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U.S. Environmental Protection Agency
Starling David Property
Work Assignment 12

BVWS Project 52012.254
August 29, 1994

Mr. Narindar Kumar, Chief
Site Assessment Section
U.S. Environmental Protection Agency
345 Courtland Street, NE
Atlanta, Georgia 30365

REC'D
SEP 01 1994
WFD-300

Subject: Site Inspection Prioritization
Starling David Property
Farmville, Pitt County, NC
EPA ID NCD003185311

Dear Mr. Kumar:

BLACK & VEATCH Waste Science, Inc. has been tasked by the U.S. Environmental Protection Agency to conduct a Site Inspection Prioritization at the Starling David Property (Starling) site, also known as David Starling Property. In accordance with the scope of work for the Starling site, a preliminary Hazard Ranking System (HRS) score was prepared to determine the need for future activities at the site.

The Starling site is an inactive disposal area located on State Route 1230, approximately 3.25 miles northwest of Farmville, Pitt County, North Carolina. The Starling site contains approximately 10,000 gallons of barium chromate, barium carbonate, and chromic acid located in a rural agricultural area (Refs. 1; 2, p. 3). The 10,000 gallons of waste was deposited in 542 containers, which included a mix of 55-gallon drums and 5-gallon pails (Ref. 3). Between January 6 and March 31, 1971, Mr. David Starling buried the waste in a trench, approximately 35,000 cubic feet in size, located in an onsite field near a hog pen (Refs. 2, pp. 4, 13; 3; 4, p. 9). The waste was generated by Union Carbide Corporation, currently known as Eveready Battery, through a magnesium battery manufacturing process which included chrome coating. The waste sludge generated during this process consisted of 40 to 50 percent barium carbonate and 50 to 60 percent barium chromate (Ref. 3). A sample of the waste sludge collected from an exposed drum at the site indicated the presence of barium and chromium (Ref. 4, p. 10).

According to an interview with Phil Starling, David Starling's son, the waste consisted of orange-yellow chalky liquids and solids. Phil Starling also stated that prior to covering the waste with soil, some of the Starling's cows and hogs entered the waste disposal area, presumably ingested the waste, and died (Refs. 2, p. 4; 5).

In November 1983, Law Engineering Testing Company (LETC) conducted a Hydrogeological Assessment at the Starling site (Ref. 4). Four monitoring wells were installed around the perimeter of the disposal area. One of these wells was determined to be a background well (Ref. 4, p. 20). Analytical results of groundwater samples collected during this Hydrogeological Assessment indicated elevated levels of barium and chromium (Ref. 4, p. 20, 21). LETC also conducted surface water monitoring in an intermittent drainage ditch onsite. Analytical results of the surface water sampling did not indicate the presence of barium and chromium (Ref. 4, p. 21, 22, 38).

Eveready Battery conducted voluntary groundwater monitoring at the Starling site between 1983 and 1986. Analytical results of these groundwater samples indicated the presence of barium and chromium (Ref. 2, pp. 28 - 33, 36 - 40).

On August 16, 1989, North Carolina Department of Environment, Health and Natural Resources personnel conducted a Screening Site Inspection (SSI) at the Starling site (Ref. 2, p. 5). One private groundwater well sample was collected. This sample was analyzed for organic and inorganic compounds by the North Carolina State Laboratory of Public Health. Analytical results of this groundwater sample did not indicate the presence of contaminants (Ref. 2, pp. 20 - 25).

Analytical results of groundwater samples collected during several investigations at the site has indicated a release of barium and chromium to groundwater within the water table aquifer (Refs. 2, pp. 28 - 33, 36 - 40; 4, pp. 20, 21). The private drinking water well sample collected during the SSI did not indicate the presence of contaminants (Ref. 2, pp. 20 - 25). There is no documentation to indicate a release of contaminants to the aquifer of concern, which is separated from the water table aquifer by a confining bed.

The site is located within the North Carolina Coastal Plain Physiographic Province, and is underlain primarily by unconsolidated fine-grained gray sand (Refs. 1; 2, pp. 6, 51). Within the unconsolidated surficial sands is the water table aquifer, approximately 10 feet thick, which has an estimated hydraulic conductivity of 10^{-4} centimeters per second (cm/sec) (Refs. 4, pp. 12, 45; 6). Underlying the water table aquifer is the Yorktown confining bed, approximately 20 feet thick, which is comprised of gray silty clay with an estimated hydraulic conductivity of 10^{-8} cm/sec (Refs. 4, pp. 12, 34, 45; 6). Underlying the Yorktown confining bed is the Lower Unit of the Cretaceous Aquifer System. This aquifer system is approximately 250 feet thick and is found at approximately 50 feet below land surface (bls). The Lower Unit of the Cretaceous Aquifer System includes the water-bearing sands of the Black Creek and Tuscaloosa stratigraphic units, and has an estimated hydraulic conductivity

of 10^{-3} cm/sec (Ref. 4, pp. 13, 34, 45; 6). In the Farmville area, the average annual precipitation is 47 inches, and the average lake evaporation is 41 inches, yielding a net precipitation of 6 inches per year (Ref. 7).

