Inspection sampling trip in 1986, surficial soil contamination with PCB's (as high as 11.64 ppm) was identified in two storage areas located south and west of the warehouse. The areas of contamination were approximately 1 acre each and removals occurred in both areas during an independent cleanup in 1991. Following the soil removals, the concentration of PCB's

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was below Duke Power's detection limit (1.4 ppm) at 13 randomly selected sampling points at sample depths of 6 inches and 3 feet below the surface. The cancer risk screening concentration for PCB's in soil is 0.076 ppm. PCB's were the only contaminant analyzed in the soil samples collected from the site.

Two drinking water wells located directly across Toddville Road from the site were sampled at the time of the Site Inspection sampling in 1986 and no contaminants were detected. An onsite production well was also sampled at that time and it contained approximately 1 ppb of PCB's. The production well had not been used for drinking water since the site connected to city water in 1971. Groundwater samples were analyzed for volatile and semivolatile organics, metals, and PCB's.

The surface water pathway was sampled during the Site Inspection Prioritization sampling trip on January 24, 1995 to determine whether PCB's from the site had migrated down to wetlands and fisheries. The results of sediment sampling in the small unnamed tributary to Paw Creek that drains the site indicated elevated levels of PCB's (5.17 ppm) in a sample (TO-001-SD) collected adjacent to the site. Sample TO-001-SD was collected near the southwest corner of the site in an area located upstream of the previously identified areas of soil contamination but downstream of other storage areas on the site that were previously unidentified as potential sources of PCB contamination. However, no PCB's were detected in a downstream sediment sample (TO-002-SD) collected from a wetlands area along the unnamed tributary to Paw Creek. Sediment samples were only analyzed for PCB's.

Based on the fact that no contaminated drinking water wells were identified, no highly toxic or bioaccumulative substances were detected in the downstream wetlands or in a fishery, and the contaminants detected in soils at the site are not located on residential properties or in a commonly used work area, it is recommended that this site receive a No Further Remedial Action Planned (NFRAP) status under CERCLA.

If you have any questions, please feel free to contact me at (919) 733-2801.

Sincerely,

Robert Gandley

Robert Gandley
Environmental Engineer
NC Superfund Section

STATE OF NORTH CAROLINA

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

SITE INSPECTION PRIORITIZATION

Toddville Operations Center
NCD 981 478 480
Charlotte, Mecklenburg County, North Carolina
Reference No. 04323

June 1995

Robert Gandley
Environmental Engineer
Division of Solid Waste Management
Superfund Section

SITE INSPECTION PRIORITIZATION

Toddville Operations Center
NCD 981 478 480
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Reference No. 04323

June 1995

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

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1.0 INTRODUCTION

Under authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the North Carolina Superfund Section conducted a Site Inspection Prioritization (SIP) at the Toddville Operations Center site in Charlotte, Mecklenburg County, North Carolina. The purpose of this investigation was to update information collected during the Site Inspection (completed in March 1987) concerning conditions at Toddville Operations Center sufficient to assess the threat posed to human health and the environment. This report will assess the site using current Hazard Ranking System specifications, and determine the need for additional investigation under CERCLA/SARA or other authority.

2.0 SITE DESCRIPTION

2.1 Location

Toddville Operations Center, CERCLIS Site Number NCD 981 478 480, is located in the City of Charlotte in Mecklenburg County (Fig. 1; Ref. 1). To access the site, travel I-85 south to Freedom Drive in Charlotte. Take Freedom Drive northwest for approximately 1-1/2 miles then turn right onto Toddville Road. Travel north on Toddville Road for approximately 1 mile and the Duke Power Toddville Operations Center site is the large warehouse and storage yard on the left side of the road immediately past the railroad tracks (Fig. 2). The coordinates are 35°16'31"N latitude and 80°54'59" W longitude (Ref. 17). The mailing address is 610 Toddville Road, Charlotte, NC 28242 (Refs. 17; 21).

2.2 Site Description

The Toddville Operations Center site has been investigated under CERCLA following a citizens complaint regarding possible PCB contamination at the site. The area of site totals approximately 115 acres (Fig. 2; Ref. 24). The Toddville Operations Center has been owned and operated by Duke Power Company since 1956 (Ref. 24). Duke power uses the facility to store and rebuild transformers and capacitors. There is no known prior industrial activity at the site.

The Toddville Operations Center serves as a central storage facility for Duke Power. The site contains a large supply warehouse which contains parts and equipment that are used at all Duke Power facilities. The primary wastestream associated with the site is PCB-containing oil from transformers that were stored and rebuilt at the site. The site has been served with municipal water and sewer lines since 1971 (Refs. 9; 24).

The perimeter of the site is securely fenced to restrict access (Ref. 24). The Toddville Operations Center site is located in a residential and industrial area on the northwest side of Charlotte. There are 1,007 homes located within 1 mile of the site (Ref. 14). The Toddville Operations Center site is bounded on the north by a number of privately owned properties including Homestead Church, on the east by Toddville Road, on the south by the Seaboard Coastline Railroad, and on the west by a wooded area (Figs. 1; 2).

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

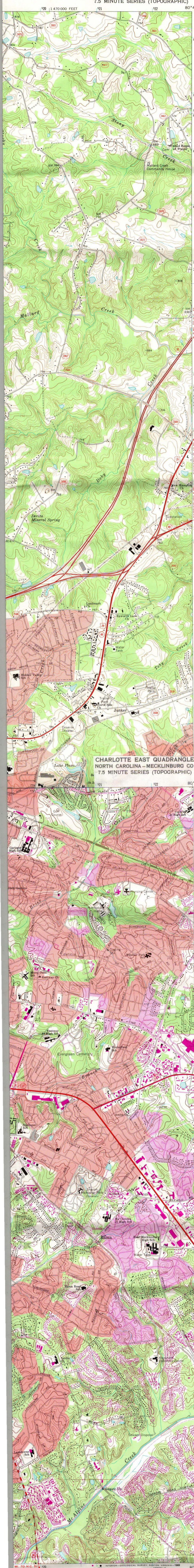
MOUNTAIN ISLAND LAKE QUADRANGLE
NORTH CAROLINA
7.5 MINUTE SERIES (TOPOGRAPHIC)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CHARLOTTE WEST QUADRANGLE
NORTH CAROLINA—MECKLENBURG CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

DERITA QUADRANGLE
NORTH CAROLINA–MECKLENBURG CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

4854 I NW (KANNAPOLIS)



CHARLOTTE EAST QUADRANGLE
NORTH CAROLINA–MECKLINBURG CO
7.5 MINUTE SERIES (TOPOGRAPHIC)

4854 I SW (HARRISBURG)

ROAD CLASSIFICATION

Primary highway, all weather, hard surface
Light-duty road, all weather, improved surface
Secondary highway, all weather, hard surface
Unimproved road, fair or dry weather

U. S. Route
State Route

N. C.
DRANGLE LOCATION

le and woodland compiled in cooperation
lina agencies from aerial photographs
ources. This information not field checked

ension of urban areas

CHARLOTTE EAST, N. C.
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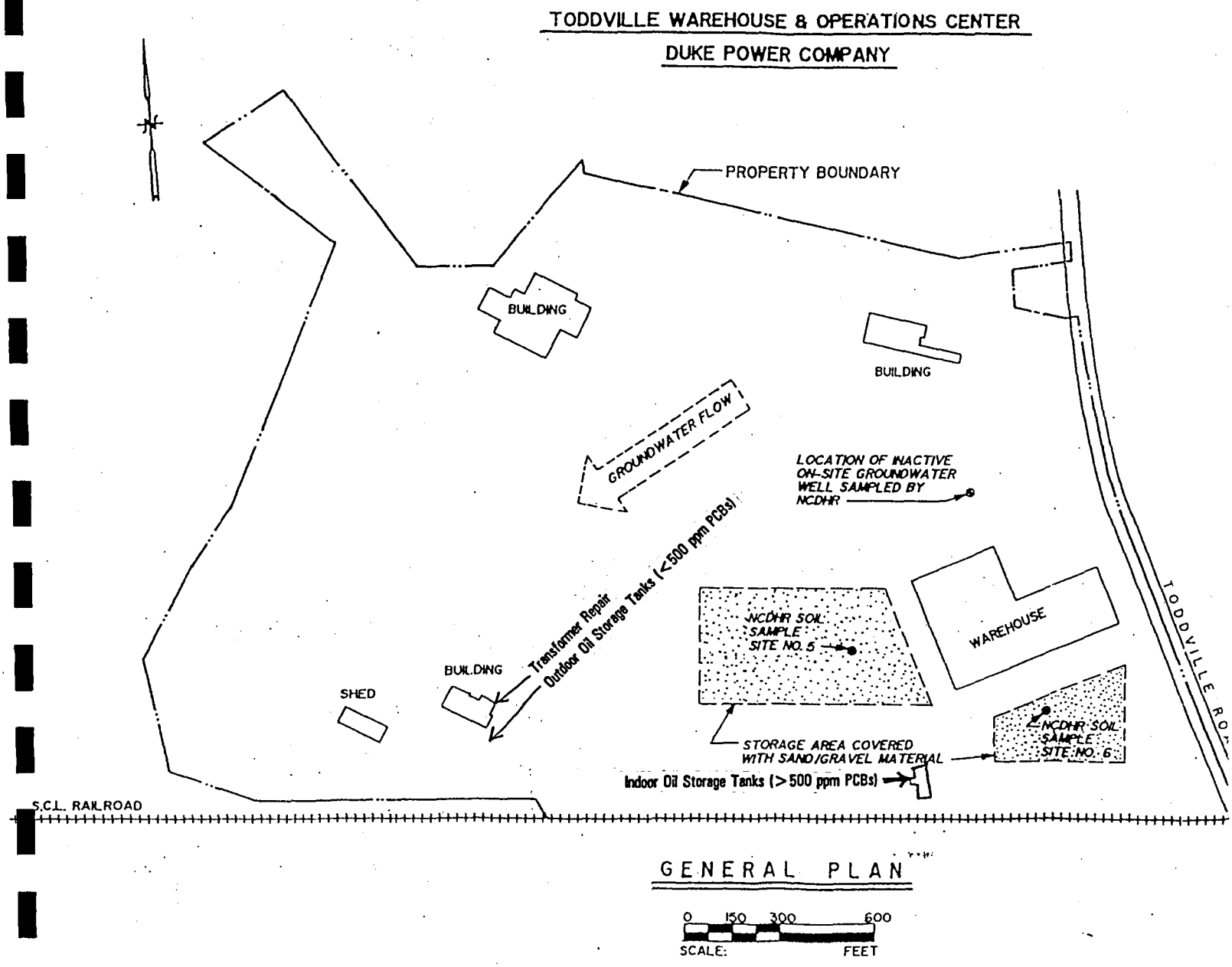
Figure 2
Site Layout Diagram
Toddville Operations Center Site
NCD 981 478 480



The Toddville Operations Center site is relatively flat. The 2-year 24-hour rainfall for the area is approximately 3.5 inches (Ref. 11). The area around the site receives a total of approximately 44 inches of precipitation and has an annual evaporation rate of approximately 40 inches per year. This results in a net annual precipitation of approximately 4 inches (Ref. 12). There are no groundwater production or monitoring wells present at the site (Refs. 9,24). The two production wells which were previously located at the site were filled with cement and abandoned in 1991 (Ref. 31).

2.3 Operational History and Waste Characteristics

The Toddville Operations Center facility was constructed from 1956 to 1958. The total site area is 115.56 acres and it is fully fenced and secure 24 hours a day, 7 days a week. The only public access to the site is customers who shop in the Duke Power surplus equipment store that is located in the warehouse at the site and is open during normal business hours. Approximately 1/2 of the site is covered in fine sandy gravel and is used for equipment storage (Ref. 24).

The primary wastestream associated with the site is transformer oil containing PCB's. Large numbers of transformers are stored and reconditioned on the site (Ref. 25, p. 3). During the life of the facility, transformers have been stored over much of the site. There are also several areas containing large above ground tanks that are used for the storage of transformer oil (Fig. 2). The transformer oil containing the highest levels of PCB's was reportedly stored in tanks contained inside of a building at the site (Refs. 22, p. 8; 25, p. 3). The site also used chlorinated solvents (1,1,1-TCA was used as a degreaser at the site for many years); however, according to Duke Power representatives solvent usage at the site was confined to the garage area where it was used in parts washers (Ref. 9). The spent solvents from the parts cleaners is handled by Safety Kleen who exchanges parts cleaners as needed. Trichloroethylene is also present onsite inside capacitors and the non-PCB containing capacitors are shipped offsite for incineration according to RCRA inspection reports (Ref. 26). Several toluene based paint thinners have also been used at the site. Wastewater from the site is discharged to the municipal sewer system or, in the case of the garage wastewater, treated in an oil water separator prior to discharge to a septic system drainfield (Ref. 21, p. 3). According to Duke Power representatives, tetrachloroethylene (a contaminant of concern due to extensive groundwater contamination in the Paw Creek area) has not been used at the site (Ref. 9).

The Toddville Operations Center site is regulated under RCRA as a large quantity generator and transporter of hazardous waste as a result the solvents and paint thinners generated during the reconditioning of transformers at the site and the transportation of waste from other Duke Power facilities through the Toddville Operations Center prior to disposal (Ref. 26). There was an independent removal action at the site which occurred in 1991. Duke Power removed PCB contaminated soils from two transformer storage areas (the shaded areas on Figure 2) on the site that had been identified as having contamination (Ref. 23). The only previous sampling activities that have occurred at the site were onsite soil and groundwater samples and offsite private well samples collected by the NC Superfund Section during the Site Inspection sampling trip in 1986 and confirmatory soil samples collected by Duke Power following soil removal activities in 1991

(Refs. 15;23). The total extent of surficial soil contamination at the site has not been determined as much of the site has not been sampled to date. There has also been periodic sampling of stormwater runoff in accordance with the facility's Stormwater Discharge Permit issued through the NC Division of Environmental Management (Ref. 21).

3.0 WASTE/SOURCE SAMPLING

3.1 Sample Locations

No waste/source samples were collected during the Site Inspection Prioritization sampling on January 24, 1995 (Fig. 3). It was decided that sufficient source constituent data had been collected during the Site Investigation in 1987 and the independent cleanup in 1991 to document releases of PCB's to surface soils at the site (Refs. 15; 23). PCB's were the only contaminant analyzed in soil samples collected at the site. There are also several other potential source areas on the site. There is a septic drainfield that receives wastewater from the garage and there are the tanks that are used to store PCB containing transformer oil (Refs. 21;22). Also, additional areas of soil contamination are possible as transformers and capacitors have been stored in many different areas on the site over the operating life of the facility (Ref. 22).

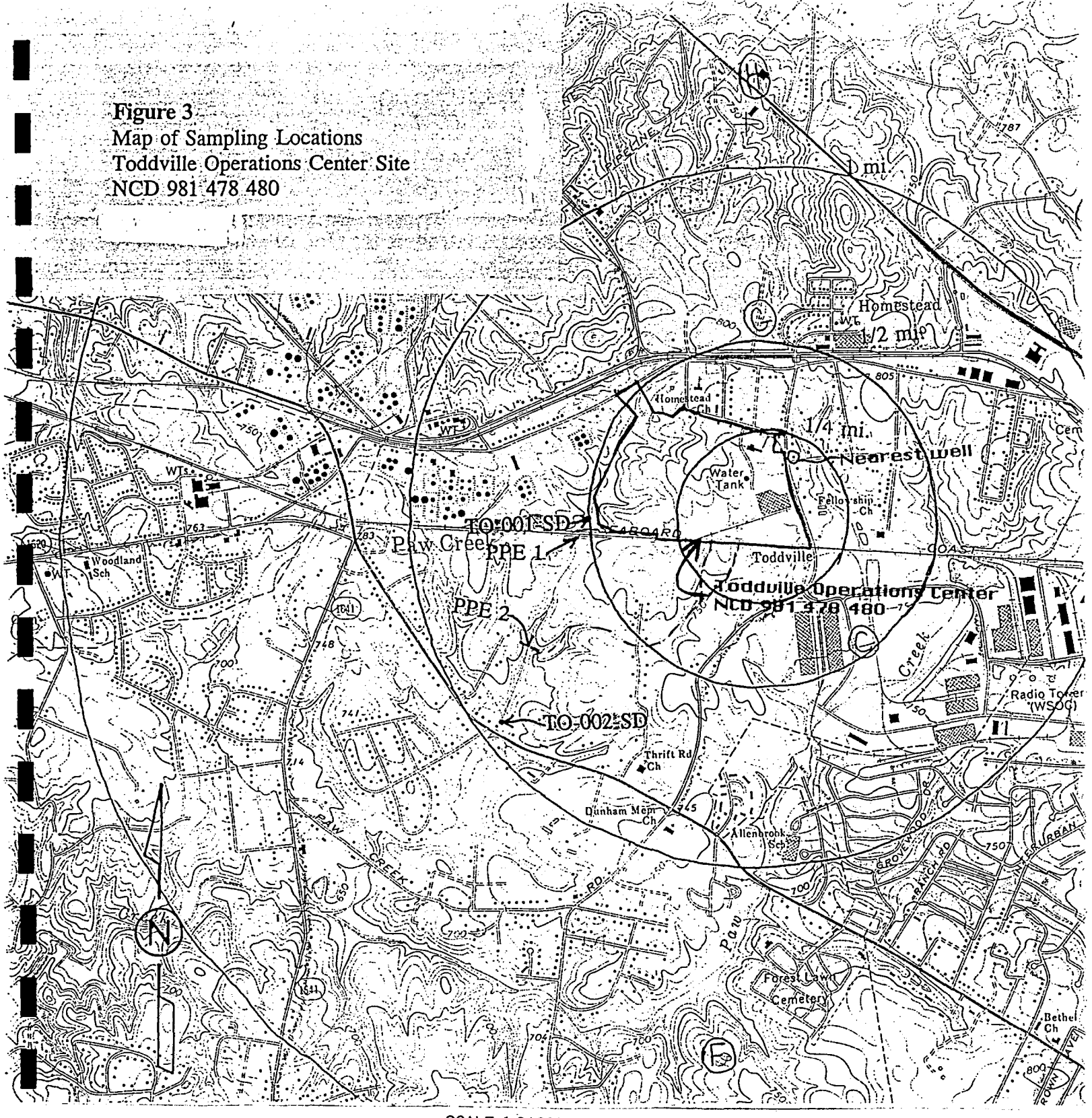
3.2 Analytical Results

The Toddville Operations Center site is known to be contaminated with PCB's in surficial soils (Refs. 15;23). PCB's were detected in a number of soil samples collected from the site during the Site Inspection in 1987 and during an independent removal in 1991. The 1991 cleanup consisted of the removal and offsite disposal of any soils sampled at the site containing PCB's at greater than 10 ppm. Approximately 40 tons (two truckloads) of PCB contaminated soil were removed from the site and taken to Chemical Waste Management Inc. in Emelle, Alabama for disposal (Ref. 23). Following the removal activities, the two areas having soil contamination were resampled at thirteen points on a 50-foot random grid. At each location, samples were collected at depths of 6 inches and 3 feet. None of the samples collected following the removal contained PCB's above the detection limit (1.4 ppm) (Ref. 23).

3.3 Conclusions

For the purposes of this report, the existing information regarding contaminants deposited at the site is sufficient. PCB's are the most hazardous waste associated with the site and soil contamination with PCB's has been previously documented in the areas south and west of the warehouse where transformers and capacitors were stored on wooden pallets.

Figure 3
Map of Sampling Locations
Toddville Operations Center Site
NCD 981 478 480



Samples TO-001-SD and TO-002-SD were two sediment samples collected by the NC Superfund Section and analyzed for PCB's. Both samples were collected on January 24, 1995 from the surficial sediments of the unnamed tributary to Paw Creek.

4.0 GROUNDWATER PATHWAY

4.1 Hydrogeologic Setting

The site lies in the Piedmont Physiographic Province. The subsurface in the Piedmont is typically classified as saprolite overlying bedrock (Ref. 27). The saprolite underlies the surficial soils and typically ranges from a few feet to more than 100 feet thick (Ref. 27). Based upon available well data, the saprolite at the site is estimated to be at least 25 to 30 feet thick and may actually be more than 50 feet thick (Ref. 24; 28). The saprolite and the underlying bedrock are typically considered to act as a single aquifer (Ref. 27). The hydraulic conductivity of both the saprolite and the underlying granite bedrock are estimated at 5 ft/day or 1.76×10^{-3} cm/sec (Ref. 27). The depth to groundwater is estimated at 16 feet (Ref. 29).

The surficial soils (top 25") at the site range from yellow clay loam to red clay and they have moderate permeability (10^{-3} to 10^{-4} cm/sec) (Ref. 29). It is likely that the original soils at the site have been disturbed due to building, grading and excavation at the site; therefore, the soils at the site are classified as urban (Ref. 30).

4.2 Targets

The majority of the population within four miles of the site is provided drinking water by municipal and community water systems with sources located outside of the study area. The Charlotte Mecklenburg Utility District (CMUD) draws its water from surface water intakes located in Mountain Island Lake upstream of the site (Ref. 5; Fig. 1). The CMUD system provides water to at least 95% of all homes in areas covered by CMUD water lines (Ref. 5). Several homes were identified at the time of the Site Inspection that were not served by city water (Ref. 15). The remainder of the residents utilize groundwater as their source of drinking water. There are no wellhead protection areas anywhere in the State of North Carolina (Ref. 19).

There are eight community wells located within four miles of the Toddville Operations Center site (Refs. 2; 13). The nearest community well is located at Parkwood Mobile Home Park approximately 1/2 mile southeast of the site and serves 157 people (Fig. 1; Refs. 1; 2). The well for Providence West Subdivision is located just over 1/2 mile north of the site and it serves 309 residents. There are four community wells (Juniper Drive Water System, Sunset Grove Mobile Home Park, Farmington, and McCall Brothers) serving a total of 309 residents located 1-2 miles from the site. The community wells for Oakdale Subdivision and Trexler Mobile Home Park are both located 2-3 miles from the site and serve 440 residents and 114 residents respectively (Fig. 1, Refs. 1;2). No other community wells were identified within four miles of the site (Ref. 2).

The nearest private well that was identified is located along Toddville Road across from the Toddville Operations Center site (Fig. 1; Ref. 32). The well is located within 1/4 mile of the site but it is topographically upgradient of the site (Fig. 1). At the time of the Site Inspection sampling in 1986 two wells were identified and sampled across Toddville Road from the site (Ref. 15).

For the purposes of this investigation, the number of homes using private wells for drinking water was estimated by counting homes not located along one of the mapped water lines for the CMUD water supply system or within the densely populated shaded areas within the Charlotte City limits (Fig. 1, Ref. 13). The accuracy of the estimated number of private well users is uncertain as the topographic maps used are all at least 10 years old (Ref. 1). It is likely that there are currently many more homes in the area. However, this underestimate is offset by the fact that the waterline map obtained from the City of Charlotte only shows water mains and does not include 2" lines (Ref. 13). Thus there are additional areas having CMUD waterline coverage that are not included on the map. The total population using groundwater was calculated by adding private well users to the population using community wells. The population obtaining drinking water from wells located within the four mile target distance limit surrounding the site is estimated as follows (Refs. 1;2;13):

Distance Ring	Population Using Groundwater
onsite	0
>0 - 1/4 mile	43
>1/4 - 1/2 mile	340
>1/2 - 1 mile	942
>1 - 2 miles	3,404
>2 - 3 miles	4,692
>3 - 4 miles	3,220

The total number of residents utilizing groundwater for drinking water within four miles of the site is estimated as 12,641 people (Ref. 13).

4.3 Sample Locations

No wells are currently located on the site, and subsequently, no onsite groundwater samples were collected during this investigation (Refs. 22; 31). Groundwater was sampled from one of two onsite production wells at the time of the Site Inspection sampling visit in 1986 (Ref. 15). The well that was sampled was located approximately 200 feet due north of the warehouse (Fig. 2). The well was approximately 110 feet deep and the depth to groundwater was approximately 16 feet (Refs. 31; 15) A second onsite production well (152 feet deep) was located approximately 250 feet due west of the well that was sampled (Ref. 15, Fig. 1). The second well was not sampled at the time of the Site Inspection sampling visit. Both onsite wells have since been abandoned and capped (Ref. 31). The site connected to municipal water lines as a source of drinking water in 1971 (Ref. 25). At the time of the Site Inspection, the NC Superfund Section also collected samples from the two private drinking water wells nearest the site. The two private wells were located directly across Toddville Road from the site at the Butts and Roland residences (Ref. 15, Fig. 1)). No community wells were sampled due to the distance from the site. The nearest community well is located approximately 1/2 mile southeast of the site (Ref. 13). The nearest private well currently identified at the site is located at the Ralph Long across Toddville Road from the site in the same area as the wells that were sampled in 1986 and it is also located

topographically upgradient of the site (Fig. 1; Ref. 32). The well has been recently sampled for volatile organics by the Mecklenburg County Department of Environmental Protection and no contamination was detected (Ref. 32). It appears that the Butts and Roland residences are currently connected to city water (Ref. 32).

4.4 Analytical Results

The samples collected by the North Carolina Superfund Section from the onsite production well (Onsite Well #4) at the time of the Site Inspection in 1987 revealed the presence of low levels of PCB's (1.2 ppb or less) in groundwater at the site (Ref. 15). No contaminants were detected in the groundwater samples collected from the two private wells (Butts Well #1 and Roland Well #2) located across Toddville Road from the site. All of the groundwater samples were analyzed at the North Carolina State Laboratory of Public Health for inorganics, volatile organics, semivolatile organics and PCB's (Ref. 15, Appendix B).

4.5 Conclusions

The nearest private wells to the site were previously sampled and no contamination was identified. Groundwater contamination with low levels of PCB's (1.2 ppb or less) was detected in an onsite production well at the time of the Site Inspection in 1987. The threat posed to private drinking water wells is minimized by the low levels of contamination onsite, the distance to the nearest groundwater wells and the fact that many homes within the study area are presently connecting to city water. No nearby wells could be located downgradient (southwest) of the site in the suspected direction of groundwater flow (Figs. 1; 2; Ref. 32).

5.0 SURFACE WATER PATHWAY

5.1 Hydrologic Setting

The majority of the Toddville Operations Center site is relatively flat. Flooding is not a concern at the site as it is located outside of the 500 year flood plain (Ref. 3). Surface drainage from the site flows into storm sewers that discharge at numerous points along the Seaboard Coastline Railroad and along the western edge of the property (Fig. 2; Ref. 21). The site drainage from the storage yards where PCB contaminated soils were identified flows south to the Seaboard Coastline Railroad (Ref. 21). The site drainage from the storage yards then flows into an unnamed intermittent tributary that flows southwest for approximately 0.75 miles until reaching a perennial unnamed tributary to Paw Creek at a point designated as probable point of entry number 2 (PPE 2) (Figs. 1; 4). A small pond is identified on the site topographic map along the intermittent tributary a short distance above PPE 2; however, we were unable to locate the pond at the time of the Site Inspection Prioritization sampling visit on January 24, 1995 due to industrial development and heavy underbrush along the overland portion of the surface water pathway.

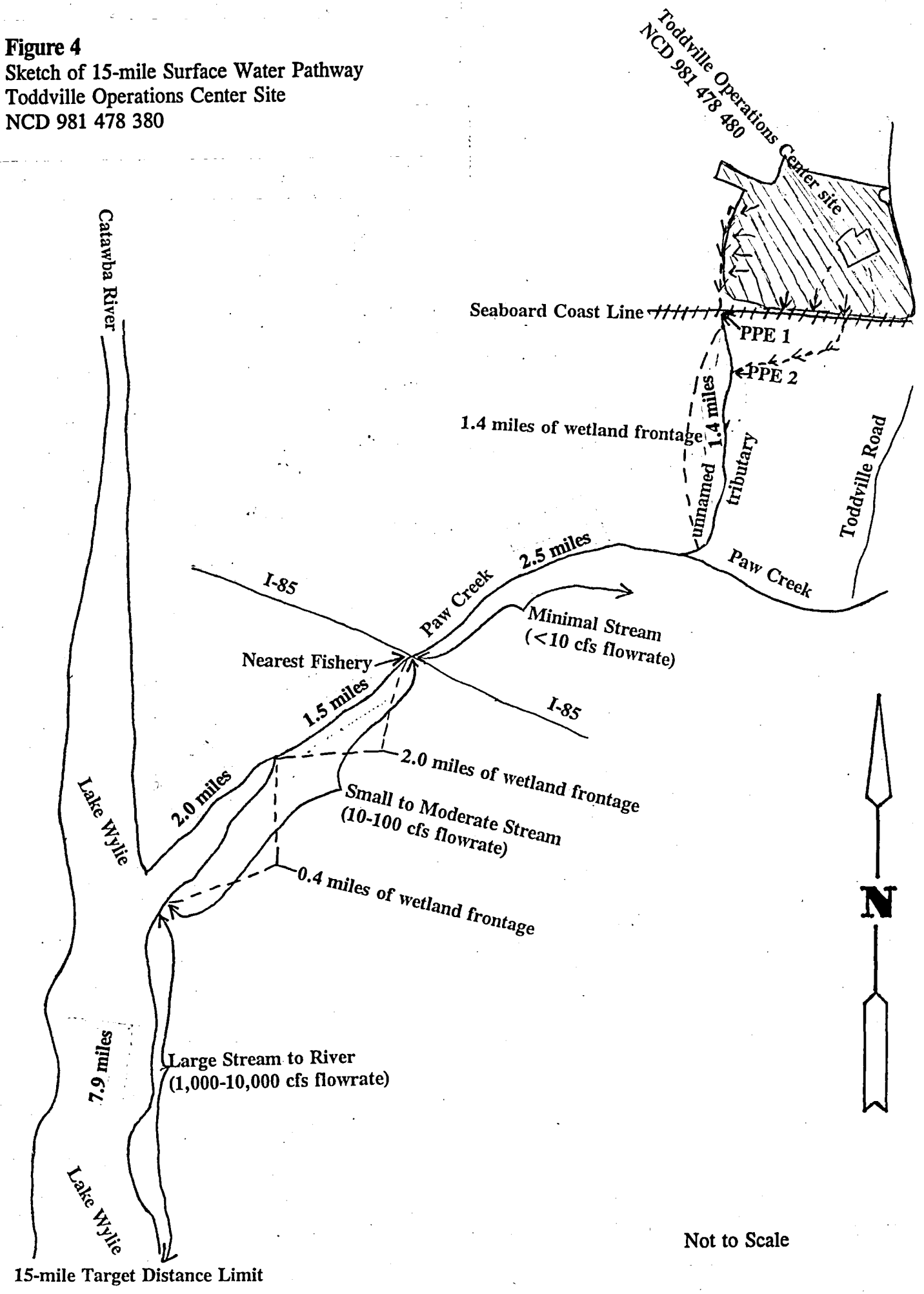
The site drainage from the western portion of the Toddville Operations Center site drains into a different unnamed intermittent tributary to Paw Creek. Drainage enters the intermittent tributary at several points along the western edge of the site and flows south until the stream becomes perennial near the Seaboard Coastline Railroad. The point where the tributary becomes perennial is identified as probable point of entry number 1 (PPE 1) (Figs. 1; 4). PPE 1 is located approximately 0.3 miles upstream of PPE 2 in the same unnamed tributary to Paw Creek (Fig. 1). From the points where site drainage enters the unnamed tributary at PPE 1, it flows approximately 1.4 miles south-southwest until it reaches Paw Creek (Fig. 4; Ref. 4). Paw Creek flows approximately 4 miles southwest until it reaches Lake Wylie. Lake Wylie comprises the final 9.5 miles of the 15-mile surface water pathway (Fig. 4; Ref. 4).

5.2 Targets

Paw Creek and the unnamed tributary to Paw Creek are classified by the State of North Carolina as Class C water bodies from the uppermost point where site drainage enters the streams at PPE 1 to the confluence with Lake Wylie (Ref. 7). As Class C water bodies, Paw Creek and its tributaries are suitable for secondary recreation, fish and wildlife propagation and agriculture (Ref. 7). They are not classified as suitable sources for drinking water. Lake Wylie and the Catawba River are classified as Class WS-V&B water bodies from the point where Paw Creek enters Lake Wylie to the North Carolina/South Carolina border, below the end of the 15-mile surface water pathway. Class WS-V&B waters are suitable for all Class C uses as well as primary recreation. They are also protected as water supplies which are generally located upstream and draining to Class WS-IV waters, and which have no categorical restrictions on watershed development treated wastewater discharges. There are no known surface water intakes in the 15 mile surface water pathway downstream of the site (Refs. 4; 5).

The unnamed tributary to Paw Creek is classified as a minimal stream and it flows through approximately 1.4 miles of linear wetland frontage (Fig. 4; Ref. 4)). Paw Creek is classified as a minimal stream for 2.5 miles downstream of the point where the site drainage enters. There are no wetlands along this stretch of Paw Creek. Paw Creek is then classified as a small to moderate stream and is lined with wetlands on both sides for the next 1-1/2 miles (3 miles of frontage) until it reaches Lake Wylie. The nearest fishery is located along Paw Creek approximately 3.6 miles from PPE 2, the most downstream point where site drainage enters the unnamed tributary to Paw Creek (Fig. 4; Ref. 4). Lake Wylie flows south and comprises the remainder of the 15-mile surface water pathway. Lake Wylie is classified as a large stream to river and there is an additional 0.2 miles of wetland frontage along the Lake Wylie segment of the surface water pathway. Figure 4 shows the surface water pathway leading away from the Toddville Operations Center site. No threatened or endangered plants or animals or other sensitive environments were identified in the 15-mile surface water pathway draining the site (Ref. 8).

Figure 4
Sketch of 15-mile Surface Water Pathway
Toddville Operations Center Site
NCD 981 478 380



5.3 Sample Locations

A pair of sediment samples were collected from the surface water pathway during the Site Inspection Prioritization field visit conducted by NC Superfund Section personnel on January 24, 1995 (Ref. 22). Figure 3 indicates the sampling locations. A background sediment sample (TO-001-SD) was taken from the small unnamed tributary near the southwest corner of the site. The sample was collected approximately 250 feet north of the Seaboard Coastline Railroad tracks. The location where the sample was collected is identified as an intermittent stream; however, on the day of the sampling the stream appeared to have good flow (Fig. 1). The sample point was approximately 25 feet upstream of the point where the drainage from the areas of known soil contamination on the site enters the unnamed tributary. The location of the background sample is downgradient and in the flow pathway for another portion of the site where PCB containing oils were stored, but no soil sampling has been conducted (Ref. 22). The background sample was collected at this location due to accessibility and also because there is no clearly defines flow area upstream of the entire site (Fig. 1). A second sediment sample (TO-002-SD) was collected from the unnamed tributary to Paw Creek approximately 1 mile downstream of the site near the point where the unnamed tributary passes under Freedom Drive (Fig. 3; Ref. 22). The sample (TO-002-SD) was collected approximately 25 feet upstream of Freedom Drive (Ref. 22). The samples were only tested for PCB's as they are the primary contaminant associated with the site and the contaminant posing the greatest risk to surface water. Both of the sediment samples collected were medium grain brown sands (Ref. 22).

Surface water samples were collected from three different stormwater discharges at the site as a part of Duke Power's 1992 Stormwater Discharge Permit Application for the Toddville Operations Center (Fig. Ref. 21). The surface water samples were collected of site runoff during rainfall events. No surface water samples were collected during the Site Inspection Prioritization sampling at the site due to the fact that the suspected sources of contamination are not actively discharging to surface water on a regular basis and contaminants would more likely be found in sediments.

5.4 Analytical Results

One of the aqueous samples collected by Duke Power in 1992 from the stormwater discharge for the capacitor storage yard contained detectable levels of PCB's. The flow composite sample was collected during a January 23, 1992 storm event as a part of Duke Powers Stormwater Discharge Permit Application and the sample contained 0.8 ppb of PCB's (Ref. 21, p.VII-2). Several other aqueous samples collected from the 3 stormwater outfalls during 2 separate storm events (1/23/92 and 2/15/92) were analyzed and did not contain any detectable levels of PCB's (Ref. 22). The outfall from the capacitor storage yard which showed detectable levels of PCB's eventually drains into the unnamed tributary at PPE 2, downstream of the background sediment sample location (Fig. 1).

The background sediment sample (TO-001-SD) collected on January 24, 1995 from the small unnamed tributary near the southwest corner of the site was found to contain 5.17 ppm of PCB's (Appendix A; Ref. 22). The downstream sediment sample (TO-002-SD) collected from the unnamed tributary to Paw Creek approximately 25 feet northeast of Freedom drive contained no PCB's (Appendix A; Ref. 22).

5.5 Conclusions

Elevated levels of PCB's were observed in the background sediment sample (TO-001-SD) collected from the unnamed tributary near the southwest corner of the site. Attribution of these contaminants to the Toddville Operations Center site is not certain as no source samples have been collected on the western edge of the Toddville Operations Center site; however, given the history of the site and the nature of the contamination found it seems likely that Toddville Operations Center is the source. A large area of the site drains into the tributary above the sample location and no soil sampling data is available for this portion of the site. It is known that PCB's have been stored on this portion of the site at various times. Given the location and the concentration of the PCB's detected in the background sediment sample they do not appear to pose a significant threat to wetlands and fisheries along the surface water pathway. A sample collected from nearby wetlands downstream of the site (TO-002-SD) did not detect any PCB's.

6.0 SOIL EXPOSURE AND AIR PATHWAY

6.1 Physical Conditions

The site is fenced to restrict public access (Ref. 25). The site surface is covered with a mixture of paved parking areas and graveled storage yards as well as the large warehouse and a number of smaller buildings (Figure 2; Ref. 25, Photos).

6.2 Land Use and Population Distribution

The Toddville Operations Center site is located on the northwestern side of Charlotte, North Carolina. The immediate area around the site is a mixture of industrial, commercial and residential properties (Fig. 1). The nearest residential areas are located along Toddville Road ~ 100 feet north and east of the site (Fig. 1). There are no residents living on the site. There is limited public access at the site (Ref. 24). The parking lot and a portion of the warehouse are regularly used by customers of the surplus supply store that Duke Power operates at the site. The surplus supply store and the parking lot are not areas of suspected contamination (Fig. 2). No schools or daycare centers were identified within 200 feet of areas of soil contamination at the site (Fig. 2). The entire site is fenced and there is security at the site to regulate who enters and leaves the facility (Ref. 24). The areas of suspected contamination are located out in the storage yard area such that workers in the warehouse would probably not be in close proximity to the contamination on a regular basis (Fig. 2; Ref. 15, Photographs). There are typically 150-200 workers and visitors at the facility on any given day (Ref. 24).

The population within a four mile radius around the site is as follows (Refs. 10; 14):

Distance Ring	Population
On-site	0 residents (200 workers)
>0 to 1/4 mile	31
>1/4 to 1/2 mile	343
>1/2 to 1 mile	1,860
>1 to 2 miles	11,821
>2 to 3 miles	16,967
>3 to 4 miles	23,919

Wetlands Inventory Maps of the area surrounding Toddville Operations Center showed no wetlands within 1/2 mile of the site (Ref. 6). There are approximately 2.7 acres of wetlands located between 1/2 and 1 mile from the site. There are approximately 34.1 acres of wetlands located between 1 and 2 miles from the site. There are approximately 47.4 areas of wetlands located between 2 and 3 miles and there are approximately 250 acres of wetlands between 3 and 4 miles from the site (Ref. 6). The wetlands in the area are mainly located adjacent to streams and rivers.

According to the North Carolina Natural Heritage Program no threatened or endangered species or other sensitive environments have been identified within 4 miles of the site (Ref. 8).

6.3 Soil Sample Locations

No additional soil sampling was conducted during the Site Inspection Prioritization. Soil samples were collected from two transformer storage areas (identified by Duke Power) at the site during the Site Inspection sampling on November 19, 1986 (Ref. 29). At both locations (labeled as locations 5 and 6) ten foot square areas were delineated and samples were collected from the four corners (designated as A, B, C, and D). At both locations surface soil samples (5A through 5D and 6A through 6D) and subsurface soil samples (5A' through 5D' and 6A' through 6D') were collected. The areas sampled were storage yards located south and west of the warehouse and at each location the subsurface soil samples were collected at a depth of 15-25 inches (Fig. 2; Ref. 29). Background soil samples (location 3) were collected in a similar fashion in a field at a location approximately 106 feet north of the fence surrounding the site and 42 feet west of Toddville Road (Ref. 29)

Post-removal soil samples were also collected in the same general areas at the site by Duke Power following an independent cleanup of the two storage areas (approximately 1 acre each) that occurred in 1991. Approximately 40 tons of contaminated soils were removed and disposed of offsite at the Chemical Waste Management landfill in Emelle, Alabama (Ref. 23). Duke Power collected post-removal soil samples from thirteen randomly selected points from a 50-foot grid that overlying the two storage areas (Ref. 23).

6.4 Soil Analytical Results

Surface soil samples collected by NC Superfund Section from sample locations 5 and 6 were analyzed for PCB's and elevated levels of PCB's were found in each sample location. The concentration of PCB's in surface soil at the site ranged from 0.28 ppm in sample 5-C to 11.64 ppm in sample 6-B (Ref. 15). No PCB's were detected in the subsurface soil samples (5-A' through 5-D' and 6-A' through 6-D') collected on the site or in any of the background soil samples (3-A through 3-D and 3-A' through 3-D') (Ref. 15). The cancer risk screening concentration for PCB's in soil is 0.076 ppm (Ref. 18).

Following the independent cleanup of the two transformer storage areas in 1991, Duke Power Company collected post-removal samples to insure that the removal was complete. At each of the thirteen random sampling locations selected from their 50-foot grid, samples were taken at depths of 6 inches and 3 feet. None of the samples contained PCB's at levels exceeding the detection limit (1.4 ppm) (Ref. 23). It should be noted that the detection limit for PCB's in the post-removal samples (1.4 ppm) is considerably higher than the cancer risk screening concentration for PCB's in soil of 0.076 ppm (Refs. 18; 23).

6.5 Air Monitoring

There has been no formal air monitoring conducted at the site. Detectable releases of gaseous or particulate emissions from the site are not suspected. Approximately 54,941 people reside within a four mile radius of the site (Ref. 14).

6.6 Conclusions

The area surrounding the site is a mixture of industrial, commercial, and residential properties. The nearest residences are approximately 100 feet to the north and east of the site. Approximately 54,941 people reside within a four mile radius of the site. The surface soils at the site may still contain elevated levels of PCB's. The detection limit for PCB's in the post-removal soil samples collected at the site (1.4 ppm) exceeds the cancer risk screening concentration for PCB's in soil (0.076 ppm); however, none of the areas of contamination are on residential properties or in areas where employee contact is likely on a regular basis. The entire site is surrounded by a maintained fence.

7.0 SUMMARY AND CONCLUSIONS

The Site Inspection Prioritization of the Toddville Operations Center site gathered the data necessary to evaluate the site as a candidate for future remedial action under CERCLA. This was accomplished by collecting environmental samples needed to characterize the extent of migration of site related contaminants in different pathways. This investigation also confirmed target populations and located environments which are potentially at risk from the site.

The site has been owned and operated by Duke Power since 1956. Duke Power uses the facility to store and rebuild transformers and capacitors. The site also contains a large warehouse which serves as a central storage facility and supply warehouse for parts and equipment. There is no known industrial activity at the site prior to its purchase by Duke Power in 1956. The most serious risk associated with the site is potential off-site contamination of surface waters with PCB's. The surface water pathway draining the site contains several wetland areas and fisheries. A sediment sample collected from the surface water pathway below the nearest wetland did not detect any PCB's. PCB's were detected at 5.17 ppm in a background sediment sample collected from an unnamed tributary on the northern edge of the site that is upstream of the areas of known contamination at the site but downstream of other potential source areas. The area where sediment contamination was identified is not a wetland or a fishery.

The Toddville Operations Center Site poses minimal risk to groundwater users. Limited use of drinking water wells was identified within 1/4 mile of the site. The nearest community well that was identified was located nearly 1/2 mile southeast of the site. The City of Charlotte obtains water from surface water intakes located on Mountain Island Lake on the Catawba River upstream of the point of entrance of site drainage.

Releases of contaminants to the air at the site seem unlikely. PCB contaminated soil present in the area of the storage yards on the southern and western side of the warehouse could pose a soil exposure threat to workers at the site. The areas sampled at the time of the SI in 1986 and after the independent removal action in 1991 are not located where workers would be expected to be in contact with the contaminants on a regular basis. Post removal sampling indicated that soils in the two storage yards where the independent removal occurred had PCB levels of less than 1.4 ppm (the detection limit). Soil contamination does not pose a significant soil exposure threat to nearby residents as the entire site is securely fenced.

Based upon these factors, it is recommended that this site receive a No Further Remedial Action Planned (NFRAP) status under CERCLA. It appears onsite soil contamination with PCB's has migrated to an adjacent unnamed tributary; however, it does not appear that the contaminants have migrated to fisheries and wetlands located downstream of the site. No contaminated drinking water wells associated with this site have been identified.

REFERENCE LIST
Toddville Operations Center Site
NCD 981 478 480

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2. Moore, Martha, NC Department of Human Resources, Public Water Supply Database, February 17, 1995.

3. Federal Emergency Management Agency, Flood Insurance Rate Map (Map Index), City of Charlotte, North Carolina, Mecklenburg County, January 6, 1994.

4. Gandley, Robert, NC Superfund Section, Memorandum to file regarding surface water pathway with attachment, March 15, 1995.

5. Gandley, Robert, NC Superfund Section, Memorandum to file reference surface water intake for the City of Charlotte, August 20, 1993.

6. Gandley, Robert, NC Superfund Section, Memorandum to file reference wetlands within 4 miles of the Toddville Operations Center site, April 10, 1995.

7. NC Department of Environment, Health, and Natural Resources, Classifications and Water Quality Standards Assigned to The Waters of the Catawba River Basin, February 1, 1993.

8. Gandley, Robert, NC Superfund Section, Memorandum to file reference Natural Heritage Program information for the Paw Creek Area, February 15, 1995.

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11. United States Department of Commerce, 1963, Rainfall Frequency Atlas of the United States, Technical Paper no. 40, US Government Printing Office, Washington, D.C.

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24. Roche, David, Duke Power Company, Risk Assessment for PCB at Duke Power Toddville Operations Center, Charlotte, August 1, 1989.

25. Stryker, Robert G., U.S. Environmental Protection Agency, PCB Compliance Inspection Report, Duke Power Company - Toddville Storage Facility, December 15, 1981.

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27. Heath, Ralph C., Basic Elements of Ground Water Hydrology with Reference to Conditions in North Carolina. Open File Report 80-44, pp. 13, 26-29, 37, US Geological Survey, 1980.

28. LeGrand, H. E. and Mundorff, M. J., Geology and Ground Water in the Charlotte Area, NC, Bulletin No. 63, 1952, pp. 8-12 and 66-77.

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30. US Department of Agriculture Soil Conservation Service, Soil Survey of Mecklenburg County, June 1980.

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Ref. 3

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
CHARLOTTE,
NORTH CAROLINA
MECKLENBURG COUNTY

MAP INDEX

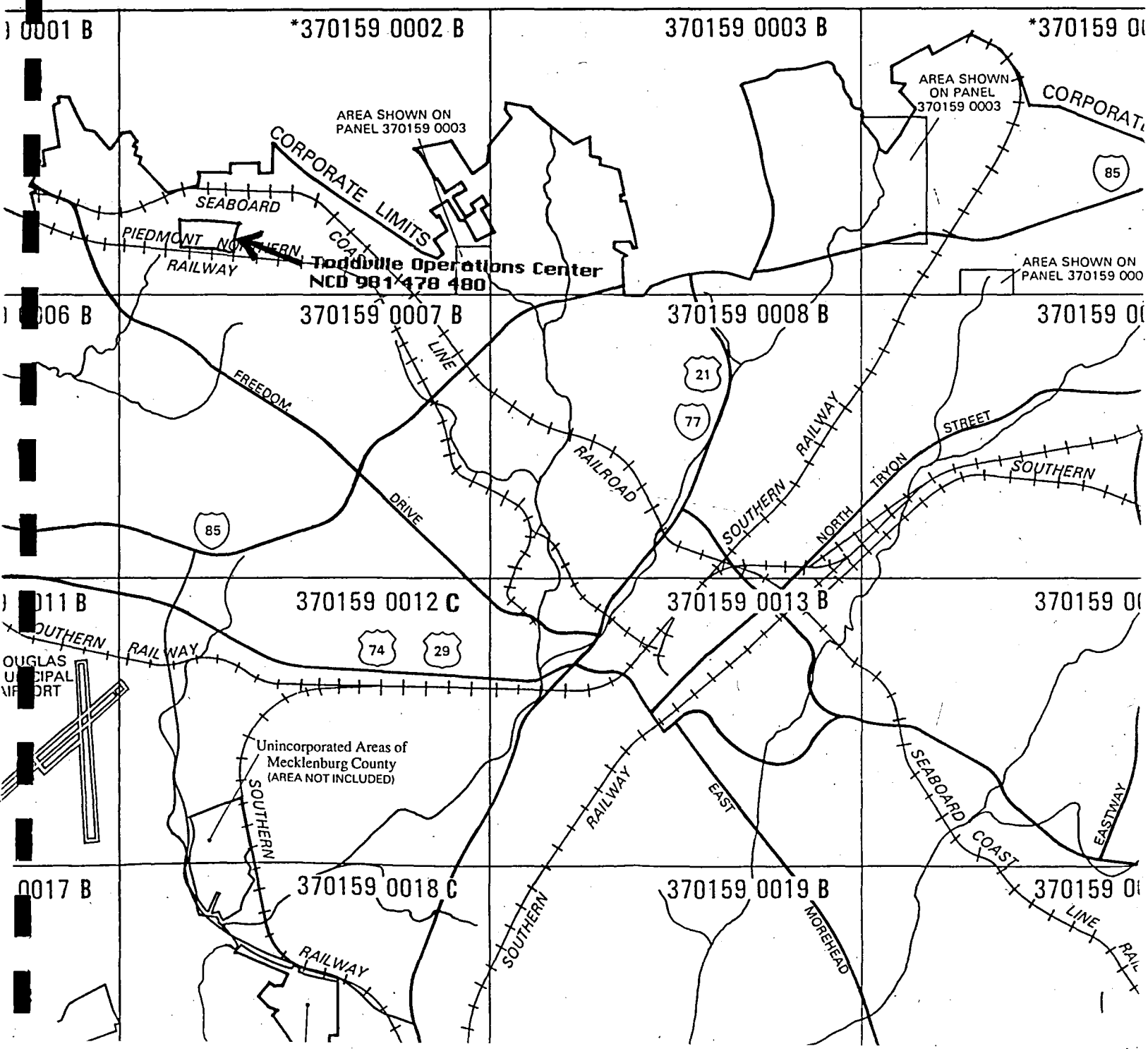
PANELS PRINTED: 3, 6, 7, 8, 9, 12, 13, 14, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 31

COMMUNITY-PANEL NUMBERS
370159 0001-0031

MAP REVISED:
JANUARY 6, 1994

Federal Emergency Management Agency

*PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS.



