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Confidential Report

Phase II Summary Report:  
Environmental Testing of Surface Soils,  
Subsurface Soils, and Groundwater  
PCB Litigation – Crystal Springs, Mississippi

3TM Project Reference: 3TM-DNA-102000-03

prepared for

David Nutt & Associates  
Jackson, Mississippi

February 14<sup>th</sup>, 2001

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3TM International has completed this Work using generally accepted environmental engineering practice and judgement for such Work, written technical and nontechnical information provided to us by others, verbal information conveyed to us by others, and observations made during the conduct of the Work. Our efforts were limited to information that was reasonably ascertainable at the time of the Work.

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This Report in no way suggests a "clean bill of health" for the sites assessed, portions of the sites assessed, portions of the sites not assessed, or that the sites are in compliance with any or all environmental or other regulations, except as stated herein. 3TM International recommends that additional field studies be undertaken, including field sampling and analysis, at portions of the sites that were noted in this Report that could possibly represent present or future environmental liabilities, or at portions of the sites that may pose present or future environmental liabilities, in order to confirm the nature and extent of such environmental liabilities, if any.

## Table of Contents

### Section

- 1.0 Introduction
- 2.0 Phase II Site Characterization Program
  - 2.1 Site Location
  - 2.2 Site Geology and Hydrogeology
  - 2.3 Site Characterization Phases
  - 2.4 Site Characterization Field Procedures
    - 2.4.1 Location of Sampling Points
    - 2.4.2 Field Health and Safety Procedures
    - 2.4.3 Surface, Subsurface, and Groundwater Sampling Procedures
    - 2.4.4 Surface Soil Sample Collection
    - 2.4.5 Subsurface Soil Sample Collection
    - 2.4.6 Field Screening of Soil Samples
    - 2.4.7 Groundwater Sample Collection
    - 2.4.8 Borehole Plugging and Abandonment
    - 2.4.9 Decontamination of Sampling Equipment
    - 2.4.10 Documentation of Sample Collection
- 3.0 Phase II Findings and Recommendations
  - 3.1 Results of Surface Soil Sampling
  - 3.2 Results of Subsurface Soil Sampling
  - 3.3 Results of Groundwater Sampling
  - 3.4 Significance of Findings
  - 3.5 Recommendations

### Figures

- Figure 1 - Soil and Groundwater Sampling Locations
- Figure 2 - Elevation Data at Sampling Locations

### Tables

- Table 1 - Summary of Surface and Subsurface Soil Analytical Testing Results
- Table 2 - Summary of Groundwater Analytical Testing Results

### Appendices

- Appendix A - Soil Sample Collection Logs
- Appendix B - Groundwater Sample Collection Logs
- Appendix C - Stratigraphic Logs
- Appendix D - Analytical Testing Results
- Appendix E - Site Sketches

## 1.0 Introduction

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This Phase II Summary Report summarizes the various site characterization activities conducted by 3TM International during December 20 - 23, 2000 and January 23 - 25, 2001 at areas surrounding the Kuhlman Electric Facility in Crystal Springs, Mississippi.

Phase I consisted of the testing of surface soils at several residences, which was documented in the 3TM International report entitled "Environmental Testing of Private Residences - November 16, 2000."

3TM International's scope of work for Phase II included the collection of surface soil, subsurface soil, and groundwater samples at 11 addresses, assessing the nature and extent of soil contamination, and assessing the nature and extent of groundwater contamination.

## 2.0 Site Characterization Program

### 2.1 Site Sample Locations

The sites sampled included 11 residential properties and vacant lots that surround the Kuhlman Plant in Crystal Springs, Mississippi (hereinafter referred to as the "sites")

- ▶ Site #1  
501 Camp St.  
Crystal Springs, Mississippi
- ▶ Site #2  
111 McPherson St.  
Crystal Springs, Mississippi
- ▶ Site #3  
Fulgham Ave.  
Crystal Springs, Mississippi
- ▶ Site #4  
407 Jackson St.  
Crystal Springs, Mississippi
- ▶ Site #5  
405 Lee St.  
Crystal Springs, Mississippi
- ▶ Site #6  
106 Deanne St.  
Crystal Springs, Mississippi
- ▶ Site #7  
223 Railroad Ave.  
Crystal Springs, Mississippi
- ▶ Site #8  
213 Railroad Ave.  
Crystal Springs, Mississippi
- ▶ Site #9  
403 Jackson St.  
Crystal Springs, Mississippi
- ▶ Site #10  
103 Forrest.  
Crystal Springs, Mississippi
- ▶ Site #11  
119 Jesse St.  
Crystal Springs, Mississippi

### 2.2 Site Geology and Hydrogeology

It is not the intent of this Report to provide a comprehensive hydrogeological characterization of the sites. However, a brief overview is presented in order to provide an insight into the nature and extent of subsurface contamination, and to correlate area hydrogeology with that of specific borings.