Groundwater is the primary source of potable water within 4 miles of the site (Refs. 8; 9). The aquifer of concern is the Lower Unit of the Cretaceous Aquifer System (Ref. 10). The town of Farmville, North Carolina draws groundwater from this aquifer using five wells located within 4 miles of the site (Refs. 8; 10). The majority of the residents obtain drinking water from public supply sources, which are either the town of Farmville and the Greene County Municipal Department. Private wells are used within a small part of the 4-mile radius of the site (Refs. 1; 8; 9; 10). The water table aquifer cannot adequately supply drinking water to private wells; therefore, it was assumed that the private wells draw groundwater from within the aquifer of concern (Ref. 4, p. 34; 10). Depth to groundwater onsite ranges between 2 and 4 feet bls (Ref. 4, pp. 57 - 60). There are five public supply wells and approximately 71 private wells serving approximately 3,910 people with drinking water, distributed as follows: 0 - 0.25 mile, 0; 0.25 - 0.5 mile, 0; 0.5 - 1 mile, 0; 1 - 2 miles, 1,492; 2 - 3 miles, 746; 3 - 4 miles, 1,672 (Refs. 1; 8; 9; 11; 12). The nearest known drinking water well is a public supply well located approximately 1 mile south-southeast of the site (Refs. 1; 8). Wellhead protection areas have not yet been delineated within the state of North Carolina (Ref. 13).

No documentation exists to indicate a release of contaminants to surface water. Analytical results of surface water samples collected by LETC during a Hydrogeological Assessment at the site indicated the presence of barium and chromium; however, these samples were not collected on a perennial waterbody (Ref. 4, p. 21, 22, 38). Overland flow from the disposal area is directed into an intermittent drainage ditch and flows approximately 2,000 feet before entering into Jacob Branch, the Probable Point of Entry. The pathway continues along Jacob Branch for approximately 2.3 miles to the confluence with Little Contentnea Creek. The pathway continues along Little Contentnea Creek for 12.7 miles, to the end of the 15-mile surface water pathway (Ref. 14). The average annual flow of Jacob Branch and Little Contentnea Creek was estimated to be less than 10 cubic feet per second (Refs. 14; 15). The drainage area through the site is estimated to be between 250 and 1,000 acres (Ref. 1). The 2-year 24-hour rainfall in the Farmville area is approximately 3.75 inches (Ref. 16). Based on the site topography and the proximity to Jacob Branch, the site was estimated to lie within the 500-year floodplain (Ref. 1).

There are no known drinking water intakes along the surface water pathway (Refs. 8; 9). Jacob Branch and Little Contentnea Creek are classified for fish and wildlife propagation, secondary recreation, and other uses requiring waters of lower quality (Ref. 17). There are 13.2 miles of wetland frontage along the surface water pathway (Ref. 14). There are no known threatened or endangered species located along the surface water pathway (Ref. 18).

No surface soil samples have been collected or analyzed from the site. During the LETC

Hydrogeological Assessment of the Starling site, containers of waste were observed protruding from the waste disposal area; therefore, a cover of greater than 2 feet does not exist over the waste disposal area (Ref. 4, p. 10). The waste disposal area covers approximately 2,500 square feet and is unfenced (Ref. 2, pp. 4, 13). There are no workers associated with the inactive Starling site (Refs. 2, p. 4; 3). There are no known residences, schools, day care facilities, or terrestrial sensitive environments within 200 feet of the waste disposal area (Ref. 1; 2, p. 4). Commercial agriculture exists on the waste disposal area (Refs. 2, p. 4; 5).

No documentation exists to indicate a release of contaminants to air (Ref. 2, p. 5). There are approximately 2,898 people living within a 4 mile radius of the Starling site, distributed as follows: 0 - 0.25 mile, 23; 0.25 - 0.5 mile, 13; 0.5 - 1 mile, 51; 1 - 2 miles, 289; 2 - 3 miles, 1,239; 3 - 4 miles, 1,283 (Refs. 1; 11; 19). The nearest residence is located approximately 800 feet west of the waste disposal area (Ref. 2, p. 5). There are approximately 663 acres of wetlands within 4 miles of the Starling site (0 - 0.25 mile, 0; 0.25 - 0.5 mile, 0; 0.5 - 1 mile, 0; 1 - 2 miles, 74 acres; 2 - 3 miles, 324 acres; 3 - 4 miles, 265 acres) (Ref. 1). There are no known threatened or endangered species within 4 miles of the site (Refs. 1; 18). The nearest school is located 3.75 miles southeast of the site (Ref. 1). There are agricultural uses within 0.5 mile of the site (Refs. 1; 2, p. 4).