Memorandum

To: File

From: Robert Gandley, Environmental Engineer
North Carolina Superfund Section Robert Gandley

Re: Surface water pathway
Toddville Operations Center site, NCD 981 478 480

Date: March 15, 1995

On this date I delineated the surface water pathway leading from the Toddville Operations Center site and the wetlands contained therein. The pathway begins with two distinct overland flow routes having different probable points of entry (PPE's) into surface water. Both PPEs are located along the same unnamed tributary to Paw Creek and they are located approximately 0.3 miles apart. The unnamed tributary is classified as a wetlands on the Wetlands Inventory Maps for the entire length between the two PPEs and for an additional 1.1 miles downstream until it reaches Paw Creek. This tributary has a minimal flowrate (<10 cfs) and flows along mapped linear wetlands for the entire 1.4 mile stretch. After reaching Paw Creek, site drainage flows 2.5 miles along a stretch of Paw Creek having a minimal flowrate (<10 cfs) and no wetlands frontage. Paw Creek then becomes a small to moderate stream (10-100 cfs flowrate) for the next 1.5 miles and runs through several wetlands having 2.0 mile of total frontage. The point where Paw Creek becomes a small to moderate stream is estimated to be the nearest fishery to the site. This estimate was made based upon information obtained by Jeanette Stanley in the attached reference. Drainage then enters the Paw Creek arm of Lake Wylie for the next 2.0 miles. The Paw Creek arm of Lake Wylie also has the flow characteristics of a small to moderate stream (10-100 cfs flowrate) and it is bordered by approximately 0.4 miles of wetland frontage. The site drainage then enters the main body of Lake Wylie and flows downstream for an additional 7.9 miles until it reaches the end of the 15-mile surface water pathway at a point near the southern edge of the Belmont NC-SC Topographic Quadrangle. The main body of Lake Wylie (also the Catawba River) has an estimated flowrate of 2,114 cfs near the point where site drainage enters. This classifies Lake Wylie as a large stream to river for the remainder of the surface water pathway. There are no significant wetlands along the remainder of the pathway.

The following summarizes the targets in the surface water pathway:

Total wetlands frontage equals 3.8 miles from the upper PPE.
The nearest wetlands is located at the PPE.
The nearest fishery is located approximately 3.6 miles downstream of the lowest PPE.

Attachments: Streamflow Calculations
Fishery memo

MEMO

DATE: October 11, 1993

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

I traced the possible surface water pathways from the site to the end of the surface water pathway. I traced these from the USGS quad maps Mountain Island Lake, NC (, Mount Holly, NC, Belmont, NC/SC, Charlotte West, NC, and Lake Wylie SC/NC. I also traced the wetlands along the surface water pathway and within four miles of the site using the National Wetlands Inventory quad maps Mountain Island Lake, NC; Mount Holly, NC; Belmont NC/SC; Charlotte West, NC; and Lake Wylie SC/NC; all dated 1991. I used highlight A-8 on pp. A-22 & 23 in the HRS Guidance Manual, November 1992, to determine which wetlands fit the HRS definition of wetlands. I measured the frontage of these wetlands along each surface water pathway and the area of the wetlands within four miles of the site.

The total wetland frontage along the Long Creek surface water pathway is 13.5 miles. There are wetlands at the PPE with 4.0 miles of contiguous frontage from the PPE. This is measured from the headwaters of the intermittent tributary into which drains the Exxon outfall.

The total wetland frontage along the Paw Creek surface water pathway is 5.0 miles. The overland flow is for 0.8 miles to the PPE. There are wetlands at the PPE with 1.8 miles of contiguous frontage.

The wetland acreage within four miles of the site is indicated in the attached sketch.

I calculated the flow rate at several points along these surface water pathways. The unnamed tributary that flows into Long Creek has a drainage area of 1.27 sq. miles, or a flow rate of 1.27/13.58 x 14 = 1.3 cfs. Long Creek at the point where this tributary enters has a drainage area of 31.8 square miles or a flow rate of 31.8/13.58 x 14 = 32.8 cfs. The Catawba River at Belmont in the vicinity of the surface water intake has a drainage area of 2051 square miles, or a flow rate of 2051/13.58 x 14 = 2114 cfs.

Paw Creek at I-85 has a drainage area of 9.94 square miles, or a flow rate of 9.94/13.58 x 14 = 10.25 cfs.

WL

Long Creek Surface water pathway (Where SW sample 5 was taken--

Mt. Hol 4 **Mountain Island Lake quad (1991)**--UT to Long Creek from head waters to Long Creek 2.0. first 0.6 miles is intermittent, last 1.4 miles are perienniel. Contiguous Wetlands all along the surface water pathway from the Exxon PPE. length of this segment may be shorter from the Consolidated Warehouse PPE.

5 4 Long Creek 5 miles long, from entry of UT into Long Creek to where in empties into the Catawba River **(on the Mount Holly quad)**, 4 miles of wetland frontage along this pathway

3 3 miles wetland frontage along Catawba River down to end of Mount Holly quad (1991) map, which is 2 more miles of surface water pathway

(Total of 9.0 miles of surface water pathway have been traced.)

2.5 **Belmont quad**--This surface water pathway ends at the power plant on the Catawba River. There are an additional 2.5 miles of wetlands frontage in the last 5.5 miles of surface water pathway (in Belmont quad)

13.5 mi. (old mt. Hol)

Paw Creek surface water Pathway--

Mountain island lake quad (1991). UT to Paw Creek, close to Carole Lane and lagoons-Where SW sample 4 was taken above the PPE for Consolidated Warehouse-1.0 mile to Paw Creek, from PPE, water flows for 0.1 miles and enters wetlands where it flows for 0.4 miles through contiguous wetlands (0.8 miles frontage, then flows for 0.5 miles until it enters Paw Creek.

WL

1.8 From Castles property, overland flow for 0.8 miles to PPE. wetlands at PPE go for 0.9 contiguous miles (1.8 miles total frontage). The creek flows for 0.5 non-wetland miles until it enters the point discussed above for the other UT to Paw Creek.

0 2 miles of Paw Creek left on mountain Island Lake quad, no wetlands

3 3 **Charlotte west quad (1991)**--Wetlands begin immediately--SW pathway runs 3 miles on this quad with 3 miles of wetland frontage

0.2 **Belmont quad**-Lake Wylie flows into Catawba River, going for 8 miles into south Carolina. Almost 0 wetlands frontage in this sector, approximately 0.2 miles

Lake Wylie quad--Paw Creek SW Pathway ends on Catawba River/Lake Wylie at the Buster Boyd Bridge (where Hwy 49 crosses over)

5.0 mi

Attachments: 1. Sketch of surface water pathway(s) from the site
2. Sketch of wetlands within four miles of the site.
3. Water Resources Investigations Report 88-4094, Map of the Mean Annual Runoff for the Northeastern, Southeastern, and Mid-Atlantic United States, Water Years 1951-80.
4. US Geological Survey Open-File Report 83-211, Drainage Areas of Selected Sites on Streams in North Carolina, pp. 123 & 124.

Memorandum
August 20, 1993

To: File

From: Robert Gandley, Environmental Engineer
NC Superfund Section Robert Gandley

Re: Ace Chemical, NCD 045 451 473
Charlotte, Mecklenburg County
CMUD intakes and connection rates.

I spoke with Cindy Carr, a civil engineer with CMUD, (704) 399-2221 to confirm data obtained during the preliminary assessment for Ace Chemical. She said that the drinking water intake for Charlotte is still located on Mount Island Lake, upstream of the Ace Chemical drainage pathway. She also stated that the previous estimate of a 95% connection rate within the areas covered by CMUD water lines is still a valid figure, but added that they are actively working to increase coverage.

Memorandum

To: File

From: Robert Gandley, Environmental Engineer
North Carolina Superfund Section Robert Gandley

Re: Wetlands within 4 miles
Toddville Operations Center site, NCD 981 478 480

Date: April 10, 1995

I calculated estimates of wetland acreage within 4 miles of the site based upon the National Wetlands Inventory Maps. The estimated areas are as follows:

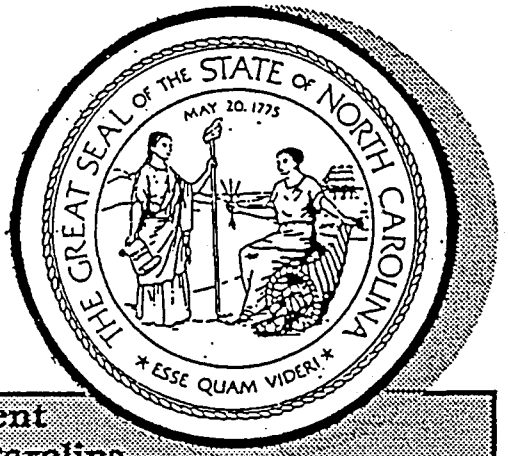
Distance	Area
0-1/4 mi.	none
1/4-1/2 mi.	none
1/2-1 mi.	2.7 acres
1-2 mi.	34.1 acres
2-3 mi.	47.4 acres
3-4 mi.	~250 acres

The majority of wetlands within four miles of the site are located along surface waters.

Ref. 7

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:

.0308 CATAWBA RIVER BASIN

Name of Stream	Description	Class	Classification Date	Classification Index No.
	Long Creek			
Long Creek	From a point 0.6 mile downstream of Mecklenburg County SR 2074 to a point 0.4 mile upstream of Mecklenburg County SR 1606	WS-IV	8/3/92	11-120-(2.5)
McIntyre Creek	From source to a point 0.3 mile upstream of Mecklenburg County SR 2025	C	9/1/74	11-120-3-(1)
McIntyre Creek	From a point 0.3 mile upstream of Mecklenburg County SR 2035 to Long Cr.	WS-IV	8/3/92	11-120-3-(2)
Gutter Branch	From source to a point 1.3 miles upstream of Mecklenburg County SR 2037	C	9/1/74	11-120-4-(1)
Gutter Branch	From a point 1.3 miles upstream of Mecklenburg County SR 2037 to Long Cr.	WS-IV	8/3/92	11-120-4-(2)
Gum Branch	From source to Long Creek	WS-IV	8/3/92	11-120-5
Thomas Pond	Entire pond and connecting stream to Long Creek	WS-IV	8/3/92	11-120-6
Long Creek	From a point 0.4 mile upstream of Mecklenburg County SR 1606 to Lake Wylie, Catawba River	WS-IV CA	8/3/92	11-120-(7)
Fites Creek	From source to a point 0.3 mile downstream of N.C. Hwy. 273	WS-IV	8/3/92	11-121-(1)
Fites Creek	From a point 0.3 mile downstream of N.C. Hwy. 273 to Lake Wylie, Catawba River	WS-IV CA	8/3/92	11-121-(2)
CATAWBA RIVER (Lake Wylie below elevation 570)	From I-85 bridge to the upstream side of Paw Creek Arm of Lake Wylie, Catawba River	WS-IV&B CA	8/3/92	11-(122)
Unnamed Tributary at Belmont Abbey College	From source to a point 0.5 mile downstream of N.C. Hwy. 273	WS-IV	8/3/92	11-123-(1)
Unnamed Tributary at Belmont Abbey College	From a point 0.5 mile downstream of N.C. Hwy. 273 to Lake Wylie, Catawba R.	WS-IV CA	8/3/92	11-123-(2)
CATAWBA RIVER (Lake Wylie below elevation 570) North Carolina portion	From the upstream side of Paw Creek Arm of Lake Wylie to North Carolina-South Carolina State Line	WS-V&B	8/3/92	11-(123.5)
Paw Creek	From source to Lake Wylie, Catawba River	C	9/1/74	11-124
Ticer Branch (Tiser Branch)	From source to Paw Creek	C	9/1/74	11-124-1
Little Paw Creek (Danga Lake)	From source to Lake Wylie, Catawba River	C	9/1/74	11-125
Beaverdam Creek	From source to Lake Wylie, Catawba River	C	9/1/74	11-126
Legion Lake and Shoaf Lake	Entire lake and connecting stream to Beaverdam Creek	C	9/1/74	11-126-1
Stowe Branch	From source to Lake Wylie, Catawba River	C	9/1/74	11-127
Neal Branch (Armour Creek)	From source to Lake Wylie, Catawba River	C	9/1/74	11-128
South Fork Catawba River	From source to a point 0.8 mile up-	WS-IV	8/3/92	11-129-(0.5)

.0308 CATAWBA RIVER BASIN

Name of Stream	Description	Class	Classification Date	Classification Index No.
CATAWBA RIVER (Lake Wylie below elevation 570)	From Mountain Island Dam to Interstate Highway 85 Bridge at Belmont	WS-IV CA	8/3/92	11-(117)
Harwood Lakes and Brinkley Twin Lakes	Entire lakes and connecting streams to Lake Wylie, Catawba River	WS-IV CA	8/3/92	11-118
Dutchmans Creek	From source to a point 0.8 mile downstream of Taylors Creek	WS-IV	8/3/92	11-119-(0.5)
Leepers Creek	From source to a point a point 0.8 mile upstream of mouth	C	8/3/92	11-119-1-(1)
Sawmill Branch	From source to Leepers Creek	C	8/3/92	11-119-1-2
Lippard Creek	From source to Leepers Creek	C	8/3/92	11-119-1-3
Link Creek	From source to Lippard Creek	C	8/3/92	11-119-1-3-1
Ore Bank Branch	From source to Leepers Creek	C	3/1/62	11-119-1-5
Lick Run	From source to Leepers Creek	C	3/1/62	11-119-1-6
Reed Creek	From source to Leepers Creek	C	3/1/62	11-119-1-7
Bradshaw Branch	From source to Leepers Creek	C	3/1/62	11-119-1-8
Dellinger Branch	From source to Leepers Creek	C	3/1/62	11-119-1-9
Armstrong Branch	From source to Dellinger Branch	C	3/1/62	11-119-1-9-1
Crooked Creek	From source to Leepers Creek	C	3/1/62	11-119-1-10
McClure Branch	From source to Leepers Creek	C	3/1/62	11-119-1-11
Leepers Creek	From a point 0.8 mile upstream of mouth to Dutchmans Creek	WS-IV	8/3/92	11-119-1-(12)
Killian Creek	From source to a point 1.2 miles upstream of mouth	C	3/1/62	11-119-2-(0.5)
Snyder Creek	From source to Killian Creek	C	3/1/62	11-119-2-1
Anderson Creek	From source to Killian Creek	C	3/1/62	11-119-2-2
Wingate Creek	From source to Anderson Creek	C	3/1/62	11-119-2-2-1
Wilkinson Creek	From source to Wingate Creek	C	3/1/62	11-119-2-2-1-1
Ballard Creek	From source to Wingate Creek	C	3/1/62	11-119-2-2-1-2
Hooper Branch	From source to Anderson Creek	C	3/1/62	11-119-2-2-2
Forney Creek	From source to Killian Creek	C	3/1/62	11-119-2-3
Killian Creek	From a point 1.2 miles upstream of mouth to Dutchmans Creek	WS-IV	8/3/92	11-119-2-(4)
Stanley Creek	From source to a point 1.0 mile upstream of Gaston County SR 1918	C	3/1/62	11-119-3-(1)
Stanley Creek	From a point 1.0 mile upstream of Gaston County SR 1918 to Dutchmans Creek	WS-IV	8/3/92	11-119-3-(2)
South Stanley Creek	From source to Dutchmans Creek	WS-IV	8/3/92	11-119-4
Taylors Creek	From source to Dutchmans Creek	WS-IV	8/3/92	11-119-5
Dutchmans Creek	From a point 0.8 mile downstream of Taylors Creek to Lake Wylie, Catawba River	WS-IV CA	8/3/92	11-119-(6)
Long Creek	From source to a point 0.6 mile downstream of Mecklenburg County SR 2074	C	9/1/74	11-120-(0.5)
Dixon Branch	From source to Long Creek	C	9/1/74	11-120-1
Vances Twin Lakes	Entire lakes and connecting stream to Dixon Branch	C	9/1/74	11-120-1-1
Swaringer Lake	Entire lake and connecting stream to	C	9/1/74	11-120-2

Memorandum

To: File

From: Robert Gandley, Environmental Engineer
North Carolina Superfund Section Robert Gandley

Re: Natural Heritage Program Information for the Paw Creek Area
Toddville Operations Center site, NCD 981 478 480

Date: February 15, 1995

On this date I reviewed the Natural Heritage Program maps for information regarding endangered species and sensitive environments within 4 miles or 15 miles downstream of the Toddville Operations Center, Crown Central Petroleum, and Fleet Transport site in the Paw Creek area of Charlotte, NC. The only endangered or threatened species sightings reported in the area were several historic sightings of mollusks (Lasmigona Decorata and Alasmidonta Robusta) along Paw Creek and Long Creek respectively. More recent field information has indicated that these species are no longer present in Paw Creek or Long Creek. See attached memo by Jeanette Stanley (2/12/94) discussing conversations with Dr. Eugene Keferl of Brunswick College in Brunswick, Georgia regarding a study on freshwater mollusks that he conducted in 1987. His study in 1987 did not reveal any endangered mollusks in either of the creeks.

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.

Ref. 9

Memorandum

To: File

From: Robert Gandley, Environmental Engineer
North Carolina Superfund Section Robert Gandley

Re: Site Information.
Toddville Operations Center site, NCD 981 478 480

Date: January 17, 1995

On January 9, 1995 I spoke with Andy Tinsley (704-382-3712) of Duke Power's Toddville Operations Center regarding conditions and practices at the site. Mr. Tinsley told me that no solvents are used out in the yard at the site but that solvents are used inside the garage. They formerly used Safety Clean as their provider/disposer of solvents. They are currently using "zep" (spelling uncertain) cleaner. Mr. Tinsley also told me that the facility currently receives water from CMUD and also receives bottled water for drinking. The wells that were onsite at the time of the Site Inspection in 1987 are now capped. Mr. Tinsley also told me that he would have Dave Roche call me to further discuss site history as Mr. Roche was present at the site at the time of the Site Inspection in 1987.

On January 17, 1995 I spoke with Dave Roche (704-382-7807) of Duke Power's Toddville Operations Center site. I asked Mr. Roche about solvent usage at the site and he stated that they used mineral spirits provided by Safety Clean in their parts washers and they used toluene based paint thinners. Mr. Roche also said that 1,1,1-trichloroethane had been used for degreasing at the site for many years. I specifically asked Mr. Roche if tetrachloroethylene (PCE) had ever been used at the site and he stated that to his knowledge, no PCE has ever been used at the site. I also asked Mr. Roche if the onsite wells that were sampled at the time of the Site Inspection were being used for drinking water at the time they were sampled. Mr. Roche told me that the wells were not being used for drinking water at the time of the Site Inspection in 1987 because the facility had previously connected to city water provided by CMUD.

Economics and Statistics Administration
BUREAU OF THE CENSUS

CENSUS '90

1990 Census of Population and Housing

Ref. 10

Summary Population and Housing Characteristics

North Carolina

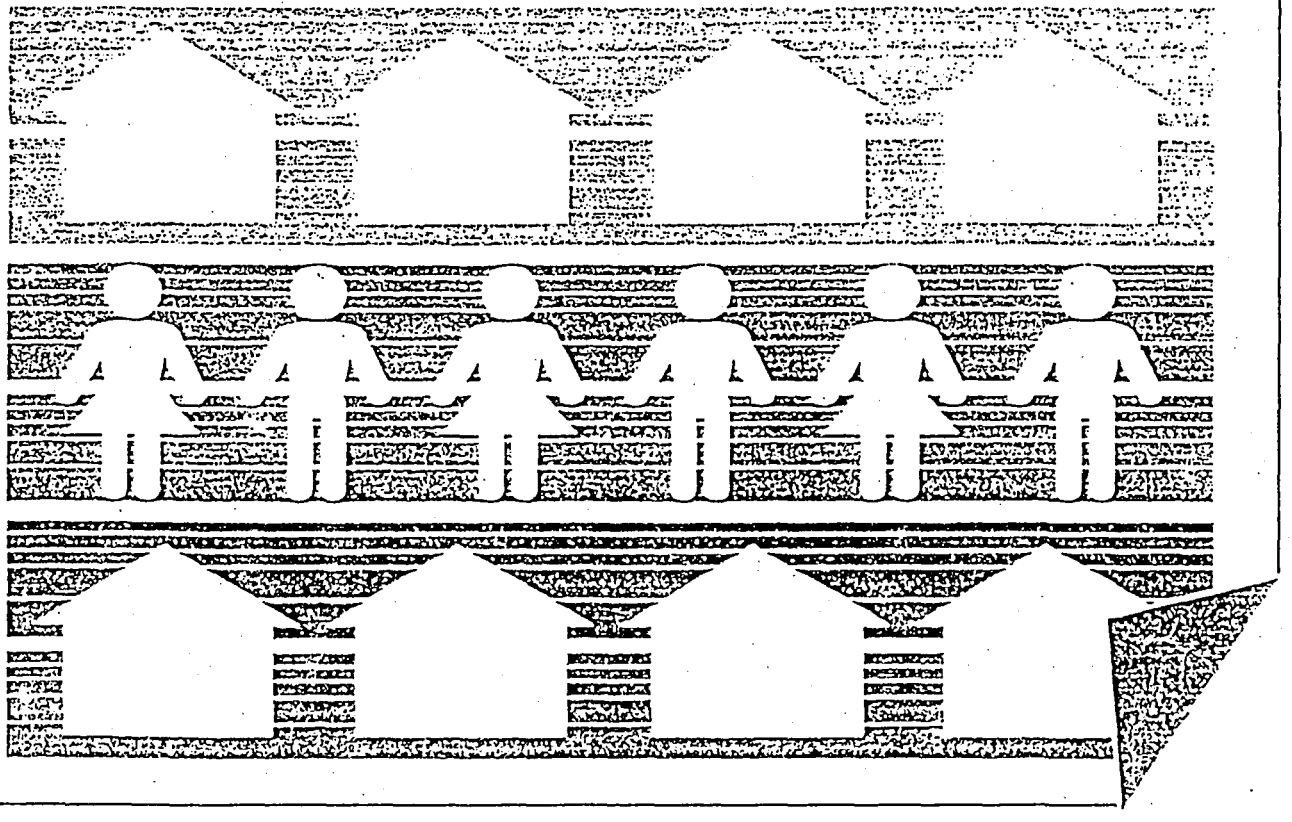


Table 5. Household, Family, and Group Quarters Characteristics: 1990—Con.

[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
Bearcross township	1 748	627	481	399	62	146	135	61	54	2.79	3.26	–	–	–
Bearcross 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	3 573	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
Gressy 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	175	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	460	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	95	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	–	–	–

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, Secretary

WEATHER BUREAU
F. W. Reichelderfer, Chief

Ref. 11

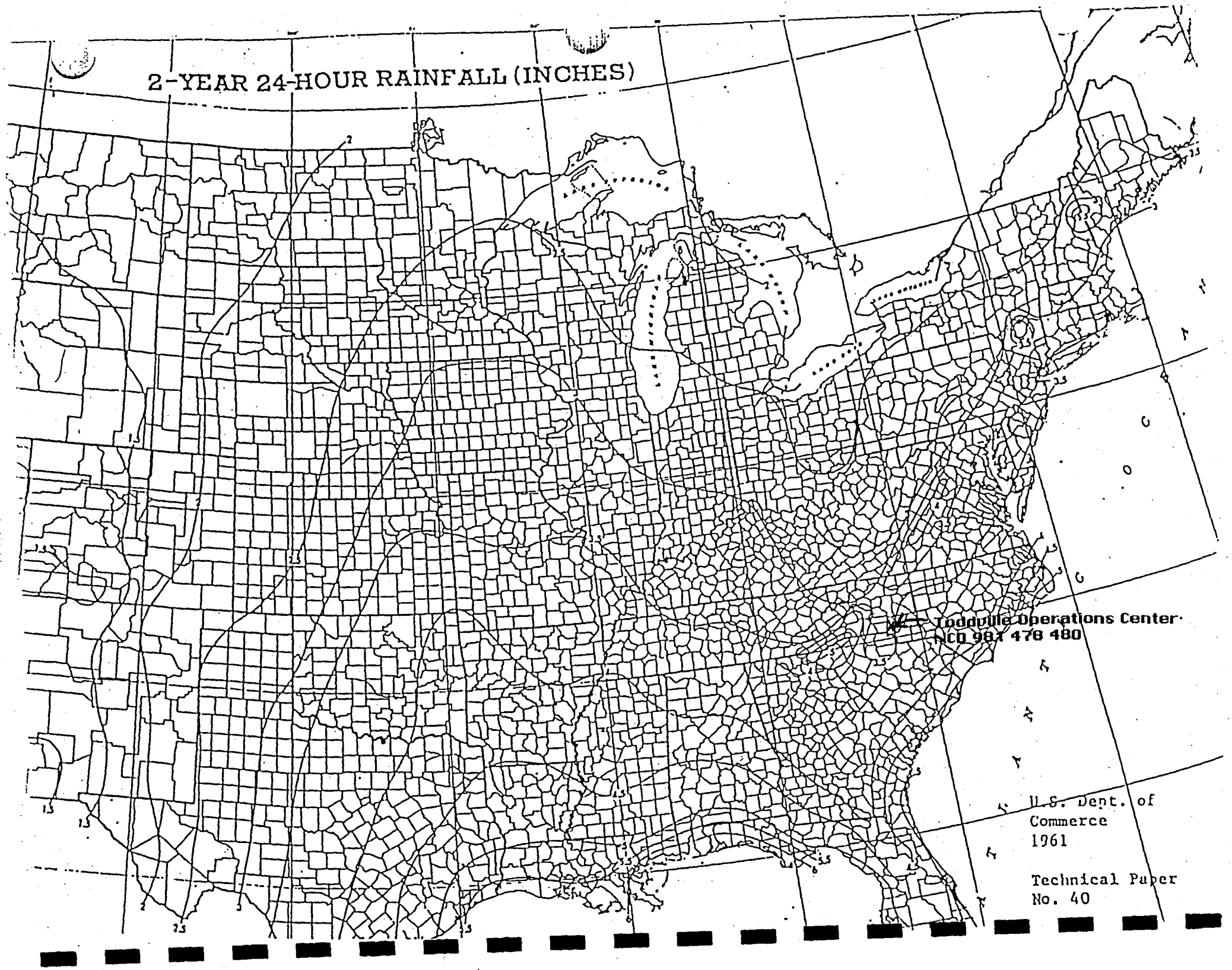
TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

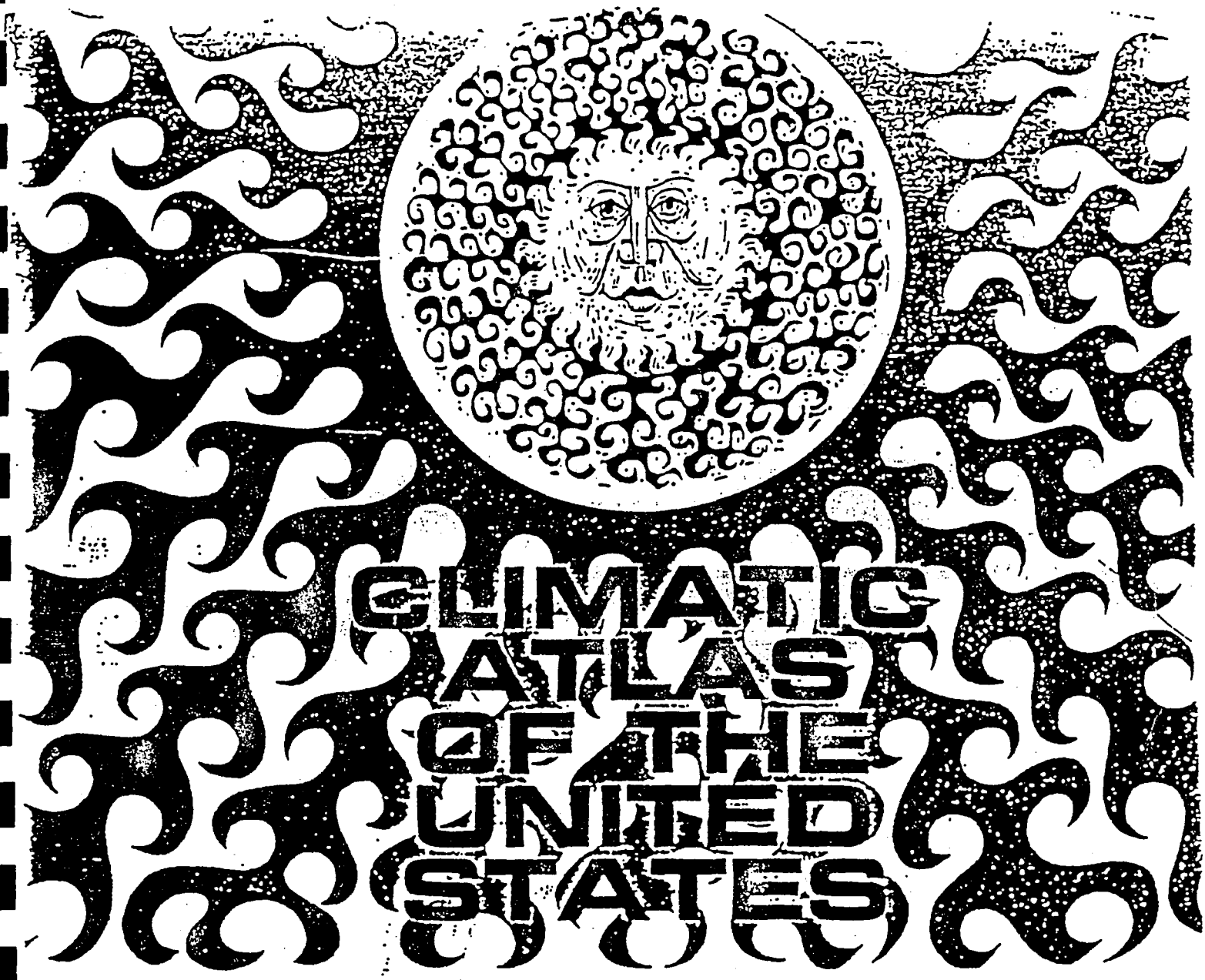
for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

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

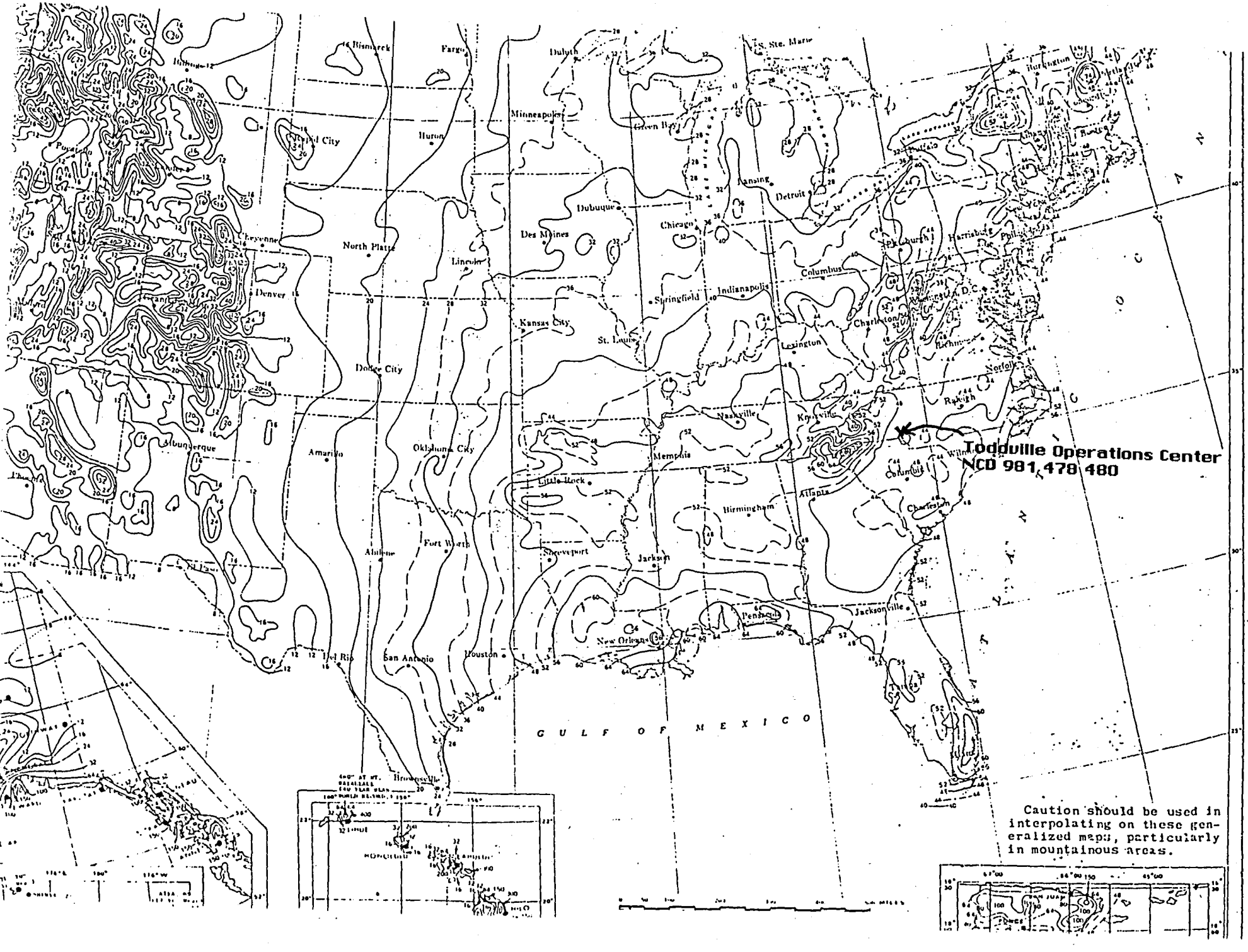
PROPERTY OF EPA
FIT IV

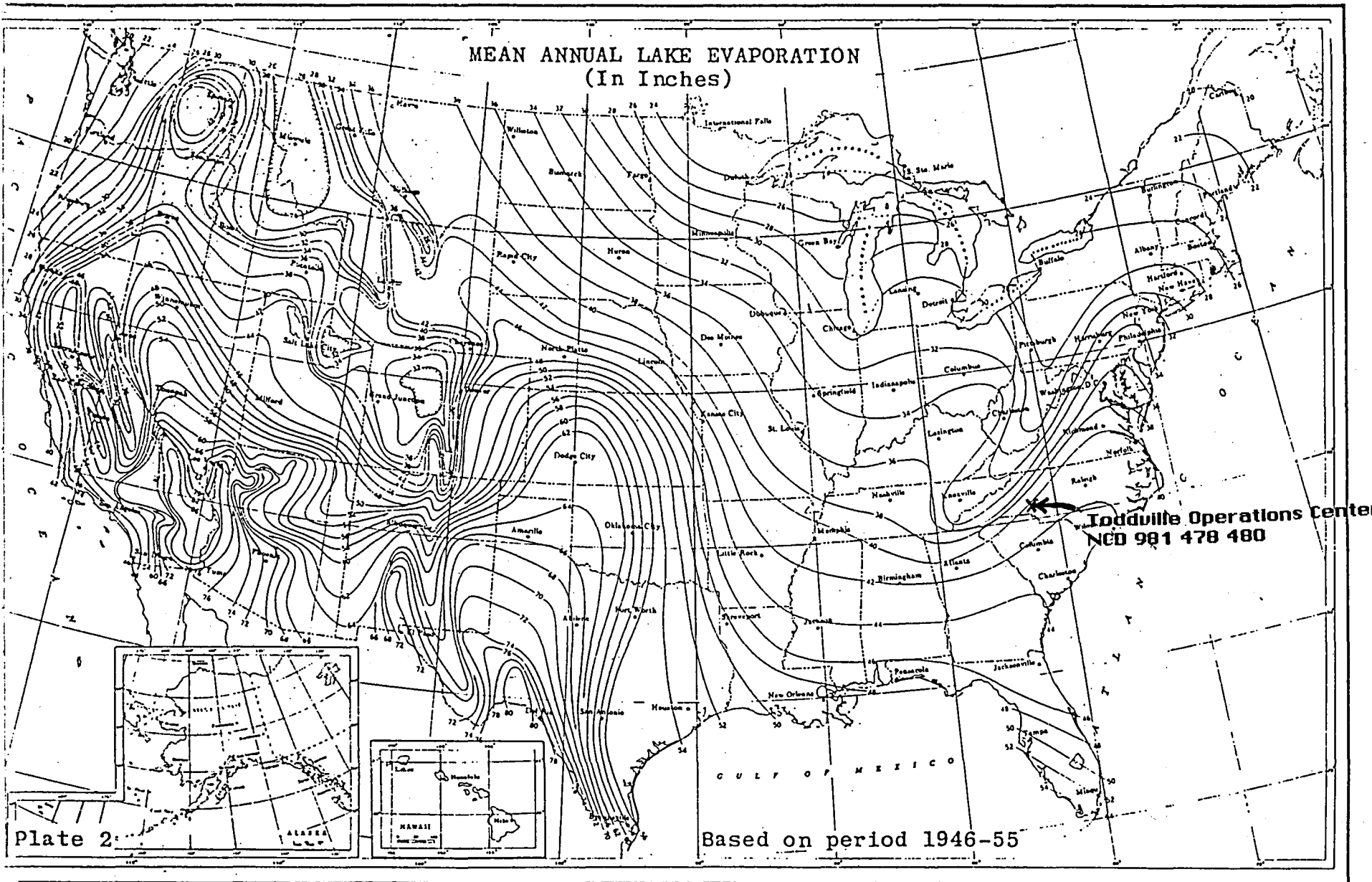

2-YEAR 24-HOUR RAINFALL (INCHES)
Toddville Operations Center
NCD 981 478 480
U.S. Dept. of Commerce
1961
Technical Paper No. 40

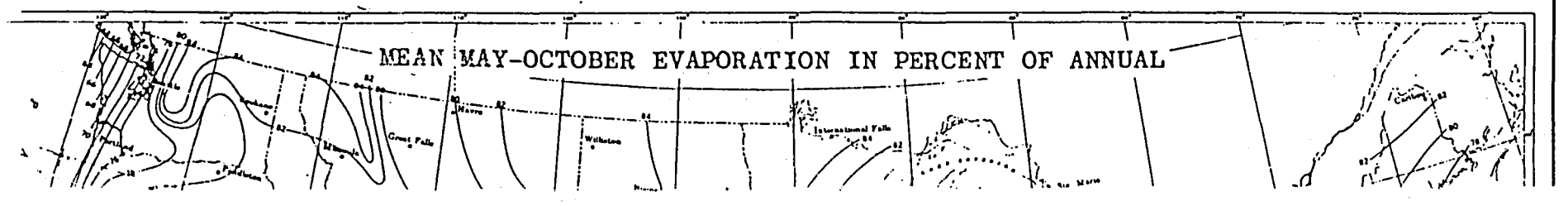
Ref. 12



RCE . Environmental Science Services Administration . Environmental Data Service


Todduville Operations Center
NCD 981,478,480
GULF OF MEXICO
Caution should be used in interpolating on these generalized maps, particularly in mountainous areas.


MEAN ANNUAL LAKE EVAPORATION
(In Inches)
Plate 2
Based on period 1946-55
GULF OF MEXICO
ALASKA
HAWAII
Todd Ville Operations Center
NCD 981 478 480


MEAN MAY-OCTOBER EVAPORATION IN PERCENT OF ANNUAL

Memorandum

To: File

From: Robert Gandley, Environmental Engineer
North Carolina Superfund Section Robert Gandley

Re: Groundwater Population within 4 miles
Toddville Operations Center site, NCD 981 478 480

Date: March 21, 1995

On this date counted all houses within 4 miles of the Toddville Operations Center site that are not located along a mapped water line. The results will be used to estimate the number of homes using private wells. The accuracy of the estimate is uncertain as the topographic maps for the area within 4 miles of the site are all at least 10 years old. It is likely that there are currently many more houses in the area. However, the waterline map obtained from the City of Charlotte only shows water mains and does not include all of the smaller water lines. The number of homes thought to be using private wells within 4 miles of the site is estimated as follows:

Distance	# of Houses	# of Private Well Users
0-1/4 mile	17	43
1/4-1/2 mile	73	183
1/2-1 mile	253	633
1-2 miles	1,238	3,095
2-3 miles	1,655	4,138
3-4 miles	1,288	3,220

The # of Groundwater Users was estimated by multiplying the # of Houses by 2.5 persons per house, the average number of persons per household in Mecklenburg County at the time of the 1990 Census.

Based upon the water supply printout provided to us by the NC Public Water Supply Section, the list of wells within four miles of the site is as follows:

Name	Distance	Population
A. Juniper Drive Water System	1-2 miles	94
B. Oakdale Subdivision	2-3 miles	440
C. Parkwood Mobile Home Park	1/4-1/2 mile	157
D. Sunset Grove Mobile Home Park	1-2 miles	76
E. Trexler Mobile Home Park	2-3 miles	114
F. Farmington	1-2 miles	109
G. Providence West Subdivision	1/2-1 mile	309
H. McCall Brothers	1-2 miles	30

By combining the private well data with the community well data, estimates of the total groundwater population within 4 mile of the site can be determined. The total groundwater population estimates are as follows:

Distance	Population
0-1/4 mile	43
1/4-1/2 mile	340
1/2-1 mile	942
1-2 miles	3,404
2-3 miles	4,692
3-4 miles	3,220

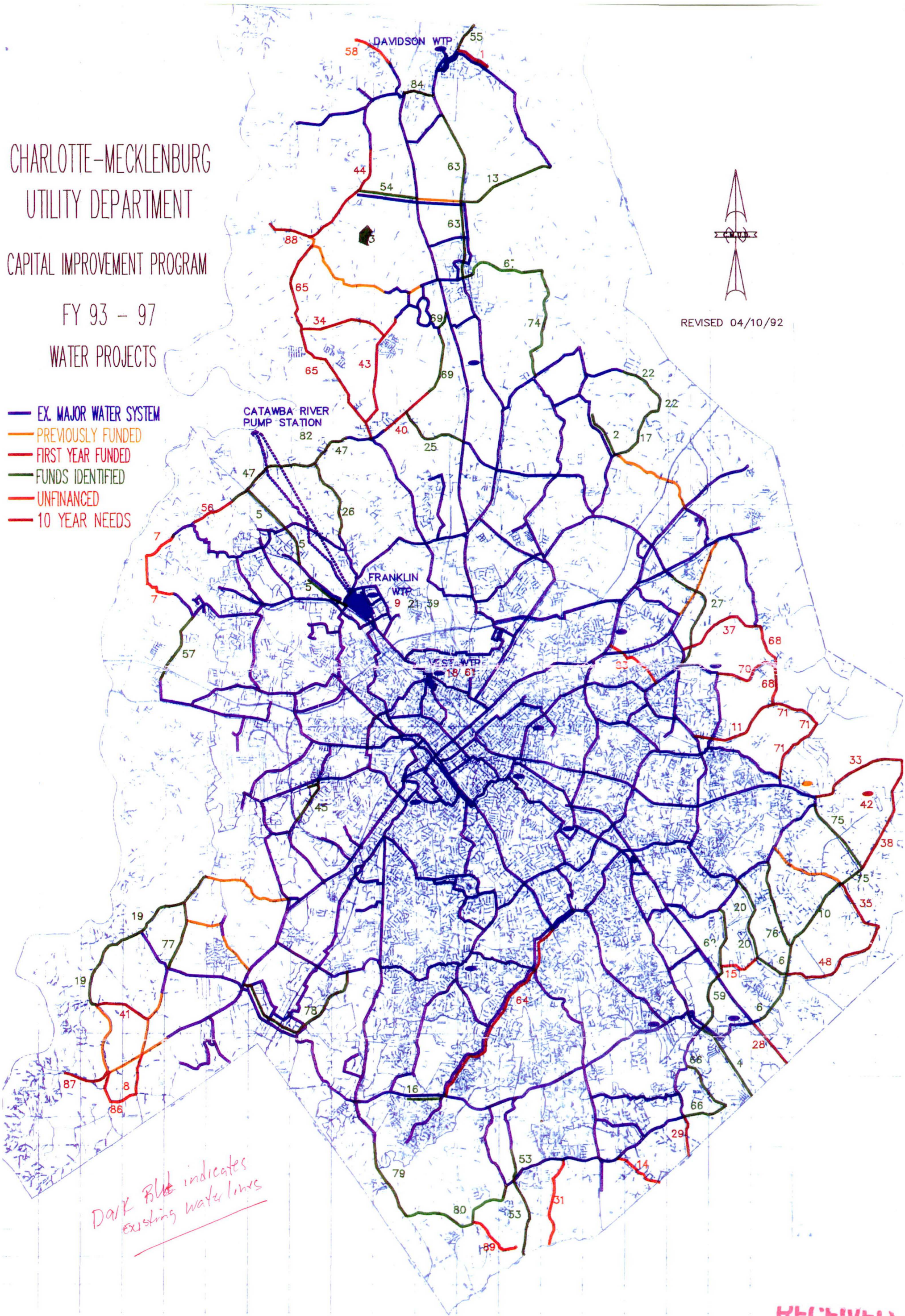
The total number of groundwater users within 4 miles of the site is estimated as 12,641 people.

CHARLOTTE-MECKLENBURG UTILITY DEPARTMENT

CAPITAL IMPROVEMENT PROGRAM

FY 93 - 97

WATER PROJECTS



RECEIVED
MAR 11 1993
SUPERFUND SECTION

Site Name: Toddville Operations Ctr
Site Number: NCD 981 478 480

Site Location: Charlotte, N.C.
Mecklenburg County
Latitude: 35 16 31.0
Longitude: 80 54 59.0

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	31	31	14	14
>1/4 to 1/2 mile	343	374	180	194
>1/2 to 1 mile	1,860	2,234	813	1,007
>1 to 2 miles	11,821	14,055	4,523	5,530
>2 to 3 miles	16,967	31,022	6,748	12,278
>3 to 4 miles	23,919	54,941	9,228	21,506

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.

Ref. 15

SITE INSPECTION REPORT

Toddville Operations Center

NC D981478480
610 Toddville Road
Charlotte, NC

CERCLA

31 March 1987

Stan T. Atwood, Toxicologist

NC Division of Health Services
Solid and Hazardous Waste Management Branch
Environmental Health Section
CERCLA Unit

Ref. 16

North Carolina Department of Human Resources
Division of Health Services
P.O. Box 2091 • Raleigh, North Carolina 27602-2091

James G. Martin, Governor
Phillip J. Kirk, Jr., Secretary

Ronald H. Levine, M.D., M.P.H.
State Health Director

3 September 1986

Ms. Denise Smith
EPA NC CERCLA Project Officer
Air and Hazardous Material Division
345 Courtland Street, N.E.
Atlanta, GA 30365

Dear Ms. Smith:

SUBJECT: Preliminary Assessment Report
Toddville Operations Center NC D981478480
Charlotte, NC 28242

Enclosed please find the Preliminary Assessment report for the subject site. The recommended priority for the site is based on review of the available data.

The Duke Power Toddville Operations Center is on approximately 115 acres of land and includes a warehouse that has been used by Duke Power for approximately 30 years. Several acres of land just west and south of this warehouse have been used to store equipment including capacitors and transformers since the warehouse was built. Some of the capacitors reportedly contained oil with high concentrations of PCB's. Some of the transformers may also have contained oil with PCB's. Servicing of transformers, including changing and filtering of transformer oil has also occurred in this area in the past.

Two wells on site were taken out of service when city water became available to the facility in about 1971. The area surrounding the facility is presently served by city water, however, it is believed that many of the houses in the immediate vicinity predate the availability of city water service. These houses may therefore still have usable wells.

Because of the potential for ground water contamination at this site a medium priority for inspection is recommended. If you have any questions please contact me at (919) 733-2801.

Sincerely,

Jack Butler

Jack Butler, Environmental Engineer
CERCLA Unit
Solid and Hazardous Waste Management Branch
Environmental Health Section

JB/tb/0214b

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT

PART I - INFORMATION AND ASSESSMENT

II. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D981478480

I SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
Toddville Operations Center	610 Toddville Road

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Charlotte	NC	28242	Mecklenburg	60	09

09 COORDINATES: LATITUDE 35° 16' 32" | LONGITUDE 80° 54' 58"

10 DIRECTIONS TO SITE (Starting from nearest public road) From I-85 exit northwest onto Hwy. 27 (Thrift Road/ Freedom Drive). Approx. 1.8 miles from I-85 turn right onto Toddville Road. Site is just north of railroad tracks.

III RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)
Duke Power Co.	422 South Church Street

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Charlotte	NC	28242	(704) 373-4011

07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)
Duke Power Co.	610 Toddville Road

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
Charlotte	NC	28242	(704) 399-7550

13 TYPE OF OWNERSHIP (Check one)
[X] A. PRIVATE [ ] B. FEDERAL: _____ (Agency) [ ] C. STATE [ ] D. COUNTY [ ] E. MUNICIPAL
[ ] F. OTHER: _____ (Specify) [ ] G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply) (CERCLA 103c)
[ ] A. RCRA 3001 DATE RECEIVED: [ ] B. UNCONTROLLED WASTE SITE DATE RECEIVED [X] C. NONE

IV CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION BY (Check all that apply)
[ ] YES DATE [ ] A. EPA [ ] B. EPA CONTRACTOR [ ] C. STATE [ ] D. OTHER CONTRACTOR
[ ] E. LOCAL HEALTH OFFICIAL [ ] F. OTHER: _____
[X] NO CONTRACTOR NAME(s): _____

02 SITE STATUS (Check one)
[X] A. ACTIVE [ ] B. INACTIVE [ ] C. UNKNOWN

03 YEARS OF OPERATION
1956 (BEGINNING YEAR) | Present (ENDING YEAR) [ ] UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED Site used for approx. 30 yrs. to store and service electrical equipment including transformers and capacitors. Transformer oil possibly also used in past for dust suppression. Two wells on site have been capped since 1971. Surrounding area served by city water

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION however some houses may have wells. This is not a RCRA facility.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
[ ] A. HIGH (Inspection required promptly) [X] B. MEDIUM (Inspection required) [ ] C. LOW (Inspection on time available basis) [ ] D. NONE (No further action needed, complete current disposition form)

VI INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
Joe Harwood	Duke Power Co.	(704) 373-8494

02 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	ORGANIZATION	03 TELEPHONE NUMBER	08 DATE
Jack Butler	NC DHR/DHS	SHW Mgmt. Br.	(919) 733-2801	08/27/86

EPA FORM 2070-12 (7-81)

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

II. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D981478480

II. WASTE STATES, QUANTITIES, AND CHARACTERS

01 PHYSICAL STATES (Check all that apply)

[ ] A. SOLID
[ ] B. POWDER, FINES
[ ] C. SLUDGE
[ ] D. Other _____
[ ] E. SLURRY
[X] F. LIQUID
[ ] G. GAS

02 WASTE QUANTITY AT SITE (Measures of Waste quantities must be independent)

TONS _____
CUBIC YARDS Unknown
NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

[X] A. TOXIC
[ ] B. CORROSIVE
[ ] C. RADIOACTIVE
[X] D. PERSISTENT
[ ] E. SOLUBLE
[ ] F. INFECTIOUS
[ ] G. FLAMMABLE
[ ] H. IGNITABLE
[ ] I. HIGHLY VOLATILE
[ ] J. EXPLOSIVE
[ ] K. REACTIVE
[ ] L. INCOMPATIBLE
[ ] M. NOT APPLICABLE

III. WASTE TYPES

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OOC	OTHER ORGANIC CHEMICALS	Unknown		Transformer and capacitor oil
IOC	INORGANIC CHEMICALS			
ACD	ADICS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

CATEGORY	SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
OOC	PCB's	1336-36-3			

V. FEEDSTOCKS (See Appendix for CAS numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e. g. state files, sample analysis, reports

1. Permanent files, NC DHR/DHS, CERCLA Unit, Raleigh, NC.
2. USGS, 7.5' Quad., Mountain Island Lake Quadrangle, 1969.

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

II. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D981478480

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION 02 [ ] OBSERVED (DATE: _____) [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION 2 wells on site not used since 1971. Possible private wells in area. Possible contamination from transformer and capacitor oil containing PCB's.