According to the "Site Characterization Report" prepared for Borg Warner, Inc. by Odgen Environmental and Engineering Services (July 2000):

"...the geology in the vicinity of the Kuhlman Plant and surrounding areas lie within the Gulf Coastal Physiographic Province. Crystal Springs is located on a prominent north-south trending ridge that separates the drainage of the Pearl River to the east from that of the Bayou Pierre to the west and northwest. Site drainage appears to

be toward the north and east in the direction of the Pearl River.

The site is within an identified interior salt basin that is located east of the axis of the Mississippi Embayment and north of the axis of the Gulf Coast Geosyncline. Local uplifts occur 20-40 miles to the north and southwest. Structural dip in the area is in a general southerly direction at approximately one degree. Salt piercement domes have been identified in the subsurface within Copiah County, with the nearest about seven miles southeast of Crystal Springs.

The site is underlain by the Lower Pleistocene Age Citronelle Formation. This formation is typically unconsolidated and sandy in character with local lenses or layers of clay or chert gravel. It has an average thickness of about 100 feet. In the Crystal Springs area the chert gravels, which have been extensively mined, occur throughout the formation. The red and orange colors of these gravels suggest that water percolates readily through the formation.

The Citronelle Formation is an important aquifer in the vicinity of Crystal Springs. Water is produced primarily from sandy and gravelly zones within the formation. Most of the shallow municipal and industrial wells are completed in the Citronelle. Water from the formation is generally acidic and has low levels of dissolved solids."

Phase II site investigations indicated that site-specific geology consisted primarily of dark silty, clayey sand, and gravels of Recent to Holocene age to depths ranging from 10 to 20 feet bgs. These deposits directly overlie deposits of the Citronelle formation at most locations throughout the investigation area. Where these deposits are water-bearing, they are referred to as "perched water" deposits because they occur above the regional water table. Perched water deposits occur sporadically throughout the Site and generally represent only very localized geofoms.

Assorted gravelly sands, silty sands, and sandy-silty gravels denoted by their characteristic red or reddish cast colors interbedded with yellowish tan colored layers are present beneath the Recent/Holocene deposits. These deposits comprise the upper Citronelle formation and have been reported to be 100 or more feet in thickness in the investigation area.

### 2.3 Site Characterization Phases

Two field campaigns were conducted during Phase II to provide additional information regarding the nature and extent of surface soil, subsurface soil, and groundwater contamination in certain areas around the Kuhlman Plant. For purposes of this Report, these campaigns are referred to as:

- Phase II: Campaign 1 – Field work conducted from December 20 - 23, 2000
- Phase II: Campaign 2 – Field work conducted from January 23 - 25, 2001

## 2.4 Site Characterization Field Procedures

### 2.4.1 Location of Sampling Points

The general sampling locations for Phase II were selected based on discussions with Dr. Phil Bedient and Dr. Richard Parent. Specific sampling points were selected by 3TM International based on site access and other logistical considerations, consistent with projects of this nature. The number and location of the points were selected in order to provide a general description of the nature and extent of both soil and groundwater contamination.

### 2.4.2 Field Health and Safety Procedures

Standard Level D personal protection equipment (PPE) was used throughout the field work. Each day, prior to any sampling activities, a Daily Safety Meeting was conducted with all field personnel to review the health and safety aspects of the project, review potential hazards, and to ensure a high level of awareness during the conduct of the work. No field incidents or accidents occurred during the conduct of the field work.

### 2.4.3 Surface Soil, Subsurface Soil, and Groundwater Sampling Procedures

For purposes of this Report, "surface soil" is defined as the top layer of soil at a sampling location, generally, from 0 to 3 inches bgs. "Subsurface soil" is defined as soil occurring at depths greater than about 3 inches bgs.

Surface soil samples were collected using either a hand-held auger or scoop, or the Geoprobe Soil Sampling System, depending on the sampling location.