The existing information, data, and additional information collected were sufficient to evaluate the Starling site. A preliminary HRS score was calculated using the Site Inspection Worksheets. Migration pathways evaluated include groundwater, surface water, soil exposure, and air. The Hazardous Waste Quantity value of 10 was calculated based on a 10,000-gallon wastestream (Ref. 2, p. 3).

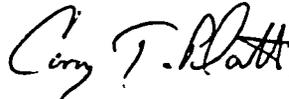
HRS Scoring Summary

Pathway	Site Score
Groundwater	0.43
Surface Water	2.76
Soil Exposure	0.60
Air	0.16
Overall Score	1.43

Based on the available file information, low target values, and overall site score, no further action is recommended for the Starling site. Attached are all the references used during the evaluation of the Starling site. If you have any questions please call me at (215) 928-2232 or Victor Blix at (404) 643-2320.

Very truly yours,

BLACK & VEATCH Waste Science, Inc.



Corry T. Platt
Site Manager

Enclosure

REFERENCE NO. 2

SCREENING SITE INVESTIGATION REPORT

David Starling Property
NCD 083185311
Farmville, NC

December 1989

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

Prepared by:

D. Mark Durway
D. Mark Durway
Hydrogeologist

For the purposes of the Site Inspection Prioritization Report this report was re-numbered for referencing. Please follow these page numbers when references

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EXECUTIVE SUMMARY

From 1-6-71 until 3-31-71, a burial area at the David Starling property was used for disposal of 10,000 gallons of barium chromate, barium carbonate, and chromic acid. This waste was generated by Union Carbide (now EverReady) in Greenville, NC. The site is now inactive as a waste disposal area. No site remediation or waste removal has been performed at the site.

The Starling site is located in the Coastal Plain Physiographic Province and is underlain by sedimentary deposits to a depth of approximately 400 feet. Hydrologic connection throughout this sedimentary aquifer system is assumed because of the spatially discontinuous nature of the strata which comprise it. The sandy clay loam and loam clay soils on site belong to the Norfolk-Exum-Goldsboro soil association, and typically have permeabilities greater than $10E-3$ centimeters per second. Depth to the seasonal high water table at the site is less than 10 feet.

The nearest drinking well to the site is located within 2000 feet of the burial area at the Starling residence. Based on information gathered during a visit to the site vicinity on 8-2-88, N.C. Public Water Supply Section records, and a USGS map house count, it has been estimated that approximately 6600 persons use ground water derived from within three miles of the site.

The site is situated in the Neuse River Drainage Basin, and the nearest surface water body to the site, Jacob Branch, is located 2500 feet to the south. Jacob Branch has been classified by the N.C. NRC Division of Environmental Management as a Class C surface water body suitable for fish and wildlife propagation, secondary recreation, agriculture and other uses requiring waters of lower quality. There are no drinking water intakes within 15 miles downstream of the site.

On 8-16-89, a site investigation was done at the Starling disposal site. While analyses show that water from Starling's deep well does not appear to have been contaminated to date, monitoring well samples indicate that chromium levels of 170 ug/l and phenol levels of .014 mg/l exist in ground water at the site. Leaching of contaminants from the burial area, therefore, is occurring.

1.0 BACKGROUND

1.1 Location

The Starling disposal site is located approximately 1100' west of the David Starling residence, which is located midway between the towns of Farmville and Fountain. The Starling's address is:

Mr. and Mrs. David Starling
Route 2, Box 246
Farmville, Pitt Co., NC 27828
Tel. (919) 753-3362

Site coordinates are 35° 38' 29" N latitude and 77° 37' 45" W longitude (App. A, maps 1 and 2).

1.2 Site Layout

The Starling disposal site is comprised of a 25' x 100' burial area which is located in a field. This burial area is located immediately west of the Starling's former hog pens (App. A, map 3). There are six ground water monitoring wells in the vicinity of the burial area (Refs. 10,13).

The disposal area is situated approximately 800' west of the nearest residence, and about 1000' west of the Starling's 180' deep drinking well. This deep well was sampled during the site visit on 8-16-89 (Ref 11).

1.3 Ownership and Site Use History

During the period 1-6-71 to 3-31-71 a total of 10,000 gallons of barium chromate, barium carbonate, and chromic acid were buried in a field on the David Starling property (Refs. 9,10). This waste was generated by Union Carbide (now EverReady) of Greenville, NC, which payed Starling to accept and dispose of it. At the time, Starling did contract work for Union Carbide, such as mowing and landscaping. According to his son, Phil Starling, the reason Union Carbide needed the waste disposed of was that the Pitt County Landfill, which had been receiving the waste, refused to continue accepting it. David Starling was told by Union Carbide that the waste was completely harmless, and that it would "make the grass green," according to Phil Starling; on the contrary, he said, it killed some of Starling's cows and hogs. (It is assumed that these animals ingested the waste prior to its being completely buried). Phil Starling described the waste as an orange-yellow, chalky solid, though some of the waste was also liquid, he said (Refs. 1,11).