01 [ ] B. SURFACE WATER CONTAMINATION 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

01 [ ] C. CONTAMINATION OF AIR 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

01 [ ] D. FIRE/EXPLOSIVE CONDITIONS 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

01 [ ] E. DIRECT CONTACT 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

01 [X] F. CONTAMINATION OF SOIL 02 [ ] OBSERVED (DATE: _____) [X] POTENTIAL [ ] ALLEGED
03 AREA POTENTIALLY AFFECTED _____ (Acres) 04 NARRATIVE DESCRIPTION Possible use of transformer oil for dust suppression in past. Possible spills of oil containing PCB's in past.

01 [X] G. DRINKING WATER CONTAMINATION 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION 2 wells on site capped in 1971. Possible private wells in area.

01 [ ] H. WORKER EXPOSURE/INJURY 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

01 [ ] I. POPULATION EXPOSURE/INJURY 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

II. IDENTIFICATION

01 STATE	02 SITE NUMBER
NC	D981478480

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 [ ] J. DAMAGE TO FLORA 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

01 [ ] K. DAMAGE TO FAUNA 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION

01 [ ] L. CONTAMINATION OF FOOD CHAIN 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

01 [ ] M. UNSTABLE CONTAINMENT OF WASTE (Spills/runoff/standing leaking drums) 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____ 04 NARRATIVE DESCRIPTION

01 [ ] N. DAMAGE TO OFFSITE PROPERTY 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION

01 [ ] O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPS 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION

01 [ ] P. ILLEGAL/UNAUTHORIZED DUMPING 02 [ ] OBSERVED (DATE: _____) [ ] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED:

IV. COMMENTS

V. SOURCES OF INFORMATION (Site specific references, e. g., state files, sample analysis, reports)

As previously cited.

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

SITE NAME: Toddville Operations Center CERCLIS #: NCD 981 478 480

AKA: _____ SSID: _____

ADDRESS: 610 Toddville Road

CITY: Charlotte STATE: NC ZIP CODE: 28242

SITE REFERENCE POINT: SW Corner of Warehouse

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

SCALE: 1:24,000 MAP DATE: 1969 (PR 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: 275

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

A x 0.3304 = 90.86"

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 1' 30.86"

D) ADD TO STARTING LATITUDE: 35° 15' 0.0" + 1' 31.0 =

SITE LATITUDE: 35° 16' 31.0"

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 451

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

A x 0.3304 = 149.01"

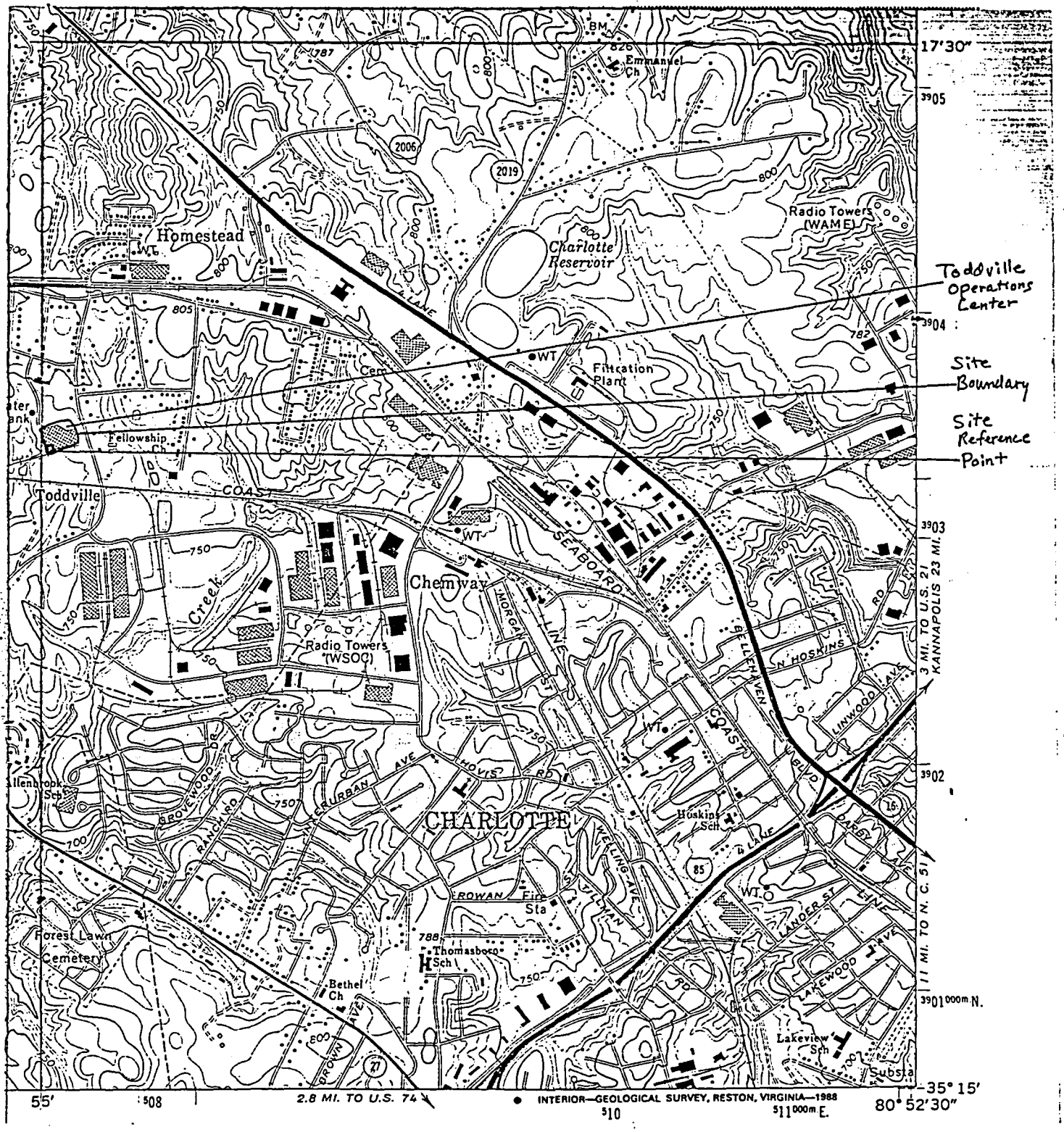
C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 2' 29.01"

D) ADD TO STARTING LONGITUDE: 80° 52' 30.0" + 2' 29.0 =

SITE LONGITUDE: 80° 54' 59.0"

INVESTIGATOR: Irene Williams DATE: 5/12/92

SITE NAME: Toddville Operations Center NUMBER: NCD 981 478 480



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

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

LATITUDE: 35° 16' 31" LONGITUDE: 80° 52' 30"

Ref. 18

SUPERFUND CHEMICAL DATA MATRIX

APPENDIX B TABLES

June 1994

Ref. 19

MEMO

TO: Superfund Section Staff

FROM: Jeanette Stanley
Environmental Chemist
NC Superfund Section

DATE: January 17, 1995

SUBJECT: Update on Status of Wellhead Protection Programs in N.C.

I spoke with Mr. Randy Prillaman, Hydrogeologist, NC DEM (919) 733-3221. He said that he has rewritten a draft Wellhead Protection Area implementation plan. It was submitted to US EPA in late December 1994. This plan is based on either an expensive hydrogeological study or the protection of a whole area based on a calculation using recharge rate and pumping rate as variables. He does not know if or when final approval will be received from EPA, but he expects to know by April or May 1995.

Some areas he expects to be the first to have wellhead protection areas are Gaston County, the Town of Black Mountain, and numerous small communities affiliated with the North Carolina Rural Water Association. Gaston County has delineated wells and completed a contaminant source inventory.

Ref. 20

12-14-90
Vol. 55 No. 241

federal register

Friday
December 14, 1990

Book 2

United States
Government
Printing Office
SUPERINTENDENT
OF DOCUMENTS
Washington, DC 20402

OFFICIAL BUSINESS
Penalty for private use, $300

SECOND CLASS NEWSPAPER

Postage and Fees Paid
U.S. Government Printing Office
(ISSN 0097-6326)

Federal Register

Friday
December 14, 1990

Part II

Environmental Protection Agency

40 CFR Part 300
Hazard Ranking System; Final Rule

Duke Power Company
Wachovia Center
P.O. Box 1007
Charlotte, N.C. 28201-1007

Ref. 21

DUKE POWER

October 1, 1992

Ms. Colleen Sullins
Division of Environmental Management
North Carolina Department of Environment,
Health and Natural Resources
P. O. Box 29535
Raleigh, NC 27626-0535

SUBJECT: Stormwater Permit Application
Duke Power Company - Toddville Operations Center

Dear Ms. Sullins:

Attached is the stormwater application for Duke Power Company Toddville Operations Center in Charlotte, NC. If you have any questions concerning the attached information, please give me a call at 704-382-4418.

Sincerely,

Patricia J. Reynolds

Patricia J. Reynolds
Corporate/Customer Environmental Services

attachments

Duke Power Company
Toddville Operations Center
NPDES Stormwater Discharge Permit Application Narrative

INTRODUCTION

The Toddville Operations Center in Charlotte, Mecklenburg County, provides trucking and warehousing, electrical equipment storage and maintenance, communication, vehicle maintenance, and shipping for final disposition of used and waste materials for the Duke Power locations in its service area. The twenty-three buildings on this site house these functions as well as offices for supervision and support of field crews.

SITE RUNOFF COLLECTION AND TREATMENT

Area Description

The surface area of the Toddville Operations Center is 115 acres. Each of the buildings is surrounded by asphalt paving, where vehicles are parked and some materials are stored. Most outdoor storage, such as for distribution transformers, is on a 6 to 8-inch depth of crusher run stone. Small portions of the site, at the entrances and property boundaries, are landscaped.

Collection, Treatment, and Discharge

There are a total of 27 catch basins which receive runoff from areas of outdoor storage or industrial activity. All of the collected runoff from the areas of outdoor storage and industrial activity are routed to a stream in the Paw Creek drainage.

Wastewaters from the buildings on-site do not enter the stormwater collection system. The wastewaters are discharged to the municipal sewer system or, in the case of garage wastewaters, treated in an oil/water separator prior to discharge to a septic system drainfield.

MATERIALS MANAGEMENT

Exposed Storage

Materials stored exposed to stormwater include electrical equipment (oil-filled transformers, non-PCB capacitors), utility poles, scrap metal (including drained transformers for salvage), and non-leaking PCB capacitors stored on pallets awaiting shipment for disposal. All such storage is on a 6 to 8-inch depth of crusher run stone.

Materials Storage Areas

With the exception of non-leaking PCB capacitors stored outside on pallets, all appreciable chemical and petroleum storage at this site is inside buildings, or is in tanks with secondary containment. The shipping and receiving dock for the warehouse is under cover. There are two buildings used for the storage of used and waste materials (including PCB) prior to shipment for final disposition. The building used for PCB storage meets the applicable USEPA regulations.

Secondary Containment

Other than underground fuel storage tanks, the largest volume of petroleum stored on-site is above ground at the transformer shop building. The transformer oil tanks at this building, with a total storage capacity of 100,000 gallons, are within a concrete retaining wall capable of holding the entire contents of the largest tank. Six (6)-inch concrete curbing is provided inside the storage buildings for used and waste materials. There are no drains from these buildings.

Non-Structural Controls

There is a current Spill Prevention Control and Countermeasure (SPCC) Plan in effect at this site per 40CFR 112 regulations for the warehouse and the transformer shop. Training in the plan is given to all involved employees annually, with periodic response drills. Monthly inspections of all oil storage are performed and documented, in addition to daily inventory for the underground fuel tanks. Weekly leak inspections are performed and documented for the two storage buildings for used and waste materials.

At chemical and oil storage locations, and in each of the warehouse's trucks, are provided spill absorbent and protective equipment. This facilitates rapid cleanup of any minor spills associated with the trucking and warehousing operation.

APPLICATION OF FERTILIZERS AND PESTICIDES

For the small area of this site that is landscaped, there has been no need for application of fertilizer. Weed killer is applied twice a year by a licensed applicator.

SUMMARY

The Toddville Operations Center does warehousing and outdoor storage of electrical material and apparatus, stores used and waste materials prior to shipment for final disposition, and operates and maintains vehicles for the transport of this material. Most appreciable chemical storage is done inside buildings or in tanks within concrete containment. Stormwater runoff from the site is collected and discharged off-site via four outfalls.

GENERAL

EPA

GENERAL INFORMATION

Consolidated Permits Program

(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER

F NCD981861438

LABEL ITEMS

I. EPA I.D. NUMBER

III. FACILITY NAME

V. FACILITY MAILING ADDRESS

VI. FACILITY LOCATION

PLEASE PLACE LABEL IN THIS SPACE

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill-in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

SPECIFIC QUESTIONS	MARK "X" YES	NO	FORM ATTACHED
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)		X	
B. Does or will this facility *(either existing or proposed)* include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2F)	X		X
D. Is this a proposed facility *(other than those described in A or B above)* which will result in a discharge to waters of the U.S.? (FORM 2D)		X	
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)		X	
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X	
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	
J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

III. NAME OF FACILITY

SKIP Duke Power Toddville Operations Center

IV. FACILITY CONTACT

A. NAME & TITLE *(last, first, & title)*	B. PHONE *(area code & no.)*
Reynolds, Patricia-Scientist	704 382 4418

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX: 610 Toddville Road

B. CITY OR TOWN	C. STATE	D. ZIP CODE
Charlotte	NC	28214

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER: Same

B. COUNTY NAME: Mecklenburg

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE (if known)
Same			

EPA Form 3510-1 (Rev. 10-80)

CONTINUE ON REVERSE

CONTINUED FROM THE FRONT

VII. SIC CODES (4-digit, in order of priority)

A. FIRST	B. SECOND
4911 Electric Services	4225 General Warehousing & Storage
C. THIRD	**D. FOURTH**
4214 Local Trucking w/Storage	7538 General Automotive Repair

VIII. OPERATOR INFORMATION

A. NAME: Duke Power Company

B. Is the name listed in Item VIII-A also the owner? [X] YES [ ] NO

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box. If "Other", specify.)
F = FEDERAL, S = STATE, P = PRIVATE, M = PUBLIC (other than federal or state), O = OTHER (specify)
P (specify) Electric Utility

D. PHONE (area code & no.): A 704 382 4418

E. STREET OR P.O. BOX: 422 South Church Street

F. CITY OR TOWN: Charlotte

G. STATE: NC

H. ZIP CODE: 28242

IX. INDIAN LAND
Is the facility located on Indian lands? [ ] YES [X] NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water): N/A	D. PSD (Air Emissions from Proposed Sources): 9 P N/A
B. UIC (Underground Injection of Fluids): N/A	E. OTHER (specify): 9 N/A (specify)
C. RCRA (Hazardous Wastes): N/A	E. OTHER (specify): 9 N/A (specify)

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS (provide a brief description)

The Toddville Operations Center provides trucking and warehousing, electrical equipment storage and maintenance, communication, vehicle maintenance, and shipping for disposition of used and waste materials for the Duke Power locations in its service area.

XIII. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
W. T. Robertson, Vice President PSM	W. T. Robertson	10/1/92

COMMENTS FOR OFFICIAL USE ONLY

EPA Form 3510-1 (Rev. 10-80) Reverse

Please print or type in the unshaded areas only

EPA ID Number *(copy from Item I of Form 1)* NCD981861438

Form Approved. OMB No. 2040-0086
Approval expires 5-31-92

Form 2F NPDES

United States Environmental Protection Agency
Washington, DC 20460

Application for Permit To Discharge Stormwater Discharges Associated with Industrial Activity

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 28.6 hours per application, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate, any other aspect of this collection of information, or suggestions for improving this form, including suggestions which may increase or reduce this burden to: Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M St., SW, Washington, DC 20460, or Director, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

I. Outfall Location

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. Outfall Number *(list)*	B. Latitude			C. Longitude			D. Receiving Water *(name)*
1	35 °	16'	27"	80°	55'	00"	Paw Creek
2	35 °	16'	27"	80°	55'	45"	Paw Creek
3	35 °	16'	32"	80°	55'	24"	Paw Creek

II. Improvements

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

1. Identification of Conditions, Agreements, Etc.	2. Affected Outfalls		3. Brief Description of Project	4. Final Compliance Date	
	number	source of discharge		a. req.	b. proj.
N/A					

B. You may attach additional sheets describing any additional water pollution (or other environmental projects which may affect your discharges) you now have under way or which you plan. Indicate whether each program is now under way or planned, and indicate your actual or planned schedules for construction.

III. Site Drainage Map

Attach a site map showing topography (or indicating the outline of drainage areas served by the outfall(s) covered in the application if a topographic map is unavailable) depicting the facility including: each of its intake and discharge structures; the drainage area of each storm water outfall; paved areas and buildings within the drainage area of each storm water outfall, each known past or present areas used for outdoor storage or disposal of significant materials, each existing structural control measure to reduce pollutants in storm water runoff, materials loading and access areas, areas where pesticides, herbicides, soil conditioners and fertilizers are applied; each of its hazardous waste treatment, storage or disposal units (including each area not required to have a RCRA permit which is used for accumulating hazardous waste under 40 CFR 262.34); each well where fluids from the facility are injected underground; springs, and other surface water bodies which receive storm water discharges from the facility.

Continue on Page 2

IV. Narrative Description of Pollutant Sources

A. For each outfall, provide an estimate of the area (include units) of impervious surfaces (including paved areas and building roofs) to the outfall, and an estimate of the total surface area drained by the outfall.

Outfall Number	Area of Impervious Surface (provide units)	Total Area Drained (provide units)	Outfall Number	Area of Impervious Surface (provide units)	Total Area Drai (provide units
1	0 acres	30 acres			
2	0 acres	20 acres			
3	1 acres	10 acres			

B. Provide a narrative description of significant materials that are currently or in the past three years have been treated, stored or dis a manner to allow exposure to storm water; method of treatment, storage, or disposal; past and present materials management employed, in the last three years, to minimize contact by these materials with storm water runoff; materials loading and access ar the location, manner, and frequency in which pesticides, herbicides, soil conditioners, and fertilizers are applied.

See Attached

C. For each outfall, provide the location and a description of existing structural and nonstructural control measures to reduce poi storm water runoff; and a description of the treatment the storm water receives, including the schedule and type of maintenance f and treatment measures and the ultimate disposal of any solid or fluid wastes other than by discharge.

Outfall Number	Treatment	List C Ta
1	SPCC Plan, Employee Training	
2	SPCC Plan, Employee Training	
3	SPCC Plan, Employee Training	

V. Nonstormwater Discharges

A. I certify under penalty of law that the outfall(s) covered by this application have been tested or evaluated for the pr nonstormwater discharges, and that all nonstormwater discharges from these outfall(s) are identified in either an accompanying or Form 2E application for the outfall.

Name and Official Title (type or print)	Signature	Date Signed
N/A		

B. Provide a description of the method used, the date of any testing, and the onsite drainage points that were directly observed duri

N/A

VI. Significant Leaks or Spills

Provide existing information regarding the history of significant leaks or spills of toxic or hazardous pollutants at the facility in th years, including the approximate date and location of the spill or leak, and the type and amount of material released.

An unknown quantity of fuel leaked from a underground storage tank at this site. The leak was discovered in November, 1990. At that time the tanks were removed and a site contamination investigation/remediation is currently in progress.

Continued from Page 2

EPA ID Number (copy from item I of Form 1)
NCD981861438

VII. Discharge Information

A,B,C, & D: See instructions before proceeding. Complete one set of tables for each outfall. Annotate the outfall number in the space provided. Tables VII-A, VII-B, and VII-C are included on separate sheets numbered VII-1 and VII-2.

E: Potential discharges not covered by analysis - Is any pollutant listed in Table 2F-2 a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ Yes *(list all such pollutants below)* ☒ No *(go to Section IX)*

VIII. Biological Toxicity Testing Data

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ Yes *(list all such pollutants below)* ☒ No *(go to Section IX)*

IX. Contract Analysis Information

Were any of the analyses reported in Item V performed by a contract laboratory or consulting firm?

☐ Yes *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)* ☒ No *(go to Section X)*

A. Name	B. Address	C. Area Code & Phone No.	D. Pollutants Analyzed

X. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. Name & Official Title *(type or print)*	B. Area Code and Phone No.
W. T. Robertson, Vice President PSM	(704) 373-4751
C. Signature W. T. Robertson	D. Date Signed 10/1/92

VII. Discharge Information *(Continued from page 3 of Form 2F)*

Part A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite		
Oil and Grease						
Biological Oxygen Demand (BOD5)						
Chemical Oxygen Demand (COD)			See Attached			
Total Suspended Solids (TSS)						
Total Kjeldahl Nitrogen						
Nitrate plus Nitrite Nitrogen						
Total Phosphorus						
pH	Minimum	Maximum	Minimum	Maximum		

Part B - List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite		
			See Attached			

Part C - List each pollutant shown in Tables 2F-2, 2F-3, and 2F-4 that you know or have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite		
			See Attached			

Part D - Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

1. Date of Storm Event	2. Duration of Storm *(in minutes)*	3. Total rainfall during storm event *(in inches)*	4. Number of hours between beginning of storm measured and end of previous measurable rain event	5. Maximum floe rate during rain event *(gallons/minute or specify units*	6. Total flow from rain event *(gallons or specify units)*	7. Season sample was taken	8. Form of Precipitation *(rainfall, snowmelt)*
			See Attached				

9. Provide a description of the method of flow measurement or estimate.

See Attached

Toddville : Storm Water Discharge #1 (Capacitor Storage Yard)

42" CMP downgrade of railroad ROW, outside fence.

1. First Flush Sample : rain event 15 FEb 92

EPA ID Number (copy from Item 1 of Form 1)

Toddville Storm Discharge #1 (Capacitor Storage)

VII. Discharge Informatiuon (Continued from page 3 of Form 2F)

Part A: You must provide the results of at least one analysis for every pollutant in this table.

Pollution and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Oil and Grease	1.1 mg/L		0.76 lb.		1	
Biological Oxygen Demand(BOD5)	7.3 mg/L		5.0 lb.		1	
Chemical Oxygen Demand(COD)	27 mg/L		19 lb.		1	
Total Suspended Solids(TSS)	46 mg/L		32 lb.		1	Yard fill material (crusher stone)
Total Kjeldahl Nitrogen	0.68 mg/L		0.47 lb.		1	
Nitrate plus Nitrite Nitrogen	0.68 mg/L		0.47 lb.		1	
Total Phosphorus	0.1 mg/L		0.07 lb.		1	
pH	Minimum 6.7	Maximum 6.7	Minimum	Maximum		

Part B: List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (If the facility is operating under an existing NPDES permit). Complete one table for each outfall.
See the instructions for additional details and requirements.

Pollutant and CAS Number (if avalalable)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Copper, total 7440-50-8	NA					
Iron, total 7439-89-6	NA					
Arsenic,total 7440-38-0	NA					
Selenium,total 7782-49-2	NA					

Part C: List each pollutant shown in Tables 2F-2, 2F-3 and 2F-4 that you have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.

Pollutant and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Cresols 1319-77-3						
Phenol 108-95-2						
Napthalene 91-20-3						
Pyrene 129-00-0						
Benzo(a) Anthrac 56-55-3						
PCB-1260 11096-82-5		<0.5 ug/L			.1	Capacitor Storage

1. Date of Storm Event	2. Duration of Storm (in minutes)	3. Total rainfall during storm event (in inches)	4. No. of hours between beginning of storm measured and end of previous measurable storm event	5. Maximum flow rate during rain event (gallons/minute or specify units)	6. Total flow from rain event (gallons or specify units)	7. Season sample was taken	8. Form of Precipitation (rainfall, snowmelt)
15FEB92	840	0.73	>300 HRS.	470 gpm	82.8K gal.	Winter	Rainfall

9. Provide a description of the method of flow measurement or estimate.

Pressure transduced depth measurements and velocity measurements were taken via sensor probe mounted in flow channel.

Depth and velocity readings were taken at 5 or 10 minute intervals. Data was processed via the flow equation Q=VxA.

Toddville: Storm Water Discharge #1 (Capacitor Storage Yard)

42" CMP downgrade of railroad ROW, outside fence.

1. Flow Composite sample: rain event 1/23/92

EPA ID Number (copy from Item 1 of Form 1)

Toddville Storm Discharge #1 (Capacitor Storage)

VII. Discharge Informatiuon (Continued from page 3 of Form 2F)

Part A: You must provide the results of at least one analysis for every pollutant in this table.

Pollution and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Oil and Grease		NA				
Biological Oxygen Demand(BOD5)		6.6 mg/L		9.1 lb.	1	
Chemical Oxygen Demand(COD)		43 mg/L		59 lb.	1	
Total Suspended Solids(TSS)		280 mg/L		390 lb.	1	Yard fill material (crusher stone)
Total Kjeldahl Nitrogen		1.2 mg/L		1.7 lb.	1	
Nitrate plus Nitrite Nitrogen		0.54 mg/L		0.75 lb.	1	
Total Phosphorus		0.250 mg/L		0.35 lb.	1	
pH	Minimum	Maximum	Minimum	Maximum		

Part B: List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements.

Pollutant and CAS Number (if avalalable)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Copper, total 7440-50-8	NA					
Iron, total 7439-89-6	NA					
Arsenic,total 7440-38-0	NA					
Selenium,total 7782-49-2	NA					

Part C:	List each pollutant shown in Tables 2F-2, 2F-3 and 2F-4 that you have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.					
Pollutant and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Cresole 1319-77-3						
Phenol 108-95-2						
Napthalene 91-20-3						
Pyrene 129-00-0						
Benzo(a) Anthrac 56-55-3						
PCB-1260 11096-82-5		0.8 ug/L	0.0011 lb.		1	Capacitor Storage
*Note						*See attached analytical results (EPA 8270)

1. Date of Storm Event	2. Duration of Storm (in minutes)	3. Total rainfall during storm event (in inches)	4. No. of hours between beginning of storm measured and end of previous measurable storm event	5. Maximum flow rate during rain event (gallons/minute or specify units)	6. Total flow from rain event (gallons or specify units)	7. Season sample was taken	8. Form of Precipitatipon (rainfall, snowmelt)
23JAN92	345	0.98	>216 HRS.	1420 gpm	165.7K gal.	Winter	Rainfall

9. Provide a description of the method of flow measurement or estimate.

Pressure transduced depth measurements and velocity measurements were taken via sensor probe mounted in flow channel.

Depth and velocity readings were taken at 5 or 10 minute intervals. Data was processed via the flow equation Q=VxA.

Toddville : Storm Water Discharge #2 (Pole Storage Yard)

16" CMP located at fence adjacent to transformer yard.

1. First Flush Sample : rain event 15 FEb 92

EPA ID Number (copy from Item 1 of Form 1)

Toddville Storm Discharge #2 (Pole Yard) First Flush Sample

VII. Discharge Informatiuon (Continued from page 3 of Form 2F)

Part A: You must provide the results of at least one analysis for every pollutant in this table.

Pollution and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Oil and Grease	17 mg/L		3.0 lb.		1	
Biological Oxygen Demand(BOD5)	7.6 mg/L		1.3 lb.		1	
Chemical Oxygen Demand(COD)	39 mg/L		6.8 lb.		1	
Total Suspended Solids(TSS)	34 mg/L		6.0 lb.		1	Yard fill material (crusher stone)
Total Kjeldahl Nitrogen	0.58 mg/L		0.10 lb.		1	
Nitrate plus Nitrite Nitrogen	0.32 mg/L		0.056 lb.		1	
Total Phosphorus	0.08 mg/L		0.014 lb.		1	
pH	Minimum 6.9	Maximum 6.9	Minimum	Maximum		

Part B: List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (If the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements.

Pollutant and CAS Number (if avalaiable)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Copper, total 7440-60-8	NA					
Iron, total 7439-89-6	NA					
Arsenic,total 7440-38-0	NA					
Selenium,total 7782-49-2	NA					

Part C:	List each pollutant shown in Tables 2F-2, 2F-3 and 2F-4 that you have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.					
Pollutant and CAS Number (If avalalable)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
4-Cresol 106-44-5	2 ug/L		* 0.0004 lb.			Pole Yard Storage (creosote) Estimated concentration
Phenol 108-95-2	ND <2 ug/L					
Napthalene 91-20-3	ND <2 ug/L					
Pyrene 129-00-0	ND <3 ug/L					
Benzo(a) Anthrac 56-55-3	ND <2 ug/L					
PCB-1260 11096-82-5	NA					
*Note						*See attached analytical results (EPA 625)

1. Date of Storm Event	2. Duration of Storm (in minutes)	3. Total rainfall during storm event (in inches)	4. No. of hours between beginning of storm measured and end of previous measurable storm event	5. Maximum flow rat during rain event (gallons/minute o specify units)	6. Total flow from rain event (gallons or specif units)	7. Season sample was taken	8. Form of Precipitatipon (rainfall, snowmelt)
15FEB92	840	0.73	>300 HRS.	190 gpm	21K gal.	Winter	Rainfall

9. Provide a description of the method of flow measurement or estimate.

Pressure transduced depth measurements and velocity measurements were taken via sensor probe mounted in flow channel.

Depth and velocity readings were taken at 5 or 10 minute intervals. Data was processed via the flow equation Q=VxA.

DUKE POWER COMPANY
INSTRUMENTAL CHEMISTRY SERVICES

USEPA Method 625 Analysis Report

Field ID # **Laboratory Blank (2-17-92)**

Date Collected:: **02/17/92** *Reviewed by::* RJW

Reference Set Number:: **Laboratory Blank (2-17-9** *Lab ID #* **31010.D**

Compound Name	*Concentration (ug/L)*		*Detection Limit (ug/L)*
Pyridine	Not Detected		10
Aniline	Not Detected	***	4
Phenol	Not Detected		1
Bis(2-chloroethyl)ether	Not Detected		1
2-chlorophenol	Not Detected		1
1,3-Dichlorobenzene	Not Detected		1
1,4-dichlorobenzene	Not Detected		1
Benzyl Alcohol	Not Detected		1
1,2-dichlorobenzene	Not Detected		2
2-methylphenol	Not Detected		1
Bis(2-chloroisopropyl)ether	Not Detected		1
4-methylphenol	Not Detected		1
N-Nitrosodi-n-propyl amine	Not Detected		1
Hexachloroethane	Not Detected		2
Nitrobenzene	Not Detected		1
Isophorone	Not Detected		1
2-nitrophenol	Not Detected		1
2,4-dimethylphenol	Not Detected		5
Bis(2-chloroethoxy)methane	Not Detected		1
Benzoic acid	Not Detected	***	50
2,4-dichlorophenol	Not Detected		1
1,2,4-Trichlorobenzene	Not Detected		2
Naphthalene	Not Detected		1
4-chloroaniline	Not Detected		4

(Flags are described on page # 3)

31O10.D Laboratory Blank (2-17-92) Laboratory Blank (2-17-92) (Continued)

Compound Name	*Concentration (ug/L)*		*Detection Limit (ug/L)*
Hexachlorobutadiene	Not Detected		2
4-chloro-3-methylphenol	Not Detected		1
2-methylnapthalene	Not Detected		1
Hexachlorocyclopentadiene	Not Detected		2
2,4,6-trichlorophenol	Not Detected		1
2,4,5-trichlorophenol	Not Detected		1
2-Chloronaphthalene	Not Detected		1
2-Nitroaniline	Not Detected		1
Dimethylphthalate	Not Detected		1
Acenaphthylene	Not Detected		1
2,6-Dinitrotoluene	Not Detected		1
3-Nitroaniline	Not Detected		1
Acenaphthene	Not Detected		1
2,4-dinitrophenol	Not Detected		5
4-Nitrophenol	Not Detected		1
Dibenzofuran	Not Detected		1
2,4-Dinitrotoluene	Not Detected		1
Diethylphthalate	Not Detected		1
Fluorene	Not Detected		1
4-chlorophenyl phenyl ether	Not Detected		1
4-Nitroaniline	Not Detected		2
4,6-dinitro-2-methylphenol	Not Detected		1
N-Nitrosodiphenylamine	Not Detected		1
1,2-diphenylhydrazine	Not Detected		1
4-bromophenyl phenyl ether	Not Detected		1
Hexachlorobenzene	Not Detected		1
Pentachlorophenol	Not Detected		3
Phenanthrene	Not Detected		1
Anthracene	Not Detected		1
Di-n-Butylphthalate	Not Detected		6
Fluoranthene	Not Detected		1
Benzidine	Not Detected		50
Pyrene	Not Detected		1
Butylbenzylphthalate	Not Detected		1
3,3'-Dichlorobenzidine	Not Detected		5
Chrysene	Not Detected		1
Benzo[a]anthracene	Not Detected		1
Bis(2-ethylhexyl)phthalate	5	-Est-	2
Di-n-octylphthalate	Not Detected		1
Benzo[b]fluoranthene	Not Detected		4
Benzo[k]fluoranthene	Not Detected		1
Benzo[a]pyrene	Not Detected		1
Indeno(1,2,3-c,d)pyrene	Not Detected		1
Dibenzo[a,h]anthracene	Not Detected		1
Benzo[g,h,i]perylene	Not Detected		1

(Flags are described on page # 3)

31O10.D Laboratory Blank (2-17-92) Laboratory Blank (2-17-92) (Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/L)

TIC's Not Evaluated for APG Samples

Not Detected = Less than Detection Limit
(B) = Compound also identified in Laboratory Blank
-Est- = Estimated Concentration (< 3 Times Detection Limit)
All reported concentrations have been rounded to two significant figures
Note: *The following ompounds cannot be accurately quantitated using EPA Method 625; - Aniline - Benzoic Acid - Benzidine, in addition, Hexachlorocyclopentadiene is a difficult compound to consistantly extract from water samples. Any concentrations reported for these compounds should be regarded as approximations.*

(Flags are described on page # 3)

DUKE POWER COMPANY
INSTRUMENTAL CHEMISTRY SERVICES

USEPA Method 625 Analysis Report

Field ID # **T'ville Loc #2 Pole Yard**

Date Collected:: **02/15/92** *Reviewed by::* RJW

Reference Set Number:: **92-02-130-2A** *Lab ID #* **31O12.D**

Compound Name	Concentration (ug/L)			Detection Limit (ug/L)
Pyridine	Not Detected			19
Aniline	Not Detected		***	8
Phenol	Not Detected			2
Bis(2-chloroethyl)ether	Not Detected			2
2-chlorophenol	Not Detected			2
1,3-Dichlorobenzene	Not Detected			2
1,4-dichlorobenzene	Not Detected			3
Benzyl Alcohol	Not Detected			2
1,2-dichlorobenzene	Not Detected			3
2-methylphenol	Not Detected			2
Bis(2-chloroisopropyl)ether	Not Detected			2
4-methylphenol	2	-Est-		2
N-Nitrosodi-n-propyl amine	Not Detected			2
Hexachloroethane	Not Detected			3
Nitrobenzene	Not Detected			2
Isophorone	Not Detected			2
2-nitrophenol	Not Detected			2
2,4-dimethylphenol	Not Detected			10
Bis(2-chloroethoxy)methane	Not Detected			2
Benzoic acid	Not Detected		***	100
2,4-dichlorophenol	Not Detected			2
1,2,4-Trichlorobenzene	Not Detected			4
Naphthalene	Not Detected			2
4-chloroaniline	Not Detected			8

(Flags are described on page # 3)

31O12.D	92-02-130-2A	T'ville Loc #2 Pole Yard	(Continued)

Compound Name	Concentration (ug/L)	Detection Limit (ug/L)
Hexachlorobutadiene	Not Detected	5
4-chloro-3-methylphenol	Not Detected	2
2-methylnapthalene	Not Detected	2
Hexachlorocyclopentadiene	Not Detected	3
2,4,6-trichlorophenol	Not Detected	2
2,4,5-trichlorophenol	Not Detected	2
2-Chloronaphthalene	Not Detected	2
2-Nitroaniline	Not Detected	2
Dimethylphthalate	Not Detected	2
Acenaphthylene	Not Detected	2
2,6-Dinitrotoluene	Not Detected	2
3-Nitroaniline	Not Detected	2
Acenaphthene	Not Detected	2
2,4-dinitrophenol	Not Detected	9
4-Nitrophenol	Not Detected	2
Dibenzofuran	Not Detected	2
2,4-Dinitrotoluene	Not Detected	2
Diethylphthalate	Not Detected	2
Fluorene	Not Detected	2
4-chlorophenyl phenyl ether	Not Detected	2
4-Nitroaniline	Not Detected	4
4,6-dinitro-2-methylphenol	Not Detected	2
N-Nitrosodiphenylamine	Not Detected	2
1,2-diphenylhydrazine	Not Detected	2
4-bromophenyl phenyl ether	Not Detected	2
Hexachlorobenzene	Not Detected	2
Pentachlorophenol	Not Detected	7
Phenanthrene	Not Detected	2
Anthracene	Not Detected	2
Di-n-Butylphthalate	Not Detected	11
Fluoranthene	Not Detected	2
Benzidine	Not Detected	100
Pyrene	Not Detected	3
Butylbenzylphthalate	Not Detected	2
3,3'-Dichlorobenzidine	Not Detected	10
Chrysene	Not Detected	2
Benzo[a]anthracene	Not Detected	2
Bis(2-ethylhexyl)phthalate	69	4
Di-n-octylphthalate	Not Detected	2
Benzo[b]fluoranthene	Not Detected	7
Benzo[k]fluoranthene	Not Detected	2
Benzo[a]pyrene	Not Detected	2
Indeno(1,2,3-c,d)pyrene	Not Detected	2
Dibenzo[a,h]anthracene	Not Detected	2
Benzo[g,h,i]perylene	Not Detected	2

(Flags are described on page # 3)

31O12.D	92-02-130-2A	T'ville Loc #2 Pole Yard	(Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/L)
1,850	Isiquinoline	40

Not Detected = Less than Detection Limit
(B) = Compound also identified in Laboratory Blank
-Est- = Estimated Concentration (< 3 Times Detection Limit)
All reported concentrations have been rounded to two significant figures
Note: *The following ompounds cannot be accurately quantitated using EPA Method 625; - Aniline - Benzoic Acid - Benzidine, in addition, Hexachlorocyclopentadiene is a difficult compound to consistantly extract from water samples. Any concentrations reported for these compounds should be regarded as approximations.*

(Flags are described on page # 3)

DUKE POWER COMPANY
INSTRUMENTAL CHEMISTRY SERVICES

USEPA Method 625 Analysis Report

Field ID # **Trip Blank**

Date Collected:: **02/15/92** *Reviewed by::*

Reference Set Number:: **92-02-130-04A** *Lab ID #* **31014.D**

Compound Name	*Concentration (ug/L)*		*Detection Limit (ug/L)*
Pyridine	Not Detected		95
Aniline	Not Detected	***	38
Phenol	Not Detected		10
Bis(2-chloroethyl)ether	Not Detected		10
2-chlorophenol	Not Detected		10
1,3-Dichlorobenzene	Not Detected		12
1,4-dichlorobenzene	Not Detected		13
Benzyl Alcohol	Not Detected		10
1,2-dichlorobenzene	Not Detected		15
2-methylphenol	Not Detected		10
Bis(2-chloroisopropyl)ether	Not Detected		10
4-methylphenol	Not Detected		10
N-Nitrosodi-n-propyl amine	Not Detected		10
Hexachloroethane	Not Detected		15
Nitrobenzene	Not Detected		10
Isophorone	Not Detected		10
2-nitrophenol	Not Detected		10
2,4-dimethylphenol	Not Detected		49
Bis(2-chloroethoxy)methane	Not Detected		10
Benzoic acid	Not Detected	***	500
2,4-dichlorophenol	Not Detected		12
1,2,4-Trichlorobenzene	Not Detected		18
Naphthalene	Not Detected		10
4-chloroaniline	Not Detected		40

(Flags are described on page # 3)

31O14.D	92-02-130-04A	Trip Blank	(Continued)

Compound Name	Concentration (ug/L)	Detection Limit (ug/L)
Hexachlorobutadiene	Not Detected	23
4-chloro-3-methylphenol	Not Detected	12
2-methylnapthalene	Not Detected	12
Hexachlorocyclopentadiene	Not Detected	16
2,4,6-trichlorophenol	Not Detected	10
2,4,5-trichlorophenol	Not Detected	11
2-Chloronaphthalene	Not Detected	10
2-Nitroaniline	Not Detected	10
Dimethylphthalate	Not Detected	10
Acenaphthylene	Not Detected	10
2,6-Dinitrotoluene	Not Detected	10
3-Nitroaniline	Not Detected	10
Acenaphthene	Not Detected	10
2,4-dinitrophenol	Not Detected	46
4-Nitrophenol	Not Detected	10
Dibenzofuran	Not Detected	10
2,4-Dinitrotoluene	Not Detected	10
Diethylphthalate	Not Detected	10
Fluorene	Not Detected	10
4-chlorophenyl phenyl ether	Not Detected	10
4-Nitroaniline	Not Detected	18
4,6-dinitro-2-methylphenol	Not Detected	11
N-Nitrosodiphenylamine	Not Detected	10
1,2-diphenylhydrazine	Not Detected	10
4-bromophenyl phenyl ether	Not Detected	12
Hexachlorobenzene	Not Detected	10
Pentachlorophenol	Not Detected	35
Phenanthrene	Not Detected	10
Anthracene	Not Detected	10
Di-n-Butylphthalate	Not Detected	56
Fluoranthene	Not Detected	12
Benzidine	Not Detected	500
Pyrene	Not Detected	14
Butylbenzylphthalate	Not Detected	10
3,3'-Dichlorobenzidine	Not Detected	48
Chrysene	Not Detected	10
Benzo[a]anthracene	Not Detected	10
Bis(2-ethylhexyl)phthalate	Not Detected	19
Di-n-octylphthalate	Not Detected	10
Benzo[b]fluoranthene	Not Detected	36
Benzo[k]fluoranthene	Not Detected	12
Benzo[a]pyrene	Not Detected	10
Indeno(1,2,3-c,d)pyrene	Not Detected	10
Dibenzo[a,h]anthracene	Not Detected	11
Benzo[g,h,i]perylene	Not Detected	11

(Flags are described on page # 3)

31O14.D	92-02-130-04A	Trip Blank	(Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/L)

NO T.I.C.'s IDENTIFIED

Not Detected = Less than Detection Limit
(B) = Compound also identified in Laboratory Blank
-Est- = Estimated Concentration (< 3 Times Detection Limit)
All reported concentrations have been rounded to two significant figures
Note: *The following ompounds cannot be accurately quantitated using EPA Method 625; - Aniline - Benzoic Acid - Benzidine, in addition, Hexachlorocyclopentadiene is a difficult compound to consistantly extract from water samples. Any concentrations reported for these compounds should be regarded as approximations.*

(Flags are described on page # 3)

Toddville: Storm Water Discharge #2 (Pole Yard Storage)

16" CMP located at fence adjacent to transformer yard.

1. Flow Composite sample: rain event 1/23/92

EPA ID Number (copy from Item 1 of Form 1)

Toddville Storm Discharge #2 (Pole Yard)

VII. Discharge Informatiuon (Continued from page 3 of Form 2F)

Part A: You must provide the results of at least one analysis for every pollutant in this table.

Pollution and CAS Number (If available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Oil and Grease		NA				
Biological Oxygen Demand(BOD5)		5.7 mg/L		3.3 lb.	1	
Chemical Oxygen Demand(COD)		30 mg/L		17 lb.	1	
Total Suspended Solids(TSS)		300 mg/L		175 lb.	1	Yard fill material (crusher stone)
Total Kjeldahl Nitrogen		0.74 mg/L		0.43 lb.	1	
Nitrate plus Nitrite Nitrogen		0.42 mg/L		0.24 lb.	1	
Total Phosphorus		0.23 mg/L		0.13 lb.	1	
pH	Minimum	Maximum	Minimum	Maximum		

Part B: List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (If the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements.

Pollutant and CAS Number (If avaialable)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Copper, total 7440-60-8	NA					
Iron, total 7439-89-6	NA					
Arsenic,total 7440-38-0	NA					
Selenium,total 7782-49-2	NA					

Part C:	List each pollutant shown in Tables 2F-2, 2F-3 and 2F-4 that you have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.					
Pollutant and CAS Number (If available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Cresols 1319-77-3		ND <2 ug/L				
Phenol 108-95-2		ND <2 ug/L				
Napthalene 91-20-3		ND <2 ug/L				
Pyrene 129-00-0		ND <3 ug/L				
Benzo(a) Anthrac 56-55-3		ND <2 ug/L				
PCB-1260 11096-82-5		NA				
*Note						*See attached analytical results (EPA 625)

1. Date of Storm Event	2. Duration of Storm (in minutes)	3. Total rainfall during storm event (in inches)	4. No. of hours between beginning of storm measured and end of previous measurable storm event	5. Maximum flow rate during rain event (gallons/minute or specify units)	6. Total flow from rain event (gallons or specify units)	7. Season sample was taken	8. Form of Precipitatipon (rainfall, snowmelt)
23JAN92	345	0.98	>216 HRS.	561 gpm	69.9K gal.	Winter	Rainfall

9. Provide a description of the method of flow measurement or estimate.

Pressure transduced depth measurements and velocity measurements were taken via sensor probe mounted in flow channel.

Depth and velocity readings were taken at 5 or 10 minute intervals. Data was processed via the flow equation Q=VxA.

DUKE POWER COMPANY
INSTRUMENTAL CHEMISTRY SERVICES

USEPA Method 625 Analysis Report

Trip Blank

Date Collected:: **01/23/92** *Reviewed by::* RDS 2-26-92

Reference Set Number:: **92-01-185x04a** *Lab ID #* **22002.D**

Compound Name	*Concentration (ug/L)*	*Detection Limit (ug/L)*
Pyridine	Not Detected	19
Aniline	Not Detected	8
Phenol	Not Detected	2
Bis(2-chloroethyl)ether	Not Detected	2
2-chlorophenol	Not Detected	2
1,3-Dichlorobenzene	Not Detected	2
1,4-dichlorobenzene	Not Detected	3
Benzyl Alcohol	Not Detected	2
1,2-dichlorobenzene	Not Detected	3
2-methylphenol	Not Detected	2
Bis(2-chloroisopropyl)ether	Not Detected	2
4-methylphenol	Not Detected	2
N-Nitrosodi-n-propyl amine	Not Detected	2
Hexachloroethane	Not Detected	3
Nitrobenzene	Not Detected	2
Isophorone	Not Detected	2
2-nitrophenol	Not Detected	2
2,4-dimethylphenol	Not Detected	10
Bis(2-chloroethoxy)methane	Not Detected	2
Benzoic acid	Not Detected	100
2,4-dichlorophenol	Not Detected	2
1,2,4-Trichlorobenzene	Not Detected	4
Naphthalene	Not Detected	2
4-chloroaniline	Not Detected	8

(Flags are described on page # 3)

22002.D	92-01-185x04a	Trip Blank	(Continued)

Compound Name	Concentration (ug/L)		Detection Limit (ug/L)
Hexachlorobutadiene	Not Detected		5
4-chloro-3-methylphenol	Not Detected		2
2-methylnapthalene	Not Detected		2
Hexachlorocyclopentadiene	Not Detected		3
2,4,6-Trichlorophenol	Not Detected		2
2,4,5-Trichlorophenol	Not Detected		2
2-Chloronaphthalene	Not Detected		2
2-Nitroaniline	Not Detected		2
Dimethylphthalate	Not Detected		2
Acenaphthylene	Not Detected		2
2,6-Dinitrotoluene	Not Detected		2
3-Nitroaniline	Not Detected		2
Acenaphthene	Not Detected		2
2,4-Dinitrophenol	Not Detected		9
4-Nitrophenol	Not Detected		2
Dibenzofuran	Not Detected		2
2,4-Dinitrotoluene	Not Detected		2
Diethylphthalate	Not Detected		2
Fluorene	Not Detected		2
4-chlorophenyl phenyl ether	Not Detected		2
4-Nitroaniline	Not Detected		4
4,6-dinitro-2-methylphenol	Not Detected		2
N-Nitrosodiphenylamine	Not Detected		2
1,2-Diphenylhydrazine	Not Detected		2
4-bromophenyl phenyl ether	Not Detected		2
Hexachlorobenzene	Not Detected		2
Pentachlorophenol	Not Detected		7
Phenanthrene	Not Detected		2
Anthracene	Not Detected		2
Di-n-Butylphthalate	Not Detected		11
Fluoranthene	Not Detected		2
Benzidine	Not Detected		100
Pyrene	Not Detected		3
Butylbenzylphthalate	Not Detected		2
3,3'-Dichlorobenzidine	Not Detected		10
Benzo[a]anthracene	Not Detected		2
Chrysene	Not Detected		2
Bis(2-ethylhexyl)phthalate	18	B	4
Di-n-octylphthalate	Not Detected		2
Benzo[b]fluoranthene	Not Detected		7
Benzo[k]fluoranthene	Not Detected		2
Benzo[a]pyrene	Not Detected		2
Indeno(1,2,3-c,d)pyrene	Not Detected		2
Dibenzo[a,h]anthracene	Not Detected		2
Benzo[g,h,i]perylene	Not Detected		2

(Flags are described on page # 3)

22002.D	92-01-185x04a	Trip Blank	(Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/L)
	NO T.I.C.'s IDENTIFIED	0

Not Detected = Less than Detection Limit
(B) = Compound also identified in Laboratory Blank
-Est- = Estimated Concentration (< 3 Times Detection Limit)

All reported concentrations have been rounded to two significant figures

Note: *The following ompounds cannot be accurately quantitated using EPA Method 625; - Aniline - Benzoic Acid - Benzidine, in addition, Hexachlorocyclopentadiene is a difficult compound to consistantly extract from water samples. Any concentrations reported for these compounds should be regarded as approximations.*

(Flags are described on page # 3)

DUKE POWER COMPANY
INSTRUMENTAL CHEMISTRY SERVICES

USEPA Method 625 Analysis Report

Toddville Pole Yard

Date Collected:: **01/23/92** *Reviewed by::* 2-26-92

Reference Set Number:: **92-01-185x02a** *Lab ID #* **22001.D**

Compound Name	*Concentration (ug/L)*	*Detection Limit (ug/L)*
Pyridine	Not Detected	19
Aniline	Not Detected	8
Phenol	Not Detected	2
Bis(2-chloroethyl)ether	Not Detected	2
2-chlorophenol	Not Detected	2
1,3-Dichlorobenzene	Not Detected	2
1,4-dichlorobenzene	Not Detected	3
Benzyl Alcohol	Not Detected	2
1,2-dichlorobenzene	Not Detected	3
2-methylphenol	Not Detected	2
Bis(2-chloroisopropyl)ether	Not Detected	2
4-methylphenol	Not Detected	2
N-Nitrosodi-n-propyl amine	Not Detected	2
Hexachloroethane	Not Detected	3
Nitrobenzene	Not Detected	2
Isophorone	Not Detected	2
2-nitrophenol	Not Detected	2
2,4-dimethylphenol	Not Detected	10
Bis(2-chloroethoxy)methane	Not Detected	2
Benzoic acid	Not Detected	100
2,4-dichlorophenol	Not Detected	2
1,2,4-Trichlorobenzene	Not Detected	4
Naphthalene	Not Detected	2
4-chloroaniline	Not Detected	8

(Flags are described on page # 3)

22001.D	92-01-185x02a	Toddville Pole Yard	(Continued)

Compound Name	Concentration (ug/L)		Detection Limit (ug/L)
Hexachlorobutadiene	Not Detected		5
4-chloro-3-methylphenol	Not Detected		2
2-methylnapthalene	Not Detected		2
Hexachlorocyclopentadiene	Not Detected		3
2,4,6-Trichlorophenol	Not Detected		2
2,4,5-Trichlorophenol	Not Detected		2
2-Chloronaphthalene	Not Detected		2
2-Nitroaniline	Not Detected		2
Dimethylphthalate	Not Detected		2
Acenaphthylene	Not Detected		2
2,6-Dinitrotoluene	Not Detected		2
3-Nitroaniline	Not Detected		2
Acenaphthene	Not Detected		2
2,4-Dinitrophenol	Not Detected		9
4-Nitrophenol	Not Detected		2
Dibenzofuran	Not Detected		2
2,4-Dinitrotoluene	Not Detected		2
Diethylphthalate	Not Detected		2
Fluorene	Not Detected		2
4-chlorophenyl phenyl ether	Not Detected		2
4-Nitroaniline	Not Detected		4
4,6-dinitro-2-methylphenol	Not Detected		2
N-Nitrosodiphenylamine	Not Detected		2
1,2-Diphenylhydrazine	Not Detected		2
4-bromophenyl phenyl ether	Not Detected		2
Hexachlorobenzene	Not Detected		2
Pentachlorophenol	Not Detected		7
Phenanthrene	Not Detected		2
Anthracene	Not Detected		2
Di-n-Butylphthalate	Not Detected		11
Fluoranthene	Not Detected		2
Benzidine	Not Detected		100
Pyrene	Not Detected		3
Butylbenzylphthalate	Not Detected		2
3,3'-Dichlorobenzidine	Not Detected		10
Benzo[a]anthracene	Not Detected		2
Chrysene	Not Detected		2
Bis(2-ethylhexyl)phthalate	61	B	4
Di-n-octylphthalate	Not Detected		2
Benzo[b]fluoranthene	Not Detected		7
Benzo[k]fluoranthene	Not Detected		2
Benzo[a]pyrene	Not Detected		2
Indeno(1,2,3-c,d)pyrene	Not Detected		2
Dibenzo[a,h]anthracene	Not Detected		2
Benzo[g,h,i]perylene	Not Detected		2

(Flags are described on page # 3)

22001.D	92-01-185x02a	Toddville Pole Yard	(Continued)

Tentatively Identified Compounds Report

Scan #	Compound	Estimated Concentration (ug/L)
1,422	Ethyl- Hexanoic Acid	36
1,794	Unknown Compound	22
3,059	Unknown Compound	24

Not Detected = Less than Detection Limit
(B) = Compound also identified in Laboratory Blank
-Est- = Estimated Concentration (< 3 Times Detection Limit)
All reported concentrations have been rounded to two significant figures
Note: *The following ompounds cannot be accurately quantitated using EPA Method 625; - Aniline - Benzoic Acid - Benzidine, in addition, Hexachlorocyclopentadiene is a difficult compound to consistantly extract from water samples. Any concentrations reported for these compounds should be regarded as approximations.*

(Flags are described on page # 3)

Toddville : Storm Water Discharge #3 (Transformer Shop / Yard)

24" CMP located adjacent to transformer shop.