"Groundwater samples" are defined as those samples collected using the Geoprobe Groundwater Sampling System, and are either water samples or saturated soil samples collected from a water-bearing unit. Some groundwater samples were collected in the perched zone at a particular sampling location, while others were collected in the aquifer (i.e., Citronelle Formation).

All subsurface soil and groundwater environmental samples were collected using the Geoprobe Soil and Groundwater Sampling System, according to the following procedures:

- 3TM International's "Standard Field Procedures for Soil and Groundwater Sample Collection," which are a compilation of internal procedures based on industry practice for field tasks such as: soil sampling, soil gas sampling, groundwater sampling, use of special equipment (e.g., peristaltic pumps), field screening, sample handling, equipment calibration and validation, QA/QC, documentation of activities in a field logbook, plugging boreholes, decontamination of sampling equipment, management of investigation-derived waste, and Site safety considerations.

- Standard Geoprobe Procedures, which are those procedures developed by the manufacturer of the Geoprobe soil and groundwater sampling system, and include step-by-step procedures for the use of Geoprobe equipment to collect high-integrity environmental samples. The procedures were followed by the field technicians in setting up the Geoprobe on the sampling locations, penetrating the subsurface to the required terminal depth of sample collection, retrieval of the samples from the sampler, and completion of the boreholes.

#### 2.4.4 Surface Soil Sample Collection

3TM International collected surface soil samples at locations listed in Section 2.1, and are noted in this Report as:

B-1, B-2, B-3, B-4, B-5, B-6, B-7, B-9, B-32A, B-39A, SS-1, SS-2, and ditch.

Sample collection logs are shown in Appendix A and the sample locations are depicted in Figures 1 and 2 and Appendix E.

#### 2.4.5 Subsurface Soil Sample Collection

Subsurface soil is defined as that portion of the soil column that is greater than 3 inches bgs. Subsurface soil sampling was used primarily to determine the local Site stratigraphy and to collect in-situ soil samples for testing. Soil samples were collected in standard clear Geoprobe liners using the standard Geoprobe field procedures previously described. All soil samples at each sampling point were stratigraphically logged and documented as discussed below.

3TM International collected subsurface soil samples at locations listed in Section 2.1, and are noted in this Report as:

B-2, B-3, B-4, B-5, B-6, B-7 and B-9

Subsurface soil samples were collected at 0-1, 1-2, and 2-3 feet bgs and the soil/water interface (soil located at the top of the water table).

Sample collection logs are shown in Appendix A and the sample locations are depicted in Figures 1 and 2 and Appendix E. Stratigraphic logs are presented in Appendix C.

#### 2.4.6 Field Screening of Soil Samples

Field screening consisted of visual and olfactory observation by the sample logger. 3TM International collected soil samples in standard Geoprobe clear plastic liners. If a soil sample other than the standard depths indicated above exhibited unusual visual characteristics (e.g., stained, darkened, or unusual color) or unusual odor characteristics (e.g., hydrocarbon odor), the sample was collected in addition to the standard depth samples and submitted to the laboratory for chemical analysis.



#### 2.4.7 Groundwater Sample Collection

Groundwater samples were collected at selected boring locations after soil sampling was completed using temporary piezometers consisting of 3/4 inch diameter PVC flush joint threaded pipe and manufactured screen covered with a filter cloth jacket. The pipe and screen were inserted directly in the boreholes of shallow borings or in a 2 1/4 inch diameter steel casing at deep boring locations. A groundwater sample was collected from the temporary piezometer. When groundwater sampling was completed, the temporary piezometer was removed, and the remaining open borehole was backfilled with bentonite chips and hydrated. All groundwater samples that were collected for testing were logged and documented as discussed below.

3TM International collected groundwater samples at locations listed in Section 2.1, and are noted in this Report as:

B-1, B-2, B-3, B-3A, B-4, B-8, and B-9

Locations B-2 and B-3 were likely perched zones (10-15 feet bgs), whereas B-3A (51-56 feet bgs), B-8 (70 - 75 feet bgs), and B-9 (70-75 feet bgs) were the Citronelle formation. Location B-1 was most likely the Citronelle formation; however, due to the surface elevation of B-1, overlying deposits that could confirm the Citronelle formation were missing.

Sample collection logs are shown in Appendix A and the sample locations are depicted in Figures 1 and 2 and Appendix E.