1.4 Permit and Regulatory History

Union Carbide of Greenville, NC installed monitoring wells at the site, monitoring is being conducted on a voluntary basis by EverReady. EverReady is sending analytical reports to the N.C. Department of Environment, Health, and Natural Resources (DEHNR) Division of Environmental Management in Raleigh, as these reports are generated (Ref. 13).

Apparently, the Starling disposal site was not issued permits to operate, and has never been regulated.

1.5 Remedial Actions to Date

Remedial action has not been taken at the Starling disposal site; however, a remedial action plan was developed, but never implemented (Ref. 9).

1.6 Summary Trip Report

On 8-16-89, a screening site investigation was conducted at the David Starling property. Present for the investigation were the following:

D. Mark Durway, N.C. Superfund
Jack Butler, N.C. Superfund
Phil Starling, David Starling's son

Upon arriving at the site, Starling provided a tour of the area in which 10,000 gallons of barium chromate, barium carbonate, and chromic acid were buried in 1971 (Refs. 9,10). In addition, he provided background information about the site (Refs. 11,12).

It was observed that the disposal area was situated approximately 800' west of the nearest residence. This residence and several others on the Starling property were using water from a 180' deep well located approximately 1100' east of the burial area. A sample was collected from this well for laboratory analysis (Appendix B, analysis set 1).

A site inspection form is provided in Appendix D.

2.0 ENVIRONMENTAL SETTING

2.1 Topography

The Starling disposal site is located in the North Carolina Coastal Plain Physiographic Province on a broad, essentially flat, interstream divide. Site elevation is about 90' above mean sea level (App. A, map 1).

2.2 Surface Water

The Starling site is situated in the Neuse River Drainage Basin, and the nearest surface water body to the site, Jacob Branch, is located 2500 feet to the south (App. A, map 1). Jacob Branch has been classified by the N.C. DEHNR Division of Environmental Management as a Class C surface water body suitable for fish and wildlife propagation, secondary recreation, agriculture and other uses requiring waters of lower quality (Ref 7).

2.3 Geology, Soils, and Groundwater

The Starling site is underlain by sedimentary deposits to a depth of approximately 400 feet, where crystalline basement rock is encountered. Sedimentary deposits from the land surface down include: surficial sands of post-Pliocene age; gray marine clays and interbedded shell beds of the Pliocene Yorktown Formation; and interbedded sands and clays of the lower Cretaceous (Ref 10). Hydrologic connection throughout the sedimentary aquifer system is assumed because of the spatially discontinuous nature of the strata which comprise it.

The sandy clay loam and loam clay soils on site belong to the Norfolk-Exum-Goldsboro soil association, and typically have permeabilities greater than $10E-3$ centimeters per second. Depth to the seasonal high water table at the site is less than 10 feet (Ref. 5).

2.4 Climate and Meteorology

Mean annual precipitation and mean annual lake evaporation of 48" and 41", respectively, provide for annual net precipitation of 7". The 1-year 24-hour rainfall in the area is approximately 3.4" (Ref. 8).

2.5 Land Use

Land use in the site vicinity is predominantly for agricultural purposes. Chief crops grown are tobacco, peanuts, corn, soybeans, cotton and cucumbers. Livestock production includes cattle, hogs, and chickens (Ref. 5).

2.6 Population Distribution

The Starling site is located midway between the towns of Farmville and Fountain in a rural area. Based on the town populations and a USGS map house count, population distribution around the site has been estimated as follows (App. A, map 1; Refs. 2,3,4):

25 persons within 0.25 miles
40 persons within 0.50 miles
150 persons within 1 mile
475 persons within 2 miles
1500 persons within 3 miles
6335 persons within 4 miles

The towns of Farmville and Fountain, which lie outside a three mile radius of the site, have populations of 4,834 and 473 persons, respectively (Ref. 3).

2.7 Water Supply

Based on information gathered during a visit to the site vicinity on 8-2-88, N.C. Public Water Supply Section records, and a USGS map house count, it has been estimated that approximately 6600 persons use ground water derived from within three miles of the site (App. A, map 1; Refs. 2,3,4). However, the majority of these persons live outside a three mile radius of the site. The explanation for this is that the Farmville municipal water system, which supplies 5900 of these people, has four of its wells within three miles of the Starling disposal site (App. A, maps 1 and 5). Water from these wells is pumped to a central distribution point where it mixes with water from other municipal wells on the system before being distributed to customers (Ref. 3). All customers, therefore, potentially use ground water derived from within three miles of the Starling disposal site. The town of Fountain, and some of the main rural roads in the site area, are also served by the Farmville municipal water system (App. A, map 1; Refs. 3,4).