1. First Flush Sample : rain event 15 FEb 92

EPA ID Number (copy from Item 1 of Form 1)

Toddville Storm Discharge #3 (Transformer Shop/Yard) First Flush

VII. Discharge Informatiuon (Continued from page 3 of Form 2F)

Part A: You must provide the results of at least one analysis for every pollutant in this table.

Pollution and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Oil and Grease	0.53 mg/L		0.55 lb.		1	
Biological Oxygen Demand(BOD5)	4.2 mg/L		4.4 lb.		1	
Chemical Oxygen Demand(COD)	20 mg/L		21 lb.		1	
Total Suspended Solids(TSS)	100 mg/L		100 lb.		1	Yard fill material (crusher stone)
Total Kjeldahl Nitrogen	0.59 mg/L		0.61 lb.		1	
Nitrate plus Nitrite Nitrogen	0.60 mg/L		0.62 lb.		1	
Total Phosphorus	0.16 mg/L		0.17 lb.		1	
pH	Minimum 7.1	Maximum 7.1	Minimum	Maximum		

Part B: List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements.

Pollutant and CAS Number (if avalalable)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Copper, total 7440-50-8	NA					
Iron, total 7439-89-6	NA					
Arsenic,total 7440-38-0	NA					
Selenium,total 7782-49-2	NA					

Part C: List each pollutant shown in Tables 2F-2, 2F-3 and 2F-4 that you have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.

Pollutant and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Cresols 1319-77-3						
Phenol 108-95-2						
Napthalene 91-20-3						
Pyrene 129-00-0						
Benzo(a) Anthrac 56-55-3						
PCB-1260 11096-82-5	< 0.5 ug/L				1	Transformer shop

1. Date of Storm Event	2. Duration of Storm (in minutes)	3. Total rainfall during storm event (in inches)	4. No. of hours between beginning of storm measured and end of previous measurable storm event	5. Maximum flow rate during rain event (gallons/minute or specify units)	6. Total flow from rain event (gallons or specify units)	7. Season sample was taken	8. Form of Precipitation (rainfall, snowmelt)
15FEB92	840	0.73	>300 HRS.	1000 gpm	125K gal.	Winter	Rainfall

9. Provide a description of the method of flow measurement or estimate.

Pressure transduced depth measurements and velocity measurements were taken via sensor probe mounted in flow channel.

Depth and velocity readings were taken at 5 or 10 minute intervals. Data was processed via the flow equation Q=VxA.

Toddville: Storm Water Discharge #3 (Transformer Shop)

24" CMP located adjacent to transformer shop.

1. Flow Composite sample: rain event 1/23/92

EPA ID Number (copy from Item 1 of Form 1)

Toddville Storm Discharge #3 (Transformer Shop/Yard)

VII. Discharge Informatiuon (Continued from page 3 of Form 2F)

Part A: You must provide the results of at least one analysis for every pollutant in this table.

Pollution and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Oil and Grease		NA				
Biological Oxygen Demand(BOD5)		3.6 mg/L		5.7 lb.	1	
Chemical Oxygen Demand(COD)		30 mg/L		47 lb.	1	
Total Suspended Solids(TSS)		200 mg/L		320 lb.	1	Yard fill material (crusher stone)
Total Kjeldahl Nitrogen		0.67 mg/L		1.1 lb.	1	
Nitrate plus Nitrite Nitrogen		0.47 mg/L		0.74 lb.	1	
Total Phosphorus		0.23 mg/L		0.36 lb.	1	
pH	Minimum	Maximum	Minimum	Maximum		

Part B: List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements.

Pollutant and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Copper, total 7440-50-8	NA					
Iron, total 7439-89-6	NA					
Arsenic,total 7440-38-0	NA					
Selenium,total 7782-49-2	NA					

Part C: List each pollutant shown in Tables 2F-2, 2F-3 and 2F-4 that you have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.

Pollutant and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-Weighted Composite		
Cresols 1319-77-3						
Phenol 108-95-2						
Napthalene 91-20-3						
Pyrene 129-00-0						
Benzo(a) Anthrac 56-55-3						
PCB-1260 11096-82-5		<0.5 ug/L			1	Transformer shop

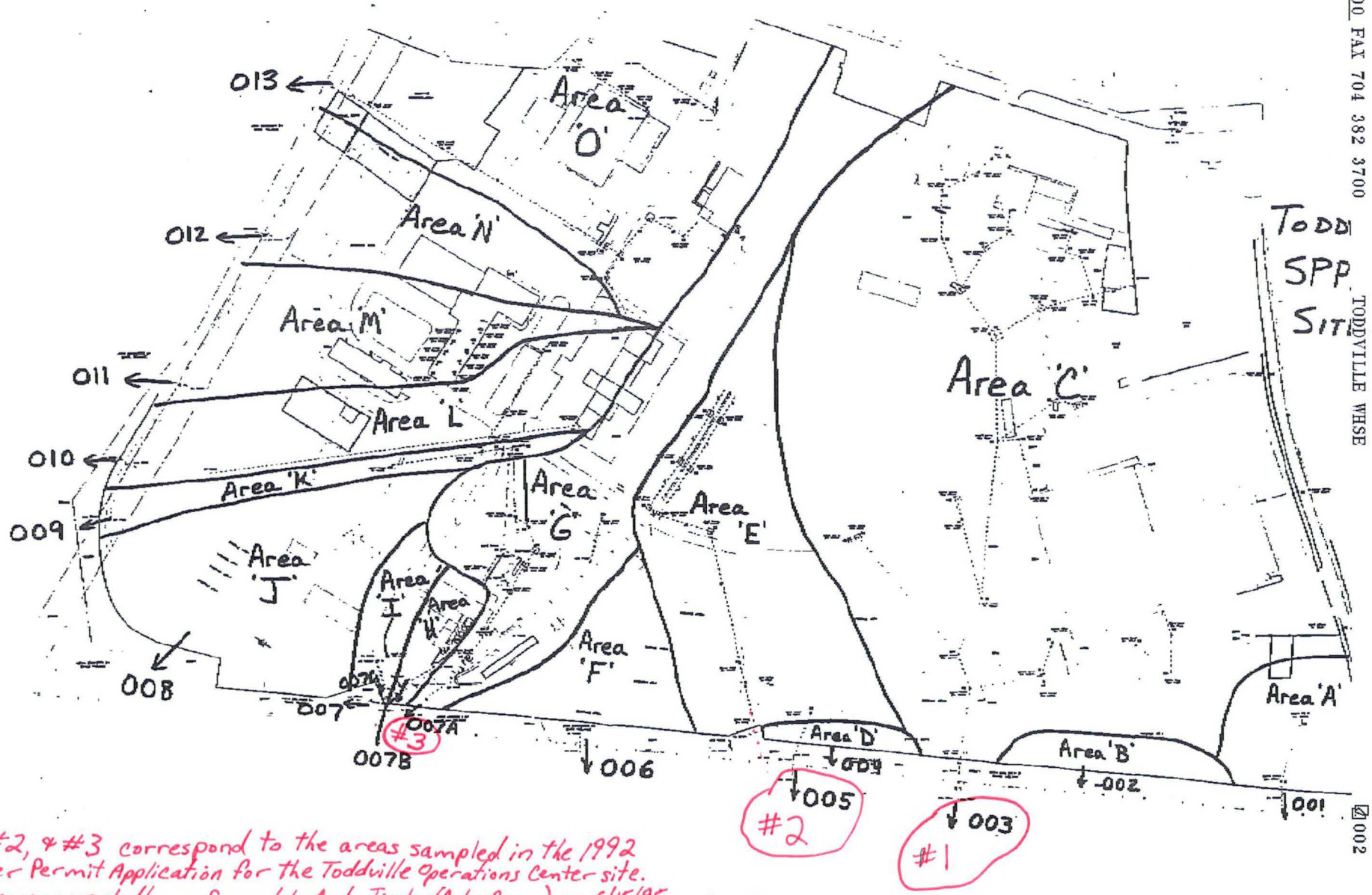
1. Date of Storm Event	2. Duration of Storm (in minutes)	3. Total rainfall during storm event (in inches)	4. No. of hours between beginning of storm measured and end of previous measurable storm event	5. Maximum flow rate during rain event (gallons/minute or specify units)	6. Total flow from rain event (gallons or specify units)	7. Season sample was taken	8. Form of Precipitation (rainfall, snowmelt)
23JAN92	345	0.98	>216 HRS.	1590 gpm	190K gal.	Winter	Rainfall

9. Provide a description of the method of flow measurement or estimate.

Pressure transduced depth measurements and velocity measurements were taken via sensor probe mounted in flow channel.

Depth and velocity readings were taken at 5 or 10 minute intervals. Data was processed via the flow equation Q=VxA.

TODDVILLE
OPERATIONS



Areas #1, #2, & #3 correspond to the areas sampled in the 1992 Stormwater Permit Application for the Toddville Operations Center site. These areas were verbally confirmed by Andy Tinsley (Duke Power) on 6/15/95.

R. Gandley

ANDREW F. TINSLEY
Scientist
Environmental Protection

(704)382-3712 Office
(704)382-3700 Fax

DUKE POWER

TV01A
610 Toddville Rd.
Charlotte, NC
28214

(1)

Toddville Operations Ctr

1/24/95 Jeanette Stanley
arrived 1450 Bob Gandley

mt w/ Andy Tinsley - Scientist
& Duke reps.
Dave Davis & Tim Hunsacker

Bob & Andy reviewed stormwater
runoff map

Selected 1st Sample Location
N of RR W of Duke site
~250' N of RR Track

marked sample on map

TO-001-SD 1550
brown sandy, medium grain
overland flow from Duke entered path way
25' below (downstream)
of Sample location

Split w/ Duke Rep.

(2)

Ref. 22

Sample TO-002-SD

Picked sample location
~25' NE of Freedom Dr.
alongstream (upstream
of road)
Sediment Same consistency
as TO-002-SD @
1630

Photo #10 - TO-002-SD

1/24/95

Received two samples
of sediment from
NC Superfund Section,
Bob Gandley
one upstream sample and
one downstream sample
just up stream of Freedom Dr

Timothy A. Kramer 1/24/95

Apt 1635

Talked w/ Dave Roach
1650 - 1710

stormwater ~~is~~ will be sampled for PCBs in Apr - Nov 1995

PCBs tested in soil only in area of complaint & some catch basins

Current Trans. oil storage tanks are contained only by gravel base. They have been in existence for only a few years

Bldg 5 contains PCB oil > 500ppm

Tanks on SW corner (cf. 25*) contain < 500ppm

Cleanups were in area near 17* 11*
See stormwater runoff map

*refers to numbers on stormwater map

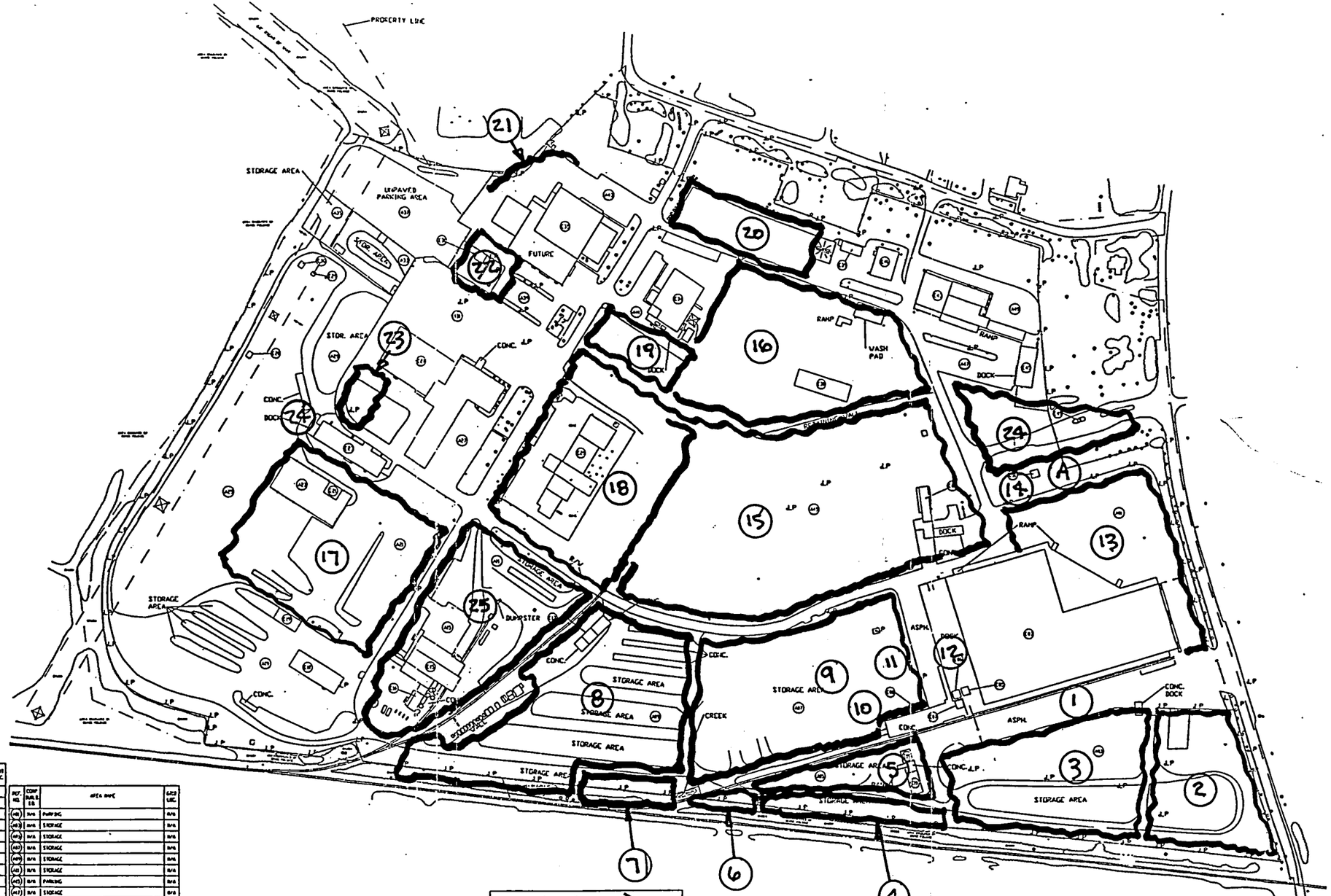
left Duke/Toddville 1715 Stanley

1/25/95

Lot #'s of Sample bottles used for Hoover Machine + Toddville Operations

VOA Soil	1057013
Semis Soil	0232023
VOA Water	3119013
Semis Water	373680-4-265-01

J Stanley



REF. NO.	COMP. BUILD. I.D.	EXISTING BUILDING NAME (ROOM)	GRID LOC.
(1)	5601	FIREWATER PUMPHOUSE	
(2)	5602	OFFICE & SHOP #5602	
(3)	5603	RODDVILLE STORES FACILITY	
(4)	5603	OFFICE #5603	
(5)	5606	OFFICE #5606	
(6)	5608	BATTERY STORAGE #5608	
(7)	5607	OIL STORAGE BUILDING #5607	
(8)	5609	PACKAGING WASTE FACILITY	
(9)	5610	PCB BUILDING #5610	
(10)	5613	REPAIR SHOP #5613	
(11)	5612	REPAIR SHOP #5612	
(12)	5611	OIL RECLAMATION BUILDING	
(13)	5618	TOOLS SHED #5618	
(14)	5615	GAS CYLINDER SHED	
(15)	5623	EQUIPMENT SHED #5623	
(16)	5623	WAREHOUSE #5623	
(17)	5626	RODDVILLE GARAGE	
(18)	5627	RODDVILLE COMPLEX #5627	
(19)	5629	STORAGE SHED #5629	
(20)	5629	STORAGE SHED #5629	
(21)	5630	STORAGE SHED #5630	
(22)	5631	BATTERY STORAGE #5631	
(23)	5634	TRANSMISSION CONTROL CENTER	
(24)	5633	COMMUNICATIONS BUILDING	
(25)	5638	HOLE SHED #5638	
(26)	5639	WELDING GAS #5639	
(27)	5640	REPAIR SHOP #5640	
(28)	5643	RODDVILLE COMPLEX #5643	
(29)	5645	CHARLOTTE LINES MAINTENANCE #5645	
(30)	5649	GUNSMOKE #5649	

REF. NO.	COMP. BUILD. I.D.	AREA NAME	GRID LOC.
(A1)	N/A	PARKING	N/A
(A2)	N/A	STORAGE	N/A
(A3)	N/A	STORAGE	N/A
(A4)	N/A	STORAGE	N/A
(A5)	N/A	STORAGE	N/A
(A6)	N/A	STORAGE	N/A
(A7)	N/A	PARKING	N/A
(A8)	N/A	STORAGE	N/A
(A9)	N/A	STORAGE	N/A
(A10)	N/A	PARKING	N/A
(A11)	N/A	STORAGE	N/A
(A12)	N/A	PARKING	N/A
(A13)	N/A	STORAGE	N/A
(A14)	N/A	STORAGE	N/A
(A15)	N/A	PARKING	N/A
(A16)	N/A	PARKING	N/A
(A17)	N/A	PARKING	N/A
(A18)	N/A	PARKING	N/A
(A19)	N/A	PARKING	N/A
(A20)	N/A	STORAGE	N/A
(A21)	N/A	PARKING	N/A
(A22)	N/A	PARKING	N/A

REF. NO.	COMP. BUILD. I.D.	FUTURE PROPOSED	GRID LOC.
(A1)		FUTURE PROPOSED FACILITY	N/A
			N/A
			N/A
			N/A
			N/A
			N/A
			N/A
			N/A
			N/A
			N/A

REF. NO.	COMP. BUILD. I.D.	TEMPORARY BUILDINGS	GRID LOC.
(T)			

REF. NO.	COMP. BUILD. I.D.	MISC. STRUCTURES	GRID LOC.
(C)	N/A	CO	

LOCATION PLAN

DUKE POWER COMPANY
TODDVILLE SITE
610 TODDVILLE ROAD
CHARLOTTE N.C.

FACILITY PLAN

Duke Power Company
Wachovia Center
P.O. Box 1007
Charlotte, N.C. 28201-1007

Ref. 23

DUKE POWER

April 12, 1991

Ms. Lee Crosby
North Carolina Superfund Section
P. O. Box 27687
401 Oberlin Road
Raleigh, North Carolina 27611-7687

Attn: Ms. Charlotte Jesneck

Subject: Duke Power Toddville Operations Center, Charlotte Resampling Results

Dear Ms. Jesneck:

As our intention was stated in my letter to you of January 28, 1991, Duke Power has now completed the following:

1. Sampled the groundwater at the bottom, a depth of 186 feet, of the inactive well for which you already have results of no detectable (less than 0.5 ppb) PCB at the water surface. The bottom water sample duplicates were found to contain less than 0.5 parts per billion and 1.0 parts per billion.

2. Removed the soil in the yards at the sampling points where 10 parts per million or greater PCB had previously been detected. Soil was removed to a depth and radius of five feet or more, and was disposed of at the Chemical Waste Management landfill in Emelle, Alabama (manifests attached).

3. Resampled both yards on a 50-ft random grid. Thirteen points were sampled at depths of 6-inches and 3-feet each. All samples were found to contain less than 1.4 parts per million PCB. The laboratory methods and results are attached.

Based on these results, Duke Power recommends that, once the well is abandoned per your procedures, the Toddville Operations Center be considered by the N.C. Superfund Section as requiring no further action.

Very truly yours,

David P. Roche

David P. Roche
Environmental Specialist
Corporate Materials Management

DPR/jd

Attachments

c: B. E. Telford
A. C. Lovin
J. E. Harwood
G. S. Rice
D. W. Anderson
R. A. Santini

Reorder by ID No. 059435321 Form 35321 (R4-90) Page 1 of 1

SAMPLE ANALYSES REQUEST AND CUSTODY FORM

(Legibly Complete Sections 1 Thru 14 In Black Ink)

REPORT TO:

1. Requestor's Name (Printed): GIORGINA FRANKLIN	2. Phone Number: 5249	3. Courier Address:
4. Department/Division/Location: PSD/PES/ASC	5. PROFS ID:	6. Requestor's Signature: Giorgina Franklin

SAMPLE INFORMATION

7. Sampling Site: TUDDVILLE OPS CENTER	8. Date Sampled: 1-23-91	9. Media/Lot #: GROUNDWATER
10. Number of Samples: 2 DEPTH-186'	11. Number of Blanks: 2	12. Date of Sample Shipment:
13. Date Results Requested:	14. Sampled By: (Signature): Giorgina Franklin	

List each sample under a) below. Complete c) and d) for each sample.

a) Field Sample Number	b) Laboratory Number	c) Volumes (For Asbestos Only)	d) Analyses Requested	e) Results ppb
TVØ12391MW1GLF1	9101216-1		*	< 0.5
TVØ12391MW1GLF2	-2			1.0
TVØ12391TBGLF	-3			< 0.5
TVØ12391FBGLF	-4			< 0.5

f) Comments: * PCB

AROCLOR 1260 WAS FOUND IN SAMPLE GLF-2, ANALYSES WAS REPEATED TO 1) REMOVE INTERFERENCE PEAKS IN 1140 REGION & VERIFY GLF-2 RESULTS, NO 1242 WAS EVIDENT IN SAMPLES. 2ND ANALYSIS CONFIRMED 1.0 ppb OBSERVED IN 1ST RUN

Ship Samples Via Courier To: MG03A — Industrial Health — John Mease

For Additional Information Contact: Jay Perkins 875-5348 or John Mease 875-5325

LABORATORY USE

Samples Received By: / Date: 01/24/91	Samples Analyzed By: / Date: 1-25-91
Results Reviewed By: / Date: 2-7-91	Requestor Notified By: / Date: 2-7-91

White, Canary, Pink - Submit With Samples Goldenrod - Requestor's File Copy

TR-417030

HAZARDOUS WASTE MANIFEST

(As Required By The Alabama Department of Environmental Management)

Please print or type. *(Form designed for use on elite (12-pitch) typewriter.)*

Form Approved. OMB No. 2050-0039. Expires 9-30-91

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. NCD931364389 — Manifest Document No. 1001

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
Duke Power Company, Toddville Stores Facility
610 Toddville Road, Charlotte, NC 28214

A. State Manifest Document Number: CWMA 485799

B. State Generator's ID

4. Generator's Phone (704) 373-7169 Luther Hall

5. Transporter 1 Company Name: Chemical Waste Management

6. US EPA ID Number: ALD000622464 (FLD099296814)

C. State Transporter's ID

D. Transporter's Phone: 205-652-9721

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address
CHEMICAL WASTE MANAGEMENT, INC.
Emelle Facility
Alabama Highway 17 at Mile Marker 163
Emelle, Alabama 35459

10. US EPA ID Number: ALD000622464

G. State Facility's ID

H. Facility's Phone: 205/652-9721

11. US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. Waste Hazardous Substance, Solid, N.O.S., ORM-E, NA9188 (Polychlorinated Biphenyls) CWM031591-2087 — CWM Profile Number D55669-MAR	1	DT	214	T	PCB2
b. CWM Profile Number					
c. CWM Profile Number					
d. CWM Profile Number					

J. Additional Descriptions for Materials Listed Above
State of Origin: North Carolina

K. Handling Codes for Wastes Listed Above
a. c.
b. d.

15. Special Handling Instructions and Additional Information
Emergency Phone After Business Hours: 704-373-8307 B42406 Release

Work Order #: 910208044 Purchase Order #: B42406 Release

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment, OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

GENERATOR — Printed/Typed Name | Signature | Month Day Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name | Signature | Month Day Year

EPA Form 8700-22 (Rev. 9-86). Previous edition is obsolete.

4 130 40

HAZARDOUS WASTE MANIFEST

(As Required By The Alabama Department of Environmental Management)

Please print or type. *(Form designed for use on elite (12-pitch) typewriter.)*

Form Approved. OMB No. 2050-0039. Expires 9-30-91

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. NCD091361339 — Manifest Document No.

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address

DUKE POWER COMPANY, TODDVILLE STORES FACILITY
610 TODDVILLE ROAD, CHARLOTTE, N.C. 28214

4. Generator's Phone (704) 3737189 Luther Hall

A. State Manifest Document Number: CWMA 585552

B. State Generator's ID

5. Transporter 1 Company Name: CHEMICAL WASTE MANAGEMENT

6. US EPA ID Number: ILD099209681

C. State Transporter's ID

D. Transporter's Phone: 205-652-9721

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address

CHEMICAL WASTE MANAGEMENT, INC.
Emelle Facility
Alabama Highway 17 at Mile Marker 163
Emelle, Alabama 35459

10. US EPA ID Number: ALD000622464

G. State Facility's ID

H. Facility's Phone: 205/652-9721

11. US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. WASTE HAZARDOUS SUBSTANCE, SOLID, N.O.S., ORM-E, NA9188 (POLYCHLORINATED BIPHENYLS CWM031591-2087 CWM Profile Number D55669-MAR	1	DT	1	KG	PCB7
b. CWM Profile Number					
c. CWM Profile Number					
d. CWM Profile Number					

J. Additional Descriptions for Materials Listed Above

STATE OF ORIGIN: NORTH CAROLINA
DATE REMOVED FOR DISPOSAL:- 3-4-91

ENTERED

K. Handling Codes for Wastes Listed Above

a. c.
b. d.

15. Special Handling Instructions and Additional Information

EMERGENCY PHONE AFTER BUSINESS HOURS: 704-373-8307

Work Order #:

Purchase Order #: 842411 RELEASE P.O. # J372881-67

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: MARTIN L. HALL — Signature — Month Day Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name — Signature — Month Day Year

April 9, 1991

TO: Dave Roche
Corporate Materials

SUBJECT: Toddville: February 22, 1991 PCB Sampling;
Sampling Protocol and Analysis Results

On February 22, 1991 personnel from Chemical Sciences conducted soil sampling at the Toddville Warehouse and Operations Center for PCB analysis. Sample locations 1-13 (see attachment) were selected using random number selection on a Hewlett Packard 11C calculator.

Soil samples were collected at surface (4 to 6 inches below gravel) and three foot depths at each of the thirteen locations. A 3 inch stainless steel bucket auger was used to advance holes to the desired depth and collect the samples.

All sampling equipment surfaces were rinsed (laboratory de-ionized water, and pesticide grade methanol) between samplings in accordance with USEPA Region IV, Engineering and Support Branch, Standard Operating Procedures, and Quality Assurance Manual (April 1, 1986).

Samples were returned to the Duke Power, Production Environmental Services laboratory for PCB analysis by EPA method 608. The PCB concentration for all locations and depths was <1.4 mg/l.

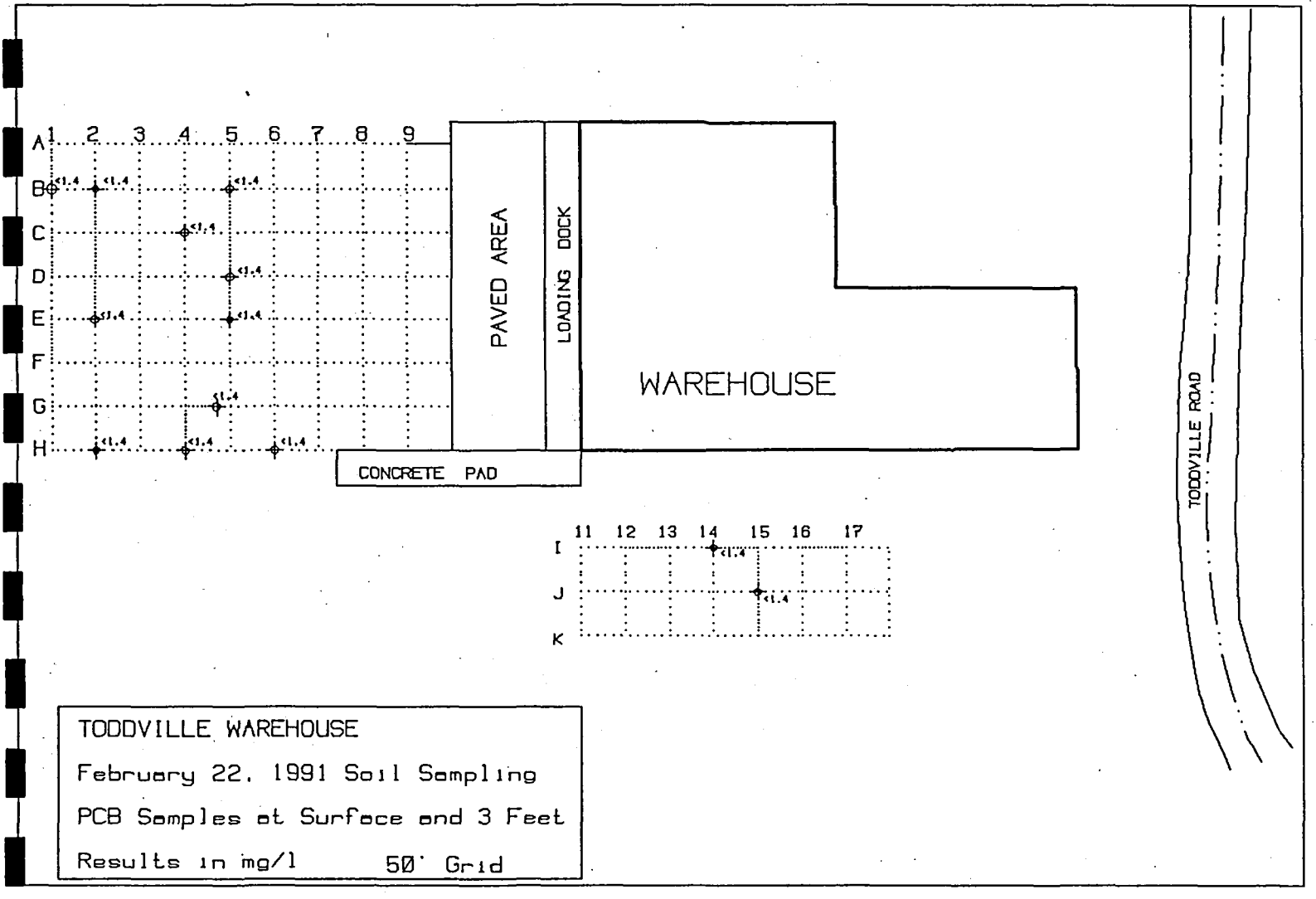
If you have any questions concerning the sampling or analysis results, please contact me at 875-5228 or Ron Santini at 875-5229.

T. S. Hunuscker

T. S. Hunuscker
PSD/PEC/Chemical Sciences

cc: R. A. Santini

attachments


A
B
C
D
E
F
G
H
1 2 3 4 5 6 7 8 9
<1.4
PAVED AREA
LOADING DOCK
WAREHOUSE
CONCRETE PAD
TODDVILLE ROAD
11 12 13 14 15 16 17
I
J
K
TODDVILLE WAREHOUSE
February 22, 1991 Soil Sampling
PCB Samples at Surface and 3 Feet
Results in mg/l
50' Grid

Duke Power Company
P.O. Box 33189
Charlotte, NC 28242

Ref. 24

~~803-885-7653~~

DUKE POWER

RECEIVED

SUPERFUND BRANCH

August 1, 1989

Ms. Charlotte Varlashkin
North Carolina Superfund Branch
401 Oberlin Road
Raleigh, N.C. 27605

**Subject: Risk Assessment for PCB at
Duke Power Toddville Operations Center, Charlotte**

Dear Ms. Varlashkin:

Duke Power has completed its health risk assessment calculations for PCB measured in an investigation by N. C. Superfund Branch at the Duke Power Toddville Operations Center in Charlotte in November 1986. The attached report presents the results of our assessment, which finds the PCB levels to represent no threat to human health or the environment.

As was stated in J. E. Harwood's letter of June 8, 1989 to Mr. William Meyer, Duke Power requests that the N. C. Superfund Branch's assessment of the Toddville site investigation results be completed as soon as possible so that, as we conclude is warranted by our risk assessment, Toddville can be removed from the Priority List of the Inactive Hazardous Sites Program.

Once you have had the opportunity to review the attached, we would like to meet with the involved Superfund Branch personnel to discuss our results. Please call me at (704) 373-7807 to schedule this meeting.

Very truly yours,

DUKE POWER COMPANY

David P. Roche

David P. Roche
Environmental Specialist
Corporate Materials Management

DPR/jd

Attachments

HEALTH RISK ASSESSMENT ANALYSIS OF PCB'S MEASURED AT THE TODDVILLE OPERATIONS CENTER FACILITY IN 1986

SUMMARY AND CONCLUSIONS

In November of 1986, the North Carolina Department of Human Resources (NCDHR) conducted a PCB sampling survey of Duke Power Company's Toddville Operations Center located in Charlotte, North Carolina. The objectives in conducting the survey were: 1) determine if PCB contamination existed at the facility; and 2) evaluate potential threats to human health based on technical data collected.

Based on low levels of PCB's reported in two surficial sand/gravel sample locations (i.e., average conc. of 3.31 mg/kg) and in a water sample collected from an abandoned on-site well casing (i.e., 1 ug/l), NCDHR identified the site as a potentially hazardous situation in June, 1989.

To facilitate a request to have the facility delisted as hazardous, Duke Power Company conducted a detailed human health risk analysis of the situation utilizing PCB contamination levels reported by the state based on their 1986 survey. The analysis consisted of: a) developing a realistic site-specific set of transport and exposure-pathways by which measured PCB contaminant levels could hypothetically reach potential human receptors both on and off the site facility; b) conducting a conservative computational analyses of the PCB intake values (i.e., doses) potential human receptors would experience based on the source locations and concentrations of PCB's measured at the site; and c) comparing and evaluating computed PCB chemical intake values to public health based standards to determine human health impact implications.

Because PCB's are considered to be potentially carcinogenic, health risks were computed as individual Lifetime Additional Daily Dose values (LADD), numerically summed, and compared to levels commonly considered as acceptable by both state and federal regulatory agencies.

Based on the analyses of human receptor group exposure-pathways for PCB contamination measured at the site, the following conclusions are warranted:*

1) PCB levels reported to be present in surficial sediments at two site locations and in water from the abandoned well casing represent no threat to human health or the environment.

2) Computed PCB dose and exposure-pathway analyses clearly suggest no human health implications existed at the site facility when samples were collected and that no remediation activities would be warranted.

3) No on-site or near-site impacts to human health (e.g., via drinking water supplies, air quality, etc.) would or could occur based on the location and concentrations of PCB's measured at the Toddville facility by NCDHR in 1986.

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*Health risk perspectives relative to PCB's as well as the hypothetical technical/scientific risk levels and computations presented in this report need to be objectively considered in the context of the following quote by Dr. Robert James of Buffalo, N. Y. in 1978: . . . . "After 50 years of industrial uses of PCB's, retrospective studies of humans occupationally exposed to PCB's have failed to identify any significant clinical disease and have not established a link to any form of cancer".

HEALTH RISK ASSESSMENT ANALYSIS OF PCB'S MEASURED AT THE TODDVILLE OPERATIONS CENTER FACILITY IN 1986

INTRODUCTION

In June 1989, the North Carolina Department of Human Resources (NCDHR) listed Duke Power Company's Toddville Operations Center as a potentially hazardous site based on PCB contamination measured at the site by NCDHR in 1986. To facilitate a request by Duke to have NCDHR "delist" the site, the company undertook a site specific human health risk assessment of the situation employing PCB contaminant levels reported by NCDHR.

In general, Duke Power Company's risk assessment for the site was developed in a stepwise process. Sequential steps in the process were:

1) Develop a set of possible/probable site-specific human receptor groups which could be hypothetically impacted by the PCB contamination situation reported by NCDHR.

2) Develop possible/probable transport and exposure pathways by which reported contaminant concentrations could reach/impact potential human receptor groups.

3) Numerically calculate/analyze PCB chemical exposure uptakes for each receptor group based on the location and concentrations of contaminants measured at the site.

4) Evaluate potential human health impacts to on-site and near-site personnel by comparison of computed exposure levels to risk values commonly considered as acceptable by state and federal agencies.

An interpretation of "no significant human health impact" for each hypothesized exposure pathway was assumed if computed risk values were equal to or no greater than 1 cancer incidence in every 1,000,000 individuals (e.g., $\leq 1X10^{-6}$). This interpretation is based on the USEPA "negligible risk" policy adopted in October 1988 which allows carcinogenic pesticide chemicals to be used if the resultant additional cancer risks are one in one million or less. In addition, since risks are considered to be numerically additive for potential carcinogens such as PCB's, the total or maximum individual risks for the Toddville site was assumed to be the sum of risk values computed for all exposure pathways. A graphical representation of this cumulative "acceptable risk" concept is contained in the appendix.

A schematic drawing depicting the risk assessment process steps followed by Duke in carrying out the Toddville PCB analysis is shown in Figure 1.

The general layout and location of the Toddville facility plus the approximate locations within the site boundaries where NCDHR reported PCB contamination is given in Figure 2. Analytic values reported by NCDHR which were utilized in this risk assessment analysis are contained in the Appendix.

RESULTS

I. Analyses of Human Health Risks Associated with PCB Concentrations Measured in Surficial Sand/Gravel Samples from Sampling Sites #5 and #6

Probable human health risk exposure pathways for PCB's measured in surficial sand/gravel samples from NCDHR sampling sites #5 and #6 are diagrammatically presented in Figure 3.

Computational results of potential health risks to on-site and near-site personnel associated with average PCB concentrations via various exposure-pathways are given in the following tables.

Table 1: Inhalation of Chemical Gases Volatilized from PCB Source Area Materials by On-Site Employees/ Visitors

Table 2: Inhalation of Chemical Gases Volatilized from PCB Source Area Materials by Near-Site Workers and Residents

Table 3: Incidental Ingestion/Inhalation of Airborne Particles Derived from PCB Source Area Materials by On-Site Employees/Visitors

Table 4: Incidental Ingestion/Inhalation of Airborne Particles Derived from PCB Source Area Materials by Near-Site Workers and Residents

Table 5: Dermal Contact with Airborne Particles Derived from PCB Source Area Materials by On-Site Employees/Visitors

Table 6: Dermal Contact with Airborne Particles Derived from PCB Source Area Materials by Near-Site Workers and Residents

The results shown in Tables 1 through 6 indicate PCB levels reported for surficial sand/gravel materials in NCDHR site areas #5 and #6 would not represent a threat to human health, either on or off the site. Maximum cumulative additional cancer risks for all calculated exposure pathways were 3E-07 (for near-site personnel) and below the acceptable limit of 1E-06.

II. Analyses of Human Health Risks Associated with PCB Concentrations Measured in Groundwater from the Inactive On-Site Well Location

Probable human health risk exposure pathways for the 1.2 ppb of PCB measured in a groundwater water sample withdrawn from an inactive well casing which had been capped for 18 years are diagrammatically presented in Figure 4. [Note: Exposure pathway scenarios presented are "practically applicable" only for the 1971 to present time period when there was no on-site drinking water supply; and "scientifically relevant" to the operational situation which existed in 1986 when NCDHR conducted their sampling survey.] The approximate location of the inactive well site casing and its proximate relationship to the two sand/gravel covered storage areas which were reported to show PCB contamination is shown in Figure 2.

Since the well was not in use as a drinking water supply for the Toddville facility in 1986, no human health risks to on-site employees/visitors are considered plausible due to the 1.2 ppb PCB contamination measured in the well casing water sample.

Hypothetical health risks to near-site workers/residents assuming there was an on-site groundwater concentration of 1.2 ppb PCB was evaluated using a mathematical groundwater model (i.e., EPRI, MYGRT version 2 code).

The principal question sought to be answered using a groundwater model was: "Could an on-site concentration of 1.2 ppb PCB be transported to an off-site drinking water supply well in concentrations equal to or greater than 0.026 ng/L PCB?" [The 0.026 ng/L level for PCB was selected as an off-site reference modeling concentration because it is the level EPA deems adequate to protect human health at the $1X10^{-6}$ cancer risk level.]

Model simulation conditions assumed the following situation for the Toddville site:

1) An on-site source of 1.2 ppb input of PCB had existed at the inactive well location for twenty (20) years;

2) The input source area is the top of the water table in old well casing and has a two-dimensional cross-sectional orientation of 5.0 meters wide by 0.5 meters deep.

3) Assumed physical-chemical conditions were: a hydraulic gradient of 0.020 feet/foot; a hydraulic conductivity of 10^{-4} to 10^{-6} cm/sec; a 30% soil porosity; and a soil organic content of 0.3%.

The results of the modeling computations are graphically shown in Figure 5. The data indicate that after 80 years following the cessation of a continuous 20 year PCB input of 1.2 ppb at the well casing source area, a groundwater concentration boundary level of $\geq$ 0.026 ng/l PCB would only extend approximately 15 feet downgradient of the source location and to a depth of approximately 6 feet below the water table surface.

Considering that the nearest potential off-site downgradient drinking water well "might be" located as close as 3000 feet from the on-site PCB source location, it is reasonable to conclude no potential health risks (i.e., via drinking water supply, etc.) to near-site personnel exist relative to the 1.2 ppb PCB measured in water from the inactive on-site well location.

III. Cumulative (Total) Human Health Risks to On-site and Near-Site Personnel for All Exposure-Pathway Analyses

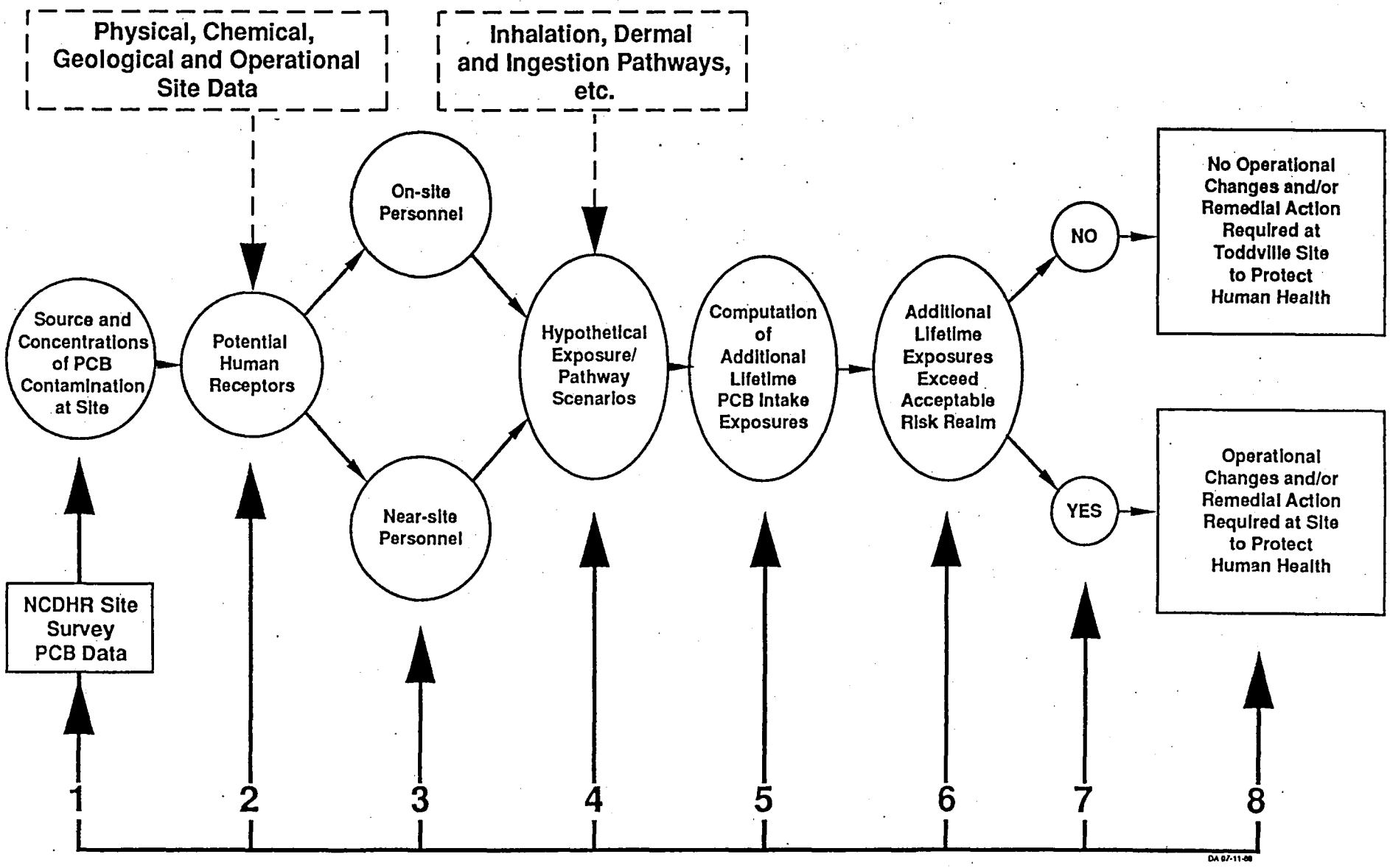
Cumulative health risks to all personnel for all potential PCB exposure pathways were calculated to be within acceptable limits and are graphically presented in Figure 6.

SUPPLEMENTAL INFORMATION

A tabulation of computational equations and relevant exposure data/information utilized in conducting the risk assessment for the Toddville facility is given in Table 7.

A limited glossary of some relevant risk assessment terms and definitions is contained in the Appendix.