#### 2.4.8 Borehole Plugging and Abandonment

The Geoprobe left a small (1.5-inch diameter) hole at the sample location which was backfilled with bentonite chips from the terminal depth of the boring to the surface, and then hydrated. The Site was then cleaned and the crew and equipment were demobilized from the sampling location.

#### 2.4.9 Decontamination of Sampling Equipment

Sampling at each location was accomplished using only samplers and other tools that had been properly decontaminated, in order to minimize the possibility for cross-contamination. Upon completion of sampling at a location, the sampling tools were decontaminated by manually removing large portions of adhered soils, cleaning with a high pressure washer, scrubbing with Alconox detergent and potable water, and final rinsing with deionized water. All investigation-derived wastes (i.e., Geoprobe liners, soil cuttings, PPE, and decon water) were drummed and left on Site.

#### 2.4.10 Documentation of Sample Collection

Each sampling point and each sample collected were documented in the field by the field supervisor by completing the following forms:

- Stratigraphic Log showing approximate soil types (e.g., clay, sand, etc.) from ground surface to terminal depth of boring. Stratigraphic Logs include documentation of the project number and sample point location, boring date and number, method of drilling and diameter, description of soil type from the ground surface to the terminal depth of the boring, depth to groundwater, water level measurement data, depth of sample collection, PID or other field screening measurements, name of driller and field supervisor, and similar information. Stratigraphic Logs are presented in Appendix C.
- Soil Sample Collection Log that documents the method of sample collection and various sample-specific aspects of the sample. Soil Sample Collection Logs include documentation of the project number and sample point location, sample collection date and time, sample number, method of sample collection, type of soil, quantity of sample collected, sample depth, type of sample container and preservative, name of driller and field supervisor, signature of field supervisor, and similar information. Soil Sample Collection Logs are presented in Appendix A.
- Groundwater Sample Collection Log that documents the method of sample collection and various sample-specific aspects of the sample. Groundwater Sample Collection Logs include documentation of the project number and sample point location, sample collection date and time, sample number, method of sample collection, type and depth of screen, quantity of groundwater purged, quantity of sample collected, sample depth, type of sample container and preservative, name of driller and field supervisor, signature of field supervisor, and similar information. Groundwater Sample Collection Logs are presented in Appendix B.
- Analytical Testing Chain-of-Custody that documents sample handling during the collection, shipping, and testing process. The Chain-of-Custody is presented in Appendix D along with the analytical testing results.
- Site Sketches that document the exact location of sampling points. The Site Sketches are shown in Appendix E.

## 3.0 Phase II Findings and Recommendations

### 3.1 Results of Surface Soil Sampling

The primary constituents of concern at the Site are polychlorinated biphenyls (PCBs) and, to a lesser extent, volatile and semi-volatile hydrocarbons. Chlorinated hydrocarbons associated with the possible fate and transport of PCBs were also of concern.

All samples were packaged on ice and shipped to Xenco Laboratories, a commercial analytical testing laboratory in Houston, Texas. All samples were tested for polychlorinated biphenyls (PCBs) using EPA Method 8082 and semi-volatile hydrocarbons using EPA Method 8270.

A summary of the surface soil testing data is provided in Table 1. These results indicate the widespread presence of PCBs at shallow depths throughout the area investigated, with levels as high as 4380 ppb (B-3).

In order to ensure consistent laboratory analysis and reporting, 3TM International requested Xenco to re-test six selected samples. Additionally, 3TM International sent two of the samples to AccuTest Laboratory in Houston, Texas for duplicate testing. The re-testing of the six samples by Xenco indicated that the results are consistent with non-homogeneous samples [e.g., the samples contained rocks, sticks, debris, and other organic matter]. A comparison of the samples tested by Xenco and AccuTest are shown below:

Consistency of PCB Testing Results		
	Sample 1 [ug/kg]	Sample 2 [ug/kg]
Xenco - Test #1	4380	580
Xenco - Test #2	6753	1130
AccuTest - Duplicate Test	2350	528
3-Sample Average	4494	746

The results of the re-testing by Xenco and the testing by AccuTest are provided in Appendix D. These results clearly show the variability in the testing results due to the environmental matrix of the individual soil samples, but they also indicate that the overall values are nonetheless consistent and reasonable. Therefore, we assumed that the Xenco testing results for all the samples are credible.