The Starling's 180' deep well, located 1100' from the disposal area, is the nearest drinking well to the site (Ref. 11).

There are no drinking water intakes within 15 miles downstream of the site (App. A, map 4; Refs. 3,4).

2.8 Critical Environments

There are no fresh water wetlands or critical habitats within one mile of the Starling disposal site, based on current listings of the U.S. Fish and Wildlife Service (Ref. 6). However, wetlands exist within three miles of the site on Contentnea Creek (App. A, map 1).

3.0 WASTE TYPES AND QUANTITIES

A total of 10,000 gallons of barium chromate, barium carbonate, and chromic acid were buried in a field on the David Starling property. This waste was generated by Union Carbide of Greenville, NC (Refs. 9,10)

4.0 LABORATORY DATA SUMMARY

On 8-16-89, a site investigation was done at the Starling disposal site. Since many samples had been previously collected at and in the vicinity of the burial area, only a ground water sample was collected from Starling's drinking well during the investigation. Analysis of this sample shows that water from Starling's deep well does not appear to be contaminated (App. B, analysis set 1). Monitoring well samples collected in 1986 and 1983 indicate, however, that chromium levels of 170 ug/l and phenol levels of .014 mg/l do exist in ground water at the site (App. B, analysis sets 2 and 3). Leaching of contaminants from the burial area, therefore, is occurring.

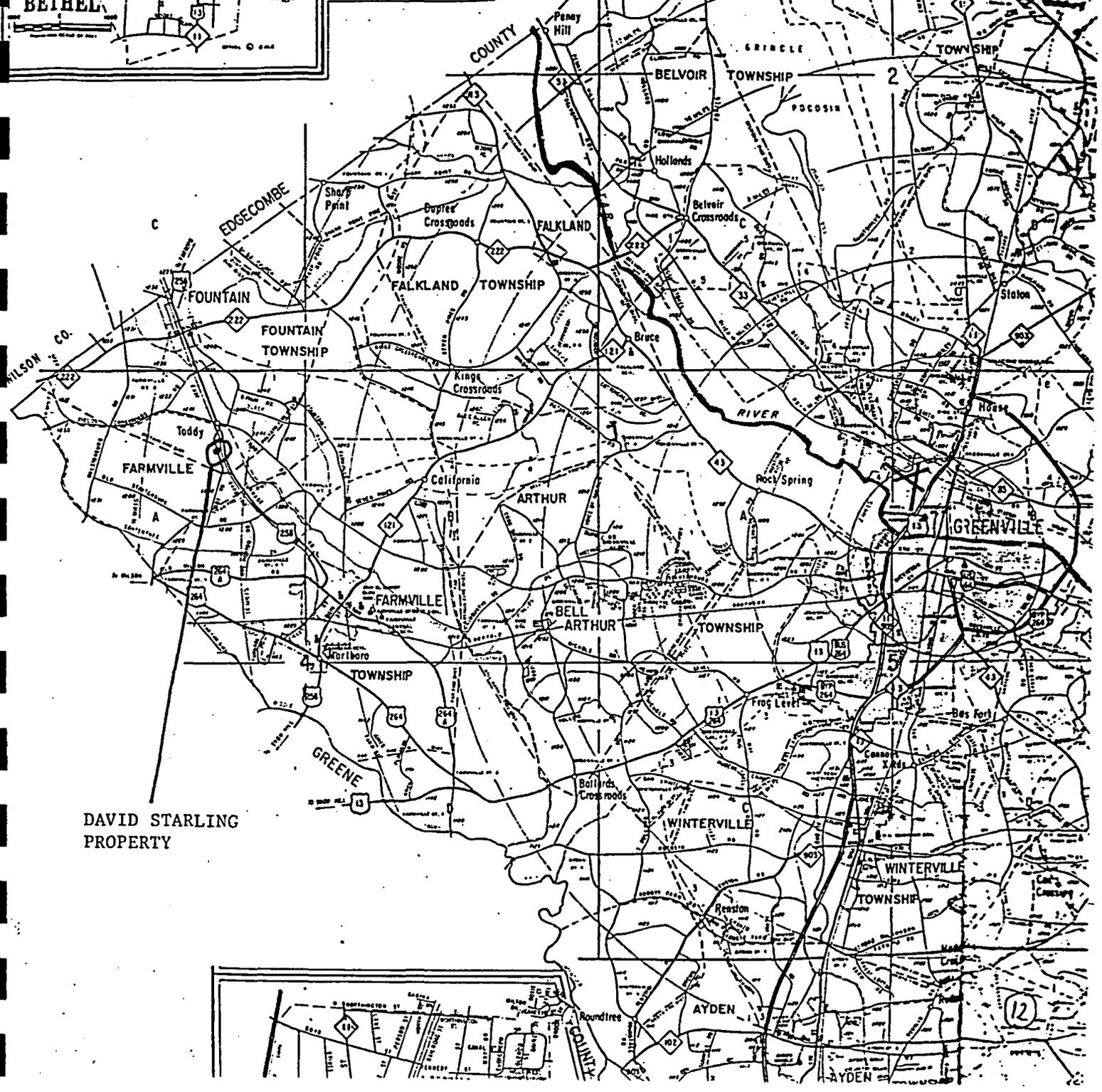
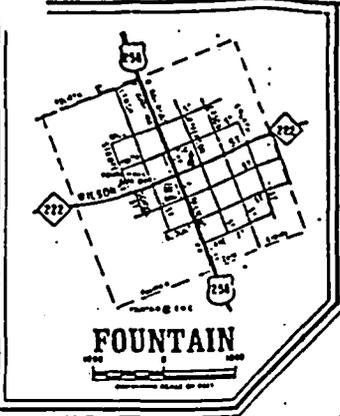
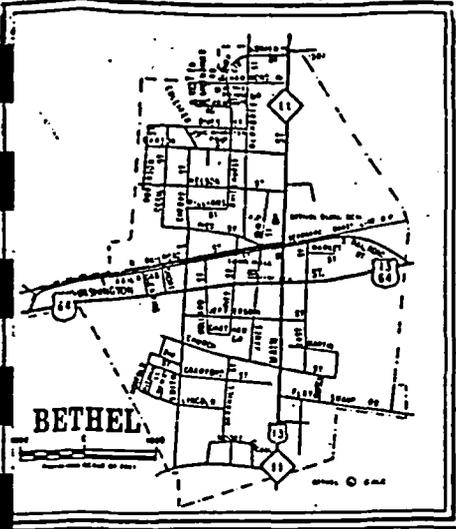
5.0 TOXICOLOGICAL AND CHEMICAL CHARACTERISTICS