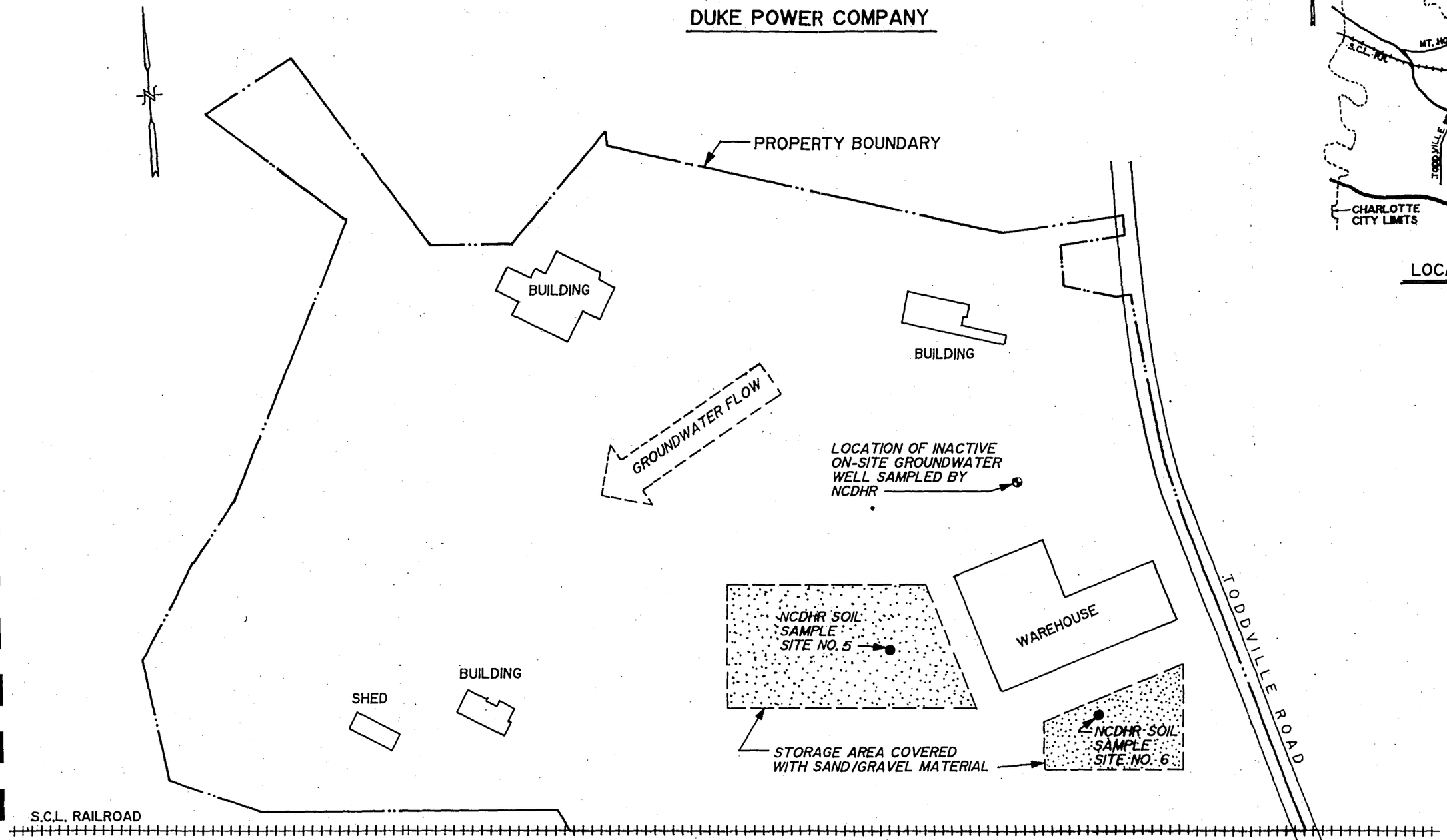
FIGURE 1



BASIC PROCEDURAL PROCESS FOLLOWED IN CONDUCTING HUMAN HEALTH RISK ASSESSMENT FOR TODDVILLE SITE FACILITY

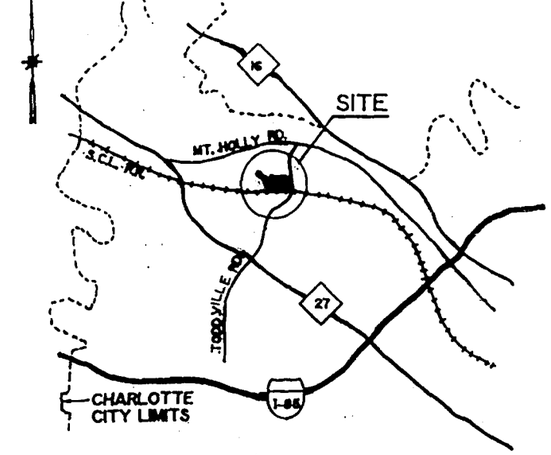
TODDVILLE WAREHOUSE & OPERATIONS CENTER

DUKE POWER COMPANY



GENERAL PLAN

0 150 300 600
SCALE: FEET

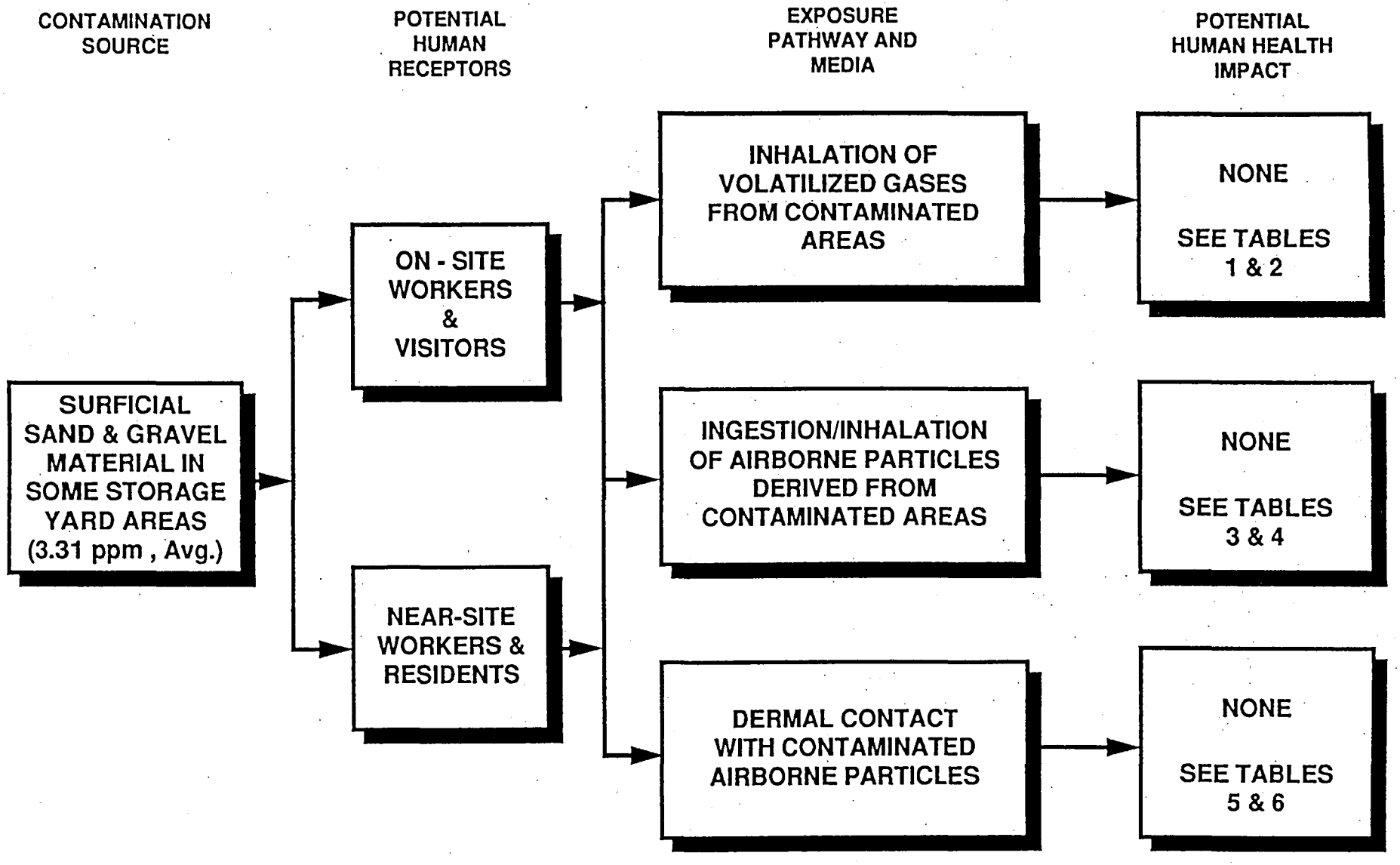


LOCATION PLAN

FIGURE 2

FIGURE 3

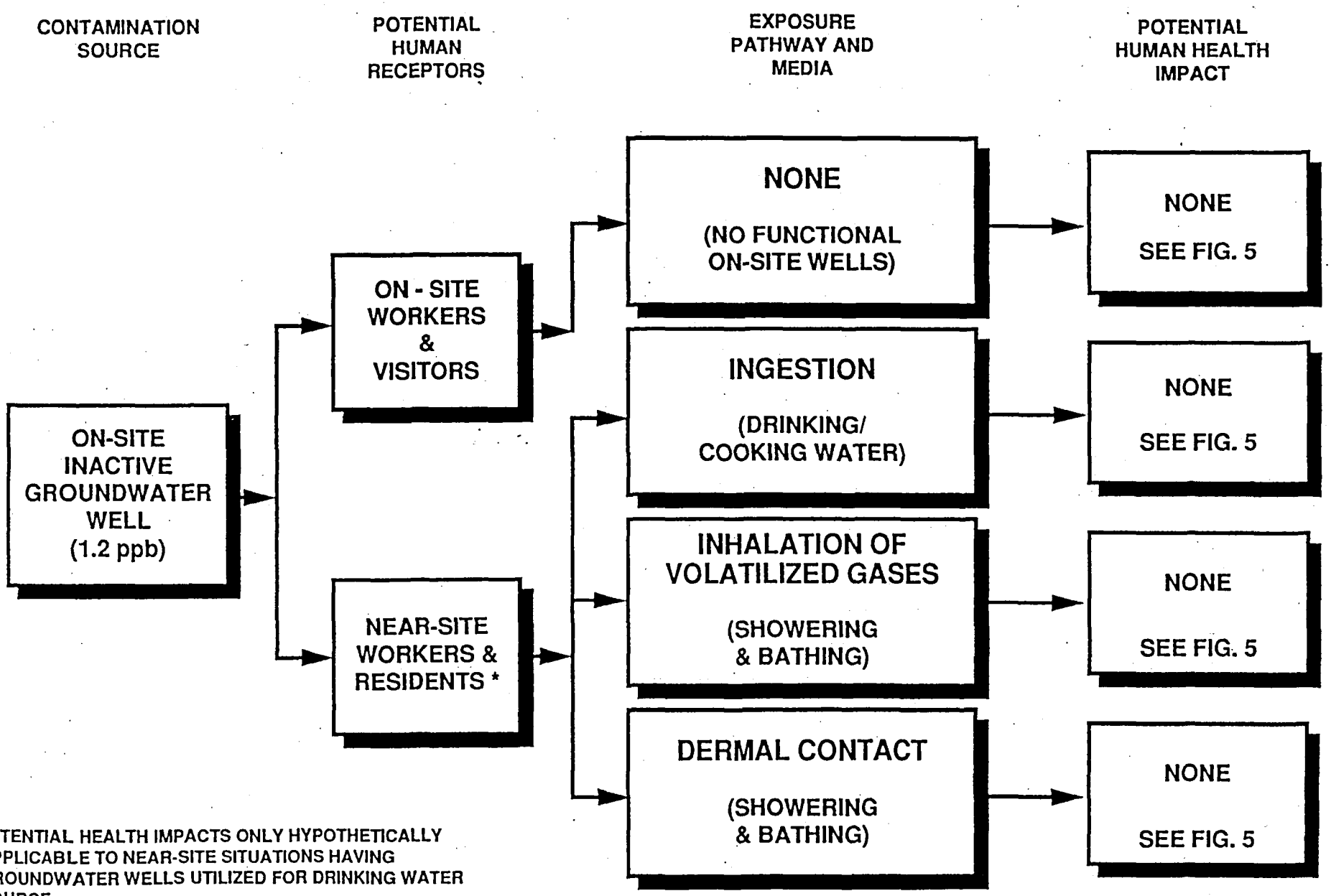
REPORTED SOURCE OF PCB CONTAMINATION AT TODDVILLE AND ITS COMPUTED HUMAN HEALTH IMPACTS *



* BASED ON 11/86 NCDHR SAMPLING SURVEY DATA

FIGURE 4

REPORTED SOURCE OF PCB CONTAMINATION AT TODDVILLE AND ITS COMPUTED HUMAN HEALTH IMPACTS

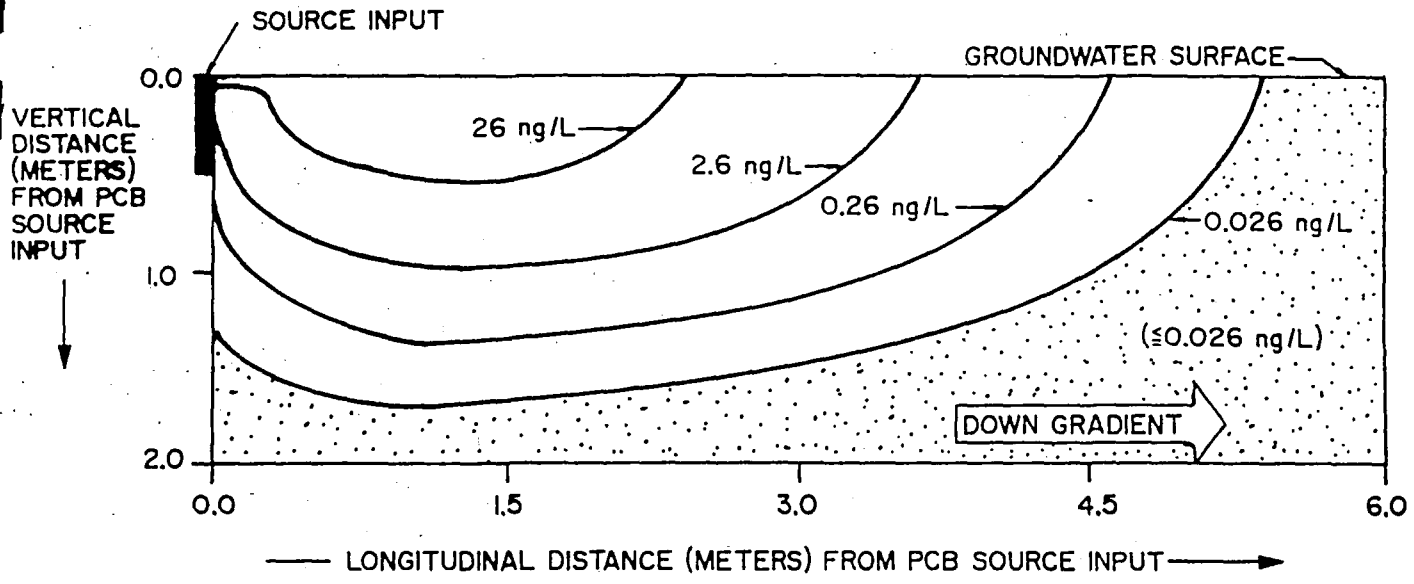


* POTENTIAL HEALTH IMPACTS ONLY HYPOTHETICALLY APPLICABLE TO NEAR-SITE SITUATIONS HAVING GROUNDWATER WELLS UTILIZED FOR DRINKING WATER SOURCE

FIGURE 5

PREDICTED PCB CONCENTRATIONS

DOWNGRADIENT OF INPUT 80 YEARS AFTER SOURCE IS REMOVED*



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* = Based on groundwater modeling results using Electric Power Research Institute (EPRI) MYGRT Version 2.0 Code developed by TETRA TECH, INC. 1989

Model Assumptions:

- Background PCB concentration in groundwater = 0.000 mg/l
- Concentration of PCB input source = 1.20 µg/l
- Duration of PCB source input = 20 years
- Assumed width and depth of PCB source input = 5.0 X 0.5 meters
- Assumed PCB octanol - water partition coefficient = (Log Kow 4.7-6.8)
- Hydraulic gradient = 0.020 feet/foot
- Hydraulic conductivity = 10^{-4} to 10^{-6}
- Assumed organic content of soil = 0.3%
- Soil porosity = 30%

FIGURE 6

INDIVIDUAL PATHWAY AND CUMULATIVE HEALTH RISKS TO ON-SITE & NEAR-SITE PERSONNEL AT DPCo. TODDVILLE OPERATIONS FACILITY RELATIVE TO PCB CONCENTRATIONS MEASURED AT SITE BY NCDHR IN NOVEMBER, 1986

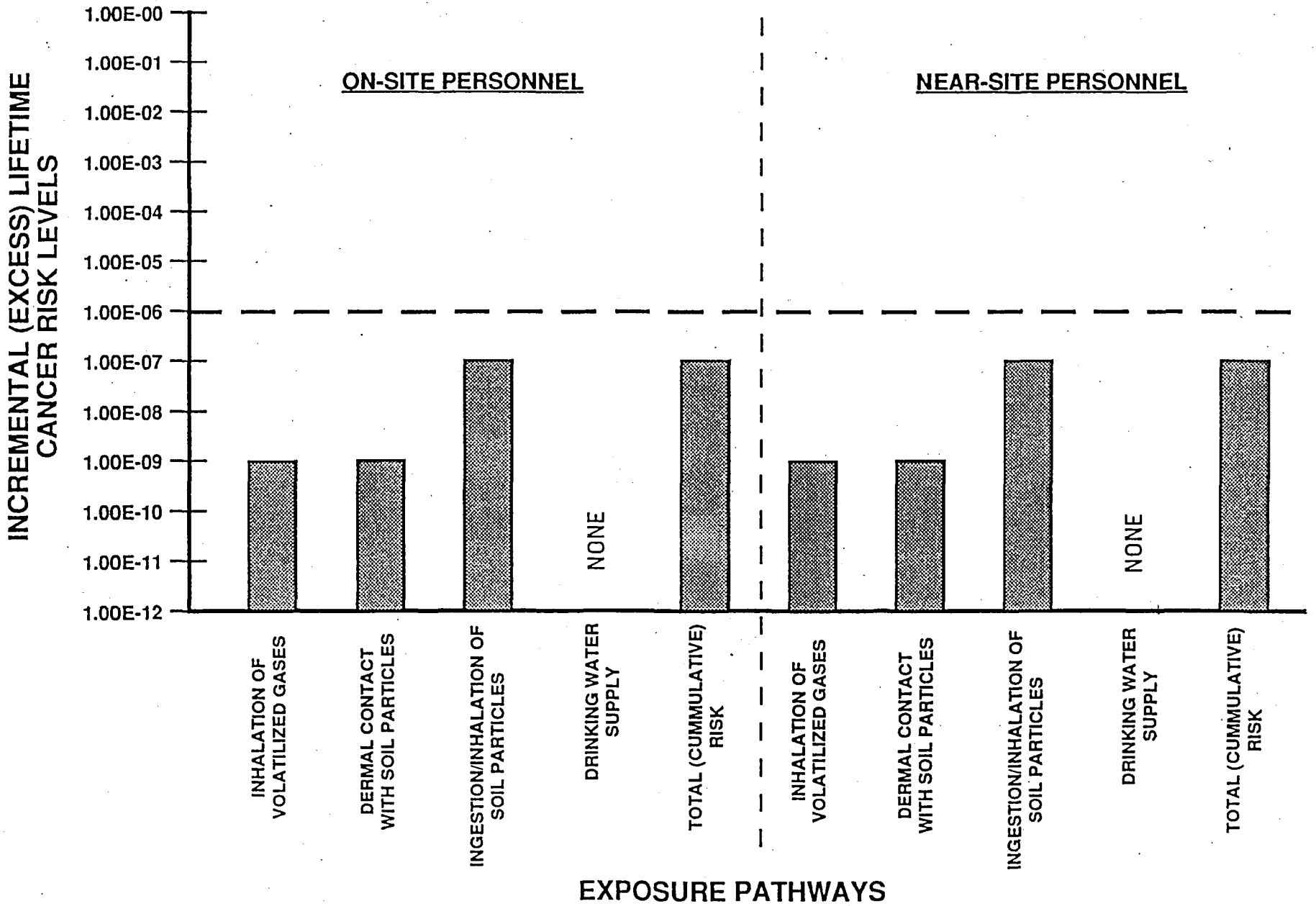


TABLE 1

INHALATION OF CHEMICAL GASES VOLATILIZED
FROM PCB SOURCE AREA MATERIALS
BY ON-SITE EMPLOYEES/VISITORS

Chemical Contaminant	Average Soil Conc. (mg/kg)	Emission Rate (gms/sec)	Ambient Air Conc. (mg/m^3)	Lifetime Average Intake (mg/kg-day)	Excess Lifetime Cancer Risk
PCB - (Assume Aroclor 1260)	3.31	9.4E-09	8.2E-09	1.60E-10	1E-09

Exposure Hypothesis Scenario:

PCB's contained in contaminated sand and gravel areas are volatilized to gaseous state which is then diluted into overlying site air mass. On-site workers and visitors inhale air containing some diluted concentrations of gaseous PCB's.

Exposure Assumptions:

Inhalation rate = 20 l/min
Body weight = 70 kg
Number of hours/day exposed = 8
Number of days/week exposed = 5
Number of weeks/year exposed = 48
Number of years exposed = 15
Lifetime = 70 years
Cancer Potency Factor = 7.70 (kg-day/mg)

Conditions:

1. Air filled soil porosity = 25%
2. Estimated size of source area = $2.5 \times 10^4 M^2$
3. Depth soil source and cover material = 10 cm
4. Average and maximum summer temperatures = 28°C & 38°C
5. Average and maximum humidity = 55% & 88%
6. Organic content of source soils = 0.2%
7. Width of emission surface perpendicular to wind = 200 meters
8. Average wind speed = 2 meters/sec
9. Prevailing wind direction = NE
10. Mixing height of air above emission surface = 2 meters

TABLE 2

INHALATION OF CHEMICAL GASES VOLATILIZED
FROM PCB SOURCE AREA MATERIALS
BY NEAR-SITE WORKERS AND RESIDENTS

Chemical Contaminant	Average Soil Conc. (mg/kg)	Emission Rate (gms/sec)	Ambient Air Conc. (mg/m^3)	Lifetime Average Intake (mg/kg-day)	Excess Lifetime Cancer Risk
PCB - (Assume Aroclor 1260)	3.31	9.4E-09	5E-09	1.51E-10	1E-09

Exposure Hypothesis Scenario:

PCB's contained in contaminated sand and gravel areas are volatilized to gaseous state which is then diluted in overlying site air mass. Site air mass is transported to near-site areas by winds, etc., and air is breathed by near-site workers and residents in both indoors and outdoor situations.

Exposure Assumptions:

Inhalation rate = 16 l/min
Body weight = 70 kg
Number of hours/day exposed = 8
Number of days/week exposed = 7
Number of weeks/year exposed = 50
Number of years exposed = 20
Lifetime = 70 years
Cancer Potency Factor = 7.70 (kg-day/mg)

Conditions:

1. Air filled soil porosity = 25%
2. Estimated size of source area = $2.5 \times 10^4 M^2$
3. Depth soil source and cover material = 10 cm
4. Average and maximum summer temperatures = 28°C & 38°C
5. Average and maximum humidity = 55% & 88%
6. Organic content of source soils = 0.2%
7. Distance to nearest receptor residence = 310 meters
8 Width of emission surface perpendicular to wind = 200 meters
9. Average wind speed = 2 meters/sec
10. Percent of time wind direction from source to receptor = 30%
11. Mixing height of air above emission surface = 2 meters
12. Atmospheric stability class = C & D

TABLE 3

INCIDENTAL INGESTION/INHALATION OF AIRBORNE PARTICLES
DERIVED FROM PCB SOURCE AREA MATERIALS
BY ON-SITE WORKERS/VISITORS

Chemical Contaminant	U.S. EPA Carcinogen Classification	Cancer[a] Potency Factor (kg-day/mg)	Average Concentration In Surficial Material (mg/kg)	Additional Excess Lifetime Cancer Risk
PCB - (Assume Aroclor 1260)	B1	7.70	3.31	1E-07

Exposure Hypothesis Scenario:

Surficial sand and gravel material in contaminated areas of site is reduced to fine airborne particles by human activities and natural physical erosional processes. Particles derived from contaminated areas are suspended into overlying site air mass which is then ingested and inhaled by on-site workers and visitors in both indoor and outdoor situations.

Exposure Assumptions:

1. Media intake (grams/day)* = .010
2. Body weight (kilograms) = 70
3. Matrix effect of media in stomach and lungs = 0.50
4. Number hours/day exposed = 8
5. Number of days/week exposed = 5
6. Number of weeks/year exposed = 48
7. Number of years exposed = 15
8. Lifetime (years) = 70
9. Structure Air change rate (ACH) = 1

(a) - Source: (1) Health Effects Assessment For Polychlorinated Biphenyls (PCBs). U. S. Environmental Protection Agency, Cincinnati, Ohio; September, 1984.

(2) PCB Spill Cleanup, Revised Draft Report. U.S. Environmental Protection Agency, Office of Toxic Substances; April 18, 1986.

* - Source: GRI "Management of Manufactured Gas Plant Sites", Volume 3 - Risk Assessment. (Nominal value for adults not involved in soil excavation or construction type work)

TABLE 5

DERMAL CONTACT WITH AIRBORNE PARTICLES
DERIVED FROM PCB SOURCE AREA MATERIALS
BY ON-SITE WORKERS AND RESIDENTS

Chemical Contaminant	U.S. EPA Carcinogen Classification	Cancer[a] Potency Factor (kg-day/mg)	Average Concentration In Surficial Material (mg/kg)	Additional Excess Lifetime Cancer Risk
PCB - (Assume Aroclor 1260)	B1	7.70	3.31	1E-09

Exposure Hypothesis Scenario:

Surficial sand and gravel material in contaminated areas of site is reduced to fine airborne particles by human activities and natural physical erosional processes. Particles derived from contaminated areas are diluted into overlying site air mass. Contaminated particles adhere to exposed skin areas of on-site workers and visitors in both indoors and outdoors situations. PCB chemical contaminant adhered to particles is absorbed through skin.

Exposure Assumption:

1. Exposed skin area (cm^2) = 4,000,00
2. Skin deposition quantity (mg/cm^2) - 0.05
3. Percent penetration/day = 0.06
4. Body weight (kg) = 70
5. Number of hours/day exposed = 8
6. Number of days/week exposed = 5
7. Number of weeks/year exposed = 48
8. Number of years exposed = 15
9. Matrix effect of soil = 0.15
10. Lifetime (years) = 70
11. Structure air change rate (ACH) = 1

(a) Source = Health Effects Assessment for Polychlorinated Biphenyls (PCB). U.S. Environmental Protection Agency, Cincinnati, Ohio. 1984.

TABLE 4

INCIDENTAL INGESTION/INHALATION OF AIRBORNE PARTICLES DERIVED FROM PCB SOURCE AREA MATERIALS BY NEAR-SITE WORKERS AND/OR RESIDENTS

Chemical Contaminant	U.S. EPA Carcinogen Classification	Cancer[a] Potency Factor (kg-day/mg)	Average Concentration In Surficial Material (mg/kg)	Additional Excess Lifetime Cancer Risk
PCB - (Assume Aroclor 1260)	B1	7.70	3.31	3E-07

Exposure Hypothesis Scenario:

Surficial sand and gravel material in contaminated areas of site is reduced to fine airborne particles by human activities and natural physical erosional processes. Particles derived from contaminated areas are suspended into overlying site air mass which is then transported with further dilution to near-site areas. Air containing suspended particles is then ingested and inhaled by near-site workers and/or residents in both indoor and outdoor situations.

Exposure Assumptions:

1. Media intake (grams/day)* = .005
2. Body weight *kilograms) = 70
3. Matrix effect of media in stomach and lungs = 0.05
4. Number of hours/day exposed = 16
5. Number of days/week exposed = 7
6. Number of weeks/year exposed = 50
7. Number of years exposed = 20
8. Lifetime = 70 years
9. Structure air change rate (ACH) = 1

(a) - Source: (1) Health Effects Assessment For Polychlorinated Biphenyls (PCBs). U. S. Environmental Protection Agency, Cincinnati, Ohio; September, 1984.

(2) PCB Spill Cleanup, Revised Draft Report. U.S. Environmental Protection Agency, Office of Toxic Substances; April 18, 1986.

* - Source: GRI "Management of Manufactured Gas Plant Sites", Volume 3 - Risk Assessment. (Nominal value for adults not involved in soil excavation or construction type work)

TABLE 6

DERMAL CONTACT WITH AIRBORNE PARTICLES
DERIVED FROM PCB SOURCE AREA MATERIALS
BY NEAR-SITE WORKERS AND RESIDENTS

Chemical Contaminant	U.S. EPA Carcinogen Classification	Cancer[a] Potency Factor (kg-day/mg)	Average Concentration In Surficial Material (mg/kg)	Additional Excess Lifetime Cancer Risk
PCB - (Assume Aroclor 1260)	B1	7.70	3.31	2E-09

Exposure Hypothesis Scenario:

Surficial sand and gravel material in contaminated areas of site is reduced to fine airborne particles by human activities and natural erosional processes. Particles derived from contaminated areas are suspended into overlying site air mass which is then transported with further dilution to near-site areas. Contaminated particles adhere to exposed skin areas of near-site workers and residents. PCB chemical contaminant is absorbed through skin.

Exposure Assumption:

1. Exposed skin area (cm^2) = 4,000,00
2. Skin deposition quantity (mg/cm^2) = 0.025
3. Percent penetration/day = 0.06
4. Body weight (kg) = 70
5. Number of hours/day exposed = 16
6. Number of days/week exposed = 7
7. Number of weeks/year exposed = 50
8. Number of years exposed = 20
9. Matrix effect of soil = 0.15
10. Lifetime (years) = 70
11. Structure air change rate (ACH) = 1

(a) Source = Health Effects Assessment for Polychlorinated Biphenyls (PCB). U. S. Environmental Protection Agency; Cincinnati, Ohio. 1984.

TABLE 7

COMPUTATIONAL EQUATIONS AND INFORMATION
UTILIZED IN THE TODDVILLE SITE ASSESSMENT ANALYSES

1) Soil Emission Rates

(Farmer Model: Dry Conditions): $J = \frac{-D_s \cdot A \cdot (C_o - C_L)}{L}$

Where: J = Mass flux of chemical vapor across the soil surface (g/sec)

D_s = Diffusion coefficient of chemical in air filled pores of soil (cm^2/sec)

A = Area covered by the wastes (cm^3)

Co = Concentration of PCB in air at the soil surface at time 0 (g/cm^3)

C_L = Concentration of PCB in soil air (g/cm^3)

L = depth of soil over wastes (cm)

(Mackay-Matsugu Model: Dry Conditions): $J = -K \cdot A \cdot (C_o - C_L)$

Note: Same as Farmer Model except D_s/L is replaced by K which is a mass transfer coefficient defined as follows:

$$1/K = 1/K_a + 1/K_s$$

Where: $K_s = D_s/L$

$$K_a = 0.482 \cdot u^{.78} \times x^{-.11} \cdot S_c^{-.67}$$

Units for transfer coefficients are cm/sec
u = wind speed in m/hr
x = dimension of waste in windward direction (meters)
Sc = Schmidt number

(Hartley Model: Wet Conditions): $Jpcb = Wpcb/W_w \cdot J_w$

Where: Jpcb = Emission rate of PCB (g/sec)

Wpcb = Weight of dissolved PCB (μg)

J_w = Emission rate of water (g/sec)

W_w = Weight of water (1×10^9 μg)

2) Ambient Air Above Source Area: $C = \frac{Q}{LS \cdot V \cdot H}$
(Box model - U. S. EPA, 1986)

Where: Q = Air flow rate (volume/time)
LS = Width dimension of contaminated area perpendicular to wind direction
V = Average wind speed x 0.5 times wind speed at mixing height
H = Mixing height (2 meters)

3) Ambient Air Above Near-Site Area(s): $C_x = Q/(3.1416 \cdot S_y \cdot S_z \cdot X)$
(Gaussian Plume Model - U. S. AEC, 1968)

Where: C_x = Concentration in air at some distance, x, from the source (g/m^3)

$Q = J_H$ = source area emission rate (g/sec)

S_y & S_z = Dispersion coefficients based upon meteorological conditions (meters) [Note: Estimates of dispersion coefficients were obtained from: Slade, David H., Editor, 1968, Meteorology and Atomic Energy, U.S. AEC. Washington, D.C. using a C and a D stability class]

X = Wind speed (m/sec)

4) Diffusion Into Structure: $C = \frac{G}{V \cdot ACH}$

Where: G = Chemical release rate (mass/time)
V = Volume of enclosure
ACH = Number air changes per hour

5) Respiratory Rates: (Liters/minute)

Adult man/woman - Resting = ~7.0
- Light Activity = ~19 to 20
- Moderate Activity = ~40 to 45

6) Body Weights: (Kilograms)

Adult Man/Woman = ~70
Child, 5-18 Years = ~40
Child, 1-6 Years = ~15

7) Typical Soil Ingestion/Inhalation Rates: (mg/day)

Construction/soil excavation activities = ~100 to 200
Routine (incidental) activities = 0 to 10

8) Skin Surface Areas:

Total Body (Adult 180 cm tall and 70 kg) = 18000 cm^2
Two hands = 5.5% of total body area
Neck = 2.5% of total body area
Two forearms = 5.5% of total body area
Two upper arms = 8.0% of total body area
Face and ears = 4.0% of total body area

9) Amount of dry dirt that may exist on exposed skin:

1.5 mg/cm^2 for active work in soil (based on Harger-1979 for potting soil)

10) Skin Penetration of Chemicals Adhered to Soil Particles:

0.01 (1%) based on TCDD data
0.06 (6%) for adults in a 12-hr period
0.15 (15%) matrix effect due to soil
0.10 (10%) for organics

11) Estimation of Dermal Uptake:

Dose = (Concentration in soil x adherence factor x exposed skin area x adsorption x matrix effect x time)/body weight

12) Estimation of Inhalation Exposures:

Dose = (Exposure x Inhalation rate x time)/body weight

13) Risk Estimation for Potential Carcinogens:

The estimate of human health effects from exposure to carcinogens involves estimating average lifetime dose as follows:

ADD (life) = ADD (day) x Exposure Period/Lifetime

Where:

ADD (life) = Average Daily Dose over a Lifetime (mg/kg/day)

ADD (day) = Average Daily Dose on a Day of Exposure (mg/kg/day)

Exposure Period = Number of Days of Exposure

Lifetime = Number of days in a 70-year lifetime

The equation for estimating Incremental Lifetime Risk from exposure to carcinogens (by compound and by pathway) is:
Risk = Cancer Potency Factor x ADD (life)

where:

Risk (Incremental Lifetime Risk) = Probability that person will manifest cancer, during lifetime, from the particular exposure condition.

Cancer Potency Factor (CPF) for a compound = The slope of the dose-response curve for cancers estimated for the specific chemical-of-interest [(mg/kg/day)-1]; different CPF values may be estimated for ingestion and inhalation; such values are published by EPA's Cancer Assessment Group or have been estimated by other private or public organizations.

The "total" risk posed by a mixture of carcinogens is estimated as the sum of the risks for individual chemicals.

14) Average Time Guidelines

Effect	Averaging Time
A. Carcinogenesis	Average Lifetime
B. Chronic effects	Greater than 90 days
C. Subchronic effects	Less than 90 days
D. Acute effects	Hours to days

15) Physical, Chemical and Operational Information Relevant to Developing Health Risk Assessment for Potential PCB Contamination at Duke Power Company Toddville Operations Center

- Operation Center is fully fenced/secured area having controlled access only through gated entry points which are manned 24 hours/day, 7 days per week. Total (fenced) site area = 115.56 acres.
- Approximately 25% of total site area covered with impermeable material (i.e., asphalt parking lots, sidewalks, buildings, etc.).
- Approximately 25% of total site is barren (i.e., covered only by grassed soil areas and/or unsurfaced roads, etc.).
- Approximately 50% of total site covered with sandy gravel material which is utilized as equipment storage areas.
- Approximately 2 acres of the total site surface area is assumed to have residual PCB contamination in concentrations equivalent to that measured and reported by NCDHR.
- Maximum employees/visitors at site = 800 persons. Nominal on-site employee/visitors per day = 150-200 persons.
- Average employee tenure at site = - 15 years.
- Site facility constructed from 1956 to 1958.

- No functional drinking water supply wells on site. Site converted from on-site well to Charlotte City water supply in 1971.

- Areas designated as #5 and #6 by NCDHR which showed residual levels of PCB contamination in surficial sand and gravel material comprise a total area of approximately 2 acres.

- PCB contamination measured in sand/gravel material at Toddville facility is assumed to be equivalent to a commercially available "Aroclor" type 1260 which had been and is contained in electrical apparatus stored in both areas #5 and #6. Arochlor 1260 is a resinous material having - 60% chlorination, a molecular formula of $C_{12}H_3CL_6$, a molecular weight of - 380, water soluble to - 2.7 ug/l, a specific gravity of 1.555 to 1.566 and a vapor pressure of 4.05 X 10^{-5} mm of Hg at 25°C.

16) Miscellaneous Site Features

- Groundwater Depth = - 30 feet
- Groundwater Slope = 0.020 feet/foot
- Soil Type = Silty-clay
- Hydraulic Conductivity of Soil = $10^{-5.5}$ cm/sec
- Assumed Organic Content of Soil = 0.3%

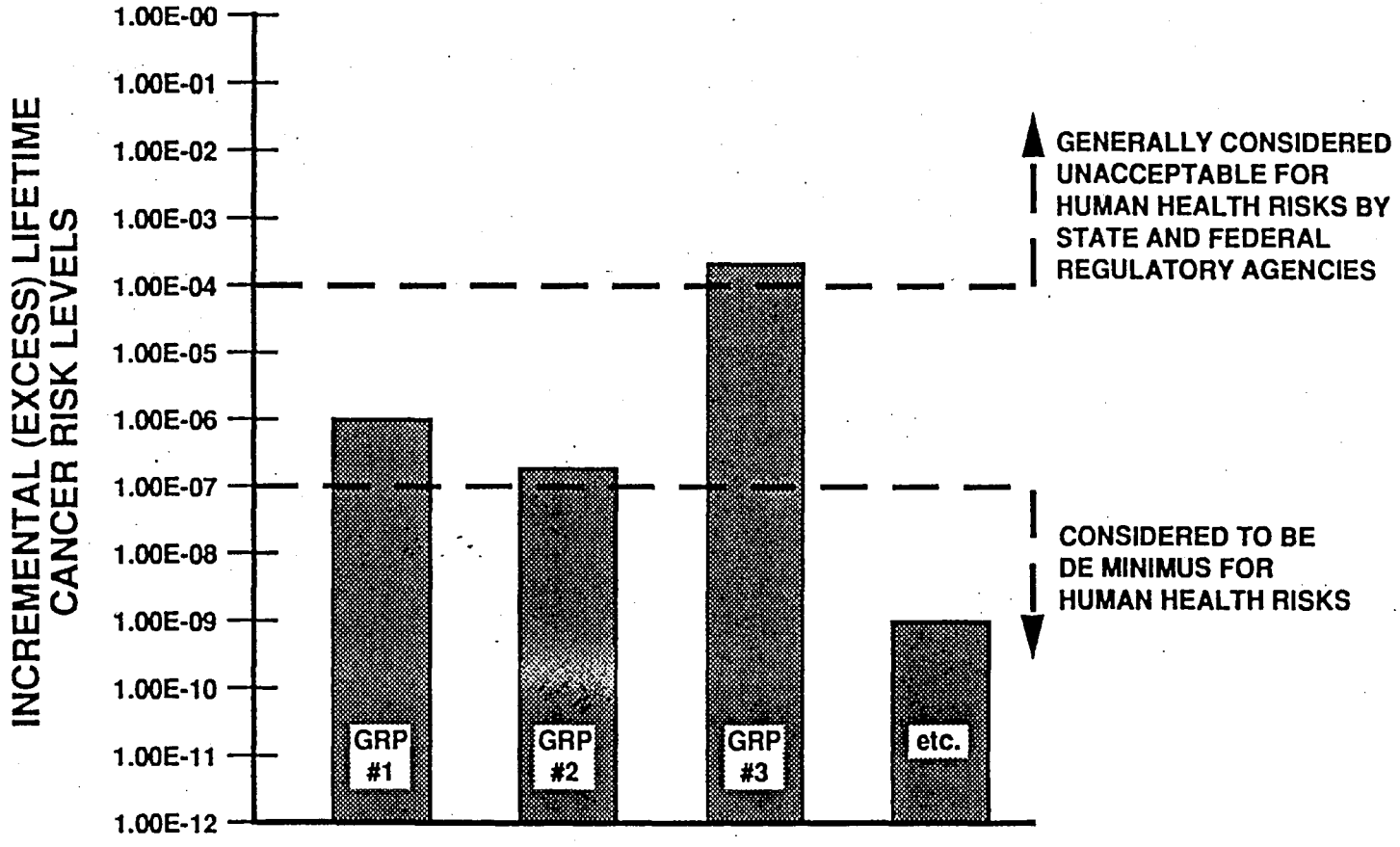
17) Regulations, Proposed Criteria/Standards, Etc., for PCB's Pertinent to Human Health

- Water Quality Criteria deemed appropriate to ensure $\leq$ 1X10^{-6} cancer risk level = $\leq$ 0.026 ng/l. (Source: Ambient Water Quality Criteria for Polychlorinated Biphenylis. USEPA Criteria and Standards, Washington, D. C., 1979.) [Note: This risk level is based on an assumed consumption rate of 2 liters of drinking water and 18.7 grams of fish/day where over 99% of the dietary intake would be obtained from the fish and less than 1% from drinking water. Therefore, utilization of this value for human health risks attributable only to drinking water supplies would be extremely conservative.]

- Ambient Water Quality Criteria deemed appropriate to protect humans to an increased lifetime cancer risk level of < 1X10^{-6} = 0.079 mg/l. (Source: Health Effects Assessment for Polychlorinated Biphenyls "PCBs", USEPA, Cincinnati, OH. 1984)

- Air Quality Criteria deemed appropriate to protect human health to the <1X10^{-5} increased lifetime cancer risk level = 8.3 X 10^{-5} mg/m^3. (Source: North Carolina Proposed Air Toxic Regulations, 1989)

GRAPHICAL ILLUSTRATION OF ACCEPTABLE RISK RANGE CONCEPT FOR CARCINOGENIC CHEMICAL EXPOSURES



EXPOSURE PATHWAY SCENARIOS
FOR HYPOTHETICAL RISK RECEPTOR GROUPS

APPENDIX

ANALYTICAL RESULTS REPORTED BY
NCDHR FOR TODDVILLE PCB SAMPLING SURVEY
NOVEMBER 19, 1986

SITE COLLECTION DESCRIPTION/ANALYTICAL RESULTS

1) Off-site drinking water well #1 = below detection level

2) Off-site drinking water well #2 = below detection level

3) On-site abandoned well site = 1.20 µg/l

4) Off-site "background" soil area (Site #3)

Surface		20" Sample	
	A = below detection level		A = below detection level
	B = below detection level		B = below detection level
	C = below detection level		C = below detection level
	D = below detection level		D = below detection level

5) On-site soil area (Site #5)

Surface		25" Sample	
	A = 0.49 mg/l		A = below detection level
	B = 0.37 mg/l		B = below detection level
	C = 0.38 mg/l		C = below detection level
	D = 0.46 mg/l		D = below detection level

6) On-site soil area (Site #6)

Surface		18" Sample	
	A = 3.58 mg/l		A = below detection level
	B = 11.64 mg/l		B = below detection level
	C = 4.90 mg/l		C = below detection level
	D = 4.63 mg/l		D = below detection level

EPA WEIGHT-OF-EVIDENCE CATEGORIES FOR POTENTIAL CARCINOGENS

EPA Category	Description of Group	Description of Evidence
Group A	Human carcinogen	Sufficient evidence from epidemiology studies to support a causal association between exposure and human cancer
Group B1	Probable human carcinogen	Limited evidence of carcinogenicity in humans from epidemiology studies
Group B2	Probable human carcinogen	Sufficient evidence of carcinogenicity in animals; inadequate evidence of carcinogenicity in humans
Group C	Possible human carcinogen	Limited evidence of carcinogenicity in animals; no data for humans
Group D	Not classified	Inadequate evidence of carcinogenicity in animals
Group E	No evidence of carcinogenicity in humans	No evidence for carcinogenicity in at least two adequate animal tests or in both epidemiology and animal studies

TERMS AND DEFINITIONS

Risk assessment The scientific activity of evaluating the toxic properties of a chemical and the conditions of human exposure to it in order to ascertain both the likelihood that exposed humans will be adversely affected, and to characterize the nature of the effects they may experience.

Extra risk The probability that the agent produced an observed response, as distinguished from the probability that the response was caused by a spontaneous event unrelated to the agent.

Dose-response The relationship between the amount of an agent administered, absorbed or believed to be effective, and the response of the biological system to that agent.

Reference dose An estimate (with uncertainty spanning perhaps an order of magnitude) of the daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effect during a lifetime. The RfD is expressed in units of mg/kg body wt./day.

Uncertainty factor Factor used in operationally deriving the RfD from experimental data. Uncertainty factors are intended to account for (i) the variation in sensitivity among members of the human population; (ii) the uncertainty in extrapolating animal data to the case of humans; (iii) the uncertainty in extrapolating from data obtained in a study

Acceptable daily intake An estimate of the daily exposure dose that is likely to be without deleterious effect even if continued exposure occurs over a lifetime.

Chronic effect A biological change produced by an alteration in the environment and persisting over a major portion of a lifetime.

Chronic exposure Exposure (usually low-level) during a major portion of a lifetime to an environmental alteration that may or may not cause a health problem.

Matrix effects The differential absorption of a chemical introduced in different media to either the lungs, gut or skin.

Kow partition coefficient This coefficient is derived by experiment by introducing a chemical into a mixture of octanol and water. The partition coefficient relates the chemical's concentration in octanol to that in water.

REFERENCES

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8. Abdul, Abdul S., Thomas L. Gibson, and Devi N. Rai. 1987. Statistical Correlations for Predicting the Partition Coefficient for Nonpolar Organic Contaminants Between Aquifer Organic Carbon and Water. Hazardous Waste and Hazardous Materials. Vol. 4 (3): 211-222.

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P. O. BOX 33189

DUKE POWER COMPANY
GENERAL OFFICES
422 SOUTH CHURCH STREET
CHARLOTTE, N. C. 28242

TELEPHONE: AREA 704
373-4011

Ref. 25

March 6, 1987

Mr. Stan Atwood
North Carolina Department of Human Resources
Solid and Hazardous Waste Management Branch
P. O. Box 2091
Raleigh, North Carolina 27602-2091

Re: PCB Compliance Inspection Report
File Nos: GAH-0207, ENV-0106

Dear Mr. Atwood:

At the request of Joe Harwood, I am forwarding to you a copy of the report on the PCB compliance inspection at the Toddville General Stores and Transformer Shop. This inspection was conducted on December 15 and 16, 1981 by R. G. Stryker of the EPA Region IV Pesticides and Toxic Substances Enforcement Office.

Please contact me at 704/373-5201 if you have any questions about this report.

Yours truly,

S. B. Hager, Chief Engineer
Civil/Environmental Division

M A Lascara

By: M. A. Lascara
Design Engineer I

MAL/mdc

Enclosure

cc w/o encl: Central Records
J. E. Harwood

Ralph

PCB COMPLIANCE INSPECTION REPORT

SECTION A. FACILITY SUMMARY

Duke Power Company
Toddville Storage Facility
610 Toddville Road
P.O. Box 33189
Charlotte, N.C. 28242
Mecklinberg County

Carl Horn, Chairman of the Board, Duke Power Co.
Bill Lee, President, Duke Power Co.
Facility Representatives: David P. Roche, Assoc. Biologist (704) 373 5846
Warren Baker, Manager of Toddville facility.

SECTION B. INSPECTION/REVIEW

Inspected by: Robert E. Stryker EPA, R-IV, PTSB

Reviewed by: _____ EPA, R-IV, PTSB

RECEIVED
JAN - 5. 1982

SECTION C. INVENTORY

1.a. The company is currently in the proces· ·f placing all PCB items on a computor inventory system. PCB capacitors while inventoried, are only maintained so far as the Annex VI records are concerned to those locations within the company where 40 or more large capacitors are in use, stored for use, or in storage for disposal (Toddville facility only).

1.b. All PCB transformers are identified by location where known to contain PCBs either from the name plate or from testing of the contents.

1.c. PCB articles, liquids and PCB containers are being stored in Annex III facilities at the Toddville location.

2.a.(2). There is no listing available for each of the 118476 large high voltage capacitors known to be PCB-filled.

2.a.(3). Company representatives did not have any figures available as to the number of non-PCB large, high-voltage capacitors.

2.b. No figures were available for large, low voltage capacitors. To Mr. Roache's knowledge, no low voltage capacitors were in the company system.

C.3 Company records identify 148 PCB transformers in service containing a total of 161824 kgs of PCB liquids. A list of individual sites of each transformer was not obtained as an inordinate amount of effort on the part of the company would have been required to consolidate the listing from the PCB records.

C.5. The combined total of PCBs in kgs for both in service and in storage for use is 354,993.8 kg.s. An additional 266,478 kgs of PCBs are in storage for disposal for a sum total of 621,471.8 kgs. An additional 444 intact capacitors are in open storage on pallets adjacent to the storage facilty.

C.8. Consistent, and sometimes heavy, rain showers precluded sampling of the storage yard where intact capacitors and a single flushed PCB transformer are being stored for disposal. There was no visible evidence of contamination in or around the storage site.

SECTION D. STORAGE AND HANDLING

D.2. Two buildings on either side of a concrete pad are used for housing PCB items. Both buildings were specifically built for PCB Annex III storage requirements. The older building (designated building A) was constructed in 1978. Its dimensions are 28'W x 32'L x 12'H with a continuous 6" curb. Its capacity is 448 cu. ft.. Currently 200, 55 gal. drums of PCB liquids are being stored in the building. The second building (designated building B) was constructed in 1980. Its dimensions are 32'W x 60' L x 12 'H with a continuous 24" curb. Its capacity is 4840 cu. ft.. The remaining 86 drums of PCB liquids (See PCB Inventory Balance as of 12-14-81 attached) are held in Building B along with 292 drums of PCB articles (Capacitors and/or debris). The transformer listed on the inventory sheet has been drained and flushed and is in open storage adjacent to the 444 capacitors stored on pallets.

SECTION E. DECONTAMINATION

E.1. All transformers sent in for repair from throughout the company's system come into the transformer repair shop operated by the transmission division of the company. Before repair or maintenance is begun on any transformer regardless of size, an oil sample is taken and sent to the analytical laboratory in the main facility building. A PCB analysis is run on the oil with one of three available gas chromatographs. If the analysis indicated less than 20 parts per million PCB, the report is listed as trace. At levels above this, a second analysis confirms the first and the actual amount in ppm is listed on the report. Turn around time for most samples is 30 minutes. Roche indicated that less than 5% of the distribution transformers so far tested exceed 50 ppm. In a separate section of the transformer shop an area has been prepared for working on PCB transformers. It is currently company policy that anytime a PCB transformer is removed from service, it will be drained, flushed and cycled for disposal. A sheet metal basin with 4" high sides and a pumping system with a manual back-up is used when working with a PCB transformer to catch any oil spilled during the draining and flushing. New kerosene is used each time. The kerosene level within the transformer is at least to the top of the core, and allowed to set at least 24 hours before being drained. The barrels of PCB liquids and PCB contaminated kerosene is removed to the storage facility generally within 24 hours after the flushing operation is completed.

SECTION F. RECORDS

All records appeared to be in compliance with Annex III and Annex VI guidelines. The company ID tag used to tag and follow the disposition of PCB articles to the storage facility, and logs maintained both within the "PCB Plan for Duke Power Company" guidelines and a separate log maintained by Mr. Baker, the Toddville facility manager, provide a double check on the movement, storage and disposition of all PCB items.

The attached PCB inventory balance dated 12/14/81 was taken from the log maintained by Mr. Baker. Additional information maintained in Mr. Baker's log is the date and location of all PCB items sent for disposal. PCBs disposed during 1980 were sent to CERCO/CER, 5092 Aber Rd., Williamsburg, OH. with a single shipment consigned to Waste Management of Alabama. A contract is currently being negotiated with Ensco in Arkansas for disposal of the capacitors currently in storage.

The annual report is maintained and updated by David Roche in the main offices of Duke Power located in the Wachovia Building in Charlotte. The last annual report ended on December 31, 1980. Some of the figues obtained for this report are more current, being taken from the daily log maintained at the Toddville facility.