### 3.2 Results of Subsurface Soil Sampling

The primary constituents of concern at the Site are polychlorinated biphenyls (PCBs) and, to a lesser extent, semi-volatile hydrocarbons with emphasis on poly aromatic hydrocarbons (PAHs). Chlorinated hydrocarbons associated with the possible fate and transport of PCBs

were also of concern.

All samples were packaged on ice and shipped to Xenco Laboratories, a commercial analytical testing laboratory in Houston, Texas. All samples were tested for polychlorinated biphenyls (PCBs) using EPA Method 8082 and semi-volatile hydrocarbons using EPA Method 8270.

A summary of the subsurface soil testing data is provided in Table 2. These results indicate the widespread presence of PCBs at various subsurface depths throughout the area investigated, with levels as high as 184 ppb at 8 feet bgs (B-2). The subsurface sample points include both Geoprobe locations and ditch bottom sediment.

### 3.3 Results of Groundwater Sampling

The primary constituents of concern at the Site are polychlorinated biphenyls (PCBs) and, to a lesser extent, volatile and semi-volatile hydrocarbons. Chlorinated hydrocarbons associated with the possible fate and transport of PCBs were also of concern.

All samples were packaged on ice and shipped to Xenco Laboratories, a commercial analytical testing laboratory in Houston, Texas. All samples were tested for polychlorinated biphenyls (PCBs) using EPA Method 8082, volatile hydrocarbons using EPA Method 8260, and semi-volatile hydrocarbons using EPA Method 8270.

A summary of the groundwater testing data is provided in Table 3. Laboratory analysis of the Citronelle formation samples and perched water samples indicated no detectable presence of the contaminants that were analyzed above the laboratory reporting limits.

The results of water level measurements in wells screened in the Citronelle formation indicate a west-northwest direction of groundwater flow in the Citronelle formation. Flow direction determination was not possible for the perched water zones due to the sporadic nature of their occurrence and inability to correlate between sampling points. Figure 2 provides elevation data for the various sampling points.

### 3.4 Significance of Findings

The findings should be considered in light of the following:

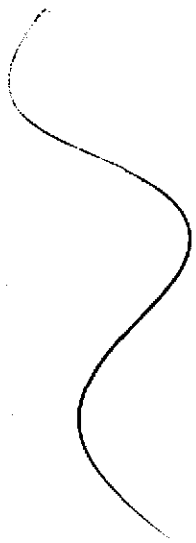
- The field sampling program was limited in scope, both in terms of the number of sampling points, the sampling depths, the number of samples collected and tested at each sampling point, and the suite of contaminants tested in the laboratory.
- Due to the nature of the environmental conditions at the sampling sites, and the environmental fate and transport mechanisms by which the contaminants were transported to and impacted (or could have impacted) the sites, it is possible that both the presence and concentration of contaminants can vary significantly by even a few feet or less.

- Therefore, the results presented herein do not necessarily represent the maximum horizontal or vertical extent of contamination that could potentially exist at the sites, the maximum concentrations of any contaminant that could exist at any given sampling point, or the complete suite of contaminants that could exist at any given sampling location.