Toxicological and chemical characteristics of substances known or believed to be present at the Starling disposal site are discussed the Site Health and Safety Plan in Appendix E.

APPENDIX A

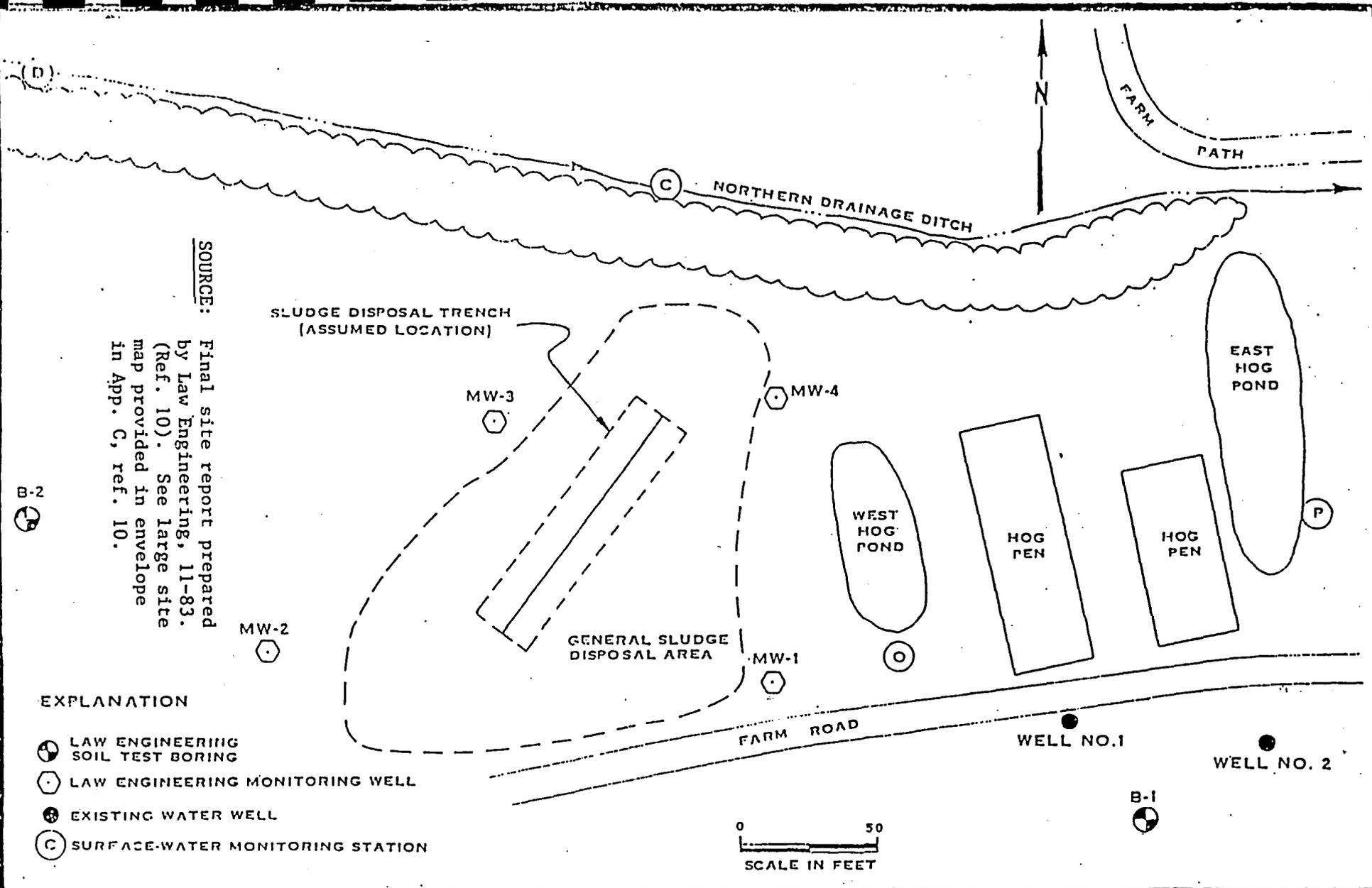
MAPS AND PHOTOGRAPHS

PITTSBORO



DAVID STARLING PROPERTY

12