RIVERBEND STEAM PLANT

Before beginning the inspection of the Toddville facility, I met David Roche at the Riverbend Steam Plant for the purpose of inspecting and observing the high efficiency boiler used by Duke Power for incineration of PCB contaminated oils below 500 ppm. The Riverbend Steamplant manager is Al Hornsby and the superintendent of operations is Jim Greer.

The plant has four operating boilers constructed in the early 1950's. Three boilers constructed in the 1920's are retired from service. Unit No. 7 is used for PCB contaminated oil incineration. Its rated power capacity is 130 megawatts.

Oil is injected through one of two oil injection systems which may be used to fire the boiler after shutdown. The contaminated oil is drawn from a 20,000 gal. storage tank located adjacent to the NW corner of the plant. The oil is metered through a flow meter for injection at the rate of 4 to 5 gallons per minute. If at any time, the boiler should drop below 75% of full capacity, an automatic trip device shuts down the pump located at the storage tank. At full load the boiler consumes 40 tons of pulverised coal per hour. The rate of oil injection is thus well below the 10% level. The oil is injected into the boiler under approximately 90 psi. The average retention time in the boiler's fire chamber is 2 to 3 seconds at some 3000 degrees F. During the contaminated oil burns, a CO continuous strip monitor is in operation. An alarm and warning light automatically function if the CO level goes above 100 ppm. Oxygen levels are monitored continuously during boiler operations at all times. Inspection of strip charts recorded during the test burns indicated oxygen levels averaged 4.2 ppm and CO levels of 20 to 30 ppm.

Total contaminated oil burned during July 22, 23, & 24; August 18th; and Sept. 1 was 10,698 gallons. Flow meter readings were some 30 to 40 % above these levels as recorded by physical measurements taken at the storage tank source. The flow meter problem is thought to be corrected now through better calibration . The average rate of burn during the above listed dates was 180 gal.s/hr.

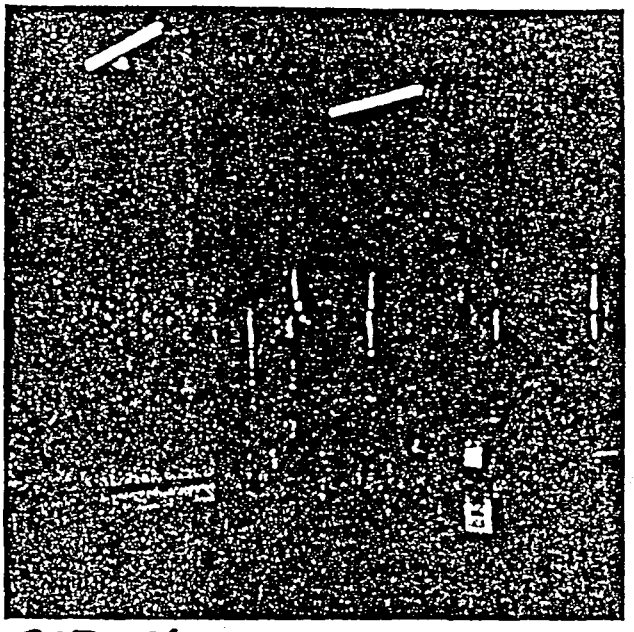
Roche indicated the Riverbend facility was picked for a number of reasons. It was close to the Toddville storage site. It is one of the most advanced plants on the Duke System for air pollution control devices. It is equipped with hot side precipitators which are among the most efficient in operation.

The company also uses this facility to burn mineral oil removed from nonPCB transformers which is no longer suitable for recycling and reuse. Roche said over 40,000 gallons of waste mineral oil had been burned in the boiler.

One item was noticed during the inspection which may be of some importance. At the transformer repair shop, a mineral oil filtration and recycling facility is used to clean mineral oil of sediment, water and gases. The filters in the system consist of a multiple pad series plus three large cylindars filled with a sandy particulate material. *Is there any possibility that low concentrations of PCBs in mineral oil testing less than 50 ppm could accumulate in these filtering systems to rather high levels? Many thousands of gallons of mineral oil may pass through the filters before they are changed. If the PCBs were adhereing to the sediment particles, they would be strained out and left in the filters. Roche did not seem to think there was much possibility for this to occur, but I am inclined to be lieve it could be very easily.

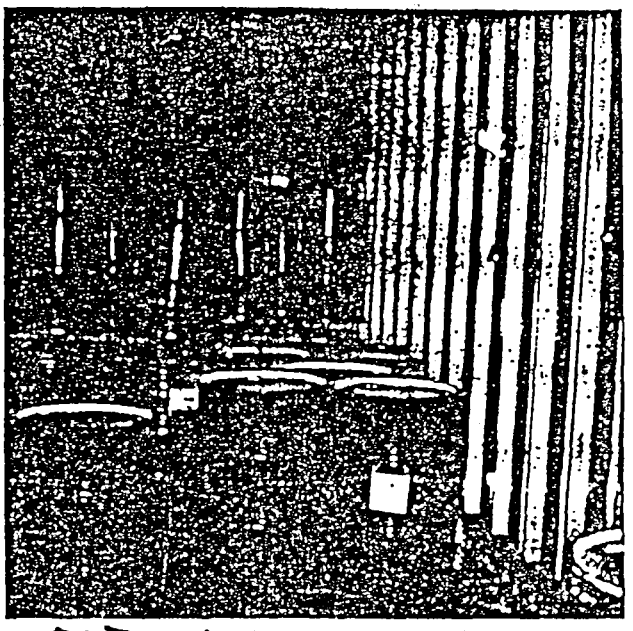
Duke Power Co., Toddville Facility

Annex III Storage Buildings.



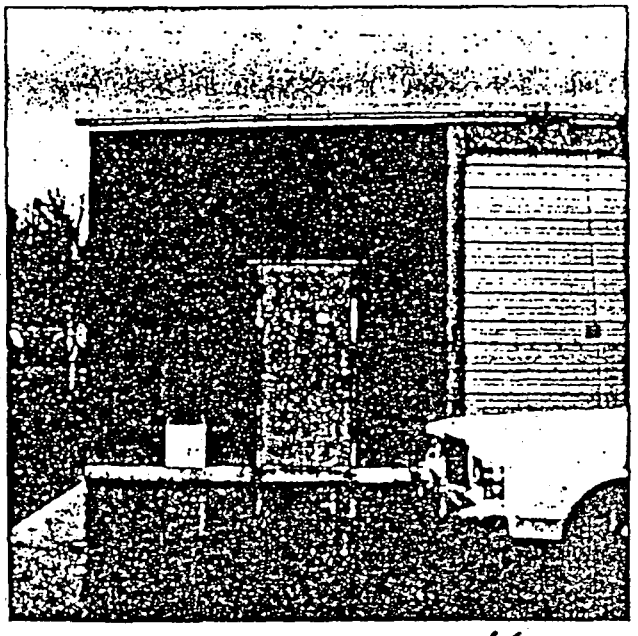
PCB Storage
12-15-81
RGS

Interior
Bldg. A.



PCB storage
12-15-81
RGS.

Interior
Bldg A.



PCB Storage Bldg. Toddville
fac. Bldg B
12-15-81 RGS Duke Power

DUKE POWER COMPANY
FOSSIL PRODUCTION DEPARTMENT
P.O. BOX 33189, 422 SOUTH CHURCH STREET
CHARLOTTE, N.C. 28242
(704) 373-4011

September 27, 1982

Mr. R. G. Stryker
Enforcement Officer
EPA Environmental Research Center (MD7)
Research Triangle Park, NC 27711

Subject: PCB Analysis of Spent Fuller's Earth
from Mineral Oil Reprocessing
File: GS-709.25

Dear Mr. Stryker:

Attached for your information are the results of our laboratory's analysis of spent Fuller's Earth which had been used in filtering recycled mineral oil at our Toddville Road facility. The two samples were analyzed by gas chromatograph/electron capture detection. A concentration of less than 5 ppm PCB was detected in both samples of Fuller's Earth. If you have any questions, please call me at (704)373-8775.

Very truly yours,

David Roche

D. P. Roche
Associate Biologist

DPR:jsc

Attachments

bcc: R. E. Holmes
B. K. Sipe
J. E. Harwood
H. Pauley w/o attachments

September 7, 1982

Memo to: F. L. Tatum, Manager
Substation Maintenance
Toddville

Subject: Determination of PCB's in Fuller's Earth
GS-709.25

A sample (#082582P) of the Fuller's Earth filtering media from the transformer oil recycling system at Toddville was analyzed for the determination of PCB's. As you requested, the analysis was performed by Production Environmental Services.

The media sample was extracted by using the United States Environmental Protection Agency "Interim Method for the Sampling and Analysis of Priority Pollutants (PCB's) in Sediments and Fish Tissue."

The results showed 4.6 ppm of Aroclor 1260 present in the Fuller's Earth. If there are any questions concerning the data, please call John Mease at 875-1971.

H. F. Pauley, Supervisor
Industrial Health
Production Environmental Services

JMR/sm

cc: J. R. Mease
J. G. Nunn
R. D. Jones

August 27, 1982

Memo to: F. L. Tatum, Manager
Substation Maintenance
Toddville

Subject: Determination of PCB's in Fuller's Earth
GS-709.25

A sample of the Fuller's Earth filtering media from the transformer oil recycling system at Toddville was analyzed for the determination of PCB's. As you requested, the analysis was performed by Production Environmental Services. Due to the high background, it was necessary to clean up and reanalyze the sample several times.

The media sample was extracted by using the United States Environmental Protection Agency "Interim Method for the Sampling and Analysis of Priority Pollutants (PCB's) in Sediments and Fish Tissue."

The results showed 3.3 ppm of Aroclor 1260 present in the Fuller's Earth. If there are any questions concerning the data, please call John Mease at 875-1971.

H. F. Pauley, Supervisor
Industrial Health
Production Environmental Services

JMR/sm

cc: J. R. Mease
J. G. Nunn

United States Environmental Protection Agency

NOTICE OF INSPECTION

Name of Firm: Duke Power Company

Firm Address: P.O. Box 33189, Charlotte, N.C. 28242

Inspector Name and Address: Robert G. Stryker, EPA-ERC (MD-7), Research Triangle Park, N.C. 27711

Date: 12-15-81

Time: 8:55 AM

Inspector's Signature: Robert G. Stryker

Name and Title of Recipient: David Roche, Assoc. Biologist

Title: Enforcement Officer

Signature of Recipient: David F. Roche

REASON FOR INSPECTION: Annex III & Annex VI routine inspection.

Under the authority of Section 11 of the Toxic Substances Control Act

[X] For the purpose of inspecting (including taking samples, photographs, statements, and other inspection activities) an establishment, facility, or other premises in which chemical substances or mixtures or articles containing same are manufactured, processed or stored, or held before or after their distribution in commerce (including records, files, papers, processes, controls, and facilities) and any conveyance being used to transport chemical substances, mixtures, or articles containing same in connection with their distribution in commerce (including records, files, papers, processes, controls and facilities) bearing on whether the requirements of the Act applicable to the chemical substances, mixtures, or articles within or associated with such premises or conveyance have been compiled with.

[ ] In addition, this inspection extends to (circle appropriate letters):

(A) Financial data
(B) Sales data
(C) Pricing data
(D) Personnel data
(E) Reserach data

The nature and extent of inspection of such data specified in A through E above as follows:

United States Environmental Protection Agency

TSCA INSPECTION CONFIDENTIALITY NOTICE

Inspector Name: Robert G. Stryker

Inspector Address: EPA-ERC (MD-7)
Research Triangle Park, N.C. 27711

Facility: Duke Power Co.

Facility Address: P.O. Box 33189
Charlotte, NC 28242

Chief Executive Officer of Firm: Carl Horn

Title: Chairman of the Board

Name of Individual to Whom Notice Given: David Roche

Title: Assoc. Biologist

It is possible that EPA will receive public requests for release of the information obtained during inspection of the facility above. Such requests will be handled by EPA in accordance with provisions of the Freedom of Information Act (FOIA), 5 U.S.C. 552; EPA regulations issued thereunder, 40 CFR Part 2; and the Toxic Substances Control Act, Section 14. EPA is required to make inspection data available in response to FOIA requests unless the Administrator of the Agency determines that the data contains information entitled to confidential treatment.

Any or all the information collected by EPA during the inspection may be claimed confidential if it relates to trade secrets or commercial or financial matters that you consider to be confidential. If you make claims of confidentiality, EPA will disclose the information only to the extent, and by means of the procedures, set forth in the regulations (cited above) governing EPA's treatment of confidential information. Among other things, the regulations require that EPA notify you in advance of publicly disclosing any information you have claimed and certified confidential.

To Claim Confidential Information

To claim information confidential, you must certify that each claimed item meets all of the following criteria:

1. Your company has taken measures to protect the confidentiality of the information, and it intends to continue to take such measures.
2. The information is not, and has not been, reasonably obtainable without your company's consent by other persons (other than governmental bodies) by use of legitimate means (other than discovery based on a showing of special need in a judicial or quasi-judicial proceeding).
3. The information is not publicly available elsewhere.
4. Disclosure of the information would cause substantial harm to your company's competitive position.

At the completion of the inspection, you will be given a receipt for all documents, samples, and other materials collected. At that time, you may make claims that some or all of the information is confidential and meets the four criteria listed above.

If you are not authorized by your company to make confidentiality claims, this notice will be sent by certified mail, along with the receipt for documents, samples, and other materials to the Chief Executive Officer of your firm within two days of this date. The Chief Executive Officer must return a statement specifying any information which should receive confidential treatment.

The statement from the Chief Executive Officer should be addressed to: Document Control Officer
EPA, R-IV, PTSEB
345 Courtland Street
Atlanta, GA 30365

and mailed by registered, return-receipt-requested mail within seven (7) calendar days of receipt of this Notice.

Failure by your firm to submit a written request that information be treated as confidential, either at the completion of the inspection or by the Chief Executive Officer within the seven-day period, will be treated by EPA as a waiver by your company of any claims for confidentiality regarding the inspection data.

To be completed by facility official receiving this notice

I have received and read this Notice.

Name: David Roche

Title: Assoc. Biologist

Signature: David P. Roche

Date: December 15, 1981

If there is no one on the premises of the facility who is authorized to make business confidentiality claims for the firm, a copy of this Notice and other inspection materials will be sent to the company's chief executive officer. If there is another company official who should also receive this information, please designate below.

Name: W. A. Haller

Title: Manager, Tech & Env. Services

Address: P.O. Box 33159
Charlotte, NC 28242

United States Environmental Protection Agency

DECLARATION OF CONFIDENTIAL BUSINESS INFORMATION

EPA Regional Office Address
345 Courtland Street.
Atlanta, Ga. 30365

Date
12-15-81

Name of Individual
David Roche

Title
Assoc. Biologist

Firm Name
Duke Power Company

Firm Address
P.O. Box 33189
Charlotte, NC 28242

Information Designated as Confidential Business Information:

Acknowledgment by Claimant

The undersigned acknowledges that the information described above is designated as Confidential Business Information under Section 14(c) of the Toxic Substances Control Act. The undersigned further acknowledges that he/she is authorized to make such claims for his/her firm.

The undersigned also certifies that each item described above meets all of the following criteria: (1) The company has taken measures to protect the confidentiality of the information and it intends to continue to take such measures; (2) The information is not, and has not been reasonably attainable without the company's consent by other persons (other than governmental bodies) by use of legitimate means (other than discovery based on a showing of special need in a judicial or quasi-judicial proceeding); (3) The information is not publicly available elsewhere; and (4) Disclosure of the information would cause substantial harm to the company's competitive position.

Signature (Owner, Operator, Agent)

Name of Inspector — Title
Robert G. Stryker, Enforcement Officer

Title

Inspector's Signature
Robert G. Stryker

EPA United States Environmental Protection Agency

RECEIPT FOR SAMPLES AND DOCUMENTS

Name of Firm: Duke Power Co

Firm Address: P. O. Box 33189 Charlotte, NC 28242

Inspector Name: Robert G. Stryker

Inspector Address: EPA-ERC (MD-7) Research Triangle Park, N.C. 27711

Name of Individual: David P Roche

Title: Assoc. Biologist

Date Collected: 12-16-81

Duplicate Samples Requested and Received: ( ) Yes (X) No

Sample Numbers: —

The documents and samples of chemical substances and/or mixtures described below were collected in connection with the administration and enforcement of the Toxic Substances Control Act.

Receipt for the document(s) and/or sample(s) described is hereby acknowedged:

PCB Inventory Balance sheet as of 12/14/81

SPCC Plan for Riverbend Steam Station dated 10/24/79.

PCB Plan for Duke Power Co. revised 6/5/81

3 photos of Annex III storage facility

Signature of Inspector: Robert G. Stryker

Title: Enforcement Officer

Signature of Owner, Operator, or Agent: David P. Roche

Title: Assoc. Biologist

PCB INVENTORY BALANCE
AS OF 12/14/81
TODDVILLE STORES FACILITY

	No. of Drums	Net Weight	Gross Weight
PCB's Stored in Drums: (Thru #507)	292	100,287	117,747
Containing Capacitors:	251	86,270	101,270
Containing Dirt, Debris, Etc.:	41	14,017	16,477

Capacitors Stored on Pallets:

Number of Pallets:	26
Number of Capacitors:	444
Weight of Capacitors:	37,141

Liquid Greater Than 500 PPM:

Number of Drums:	286
Net Weight:	148,731
Gross Weight:	165,891

86

Liquid Less Than 500 PPM:

Number of Drums:	0

PCB Transformers:	1
Total Weight:	6,568
Total Cubic Feet:	160

12/14/81

bc

PCB COMPLIANCE INSPECTION REPORT

SECTION A. FACILITY SUMMARY

Name and address of facility (include county, state, and zip code)

Duke Power Co., Toddville Storage Facility
601 Toddville Rd
Charlotte, N.C. Mecklinberg County

Responsible Official	Title	Phone
See cover sheet		

Facility Representative	Title	Phone
David Roche	Assoc. Biologist	
Warren Baker	Facility Manager	

SECTION B. INSPECTION/REVIEW

	Signatures	Agency	Date
Inspected by	[signature]	EPA, RIV - PTSB	12-15-81
Inspected by			
Reviewed by			

SECTION C. INVENTORY

1. As of July 2, 1978, did facility contain in service, stored for future use, or stored for disposal:

   a. 50 or more large high or low voltage capacitors? YES X NO ___ N/A* ___ C/A** X

   b. 1 or more PCB transformers? YES X NO ___ N/A ___ C/A X

   c. 45 kgs (99.4 lbs) or more PCB chemical substances or PCB mixtures? YES X NO ___ N/A ___ C/A X

2. Does the facility use large capacitors?

   YES X NO ___ N/A ___ C/A ___

   (If yes, characterize below.)

   a. Large High Voltage

      1) Total number of large high voltage PCB capacitors 118476

      2) List number, size, location, and type of large high voltage capacitors below:

No.	Size	Type	Kg PCBs Each	Area Located	No. Properly Marked	No. in Service	No. Stored for Use	No. Stored for Disposal
See comments								

      3) Total number of large, high voltage non-PCB capacitors ___

   b. Large Low Voltage

      1) Total number of large, low voltage PCB capacitors ___

*Not applicable
**Comments attached

2) List number, size, and type of large low voltage capacitators

No.	Size	Type	Kg PCBs Each	Area(s) Located	No. Properly Marked	No. in Service	No. Stored for Use	No. Stored for Disposal

3) Total number of large, low voltage non-PCB capacitors *See Comments*

c. Other Capacitors

1) Total number of other capacitors with PCBs _____

2) List of other capacitors

No.	Size	Type	Each	Area (s)	No. in Service	No. Stored for Use	No. Stored for Disposal

3) Total number of other non-PCB capacitors *not available*

3. Does the facility use PCB transformers?

(If yes, characterize below) YES X NO___ N/A___ C/A___

No.	Size	Type	Kg/Gal of PCBs or Mixtures ~~Each~~ Total	No. Properly Marked	Area(s) Located	No. in Service	No. Stored for Use	No. Stored for Disposal
148			161,824					1

4. Does the facility contain other PCBs, PCB equipment (e.g., electromagnets, electric motors, hydraulic systems, heat transfer systems, compressors), or containers of PCBs or PCB mixtures?

YES___ NO X N/A___ C/A___

(If yes, characterize below)

Item	Kg PCB/ Gal. Liquid	Size	No. Properly Marked	No. in Service	No. Stored for Use	No. Stored for Disposal

5. Based on the above inventory, what is the estimated amount of PCB chemical substances or PCB mixtures in service or stored for disposal at this facility?

In Service _____ (kgs)

In Storage for Use 354,993.8 (kgs)

In Storage for Disposal 266 478 (kgs) plus 444 capacitors on pallets in open storage.

Total 621,471.8 (kgs)

6. Were there observations of leaks or spills or any signs of improper disposal of PCB substances or mixtures?
(If yes, document and sample.) YES___ NO X N/A___ C/A___

7. Was there any indication that waterways in the vicinity have been contaminated by spills, leaks, or improper disposal?
(If yes, document and sample.)
YES___ NO X N/A___ C/A___

8. Were samples collected for analysis of PCB residual concentration?
YES___ NO X N/A___ C/A X

SECTION D. STORAGE AND HANDLING

1. Location:

a. Does the facility have its own storage site for PCBs?
YES X NO___ N/A___ C/A___

b. If the storage site is not within the boundary of the facility, give the site's name and address._____

_____

2. Physical requirements: Does storage site:

a. Provide protection from rainfall? YES X NO___ N/A___ C/A___

b. Meet floor requirements with 6-inch continuous curbs? YES X NO___ N/A___ C/A___

c. Meet containment volume requirements?
YES X NO___ N/A___ C/A___

1) What is total containment [illegible] storage site (width x length x depth).

Bldg A - 448 cu ft
Bldg B - 4840 cu ft

2) What is the internal volume of the largest PCB article or container stored within?

55 gals

3) What is the total internal volume of the containers within the storage site?

528/55 gal drums & 4 cap.s

4) Is item 1) greater than 2 times item 2)

YES ✓ NO___ N/A___ C/A___

or 25% of item 3) above? YES ___ NO___ N/A___ C/A___

d. Is the area within the curbed area void of drains, valves, expansion joints, or other openings?

YES X NO___ N/A___ C/A X

(If no, document location of opening, drainage path, and ultimate disposal location in log book.)

e. Is storage site located above the 100 year flood water elevation level?

YES X NO___ N/A___ C/A___

f. Are storage areas adequately marked? YES X NO___ N/A___ C/A___

3. Containers:

a. Are all PCB storage containers which are located within storage areas marked and dated?

YES X NO___ N/A___ C/A___

b. Do PCB containers comply with DOT specifications?

YES X NO___ N/A___ C/A___

4. Storage Site Operations:

a. Are storage containers marked and arranged so they can be located by date?

YES X NO___ N/A___ C/A___

1) What is total containment volume of storage site (width x length x height)? 5288 (both buildings)

2) What is the internal volume of the largest PCB article or container stored within?

55 gal

3) What is the total internal volume of all containers within the storage site?

575/55 gal drums

d. Is moveable equipment decontaminated by approved procedures?

YES X NO___ N/A___ C/A X

e. Are PCB containers stored and handled in a manner that protects them from accidental breakage or damage?

YES X NO___ N/A___ C/A___

5. Other Storage Areas:

a. Are any non-leaking PCB articles temporarily being stored outside prescribed storage area?

YES X NO___ N/A___ C/A X

Have they been there for fewer than 30 days?

Transformer drained & flushed 2/25/81. YES___ NO X N/A___ C/A X

b. Are there any large high voltage capacitors next to the storage site?

YES X NO___ N/A___ C/A___

i. Are they on pallets? YES X NO___ N/A___ C/A___

ii. Is there adequate space within the storage site to contain 10% of the volume of the above mentioned capacitors?

YES X NO___ N/A___ C/A___

SECTION E. DECONTAMINATION

1. Does the facility drain or cleanse PCB transformers or other equipment containing PCB chemical substances or mixtures prior to disposal? (At Transformer Repair Shop.)

YES X NO___ N/A___ C/A X

Lab sample of oil from each dist. transformer brought in for service, 3 ml. sample tested by GLC. Approximately 5% of xformers tested are over 7. 50 ppm PCBs.

2. Is the drainage and solvent filling site adequate to protect against spills and leaks and consequent contamination of surrounding area and waterways?

YES X NO___ N/A___ C/A X

3. Do solvents to be used for removing PCBs contain less than 0.05% PCBs? Virgin Kerosene used in flushing.
Perthene used for wash down.

YES X NO___ N/A___ C/A___

4. Was a sample of the solvent that was used for PCB removal obtained?

YES___ NO X N/A___ C/A X

5. Was the rinse volume of the dilutant approximately equal to the container's total volume?
Core & bushing always covered.
Averages 75 to 80% of total volume of transformer.

YES X NO___ N/A___ C/A___

6. Are PCB containers completely filled with solvent and allowed to stand for 18 hours before being drained?
24 hrs. generally elapse before drainage.

YES X NO___ N/A___ C/A___

7. Are the drained PCB chemical substances or PCB solvent mixtures properly disposed of or stored?
Transferred to annex III storage

YES X NO___ N/A___ C/A X

8. Are solvents or materials which have been used for decontamination of PCB equipment disposed of or stored in the same manner as PCB mixtures?

YES X NO___ N/A___ C/A X

9. If decontamination procedures were not observed during inspection, did facility representatives demonstrate knowledge of proper decontamination procedures?

YES X NO___ N/A___ C/A___

10. Does facility have written decontamination procedures?
See attachment - Duke PCB Plan.

YES X NO___ N/A___ C/A X

SECTION F. RECORDS

1. Do records indicate:

a. Date of receipt of PCB materials? YES X NO___ N/A___ C/A___

b. Date PCBs are removed from service?

YES X NO___ N/A___ C/A___

c. Date PCBs are placed in storage? YES X NO___ N/A___ C/A___

d. Date PCBs are placed in transport for disposal?

YES X NO___ N/A___ C/A___

2. Do records indicate:

a. That all PCB articles or PCB containers stored for disposal before January 1, 1983, have been removed from storage and disposed of before January 1, 1984?

(If no, document in log book.) YES___ NO___ N/A X C/A___

b. That PCBs stored for disposal after January 1, 1983, have been removed from storage and disposed of within one year of the date placed in storage?

(If no, document in log book.) YES___ NO___ N/A X C/A___

3. Do records indicate the total quantity of PCB articles, substances, or mixtures remaining in service at the end of a calendar year?

a. PCB transformers

1) Quantity 148

2) Weight of PCB substances or mixtures contained in transformers 161824 kgs.

b. PCB capacitors

1) Quantity large high voltage 118,476 large low voltage N/A

2) Quantity others N/A

3) Weight of PCB substances or mixtures contained in capacitors

371,480 gals kgs.
or 193169.8 Kgs.

c. PCB containers

Weight of PCB substances or mixtures in containers

See attached Toolbelle 12/14/81 inventory list. _____ kgs.

4. Do records indicate the total quantity of PCB substances or mixtures in PCB containers not in service?

YES X NO ___ N/A ___ C/A ___

(If yes, characterize below.)

See Inventory sheet

a. Removed from service _____ kgs.

b. Placed in storage for disposal _____ kgs.

c. Placed in transport for disposal _____ kgs.

5. Do records indicate the total quantity of PCB transformers not in service?

YES X NO ___ N/A ___ C/A ___

(If yes, characterize below.)

a. Removed from service

1) Quantity 1

2) Weight of PCBs contained 1290 kgs.

b. Placed in storage for disposal

1) Quantity 1

2) Weight of PCBs contained 0 kgs. Oil drained, flushed & barreled.

c. Place in transport for disposal

1) Quantity 20 (All transformers drained & flushed

2) Weight of PCBs contained 22522.5 kgs. on hand in storage

6. Do records indicate the total quantity of large high and low voltage capacitors not in service?

(No data on large low V capacitors.)

YES X NO ___ N/A ___ C/A X

(If yes, characterize below.)

a. Removed from service 1549 ~~kgs.~~ capacitors

OH as of 1-1-80 62

b. Placed in storage for disposal ~~OH as of~~

1) Quantity High voltage 1549 Low voltage _____

2) Weight of PCBs contained 105,329.15 kgs.

includes soil & debris.

c. Placed in transport for disposal

1) Quantity High Voltage X Low voltage ___

2) Weight of PCBs contained 1443 kg.

758 drums - 117,806.6 Kg total capacitors and debris.

7. Do records indicate the location of the initial disposal or storage facility for PCBs removed from service?

(If yes, list location of facility.) YES X NO ___ N/A ___ C/A *

Toledo Storage Facility → 1. Cerco/Cer 2. Waste Mgmt of Al.

8. Do records indicate name of owner or operator of disposal or storage facilities?
(If yes, list name of owner or operator.)
YES X NO ___ N/A ___ C/A X

Duke Power Co.

9. Does annual report include records of disposition of PCB chemicals, articles, and mixtures?
YES X NO ___ N/A ___ C/A ___

10. Does annual report contain:

a. Date and source of PCB articles, chemicals, and mixtures received?
YES X NO ___ N/A ___ C/A ___

b. Date and type of articles, chemicals, and mixtures removed from service?
YES X NO ___ N/A ___ C/A ___

c. Accounting of amount received, amount removed, and amount remaining at facility?
YES X NO ___ N/A ___ C/A ___

11. Are pertinent documents, correspondence, or permits to or from federal, state, or local agencies maintained for a period of five years?
YES X NO ___ N/A ___ C/A ___

12. If owners or operators maintain more than one facility that contains PCBs in the quantities prescribed in A.1 ; are records and documents kept at a single location?

(If yes, list the location.) YES X NO___ N/A___ C/A___

Duke Power Co., Wachovia Bldg.
Charlotte, N.C.

13. If facility has closed down storage or disposal operations, has regional administration been properly notified?

YES___ NO___ N/A X C/A___

14. Do facility records for PCBs received, in service, in storage, or disposed of, correspond to inventory data compiled in Section A5? (If no, indicate area of discrepancy.)

YES X NO___ N/A___ C/A___

RCRA INSPECTION REPORT

X=violation noted; NA=not applicable

Facility Name: Duke Power - Toddville Rd Facility
Location: 610 Toddville Rd Charlotte, N.C. 28214
Mailing Address: (same as above)
ID#: NCD 981 861 438 **Phone Number:** (704) 382-7807
Contact/Title: Andy Tinsley
Inspection Date: 18 Jan 1995 **Last Inspection:** 23 March 1994
Status: LQG TRNS **Type of Inspection:** CEI
Inspector(s): Robin R. Hedden - WMS
Present at Inspection: Andy Tinsley, David Roche
Type of Business: Warehousing and accumulation site
Waste Generated: D001, F003, F005

Manifests: 40 CFR 263: OK. TRNS: for LAIDLAW, Southdown to Toddville.

Approved Transporters? OK **Approved TSD's?** OK
Signed Copies? OK **Filled Out Correctly?** OK
LDR Notification Attached? OK

Waste Minimization: Written plan for each waste stream (Solid and Hazardous)

Inspection Records:

Evidence That Inspections Are Conducted: Yes, weekly on 90-day area & schedule area.

Contingency Plan:

On Site? OK
Any Changes To Facility/Processes Or Emergency Coordinator Since Last Review? July 1994
Contingency Plan used? No **(if yes, was it adequate?)** N/A

Training Records:

Certified Training Documents Available? OK, New as of June 1994
Any New Employees Since Last Review? yes
Evidence Of Improper/Inadequate Training? No, Dec 1995 and 1st quarter of 1995.

INSTRUCTIONS

SMALL HAZARDOUS WASTE GENERATOR SURVEY

1. GENERAL INFORMATION: Self explanatory.

2. NATURE OF BUSINESS: Provide brief description.

   Example #1 - Small appliance manufacturing
   Example #2 - Finished furniture manufacturing

3. NATURE OF HAZARDOUS WASTES: Provide brief explanation.

   Example #1 - Electroplating sludge - contains chromium and zinc
   Example #2 - Liquid solvent - contains toluene and MEK

4. DESCRIPTION OF HAZARDOUS WASTE:

   A - EPA Hazardous Waste Number (see lists)

   B - Estimated annual quantity

   C - Unit of Measure: For each quantity entered in Column B, enter the unit of measure code:

Gallons	- G	Pounds	- P
Liters	- L	Tons	- T
Cubic Yards	- Y	Kilograms	- K

   D - Storage

Container (barrel, drum, etc.)	- S01
Tank	- S02
Waste Pile	- S03
Surface Impoundment	- S04
*Other (explain in comments)	- S05

   E - Treatment

Tank	- T01
Surface Impoundment	- T02
Incinerator	- T03
*Other (explain in comments)	- T04

   F - Transportation

Transported by company - bulk	- TS1B
Transported by contractor - bulk	- TS2B
Transported by company - containers	- TS1C
Transported by contractor - containers	- TS2C

   G - Disposal

Injection Well	- D79
Landfill	- D80
Land Application	- D81
Wastewater Treatment Plant	- D82
Surface Impoundment	- D83

Retention: 10 years from date of survey

...h Carolina Department of Human Resources
Division of Health Services

...UNTY OF Mecklenburg EPA I.D.# NCD 981861438

SMALL HAZARDOUS WASTE GENERATOR SURVEY

1. GENERAL INFORMATION:

Name of Facility: Duke Power Toddville Stores

Facility Contact: David Roche Phone: 373-7807

Facility Location: 610 Toddville Road

Street:

City: Charlotte Zip Code: 28242

2. NATURE OF BUSINESS: (Provide Brief Description)

Central Warehouse & Truck dispatching

3. NATURE OF HAZARDOUS WASTES: (Provide Brief Explanation)

See below

4. DESCRIPTION OF HAZARDOUS WASTE:

	A	B	C	D	E	F*	G*	H
	Hazardous Waste #	Annual Quantity	Unit Meas.	Storage	Treat-ment	Transpor-tation	Disposal	Manifest Available (Yes or No)
①	D001 *	4200	lbs					YES
②	D001 *	500	lbs	S01	None	TSIC	INCINERATION	YES

*Provide name, address and I.D. # of transporter and disposal site in comments.

5. COMMENTS:

* ① Safety Kleen Pickup of Parts washer mineral spirits, remains in units
* ② Varsol (mineral spirits) used to clean paint guns
③ Non-PCB capacitors - contain TCE & U107 (4500 lbs including container weight); 100 gals of actual liquid haz waste per year

6. DATE OF SURVEY: 2/19/88

By: Adam Wyffield Department: Environmental Health

(Instructions on Reverse)

DHS Form 3061 (3/82)
Solid & Hazardous Waste Management Branch

...MATION
...Toddville STORES
...Toddville ROAD
CHARLOTTE, N.C.

DATE OF INSPECTION
2-19-88

APPLICABLE REGULATIONS
40CFR 263

EPA ID NUMBER
NCD 981861438

Mecklenburg COUNTY

RESPONSIBLE OFFICIAL: Warren Baker, operation manager

SURVEY PARTICIPANTS: ADAM WIPFIELD, W. Baker, DAVID ROCHE

PURPOSE OF SURVEY: A RCRA inspection was conducted at this site in CHARLOTTE, N.C. by the N.C. Solid and Hazardous Waste Management Branch. The inspection included a site survey and records review. Regulatory requirements covered those contained in 40 CFR 263 TRANSPORTER Standards.

DOCUMENTATION OF SITE DEFICIENCIES:

None

COMPLIANCE SCHEDULE AND RECOMMENDATIONS:

N/A

FACILITY DESCRIPTION: This site is a central warehouse and truck dispatching center for DUKE POWER Company. TRANSPORTER activities include transport of PAINT waste (mineral spirits, D001) from this and other Duke Power sites to Thermal KEM in Rock Hill, S.C. Non-PCB containing capacitors using TRICHLOROethylene and di-n-octyl ester (U107) are transported to ENSCO in Emelle, Ala. for incineration. This site also operates 6 mineral spirits parts washers serviced by Safety Kleen. Duke Power Toddville is also a SQG - see attached report for a summary of their annual generation.

TRANSPORTER INSPECTION FORM - PART 263

RECEIVED FEB 22 1988

DUKE POWER TODDVILLE STORES NCD 981861438 MECKLENBURG

Name of Site | EPA I.D. | County

610 TODDVILLE ROAD CHARLOTTE 2-19-88 John Wapfeld

Location | Inspection Date | Signature of Inspector(s)

K W Baker

Compliance | Signature of Facility Contact

An inspection of your facility has been made this date and you are notified of the violations, if any, marked below with a cross (X).

SUBPART A - GENERAL

1. EPA Identification Number (263.11)
   C yes (a)(b)

2. Transfer Facility Requirements (263.12)
   C 10 days limit

SUBPART B - MANIFEST SYSTEM/RECORDKEEPING

3. The Manifest System (263.20)
   C generator signature (a)
   C transporter signature/date/copy (b)
   C accompanying manifest (c)
   C delivery compliance (d)(1)(2)(3)
   C bulk shipment-water (e)(1)(2)(3)(4)(5)
   C rail shipment (f)(1)(2)(3)(4)
   C foreign shipment (g)(1)(2)(3)

4. Compliance With The Manifest (263.21)
   C designated facility delivery (a)(1)
   C alternate facility delivery (a)(2)
   C designated transporter delivery (a)(3)
   C designated foreign facility (a)(4)
   C generator contact (b)

5. Recordkeeping (263.22)
   C signed copies (a)
   C bulk shipment-water (b)
   C rail shipment (c)(i)(ii)
   C foreign shipment (d)
   C extended retention (e)

SUBPART C - HAZARDOUS WASTE DISCHARGES

6. Immediate Action (263.30)
   C immediate action (a)
   C notification (c)(1)(2)
   C water transporter notification (d)

7. Discharge Clean-Up (263.31)
   C remedial action

REMARKS: No violations

DHS Form 3010 (Rev. 9-83)
SOLID & HAZARDOUS WASTE

NORTH CAROLINA DEPARTMENT OF HUMAN RESOURCES
SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH
P.O. BOX 2091 RALEIGH, NORTH CAROLINA 27602-2091
306 N.WILMINGTON STREET

RECEIVED FEB 29 1988

RDH

1

INSPECTION AND EVALUATION REPORT

EPA ID: # NCD 981861438 FACILITY NAME: DUKE POWER Toddville STORES

ADDRESS: 610 TODDVILLE ROAD CITY: CHARLOTTE

NEW: X UPDATE: ____ DATE OF INITIAL EVALUATION: ____ ____ ____ STAFF ID: 05

RESPONSIBLE AGENCY: S S = STATE E = EPA X = OVERSITE O = OTHER

TYPE OF EVALUATION COVERED BY THIS REPORT: ENTER ONE 1

1= COMPLIANCE EVAL. INSP.(CEI)
2= SAMPLING INSPECTION
3= RECORD REVIEW
4= COMP.GWM EVAL.(CME)
5= COMPLIANCE SCHED. (FOLLOW UP)
6= CITIZEN COMPLAINT
7= PART B CALL-IN
8= WITHWRAWAL CAND.
9= CLOSED FACILITY
10= GENERAL
11= CASE DEVELOPMENT
12= O & M INSPECTION

DATE OF EVALUATION COVERED BY THIS REPORT: 2 19 88

CLASS OF VIOLATION — VIOLATIONS/RELEASES

CLASS	GWM/RLSE	C/CP	FIN	PT.B	CMPL.SCH	MANIFEST	OT	LAND BAN
I								
II						0	0	0

ACCEPTABLE CODES

	GWM/RLSE	C/CP	FIN	PT.B	CMPL.SCH	MANIFEST	OT	LAND BAN
	X S Z O R* B*	X S Z O	X S Z O I*B*	X S Z O	X S Z O C B	X S Z O	X S Z O	X S Z O

KEY
X = VIOLATIONS O = NO VIOLATION Z = PENDING
B = VIOL. & SPECIALTY; S = SAME VIOL./SPEC.

SPECIALTIES
I = NO insurance only; C = CA SCHED. VIOL.
R = 3008(h)-like release; * = CLASS I only

ENTERED MAR 7 1988 DATA PROCESSING

ENFORCEMENT ACTIONS: (AREA OF VIOL./RLSE.=GW, CP, FR, PB, CS, MA, OM, LB, or AA

CLASS	AREA OF VIOL.	TYPE CODE	DATE ACTION TAKEN	COMPLIANCE DATES SCHED.	ACTUAL	PENALTY ASSES.	COLL.	REGISS AG.

CODES FOR TYPES OF ENFORCEMENT ACTIONS:
03 =WARNING LETTER/NOV
04 =ADMIN. COMPLAINT
05 =FINAL ADMIN. ORDER
10 =INFORMAL
11 = FILED CIVIL ACTION
12 = FILED CRIMIMAL ACTION
13 = CIVIL REFERRAL TO AG
90 = HEARING

COMMENTS: TRANSPORTER & SQG

Duke Power Company
Generation Services Department
13339 Hagers Ferry Road
Huntersville, NC 28078-7929

DUKE POWER

FEB 1994
Received
Hazardous Waste
Section

February 8, 1994

TO: Memo to File

SUBJECT: Toddville Operation's Center
Nickel-Cadmium Batteries
File GS-707.13

On January 14, 1994 at 1445, a fifty-five gallon drum of dry cell nickel-cadmium batteries was discovered to have exceeded its stop date. The start date was September 9, 1993. The start date was declared when Toddville Operations Center was a Small Quantity Generator, which allows for a 180-day storage time. On October 28, 1993, the Toddville Operations Center submitted a subsequent EPA Notification Form as a Large Quantity Generator, which reduced hazardous waste storage time to 90 days. The nickel-cadmium drum's stop date was not re-adjusted.

Andy Tinsley of Duke Power spoke to Jim Edwards of NCDEHNR and explained the situation. Jim Edwards understood and stated that Duke Power should move quickly to have the drum properly disposed of and to document the oversight as a memo-to-file.

Dave Roche of Duke Power immediately arranged for shipment and the recycling of the nickel-cadmium dry cell batteries. A copy of the manifest, 94001, is attached.

In order to prevent this type of error happening again, it is best to ship all stored waste prior to submitting a hazardous waste activity notification change.

Andrew F. Tinsley

Andrew F. Tinsley, Associate Scientist

aft/TVNICD

Attachment

cc: Jim Edwards (NCDEHNR)
M. E. Hollis
D. P. Roche

Printed on recycled paper

Resource Recovery Department, TV01B
422 South Church Street
Charlotte, NC 28242-0001

DUKE POWER

October 28, 1993

NOV 1993
ENTERED STATE

Mr. Jim Edwards
North Carolina Department of Environment
Health and Natural Resources
Division of Solid Waste Management
PO Box 27687
Raleigh, NC 27611-7687

SUBJECT: Duke Power Toddville Road Operations Center
NCD981861438
Updated Notification of Hazardous Waste Activity

Dear Mr. Edwards:

Attached is a subsequent notification of hazardous waste activity for the Toddville Road Operations Center. This update is being done to change generator status. During the third quarter, because of cleanup of a spill and a tanker truckload of used oil that tested hazardous for metals, Toddville generated in excess of 2200 pounds of hazardous waste and has therefore temporarily changed to Large Quantity Generator Status. The waste codes generated remain unchanged. The notification for Toddville will be updated in 1994 to its usual Small Quantity Generator status when normal activities resume. Until then, Toddville will comply with all requirements for Large Quantity Generators.

If you need additional information, please call me at (704) 382-7807.

Very truly yours,

David Roche

David Roche
Senior Scientist

Attachment
cc: R. L. Greene
S. W. Whitley

Printed on recycled paper

DUKE POWER

RECEIVED
MAR 15 1990
HAZARDOUS WASTE SECTION

March 14, 1990

N.C. Division of Solid Waste Management
Hazardous Waste Section
P.O. Box 27687
Raleigh, North Carolina 27611-7687

Attention: Ms. Margaret Babb

Subject: Updated Notification of Hazardous Waste Activity
NCD 981861438

Dear Ms. Babb:

Attached is a subsequent notification of hazardous waste activity for the Toddville Road Operations Center, (Duke Power Corporate Materials Management), NCD 981861438. This update is being done to add one small quantity wastestream, which is expected to require disposal one time only: dichlorodiphenyltrichloroethane (DDT). Corrosive characteristic waste is also being added as a contingency because this facility handles surplus acids and caustics.

If you have any questions, please call me at (704) 373-7807.

Very truly yours,

David P. Roche

David P. Roche
Environmental Specialist
Corporate Materials Management

DPR/pck

Attachment

cc: Mr. Adam Wipfield

A. Hazardous Wastes from Nonspecific Sources. Enter the four-digit number from 40 CFR Part 261.31 for each listed hazardous waste from nonspecific sources your installation handles. Use additional sheets if necessary.
1 2 3 4 5
F 0 0 2

February 9, 1989

N. C. Division of Health Services
Hazardous Waste Branch
P. O. Box 2091
Raleigh, N.C. 27602

Attention: Ms. Margaret Babb

Subject: Updated Notification of Hazardous Waste Activity
NDC981861438

Dear Ms. Babb:

Attached is a subsequent notification of hazardous waste activity for the Toddville Road Operations Center, NCD981861438. This update is being done to add two new small quantity wastestreams: electroplating bathwater and photographic toner fluid.

If you have any questions, please call me at (704) 373-7807.

Very truly yours,

DUKE POWER COMPANY

David Roche

David P. Roche
Environmental Specialist
Corporate Materials Management

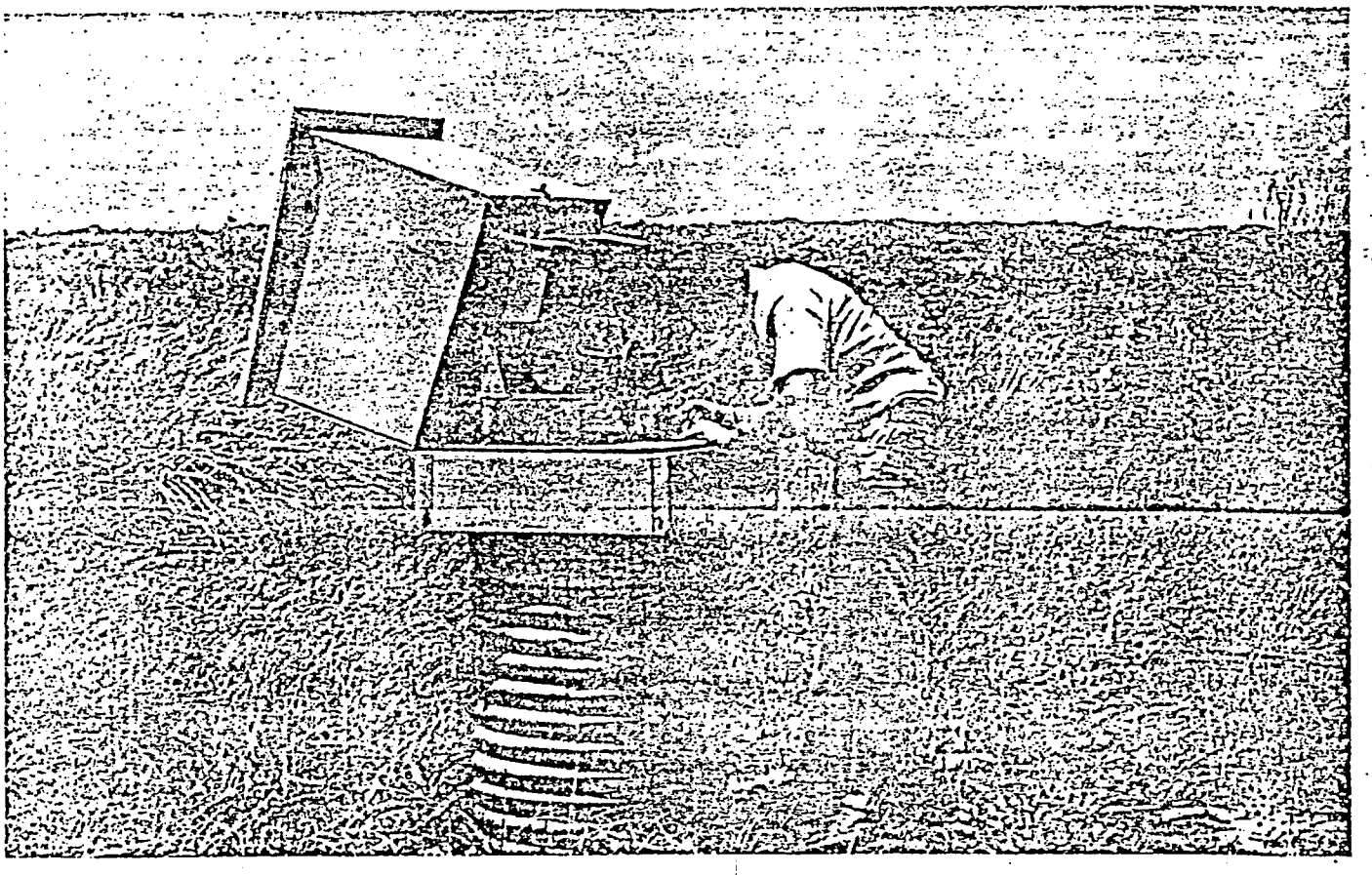
DPR/jd

Attachment

c: Adam Wipfield

Ref. 27

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

Hydraulic Conductivity of Selected Rocks

Material	Hydraulic conductivity (rounded values) (ft/day)	[(gal/day)/ft²]	(meters/day)
Coarse sand	200	1500	60
Medium sand	130	1000	40
Silt	1	5	0.2
Clay	0.001	0.01	0.0004
Limestone (Castle Hayne)	300	2000	80
Saprolite	5	50	2
Granite and gneiss	5	50	2
Slate	3	25	1

Hydraulic conductivity replaces the term "field coefficient of permeability" and should be used when referring to the water-transmitting characteristic of material in quantitative terms. It is still permissible to refer in qualitative terms to "permeable" and "impermeable" material.

PROBLEM - Determine the hydraulic conductivity of the confined aquifer shown in the preceding drawing in both feet per day and gallons per day per square foot.