### 3.5 Recommendations

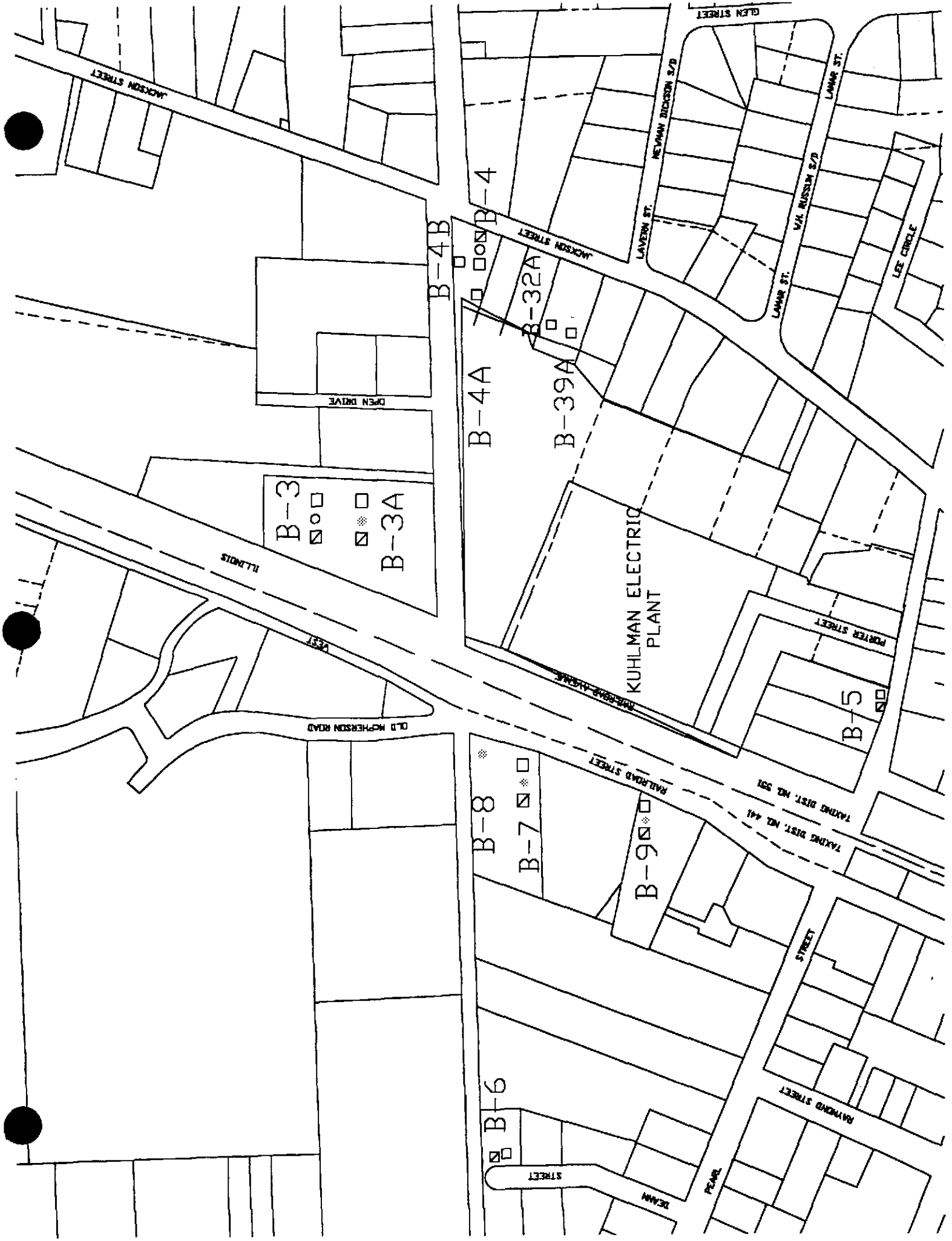
Based on the analytical testing results of Phase II, we recommend:

- No further investigation of the Site area groundwater in either the perched zones or the Citronelle formation, at this time, unless additional information is made available that would suggest the possibility of a groundwater impact.
- Correlation of surface soil analytical results with indoor dust sampling data, human blood sampling data, and other information.
- Correlation and evaluation of soil/groundwater sampling results of the Borg-Warner investigations with the results of the 3TM International, Inc. Phase I and II sampling results.
- Formulating a plan of further action based on the results of the above correlations and evaluations.



Figures





JACKSON STREET

GLEN STREET

B-4B

B-4

JACKSON STREET

B-32A

B-39A

B-4A

LAVERN ST.

MELVAIN DICKSON S/D

LAMAR ST.

W/A RUSSELL S/D

LAMAR ST.