UNION CARBIDE CORPORATION
 DAVID STARLING DISPOSAL SITE.

LAW ENGINEERING TESTING COMPANY
 MARIETTA, GEORGIA

GENERAL SLUDGE DISPOSAL AREA
 AND LAYOUT OF BORINGS

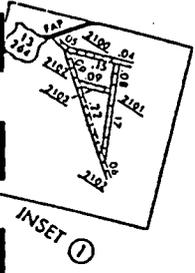
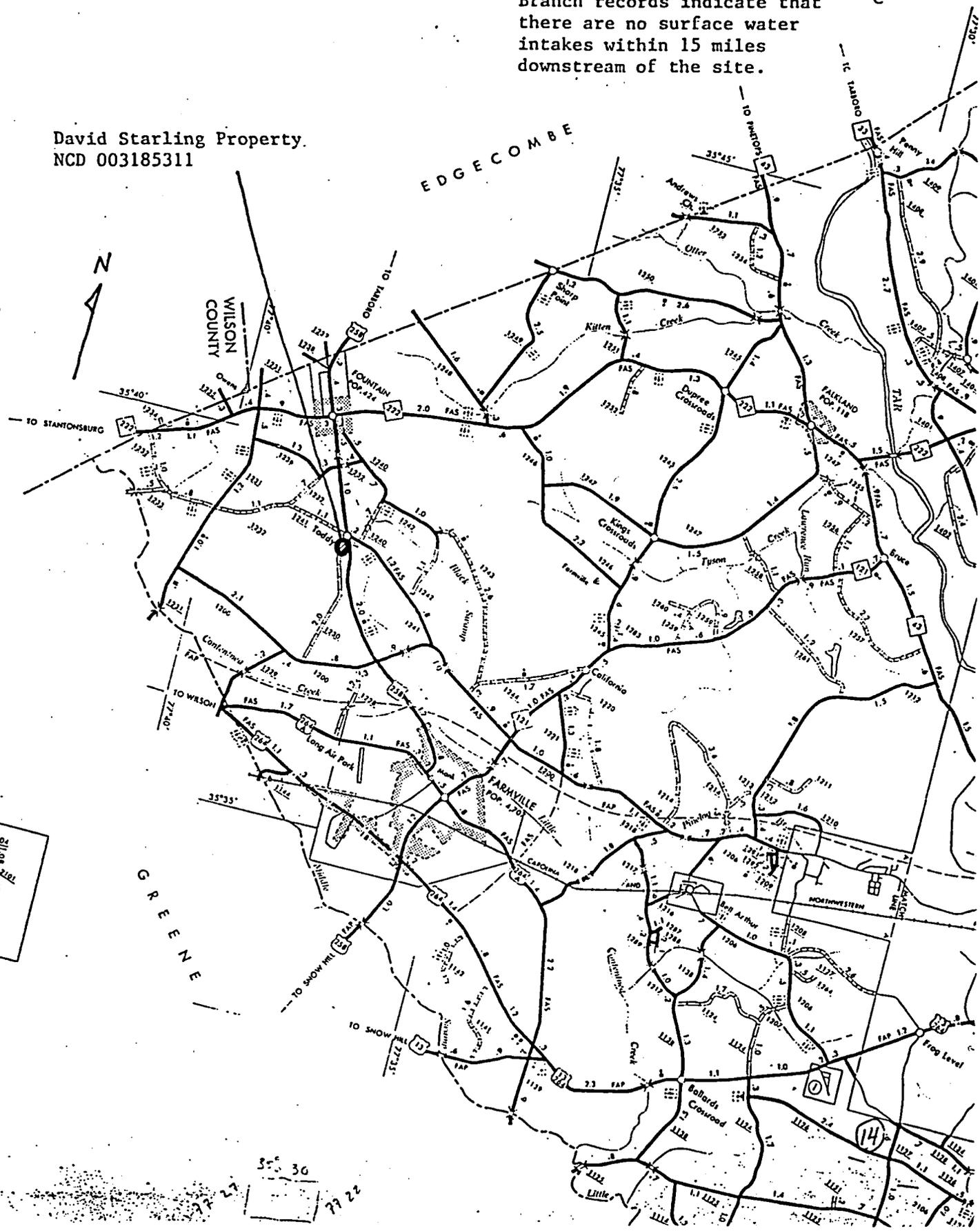
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FIGURE