(1) Solution in feet per day

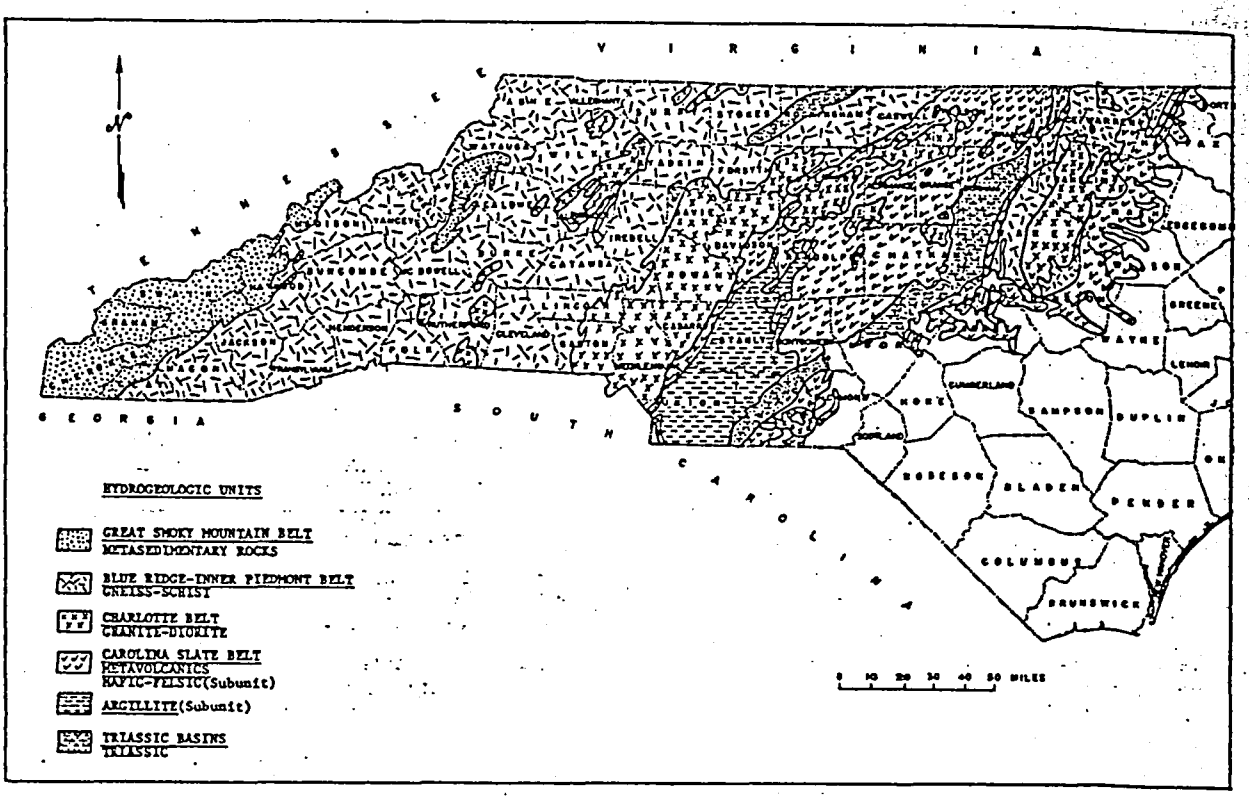
(Equation) (Q) (A) (dl/dh)

$$K = \frac{Qdl}{Adh} = \frac{150\ ft^3}{day} \times \frac{1}{ft^2} \times \frac{1\ ft}{1\ ft} = \frac{150\ ft^3}{day\ ft^2} = 150\ ft/day$$

(2) Conversion of feet per day to gallons per day per square foot

$$\frac{150\ ft^3}{day\ ft^2} \times \frac{7.5\ gal}{ft^3} = 1125\ (gal/d)/ft^2$$

Rock Units and Aquifers in the Piedmont and Mountains



The rocks underlying the Piedmont and mountains can be divided into two groups: (1) bedrock, and (2) saprolite (or residuum). The saprolite underlies the land surface and ranges in thickness from a foot or two near bedrock outcrops to more than 100 ft. Bedrock underlies the saprolite and is the parent rock from which the saprolite was derived in the process referred to as weathering.

Many stream valleys, especially those of larger streams, are underlain by a layer of material similar in composition to saprolite. This material, which has been deposited by the streams during floods, is correctly referred to as *alluvium*. However, to avoid unnecessary complications, we will lump the alluvium in with the saprolite for the purpose of this discussion.

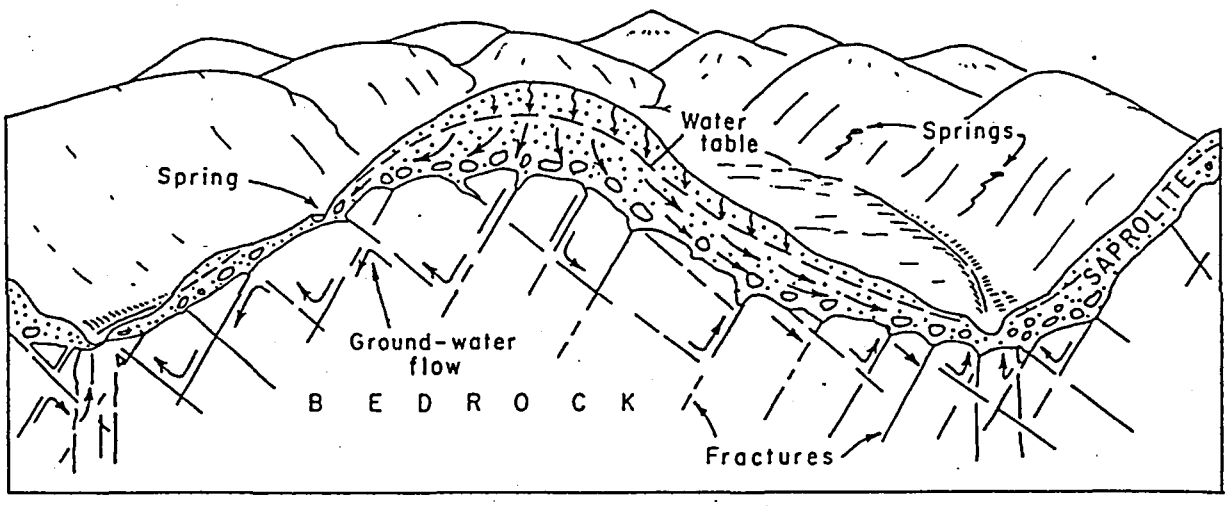
The bedrock underlying the Piedmont and mountains consists of many different types of igneous and metamorphosed igneous and sedimentary rocks. The Generalized Geological Map of North Carolina accompanying the discussion of WATER-BEARING ROCKS divides the bedrock in the Piedmont and mountains into six units. The 1:500,000 scale Geologic Map of North Carolina, published in 1958, divides the bedrock in the same area into 48 different units. But, a much larger number of units have been identified and are shown on large scale geologic maps.

The bedrock units differ from each other in mineral composition and other geologic characteristics. Fortunately, these differences do not result in large differences in hydraulic characteristics so that it is possible to combine the bedrock units into a relatively small number of hydrogeologic units.

The accompanying map shows the hydrogeologic units into which the bedrock in the Piedmont and mountains has been divided by the U.S. Geological Survey and the North Carolina Groundwater Section.

The most productive hydrogeologic units are the Great Smoky Mountain belt and the Blue Ridge-Inner Piedmont belt. The least productive units are the Carolina Slate Belt and the Triassic Basins. The Charlotte Belt is intermediate in productivity.

Ground-Water Situation in the Piedmont and Mountains



The *saprolite* (weathered rock) that forms the land surface in the Piedmont and mountains consists of unconsolidated granular material. It thus contains water in the pore spaces between rock particles.

The *bedrock*, on the other hand, does not have any significant intergranular (primary) porosity. It contains water, instead, in sheet-like openings formed along fractures (that is, breaks in the otherwise "solid" rock). Fractures in bedrock are of two types: (1) *joints*, which are breaks along which there has been no differential movement; and (2) *faults*, which are breaks along which the adjacent rocks have undergone differential movement.

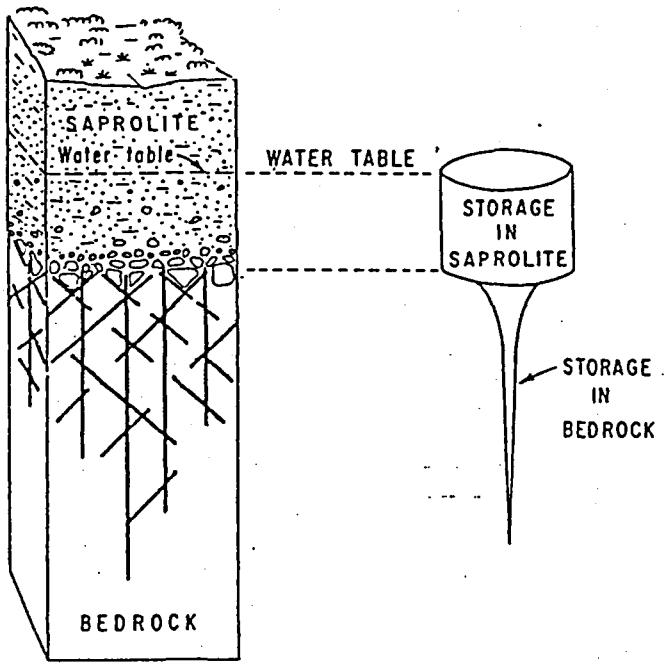
Faults are formed during earthquakes and generally contain larger and more extensive openings than those developed along joints. Joints, however, are far more numerous than faults.

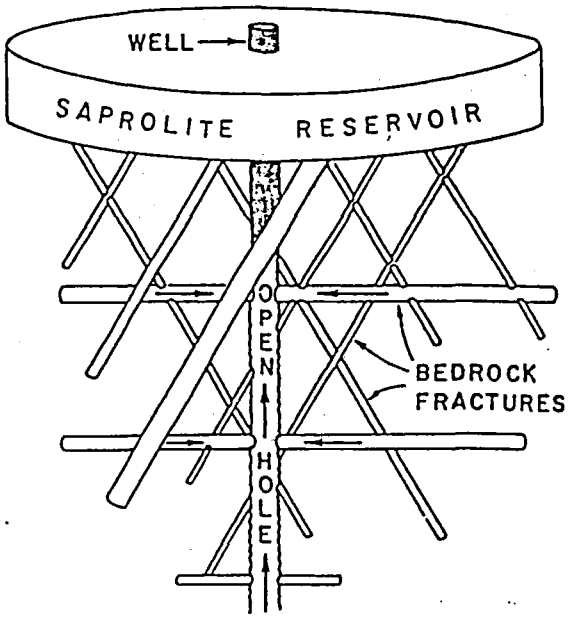
Fractures (joints and faults) are more abundant under valleys, draws, and other surface depressions than under hills. In fact, geologists assume that it is the presence of fractures that determined the position of valleys in the first place. Fractures tend to be more closely-spaced and the openings developed along them tend to be larger near the surface of the bedrock. Most fractures appear to be non water-bearing below a depth of 300 to 400 ft. Large water-bearing openings, penetrated below this depth are probably associated with faults.

The ground-water system in the Piedmont and mountains is recharged by precipitation on the interstream areas. A part of the precipitation infiltrates through the unsaturated zone to the water table, which normally occurs in the saprolite.

Ground water moves laterally and downward through the saprolite to points of ground-water seepage (springs) on the hillsides and to the streams in the adjacent valleys. Some of the water in the saprolite also moves downward into the bedrock and, thereafter, through the fractures to the adjacent valleys.

Hydraulic Characteristics of the Piedmont and Mountain Ground-Water System





One of the most basic concepts of ground-water hydrology is that aquifers function both as reservoirs, in which water is in storage, and as pipelines, which transmit water from one point to another. This is referred to as the *reservoir-pipeline concept.* This concept forms a useful basis on which to discuss the hydraulic characteristics of the Piedmont and mountain ground-water system.

The reservoir (storage) function of aquifers depends on the porosity. The pipeline function depends on the hydraulic conductivity and the thickness of the aquifer. The approximate range in porosity and hydraulic conductivity for the saprolite and bedrock is shown in the following table.

Rock type	Porosity in percent	Hydraulic conductivity in feet per day
Saprolite	20-30	1-20
Bedrock	0.1-1	1-20

The above values suggest that the principal difference between saprolite and bedrock is in water-storage capacity. In other words, the saprolite has the capacity to store a much larger quantity of water than does the bedrock. This is not the entire story, however.

As we noted above, the capacity of an aquifer to transmit water depends both on hydraulic conductivity and on aquifer thickness. The part of the bedrock containing water-bearing fractures is several times thicker than the saprolite.

We can then, without great error, view the ground-water system in the Piedmont and mountains as consisting of a saprolite reservoir overlying a bedrock pipeline consisting of numerous small, interconnected pipes. In the vicinity of a pumping well the bedrock fractures ("pipes") convey water from the saprolite reservoir to the well.

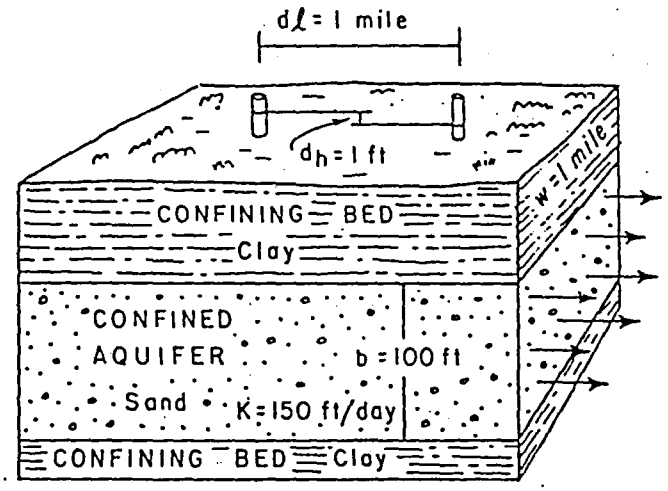
The yield of a well drawing from fractured bedrock depends on several factors. The most important of these are believed to be:

1. The number, size, areal extent, and degree of interconnection of the fractures penetrated by the well,
2. The thickness of saturated saprolite in the vicinity of the well and the specific yield of the saprolite, and
3. The hydraulic conductivity of the saprolite and the nature of the hydraulic connection between the saprolite and the bedrock.

The number and the size of the fractures control the rate at which water can enter the well. The areal extent and degree of interconnection of the fractures control the size of the area that supplies water to the well.

The thickness and the specific yield of the saprolite determines the volume of water available from storage in the saprolite. The hydraulic conductivity of the saprolite and the nature of the hydraulic connection between the saprolite and the bedrock determines the rate at which water can drain from the saprolite into the bedrock fractures.

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 (ft^2./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 ft^3./day to gal./day

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

Ref. 28

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

DIVISION OF MINERAL RESOURCES
JASPER L. STUCKEY, STATE GEOLOGIST

BULLETIN NUMBER 63

CERCLA

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

most places. The limestone proper is generally less than 100 feet thick, as a result of which its areal extent is small. In contrast to the quartzite it weathers readily, forming longitudinal valleys along its strike.

Keith[7] has named this rock the Gaffney marble because of its prominence near Gaffney, S. C. It is mostly gray in color and contains, in addition to calcite and dolomite, such impurities as quartz, mica, graphite, and hornblende.

Diorite and granite complex.—Rocks of the diorite and granite group cover a large area in Cabarrus and Mecklenburg Counties, and they also occur in eastern Gaston and Lincoln Counties. They are believed to have a wide distribution outside the Charlotte area, although very little geological study has been made of rocks of this complex.

A mafic component, chiefly diorite, and a felsic component, chiefly granite, form this complex, (fig. 3), The mafic component varies in composition, being a gabbro in some places and a diorite in others, but, for convenience, it is called diorite in this report. The felsic component is granite in all places.

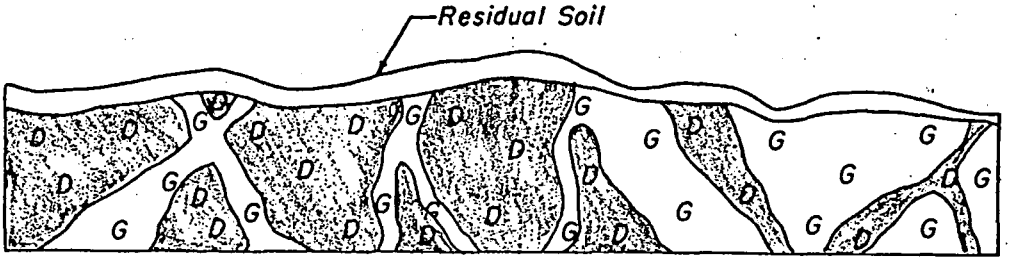


FIGURE 3.—*Diagrammatic sketch showing the relation of granite (G) and diorite (D) in Cabarrus and Mecklenburg Counties.*

So closely spaced are individual rocks within the complex that not even the larger bodies can be shown on the accompanying maps. It was decided to split the complex proper into two units, one in which the diorite predominates and the other in which the granite predominates. In using this subdivision the boundaries between these units are necessarily arbitrary and somewhat indefinite.

The most conspicuous occurrence of the granite is as discrete bodies veining and penetrating the diorite in random fashion. Thus, in most places, it is evident that granite was intruded into the diorite, although each type of rock is clearly separated from the other, without any appreciable modification of either.

The diorite in a semiweathered state, commonly seen, is a dark-blue or gray medium-textured rock composed predominantly of hornblende and feldspar and containing varying amounts of quartz, biotite, pyroxene, and other accessory minerals. The rock granulates readily near the surface of the ground, and the soil may be composed in part of individual hornblende and feldspar crystals typical of the Mecklenburg soil types.

The granite forming the complex with the diorite is light in color, being composed almost entirely of feldspar and quartz. Biotite, muscovite, and the accessory minerals common to most granites are not conspicuous. Like the diorite with which it is associated, the granite disintegrates readily near the surface, breaking down into pea-size aggregates of quartz and feldspar.

Some of the diorite is strongly schistose and much of the granite is sheared. The wide range in degree of metamorphism of the diorite suggests that basic rocks of different ages are included in this complex. Laney[8] describes a group of diorite dikes younger than the granite and diorite and cutting both.

The source of the granite forming the complex with the diorite is not known. It is in contact with a large granite mass near Kannapolis in Cabarrus County and with the syenite ring dike south of Concord. Although differing in general appearance from the other granites of the Charlotte area, general field relations suggest that the various granites may be of the same age. Where granite occurs in lesser

[7]Op cit., p. 6.
[8]Laney, F. B., Gold Hill mining district of North Carolina: North Carolina Geol. and Econ. Survey Bull. 21, p. 56, 1910.

amounts than diorite it appears that the granite was emplaced after the diorite, and this relation may exist also in areas where the granite is dominant over the diorite. It is possible that the granite and diorite are genetically related and that the emplacement of the granite followed quickly that of the diorite. Although some outcrops show that granite has assimilated the diorite locally, these two rocks normally occur as distinct bodies. In places where the granite is subordinate the basic component may be a gabbro, suggesting that the diorite of the complex is related to the gabbro-diorite rocks not included in the complex.

Syenite.—A more or less circular belt or ring dike of augite-syenite occurs about 4 miles southwest of Concord in Cabarrus County (fig. 9). Inside the ring is massive gabbro-diorite. The area is about 6 miles wide although the width of the ring averages less than 1 mile.

The rock is described[9] as "of uniformly coarse texture over the entire area, of massive structure and composed of large bluish gray feldspar individuals, without pronounced crystal outline (allotriomorphic). It contains little of the other minerals, as a rule, but is largely made up of the coarse crystallization of feldspar . . .

". . . The small amount of groundmass present in the rock is coarse-textured and dark gray from the proportion of the dark bisilicates present."

Large boulders, characteristic of the syenite, indicate that vertical joints are widely spaced. Its massiveness appears to be a factor in its resistance to erosion because it stands slightly higher than the mafic and felsic rocks along both the inner and outer edges. The syenite disintegrates readily but decomposes slowly, resulting in a granulated and crumbly weathered rock and soil composed almost entirely of feldspar crystals or aggregates.

In 1944 Dr. William A. White of the University of North Carolina and M. J. Mundorff mapped the syenite outcrop in some detail and studied its relation to adjacent rocks. At that time its concentric-ring outline was ascertained—an almost circular ring which is broken on the southeast side by gaps that total less than 2 miles. The rock within the ring is, for the most part, gabbro-diorite and that on the outside is chiefly the diorite injection complex, there being some granite in the town of Concord.

The origin and underground shape of the syenite ring dike are not known. The circular shape of the dike at the surface suggests that the syenite filled a peripheral fault after the central core had subsided, perhaps during late Palezoic time. The syenite is not interpenetrated by other rocks and is not metamorphosed. It may be younger than the granites.

Slates and related volcanic rocks.—In the eastern part of Cabarrus and Mecklenburg Counties a series of sedimentary slates is interbedded with volcanic rocks. These rocks form the western edge of a northeastward-trending belt that extends across the State and is generally known as the Carolina Slate Belt. The contained ore deposits, chiefly gold, have led to detailed study of parts of the belt. A part of the belt lying in the northeast corner of Cabarrus County and extending into Rowan and Stanly Counties has been described by Laney.[10].

The most common rock of the Slate Belt is a slate that appears to represent sedimentary beds of shale. The slate, blue and dense where fresh, shows distinct bedding planes especially near the Cabarrus-Stanly County line. The slates and the volcanic rocks that they enclose strike northeastward.

The volcanic rocks, chiefly tuffs of rhyolite and andesite, are interbedded with the slates and grade into them. The fine-grained tuff is dense and resembles chert; it grades into the slate and also into coarser tuffs which show fragments of coarse feldspar and quartz.

The rocks of the slate belt represent a period of intermittent volcanic activity. During the active intervals lavas of rhyolite and andesite were thrown out. The commingling of volcanic ash and other ejecta with some land waste led to the formation of tuffs. During the more quiet intervals beds of finer materials were deposited. Some of the beds, especially the finer tuffs and slates, are believed to have been deposited in water.

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[9]Watson, T. L., and Laney, F. B., The building and ornamental stones of North Carolina: North Carolina Geol. Survey Bull. 2, p. 94, 1906.

[10]Laney, F. B., Op. cit., pp. 25-42.

The slates are generally regarded as being of pre-Cambrian age. Detailed studies of local areas in the slate belt by Laney,[11] Pogue,[12] and Stuckey,[13] and regional investigations by King[14] indicate that the age is conjectural.

Greenstone schist.—The greenstone schist crops out in a thin belt extending northeastward through the eastern parts of Mecklenburg and Cabarrus Counties. The greenstone includes an assemblage of rocks that were mapped together because it is difficult to separate them in the field. All are green in color, are slightly to highly schistose, and are mafic rocks of igneous origin. The typical greenstone is fine-grained and in the more massive facies[15] phenocrysts of dark-green hornblende and greenish-yellow epidotized feldspars are distinguishable. The rock probably represents a basic lava flow. Along its western border the greenstone is coarser and is similar to the schistose diorite with which it is in contact on the west side. The contact was not observed, chiefly because of the thick cover of decomposed rock.

Insofar as the capacity to yield ground water is concerned, the greenstone is similar to the rocks of the slate belt in structure, showing strong schistosity and prominent joints transverse to the schistosity. It is similar to the diorite in general chemical composition and in the quality of ground water that it yields. Both the greenstone and diorite are intruded by granite, whereas the slate is not.

GROUND WATER

Ground water in the Charlotte area is derived from precipitation as rain or snow. The average annual precipitation of the area is about 47 inches.

The surficial materials at many places are relatively impermeable clays, and the fraction of precipitation that reaches the water table may be somewhat less than one-third. Thus, recharge to the ground-water reservoir probably is between 10 and 15 inches per year. Seasonal fluctuations of the water table are considerable, and there may be considerable change in water level between dry and wet years. However, over a period of many years the net change in water level is small, indicating that the average annual discharge of ground water is about equal to the average annual recharge.

Ground water is discharged by springs and seeps, by evaporation and transpiration, and by wells. Most of the water discharged by springs and seeps enters the streams and maintains their flow during periods of fair weather.

OCCURRENCE AND MOVEMENT

Large quantities of water are contained below the land surface in the openings or interstices in the rocks. These range in size from the minute pores in clays to large tunnels and caverns in lavas and limestones. The interstices in unconsolidated sedimentary rocks, such as gravel, sand, and clay, are primary interstices consisting of pores or openings between the sand or clay particles. Crystalline rocks, such as granite, diorite, gneiss, and schist, have little primary pore space between the component grains. The important interstices in these rocks are the joints, fractures, cleavage planes, planes of schistosity, bedding planes, and solution channels. Consolidated sedimentary rocks have had their primary openings reduced by compaction and cementation. However, in these rocks jointing and fracturing have produced secondary interstices in which water may accumulate.

The porosity of a rock is the percentage of the total volume that is occupied by the interstices. The porosity of the different rock materials covers a wide range, that of some clays, for example, may be more than 50 percent, whereas that of some crystalline rocks may be less than 1 percent. The porosity of clean sands and gravels generally is between 20 and 40 percent. Sands and clays that are cemented and compacted to form sandstones and shales have a much lower porosity.

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[11]Laney, F. B., Op. cit., p. 74.
[12]Pogue, J. E., Jr., Cid mining district of Davidson County: North Carolina Geol. and Econ. Survey Bull. 22, p. 95, 1910.
[13]Stuckey, J. L., The pyrophyllite deposits of North Carolina: North Carolina Dept. Cons. and Dev. Bull. 37, p. 25, 1928.
[14]King, P. B., Tectonic framework of the Southeastern States: Proc. Symposium on the mineral resources of the Southeastern United States, University of Tennessee Press, Knoxville, p. 18, 1949.
[15]Laney, F. B., Op. cit., p. 43.

Many of the secondary interstices in the igneous and metamorphic rocks are formed or enlarged by weathering processes near the earth's surface; therefore they decrease in number and size with depth. Solution of mineral constituents of the soil and decay of vegetal matter in it may result in a porosity of 50 percent or more, but the porosity decreases downward in the subsoil and the partially decomposed and disintegrated bedrock. The solid bedrock may have a very low porosity.

A material may have a high porosity and yet yield little water, even though saturated and allowed to drain for a long time. For example, a clay having a porosity of 50 percent might not yield any water because of the smallness of the pores, the water being retained because of molecular attraction. Some water may be retained in a rock also because the pores are isolated or poorly interconnected. The ratio of the volume of water that saturated material will yield to the total volume is known as the specific yield and is stated as a percentage.

One of the most important characteristics of an aquifer is its permeability, that is, its relative ability to transmit water. Permeability and porosity are not necessarily related; a clay having a porosity of 50 percent may transmit water very slowly or not at all, whereas a sand or gravel having half the porosity may transmit water with relative rapidity.

The movement of ground water generally is due to the force of gravity and the velocity of flow varies directly with the hydraulic gradient. Normally the places at which ground water discharges are at lower altitudes than the areas of recharge. In a humid region such as the Charlotte area, recharge occurs in the interstream areas and the discharge is into streams, lakes, and swamps. Rain falling on the land surface percolates downward to the water table and then moves laterally toward the points of discharge. During the winter and spring, when the water table is higher, the head is greater; therefore the velocity is higher and the volume of ground water discharged is greater than in summer and autumn when the water table is lower.

THE WATER TABLE

A part of the rain falling on an area percolates downward through the soil until it reaches the zone of saturation. In this zone all the pores and interstices are completely filled with water. The top of the zone of saturation is known as the water table, which is not a stationary surface, but one which is continually fluctuating, rising during and immediately after periods of rainfall and declining during periods of fair weather. In humid regions such as the Charlotte area, the water table is an undulating surface reflecting in a subdued way the irregularities of the topography. The relief, that is the difference in altitude between high and low points of the water table, generally is much less than the relief of the topography.

The depth to the water table depends chiefly upon the climate, the topography, and the character of the rocks. In the Charlotte area the climate is fairly uniform and the various rocks are similar in regard to porosity and permeability, so that differences in depth to the water table depend largely upon topography. In valleys the water table generally is at or near the surface; on wide flat uplands the water table generally is not more than a few tens of feet below the surface; and on sharp hills the water table may be more than 100 feet below the surface. The relation of the water table to the topography, in homogeneous materials, is shown in figure 4.

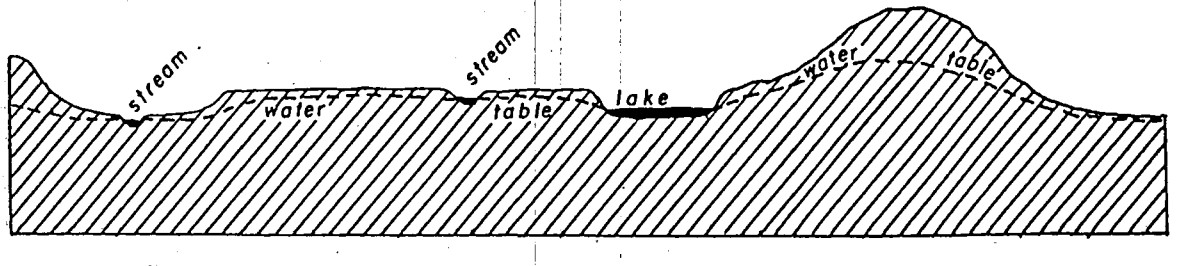


FIGURE 4.—*Diagrammatic section illustrating the relation of the water table to the topography.*

FLUCTUATIONS OF THE WATER TABLE

As the source of ground water is precipitation, the water table fluctuates in response to rainfall. However, correlation of the fluctuations with the rainfall is complicated by a number of factors.

The intensity and duration of the rainfall have a considerable effect on the proportion of water that reaches the water table. A heavy rainfall of short duration may result in a large percentage of surface runoff because of the inability of the soil to transmit the water rapidly to the water table. The same amount of rain, falling during a longer period, may result in a much larger proportion of water reaching the water table. However, during the longer period of rainfall there may be an increase in the total amount of water evaporated, reducing to that extent the amount of water reaching the water table.

The evaporation capacity of the air which is dependent upon temperature, humidity, and rate of air movement, determines the rate of evaporation and thus has considerable bearing on the proportion of rainfall that may reach the water table. Evaporation records are available for a floating pan on Lake Michie, near Durham.[16] Average monthly evaporation ranges from 1.44 inches in January to 6.39 inches in July.

Transpiration is an important factor with respect to recharge and discharge of ground-water. During spring and summer months large quantities of water are used by plants and a considerable part of the rainfall is taken from the soil before it can reach the water table. Also, large quantities of ground water are withdrawn by plants growing in lowlands and swamps. During fall and winter months vegetation requires much less water. Transpiration probably has greater effect on the proportion of rainfall that reaches the water table at various seasons than any other factor in this area.

The porosity and permeability of the soil differs from place to place and thus variously affects the proportion of rainfall that recharges the ground-water reservoir. The porosity and permeability may be changed by rainfall, heavy rains beating down and compacting the soils. Type of vegetation and land usage also have considerable effect on the porosity and permeability; intensive cultivation usually reduces both.

In the Charlotte area water levels begin to decline in April or May, owing to the increasing amount of evaporation and transpiration by plants. Generally this decline continues, interrupted only by minor rises due to heavy rainfall, through summer and early autumn, in spite of the fact that the greatest average monthly rainfall occurs in July and August. In late autumn, generally in November or December, when most of the vegetation is dormant and the evaporative capacity of the air is low, the water levels begin to rise. The winter rains generally are slow and steady in comparison with the summer rains and are more favorable for infiltration than the summer rainstorms. The first rains in winter often do not have as much effect on the water table as the later winter and spring rains because of the general deficiency in soil moisture prevailing by late autumn. Soil, which consists of varying proportions of fine sand, silt, and clay, holds considerable amounts of water in its pore space by molecular attraction of the particles, and this water does not percolate downward to the water table. After a long dry period this moisture is depleted, perhaps for many feet below the surface, by evaporation and transpiration. Before any water can reach the water table, this soil-moisture deficiency must be made up, and sometimes several weeks of winter rains are needed.

UTILIZATION OF GROUND WATER

In the Charlotte area water is obtained through dug, bored, or drilled wells or springs.

Dug wells.—Dug wells listed in this report range in depth from 17 to 100 feet, although the majority are from 25 to 60 feet. The diameter of the curbed wells ranges from 18 to 36 inches, and the diameter of uncurbed wells is somewhat larger. The well with the largest diameter, 120 inches, was dug as a shaft for a mine.

Many dug wells are curbed with stone, brick, clay, or concrete tile, and occasionally wood. Many are not curbed or lined in any way, and others have only a few joints of tile placed in the bottom, generally extending a short distance above the water table.

The chief advantage of a dug well is its large storage capacity, which helps to afford an adequate supply for domestic use if the yield is low.

[16] Hydrologic data on the Neuse River basin, 1866-1945, North Carolina Dept. Cons. and Devel., 1947.

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.

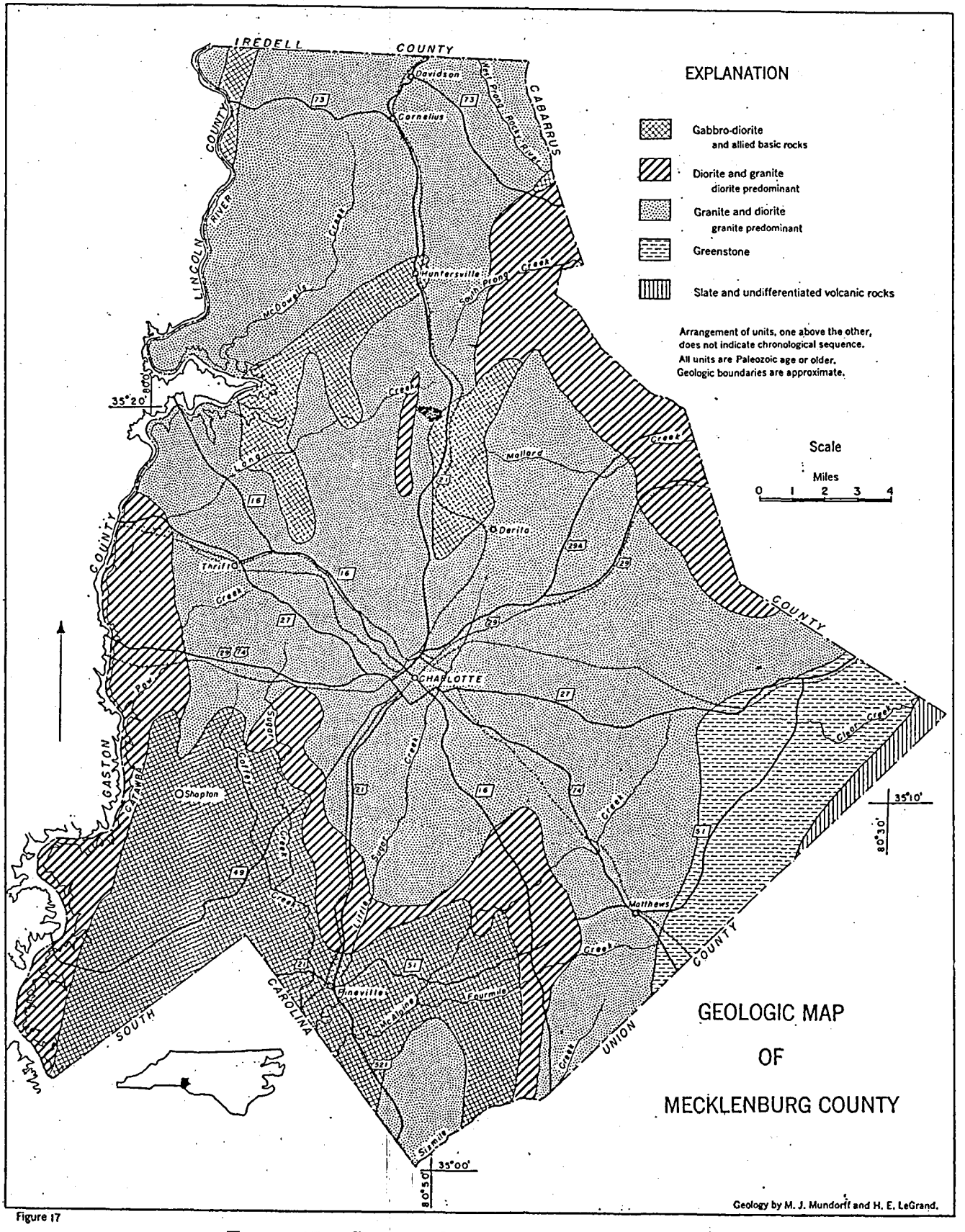


Figure 17

FIGURE 17.—GEOLOGIC MAP OF MECKLENBURG COUNTY.

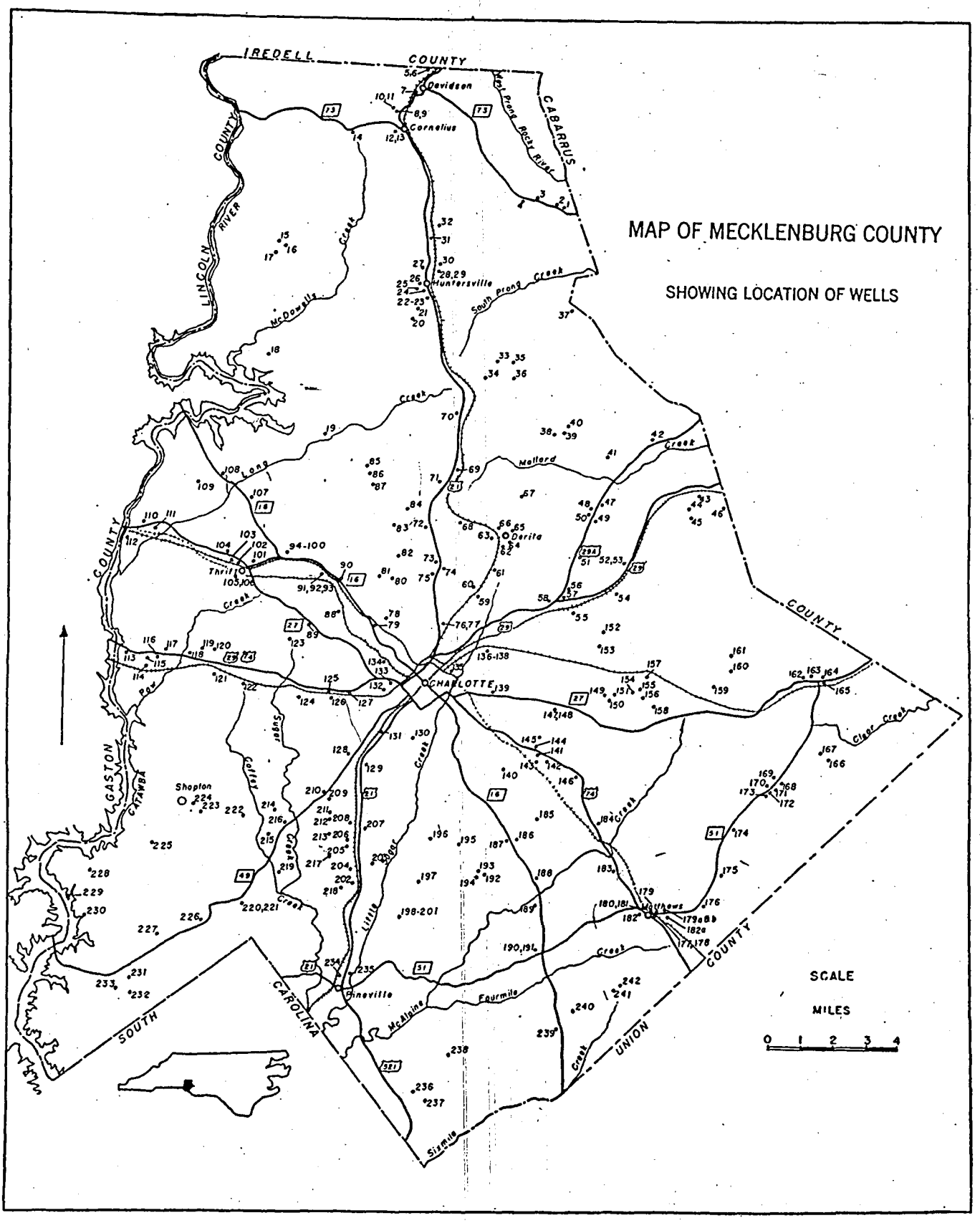


FIGURE 18.—MAP OF MECKLENBURG COUNTY SHOWING LOCATION OF WELLS.

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. Seegar		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		14.54			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.

ANALYSES OF GROUND WATER FROM MECKLENBURG COUNTY,[1] N. C.
(Numbers at heads of columns correspond to numbers in table of well data)
(parts per million)

	27	133	180	235
Silica (SiO_2)	35	37	39	60
Iron (Fe)	.12	.15	.06	.09
Calcium (Ca)	16	29	15	55
Magnesium (Mg)	5.8	9.8	5.8	26
Sodium and potassium (NA+K)	5.7	11	8.2	20
Carbonate (CO_3)	0	0	0	0
Bicarbonate (HCO_3)	70	108	62	185
Sulfate (SO_4)	3.9	29	2.8	94
Chloride (C1)	4.5	10	12	22
Fluoride (F)	.1	.1	.2	.5
Nitrate (NO_3)	10	3.5	10	6.0
Dissolved solids	120	189	139	395
Total hardness as $CaCO_3$	64	113	61	244
Date of collection	6/12/45	7/21/45	6/25/45	6/25/47

[1] Analyzed by the U. S. Geological Survey.

POLK COUNTY

(Area 234 square miles; population in 1950, 11,627)

Geography and physiography.—Polk County forms the southwestern corner of the area included in this report (figs. 1 and 20). Agriculture, which is favored by the relatively high annual rainfall distributed throughout the year, is the principal industry in the county. Severe droughts are extremely rare. The water power afforded by the swift-flowing streams is an asset of the county.

The southern and eastern parts, including about three-fourths of the county, lie in the Piedmont Plateau. This section is an undulating upland which is more hilly toward the west than toward the east. The general altitude of the Plateau is about 1,000 feet above sea level.

Joining the Piedmont Plateau on the west and north and rising rather abruptly above it is a part of the Blue Ridge province. The topography of the latter area is decidedly hilly and is generally unsuited for farming. At least two of the peaks in the county are more than 3,200 feet above sea level.

As the Blue Ridge province forms a major drainage divide in the northwestern section the streams follow devious but prevailingly southeastern courses toward the Broad River. The heavy rainfall produces considerable water for the numerous streams that arise within the county. The streams have cut rather deep valleys below the general upland level and their steep gradients allow them to erode the land readily.

Geology.—A striking feature of the geology of Polk County is the absence of homogeneous rocks (fig. 19). Despite the great depth of weathering outcrops of rocks are more common than in other counties of the Charlotte area, owing to the hilly topography.

The western and eastern parts of Polk County are underlain by a great series of rocks of which biotite granite gneiss and schist are the most prevelant. These rocks have a persistent northeast trend. Granite, pegmatite, and mica schist are profusely interlayered with the granite gneiss and are locally predominant. Also common in this series is hornblende gneiss, which occurs as thin beds generally conformable with the foliation of the granite gneiss. The amount of hornblende gneiss in this series varies considerably from place to place.

Hornblende gneiss forms the predominant rock in a belt extending northeastward from Tryon through Mill Spring to the Rutherford County line. It has a prevailingly black color where fresh, but as generally

Ref. 29

North Carolina Department of Human Resources
Division of Health Services
P.O. Box 2091 • Raleigh, North Carolina 27602-2091

James G. Martin, Governor
Phillip J. Kirk, Jr., Secretary

Ronald H. Levine, M.D., M.P.H.
State Health Director

20 November 1986

Ms. Denise Smith
EPA NC CERCLA Project Officer
EPA Region IV Waste Division
345 Courtland Street, N.E.
Atlanta, GA 30365

Dear Ms. Smith:

SUBJECT: Summary Trip Report
Toddville Operations Center NC D981478480
610 Toddville Road
Charlotte, NC 28242

The Duke Power Toddville Operations Center is located just northwest of Charlotte on about 115 acres of land. The site has been used for about 30 years to service and store electrical equipment. The oil used in some of the transformers and capacitors serviced on site contained PCB's. There are two wells on site which have been capped since 1971.

On 19 November 1986, Stan Atwood, Jack Butler, and Cheryl McMorris, NC DHR/DHS CERCLA Unit, conducted an investigation of the Toddville site. We arrived at the site at 10:00 a.m. and located the nearest off-site wells. Alan Giles, Mecklenburg County Health Department, met us and accompanied us throughout the investigation. Two off-site wells, just across Toddville road from the site, were sampled for organic and inorganic contaminants. The exact depth of the first well was unknown but was reported to be less than 100 ft. The second well was reported to be between 36 and 38 feet deep. Temperature and pH measurements for the first well were 15.6°C and 7.06; readings for the second well were 16°C and 6.33. Both wells were located within 110 feet of the highway (Figure 1).

At 11:00 a.m. we met with Michael Lascara, Dave Anderson, John Meau, Jay Perkins, and Warren Baker of Duke Power Company. They accompanied us throughout the remainder of the investigation. Duplicate samples were requested and supplied. A prearranged sampling plan was followed. A ten foot square was marked at each sampling area. Surface and subsurface samples were collected at the corners.

Background soil samples were collected first. The area sampled is in a field north of the site located 42 feet west of Toddville road and 106 feet north of the fence that surrounds the site (Figure 1). Subsoil samples were taken at a depth of 20 inches in red clay with a hand auger.

An on-site well was uncapped by Duke Power Company personnel to allow access to ground water (Figure 1). A teflon bailer was used to collect grab samples. The water was silty. Measurements taken included water temperature (17.9°C), pH (7.5), well depth (greater than 250 ft.), water level (16 ft.), and casing width (8 in.).

The final soil sampling locations were located near the centers of storage areas on the west and south sides of the warehouse. Both surface and subsurface samples were collected. Subsurface samples were taken at depths ranging from 15 to 25 inches. Soil texture ranged from yellow loamy clay to red clay. Both storage areas were covered with several inches of gravel. The investigation was concluded at 2:00 p.m.

A visit was also made to Carolina Water Services at 5701 Westpark Drive, Suite 101, Charlotte, NC. They operate more than 30 community well systems in Mecklenburg County. We met with Jerry Oliver who supplied us with a list of their systems, locations, and the number of meters. He said he would mail information on well depths and yields at a later date. Three of their systems are located within three miles of the Toddville site. These are McClure Circle, Trexler Park, and Oakdale which serve 80, 167, and 430 people, respectively.

If you have any questions, please contact me at (919) 733-2801.

Sincerely,

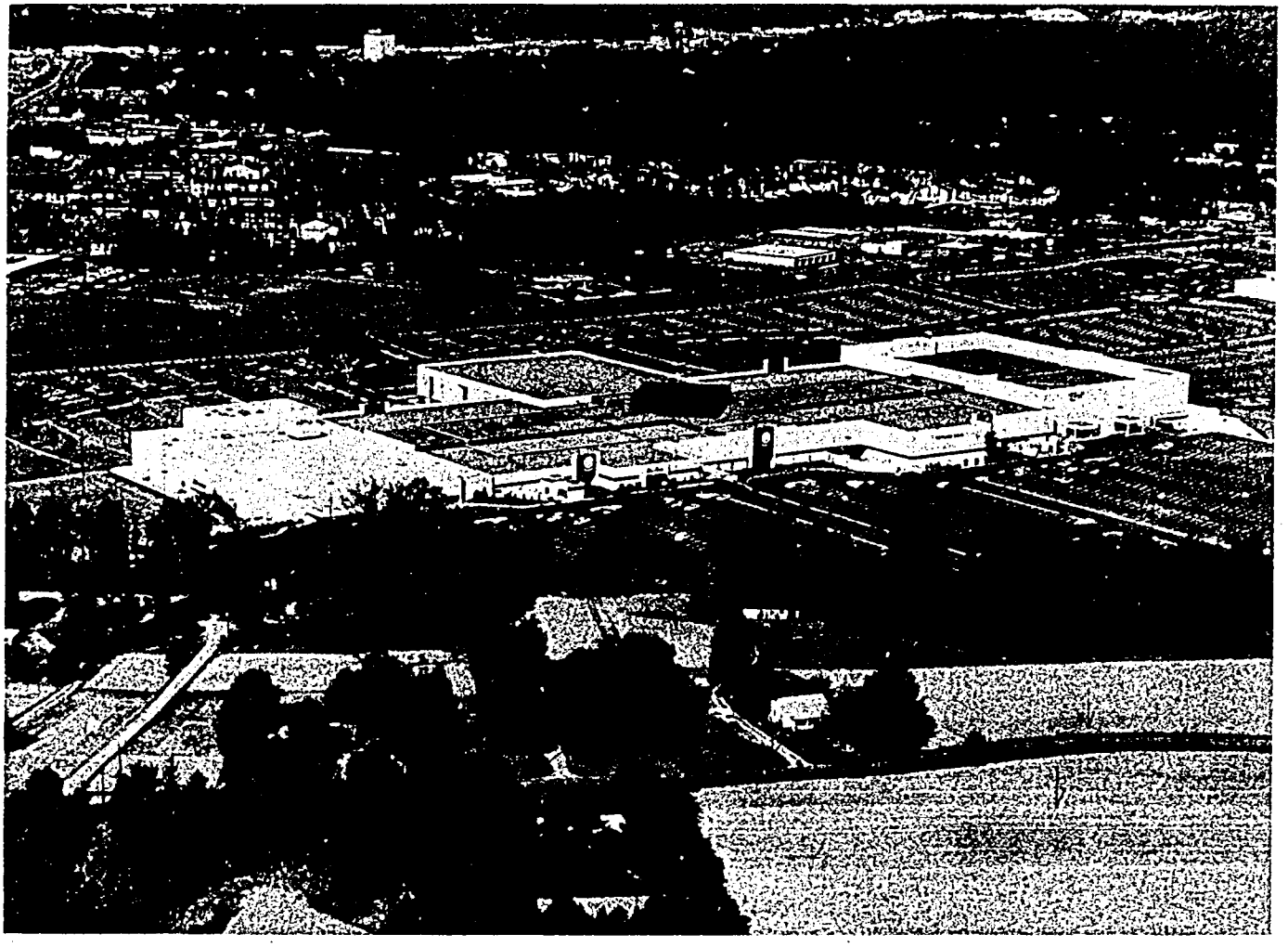
Stan Atwood, Toxicologist
CERCLA Unit
Solid and Hazardous Waste Management Branch
Environmental Health Section

SA/tb/0342b

Soil survey of

Ref. 30

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

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

By Clifford M. Mc Cachren,
Soil Conservation Service

Soils surveyed by Clifford M. Mc Cachren,
William E. Woody, Jerry V. Stimpson,
Clarence E. Brandon, and Roger J. Leab,
Soil Conservation Service

MECKLENBURG is a highly urbanized county in the south-central part of North Carolina, adjoining York and Lancaster Counties, South Carolina. The county has a total area of 336,530 acres, or 525 square miles.

In 1977, the total population of Mecklenburg County was approximately 424,000, which is 7 percent of the population in the state. Charlotte, the county seat, has a population of approximately 339,200. It is the largest city in the state and the hub of the major trade, distribution, financial, and transportation center of the Southeast. Urbanization is claiming many acres of farmland in the county each year. More than 50 percent of the county is now in nonfarm use.

Farming is still a viable industry in the county. Hay, soybeans, and corn for grain and silage make up a large percentage of the harvested cropland. The rest is small grain. Beef cattle is the dominant livestock enterprise. Dairying also has a major impact on the agricultural economy. Swine and poultry enterprises are relatively unimportant.

General nature of the county

Mecklenburg County was established in 1762 from a part of Anson County and included, at that time, parts of what are now Cabarrus, Union, Lincoln, Rutherford, Cleveland, and Gaston Counties. The county, in its present boundaries, was established in 1842.

Settlers chose the name Mecklenburg for the county, hoping to gain favor with King George III of England whose wife, Queen Charlotte, was born in a German province of that name. The city of Charlotte, incorporated on November 7, 1768, was named for the queen.

Following the Revolutionary War in 1799, gold was discovered near Concord in Cabarrus County, then a part of Mecklenburg. Charlotte became the gold-mining capital of the United States until the discovery of gold in California in 1849. The quantity of rich ore led to the establishment of a branch of the United States Mint in Charlotte in 1836. Five million gold dollars were coined at the mint between 1837 and 1861.