LEE CIRCLE

OPEN DRIVE

B-3

B-3A

ILLINOIS

WEST

OLD McPHERSON ROAD

KUHLMAN ELECTRIC PLANT

PORTER STREET

B-5

RAILROAD STREET

TAKING DIST. NO. 501

TAKING DIST. NO. 441

B-8

B-7

B-9

STREET

B-6

STREET

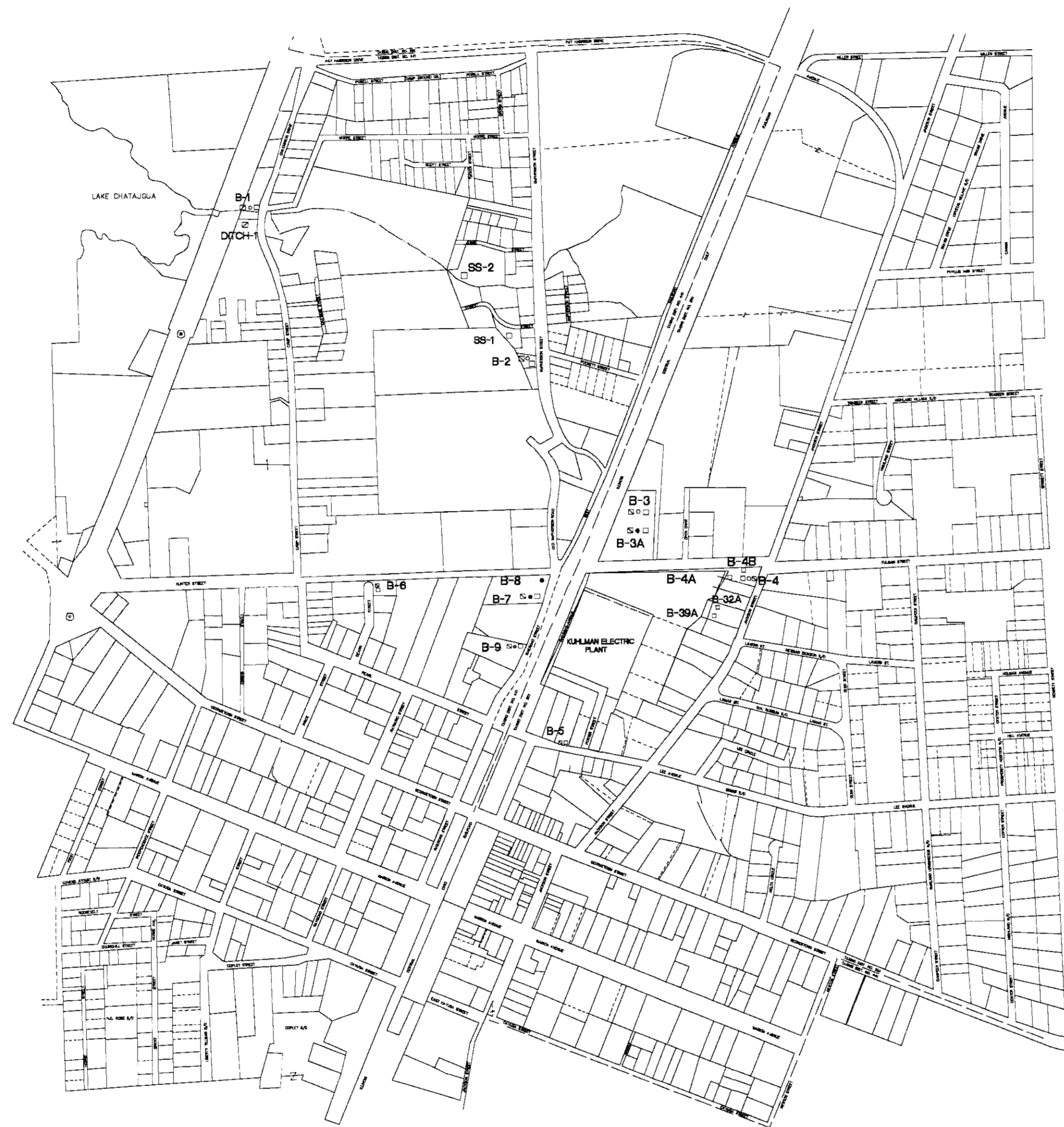
DEAN

PEARL

RAYMOND STREET

A B C D E F G H

1  
2  
3  
4  
5  
6



**LEGEND:**  
**STM SAMPLING LOCATIONS**  
 □ SURFACE SOIL SAMPLE  
 ▨ DITCH SEDIMENT SAMPLE  
 ▤ SUBSURFACE SOIL SAMPLE  
 ○ PERCHED ZONE GROUNDWATER SAMPLE  
 ● CITRONELLE ZONE GROUNDWATER SAMPLE

REV	REVISIONS	BY	DATE
0	ISSUE FOR APPROVAL	RDH	2/14/01

CHK	APPV	DATE
RDH		2/14/01

FOR APPROVAL	
FOR CONST	
DESIGN	
DRAWN	TJD 2/14/01
CHECKED	RDH 2/14/01
APP'D	RDH 2/14/01

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FIGURE 1	
PROJECT NO.	SCALE
3TM-DNA-102000-03	NONE
STM DWG. DATE	
FEBRUARY 14, 2001	
CUSTOMER DRAWING NO.	REV
DNA-102000-03-01	0