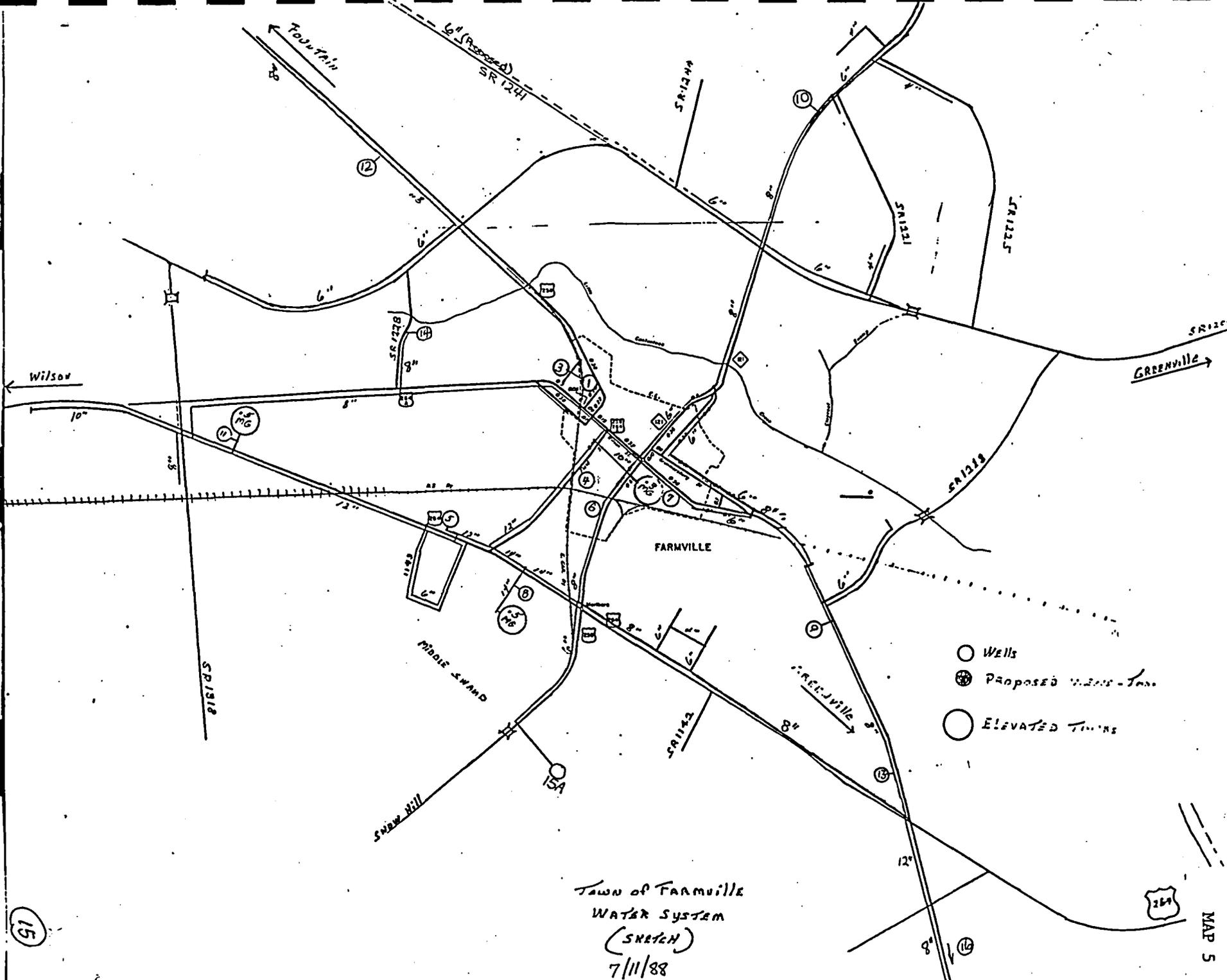
SOURCE: NC DOT MAP (1984)

NC Public Water Supply Branch records indicate that there are no surface water intakes within 15 miles downstream of the site.

David Starling Property.
NCD 003185311



35° 30' 27
77 22



TOWN OF FARMVILLE
 WATER SYSTEM
 (SKETCH)
 7/11/88

- Wells
- ⊙ Proposed Wells-Tank
- Elevated Tanks