By 1900, Mecklenburg had a population of 55,268. The population tripled by 1950 and then more than doubled by the 1970's. The Camp Green Army Base was established in 1917. The forerunner of Douglas Municipal Airport was opened in 1936 and the Charlotte Memorial Hospital in 1940. City and county schools were consolidated in 1959. Central Piedmont College opened in 1963 and the University of North Carolina at Charlotte in 1965.

Public and private educational facilities in the county have kept pace with the population growth. There are 94 elementary and junior high schools and 10 high schools in the Charlotte-Mecklenburg System. In addition, there are 14 state-approved parochial schools and a number of other private schools.

Institutions of higher education in the county include the University of North Carolina at Charlotte, Queens College, Johnson C. Smith University, Davidson College, and the Central Piedmont Community College, which offers a wide variety of vocational, junior college, and adult education programs.

Industrial and commercial development has been enhanced by excellent transportation facilities. Two interstate highways, I-77 and I-85, converge at Charlotte. There are 115 trucking firms in Charlotte, operating more than 5,000 tractor-trailers. Charlotte is the only major trucking point with overnight access to both New York and Florida. In addition, two railroad lines and five commercial airlines serve the area.

Physiography, relief, and drainage

Mecklenburg County is entirely within the Southern Piedmont physiographic region. It is characterized by broad, gently rolling interstream areas and by steeper slopes along the drainageways. No prominent hills stand out above the generally level uplands. The highest point

Ur—Urban land. This map unit consists of areas where more than 85 percent of the surface area is covered with asphalt, concrete, buildings, or other impervious cover. Most of the soil material has been cut, filled, and graded, and the natural characteristics altered or destroyed. The rest is small lawns or shrub gardens near buildings, sidewalks, and parking lots.

Most areas are in or near the business district of Charlotte. Isolated areas mapped are more than 5 acres.

The main problem created in areas of Urban land is that the very high volume of surface runoff can cause flooding in low-lying areas downstream.

Examining and identifying the soils in this unit is impractical. Careful onsite investigation is needed to determine the suitability of any particular area for any proposed use.

VaB—Vance sandy loam, 2 to 8 percent slopes. This well drained soil is on broad ridges and side slopes of the uplands. Mapped areas are commonly oblong and range from 4 to 40 acres.

Typically, the surface layer is yellowish brown sandy loam about 8 inches thick. The subsoil is strong brown clay 25 inches thick. The underlying material to a depth of 50 inches is mottled strong brown, yellow, and red clay loam and loam.

Included with this soil in mapping are a few areas of similar soils that are less acid than the Vance soil and a few eroded areas where the surface layer is sandy clay loam or clay loam. Also included are small areas of Appling, Enon, and Helena soils. The included soils make up about 10 to 25 percent of this map unit.

The organic matter content is low in the surface layer of this Vance soil. Permeability is slow, 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 below 60 inches. The water table is below 6 feet.

Most of the acreage is used for crops, hay, and pasture. Some areas are woodland.

This soil has moderately high potential for most crops. Erosion is a hazard if cultivated crops are grown. As the original surface layer is lost, the underlying sticky subsoil becomes part of the plow layer. This process lowers the overall tilth. Minimum tillage, the return of crop residue to the soil, and the use of cover crops, including grasses and legumes, reduce runoff and help to control erosion.

This soil has moderately high potential for broadleaf and needleleaf trees. The dominant trees are loblolly pine, Virginia pine, sweetgum, sycamore, white oak, and yellow-poplar. The dominant understory species are dogwood, redbud, holly, sourwood, and black cherry. There are no significant limitations in woodland use or management.

This soil has low potential for most urban uses because of the slow permeability and the low strength. The slow permeability significantly limits the absorption of effluent in 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. Corrective measures commonly used for low strength are increasing the size of the footings and, where appropriate, placing structures on slabs. The potential is only moderate for camp areas and playgrounds because of the slow permeability. It is high for most other kinds of recreation.

The capability subclass is IIIe. The woodland group is 3o.

VaD—Vance sandy loam, 8 to 15 percent slopes. This well drained soil is on side slopes on the uplands. Mapped areas are oblong and range from 4 to 25 acres.

Typically, the surface layer is yellowish brown sandy loam about 8 inches thick. The subsoil is strong brown clay 25 inches thick. The underlying material to a depth of 50 inches is mottled strong brown, yellow, and red clay loam and loam.

Included with this soil in mapping are a few areas of similar soils that are less acid than the Vance soil and a few eroded areas where the surface layer is sandy clay loam or clay loam. Also included are small areas of Appling, Enon, and Helena soils. The included soils make up about 10 to 25 percent of this map unit.

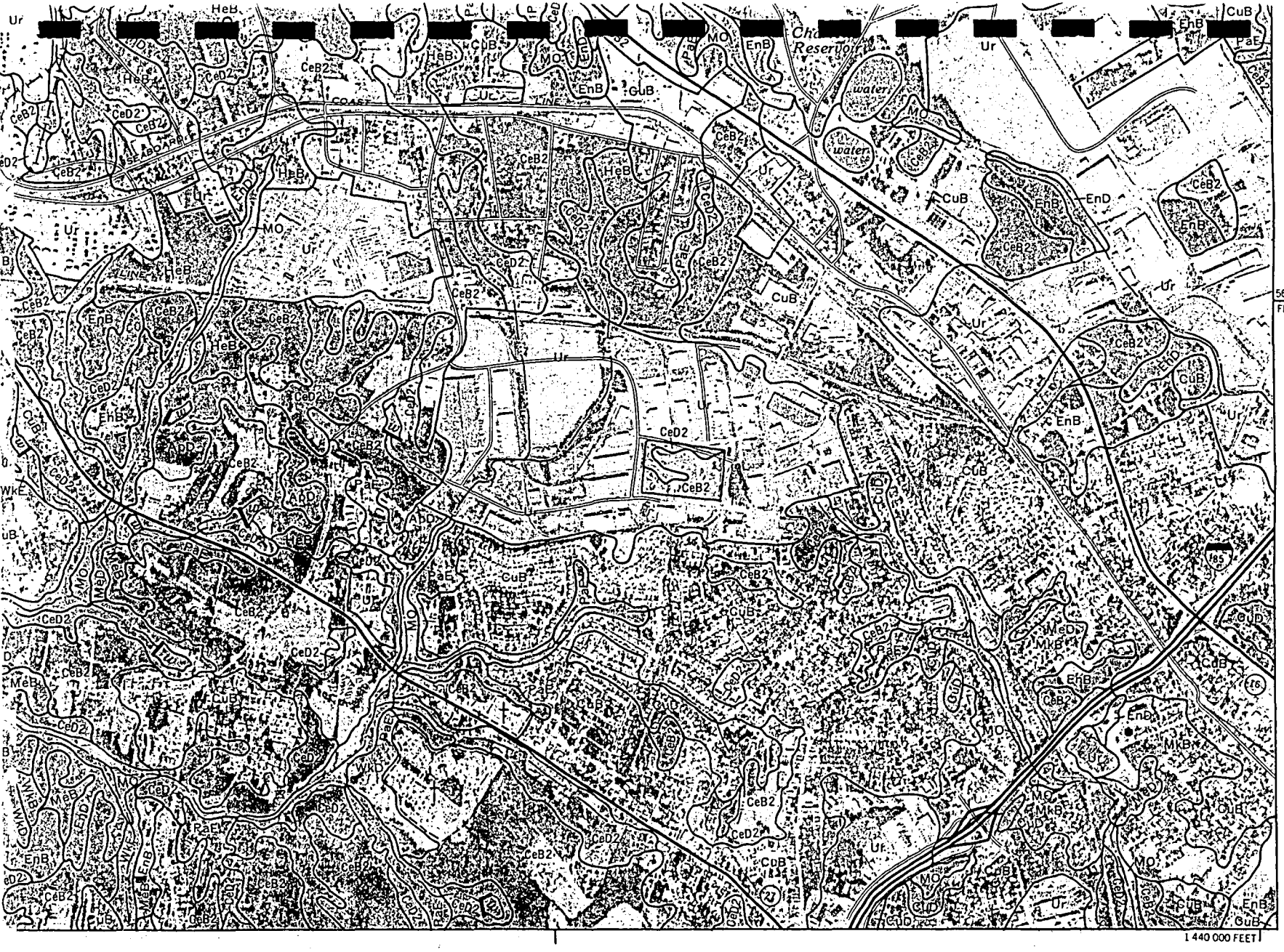
The organic matter content is low in the surface layer of this Vance soil. Permeability is slow, the available water capacity is medium, the shrink-swell potential is moderate, and surface runoff is rapid. The subsoil is strongly acid or very strongly acid. Depth to bedrock is below 60 inches. The water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

Most of the acreage is woodland. Some areas are used for crops, hay, and pasture.

This soil has moderately high potential for most crops. Good tilth can be maintained by returning crop residue to the soil. Surface runoff and erosion are hazards if cultivated crops are grown. Minimum tillage or the use of cover crops, including grasses and legumes, helps to control erosion in cultivated areas.

This soil has moderately high potential for broadleaf and needleleaf trees. The dominant trees are loblolly pine, Virginia pine, sweetgum, sycamore, white oak, and yellow-poplar. The dominant understory species are dogwood, redbud, holly, sourwood, and black cherry. There are no significant limitations in woodland use or management.

The potential for most urban uses is low because of the slow permeability, the slope, and the low strength. The slow permeability significantly limits the absorption of effluent in 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. The slope limitation can be reduced or modified by special planning, design, and maintenance. Corrective measures commonly used for low strength are increasing the size of the footings and, where appropriate, placing structures



1 2 Miles

.00 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.

ORTH CAROLINA NO. 3

SHEET NO. 3 OF

Duke Power Company
Wachovia Center
P.O. Box 1007
Charlotte, N.C. 28201-1007

Ref. 31

DUKE POWER

July 9, 1991

RECEIVED
JUL 10 1991
SUPERFUND SECTION

Ms Lee Crosby
North Carolina Superfund Section
P. O. Box 27687
401 Oberlin Road
Raleigh, North Carolina 27611-7687

Attention: Ms Charlotte Jesneck

Subject: Duke Power Toddville Operations Center, Charlotte
Well Abandonment

Dear Ms Jesneck:

Attached for your files are copies of the well abandonment records completed for the two inactive wells at the Toddville Operations Center and submitted to the North Carolina Division of Environmental Management by our contractor McCall Brothers. McCall used an earlier version of the record form but the content is the same. Also attached are copies of the certificates and three-signature manifests to document the disposal of the removed soil from Toddville.

It is our understanding this completes all required items for this site to be placed in the No Further Action category.

Very truly yours,

David Roche

David P. Roche
Environmental Specialist
Corporate Materials Management

DPR/jd

Attachments

c: B. E. Telford
A. C. Lovin
J. E. Hartwood
G. S. Rice
R. A. Santini

Chemical Waste Management, Inc.
Emelle Facility
P.O. Box 55
Emelle, Alabama 35459
EPA ID Number: ALD000622464
(205) 652-9721 - Recordkeeping & Reporting

DUKE POWER
610 TODDVILLE RD
CHARLOTTE, NC 28242
Attn: M LUTHER HALL

ACKNOWLEDGEMENT OF RECEIPT OF WASTE SHIPMENT

Generator's name ....: DUKE POWER
Generator's US EPA ID: NCD981861438

Enclosed is/are your Generator Number Two copy/copies for Alabama manifest number(s): CWMA - 485799.

This copy is to acknowledge that Chemical Waste Management, Inc., of Emelle, Alabama has received your shipment. As a requirement of 40 CFR 264.12 (b), this letter also serves to inform you that this facility has the proper permits and will accept your shipment upon completion of waste analysis procedures specified in the facility's Waste Analysis Plan and as determined in the approved waste profile submitted for this/these waste(s).

As of July 11, 1988, Chemical Waste Management, Inc, Emelle, Alabama, (ALD000622464), is operating under a RCRA permit issued by US E.P.A., Region IV and also interim status from the Alabama Department of Environmental Management, (ADEM).

If you have any questions regarding manifests, please call (205) 652-9721 and ask for "Recordkeeping & Reporting". For questions regarding Waste Approval, Profiles, or Lab Samples, ask for "Customer Service". If you are interested in arranging an audit or site tour, please ask for the "Customer Service Representative."

Sharon Stephens

Date: 02/13/91

HAZARDOUS WASTE MANIFEST

(As Required By The Alabama Department of Environmental Management)

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039. Expires 9-30-91

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. N C D 9 8 1 8 6 1 4 3 8 9 — Manifest Document No. 1 0 0 1

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
Duke Power Company, Toddville Stores Facility
610 Toddville Road, Charlotte, NC 28214

4. Generator's Phone (704) 373-7189 Luther Hall

5. Transporter 1 Company Name: Chemical Waste Management
6. US EPA ID Number: ILD 099 202 681 (A L D 0 0 0 6 2 2 4 6 4)

7. Transporter 2 Company Name
8. US EPA ID Number

9. Designated Facility Name and Site Address
CHEMICAL WASTE MANAGEMENT, INC.
Emelle Facility
Alabama Highway 17 at Mile Marker 163
Emelle, Alabama 35459
10. US EPA ID Number: A L D 0 0 0 6 2 2 4 6 4

A. State Manifest Document Number: CWMA 485799
B. State Generator's ID:
C. State Transporter's ID:
D. Transporter's Phone: 205-652-9721
E. State Transporter's ID:
F. Transporter's Phone:
G. State Facility's ID:
H. Facility's Phone: 205/652-9721

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. Waste Hazardous Substance, Solid, N.O.S., ORM-E, NA9188 (Polychlorinated Biphenyls) CWM031591-2087 — CWM Profile Number D55669-MAR	1	DT	[illegible]	kg	PCB-2
b. CWM Profile Number					
c. CWM Profile Number					
d. CWM Profile Number					

J. Additional Descriptions for Materials Listed Above
State of Origin: North Carolina
Removed for Disposal: 2/27/91
~~OSC 2-7-91 21,328 ft~~ (2-11-91)

K. Handling Codes for Wastes Listed Above
a. L b. c. d.

15. Special Handling Instructions and Additional Information
Emergency Phone After Business Hours: 704-373-8307 ~~B42406 Release~~
Work Order #: ~~910208064~~ Purchase Order #: ~~B42406~~ 11 Release P.O. J37281-67

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

GENERATOR — Printed/Typed Name: LUTHER L. HALL — Signature: Martin L. Hall — Month Day Year: 10 21 91

TRANSPORTER — 17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: WAYNE PLUNKETT — Signature: Wayne Plunkett — Month Day Year: 10 21 91

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name — Signature — Month Day Year

FACILITY — 19. Discrepancy Indication Space
added Fe, wt + OSC per David Roche (2-11-91)

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Tim Pickell — Signature — Month Day Year: 10 21 91

Chemical Waste Management, Inc.
Emelle Facility
P.O. Box 55
Emelle, Alabama 35459
EPA ID Number: ALD000622464
(205) 652-9721 - Recordkeeping & Reporting

DUKE POWER
610 TODDVILLE RD
CHARLOTTE, NC 28242
Attn: M LUTHER HALL

ACKNOWLEDGEMENT OF RECEIPT OF WASTE SHIPMENT

Generator's name ....: DUKE POWER
Generator's US EPA ID: NCD981861438

Enclosed is/are your Generator Number Two copy/copies for Alabama manifest number(s): CWMA - 585552.

This copy is to acknowledge that Chemical Waste Management, Inc., of Emelle, Alabama has received your shipment. As a requirement of 40 CFR 264.12 (b), this letter also serves to inform you that this facility has the proper permits and will accept your shipment upon completion of waste analysis procedures specified in the facility's Waste Analysis Plan and as determined in the approved waste profile submitted for this/these waste(s).

As of July 11, 1988, Chemical Waste Management, Inc, Emelle, Alabama, (ALD000622464), is operating under a RCRA permit issued by US E.P.A., Region IV and also interim status from the Alabama Department of Environmental Management, (ADEM).

If you have any questions regarding manifests, please call (205) 652-9721 and ask for "Recordkeeping & Reporting". For questions regarding Waste Approval, Profiles, or Lab Samples, ask for "Customer Service". If you are interested in arranging an audit or site tour, please ask for the "Customer Service Representative."

Sharon Stephens

Date: 03/06/91

413040

HAZARDOUS WASTE MANIFEST

(As Required By The Alabama Department of Environmental Management)

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) tr 411028 Du 413040 Form Approved. OMB No. 2050-0039. Expires 9-30-91

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. N C D 9 8 1 8 6 1 4 3 8 9 1 0 0 3 — Manifest Document No.

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address

DUKE POWER COMPANY, TODDVILLE STORES FACILITY
610 TODDVILLE ROAD, CHARLOTTE, N.C. 28214

4. Generator's Phone (704) 3737189 Luther Hall

A. State Manifest Document Number: CWMA 585552

B. State Generator's ID: NA

5. Transporter 1 Company Name: CHEMICAL WASTE MANAGEMENT — 6. US EPA ID Number: T L D 0 9 9 2 0 2 6 8 1

C. State Transporter's ID:

D. Transporter's Phone: 205-652-9721

7. Transporter 2 Company Name — 8. US EPA ID Number

E. State Transporter's ID:

F. Transporter's Phone:

9. Designated Facility Name and Site Address — 10. US EPA ID Number

CHEMICAL WASTE MANAGEMENT, INC.
Emelle Facility
Alabama Highway 17 at Mile Marker 163
Emelle, Alabama 35459 — A L D 0 0 0 6 2 2 4 6 4

G. State Facility's ID:

H. Facility's Phone: 205/652-9721

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	Waste No.
a. WASTE HAZARDOUS SUBSTANCE, SOLID, N.O.S., ORM-E, NA9188 (POLYCHLORINATED BIPHENYLS EWM031591-2087 CWM Profile Number D55669-MAR	1	DT	1 4 7 63	KG	PCB?
b. CWM Profile Number					
c. CWM Profile Number					
d. CWM Profile Number					

J. Additional Descriptions for Materials Listed Above

STATE OF ORIGIN: NORTH CAROLINA
DATE REMOVED FOR DISPOSAL: 3-4-91

K. Handling Codes for Wastes Listed Above

a. L b. c. d.

15. Special Handling Instructions and Additional Information

EMERGENCY PHONE AFTER BUSINESS HOURS: 704-373-8307

Work Order #: 910304007 Purchase Order #: B42411 RELEASE P.O. # I37281-67

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

GENERATOR

Printed/Typed Name: MARTIN L. HALL — Signature: Martin L. Hall — Month Day Year: 03 04 91

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: JESSIE BONNER — Signature: Jessie Bonner — Month Day Year: 03 04 91

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name — Signature — Month Day Year

orth Carolina
Department of Natural Resources and Community Development
Division of Environmental Management
P.O. Box 27687 - Raleigh, N.C. 27611

ELL ABANDONMENT RECORD

CONTRACTOR McCall Brothers Inc REG. NO. 30

1. WELL LOCATION: (Show a sketch of the location on back of form.)

Nearest Town: Charlotte N.C. County Mecklenburg

Toddville Road Quadrangle No. No Map
(Road, Community, Subdivision, Lot No.)

2. OWNER: Duke Power Company

3. ADDRESS: 610 Toddville Road Charlotte N.C. 28214

4. TOPOGRAPHY: draw, slope, hilltop, valley, (flat)

5. USE OF WELL: Domestic & Firewater DATE: No Information

6. TOTAL DEPTH: 110 feet DIAMETER: 6"

7. CASING REMOVED:

feet	diameter
—	

8. SEALING MATERIAL:

Neat cement		Sand cement	
bags of cement	7	bags of cement	-
gals. of water	44	yds. of sand	-
		gals. of water	-

Other
Type of material #57 Washed Stone
Amount 70 yds

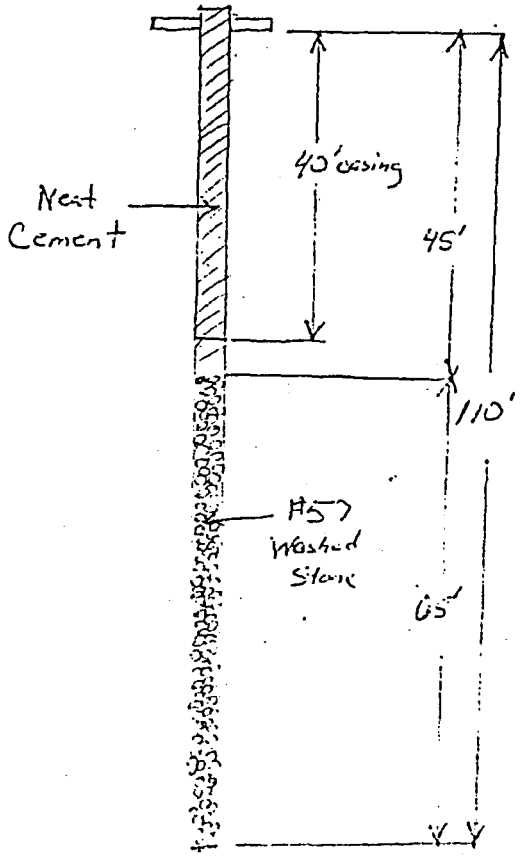
9. EXPLAIN METHOD OF EMPLACEMENT OF MATERIAL

(1) Chlorinate well (2) Fill with #57 washed stone (3) Tremie grout with neat cement to surface

I do hereby certify that this well abandonment record is true and exact.

[signature] 10/30/91
Signature of Contractor or Agent Date

WELL DIAGRAM: Draw a detailed sketch of the well showing total depth, depth and diameter of screens remaining in the well, gravel interval, intervals of casing perforations, and depths and types of fill materials used.



Submit original to the Division of Environmental Management, one copy to the

North Carolina
Department of Natural Resources and Community Development
Division of Environmental Management
P.O. Box 27687 - Raleigh, N.C. 27611

WELL ABANDONMENT RECORD

CONTRACTOR McCall Brothers Inc. REG. NO. 30

WELL LOCATION: (Show a sketch of the location on back of form.)

Nearest Town: Charlotte County Mecklenburg

Toddville Rd Quadrangle No. No Map
(Road, Community, Subdivision, Lot No.)

OWNER: Duke Power Company

ADDRESS: 610 Toddville Road Charlotte N.C. 28214

TOPOGRAPHY: draw, slope, hilltop, valley, (flat)

USE OF WELL: Domestic & Fire Water DATE: No Information

TOTAL DEPTH: 152 ft DIAMETER: 6"

CASING REMOVED:

feet	diameter
—	

SEALING MATERIAL:

Neat cement		Sand cement	
bags of cement	8	bags of cement	-
gals. of water	50	yds. of sand	-
		gals. of water	-

Other
Type of material #57 washed stone
Amount .75 yds

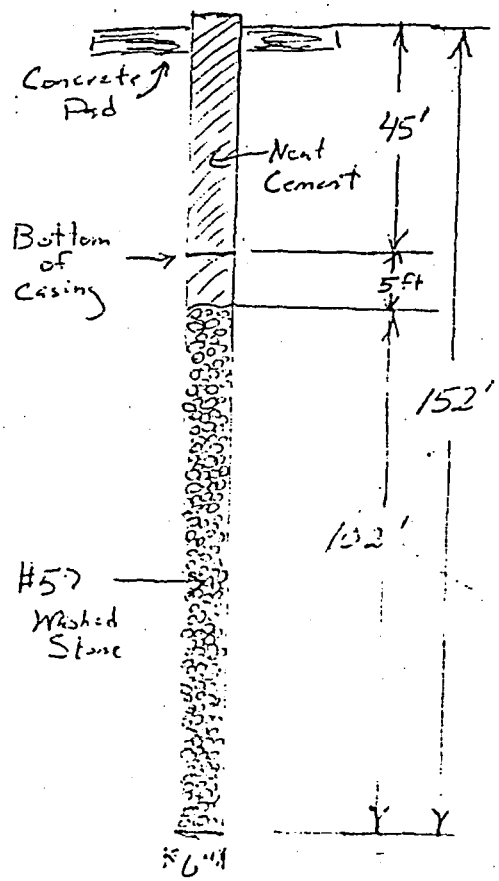
EXPLAIN METHOD OF EMPLACEMENT OF MATERIAL

(1) Chlorinate Well (2) Fill with #57 washed stone (3) Tremie grout with neat cement to surface

I do hereby certify that this well abandonment record is true and exact.

[signature] 6/23/91
Signature of Contractor or Agent / Date

WELL DIAGRAM: Draw a detailed sketch of the well showing total depth, depth and diameter of screens remaining in the well, gravel interval, intervals of casing perforations, and depths and types of fill materials used.



Submit original to the Division of Environmental Management, one copy to the Driller, and one copy to the Owner.

Klenburg Co. Dept. of Env. Prot.

List of Wells Sampled

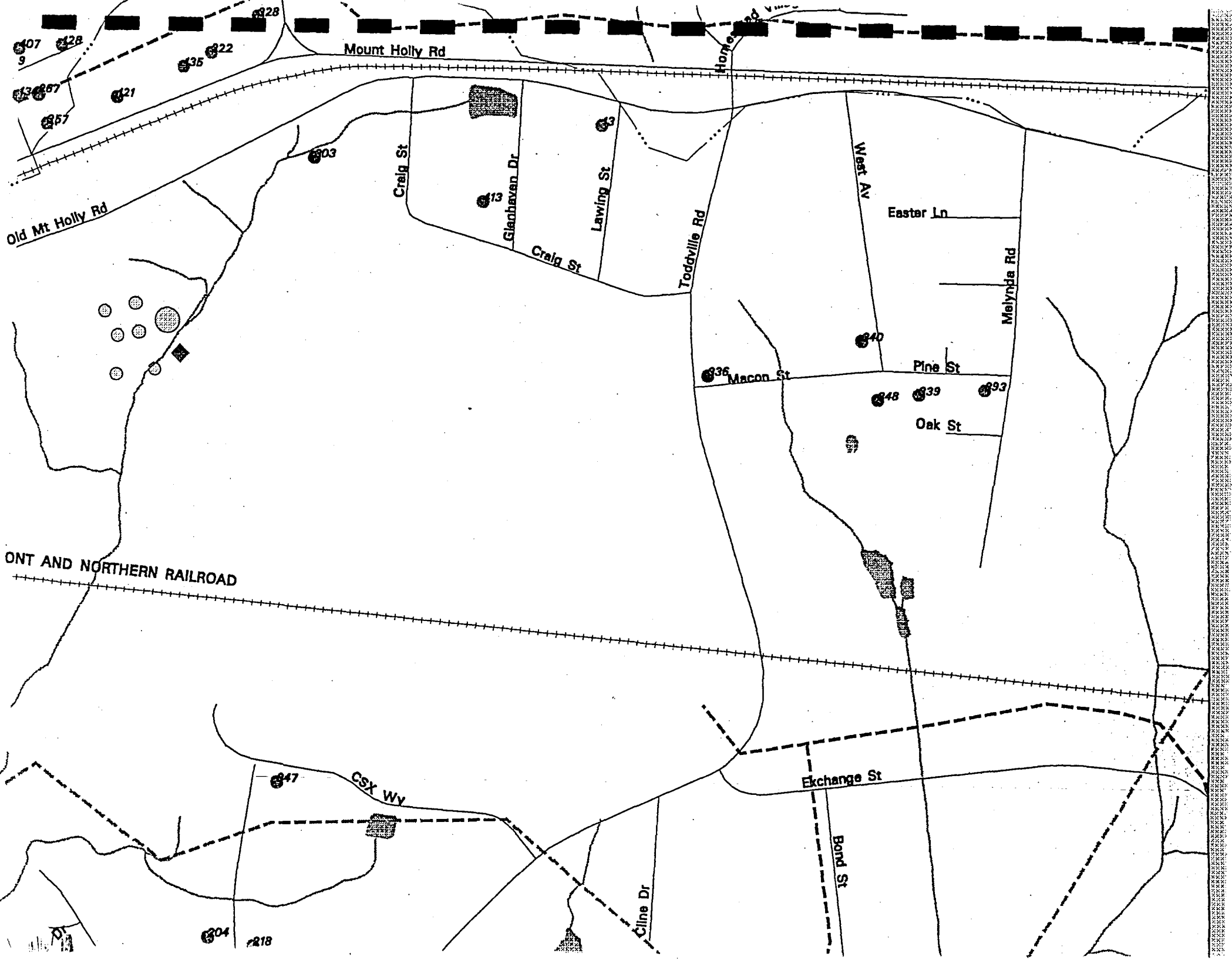
RECEIVED
SEP 16 1993
SUPERFUND SECTION

Ref. 32

staxno	Map	Resident	R	I	Number	Strname	Ty	Telephone
103314	5	Mr. Troy Green	D	Y	117	Hugh Caldwell	Rd	
104603	112	Mr. Jim Helms	N	Y	1020	Helms	Rd	392-8105
5[redacted]6305	113	Ted Mauch	N	Y	241	I. K. Beatty	st	372-3295wk
5515708	114	Teresa Evans	N	Y	6510	Hoover	Cr	529-3300
5515711	115	Linda Reams	N	Y	6416	Hoover	Cr	392-4961
3[redacted]7918	116	Thomas Lineberger	N	Y	1301	Valleydale	Rd	3362914 WK
3[redacted]1322	117	Andy Cheek	N	Y	7129	Mack	St	392-2017
5920100	118	Don Schueller	N	Y	6109	Paw Creek	Rd	394-5827
55[redacted]2108	119	Bess Thompson	N	Y	2807	Wildlife	RD	394-0210
31[redacted]7706	120	R.O. Price	D	Y	221	Fielding	Rd	399-3288
3101229	121	Holly Bottenfield	N	Y	7100	Mt. Holly	Rd	394-7173
5547202	122	Roswell Ramsuer	N	Y	6512	Sullins	Rd	399-1105
53[redacted]1130	123	Vernette Price	N	Y	708	Rhyne	Rd	357-1147
3104610	124	Pam Scott	N	Y	1001	Tom Sadler	Rd	392-1703
3105421	125	Lucille Fisher	N	Y	2310	Tom Sadler	Rd	392-5838
31[redacted]5612	126	C.J. Mingus	D	Y	2128	Tom Sadler	Rd	392-3507
59[redacted]6105	127	Harry Gosey	D	Y	5956	Elmwood	Cr	399-0127
3101215	128	Earl Strikeleather	D	Y	714	Mack	St	399-5521
53[redacted]2304	129	Charles Moore	N		10039	Mt Holly	Rd	543-5878
31[redacted]3315	130	Robert Ferrell	N	Y	131	Hugh Caldwell	Rd	
3104811	131	Jimmie Auten	D	Y	2105	Tom Sadler	Rd	392-2609
5723204	132	Elizabeth Gray	N	Y	6312	Freedom	Dr	399-3414
[redacted]	133	Gene Locklair	N		1840	Stoney Ridge	Dr	
31[redacted]1223	134	Tabitha Brunk	D	Y	124	Morningside	Dr	393-2190
3101101	135	Bob Jeffery	D	Y	6932	Mt Holly	Rd	596-0035
55[redacted]4114	136	Anna Sherril	D	Y	527	Carole	Ln	393-2799
55[redacted]3128	137	Ruby Shever	N	Y	213	Ventner	Ct	393-5117
3105610	138	Minnie Brigman	D	Y	1722	Marita	Dr	
31[redacted]1217	139	Marie Holder	N	Y	200	Morningside	Rd	398-0121
31[redacted]4308	140	J.N. Richardson	N		275	Enwood	Dr	399-0305
5506106	142	James White	D	Y	100	Lee	Dr	392-3805
	143	Mr. Tom Volpe	N		10147	Littlefield	Dr	
55[redacted]6212	144	Debbie Gaddy	D	Y	8827	Mt. Holly	Rd	398-2920
31[redacted]6709	145	Nancy Abernathy	D	Y	634	Gum Branch	Rd	392-5707
5512205	146	Rhonda Davis	D	Y	1101	Walden	Rd	398-3122
35[redacted]0422	147	Thelma Gardner	N	Y	821	Oak	St	392-4141
31[redacted]5419	148	Ann Smith	N	Y	1829	Marita	Dr	338-9999
5506308	149	Mrs. William Powers	N	Y	121	Hansard	Dr	393-2030
31[redacted]5617	150	Sheila Hord	D	Y	1830	Gum Branch	Rd	398-0188
[redacted]	151	Winfred Nance			1208	Toddville	Rd	399-9049
5503110	152	Joy Sons	N	Y	239	Lee	St	394-0322
5922102	153	Jeanette Helton	N	Y	6518	Elmwood	Cr	392-4341
53[redacted]2306	154	Mike King	N	Y	10209	Mt. Holly	Rd	391-0670
31[redacted]1106	155	Joe Evans	D	Y	131	Valleydale	Rd	392-0097
3105420	156	Libby Stogner	D	Y	1840	Marita	Dr	392-4211
31[redacted]7908	157	George Spinks	N	Y	151	Birchwood	Dr	193-3881
59[redacted]0201	158	Sandy Setzer	N		5232	Pinebrook	Dr	399-0365
5914518	159	Ms. Booker		Y	5624	Paw Creek	Rd	394-7491
55[redacted]3113	160	Dabra Lawing	N	Y	216	Ventner	Ct	393-5117
59[redacted]7209	161	James Summerville	N		6006	Tuckaseegee	Rd	399-5862
3106713	162	Judy Holder	N		600	Lovvorn	Dr	399-2024
5723203	163	Laura Wingate	N		721	Wingate	Dr	398-2312
[redacted]								

taxno	Map	Resident	R	L	Number	Strname	Ty	Telephone
5722207	318	Chiscelde Osborne	N		6600	Elmwood	Cr	399-3929
5709512	319	Ida Murphy	D		6177	Old Mount Holly	Rd	392-9256
3126318	320	Bertha Green	N		1820	Gum Branch	Rd	392-4185
5707407	321	Raymond Reitzel	N		207	Rockwood	Dr	392-9868
5721105	322	Andrea Hilley	C	Y	7304	Old Mount Holly	Rd	565-4514
3103322	323	Sarah Cox	D		839	Tom Sadler	Rd	394-1952
3104505	324	Ralph Cox	D		114	Kinderway	Av	399-1374
5511201	325	Ruth Beatty	N	Y	9301	Moores Chapel	Rd	399-7076
3105407	326	Robert Broome	D	Y	1632	Woodlea	Rd	399-6239
3104816	327	Kelly Longshore	D		9228	Mt. Holly	Rd	394-2875
3111104	328	Ms. S. Coleman	N	Y	115	Valleydale	Rd	
3107803	329	Jack Hagler	N	Y	133	Coulwood	Dr	
3108506	330	Mrs. James Cathy	N	Y	155	Scotsmoor	Dr	
3106703	331	Billie D. Staton	D	Y	1034	Gumbranch	Rd	
3106705	332	Barbara Tomlinson	D	Y	1016	Gumbranch	Rd	
5514103	333	Marvin Taylor	N	Y	614	Carole	Ln	
	334	J. Christopher	N		120	Rhyne	Rd	
5506201	335	Susan Eaker	D	Y	8813	Mt. Holly	RD	
5711210	336	Ralph Long	N	Y	423	Toddville	Rd	399-0663
5912311	337	George Pickett	D		6012	Elmwood	Cr	
5506210	338	Stephen Clewis	D		132	Hansard	Dr	
5712209	339	Sherree Huit	D		6235	Pine	St	393-2303
5711216	340	Margie Hunter			424	West	Av	399-5498
3107707	341	Jack Parsons	D		305	Fielding	Rd	399-5736
3106108	342	Terri Hines	N	Y	1433	Gum Branch	Rd	399-4378
5312216	343	C.K. Attaway	N	Y	4621	Charlie Hipps	Rd	551-4596
5300102	344	Michaele Harlowe	N	Y	4700	Charlie Hipps	Rd	398-1991
	345	Nina Chapman	N	Y	700	Wingate	Rd	392-1075
3101109	346	Francis King	N	Y	213	Valley Dale	RD	392-2006
	347	Sandra Gouge	N	Y	839	Lundy	Ln	391-0133
	348	Sarah Barbee	N	Y	6301	Macon	St	596-1929
	349	Edna H Derrick	D		810	Tom Sadler	Rd	399-5800
	350	Helen Sigmon	N	Y	7217	Mack	St	394-3428
	351	Dan Seagel	D		5948	Elmwood	Cr	392-8294
	352	Genezy Ramsey			5723	Paw Creek	Rd	
	353	Wayne Ramsey			5723	Paw Creek	Rd	
	354	Gladys Camp	N		2119	Mount Holly	Rd	
5911320	355	Nancy Mowery	N		2743	Daleview	Dr	
	357	Nancy Bell	D		7138	Mt Holly	Rd	
	358	Virginia Oats	D		1136	Gum Barnch	Rd	
	359	Jarvis Midgett	D		6237	Freedom	Dr	399-0263
	360	Litha Porter			6740	Sullins	Rd	336-5295
	361	C.M. Yandle			6300	Freedom	Dr	392-2691
	362	Giles Foxx	D		1400	Niagra	Cr	399-9055
	363	Ms. Rothwell			527	Fielding	Rd	399-3119
	364	Ms Rothwell	D		5930	Old Mt Holly	Rd	399-3119
	365	Mr Woodard	D		1440	Niagra	Cr	
	366	James Blackwood	D		1418	Niagra	Cr	382-6518
	367	Mr. Stack			109	Lee	Dr	394-4338
	368	Mr Clyde Perkins			9207	Elgin	Dr	853-8661
	369	C.M. Yandle			6300	Freedom	Dr	392-2691
	370	Winfred Nance			1208	Toddville	Rd	399-9049

staxno	Map	Resident	R L Number	Strname	Ty	Telephone
	423	Rose Almond	6447	Elmwood	Cr	392-5957
	424	George Pickett	6012	Elmwood	Cr	392-8294
	425	Donald Sides	1201	Regher	Av	391-6876
	426	Charles Hewes	320	Kingsway	Cr	399-7668
	427	Kathy Furr	1118	Walden	Rd	391-9855
	428	Cheryl Holt	6501	Elmwood	Cr	399-0648
	429	Elaine Randall	325	Brooklain	Dr	
	430	Karen Guy	6417	Elmwood	Cr	392-5062
	431	George Alvis	8325	Mount Holly	Rd	398-2821
	432	Carol Hall	1410	Niagra	Cr	393-0752
	433	Wanda Mauch	241	I K Beatty	St	355-2110
	434	Fred Gillenwater	335	Fielding	Rd	399-0389
	435	Ernest Clewis	1112	Regher	Av	392-4472
	436	Robert Kiker	1118	Kiker	Cr	399-0334
	437	Phyllis Ashe	1234	Kiker	Cr	343-6041
	438	Jay Almond	2001	Toddville	Rd	399-1388
	439	Jim Mullis	1929	Toddville	Rd	399-1388


Mount Holly Rd
Old Mt Holly Rd
Craig St
Glanhaven Dr
Lawing St
Toddville Rd
West Av
Easter Ln
Melynda Rd
Pine St
Macon St
Oak St
ONT AND NORTHERN RAILROAD
CSX Wy
Ekchange St
Bond St
Cline Dr

Ref. 33

Ground-Water Regions of the United States

By RALPH C. HEATH

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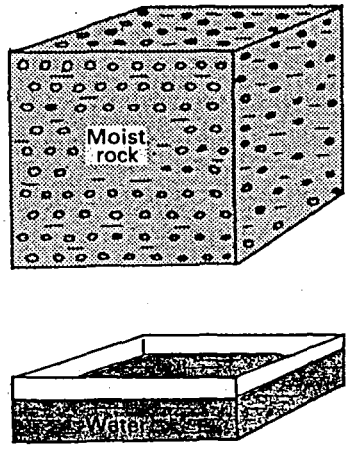

Figure 8. Specific yield and specific retention. Only a part of the water filling the pores of a rock will drain under the influence of gravity. This part is referred to as specific yield. Water retained in small openings and as a film on the surface of the larger pores and openings is referred to as specific retention.

WATER-BEARING ROCKS

All of the types of rocks mentioned in the preceding discussion of geology and ground water are water bearing and serve as sources of ground water in one area or another. Each group is composed of several different kinds of rocks, each kind having different water-bearing characteristics. It is, therefore, useful to identify and discuss briefly the kinds of rocks that serve as important sources of water or as barriers to ground-water movement. Table 3 lists the rocks of most importance to ground-water hydrology, either as sources of water (aquifers) or as layers that hamper the movement of water (confining beds).

Rocks that are most important as sources of large amounts of ground water include (1) sand and gravel, (2) limestone and dolomite, (3) basalt, and (4) sandstone. The principal areas in which these rocks occur are shown on the map in figure 9. Other, relatively common rocks that serve as sources of small to moderate supplies are also listed in the table, but they are not shown on the map. Rocks that serve primarily as barriers to ground-water movement include clay and shale.

Sand and gravel are the sources of most of the water pumped from wells in the United States. As shown on figure 9, sand and gravel beds underlie much of the Atlantic and Gulf Coastal Plain, several large areas in the North-Central States, a large area east of the Rocky Mountains that extends from Texas to South Dakota, and numerous valleys in the west, including the Central Valley in California. At the scale of the map, it is not possible to show the numerous glaciated valleys in the central and northern parts of the country that are also underlain by highly productive deposits of sand and gravel. However, these valleys are shown in figure 13. The importance of sand and gravel as a source of ground water is a result of both their widespread occurrence and their capacity to yield water to wells at large rates.

Limestone and dolomites are the sources of some of the largest well and spring yields in the United States. Of the 65 or more first-magnitude springs in the United States—springs having a maximum discharge of more than 2.83 cubic meters per second (m^3sec^{-1}) (100 ft^3sec^{-1})—more than one-third are in limestone. Limestone and dolomite, collectively referred to as carbonate rocks, underlie large areas in the southeast and in the central part of the country, as seen in figure 9. Their yields are large because they are more soluble in water than are other common aquifer-forming rocks. Openings present in them at the time of deposition, and openings that form later, are enlarged by circulating water. One result of this is the formation of large and extensive cave systems (see figure 32).

Basalt and other volcanic rocks are among the most productive water-bearing materials. Basalt is a dark-colored volcanic rock that may spread in sheets or flows to form extensive plains, as has occurred in southern Idaho and eastern Washington and Oregon. The thickness of the flows ranges from a fraction of a meter to several tens of meters. Water-bearing openings in the basalt flows include *lava tubes, shrinkage cracks, joints,* and a fragmented and broken (*brecciated*) zone at the top of the flows. The interior of some flows is composed of basalt that cooled gradually, forming a dense rock in which most water-bearing openings are shrinkage cracks and joints. Hawaii is underlain by basalt laid down as a complex sequence of flows that formed dome-shaped masses around eruption centers.

Sandstone is the consolidated equivalent of sand and differs from it primarily by the presence of cementing material deposited between the grains or crystalline growth of the grains themselves. Any of several minerals, including calcium carbonate, silica, and iron oxide, may serve as "cement." Sandstone is most important as a source of ground water where the cementing minerals have been deposited only around the points of contact of the sand particles, resulting in the retention of appreciable intergranular porosity. Some geologists refer to such partially cemented rocks as semiconsolidated to differentiate them from other (consolidated) rocks in which all pores are filled with cementing minerals. Sandstone may be fractured along bedding planes and more or less per-

Table 3. Rocks of greatest importance in ground-water hydrology.

Sedimentary rocks			Igneous rocks	
Unconsolidated (pores)	Consolidated (pores, fractures, and solution openings)	Metamorphic rocks (fractures)	Intrusive (fractures)	Extrusive (pores, tubes, rubble zones, and fractures)
GRAVEL[1]	Conglomerate[2]	Gneiss	Granite and other coarse-grained igneous rocks	BASALT and other fine-grained igneous rocks
SAND	SANDSTONE	Quartzite-schist		
Silt	Siltstone	Schist		
Clay[3]	*Shale*	Slate-schist		
Till	Tillite (rare)			
Marl	LIMESTONE-DOLOMITE	Marble		
Coquina				

[1]Capitalized names indicate rocks that are major sources of large ground-water supplies.
[2]Lower-case names indicate rocks of relatively wide extent that are sources of small to moderate ground-water supplies.
[3]Italic names indicate rocks that function primarily as confining beds.

pendicular to the planes. Sandstone serves as an important source of ground water in a large area in the north-central part of the country, in an area in northeastern Texas, in an area in west Texas (interbedded with limestone), and in a relatively narrow zone west of the Appalachian Mountains from Alabama to Pennsylvania.

The fifth group of rocks shown on figure 9 includes several different igneous, metamorphic, and consolidated sedimentary rocks. Rocks in this group include granite, gneiss, schist, quartzite, slate, and interbedded shale and sandstone. It is possible, from a ground-water standpoint, to lump together such a large and diverse group of rocks because they contain water primarily in openings developed along fractures and other breaks. Because all these rocks are relatively insoluble, there is no appreciable enlargement of the fractures by solution, as has occurred in the carbonate rocks. The sandstones interbedded with shale, especially in the central part of the country, may retain some intergranular porosity that makes them somewhat more productive than the other rocks in this group, but it is not feasible in the scope of this discussion to treat them separately from the remainder of the group. Because water is present in this group of rocks primarily along fractures, they are the least productive of the rocks covered in this discussion.

Most of the rocks discussed in this section are irregularly overlain by, and interbedded with, clay and shale which serve as confining beds, or barriers to ground-water movement. Clay has a large porosity but, because its pores are microscopic, the movement of water through it is extremely slow. Shale, like other consolidated rocks, is fractured; however, the fractures tend to be more closely spaced and, therefore, the openings along them are smaller than those in carbonate rocks and sandstones.

CLASSIFICATION OF GROUND-WATER REGIONS

To describe concisely ground-water conditions in the United States, it is necessary to divide the country into regions in which these conditions are generally similar. Because the presence and availability of ground water depend primarily on geologic conditions, ground-water regions also are areas in which the composition, arrangement, and structure of rock units are similar (Heath, 1982).

Several divisions of the country into ground-water regions have been proposed, starting with Fuller's subdivision of the eastern part of the country in 1905. The two most successful and most useful subdivisions are those proposed by Meinzer in 1923 and by Thomas in 1952. Meinzer divided the country into 21 ground-water provinces, primarily on the basis of the rock units that serve as the principal sources of ground water. These provinces are shown in figure 10. Thomas reduced Meinzer's 21 provinces to 10 regions by combining provinces where differences in ground-water conditions are minor (fig. 11). This resulted in a very useful regional classification which has been used many times since 1952 in national summaries of ground-water conditions.

To divide the country into ground-water regions, it is necessary to develop a classification that identifies features of ground-water systems that affect the occurrence and availability of ground water. The five features pertinent to such a classification are (1) the components of the system and their arrangement, (2) the nature of the water-bearing openings of the dominent aquifer or aquifers with respect to whether they are of primary or secondary origin, (3) the mineral composition of the rock matrix of the dominant aquifers with respect to whether

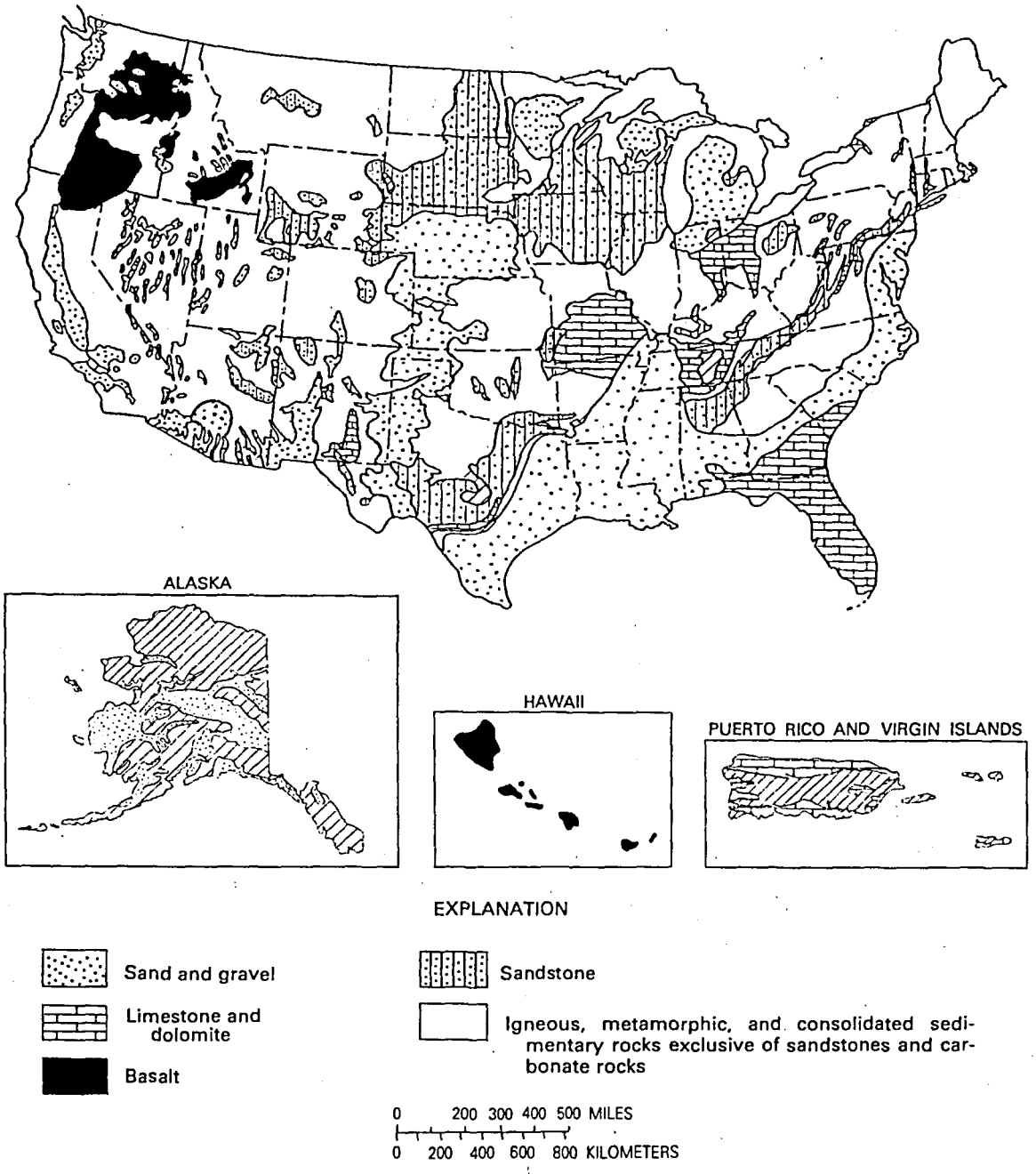

Figure 9. General occurrence of the principal types of water-bearing rocks in the United States.

it is soluble or insoluble, (4) the water storage and transmission characteristics of the dominant aquifer or aquifers, and (5) the nature and location of recharge and discharge areas.

The first two of these features are primary criteria used in all delineations of ground-water regions. The remaining three are secondary criteria that are useful in subdividing what might otherwise be large and unwieldy regions into areas that are more homogenous and, therefore, more convenient for descriptive purposes. Each of the five features is listed in table 4, together with explanatory information. The fact that most of the features are more or less interrelated is readily apparent from the comments in the column headed "Significance of Feature."