MOORE STREET

CHATAUGUA DRIVE

B-1

MOORE

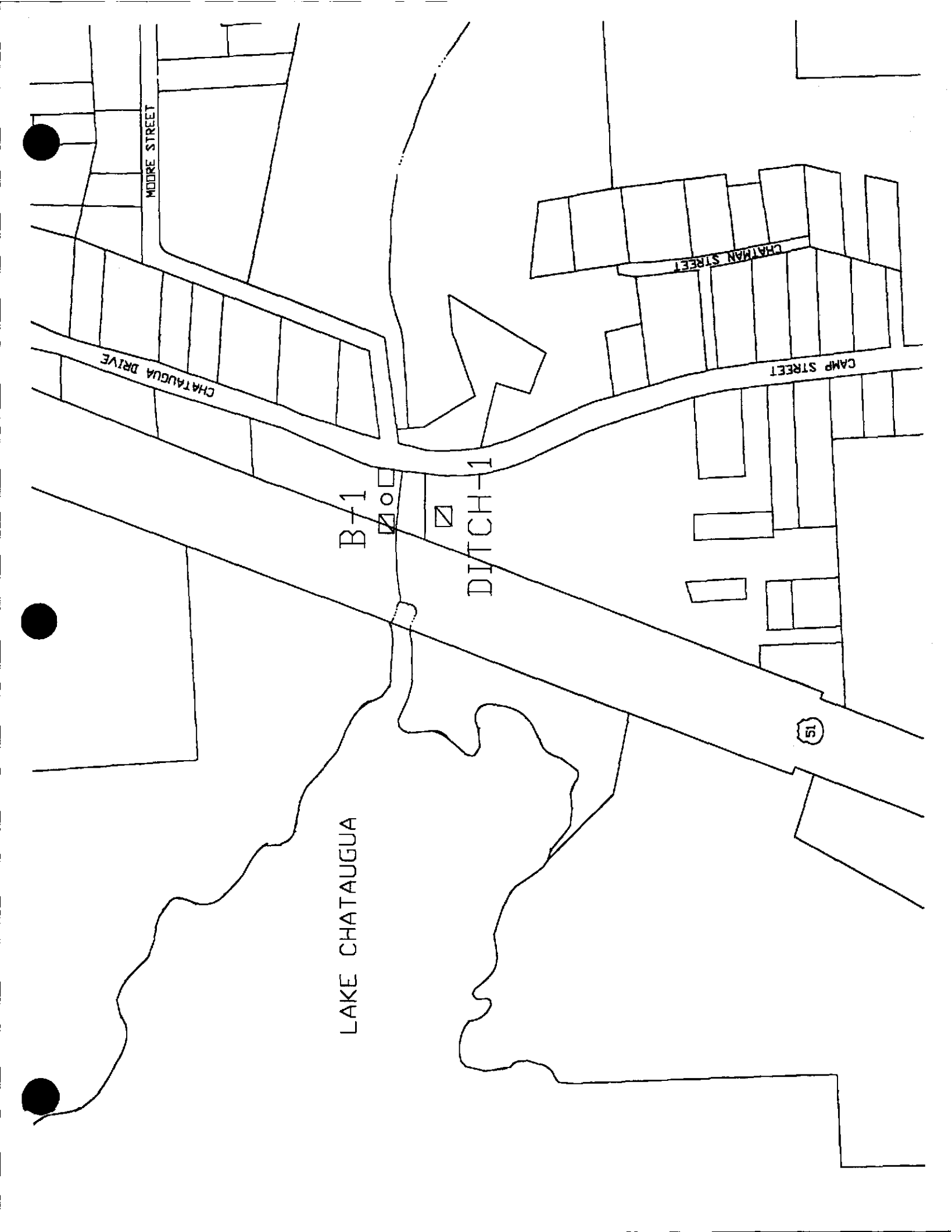
DITCH-1

CHATMAN STREET

CAMP STREET

51

LAKE CHATAUGUA



GULF

TAXING DIST. NO. 551

TAXING DIST. NO. 441

RAILROAD

CENTRAL

PUCKETT STREET

MCPHERSON STREET

MCPHERSON STREET

MCPHERSON

TUCKER

STREET

JESSIE

SS-2

FIRE

STREET

SS-1

B-2

NO

